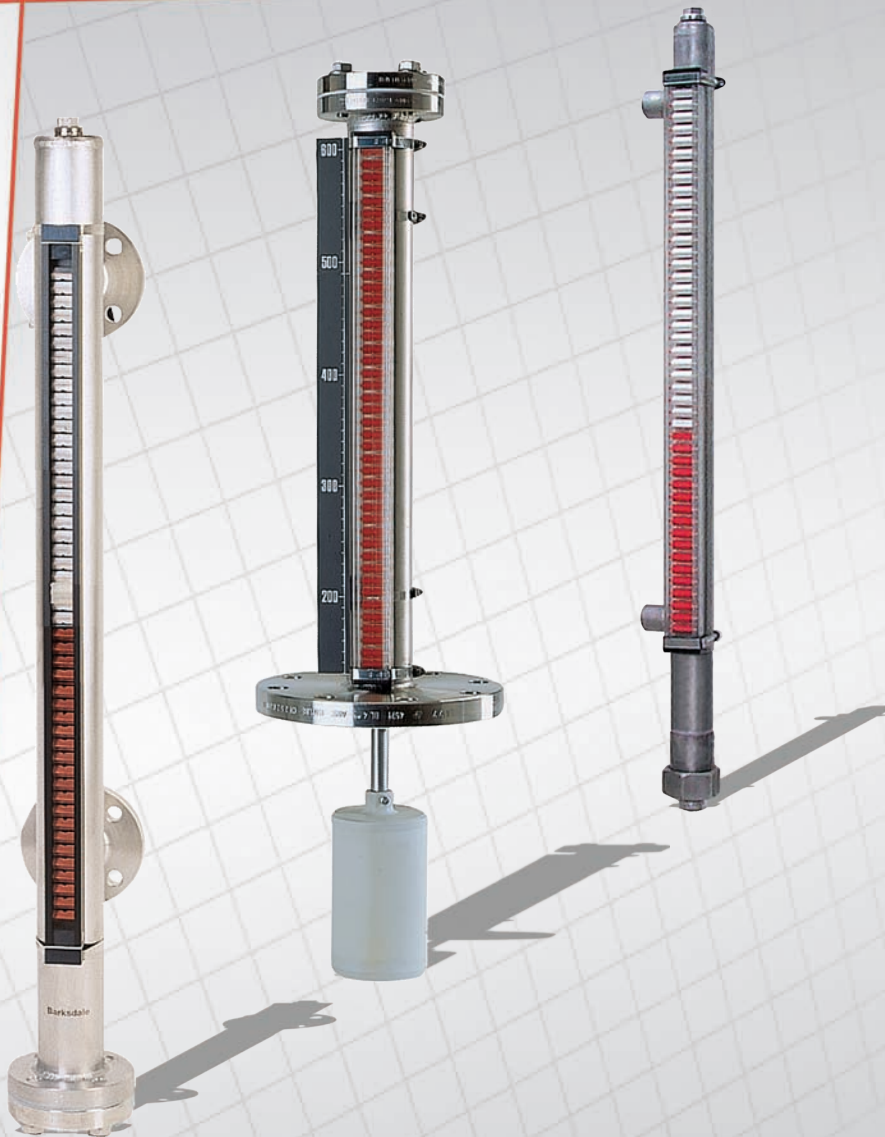


Level Level



► Bypass

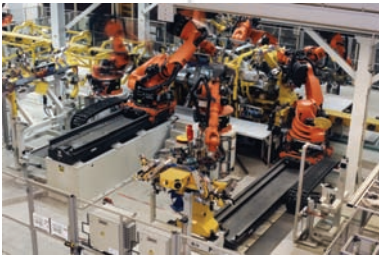
Level Indicators

Barksdale
CONTROL PRODUCTS
CRANE Barksdale, Inc./Barksdale GmbH
A Subsidiary of Crane Co.

Barksdale – Comprehensive process control

Our product range covers the complete field of mechanical and electronic pressure, temperature, level and flow monitoring and control for liquid and gaseous media. The high standard and functional reliability of our products provide the ideal prerequisites for challenging measuring tasks even under extreme operating conditions. Our motto is „Control every move“ and in this sense we develop intelligent solutions for today's market in the fields of hydraulic systems, utility vehicles and industrial equipment focussing on:

- ▶ Mobile and stationary hydraulic systems
- ▶ Pneumatic shock absorbing systems for trailers, trucks and busses
- ▶ Shipbuilding technology
- ▶ Petroleum and natural gas production



Pressure

Electronic pressure transducers
Electronic pressure switches
Mechanical pressure switches



Level

Level switches
Continuous tank level indicating systems TLI
Level probes
Bypass level indicating systems



Flow

Flow switches
Flow sensors



Temperature

Electronic temperature switches
Electronic temperature sensors
Mechanical temperature switches



Valves

Shutoff valves
Directional control valves
Air suspension valves



Contents

Index: A

Bypass Level Indicators	4
Introduction	4
Overview	10
Type BNA-S21/S22	14
Type BNA-S31/S32	15
Type BNA-S35/S36	16
Type BNA-S41/S42	17
Type BNA-S45/S46	18
Type BNA-S51/S52	19
Type BNA-U102	20
Type BNA-U301/U401/U701	21
Type BNA-K301/K401/K701	22
Type BNA-K302.0/K402.0/K702.0	22
Type BNA-K302.1/K402.1/K702.1	23
Type BNA-K303/K403/K703	23
Limit Switch	24
Type GK03	24
Float	25
Type VA.../TT.../BN.../PVC.../PP.../PVDF...	25
Transmitters	26
Type XM/XMi	26
Type XT/XTi	27
Electronic Displays	28
Type UAS 3 - V3	28
Bypass Level Indicators	30
Accessories	30
Order code	31

Specifications are subject to changes without notice.

Principle of Operation

Barksdale Bypass Level Indicators (BNA) provide the convenience of a sight glass without the risk of a glass to break. With this type of level indicators there is no sight glass effect, even crystal clear, colourless liquids can be indicated without problems. No indicating errors occur even when the system is subject to significant vibrations, for each indication flag contains its own permanent bar magnet.

The bypass level indicator consists of a pressure-proof bypass tube with lateral connections or a process connection which is connected with the tank at the top and at the bottom. The indication rail is attached to the outside of the bypass tube, i.e. separated from the medium, with stainless steel clamps.

The float inside the measuring tube is always at the same level as the liquid in the tank and transmits its movements to the indication rail attached to the outside without any contact. This design ensures pressure-proof isolation of the indicator from the measuring room.

The reliable, accident-proof and maintenance-free bypass level indicators are available in standard versions for operating pressures up to 64 bar and operating temperatures up to 320 °C.

Special materials, insulations, heaters, tests and a wide range of accessories are available for special process requirements.

On request, we build bypass level indicators of a total length of six meters in one piece. We recommend, however, split versions with section lengths of 2 m or 2.9 m max. because these

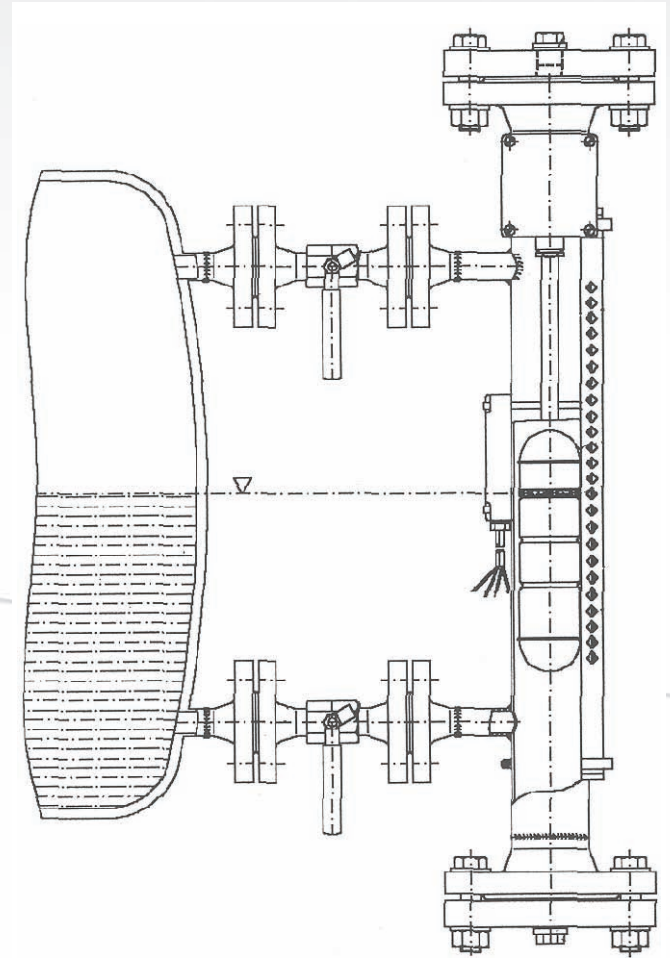
- are easier to handle,
- can be packed in cardboard boxes (and thus reduce transport costs significantly) and
- can be easily assembled on site.

Note:

Due to its design the indication rail is interrupted at the intermediate flanges. The split should not be designed at a point where precise indication or a limit switch is required.

Materials

The bypass tubes and floats may be manufactured from stainless steel material (1.4571), titanium, PVC, PP, and PVDF. The stainless steel bypass level indicator can be provided with a vacuum-resistant PTFE coating for particularly aggressive media. Bypass level indicators in material 1.4571, special materials, e.g. Hastelloy C4, on request.



Index: A

Specifications are subject to changes without notice.

Bypass Level Indicators

Introduction

Indication flags

Index: A

The square indication flags provide optimum liquid level reading. Each of the two-coloured flags is equipped with a bar magnet and is rotated by the toric magnet in the float through 180° in accordance with the level change in the tank.

The individual flags do not change their positions when subject to significant stress and vibration. This indication system has proven effective even in case of very fast level changes.

Indication rail

Bypass level indicators can be supplied with a Makrolon or aluminium indication rail assembly.

Makrolon indication rails are break-proof. The crystal-clear indication rail with the two-coloured (red/white) flags produced by injection moulding are virtually resistant to UV radiation and aggressive atmosphere. The indication rail is closed at the ends by Makrolon end caps. The complete indication rail can always be attached in optimum reading position over the entire circumference of the bypass tube. Makrolon indication rails can be used up to an ambient temperature of 120 °C max. (medium temperature 150 °C max.).

Aluminium indication rails are equipped with anodised red/silver flags (up to 200 °C) or aluminium flags painted red/white (up to 350 °C) and covered by a glass pane.

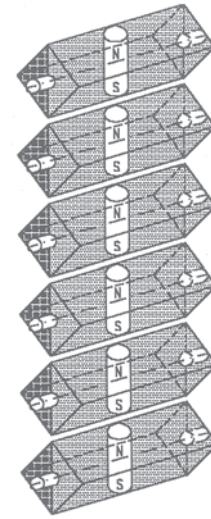
Aluminium indication rails can be used up to a medium temperature of 350 °C.

Both indication rails have a resolution of 12.5 mm. 80 flags cover an indication length of 1 m, which corresponds to an indication accuracy of 1.25%. The indication rails are attached to the bypass tube with two stainless steel clamps.

To obtain a lateral indication the rail can be turned through up to 90° to the left or right after loosening the clamps (not possible with double tube design).

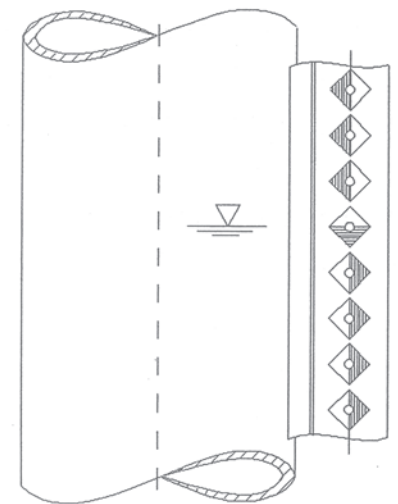
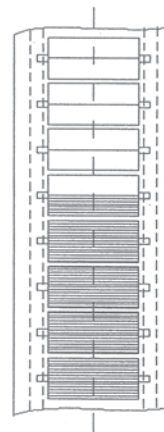
Indication flags which are in the wrong position due to any external influence will automatically return to the right position on the next level change.

Specifications are subject to changes without notice.



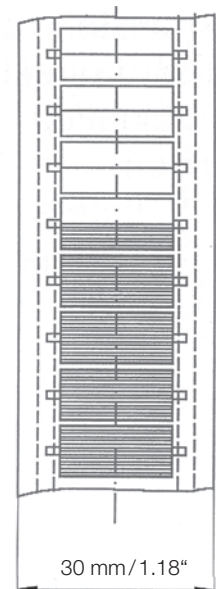
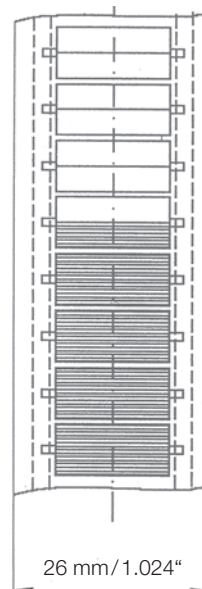
Front view

Side view



Makrolon

Aluminium



Float

The float equipped with special magnets can freely rotate in the bypass tube and move up and down.

The stainless steel versions in 1. 4571 VA can be used up to 150 °C, the titanium versions up to 320 °C.

The type VA50/15 and TT50/15 floats provide the opportunity of adjusting the weight of the float precisely to the density (g) of the medium and in this way adjusting the indication exactly to the filling level or interfacial level.

For pressures above 40 bar the float is equipped with a pressure compensation facility so that the pressure in the float is always equal to the pressure in the bypass chamber.

When the temperature of the fluid in the bypass chamber drops below that of the steam or gas, the condensate formed will be collected by a small tube of $\varnothing 6$ mm in the float and automatically discharged again to the bypass chamber with the next small pressure drop (100 mbar).

Mounting brackets

In the standard version we supply all bypass level indicators with top and bottom process connections and with one or several mounting brackets; for the versions with lateral connections these mounting brackets must be ordered explicitly.

In case of the BNA-S2... and BNA-K... series these brackets are attached to the tube with stainless steel clamps and can be adjusted during assembly; all other versions are provided with welded brackets.

When not specified otherwise the dimension LB1 is 300 mm for all bypass level indicators $L_0 < 1000$ mm. For total lengths of up to 2000 mm $LB_1 = 300$ mm and $LB_2 = L_0 - 400$ mm. For total lengths < 2000 mm there is a third bracket in the middle between LB_1 and LB_2 . $LB_{middle} = (LB_2 - LB_1)$.

When the bypass tube is a split version, there will be a bracket 200 mm below and another one 100 mm above the "split". All dimensions are measured from the bottom edge of the mounting bracket.

When other dimensions are required they must be listed explicitly in the order.

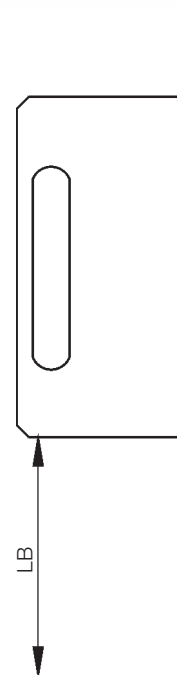
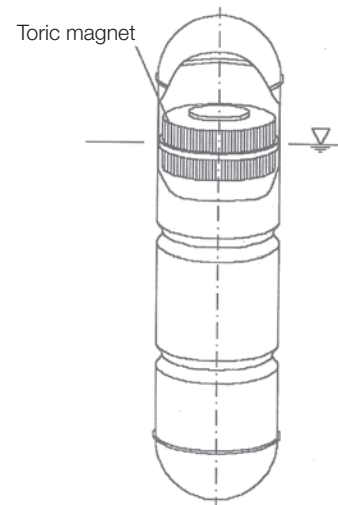
Heat tracing

To prevent the cooling of media we offer electric band heaters or a double tube design to be used with steam or water.

The electric band heaters can be supplied with thermostats.

A version for use in explosive atmosphere is also available.

We recommend to order these heaters with an isolation or to provide for isolation of the bypass level indicators together with the rest of the installation.



Index: A

Specifications are subject to changes without notice.

Isolation

Index: A

For higher temperatures we offer a glass band isolation to prevent burns by contact with the tube.

Temperature range: -40 °C...+400 °C.

For medium temperatures below 0 °C we recommend an Armaflex isolation to prevent ambient moisture from freezing to the pipe and keep the indication free from ice.

Temperature range: -40 °C...+105 °C.

Protective tubing

For outdoor applications and applications involving dirt and dust formation we recommend to order a protective tubing for the indication rail.

This transparent shrink tubing from polyolefine features also good resistance to oil, vapours and gases in the chemical industry and reduces freezing of the surface and ice build-up.

Cleaning with water or steam is easy; no solvents are required.

Temperature range: -55 °C...+135 °C.

Limit switches

Two different versions of limit switches are available:

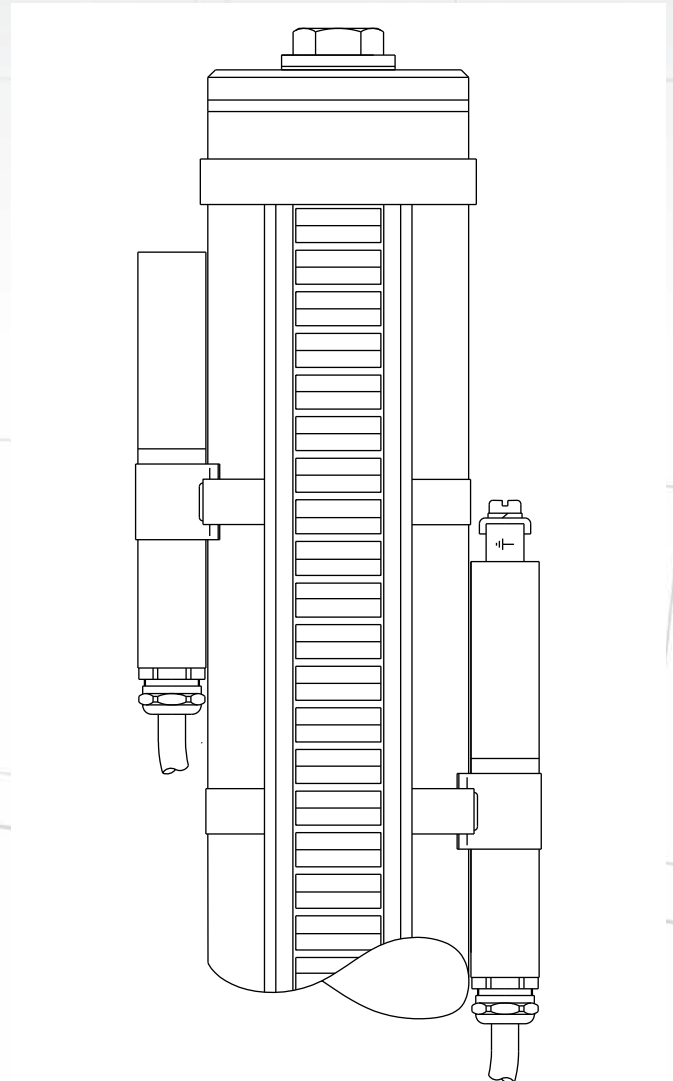
- GK 03, optional in EEx ia
- GK HT1 (high-temperature version)

Apart from the HT1 version which is equipped with a micro switch, all other limit switches have bistable reed contacts and can be attached to the tube in any freely selectable position with stainless steel clamps.

The magnet system in the float will switch over the contact whenever the switch is passed. This permits an arbitrary arrangement of many switches on the tube surface without the switches influencing each other.

When the switching power requirement is higher than permitted by the reed contact (60 VA and 30 VA for EEX), suitable protective relays must be used.

When frequently changing process requirements make a permanent contact position difficult to handle we recommend to order our transmitters with 4...20 mA output and separate signal conditioner UAS 3 - V3 with its four, easily changeable limit values and many additional features.



Specifications are subject to changes without notice.

Transmitter

All bypass level indicators are available with a transmitter either as a potentiometer or a two-wire transmitter with 4...20 mA output.

A float with integrated magnet system moves reliably up and down with the fluid. A board equipped with resistors and reed switches is located in the tube of the transmitter. The resistors are connected to form a measuring chain. The reed switches magnetically activated by the float measure a variable d.c. voltage on the measuring chain dependent on the filling level.

XM and XMi are designed as simple voltage dividers (potentiometers); XMi is the intrinsically safe version.

The XT and XTi versions are the two-wire versions with 4...20 mA output; XTi is the intrinsically safe version.

For e.g. interface level measurements the output signal may be inverted (20...4 mA).

Safety switching function

The magnetic field of the moving float switches the reed contacts in a 2-3-2 sequence.

When two adjacent reed contacts are closed, the effective electrical switch point is halfway between the two. When the float moves by another 6.4 mm and the third reed contact is closed, the electric indication in the potentiometer moves to the central contact, i.e. by 6.4 mm.

The sequence described shows a redundancy integrated in the system - if e.g. one of the reed contacts fails, the indication will not break down, but the level will be properly indicated via the remaining reed contacts.

Accuracy of the measuring sensor

(without transducer)

Depending on requirements and model different screen sizes are available:

R12 - (1/4" = 6.4 mm),

Accuracy approx. 0.3% at 3000 mm - standard

The accuracy of the sensors can be determined by using the following formula according to the measuring length:

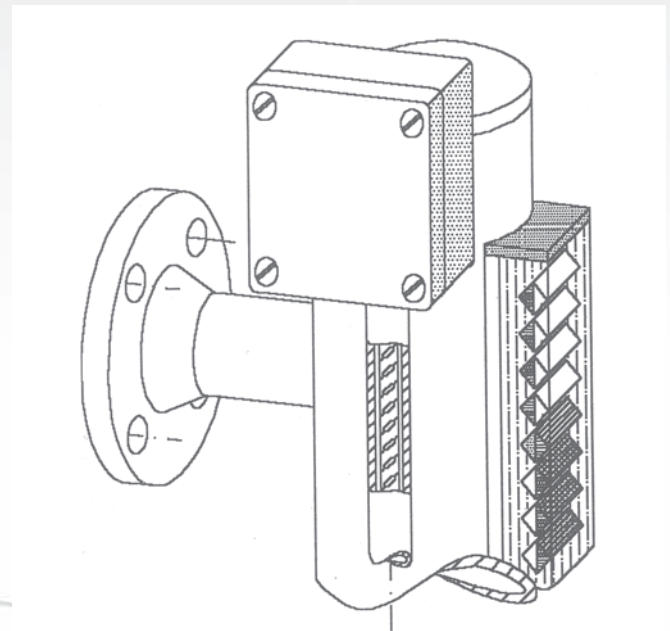
$$\pm \frac{(\text{Screen} : 2)}{\text{Measuring length } L_m} \times 100 \%$$

e.g.: $\pm \frac{(6.4 \text{ mm} : 2)}{1000 \text{ mm}} \times 100 \% = 0.32 \%$

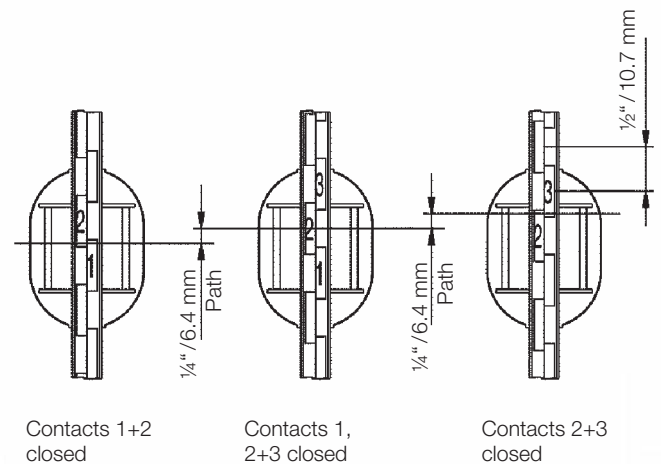
Special designs

This catalog contains only our standard products and standard options. There are many more versions available.

Please contact us - we are happy to assist you!



Index: A



Specifications are subject to changes without notice.

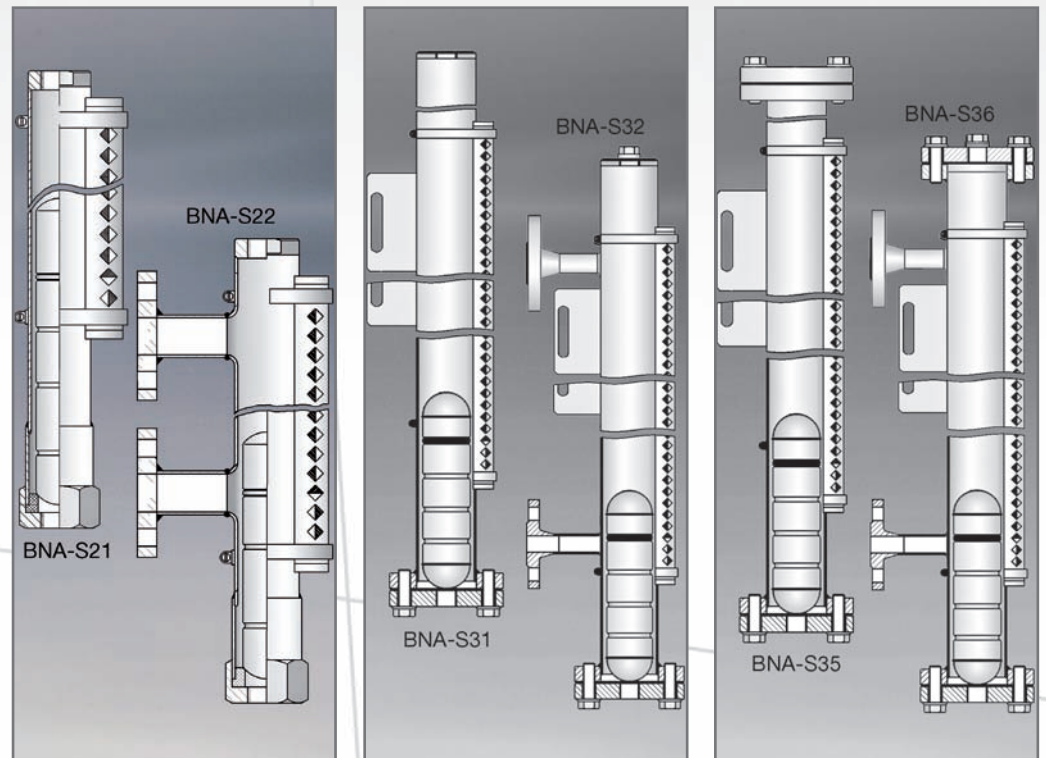
Level

Bypass Level Indicators

Introduction

Index: A

Specifications are subject to changes without notice.

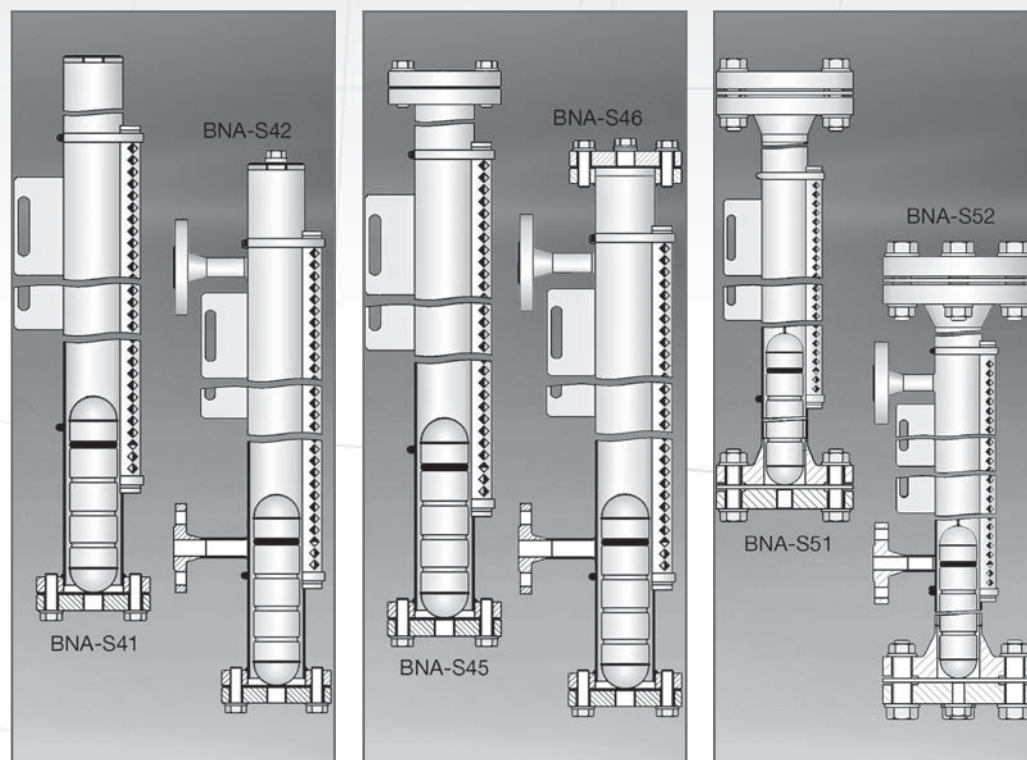


Index: A

Model	BNA-21 / BNA-22	BNA-31 / BNA-32	BNA-35 / BNA-36
Measuring ranges:	LM max. 3000 mm in one piece, max. LM in split sections on request	LM max. 6000 mm in one piece, max. LM in split sections on request	LM max. 6000 mm in one piece, max. LM in split sections on request
Indication rail:	Makrolon (polycarbonate) clear, with white/red indication flags	Makrolon (polycarbonate) clear, with white/red indication flags	Makrolon (polycarbonate) clear, with white/red indication flags
Process connection: (without adaptor)	BNA-S21: top and bottom G½ BNA-S22: side connections	BNA-S31: top and bottom G½ BNA-S32: side connections	BNA-S35: top and bottom G½ BNA-S36: side connections
Bypass tube:	Stainless steel 1. 4571 (SS 316 Ti) PN 25, ø40x1 mm	Stainless steel 1. 4571 (SS 316 Ti) PN 16, ø60.3x2 mm	Stainless steel 1. 4571 (SS 316 Ti) PN 16, ø60.3x2 mm
Float: Standard: min. density: max. temperature:	VA 30/02, (SS 316Ti) 1.4571 0.85 g/cm³ 150 °C	PN 25: VA 50/10 in 1.4571 0.62 g/cm³ 150 °C	PN 25: VA 50/10 in 1. 4571 0.62 g/cm³ 150 °C
Max. permissible pressure:	16 bar	16 bar	16 bar
Max. permissible temperature:	150 °C media dependent	150 °C media dependent	150 °C media dependent
Options:	Titanium/Buna-N float	Aluminium indication rail, titanium float, special connections	Aluminium indication rail, titanium float, special connections
Approval:	Shipbuilding approval	Shipbuilding approval	Shipbuilding approval

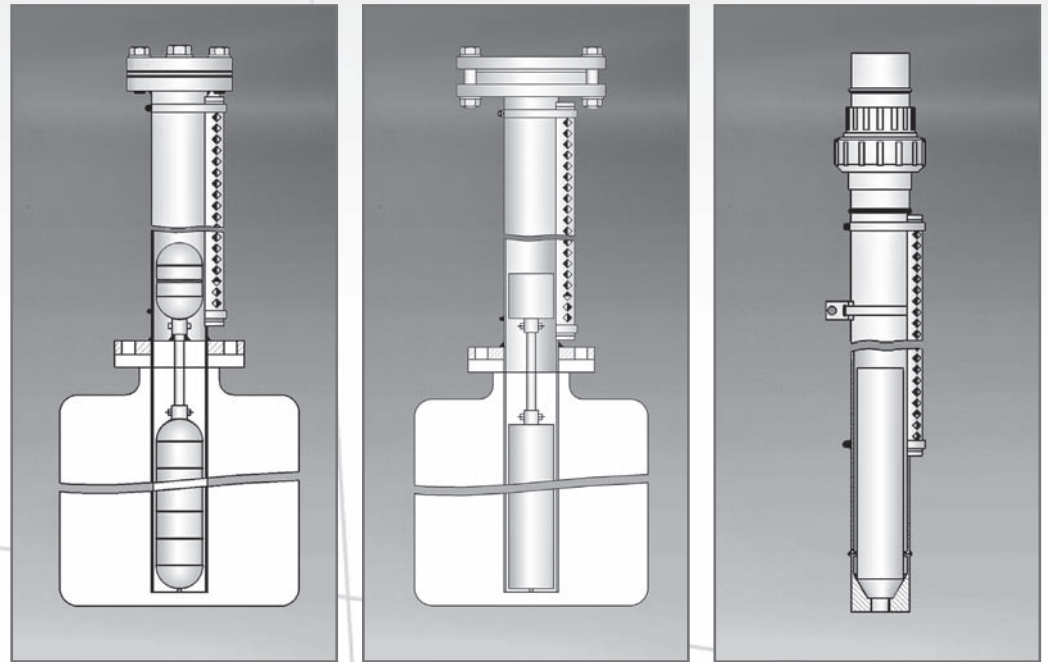
Specifications are subject to changes without notice.

Index: A



Model	BNA-41 / BNA-42	BNA-45 / BNA-46	BNA-51 / BNA-52
Measuring ranges:	LM max. 6000 mm in one piece, max. LM in split sections on request	LM max. 6000 mm in one piece, max. LM in split sections on request	LM max. 6000 mm in one piece, max. LM in split sections on request
Indication rail:	Makrolon (polycarbonate) clear, with white/red indication flags	Makrolon (polycarbonate) clear, with white/red indication flags	Makrolon (polycarbonate) clear, with white/red indication flags
Process connection: (without adaptor)	BNA-S41: top and bottom G $\frac{1}{2}$ BNA-S42: side connections	BNA-S45: top and bottom G $\frac{1}{2}$ BNA-S46: side connections	BNA-S51: top and bottom G $\frac{1}{2}$ BNA-S52: side connections
Bypass tube:	Stainless steel 1.4571 (SS 316 Ti) PN 40, \varnothing 60.3x2 mm	Stainless steel 1.4571 (SS 316 Ti) PN 40, \varnothing 60.3x2 mm	Stainless steel 1.4571 (SS 316 Ti) PN 64, \varnothing 60.3x2 mm
Float:			
Standard:	PN 40: TT 50/10 in titanium	PN 40: TT 50/10 in titanium	TT 50/20-VAE (vented) in 1.4571
min. density:	0.56 g/cm 3	0.56 g/cm 3	0.65 g/cm 3
max. temperature:	320 °C	320 °C	150 °C
Max. permissible pressure:	40 bar	40 bar	64 bar
Max. permissible temperature:	320 °C media dependent	320 °C media dependent	150 °C media dependent
Options:	Aluminium indication rail, titanium float, special connections	Aluminium indication rail, titanium float, special connections	Aluminium indication rail, titanium float, special connections
Approval:	Shipbuilding approval	Shipbuilding approval	Shipbuilding approval

Specifications are subject to changes without notice.

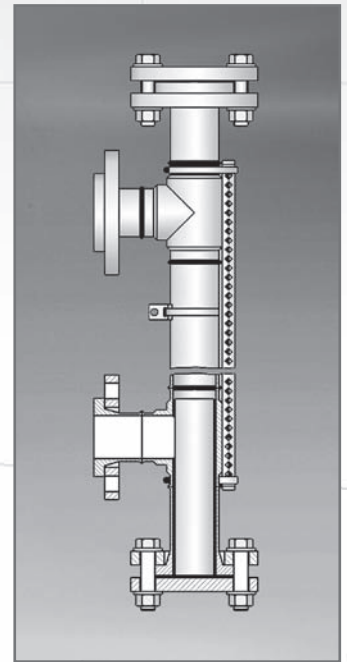
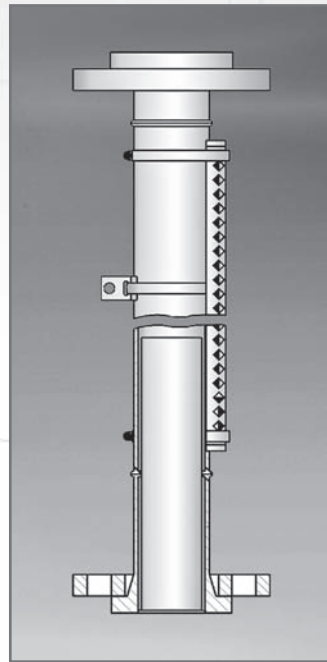
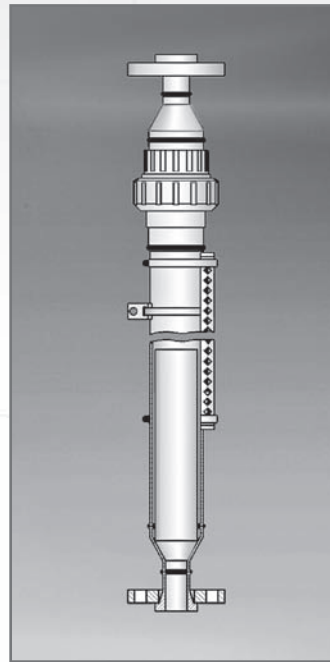


Index: A

Model	BNA-U102	BNA-U301/U401/U701	BNA-K301/K401/K701
Measuring ranges:	LM depends on the buoyancy of the float which in turn depends on the density of the medium (g), max. LM on request	LM depends on the buoyancy of the float which in turn depends on the density of the medium (g)	LM max. 3000 mm one piece, split sections on request
Indication rail:	Makrolon (polycarbonate) clear, with white/red indication flags	Makrolon (polycarbonate) clear, with white/red indication flags	Makrolon (polycarbonate) clear, with white/red indication flags
Process connection: (without adaptor)	VA flange DIN 2527 DN 65/ PN 16 LM max. 4500 mm	Flange DN 65	With thread
Bypass tube:	Stainless steel 1. 4571 (SS 316 Ti) $\varnothing 60,3 \times 2$ mm	$\varnothing 63 \times 3$ mm, made of plastic material	$\varnothing 63 \times 3$ mm, made of plastic material
Float:	TT 50/300 with ABS tube, min. density: 0.6 g/cm^3	PVC 300, LM 1000 mm, min. density: 0.7 g/cm^3 PVC 300, LM 2000 mm, min. density: 0.8 g/cm^3 PVC 400, LM 2000 mm, min. density: 0.67 g/cm^3 PP 300, LM 4000 mm, min. density: 0.8 g/cm^3 PP 400, LM 4000 mm, min. density: 0.67 g/cm^3	PVC 50/10, min. density: 0.54 g/cm^3 PVDF 50/10, min. density: 0.66 g/cm^3 PP 50/10, min. density: 0.45 g/cm^3
Max. permissible pressure:	16 bar	BNA-U301: 2.5 bar BNA-U401: 6.0 bar BNA-U701: 2.5 bar	BNA-K301: 2.5 bar BNA-K401: 6.0 bar BNA-K701: 2.5 bar
Max. permissible temperature:	150 °C media dependent	BNA-U301: 60 °C BNA-U401: 140 °C BNA-U701: 80 °C	BNA-K301: 60 °C BNA-K401: 140 °C BNA-K701: 80 °C
Options:	Float, connections	Float, connections	Special connections
Approval:	---	---	---

Specifications are subject to changes without notice.

Index: A



Model	BNA-K302.0/402.0/702.0	BNA-K302.1/402.1/702.1	BNA-K303/K403/K703
Measuring ranges:	LM max. 3000 mm one piece, split sections on request	LM max. 3000 mm one piece, split sections on request	LM max. 3000 mm one piece, split sections on request
Indication rail:	Makrolon (polycarbonate) clear, with white/red indication flags	Makrolon (polycarbonate) clear, with white/red indication flags	Makrolon (polycarbonate) clear, with white/red indication flags
Process connection: (without adaptor)	With flanges DN 15 to DN 32	Lap joint flanges with stub ends at top DIN 8063/PN10, top and bottom DN 50	Lap joint flanges with stub ends at top DIN 8063/PN10, top and bottom DN 50, side mounting DN 15 to DN 50
Bypass tube:	ø 63x3 mm, made of plastic material	ø 63x3 mm, made of plastic material	ø 63x3 mm, made of plastic material
Float:	PVC 50/10 min. density: 0.54 g/cm ³ PVDF 50/10 min. density: 0.66 g/cm ³ PP 50/10 min. density: 0.45 g/cm ³	PVC 50/10 min. density: 0.54 g/cm ³ PVDF 50/10 min. density: 0.66 g/cm ³ PP 50/10 min. density: 0.45 g/cm ³	PVC 50/10 min. density: 0.54 g/cm ³ PVDF 50/10 min. density: 0.66 g/cm ³ PP 50/10 min. density: 0.45 g/cm ³
Max. permissible pressure:	BNA-K302.0: 2.5 bar BNA-K402.0: 6.0 bar BNA-K702.0: 2.5 bar	BNA-K302.1: 2.5 bar BNA-K402.1: 6.0 bar BNA-K702.1: 2.5 bar	BNA-K303: 2.5 bar BNA-K403: 6.0 bar BNA-K703: 2.5 bar
Max. permissible temperature:	BNA-K302.0: 60 °C BNA-K402.0: 140 °C BNA-K702.0: 80 °C	BNA-K302.1: 60 °C BNA-K402.1: 140 °C BNA-K702.1: 80 °C	BNA-K303: 60 °C BNA-K403: 140 °C BNA-K703: 80 °C
Options:	Special connections	Special connections	Special connections
Approval:	---	---	---

Specifications are subject to changes without notice.

Mini Bypass Level Indicator

Type BNA-S21/S22

The Mini Bypass Level Indicator is the "light" version in the family available with lengths up to 3000 mm, medium temperatures up to 150 °C and pressures up to 16 bar max.

Features

This "light version" is easy to handle, ideal to replace sight glasses and low in cost due to the many OEM applications.

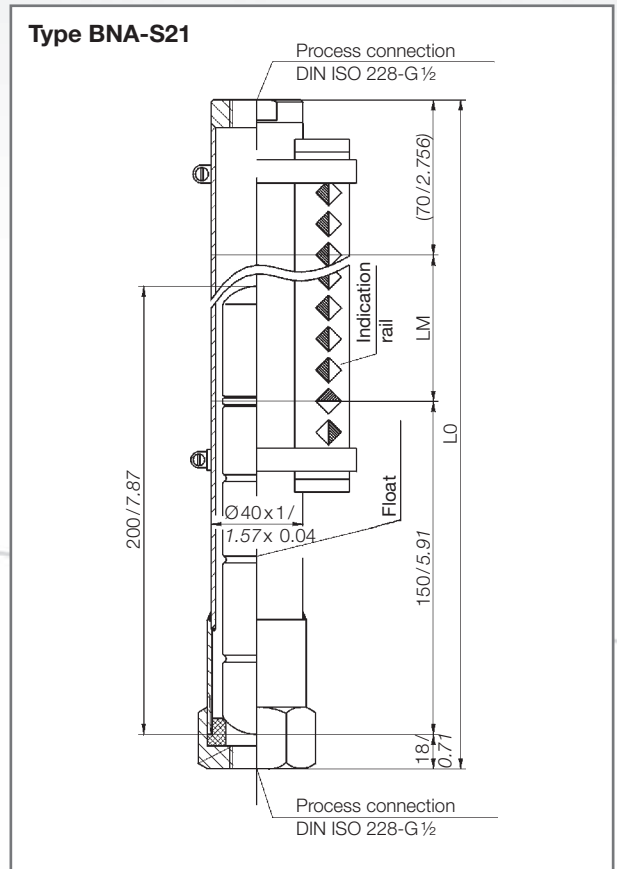
Measuring ranges

LM max. 3000 mm in one piece,
max. LM in split sections on request

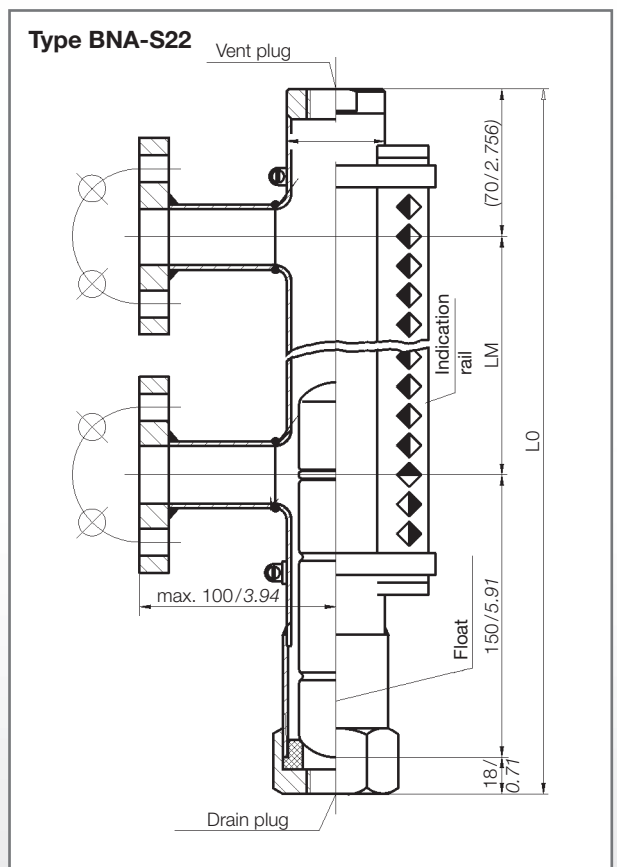
Applications

Tanks in which due to their construction internal measurement is impossible, e.g. ship building, sewage works.

Dimensions (in mm/inch)



Index: A



Specifications are subject to changes without notice.

Technical Data

Bypass tube:	Stainless steel 1.4571 (SS 316 Ti) PN 16, Ø = 40x1 mm
Float:	
Standard:	VA 30/02: 1.4571 (SS 316Ti), max. 16 bar and 150 °C, min. density: 0.85 g/cm ³
Option:	TT 30/02: in Titanium, PN 25, min. density: 0.85 g/cm ³ max. temperature: 150 °C Buna N: BN 32/100, PN 10, min. density: 0.62 g/cm ³ max. temperature: 90 °C
Proof pressure:	1.5 x operating pressure
Process connection:	BNA-S21 top and bottom connections: R 1 1/4" with hex. nut for service, G 1/2" top and bottom with plug BNA-S22 side connections: thread R 1/2" or flanges in: DIN DN 15, 20, 25 or ANSI 1/2", 3/4", 1", NPT: 1/2"
Indication rail:	Makrolon (polycarbonate) clear, with white/red indication flags, up to 150 °C media dependent
Accessories:	Limit switches, Transmitters, Scale, Isolation, Tests/certificates

The Bypass Level Indicator is available with lengths up to 5700 mm, in one piece, medium temperature up to 150 °C max. and pressures up to 16 bar max.

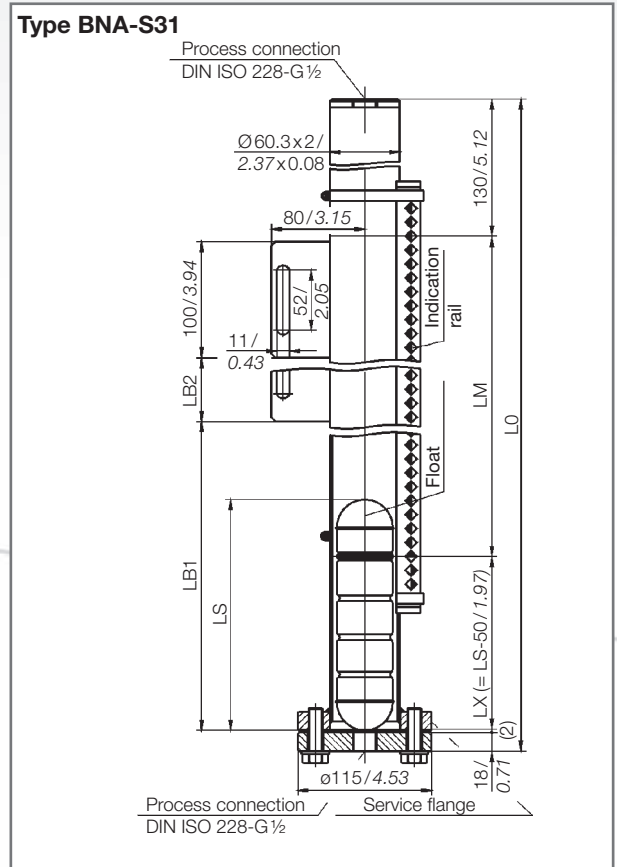
Applications

Tanks in which due to their construction internal measurement is impossible, e.g. ship building, sewage works.

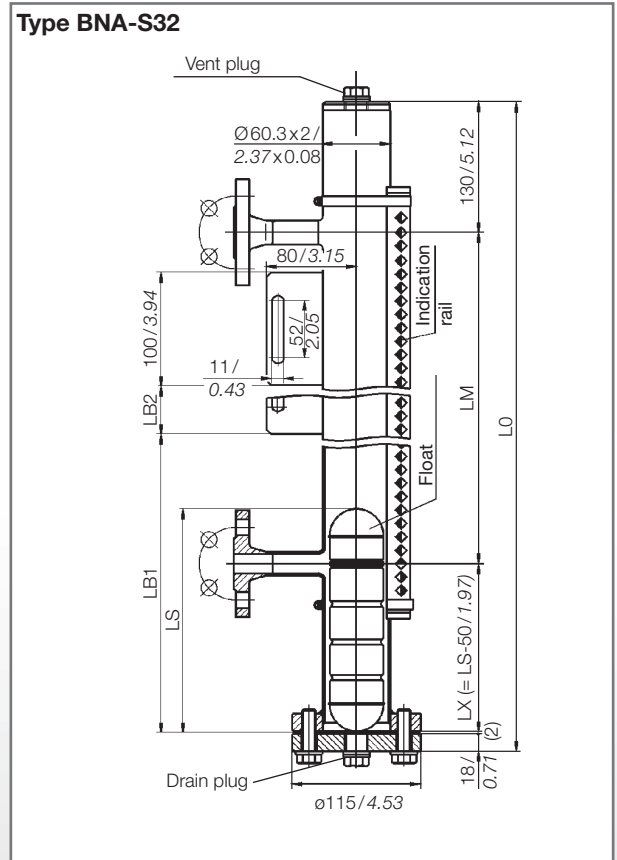
Technical Data

Bypass tube:	Stainless steel 1.4571 (SS 316 Ti) PN 16, Ø = 60.3x2 mm
Float:	
Standard:	PN 16: VA 50/10 in 1.4571, min. density: 0.62 g/cm ³ max. temperature: 150 °C media dependent
Option:	VA 50/15 in 1.4571, with M4 plug min. density: 0.63 g/cm ³ max. temperature: 150 °C media dependent
	TT 50/10 in Titanium, min. density: 0.56 g/cm ³ max. temperature: 320 °C media dependent
	TT 50/15 in Titanium, with M4 plug min. density: 0.57 g/cm ³ , max. temperature: 320 °C media dependent
Proof pressure:	1.5x operating pressure
Process connections:	BNA-S31 top and bottom connections: top G½, bottom service flange ½"
	BNA-S32 side connections: threaded R ½", R ¾", 1", or flanges in: DIN DN 15, 20, 25, 32, 40, 50 or ANSI ½", ¾", 1", 1 ½", 2", NPT: ½", ¾", 1"
Indication rail:	
Standard:	Makrolon (polycarbonate) clear, with white/red indication flags, up to 150 °C media dependent
Option:	Aluminium, black anodized, flags painted silver/red, up to max. 350 °C - A2
Accessories:	Limit switches, Transmitters, Scale, Isolation, Tests/certificates

Dimensions (in mm/inch)



Index: B



Specifications are subject to changes without notice.

The Bypass Level Indicator is available with lengths up to 6000 mm, in one piece, medium temperature up to 150 °C max. and pressures up to 16 bar max.

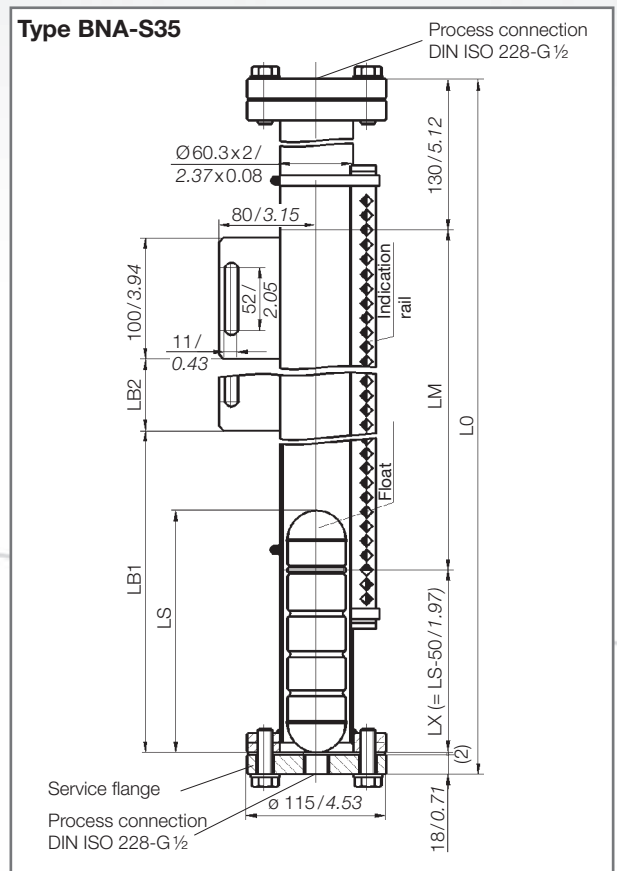
Applications

Tanks in which due to their construction internal measurement is impossible, e.g. ship building, sewage works.

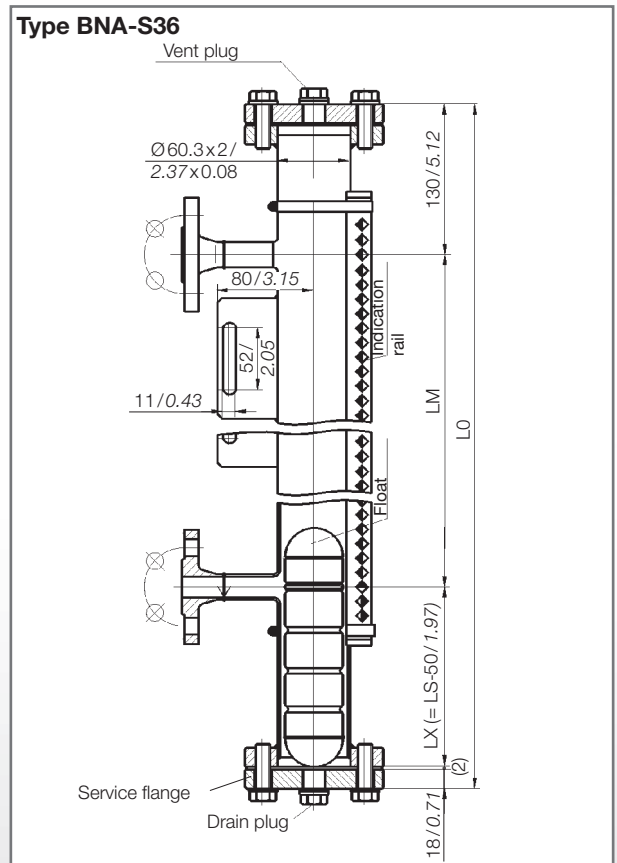
Technical Data

Bypass tube:	Stainless steel 1.4571 (SS 316 Ti) PN 16, Ø = 60.3x2 mm
Float:	
Standard:	VA 50/10 in 1.4571, min. density: 0.62 g/cm ³ max. temperature: 150 °C media dependent
Option:	VA 50/15 in 1.4571, with M4 plug min. density: 0.63 g/cm ³ max. temperature: 150 °C media dependent TT 50/10 in Titanium, min. density: 0.56 g/cm ³ max. temperature: 320 °C media dependent TT 50/15 in Titanium, with M4 plug min. density: 0.57 g/cm ³ max. temperature: 320 °C media dependent
Proof pressure:	1.5 x operating pressure
Process connections:	BNA-S35 top and bottom connections: top G½, bottom service flange ½" BNA-S36 side connections: threaded R ½", R ¾", 1", or flanges in: DIN DN 15, 20, 25, 32, 40, 50 or ANSI ½", ¾", 1", 1 ½", 2", NPT: ½", ¾", 1"
Option:	Instead of G½, top and bottom ½" NPT or flange connections with weld neck flanges.
Indication rail:	
Standard:	Makrolon (polycarbonate) clear, with white/red indication flags, up to 150 °C media dependent
Option:	Aluminium, black anodized, flags painted silver/red, up to max. 350 °C - A2
Accessories:	Limit switches, Transmitters, Scale, Isolation, Tests/certificates

Dimensions (in mm/inch)



Index: B



Specifications are subject to changes without notice.

Bypass Level Indicators

Type BNA-S41/S42

The Bypass Level Indicator is available with lengths up to 5700 mm, in one piece, medium temperature up to 320 °C max. and pressures up to 40 bar max.

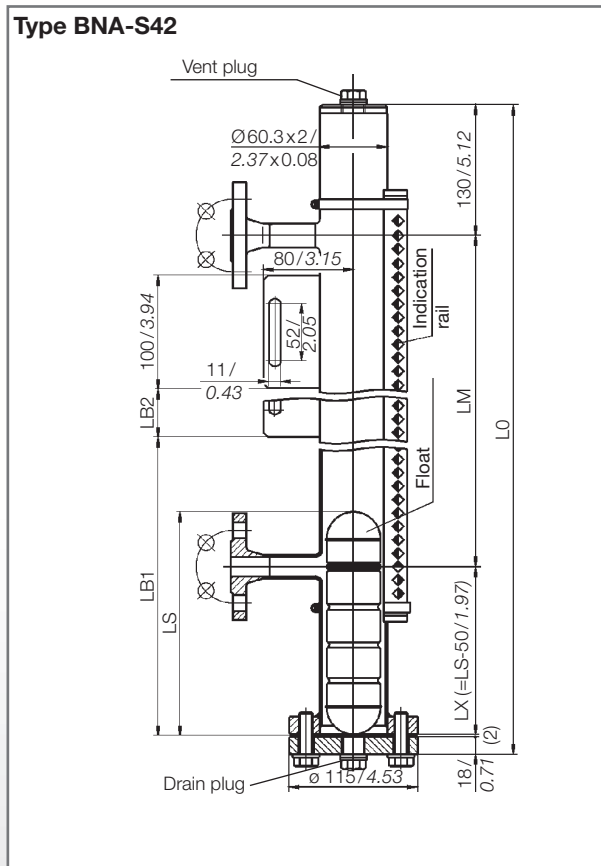
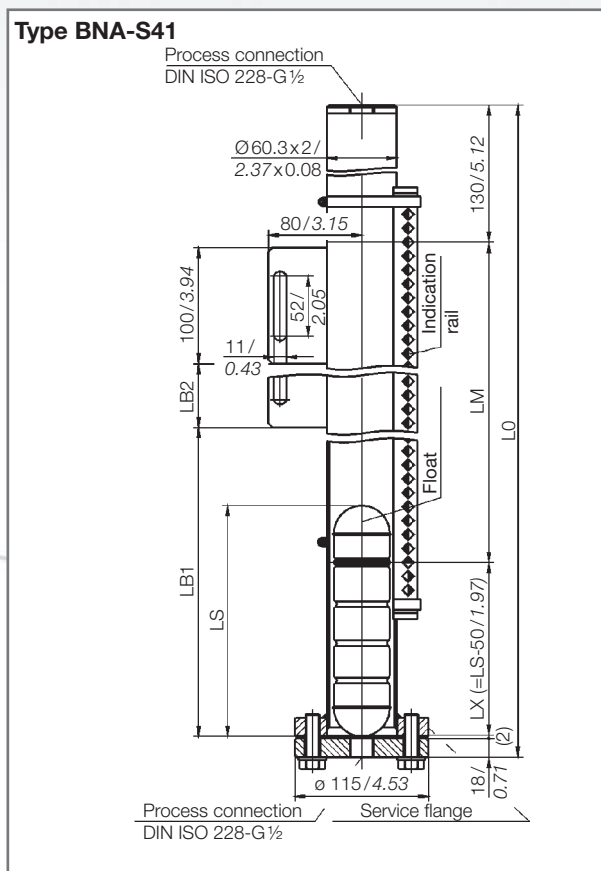
Applications

Tanks in which due to their construction internal measurement is impossible, e.g. ship building, sewage works.

Technical Data

Bypass tube:	Stainless steel 1.4571 (SS 316 Ti) PN 16, Ø = 60.3x2 mm
Float:	
Standard:	TT 50/10 in Titanium, min. density: 0.56 g/cm ³ max. temperature: 320 °C media dependent
Option:	TT 50/15 in titanium, with M4 plug min. density: 0.57 g/cm ³ max. temperature: 320 °C media dependent
Proof pressure:	1.5 x operating pressure
Process connections:	BNA-S41 top and bottom connections: top G½, bottom service flange ½"
	BNA-S42 side connections: threaded R ½", R ¾", 1", or flanges in: DIN DN 15, 20, 25, 32, 40, 50 or ANSI ½", ¾", 1", 1 ½", 2", NPT: ½", ¾", 1"
Option:	Instead of G½, top and bottom ½" NPT or flange connections with weld neck flanges.
Indication rail:	
Standard:	Makrolon (polycarbonate) clear, with white/red indication flags, up to 150 °C media dependent
Option:	Aluminium, black anodized, flags painted silver/red, up to max. 350 °C - A2
Accessories:	Limit switches, Transmitters, Scale, Isolation, Tests/certificates

Dimensions (in mm/inch)



Bypass Level Indicators

Type BNA-S45/S46

The Bypass Level Indicator is available with lengths up to 5700 mm, in one piece, medium temperature up to 320 °C max. and pressures up to 40 bar max.

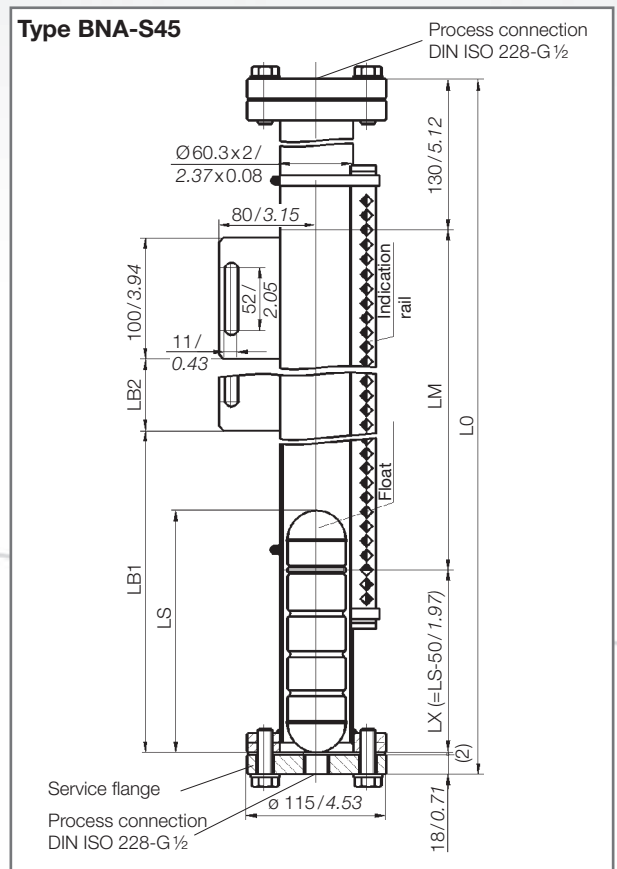
Applications

Tanks in which due to their construction internal measurement is impossible, e.g. ship building, sewage works.

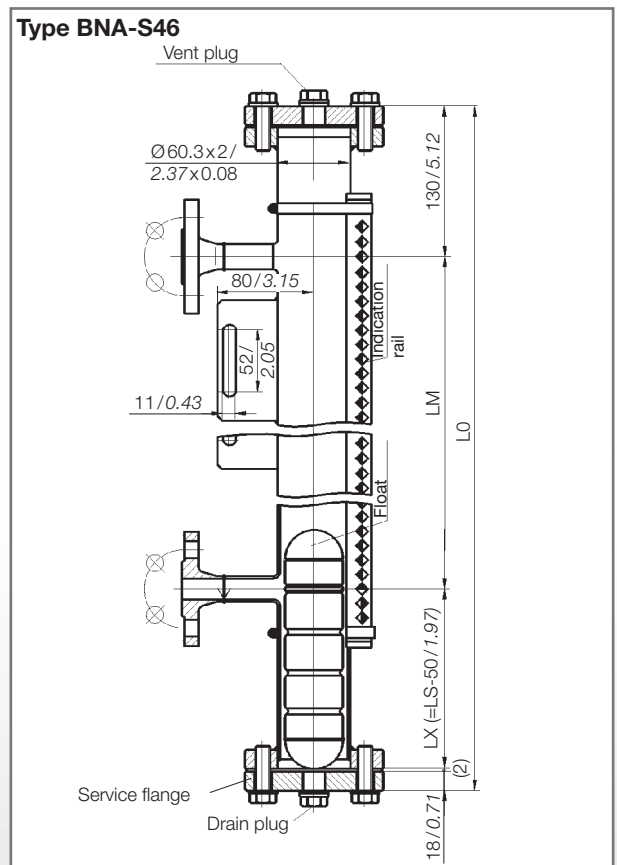
Technical Data

Bypass tube:	Stainless steel 1.4571 (SS 316 Ti) PN 40, Ø = 60.3x2 mm
Float:	
Standard:	TT 50/10 in Titanium, min. density: 0.56 g/cm ³ max. temperature: 320 °C media dependent
Option:	TT 50/15 in Titanium, with M4 plug min. density: 0.57 g/cm ³ , max. temperature: 320 °C media dependent
Proof pressure:	1.5x operating pressure
Process connections:	BNA-S45 top and bottom connections: top G½, bottom service flange ½"
	BNA-S46 side connections: threaded R ½", R ¾", 1", or flanges in: DIN DN 15, 20, 25, 32, 40, 50 or ANSI ½", ¾", 1", 1 ½", 2", NPT: ½", ¾", 1"
Option:	Instead of G½, top and bottom ½" NPT or flange connections with weld neck flanges.
Indication rail:	
Standard:	Makrolon (polycarbonate) clear, with white/red indication flags, up to 150 °C media dependent
Option:	Aluminium, black anodized, flags painted silver/red, up to max. 350 °C - A2
Accessories:	Limit switches, Transmitters, Scale, Isolation, Tests/certificates

Dimensions (in mm/inch)



Index: A



Specifications are subject to changes without notice.

Bypass Level Indicators

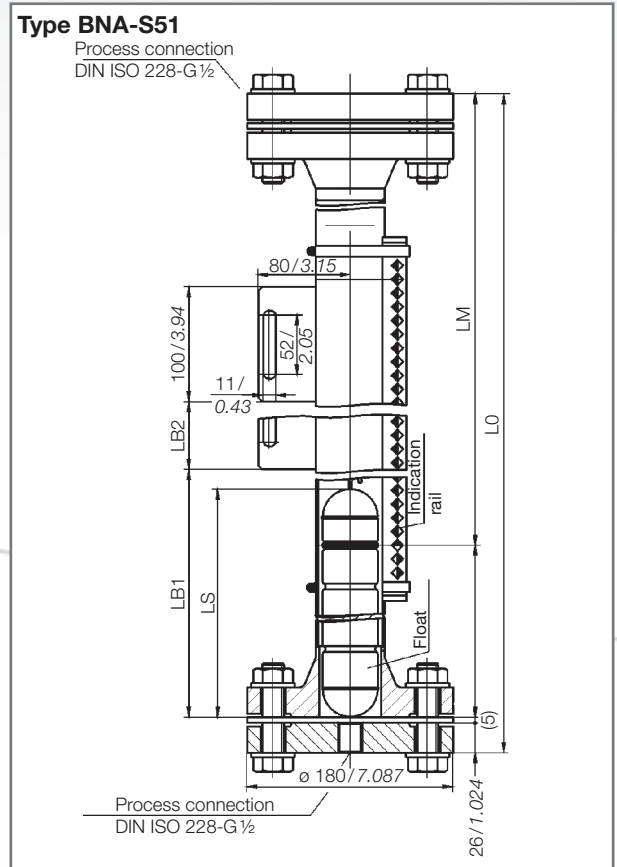
Type BNA-S51/S52

The Bypass Level Indicator is available with lengths up to 5700 mm, in one piece, medium temperature up to 150 °C max. and pressures up to 64 bar max.

Applications

Tanks in which due to their construction internal measurement is impossible, e.g. ship building, sewage works.

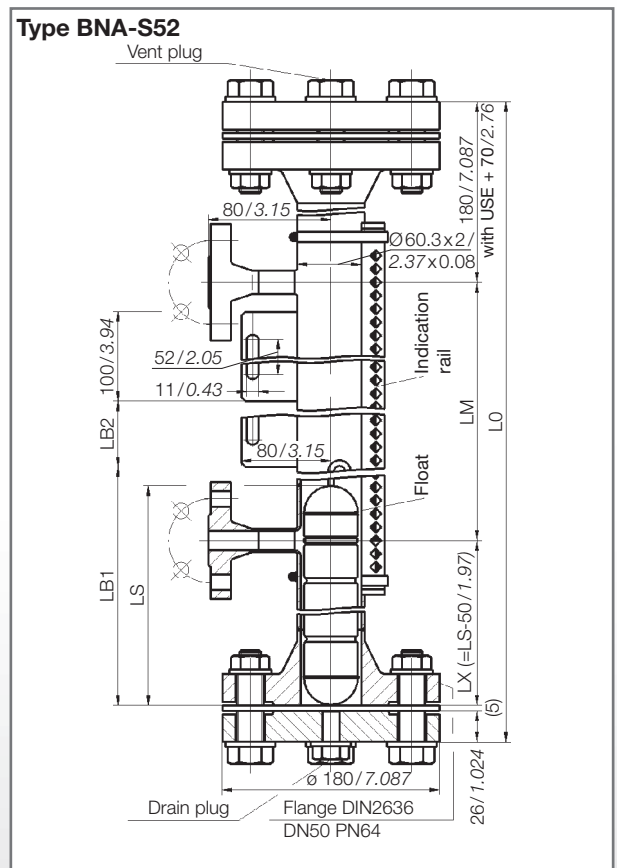
Dimensions (in mm/inch)



Index: A

Technical Data

Bypass tube:	Stainless steel 1.4571 (SS 316 Ti) PN 64, $\phi = 60.3 \times 2$ mm
Float: Standard:	TT 50/20-VAE (vented) in 1.4571, min. density: 0.65 g/cm ³ max. temperature: 320 °C media dependent
Proof pressure:	1.5 x operating pressure
Process connections:	BNA-S51 top and bottom connection with weld neck flanges DIN 2636 and blind flanges DN 50 PN 64: G 1/2 BNA-S52 side connections: Flanges in: DIN DN 15, 25, 32, 40 or 50, or ANSI 1/2", 3/4", 1", 1 1/2", 2", NPT: 1/2", 3/4", 1"
Option:	Instead of G 1/2, top and bottom 1/2" NPT or flange connections with weld neck flanges
Indication rail: Standard:	Makrolon (polycarbonate) clear, with white/red indication flags, up to 150 °C media dependent
Option:	Aluminium, black anodized, flags painted silver/red, up to max. 350 °C - A2
Accessories:	Limit switches, Transmitters, Scale, Isolation, Tests/certificates



Specifications are subject to changes without notice.

The measuring length of the bypass level indicator depends on the buoyancy of the float, which in turn depends on the density of the medium (g), max. LM on request, one part, medium temperature up to 150 °C max. and pressures up to 16 bar max.

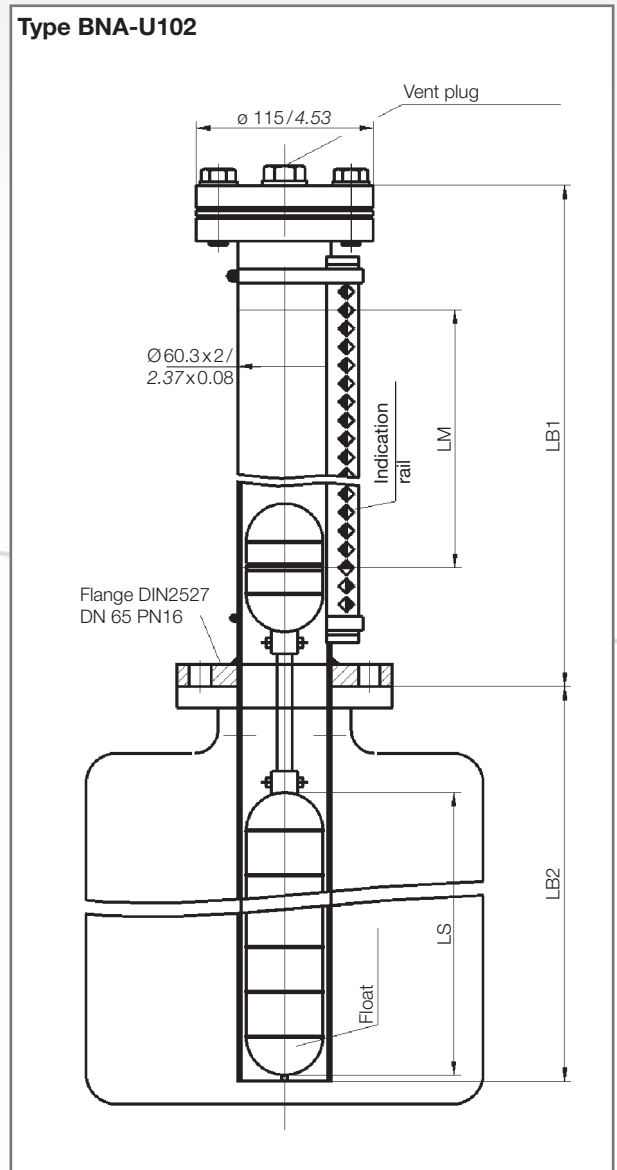
Applications

Tanks in which due to their construction internal measurement is impossible, e.g. ship building, sewage works.
For top tank mounting

Technical Data

Bypass tube:	Stainless steel 1.4571 (SS 316 Ti) PN 16, Ø = 60.3x2 mm
Float:	
Standard:	TT 50-300 , LM max. 4500/1.0 g/cm ³
Option:	Further floats on request
Proof pressure:	1.5 x operating pressure
Process connections:	
Standard:	With VA flange DIN 2527 DN 65 PN 16
Option:	Special (larger) flange connections or U102 in split version (to facilitate transport and installation) possible.
Indication rail:	Makrolon (polycarbonate) clear, with white/red indication flags, up to 150 °C media dependent
Accessories:	Limit switches, Transmitters, Electronic transmitters, Isolation, Tests/certificates
Order data:	
Type:	BNA-U102
Medium:	Density of medium [g/cm ³]
Measuring length:	LM [mm]
Installation data:	Distance from tube end to bottom of flange (LB2). Further details or drawings with planned installation geometry are helpful.
Options and accessories:	on request

Dimensions (in mm/inch)



Index: B

Specifications are subject to changes without notice.

The measuring length of the plastic bypass level indicator depends on the buoyancy of the float, which in turn depends on the density of the medium (g), max. LM on request, one part.

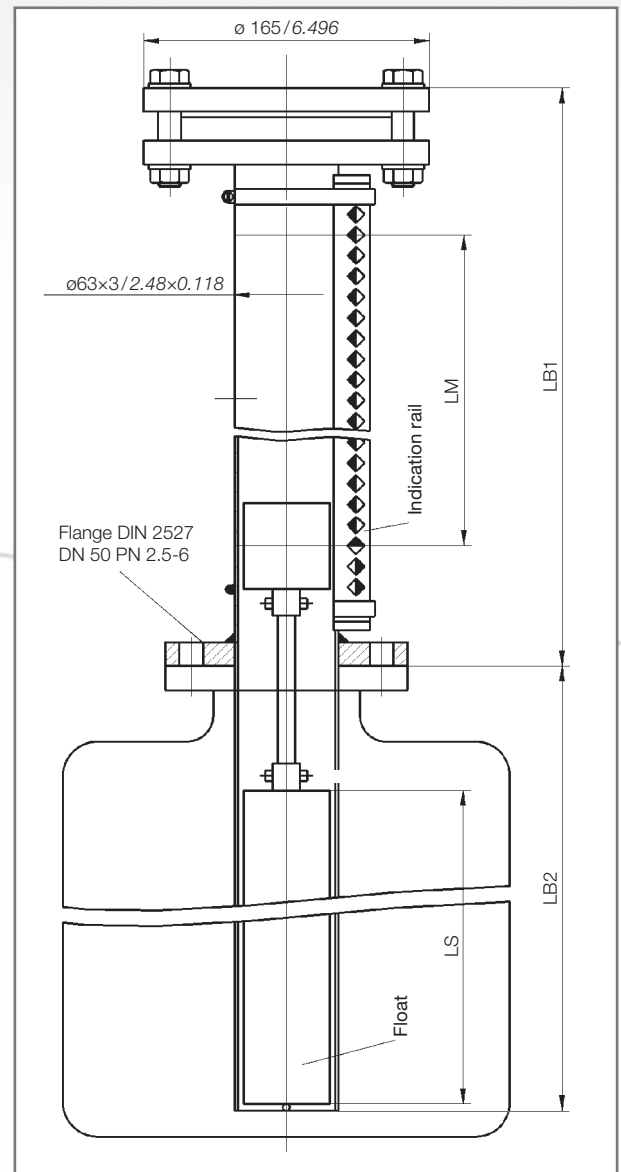
Applications

Tanks in which due to their construction internal measurement is impossible, e.g. ship building, sewage works.

Technical Data

Bypass tube:	ø63 x 3 mm				
Material:	PVC	PVDF	PP		
Nom. press. [bar]:	2.5	6.0	2.5		
Max. temp. [°C]:	60	140	80		
Float:	PVC 300	PVC 300	PVC 400	PP 300	PP 400
LM [mm]:	1000	2000	2000	4000	4000
Min. density [g/cm³]:	0.70	0.80	0.67	0.80	0.67
Option:	Further floats on request				
Proof pressure:	1.5 x operating pressure				
Process connections:	Flange DN 50				
Standard:	Flange DN 50				
Option:	Special (larger) flange connections or in split version (to facilitate transport and installation) possible.				
Indication rail:	Makrolon (polycarbonate) clear, with white/red indication flags, up to 150 °C media dependent				
Standard:	Makrolon (polycarbonate) clear, with white/red indication flags, up to 150 °C media dependent				
Dimensions:	LB2 = LB1+200 mm, LB2 is determined by LM, the tank geometry and the density of the medium				
Accessories:	Limit switches, Transmitters, Electronic transmitters, Isolation, Tests/certificates				
Order data:	BNA-U301, BNA-U401 or BNA-U701				
Type:	Density of medium [g/cm³]				
Medium:	LM [mm]				
Measuring length:	Distance from tube flange to bottom of flange (LB2).				
Installation data:	Further details or drawings with planned installation geometry are helpful.				
Options and accessories:	on request				

Dimensions (in mm/inch)



Index: B

Specifications are subject to changes without notice.

Level

Bypass Level Indicators

Type BNA-K301/K401/K701
Type BNA-K302.0/K402.0/K702.0

The plastic bypass level indicator is available for measuring lengths up to 3000 mm in one piece (LM in split sections on request).

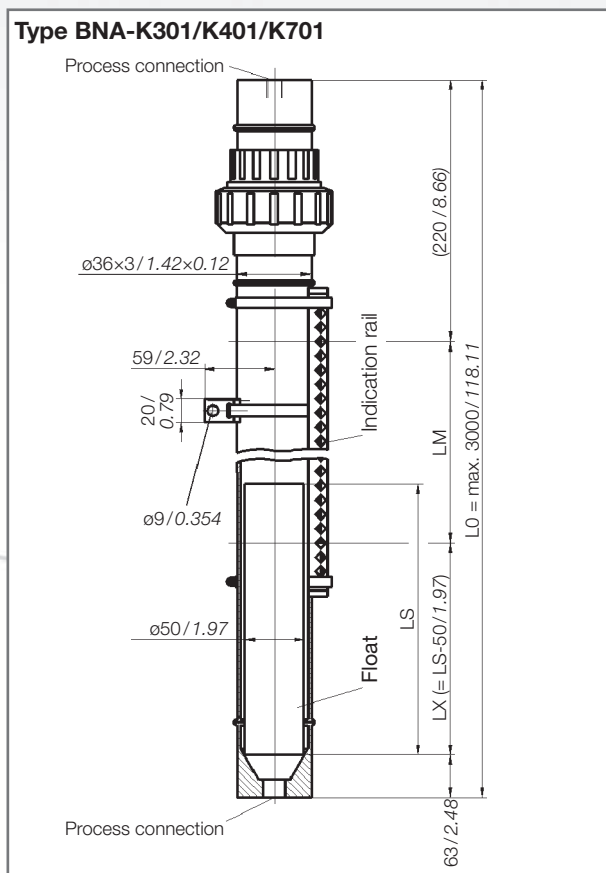
Applications

Tanks in which due to their construction internal measurement is impossible, e.g. ship building, sewage works.

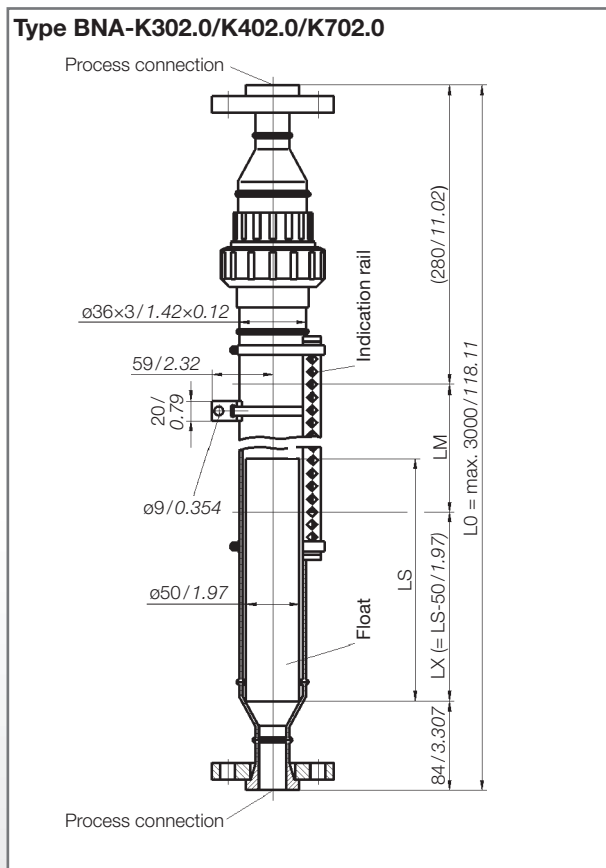
Technical Data

Bypass tube:	ø 63x3 mm
Material:	PVC PVDF PP
Nom. pressure [bar]:	2.5 6.0 2.5
Max. temp. [°C]:	60 140 80
Float:	
Standard:	PVC 50/10 min. density: 0.54 g/cm ³
	PVDF 50/10 min. density: 0.66 g/cm ³
	PP 50/10 min. density: 0.45 g/cm ³
Note:	The standard floats are relatively light. They are, however, weighted when manufactured. So they immerse into the medium and indicate the level correctly. Please indicate medium density in your order.
Proof pressure:	1.5 x operating pressure
Process connections:	
Standard:	Top and bottom connections: G ¹ / ₂ , G ³ / ₄ , G 1 or flanges DN 15 to DN 32 or ANSI 1/2", 3/4", 1", 1 1/4"
Option:	Special threads, glued or welded joints on request
Indication rail:	
Standard:	Makrolon (polycarbonate) clear, with white/red indication flags
Accessories:	Limit switches, Transmitters, Electronic transmitters, Isolation, Tests/certificates

Dimensions (in mm/inch)



Index: A



Specifications are subject to changes without notice.

Bypass Level Indicators

Type BNA-K302.1/K402.1/K702.1
Type BNA-K303/K403/K703

The plastic bypass level indicator is available for measuring lengths up to 3000 mm in one piece (LM in split sections on request).

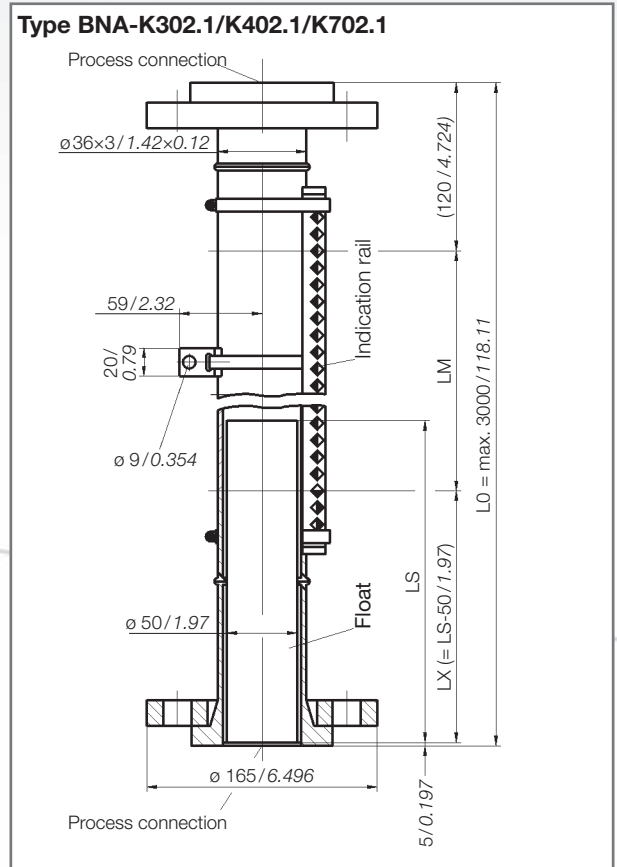
Applications

Tanks in which due to their construction internal measurement is impossible, e.g. ship building, sewage works.

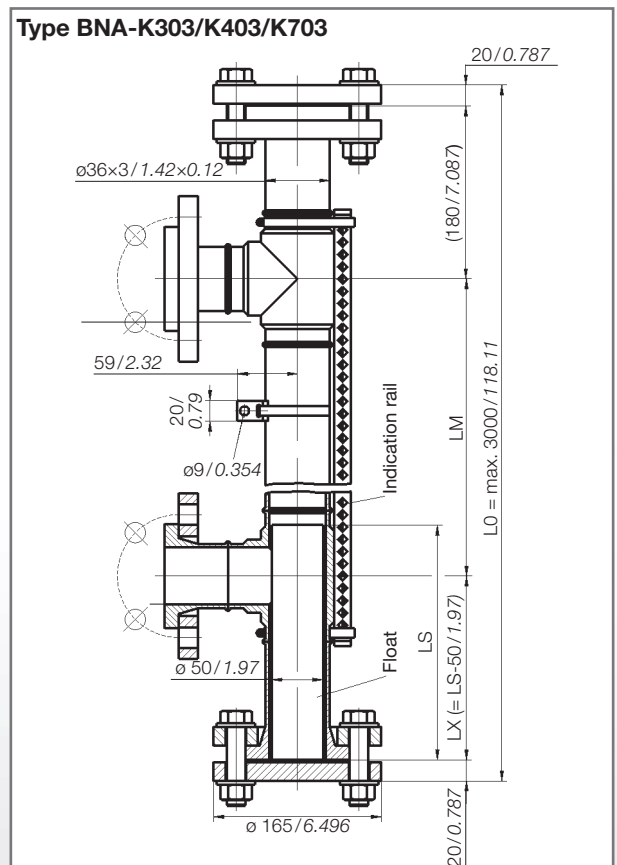
Technical Data

Bypass tube:	ø63x3 mm
Material:	PVC PVDF PP
Nom. pressure [bar]:	2.5 6.0 2.5
Max. temp. [°C]:	60 140 80
Float:	
Standard:	PVC min. density: 0.54 g/cm ³
	PVDF min. density: 0.66 g/cm ³
	PP min. density: 0.45 g/cm ³
Note:	The standard floats are relatively light. They are, however, weighted when manufactured. So they immerse into the medium and indicate the level correctly. Please indicate medium density in your order.
Proof pressure:	1.5 x operating pressure
Process connections:	
Standard:	With lap joint flanges with stub ends according to DIN 8063 PN 10
	BNA-K302.1/K402.1/K702.1 top and bottom connections: DN 50
	BNA-K303/K403/K703 side mounting: DN 15...DN 50
Option:	Special flange connections are possible
Indication rail:	
Standard:	Makrolon (polycarbonate) clear, with white/red indication flags
Accessories:	Limit switches, Transmitters, Electronic transmitters, Isolation, Tests/certificates

Dimensions (in mm/inch)



Index: A



Specifications are subject to changes without notice.

Limit Switch

Type GK03

Limit Switch for Bypass Level Indicator



Features / Description

All GK switches have bi-stable reed contacts. They can be mounted in any position around the tube of a magnet-controlled level indicator with stainless steel clamps, however the cable direction should preferably be downward. The magnet system in the float will switch over the contact whenever the switch is passed. This permits an arbitrary arrangement of many switches on the tube surface without the switches disturbing each other. The switch position must be checked before installation; it can be set with a ring magnet or the float. The switch hysteresis depends on the distance to the magnet system in the float and is smallest when the switches are installed closely along the indication rail.

Applications

Limit value measuring on magnetically controlled level indicators

Technical Data

Housing: GK03/GK03L/GK03-EXI:	1.4305 and M16 x 1.5 cable gland
Cable: GK03: GK03-EXI: GK03L:	Silicone 3x0.5 mm ² or PVC 3x0.34 mm ² , length 1, 3 or 5 m PVC 3x0.34 mm ² , length 1, 3 or 5 m PVC 4x0.55 mm ² , length 2 m other lengths or versions on request
Protection class:	IP 65
Switching power: GK03: GK03-EXI: GK03L:	220 V AC/1.0 A/60 VA, 220 V DC/1.0 A/40 W 28 V/50 mA 24 V DC/1.0 A/40 W
Temperature range: GK03: GK03-EXI: GK03L:	-55 °C...+140 °C -40 °C...+75 °C -10 °C...+80 °C
Option: GK03:	Grounding clip (incl. in case of GK03-EXI)
Approvals: GK03-EXI:	ISSeP08ATEX016X  II G Ex ia IIC T6  II1GD Ex iaD 2D T100

When larger contact ratings are needed than the reed contacts allow, suitable relays must be used.

When frequently changing process requirements make a permanent contact position difficult to handle we recommend to order our transmitters with 4 ...20 mA output and separate trip amplifier UAS 3, which enables set point changes by touching a keypad and many additional features.

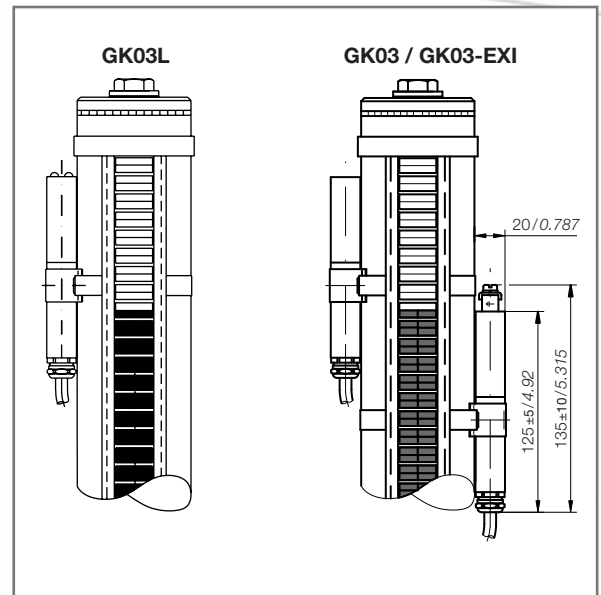
Order Numbers

Order No.	Limit Switch
0303-031	GK03 1m PVC cable
0303-028	GK03 1m Si cable
0303-032	GK03 3 m PVC cable
0303-029	GK03 3m Si cable
0303-033	GK03 5 m PVC cable
0303-030	GK03 5m Si cable
0303-035	GK03-EXI 1m PVC cable
0303-027	GK03-EXI 3 m Si cable
0303-036	GK03-EXI 5 m PVC cable
0303-038	GK03L-EXI 2 m PVC cable

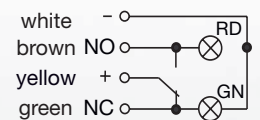
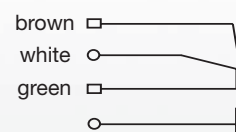


Index: B

Dimensions (in mm/inch)



Circuit diagram (empty tank)



RD (red LED) = full
GN (green LED) = empty

Figure 1: Schematic diagram GK03/GK03-EXI

Figure 2: Schematic diagram GK03L

Specifications are subject to changes without notice.

The standard floats listed below have less weight, are shorter and versatile; they replace all versions built so far.

In case of the ../15 versions (with M4 plug) the optimum immersion depth of 150 mm can be trimmed exactly to the density of the medium by filling them with silica sand or lead shot.

The required total weight of the float is calculated by means of the following formula:

$$283 \times \gamma \text{ (density) of the medium} = \text{weight in g}$$

The ../20 versions are vented floats with automatic condensate discharge (VAE) for pressures above 40 bar.

Type	Material	LS [mm]	P max [bar]	T max [°C]	Weight [g]	Volume [cm ³]	γ min ** [g/cm ³]	Extras
VA 50/10	1.4571	200	25	150	205	360	0,62	---
VA 50/15	1.4571	200	25	150	207	360	0,63	With M4 plug
TT 50/10	Titanium	200	40	320	202	360	0,56	---
TT 50/15	Titanium	200	40	320	202	360	0,57	With M4 plug
TT 50/20	Titanium	200	VAE	320	210	360	0,60	With VAE tube
VA 30/02	1.4571	200	16	150	104	141	0,85	Only BNA-S21/S22
TT 30/02	Titanium	200	25	150	102	141	0,85	Only BNA-S21/S22
TT 30/03	Titanium	200	40	320	103	141	0,86	Only BNA-S21/S22
BN 32/100	Buna N	100	10	90	48	80	0,62	Oil up to 110 °C (only BNA-S21/S22)
PVC 50/10	PVC	200	2.5	60	205	393	0,54	Give fluid density*
PP 50/10	PP	200	2.5	80	175	393	0,45	Give fluid density*
PVDF 50/10	PVDF	200	6,0	140	253	393	0,66	Give fluid density*

* The plastic floats with the new magnet system are relatively light. To enable adjustment of the float weight to the medium, the medium density (γ) must be stated in the order.

** The min. density relates to a float immersion depth of 175 mm (or 87.5%). The ideal immersion depth of the 200-floats is 150 mm, but an immersion depth of 175 mm is absolutely sufficient for most applications. Only in very viscous or dirty media a "residual buoyance" of 25 mm only is not recommended.

For media with very low density, such as some hydrocarbons, special floats are available.

Maximum permissible pressures

Higher temperatures may impair the pressure resistance of the bypass tube.

The maximum permissible pressures for stainless steel pipes, material number 1.4571, are specified in DIN 2413. Including the strength values, the permissible 1% technical elastic limit and a safety value of 1.5 the following table is drawn up:

Outer ø [mm]	Wall thickness [mm]	20 °C [bar]	100 °C [bar]	150 °C [bar]	200 °C [bar]	250 °C [bar]	300 °C [bar]	350 °C [bar]	400 °C [bar]
60,3	2,00	83	70	64	58	54	52	49	46
60,3	2,77	115	87	90	81	76	71	68	65
60,3	2,90	121	101	94	85	79	75	71	68

The pressure limits for plastic tubes are as follows (dependent on the temperature):

Medium temperature	-40 °C	-20 °C	0 °C	20 °C	40 °C	60 °C	80 °C	100 °C	120 °C	140 °C
Max. operating pressure	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]
PVDF	10	10	10	10	10,0	8,6	6,5	4,6	3	2
PP	---	10	10	10	8,2	5,0	2,5	---	---	---
PVC	---	---	6	6	6,0	1,0	---	---	---	---

Transmitters for bypass level indicators

Features/Description

The measuring chain is installed in a tube and attached to the float chamber with stainless steel clamps. This design enables retrofitting to existing systems.
An electrical connection box made of aluminium with series terminals permits direct cable connection.
The maximum deviation is ± 1 mm and due to the screen of 6.4 mm (R12) there are two switching cycles per indication flag.

Technical Data

Two versions are available:

XM - Standard version

XMi - EEx i for intrinsically safe applications

XM with a measuring chain, total resistance 100 kOhm max.

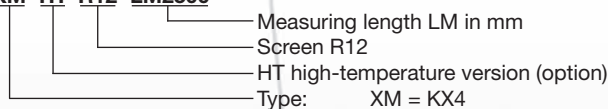
XMi like XM, but with external ground screws and blue cable gland.

Tubing:	1.4571, $\varnothing 13$ mm
Connection box:	KX4, KLS, aluminium, 75x80x50 mm, system of protection IP65, with screw terminals
Measuring length (LM):	Normally the same length as the indication rail. Please state LM in spare part orders.
Total length (L0):	
XM:	Measuring length (LM) + 158 mm, however LM + 175 mm for the high-temperature version up to 150 °C medium temperature
XMi:	is measuring length (LM) + 158 mm
Temperature range:	
XM:	-10 °C...+90 °C, -50 °C...+150 °C for high-temperature version
XMi:	T1...T4 up to 100 °C, T5 up to 65 °C, T6 up to 50 °C
Note concerning XMi:	Intrinsically safe is only applicable with an approved current circuit with a maximum open circuit voltage (U _i) of 24 V. Total length (L0) 6000 mm max. according to approval.

Order code

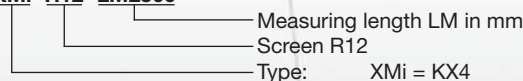
Order number example for XM:

XM-HT-R12-LM2500

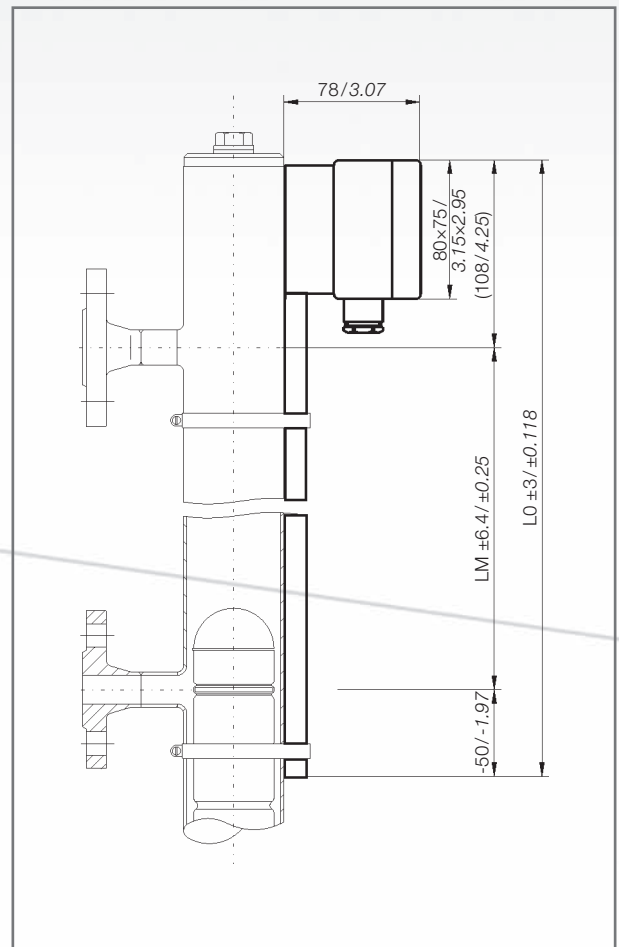


Order number example for XMi:

XMi-R12-LM2500

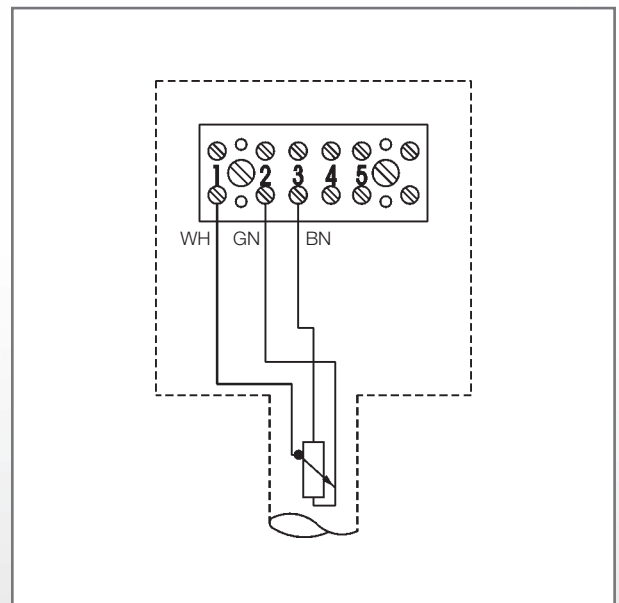


Dimensions (in mm/inch)



Index: A

Electrical connection KX4



Specifications are subject to changes without notice.

Transmitters

Type XT/XTi

Transmitters for bypass level indicators

Features/Description

The measuring principle and construction of this series are identical to those of the XM series, however the XT series is equipped with a 2-wire transmitter module (instead of simple terminals in the KLS terminal box). This transmitter module (transducer) converts the resistance into a 4...20 mA output signal. For e.g. interface measurement the output signal can also be inverted (20...4 mA). A version with linearisation of the tank content graph is available as an option.

Technical Data

Two versions are available:

- XT** - Standard version
- XTi** - EEx i for intrinsically safe applications

Transmitter **XT** with type MU3L, circuit monitoring with selective fault recognition and selective output control (Namur NE43) 3.5 mA or 23 mA, reversed polarity protection.

Transmitter **XTi** with type MUEX, intrinsically safe transmitter module with ATEX approval EEx ia IIC T1...T6, reversed polarity protection and fault recognition with selective output control (Namur NE 43) 3.5 mA or 23 mA.

Power supply:	
XT:	8...35 VDC, max. 10% residual ripple
XTi:	8...24 VDC, max. 10% residual ripple
Output:	4...20 mA, reversed polarity protected
Load:	max. 700 Ohm at 24 V
Delay:	0.33 sec
Accuracy:	max. $\pm 0.2\%$ f. s.
Temperature range:	
XT:	-40 °C... +85 °C -50 °C...+150 °C for high-temperature version
XTi:	T1...T4: -40 °C...+85 °C T5 and T6: -40 °C...+60 °C
Note:	The configuration of the selective output control for fault recognition is ≤ 3.5 mA unless expressly specified otherwise in the order.

Order code

Order number example for XT:

XT- HT- R12- LM2500

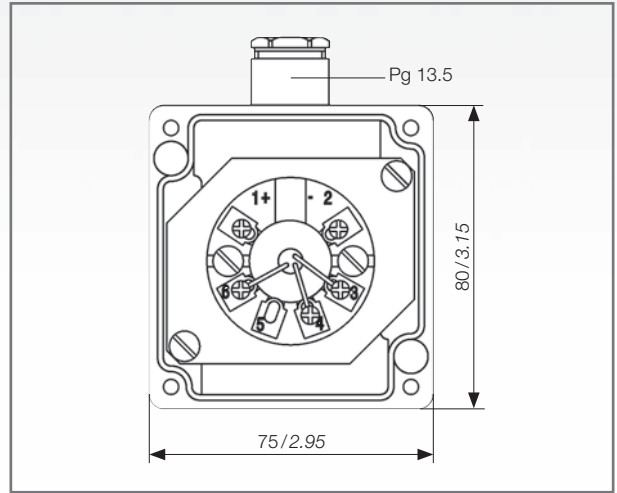
- Measuring length LM in mm
- Screen R12
- HT high-temperature version (option)
- Type: XT = KLS (incl. transducer)

Order number example for XTi:

XTi- R12- LM2500

- Measuring length LM in mm
- Screen R12
- Type: XTi = KLS (incl. transducer)

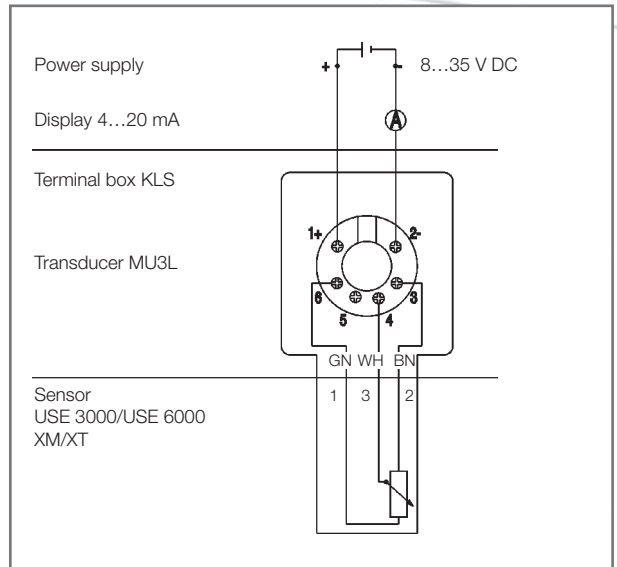
Dimensions (in mm/inch)



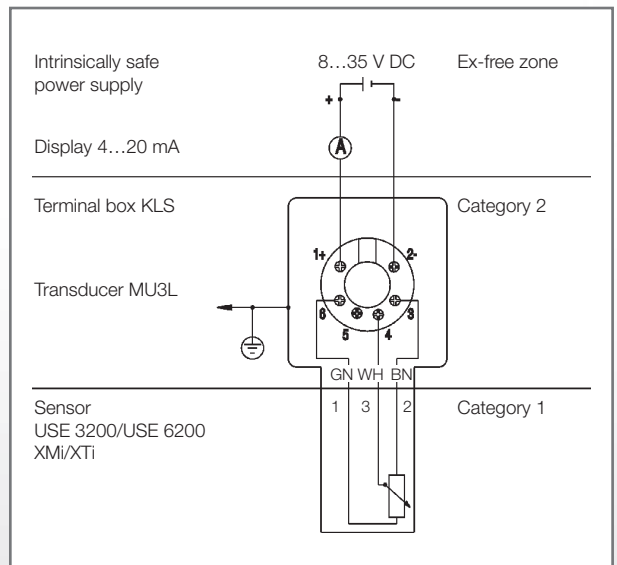
Index: B

Connection diagram

Level sensor with transmitter - Non-Ex application



Level sensor with transmitter - Ex application



Specifications are subject to changes without notice.

Trip amplifier for all physical quantities with digital display,
4 switching outputs and 1 analog output.
Linearity error 0.2% v. f. s.

Features

8-digit 14-segment LCD display with bargraph and trend indication, microprocessor controlled, self monitoring, all parameters are configured by keypad, display unit selectable, adjustable keypad lock, high accuracy, quick scanning rate (1000/s)

Display range

freely scalable: -9,999...+9,999

Applications

OEM applications,
Hydraulics and pneumatics,
Test bed and apparatus engineering,
Heavy industry



Index: A

Technical Data

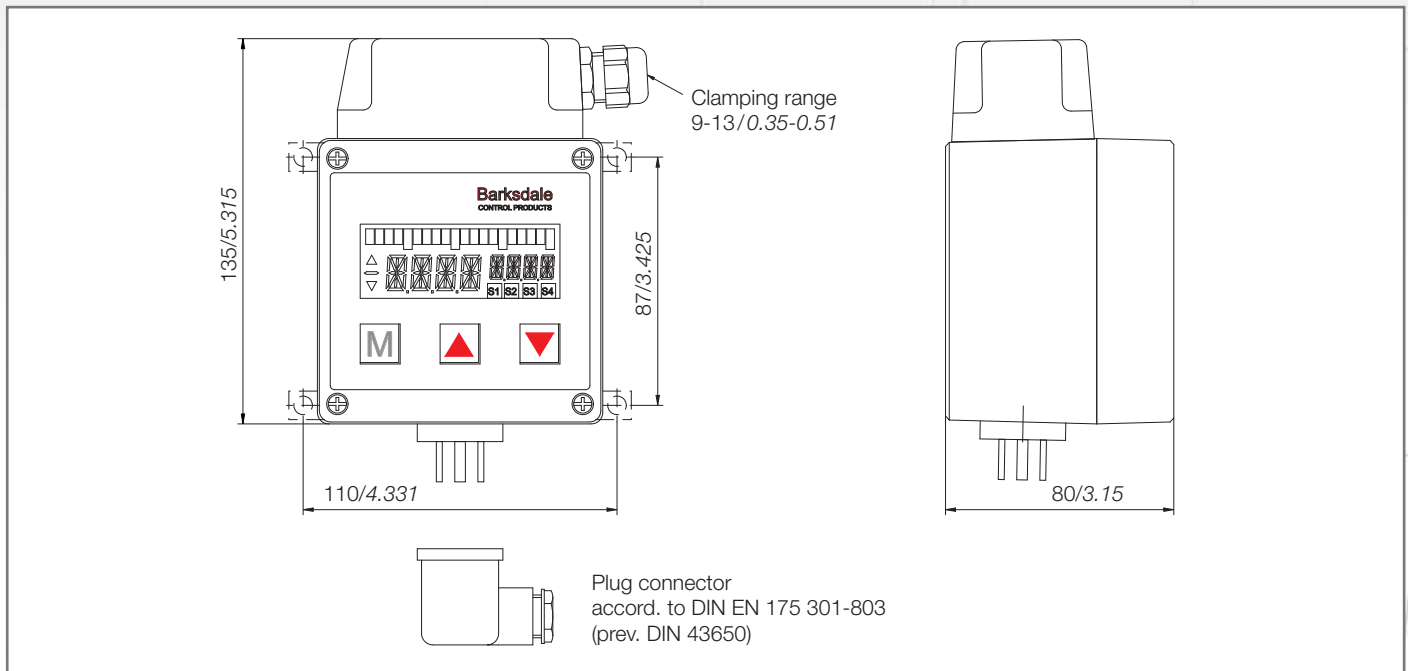
Measuring principle:	Amplifier with 12 bit A/D converter
Materials:	
Electronics housing:	Cast aluminum G AL SI 12
Housing seal:	CR
Keypad:	Polyester
Operating elements:	Keypad with easy-response pushbuttons
System of protection:	IP65
Protection class:	I
Dimensions:	100 x 135 x 80 mm (W x H x D)
Weight:	approx. 1080 g
Analog measuring inputs:	
Current input:	4...20 mA
Voltage input:	0...10 V DC
Resistance input:	0.5... 100 kOhm
Temperature:	PT100 element accord. to IEC751, see UTS3
Linearity error:	<±0.2% v. f. s. at 25 °C
A/D converter:	
Resolution:	12 bit (4096 steps per measuring span)
Scanning rate:	1000/s
On-status display:	
Bargraph:	8-digit 17-segment LCD display, digit height 12 mm, green
Trend arrows:	20-segment for current value last changes
Display range:	-9999... +9999
Display rate:	4/s
Display unit:	all technical units
Sensor connection:	Plug 3-pin, DIN EN 175 301-803-A (prev. DIN 43650), incl. plug connector
Electrical connection:	14-pin screw terminal for 1.5 mm ² AWG14, plug-in type

Cable gland:	
Standard:	1 x PG13.5 side entry
Option:	2 x PG13.5 top entry
Temperature influence:	<0.05% v. f. s./10K
Compensation range:	-10 °C... +70 °C
Repeatability:	≤ ±0.01% v. f. s.
Temperature range:	
Electronics:	-10 °C... +70 °C
Storage:	-30 °C... +80 °C
Power supply:	18...32 V DC, reversed polarity protected (SELV, PELV)
Power consumption:	approx. 350 mA at Ub = 24 V DC (without load)
Analog output:	
Current output:	4...20 mA
Load:	max. RI = (Ub-12 V)/20 mA RI = 600 Ohm at Ub = 24 V DC
Load influence:	0.3% / 100 Ohm
Scanning rate:	1 ms
Voltage output:	0...10 V DC
Rating:	max. 10 mA
Adjustment range:	25%... 100% f. s.
4x relay output(s) - change-over contacts (SPDT):	
Switching voltage:	max. 120 V DC / 250 V AC
Switching power:	max. 120 W / 1250 VA
Cycles:	1 mio. at 24 V DC / 2 A
Switching rate:	max. 20/s
Delay:	0.0 s ... 9.9 s adjustable
Operation time:	1 ms
Status display:	S1...S4 on LCD display
Accessories:	Mounting traverse, vibration damper
Approval:	cULus: file no. E248549

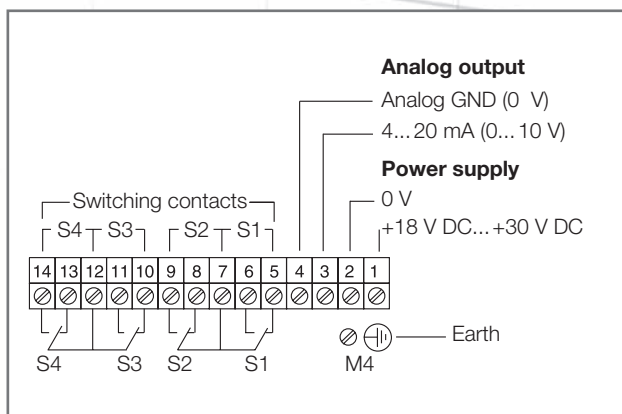
Specifications are subject to changes without notice.

Dimensions (in mm / inch)

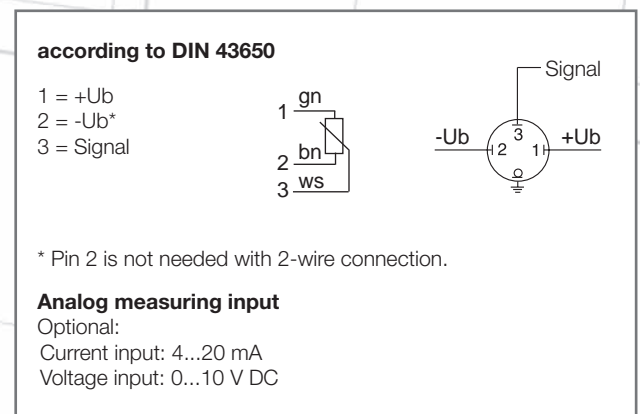
Index: A



Electronic connection scheme



Sensor Connection



Order Numbers

Electronic trip amplifier with 4 relays, 1 input and multifunction display		
Analog Input	Analog Output	Order No.
4...20 mA	---	0003-026
4...20 mA	4...20 mA	0003-024
4...20 mA	0...10 V	0003-025
0...10 V	---	0003-032
0...10 V	4...20 mA	0003-030
0...10 V	0...10 V	0003-031

Accessories

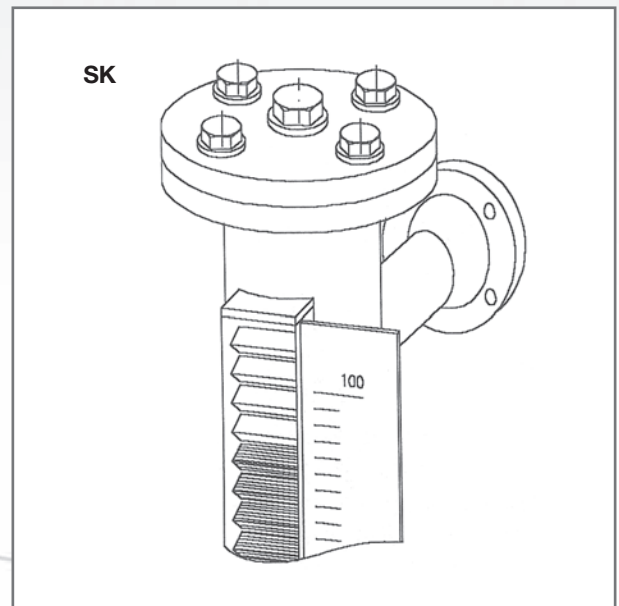
Order Number	Description
0099-001	Mounting traverse (1 set = 2 pcs)
0099-002	Mounting traverse (1 set = 2 pcs)
914-0107	Vibration damper (1 pack = 4 pcs)

Scale

All bypass level indicators can be supplied with a scale attached directly beside the indication rail. This scale will be manufactured according to the customer's requirements. So any graduation or measuring unit is possible. The base material is aluminium. For applications up to 150 °C the scales are affixed, for applications above 150 °C the scales are engraved.

We need the following data to submit an offer:

- ▶ Unit of measurement,
- ▶ Scale start and end values
- ▶ LM (indication length)
- ▶ Graduation: centimeter, decimeter or inch
- ▶ Any special requests, e.g. non-linear scale marking, engraved scale markings, colour marking, Resopal, plastic version, additional text etc.



Index: A

Isolation

PO:	For outdoor applications or applications in which the bypass level indicator is exposed to cold, splash water or dust we recommend the use of our protective polyolefine tubing for the indication rail. Temperature range: -55...130 °C.
AR:	Armaflex isolation (a foam rubber with smooth surface) is a suitable protection against cold and heat in the temperature range from -40 °C to +105 °C.
GL:	Glass fiber isolation is used as personal protection against skin burns when the medium temperature is above 60 °C. Temperature range: -40 °C...+500 °C.

Other isolations, e.g. mineral fibers and aluminium covers - also in combination with electrical heating - can be supplied on request.

Heating/Double wall design

EL:	Standard electrical heaters are designed for a temperature range from -30 to 65 °C and are attached to the bypass tube complete with capillary-tube thermostat. Nominal voltage: 230 V AC, protection class IP66.
ELX:	Electrical heaters for hazardous areas are designed for a temperature range from -30 to +65 °C and are attached to the bypass tube complete with Ex d capillary-tube thermostat. Nominal voltage: 230 V AC.
D:	Double tubes for steam or water heating are a good alternative for installations where these media are available in the direct vicinity. The total length L0 will increase slightly dependent on the process connections required. Connections for auxiliary media are available as threaded connections R 1/2", R 3/4" or DN 15, DN 25 flanges, on the side or rear.

Tests and certificates

- ▶ X-radiographic inspection of the weld seams
- ▶ Pressure test with certificates
- ▶ Factory certificates according to DIN 50049-2.1, 50049-2.2 or 50049-3.1b
- ▶ TÜV verification
- ▶ Special test certificates

Detailed information on all accessories on request.

Specifications are subject to changes without notice.

Type BNA-S21/S22

Index: A

Type:	Version:
BNA-S21	PN 16, G $\frac{1}{2}$ female connections top and bottom, Makrolon indication rail
BNA-S22	PN 16, side connections, Makrolon indication rail

Side connections:

R $\frac{1}{2}$ "	Side process connection
R $\frac{1}{2}$ " NPT	Side process connection
R $\frac{3}{4}$ "	Side process connection
DN 15	Flange according to DIN 2633 (flange face form C)
DN 20	Flange according to DIN 2527 (flange face form C)
DN 25	Flange according to DIN 2527 (identical in construction to DN 20), however tube OD remains 21.3 mm
$\frac{1}{2}$ "	Flange according to ANSI B 16,5 150 lbs
$\frac{3}{4}$ "	Flange according to ANSI B 16,5 150 lbs
1"	Flange according to ANSI B 16,5 150 lbs, however tube OD remains 21.3 mm

Indicator length [mm] (example):

2000/1	LM = 2000 mm/in one piece
3600/2	LM = 3600 mm/in two pieces

Float:

VA 30/02	material 1.4571, max. 16 bar/+150 °C, min. density: 0.85 g/cm 3
TT 30/02	material titanium, max. 25 bar/+150 °C, min. density: 0.85 g/cm 3
BN 32/100	material Buna N, max. 10 bar/+90 °C, min. density: 0.62 g/cm 3

Indication rail:

MA	Makrolon = standard, max. temperature: +150 °C
----	------------------------------------------------

Isolation:

Notes: AR and PO are possible in combination

AR	Armaflex, foam rubber isolation, temperature -40...105 °C
GL	Glass fiber tape, contact protection, temperature -40...500 °C
PO	Poliolefine shrink tubing, weather and dust protection for indication rail

Limit switches:

Note: The digit preceding the first letter indicates the desired quantity.

1GK03	1 limit switch GK03, temperature: -55 °C...+140 °C
-------	----------------------------------------------------

Remote indication:

XM	Remote indicator, potentiometer
XM _i	As above, Ex i version
TX	with 4...20 mA
TX _i	with 4...20 mA Ex i

BNA-S22 - DN 15 - 2600/1 - VA 30/02 - MA - AR - 1GK03 - XT_i (Example)

Specifications are subject to changes without notice.

Type BNA-S31...S46

Type:	Version:
BNA-S31	PN 16, top and bottom G $\frac{1}{2}$ connections, Makrolon indication rail, bottom service flange only
BNA-S32	PN 16, G $\frac{1}{2}$ side connection, Makrolon indication rail, bottom service flange only
BNA-S35	PN 16, top and bottom G $\frac{1}{2}$ connections, Makrolon indication rail, top and bottom service flange
BNA-S36	PN 16, G $\frac{1}{2}$ side connection, Makrolon indication rail, top and bottom service flange
BNA-S41	PN 40, top and bottom G $\frac{1}{2}$ connections, Makrolon indication rail, bottom service flange only
BNA-S42	PN 40, G $\frac{1}{2}$ side connection, Makrolon indication rail, bottom service flange only
BNA-S45	PN 40, top and bottom G $\frac{1}{2}$ connections, Makrolon indication rail, top and bottom service flange
BNA-S46	PN 40, G $\frac{1}{2}$ side connection, Makrolon indication rail, top and bottom service flange

Side connections:

R 1/2" or R 1/2" NPT	Process connection
R 3/4" or R 3/4" NPT	Process connection
R 1" or R 1" NPT	Process connection
DN 15	Flange PN16/DIN 2633 or PN 40/DIN 2635
DN 20	Flange PN16/DIN 2633 or PN 40/DIN 2635
DN 25	Flange PN16/DIN 2633 or PN 40/DIN 2635
DN 32	Flange PN16/DIN 2633 or PN 40/DIN 2635
DN 40	Flange, as above, however with conical reducer, extended from DN 32 to DN 40
DN 50	Flange, as above, however with conical reducer, extended from DN 32 to DN 50
1/2"	Flange 150 lbs, 300 lbs ANSI B 16,5
3/4"	Flange 150 lbs, 300 lbs ANSI B 16,5
1"	Flange 150 lbs, 300 lbs ANSI B 16,5
1 1/4"	Flange 150 lbs, 300 lbs ANSI B 16,5
1 1/2"	Flange 150 lbs, 300 lbs ANSI B 16,5, however with conical reducer, extended from DN 32 to 1 1/2"
2"	Flange 150 lbs, 300 lbs ANSI B 16,5, however with conical reducer, extended from DN 32 to 2"

Indicator length [mm] (example):

2000/1	LM = 2000 mm/in one piece
6000/2	LM = 6000 mm/in two pieces

Float:

VA 50/10	material 1.4571, max. 25 bar/+150 °C, min. density: 0.62 g/cm ³
VA 50/15	material 1.4571, as above, however with plug M4, density: 0.63 g/cm ³
TT 50/10	material titanium, max. 40 bar/+320 °C, min. density: 0.56 g/cm ³
TT 50/15	material titanium, as above, however with plug M4, density: 0.57 g/cm ³

Indication rail:

MA	Makrolon = standard, max. temperature: +150 °C
A2	Aluminium painted, max. temperature: +350 °C

Isolation:

Notes: AR and PO are possible in combination

AR	Armaflex, foam rubber isolation, temperature -40...105 °C
GL	Glass fiber tape, contact protection, temperature -40...500 °C
PO	Poliolefine shrink tubing, weather and dust protection for indication rail

Limit switches:

Note: The digit preceding the first letter indicates the desired quantity.

1GK03	1 limit switch GK03, temperature: -55 °C...+140 °C
2GKHT1	2 high-temperature limit switches, temperature: -55 °C...+350 °C

Remote indication:

XM	Remote indicator, potentiometer
XM _i	As above, Ex i version
TX	with 4...20 mA
TX _i	with 4...20 mA Ex i

Scale:

SK	Scale*
----	--------

Heating:

EL	Electric heating*
ELX	in EX d *
D	Double tube*

BNA-S32 - DN 25 - 2600/1 - VA 50/15 - MA - AR - 2GK03 - XT_i - SK - EL (Example)

* Detailed specification and description required.

Type BNA-S51...S52

Index: A

Type:	Version:
BNA-S51	PN 64, top and bottom G½ connections in DIN252, DN 50 blind flange top and bottom, Makrolon indication rail
BNA-S52	PN 64, G½ side connections in DIN252, DN 50 blind flange top and bottom, Makrolon indication rail

Side connections:

DN 15	Flange DIN 2637 (up to DN 40 PN 64 = PN 100, from DN 50 DIN 2636)
DN 20	Flange DIN 2637
DN 25	Flange DIN 2637
DN 32	Flange DIN 2637
DN 40	Flange, as above, however with conical reducer, extended from DN 32 to DN 40
DN 50	Flange, as above, however with conical reducer, extended from DN 32 to DN 50
½"	Flange 150 lbs, 300 lbs ANSI B 16,5
¾"	Flange 150 lbs, 300 lbs ANSI B 16,5
1"	Flange 150 lbs, 300 lbs ANSI B 16,5
1 ¼"	Flange 150 lbs, 300 lbs ANSI B 16,5
1 ½"	Flange 150 lbs, 300 lbs ANSI B 16,5, however with conical reducer, extended from DN 32 to DN 40
2"	Flange 150 lbs, 300 lbs ANSI B 16,5, however with conical reducer, extended from DN 32 to DN 50

Indicator length [mm] (example):

2000/1	LM = 2000 mm/in one piece
6600/2	LM = 6600 mm/in two pieces

Float:

VA 50/20	material 1.4571, max. 25 bar/+150 °C, min. density: 0.65 g/cm³
TT 50/20	material titanium, max. 40 bar/+320 °C, min. density: 0.60 g/cm³

Indication rail:

MA	Makrolon = standard, max. temperature: +150 °C
A2	Aluminium painted, max. temperature: +350 °C

Isolation:

Notes: AR and PO are possible in combination

AR	Armaflex, foam rubber isolation, temperature -40...105 °C
GL	Glass fiber tape, contact protection, temperature -40...500 °C
PO	Poliolfine shrink tubing, weather and dust protection for indication rail

Limit switches:

Note: The digit preceding the first letter indicates the desired quantity.

1GK03	1 limit switch GK03, temperature: -55 °C...+140 °C
2GKHT1	2 high-temperature limit switches, temperature: -55 °C...+350 °C

Remote indication:

XM	Remote indicator, potentiometer
XM <i>i</i>	As above, Ex i version
TX	with 4...20 mA
TX <i>i</i>	with 4...20 mA Ex i

Scale:

SK	Scale*
----	--------

Heating:

EL	Electric heating*
ELX	in EX d *
D	Double tube*

BNA-S52 - DN 25 - 2600/1 - VA 50/20 - MA - AR - 2GK03 - XT*i* - SK - EL (Example)

* Detailed specification and description required.

Type BNA-K301/K401/701/K302.0/K402.0/K702.0

Type:	Version:
BNA-K301	PVC with top and bottom threaded connection, Makrolon indication rail, bottom service port only
BNA-K302.0	PVC with top and bottom flange connection, Makrolon indication rail, bottom service port only
BNA-K401	PVDF with top and bottom threaded connection, Makrolon indication rail, bottom service port only
BNA-K402.0	PVDF with top and bottom flange connection, Makrolon indication rail, bottom service port only
BNA-K701	PP with top and bottom threaded connection, Makrolon indication rail, bottom service port only
BNA-K702.0	PP with top and bottom flange connection, Makrolon indication rail, bottom service port only

Side connections:

G 1/2"	Process connection
G 3/4"	Process connection
G 1"	Process connection
DN 15	Flange PN16/DIN 2633
DN 20	Flange PN16/DIN 2633
DN 25	Flange PN16/DIN 2633
DN 32	Flange PN16/DIN 2633
1/2"	Flange 150 lbs, ANSI B 16,5
3/4"	Flange 150 lbs, ANSI B 16,5
1"	Flange 150 lbs, ANSI B 16,5
1 1/4"	Flange 150 lbs, ANSI B 16,5

Indicator length [mm] (example):

2000/1	LM = 2000 mm/in one piece
3600/2	LM = 3600 mm/in two pieces

Float:

PVC 50/10	max. 2.5 bar/+60 °C, min. density: 0.54 g/cm ³
PP 50/10	max. 2.5 bar/+80 °C, min. density: 0.45 g/cm ³
PVDF 50/10	max. 6.0 bar/+140 °C, min. density: 0.66 g/cm ³

Note: Please specify the medium density in your order, so that we can calibrate the float accordingly.

Isolation:

PO	Poliolefine shrink tubing, weather and dust protection for indication rail
----	----------------------------------------------------------------------------

Limit switches:

Note: The digit preceding the first letter indicates the desired quantity.

1GK03	1 limit switch GK03, temperature: -55 °C...+140 °C
-------	----------------------------------------------------

Remote indication:

XM	Remote indicator, potentiometer
XM <i>i</i>	As above, Ex i version
TX	with 4...20 mA
TX <i>i</i>	with 4...20 mA Ex i

Scale:

SK	Scale*
----	--------

Heating:

EL	Electric heating*
ELX	in EX d *

BNA-K701 - DN 25 - 2600/1 - PP 50/10 - PO - 2GK03 - XT*i* - SK - EL (Example)

* Detailed specification and description required.

Type BNA-K302.1/K402.1/K702.1/K303/K403/K703

Index: A

Type:	Version:
BNA-K302.1	PVC with top and bottom lap joint flange DIN 8063 PN10 DN50, Makrolon indication rail
BNA-K303	PVC with side lap joint flange and top and bottom blind flange DN50, Makrolon indication rail
BNA-K402.1	PVDF with top and bottom lap joint flange DIN 8063 PN10 DN50, Makrolon indication rail
BNA-K403	PVDF with side lap joint flange and top and bottom blind flange DN50, Makrolon indication rail
BNA-K702.1	PP with top and bottom lap joint flange DIN 8063 PN10 DN50, Makrolon indication rail
BNA-K703	PP with side lap joint flange and top and bottom blind flange DN50, Makrolon indication rail

Side connections:

DN 15	Flange, lap joint with stub end acc. to PN10/DIN 8063, reduced from DN 50 T piece
DN 20	Flange, lap joint with stub end acc. to PN10/DIN 8063, reduced from DN 50 T piece
DN 25	Flange, lap joint with stub end acc. to PN10/DIN 8063, reduced from DN 50 T piece
DN 32	Flange, lap joint with stub end acc. to PN10/DIN 8063, reduced from DN 50 T piece
DN 40	Flange, lap joint with stub end acc. to PN10/DIN 8063, reduced from DN 50 T piece
DN 50	Flange, lap joint with stub end acc. to PN10/DIN 8063
½"	Flange, lap joint with stub end acc. to 150 lbs, reduced from DN 50 T piece
¾"	Flange, lap joint with stub end acc. to 150 lbs, reduced from DN 50 T piece
1"	Flange, lap joint with stub end acc. to 150 lbs, reduced from DN 50 T piece
1 ¼"	Flange, lap joint with stub end acc. to 150 lbs, reduced from DN 50 T piece
1 ½"	Flange, lap joint with stub end acc. to 150 lbs, reduced from DN 50 T piece
2"	Flange, lap joint with stub end acc. to 150 lbs

Indicator length [mm] (example):

2000/1	LM = 2000 mm/in one piece
3600/2	LM = 3600 mm/in two pieces

Float:

PVC 50/10	max. 2.5 bar/+60 °C, min. density: 0.54 g/cm ³
PP 50/10	max. 2.5 bar/+80 °C, min. density: 0.45 g/cm ³
PVDF 50/10	max. 6.0 bar/+140 °C, min. density: 0.66 g/cm ³

Note: Please specify the medium density in your order, so that we can calibrate the float accordingly.

Isolation:

PO Poliolefine shrink tubing, weather and dust protection for indication rail

Limit switches:

Note: The digit preceding the first letter indicates the desired quantity.

1GK03 1 limit switch GK03, temperature: -55 °C...+140 °C

Remote indication:

XM	Remote indicator, potentiometer
XM <i>i</i>	As above, Ex i version
TX	with 4...20 mA
TX <i>i</i>	with 4...20 mA Ex i

Scale:

SK Scale*

Heating:

EL	Electric heating*
ELX	in EX d *

BNA-K703 - DN 50 - 2600/1 - PP 50/10 - PO - 2GK03 - XT*i* - SK - EL (Example)

* Detailed specification and description required.

Specifications are subject to changes without notice.

Experts

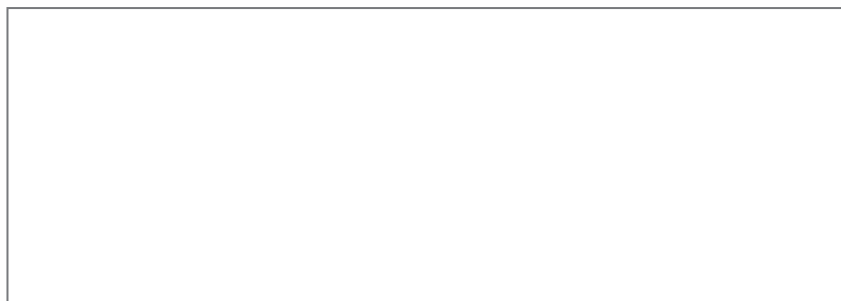
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- ▶ Pressure
- ▶ Temperature
- ▶ Level
- ▶ Flow

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