# LEVEL

## Bypass Level Indicators

switch

measure

control

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

# Index



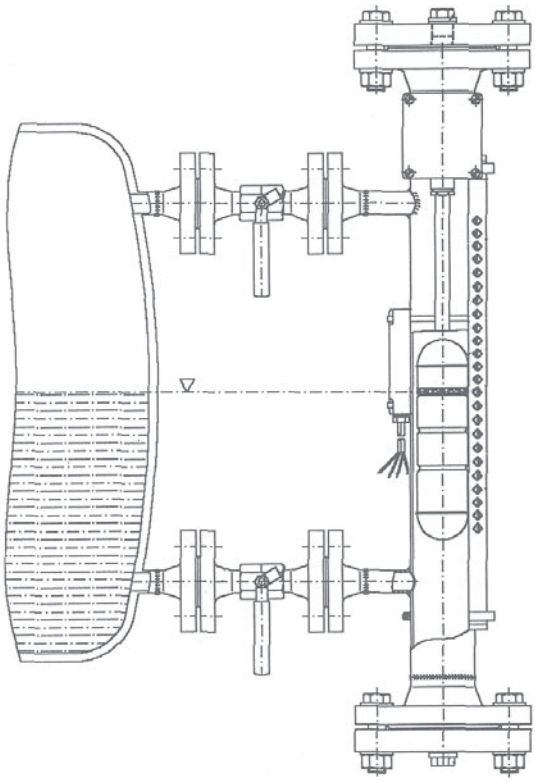
06 / 05 BNA US 01/1

# Introduction

06 / 05 BNA US 01/1



## Function Principle



The **Barksdale** Bypass Level Indication System combines the convenience of a sight glass and the strength of a Stainless Steel tube, with the only difference; there is no glass to break or seals to leak. Colourless clean, or even dirt contaminated liquids are indicated by a row of red / white coloured rotating flags and can be seen from great distances.

The bypass tube is connected by side / side, or top and bottom connections with the tank. A magnetic float inside the bypass tube rides on the same level as in the tank and operates the coloured flags, the limit switches and / or the optional level transmitter on the outside of the tube.

The special permanent magnet design provides a 360 degree magnetic flux field. This allows the indication rail, the limit switches and continuous level sensor to be located anywhere around the bypass tube.

The Bypass Level Indication System is available in a variety of metals and plastics.

Except for the tank top version, we can serve many applications up to standard 64 bar and 320 °C.

Depending on process requirements we offer many options such as: special floats, calibrated scales, trace heating, isolations, drain valves, various international construction standards, special tests and approvals.

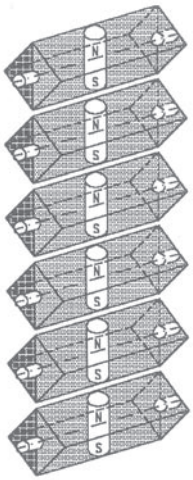
Bypass level tubes with total length > 3 meters can cause higher packing, transport and installation costs than short sections. We therefore offer split versions which can be flanged together on site during installation.
Please contact us for details.

**Attention:** The indication rail will be interrupted for 30 to 50 mm at the split. In this gap neither indication nor limit switches are possible.



## Materials

Bypass tube, flanges and floats are as standard available in: Stainless Steel 316 Ti / 1.4571, Titanium, PVC, PVDF, or Polypropylene.
Optional metals and cladding, Teflon lining, chemical metalising, and coatings are available on demand.

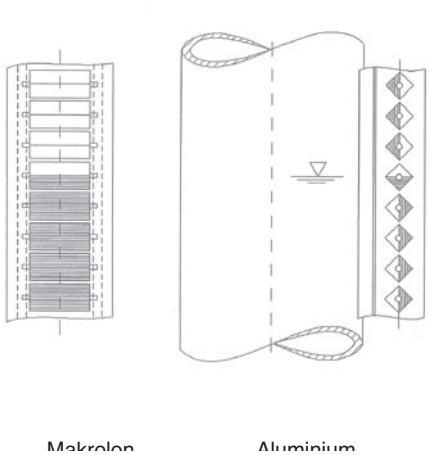


## Indication Flags

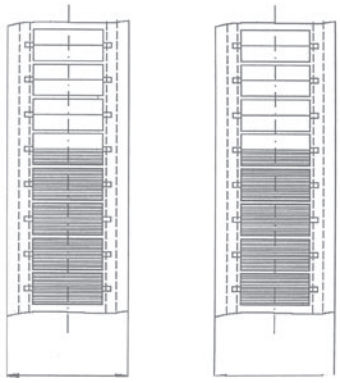
The rotary flags are large in size and brilliant in colour. These square section rotary flags are magnetically interlocked, designed to main-tain their relative position even when subject to significant vibration. They rotate from white to red when the magnet quipped float rises with the liquid level in the bypass tube and clearly indicate the level which can be seen from over thirty meters away.
In one meter indication there are 80 flags, corresponding to an accuracy of 1,25% for one meter, or 0,6% for two meter indication length. Aluminum flags are painted red and aluminum and can be subjected to 320 °C, the polycarbonate flags can be exposed to 150 °C medium, equals 120 °C ambient temperature.

# Introduction

## Indication Rail Assembly



Makrolon Aluminium



Indication rail assemblies are available in polycarbonate (Makrolon) and anodised aluminium for high Temperatures.
The polycarbonate assemblies are 26 mm wide, clear, virtually resistant against UV, chemically polluted atmospheres and im-pacts and offer 180° visibility.
The extruded aluminum indication rails are anodised, 30 mm wide and have glass panes to protect the flags. They can be subjected to 320 °C ambient or 350 °C medium temperatures.

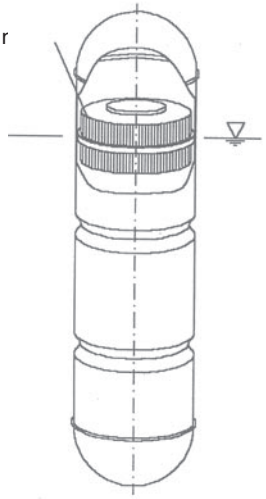
The indication rail assemblies are attached to the outside of the bypass tube with stainless steel clamps and therefore can easily be positioned in the direction needed for optimal reading (not possible with the double wall / tube design).

The end caps on the rails protect the flags against dirt or dust, however when rain or freezing conditions can be expected we recommend an additional shrink tubing. Please see also page 6.

Flags which are in the wrong position due to external magnetic influences will automatically return to the right position by the flux field of the float on the next passing by.

## Floats

Ring r



The floats are fabricated in various standard versions: stainless steel, Titanium, PVC, PP, or PVDF (Kynar). Please see page 23.
The stainless steel versions in 1.4571 (316Ti) can be used up to 150 °C medium temperatures, the Titanium up to 320 °C.

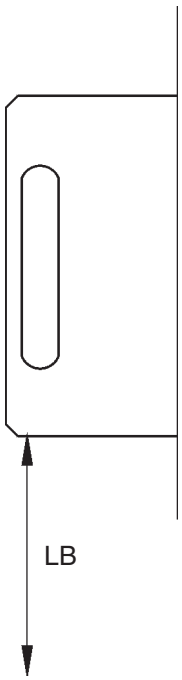
In the metal floats the top extends 50 mm above the magnet. Depending on the specific gravity g (equals density) of the fluid the float raises or lowers its floating position and therefore influences the indication accuracy.
The type VA50/15 and TT50/15 floats are designed to simply match the indication with the liquid level in the bypass tube by adding weight in the float for fluids with higher densities.
These floats are also used for interface measurement between two liquids; for example oil and water; the float will sink through the oil and floats on the water.
Interface application require a minimum specific gravity difference of 0,2.
For pressures over 40 bar we have vented floats VA50/20 and TT50/20 which have a vent tube for equalising the inside and outside pressure of the float. This vent tube automatically removes with each small pressure drop condensate from the inside of the float back into the bypass tube.
These vented floats should not be exposed to pressure shocks; it is important that the system will be brought up to pressure slowly.

06 / 05 BNA US 01/1

# Introduction



## Mounting Brackets




In the standard version we supply all bypass indication systems with top and bottom process connections with mounting brackets; the 60 mm ø metal versions with welded-on bracket(s), the others in engineered plastics (K) and the S21/ S22 version have clamped-on bracket(s).

When not specified otherwise the dimension LB1 is 300 mm for all units with a total length (L0) > 1000 mm.
For L0 up to 2000 mm LB1 is 300 mm and LB2 = L0 –400 mm.
For L0 over 3000 mm there is a bracket in the middle (LBm) between LB1 and LB2. LBm = LB1 –LB2 .

When the bypass tube is a split version there will be a bracket 200 mm under the “split” flange facing and another bracket 100 mm above.

All LB dimensions are measured from the bottom of the bracket.

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

## Heat Tracing

To prevent the cooling or freezing of liquids in the bypass tube we offer an electric heat trace system or a double tube design to be used with steam or water. This double tube design can be used with chilled water when cooling is needed.

It is recommended to order this option with an isolation or plan to have these isolated together with the rest of the installation.

## Isolation

For personal protection we offer a woven glass isolation (–40 °C...+400 °C) around the tube, a rubber foam type isolation (–40 °C...+105 °C) for low temperatures, and a calcium silicate and aluminium isolation to save energy with high temperatures up to 400 °C.

## Weather Protection

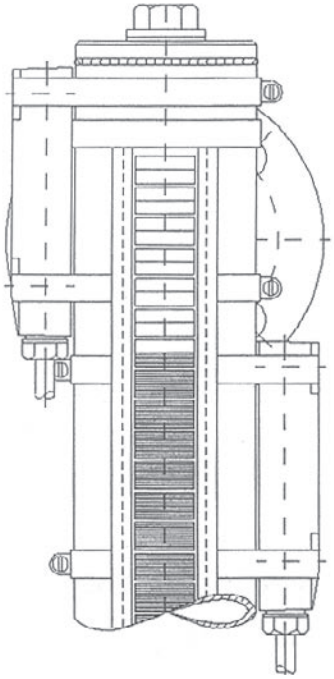
For outdoor or applications where moisture or dust can be expected we recommend the use of our protective shrink tubing for the indication rail.

This transparent Polyolefin shrink tubing offers also a good resistance against 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; the use of solvents is not recommended. Temperature limits: –55 °C...+135 °C.

# Introduction

## Limit Switches



**Barksdale** offers a line of various Limit Switches:

- GK 01 (Standard)
- GK 01-L with LED's, optional in EEx ia
- GK 03, optional in EEx ia
- GK HT1 (high temperature version).

As the float rises with the liquid level the magnet system will switch-over the contact. This contact status will remain until the float passes again and the switch status returns to it's original position.

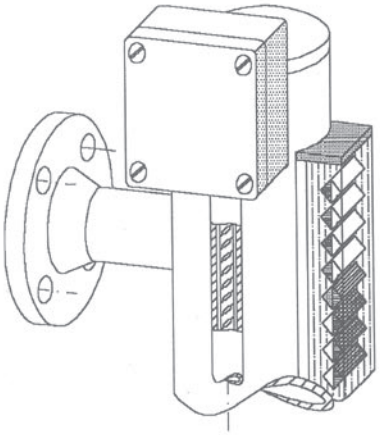
Besides the GK HT1 which has a micro switch, all other Limit Switches have bi-stable reed contacts.

The GK 01-L has a red and a green LED which indicate the switch over status of the contact whenever the float passes.

The Limit Switches are designed for quick and easy installation; only a screw driver is needed to tighten the stainless steel clamps. They can be mounted in any position around the bypass tube without influencing each other.

When frequent changing process requirements make a permanent contact position difficult to handle we recommend to order our XT level transmitters and UAS 3 - V3 trip amplifiers, which enables set point changes by touching a key pad.

## Continuous Level Indicating Transmitters (TLI)



All Bypass Level Indicators are available with a strap-on transmitter with continuous (resistance) electrical output or as Level Transmitter with integrated signal conditioner and a two-wire 4...20 mA output.

The measuring principle is a static chain of magnetically activated reed switches with resistors arranged inside a vertical SS tube at 12,7 mm intervals.

The flux field transmitted by the float causes reed switches to operate in a „2-3-2 at a time" sequence, rendering an effective reading of 6,35 mm accuracy regardless of the length of the chain and provide a reed switch and signal redundancy.

Intrinsically safe versions XMi and XTi are available for hazardous areas, when needed, there is also a digital version with Hart protocol configuration.

For interface level measurement the output signal can easily be inverted (20...4 mA).

06 / 05 BNA US 01/1

# Introduction

## Safety Switching Function

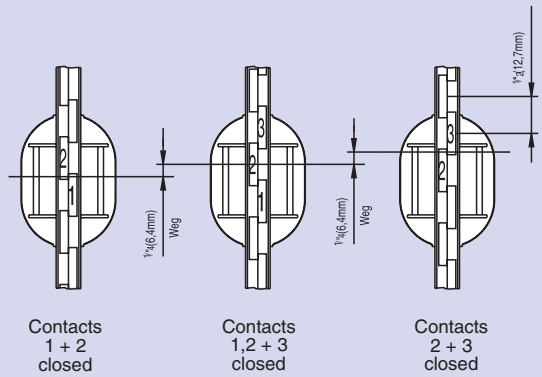



Fig. 3

Magnetic reed switches are tapped into a voltage divider resistance at 6,4 mm intervals within the transmitter and connected to a remote indicating meter.

The magnet-equipped float closes these switches in a „2-3-2“ sequence as it moves as shown in Fig. 3. When two switches are closed, the effective tab point is halfway between the two. When the float moves another 6,4 mm and closes the next switch, while holding the first closed, the effective tap point is at the middle switch of the three and one 3,2 mm from the first tab point. Therefore, a voltage is read at the meter for each 6,4 mm of float travel.

## Transmitter Accuracy

Depending on requirements and model different screen sizes are available:

R12 - (1/4“ = 6,4 mm),
accuracy appr. 0,2% at 3000 mm - standard

The measuring accuracy of the level sensor can be calculated by using the following formula in accordance to the measuring length:

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

e. g.: $\pm \frac{(6{,}4\ \text{mm} : 2)}{1000\ \text{mm}} \times 100\% = 0{,}32\%$

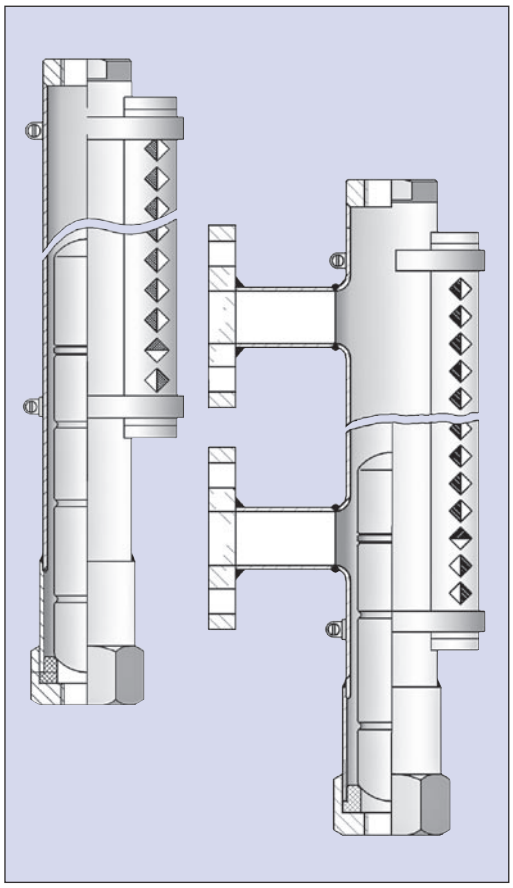
## Special Designs

**This catalog contains only our standard program.**

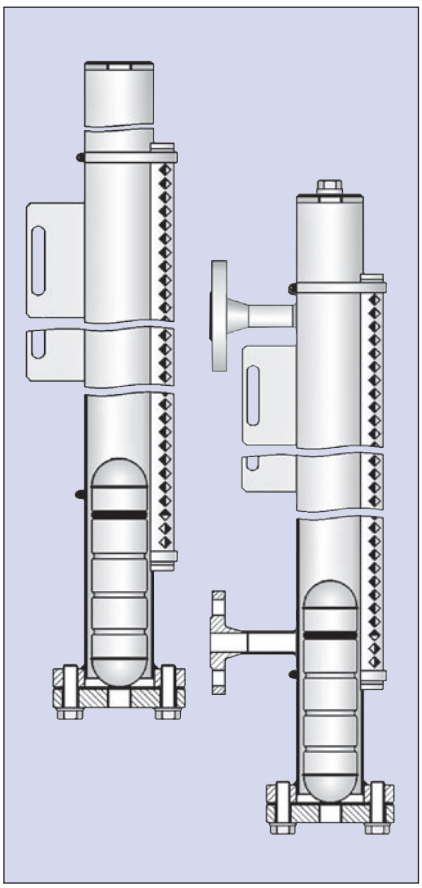
**There are many more versions available, please contact us. We are happy to assist you.**

# Overview

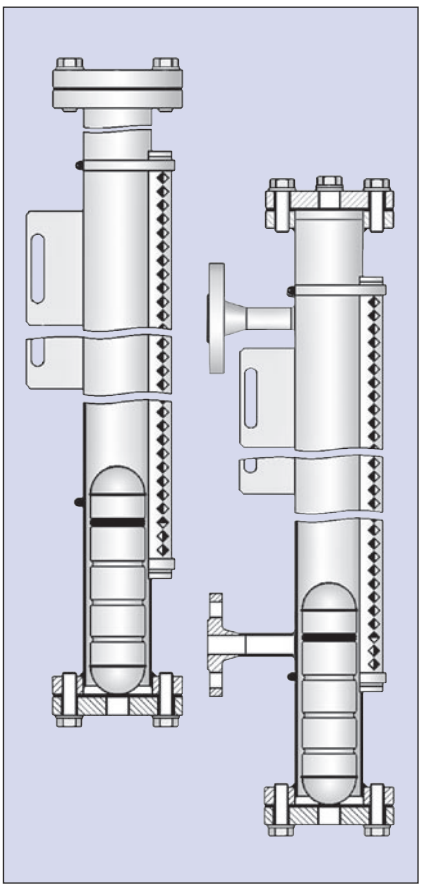
BNA-S21 BNA-S22



BNA-S31 BNA-S32



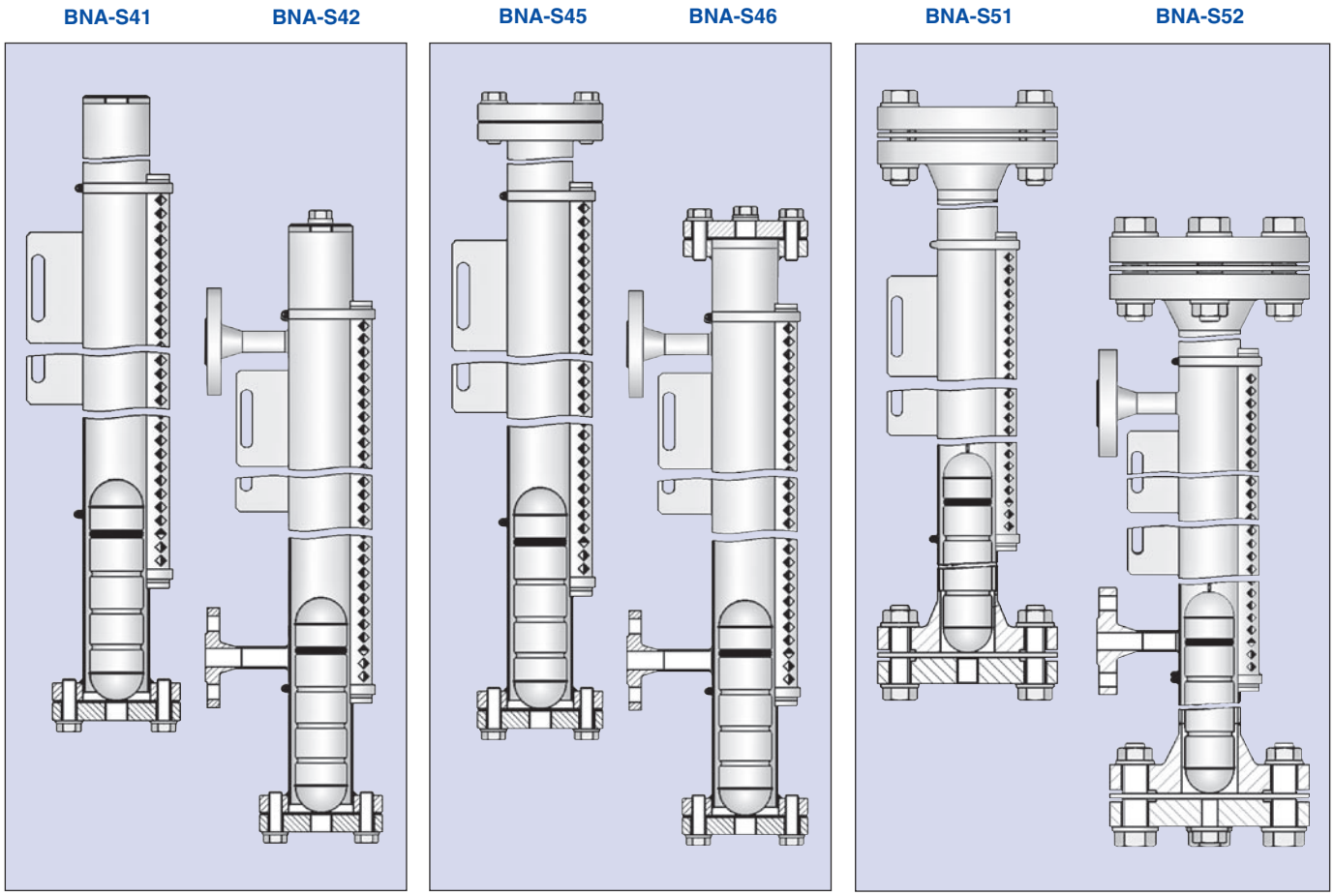
BNA-S35 BNA-S36



| Type | BNA-S21<br>BNA-S22 | BNA-S31<br>BNA-S32 | BNA-S35<br>BNA-S36 |
|---|---|---|---|
| **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 one piece, max. LM in split sections on request |
| **Indication Rail Assembly** | Makrolon (Polycarbonate), with red/white square flags | Makrolon (Polycarbonate), with red/white square flags | Makrolon (Polycarbonate), with red/white square flags |
| **Process Connection (without Adaptor)** | BNA-S21: top and bottom G 1/2<br>BNA-S22: side mounted | BNA-S31: top and bottom G 1/2<br>BNA-S32: side mounted | BNA-S35: top and bottom G 1/2<br>BNA-S36: side mounted |
| **Stem** | Stainl. St. 1. 4571 (SS 316 Ti) PN 25, diameter 40 x 1 mm | Stainl. St. 1. 4571 (SS 316 Ti) PN 16, diameter 60,3 x 2 mm | Stainl. St. 1.4571 (SS 316 Ti) PN 16, diameter 60, 3 x 2 mm |
| **Float** | Standard: VA 30/02, (SS 316Ti) 1.4571, min. density: 0,85 g/cm³<br>max. 25 bar and 150 °C | Standard PN 25: VA 50/10 in 1.4571, min. density: 0,62 g/cm³,<br>max. temperature: 150 °C | Standard PN 25: VA 50/10 in 1. 4571<br>min. density: 0,62 g/cm³,<br>max. temperature: 150 °C |
| **Max. Pressure in bar** | 25 bar | 16 bar | 16 bar |
| **Max. Temperature** | 150 °C media dependent | 150 °C media dependent | 150 °C media dependent |
| **Options** | Titanium- / Buna-N Float | Alu-Indication Rail, Titanium-Float, Special Connections | Alu-Indication Rail, Titanium-Float, Special Connections |
| **Approvals** | Shipbuilding Approval | Shipbuilding Approval | Shipbuilding Approval |

06 / 05 BNA US 01/1

# Overview

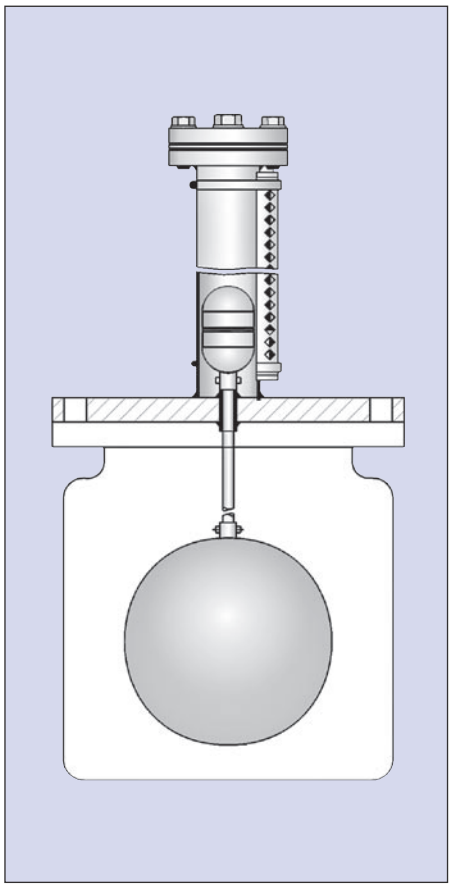



| Type | BNA-S41<br>BNA-S42 | BNA-S45<br>BNA-S46 | BNA-S51<br>BNA-S52 |
|---|---|---|---|
| **Measuring Ranges** | LM max. 6000 mm one piece, split sections also longer, max. LM on request | LM max. 6000 mm one piece, split sections also longer, max. LM on request | LM max. 6000 mm one piece, split sections also longer, max. LM on request |
| **Indication Rail Assembly** | Makrolon (Polycarbonate), with red/white square flags | Makrolon (Polycarbonate), with red/white square flags | Makrolon (Polycarbonate), with red/white square flags |
| **Process Connection (without Adaptor)** | BNA-S41: top and bottom G 1/2<br>BNA-S42: side mounted | BNA-S45: top and bottom G 1/2<br>BNA-S46: side mounted | BNA-S51: top and bottom G 1/2<br>BNA-S52: side mounted |
| **Stem** | Stainl. St. 1.4571 (SS 316 Ti) PN 40, diameter 60,3 x 2 mm | Stainl. St. 1.4571 (SS 316 Ti) PN 40, diameter 60,3 x 2 mm | Stainl. St. 1.4571 (SS 316 Ti) PN 64, diameter 60,3 x 2 mm |
| **Float** | Standard PN 40: TT 50/10 in Titan, min. density: 0,56 g/cm³, max. temperature: 320 °C | Standard PN 40: TT 50/10 in Titan, min. density: 0,56 g/cm³, max. temperature: 320 °C | Standard: VA 50/20-VAE (vented) in 1.4571, min. density: 0,65 g/cm³, max. temperature: 150 °C |
| **Max. Pressure in bar** | 40 bar | 40 bar | 64 bar |
| **Max. Temperature** | 320 °C media dependent | 320 °C media dependent | 150 °C media dependent |
| **Options** | Alu-Indication Rail, Titanium-Float, Special Connections | Alu-Indication Rail, Titanium-Float, Special Connections | Alu-Indication Rail, Titanium-Float, Special Connections |
| **Approvals** | Shipbuilding Approval | Shipbuilding Approval | Shipbuilding Approval |

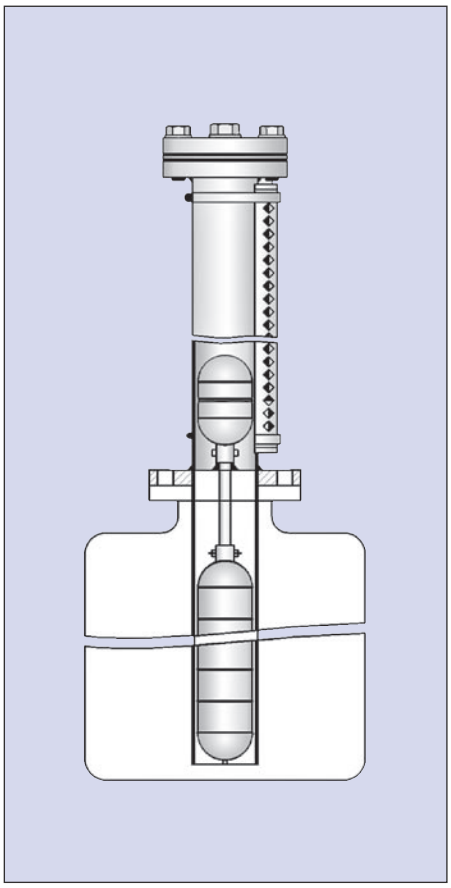
06 / 05 BNA US 01/1

# Overview

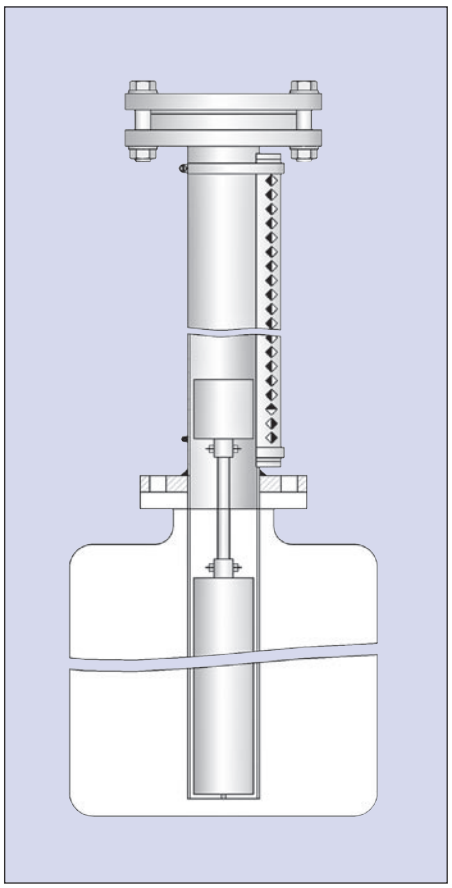
BNA-U101



BNA-U102



BNA-U301 BNA-U401 BNA-U701



| Type | BNA-U101 | BNA-U102 | BNA-U301<br>BNA-U401<br>BNA-U701 |
|---|---|---|---|
| **Measuring Ranges** | Depends on the buoyancy of the float (which again depends on the density of the medium (g)), max. LM on request | Depends on the buoyancy of the float (which again depends on the density of the medium (g)), max. LM on request | Depends on the buoyancy of the float (which again depends on the density of the medium (g)) |
| **Indication Rail Assembly** | Makrolon (Polycarbonate), with red/white square flags | Makrolon (Polycarbonate), with red/white square flags | Makrolon (Polycarbonate), with red/white square flags |
| **Process Connection (without Adaptor)** | VA Flange DIN 2527 DN 200 / PN 16<br>LM max. 6000 mm, 5300 mm / | VA Flange DIN 2527 DN 65 / PN 16<br>LM max. 4500 mm / | Flange DN 65 |
| **Stem** | Stainl. St. 1. 4571 (SS 316 Ti) PN 64, diameter 60, 3 x 2 mm | Stainl. St. 1. 4571 (SS 316 Ti) PN 64, diameter 60, 3 x 2 mm | Diameter 63, 3 x 2 mm |
| **Float** | VA 200 with VA tube 12 x 1<br>min. density = 0,6 g/cm³ | VA 50-400 mit ABS Rohr<br>min. density = 0,6 g/cm³ | PVC 300, LM 1000 mm, min. dens. 0,7 g/cm³<br>PVC 300, LM 2000 mm, min. dens. 0,8 g/cm³<br>PVC 400, LM 2000 mm, min. dens. 0,67 g/cm³<br>PP 300, LM 4000 mm, min. dens. 0,8 g/cm³<br>PP 400, LM 4000 mm, min. dens. 0,67 g/cm³ |
| **Max. Pressure in bar** | 16 | 16 | BNA-U301: 2,5 / BNA-U401: 6<br>BNA-U701: 2,5 |
| **Max. Temperature** | 150 °C media dependent | 150 °C media dependent | BNA-U301: 60 °C / BNA-U401: 140 °C<br>BNA-U701: 80 °C |
| **Options** | Alu-Indication Rail, Titanium-Float | Float, Connections | Float, Connections |
| **Approvals** | --- | --- | --- |

06 / 05 BNA US 01/1

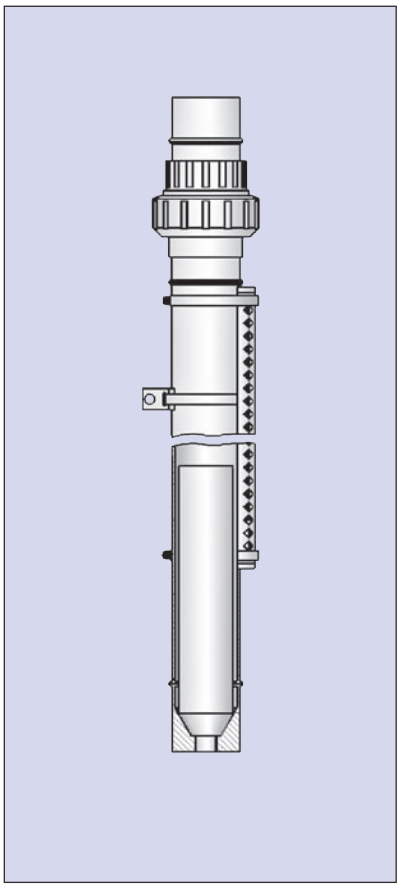
# Overview



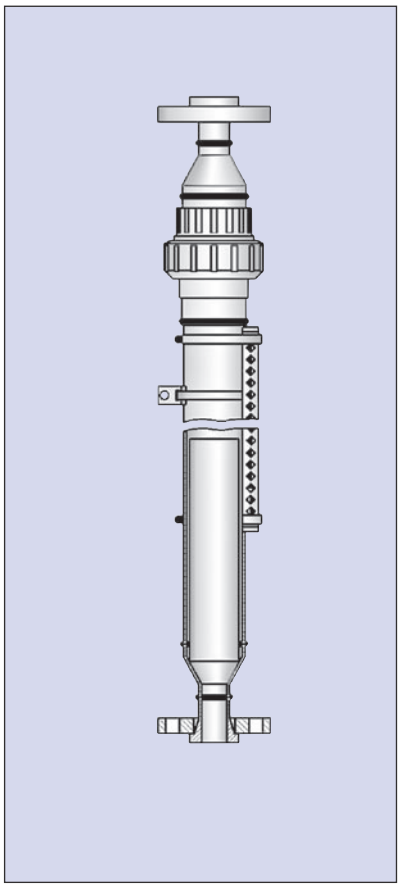




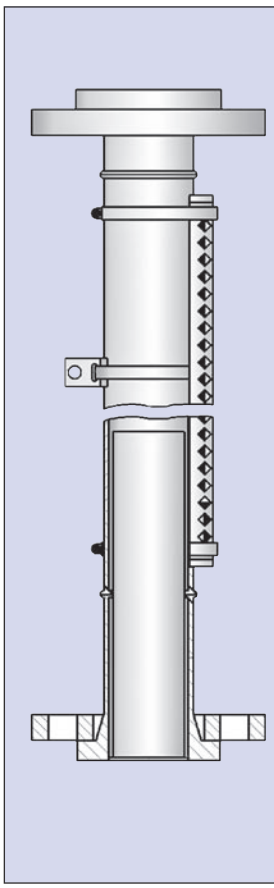
**BNA-K301 BNA-K401 BNA-K701**



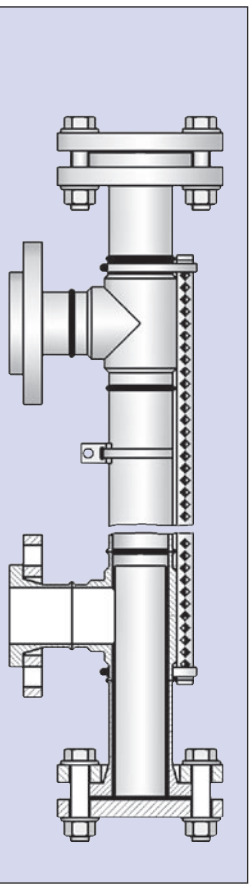
**BNA-K302.0 BNA-K402.0 BNA-K702.0**



**BNA-K302.1 / -K402.1 / -K702.1**



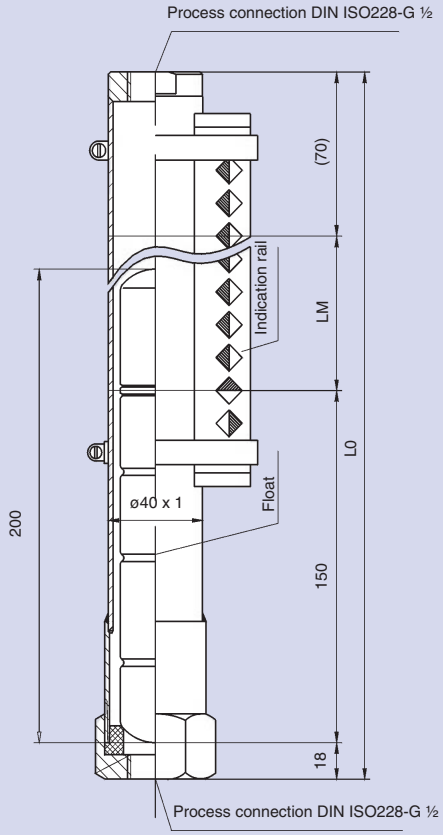
**BNA-K303 / -K403 / BNA-K703**



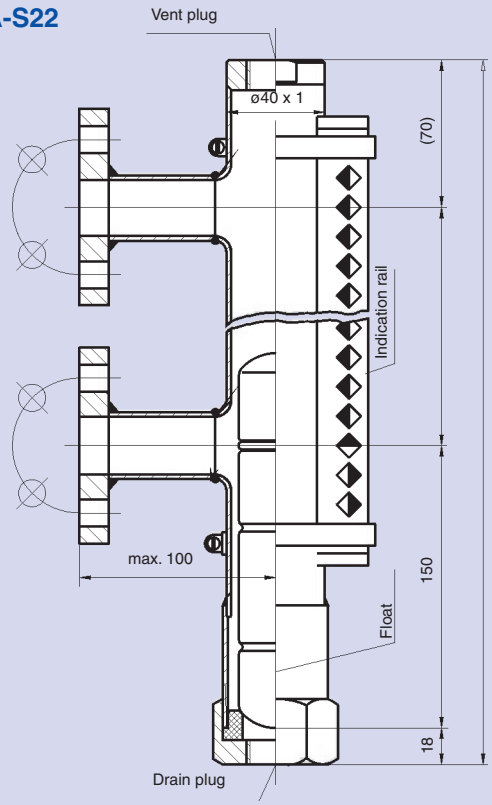
| Type | BNA-K301<br>BNA-K401<br>BNA-K701 | BNA-K302.0<br>BNA-K402.0<br>BNA-K702.0 | BNA-K302.1<br>BNA-K402.1<br>BNA-K702.1<br>BNA-K303*<br>BNA-K403*<br>BNA-K703* |
|---|---|---|---|
| **Measuring Ranges** | LM max. 3000 mm one piece, split sections on request | LM max. 3000 mm one piece, split sections on request | LM max. 3000 mm one piece, split sections on request |
| **Indication Rail Assembly** | Makrolon (Polycarbonate), with red/white square flags | Makrolon (Polycarbonate), with red/white square flags | Makrolon (Polycarbonate), with red/white square flags |
| **Process Connection (without Adaptor)** | with Thread | with Flanges DN 15 to DN 32 | Lap joint flanges with stub ends at top DIN 8063/PN10, top + bottom DN 50<br>* side mounted DN 15 to DN 50 |
| **Stem** | Diameter 63,3 x 3 mm | Diameter 63,3 x 3 mm | Diameter 63 x 3 mm |
| **Float** | PVC 50/10, min. density 0,54 g/cm³<br>PVDF 50/10, min. density 0,66 g/cm³<br>PP 50/10, min. density 0,45 g/cm³ | PVC 50/10, min. density 0,54 g/cm³<br>PVDF 50/10, min. density 0,66 g/cm³<br>PP 50/10, min. density 0,45 g/cm³ | PVC 50/10, min. density 0,54 g/cm³<br>PVDF 50/10, min. density 0,66 g/cm³<br>PP 50/10, min. density 0,45 g/cm³ |
| **Max. Pressure in bar** | BNA-K301: 2,5 / BNA-K401: 6<br>BNA-K701: 2,5 | BNA-K302.0: 2,5 / BNA-K402.0: 6<br>BNA-K702.0: 2,5 | BNA-K302.1: 2,5 / BNA-K402.1: 6<br>BNA-K702.1: 2,5 |
| **Max. Temperature** | BNA-K301: 60 °C / BNA-K401: 140 °C<br>BNA-K701: 80 °C | BNA-K302.0: 60 °C / BNA-K402.0: 140 °C<br>BNA-K702.0: 80 °C | BNA-K302.1: 60 °C / BNA-K402.1: 140 °C<br>BNA-K702.1: 80 °C |
| **Options** | Special Connections | Special Connections | Special Connections |
| **Approvals** | --- | --- | --- |

# BNA-S21 / -S22

## BNA-S21




## BNA-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 25 bar.

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

## Technical Data

### Standard version:

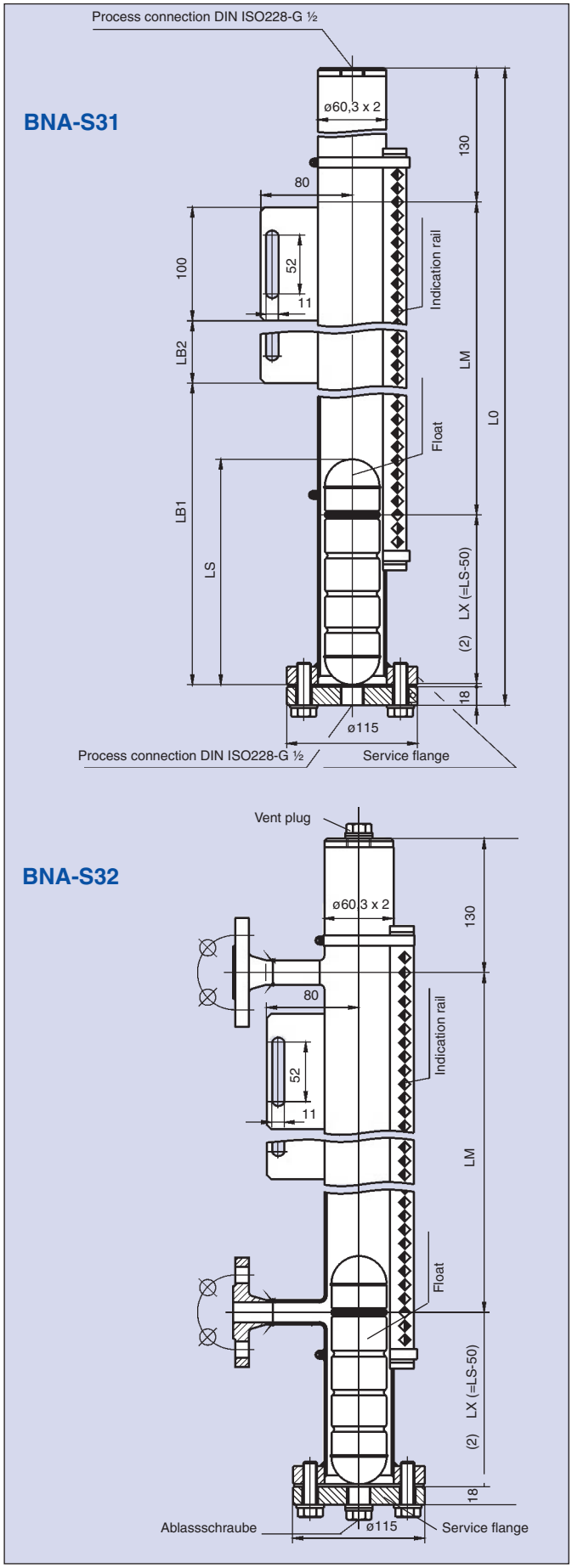
| | |
|---|---|
| Measuring range: | LM max. 3000 mm in one piece,<br>max. LM in split sections on request |
| Bypass tube: | Stainless Steel No. 1.4571 (SS 316 Ti)<br>PN 16, diameter 40 x 1 mm |
| Proof pressure: | 1,5 x max. operating pressure |
| Service conn.: | R 1 1/4” with hex. nut for service,<br>G1/2 top and bottom with plug |
| Process conn.: | Threaded R 1/2 , R 3/4<br>or DIN flanges DN 15, 20, 25<br>or ASA flanges DN 1/2”, 3/4” |
| Indication rail: | Makrolon (Polycarbonate) with red and white square flags for medium temperature up to 150 °C media dependent |
| Float(s): | Standard:<br>VA 30/02, (SS 316Ti) 1.4571, max 25 bar and 150 °C, min. density 0,85 g/cm³ |
| **Type:** | **BNA-S21**, top and bottom connections<br>**BNA-S22**, side connections, |

### Options:

| | |
|---|---|
| Float(s): | TT 30/02, in Titanium, PN 16<br>min. density: 0,85 g/cm³, max. temp.: 150 °C<br><br>Buna N : BN 32/100, PN 10<br>min. density: 0,62 g/cm³, max. temp.: 90 °C<br><br>more floats on request |
| **Accessories:** | Limit switches<br>Analog output<br>Scale<br>Isolation<br>Tests / Certificates |

06 / 05 BNA US 01/1

# BNA-S31 / -S32




## Technical Data

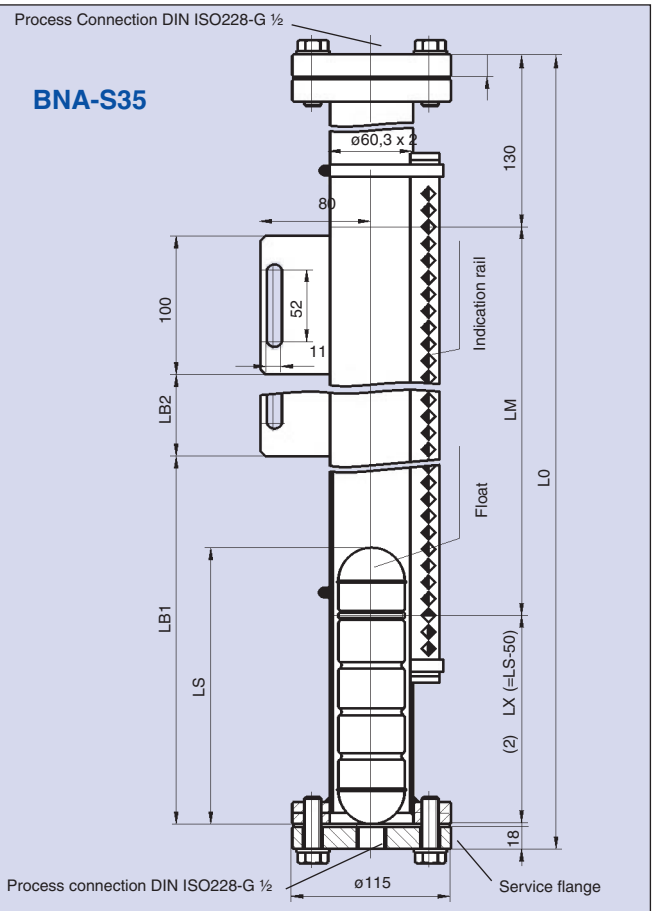
### Standard Version:

| | |
|---|---|
| Measuring range: | L0 max. 6000 mm in one piece,<br>max. LM in split sections on request |
| Bypass tube: | Stainless Steel No. 1.4571 (SS 316 Ti)<br>PN 16, diameter 60,3 x 2 mm |
| Proof pressure: | 1,5 x max. operating pressure |
| Process conn.: | G1/2 top and bottom with plug |
| Side connections: | Threaded R 1/2 , R 3/4, 1“ or<br>DIN flanges DN 15, 25, 32, 40 oder 50, or<br>ASA 1/2”, 3/4”, 1”, 1 1/4”, 1 1/2” |
| Indication rail: | Makrolon (Polycarbonate) with red and white square flags<br>for medium temperature up to 150 °C |
| Float(s): | Standard PN 25: VA 50/10 in 1.4571,<br>min. density: 0,62 g/cm³,<br>max. temp. 150 °C media dependent |
| **Type:** | Top G1/2, bottom service-flange:<br>**BNA-S31**, top and bottom connections G1/2<br>**BNA-S32**, side connections |

### Options:

| | |
|---|---|
| Indication rail: | Aluminum, black anodized,<br>square flags painted silver/red,<br>up to max. 350 °C –**A2** |
| Float(s): | **VA 50/15** in 1.4571, with M4 plug,<br>min. density: 0,63 g/cm³,<br>max. temperature: 150 °C media dependent<br><br>**TT 50/10** in Titanium,<br>min. density: 0,56 g/cm³,<br>max. temperature: 320 °C media dependent<br><br>**TT 50/15** in Titanium, with M4 plug,<br>min. density: 0,57 g/cm³,<br>max. temperature: 320 °C media dependent<br><br>**TT 50/15** ...320 °C,<br>PVC, PP, PTFE coated |
| Connections: | Instead of G1/2 top and bottom, 1/2” NPT,<br>or flange connections with<br>weld neck flanges |
| **Accessories:** | Limit switches<br>Analog output<br>Scale<br>Isolation<br>Tests / Certificates |

# BNA-S35 / -S36




## Technical Data

### Standard Version:

| | |
|---|---|
| Measuring range: | L0 max. 6000 mm in one piece,<br>max. LM in split sections on request |
| Bypass tube: | Stainless Steel No. 1.4571 (SS 316 Ti)<br>PN 16, diameter 60,3 x 2 mm |
| Proof pressure: | 1,5 x max. operating pressure |
| Process conn.: | G1/2 top and bottom with plug |
| Side connections: | Threaded R 1/2 , R 3/4, 1“ or<br>DIN flanges DN 15, 25, 32, 40 oder 50, or<br>ASA 1/2”, 3/4”, 1”, 1 1/4”, 1 1/2” |
| Indication rail: | Makrolon (Polycarbonate) with red and white<br>square flags for medium temp. up to 150 °C |
| Float(s): | VA 50/10 in 1.4571,<br>min. density: 0,62 g/cm³,<br>max. temperature: 150 °C media dependent |
| **Type:** | Top and bottom service-flanges:<br>**BNA-S35**, top and bottom connections G1/2<br>**BNA-S36**, side connections |

### Options:

| | |
|---|---|
| Indication rail: | Aluminum, black anodized,<br>square flags painted silver/red,<br>up to max. 350 °C –**A2** |
| Float(s): | **VA 50/15** in 1.4571, with M4 plug,<br>min. density: 0,63 g/cm³,<br>max. temperature: 150 °C media dependent<br><br>**TT 50/10** in Titanium,<br>min. density: 0,56 g/cm³,<br>max. temperature: 320 °C media dependent<br><br>**TT 50/15** in Titanium, with M4 plug,<br>min. density: 0,57 g/cm³,<br>max. temperature: 320 °C media dependent |
| Connections: | Instead of G1/2 top and bottom, 1/2” NPT,<br>or flange connections with<br>weld neck flanges |

**Accessories:**

Limit switches
Analog output
Scale
Isolation
Tests / Certificates

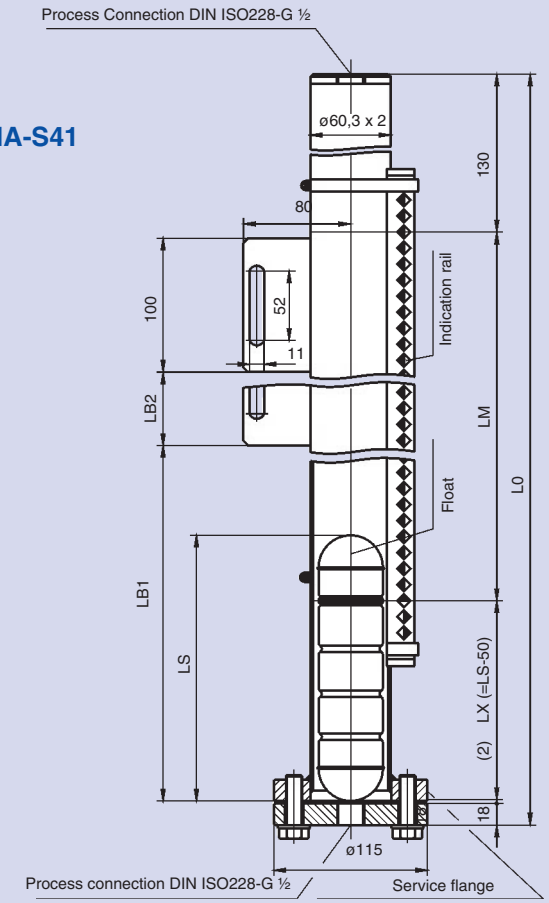
06 / 05 BNA US 01/1

# BNA-S41 / -S42

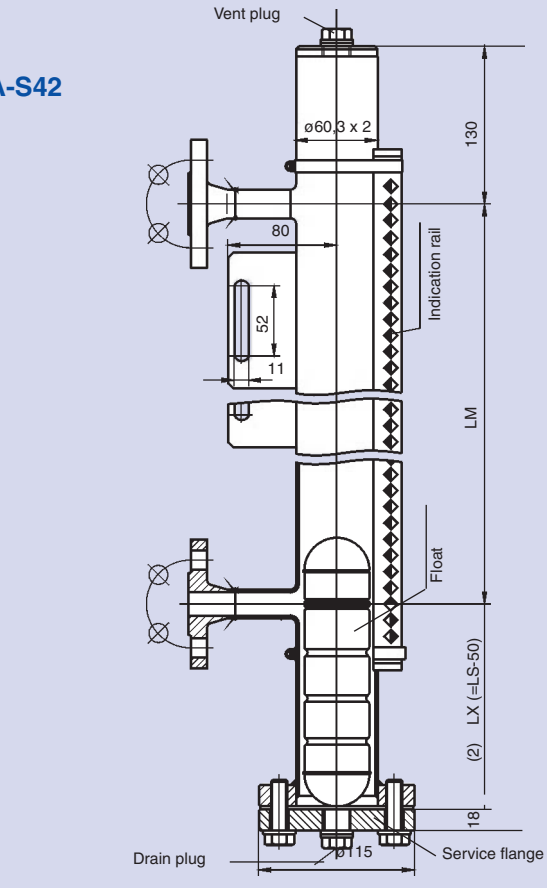
06 / 05 BNA US 01/1



## BNA-S41




## BNA-S42




## Technical Data

### Standard Standard version:

| | |
|---|---|
| Measuring range: | L0 max. 6000 mm in one piece,<br>max. LM in split sections on request |
| Bypass tube: | Stainless Steel No. 1.4571 (SS 316 Ti)<br>PN 40, diameter 60,3 x 2 mm |
| Proof pressure: | 1,5 x max. operating pressure |
| Process conn.: | G1/2 top and bottom with plug |
| Side connections: | Threaded R 1/2 , R 3/4, 1“ or<br>DIN flanges DN 15, 25, 32, 40 or 50,<br>or ASA 1/2”, 3/4”, 1”, 1 1/4”, 1 1/2” |
| Indication rail: | Makrolon (Polycarbonate) with red and white<br>square flags for medium temp. up to 150 °C |
| Float(s): | Standard PN 40: TT 50/10 in Titanium,<br>min. density: 0,56 g/cm³,<br>max. temperature: 320 °C media dependent |
| **Type:** | Top G1/2, bottom service-flange:<br>**BNA-S41**, top and bottom connections G1/2<br>**BNA-S42**, side connections |

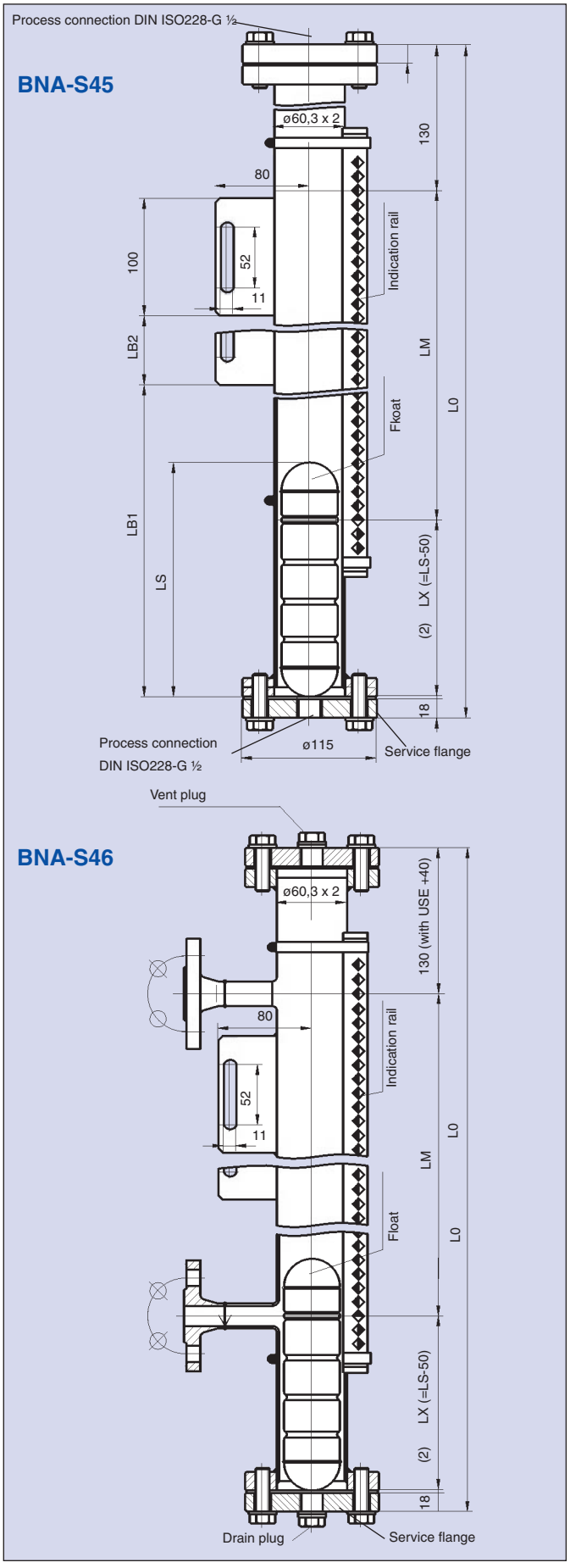
### Options:

| | |
|---|---|
| Indication rail: | Aluminum, black anodized,<br>square flags painted silver/red,<br>up to max. 350 °C –**A2** |
| Float(s): | **TT 50/10** in Titanium,<br>min. density: 0,57 g/cm³,<br>max. temperature: 320 °C media dependent |
| Connections: | Instead of G1/2 top and bottom, 1/2” NPT,<br>or flange connections with<br>weld neck flanges |

**Accessories:**

Limit switches
Analog output
Scale
Isolation
Tests / Certificates

# BNA-S45 / -S46




## Technical Data

### Standard version:

| | |
|---|---|
| Measuring range: | L0 max. 6000 mm in one piece,<br>max. LM in split sections on request |
| Bypass tube: | Stainless Steel No. 1.4571 (SS 316 Ti)<br>PN 40, diameter 60,3 x 2 mm |
| Proof pressure: | 1,5 x max. operating pressure |
| Process conn.: | G1/2 top and bottom with plug |
| Side connections: | Threaded R 1/2 , R 3/4, 1“ or<br>DIN flanges DN 15, 25, 32, 40 or 50,<br>or ASA 1/2”, 3/4”, 1”, 1 1/4”, 1 1/2” |
| Indication rail: | Makrolon (Polycarbonate) with red and white<br>square flags for medium temp. up to 150 °C |
| Float(s): | Standard PN 40: TT 50/10 in Titanium,<br>min. density: 0,62 g/cm³,<br>max. temperature: 320 °C media dependent |
| **Type:** | Top G1/2, bottom service-flange:<br>**BNA-S45**, top and bottom connections G1/2<br>**BNA-S46**, side connections |

### Options:

| | |
|---|---|
| Indication rail: | Aluminum, black anodized,<br>square flags painted silver/red,<br>up to max. 350 °C –**A2** |
| Float(s): | **TT 50/15** in Titanium, with plug M4<br>min. density: 0,57 g/cm³,<br>max. temperature: 320 °C media dependent |
| Connections: | Instead of G1/2 top and bottom, 1/2” NPT,<br>or flange connections with<br>weld neck flanges |

**Accessories:**

Limit switches
Analog output
Scale
Isolation
Tests / Certificates

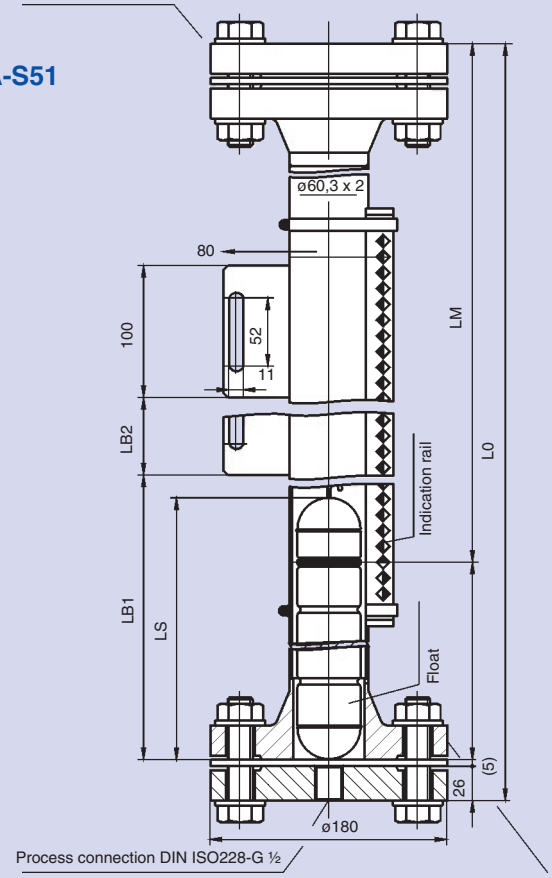
06 / 05 BNA US 01/1

# BNA-S51 / -S52

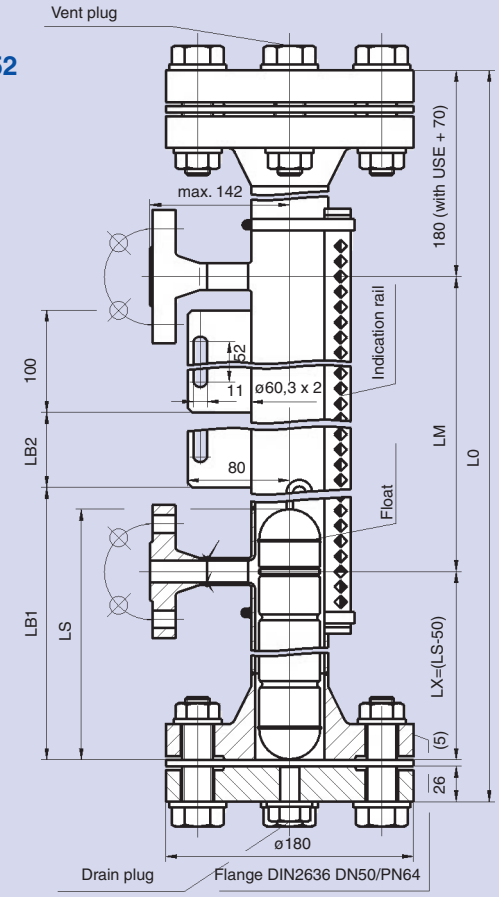
06 / 05 BNA US 01/1



## BNA-S51




## BNA-S52




## Technical Data

### Standard Version:

| | |
|---|---|
| Measuring range: | L0 max. 6000 mm in one piece, max. LM in split sections on requestBypass tube: |
| Stainless Steel No. | 1.4571 (SS 316 Ti) PN 64, diameter 60,3 x 2 mm |
| Proof pressure: | 1,5 x max. operating pressure |
| Process conn.: | G1/2 top and bottom with plug |
| Side connections: | Flanges in: DIN flanges DN 15, 25, 32, 40 or 50, or ASA 1/2”, 3/4”, 1”, 1 1/4”, 1 1/2” |
| Indication rail: | Makrolon (Polycarbonate) with red and white square flags for medium temp. up to 150 °C |
| Float(s): | Standard: VA 50/20-VAE (ventilated) in 1.4571, min. density: 0,65 g/cm³, max. temperature: 150 °C media dependent |
| **Type:** | Top G1/2, bottom service-flange: **BNA-S51**, top and bottom connections G1/2 **BNA-S52**, side connections |

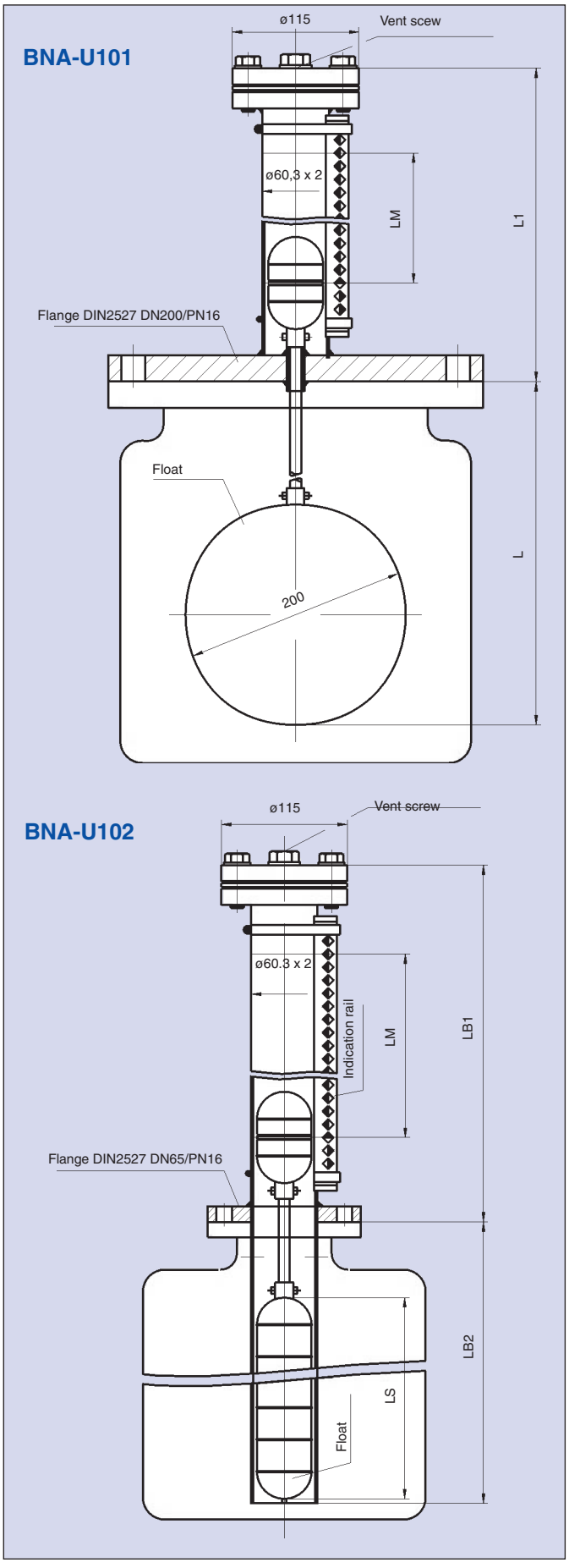
### Options:

| | |
|---|---|
| Indication rail: | Aluminum, black anodized, square flags painted silver/red, up to max. 350 °C –**A2** |
| Float(s): | **TT 50/20** in Titanium, min. density: 0,57 g/cm³, max. temperature: 320 °C media dependent |
| Connections: | Instead of G1/2 top and bottom, 1/2” NPT, or flange connections with weld neck flanges |

### Accessories:

Limit switches
Analog output
Scale
Isolation
Tests / Certificates

# BNA-U101 / -U102




## Technical Data

### Standard Version:

| | |
|---|---|
| Measuring range: | Depends on the buoyancy of the float (which again depends on the density of the medium (g)), max. LM on request |
| Bypass tube: | Stainless Steel No. 1.4571 (SS 316 Ti) PN 16, diameter 60,3 x 2 mm |
| Proof pressure: | 1,5 x max. operating pressure |
| Indication rail: | Makrolon (Polycarbonate) with red and white square flags for medium temp. up to 150 °C |
| Dimensions: | L1 = L+200 mm, L1 depends on LM, geometry of the tank and density of medium |
| **Type:** | **BNA-U101,**<br>with VA flange DIN 2527 DN 200 / PN 16<br>Float: VA200 with VA tube 12 x 1<br>LM max. 6000 mm , 5300 mm / $\gamma$ = 0,6 g/cm³ |
| . | **BNA-U102,**<br>with VA flange DIN 2527 DN 50 / PN 16<br>Float: VA 50-400 with ABS tube<br>LM max. 4500 mm/ $\gamma$ 1,0 |
| | Float : TT 50-400 with ABS tube<br>LM max. : 7000 mm / $\gamma$ 1,0 g/cm³<br>: 5000 mm / $\gamma$ 0,8 g/cm³ |

### Options:

| | |
|---|---|
| Float(s): | more floats on request |
| Connections: | Special- (bigger) flange connections or U102 in split versions are possible (to simplify transportation and installation). |

### Accessories:

Limit switches
Scale
Trip amplifier
Isolation
Tests / Certificates

### Order data:

| | |
|---|---|
| Type: | BNA-U101 or BNA-U102 with float type |
| Medium: | Density of medium in g / cm³ |
| Measuring length: | LM in mm |
| Installation data: | Distance from max. filling level to bottom of flange, further details or drawings with installation geometry are helpful |
| Options and accessories: | On request |

06 / 05 BNA US 01/1

# BNA-U301 / -U401 / -U701

## Technical Data

### Standard Version:

Measuring range: Depends on the buoyancy of the float (which again depends on the density of the medium (g)), e. g.:

| Float: | LM in mm | min. dens. in g / cm³ |
|---|---|---|
| PVC 300 | 1000 | 0,7 |
| PVC 300 | 2000 | 0,8 |
| PVC 400 | 2000 | 0,67 |
| PP 300 | 4000 | 0,8 |
| PP 400 | 4000 | 0,67 |

Bypass tube: Diameter 63,3 x 2 mm

Nominal pressure/ Max. temp.:
PVC: 2,5 bar, max. temp. 60 °C
PP: 2,5 bar, max. temp. 80 °C
PVDF: 6 bar, max temp. 140 °C

Proof pressure: 1,5 x max. operating pressure

Connection: Flange DN 50

Indication rail: Makrolon (Polycarbonate) with red and white square flags for medium temp. up to 150 °C

Dimensions: L1 = L+200 mm, L1 depends on LM, geometry of the tank and density of medium

**Type:** **BNA-U301-PVC, BNA-U401-PVDF, BNA-U701-PP**

### Options:

Float(s): more floats on request

Connections: Special- (bigger) flange connections or U102 in split versions are possible (to simplify transportation and installation)

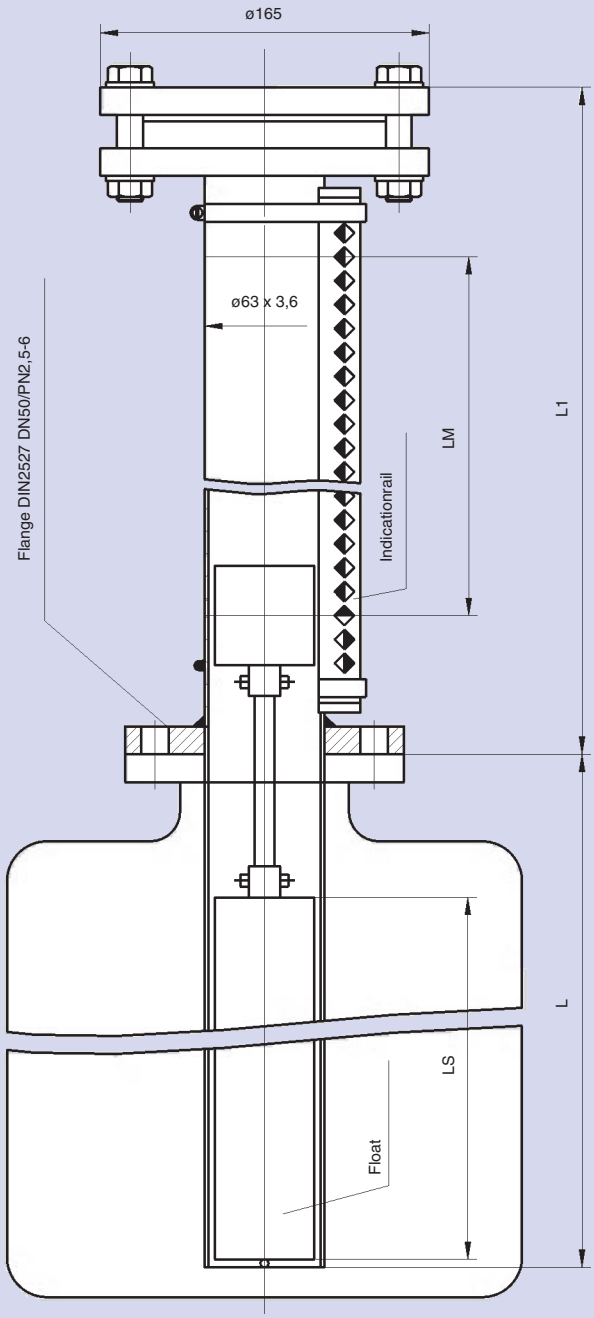
### Accessories:

Limit switches
Scale
Trip amplifier
Isolation
Tests / Certificates

### Order data:

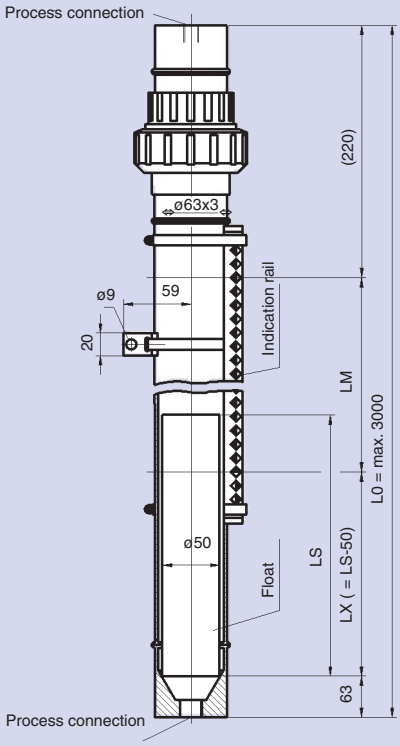
Type: BNA U301, BNA 401 or BNA701
Medium: Density of medium in g/cm³
Measuring length: LM in mm
Installation data: Distance from max. filling level to bottom of flange, further details or drawings with installation geometry are helpful
Options and accessories: On request

**BNA-U301**
**BNA-U401**
**BNA-U701**

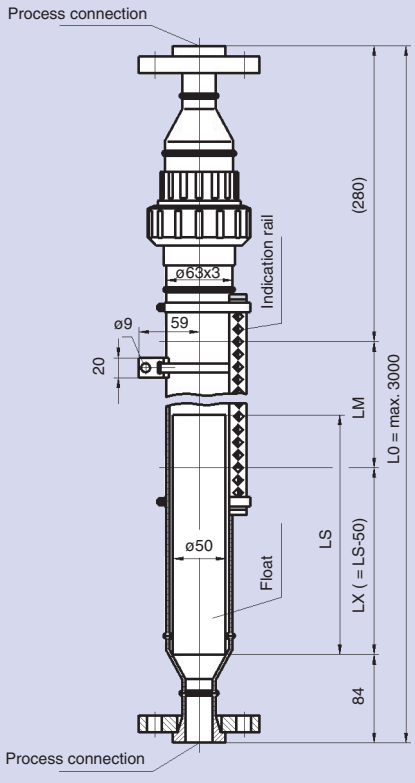


# BNA-K301 / -K401 / -K701
# BNA-K302.0 / -K402.0 / -K702.0

## BNA-K301 / -K401 / -K701




## BNA-K302.0 / -K402.0 / -K702.0




## Technical Data

### Standard Version:

| | |
|---|---|
| Measuring range: | L0 max. 3000 mm in one piece, in split sections on request |
| Bypass tube: | Diameter 63,3 x 2 mm |
| Nominal pressure/ Max. temp.: | PVC: 2,5 bar, max. temp. 60 °C<br>PVDF: 6 bar, max temp. 140 °C<br>PP: 2,5 bar, max. temp. 80 °C |
| Proof pressure: | 1,5 x max. operating pressure, |
| Process conn.: | G1/2, G 1 top and bottom, lap joint flanges with stub ends DN 15 up to DN 32 |
| Indication rail: | Makrolon (Polycarbonate) with red and white square flags for medium temp. up to 150 °C |

**Type:**

**BNA-K301-PVC**, with connection thread,
**BNA-K302.0-PVC**, with flanges,
Float PVC 50/10, $\gamma$ min. 0,54 g/cm³

**BNA-K401-PVDF,** with connection thread,
**BNA-K402.0-PVDF,** with flanges,
Float PVDF 50/10, $\gamma$ min. 0,66 g/cm³

**BNA-K701-PP**, with connection thread,
**BNA-K702.0-PP**, with flanges,
Float PP 50/10, $\gamma$ min. 0,45 g/cm³

The standard floats are relatively light. They are, however, weighted when manufactured and monitor the exact level.
**Notice:** Please indicate medium density in your order

### Options:

Connections: Special threads, glued or welded joints on request

### Accessories:

Limit switches
Scale
Trip amplifier
Isolation
Tests / Certificates

06 / 05 BNA US 01/1

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

06 / 05 BNA US 01/1

## Technical Data

### Standard Version:

Measuring range: L0 max. 3000 mm in one piece, in split sections LM on request

Bypass tube: Diameter 63 x 2 mm

Nominal pressure/ Max. temp.:
PVC: 2,5 bar, max. temp. 60 °C
PVDF: 6 bar, max temp. 140 °C
PP: 2,5 bar, max. temp. 80 °C

Proof pressure: 1,5 x max. operating pressure

Process conn.: Lap joint flanges with stub ends and flange adaptors acc. to DIN 8063/PN 10:
top and bottom: DN 50 (all types with ...02.1)
side: DN 15 to DN 50 (all types with ...03)

Indication rail: Makrolon (Polycarbonate) with red and white square flags for medium temp. up to 150 °C

Float(s): Standard version: length 200 mm
Min. density of medium: PVC 0,54 g/cm³
PVDF 0,66 g/cm³
PP 0,45 g/cm³
The standard floats are relatively light. They are, however, weighted when manufactured and monitor the exact level.
**Notice:** Please indicate medium density in your order

**Type:** Process connections DN 50 top and bottom:
**BNA-K302.1 PVC**
**BNA-K402.1 PVDF**
**BNA-K702.1 PP**

Side connections:
**BNA-K303 PVC**
**BNA-K403 PVDF**
**BNA-K703 PP**

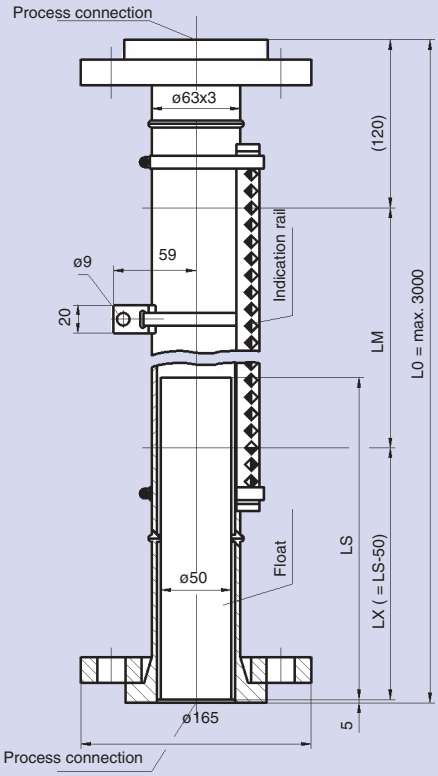
### Options:

Connections: Special flange connections are possible

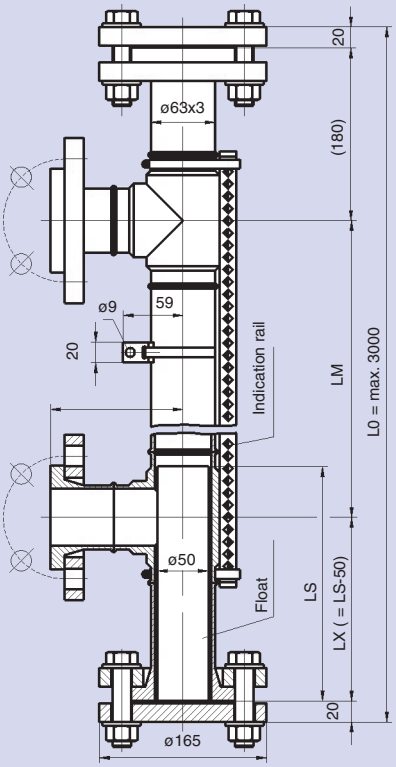
### Accessories:

Limit switches
Scale
Trip amplifier
Isolation
Tests / Certificates

### BNA-K302.1 / -K402.1 / -K702.1

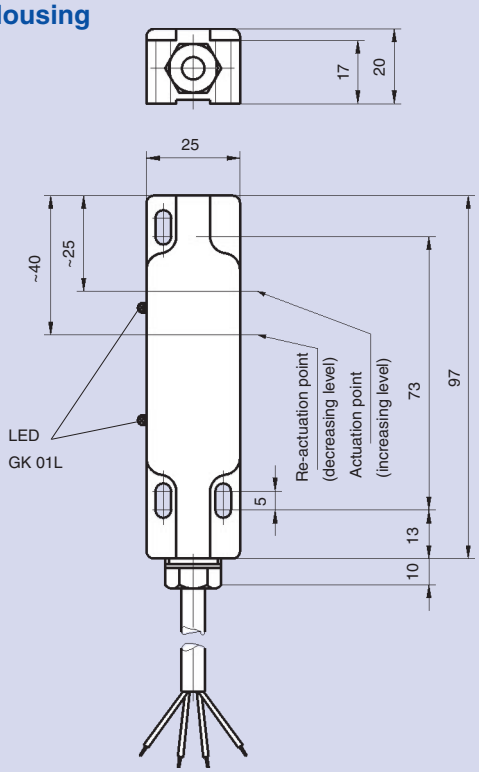



### BNA-K303 / -K403 / -K703

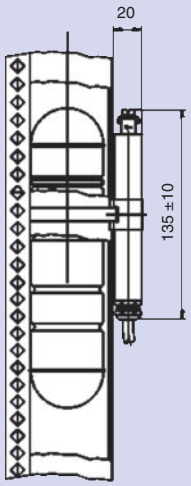


# Limit Switches GK 01 / GK 01-L / GK 03 / GK HT1

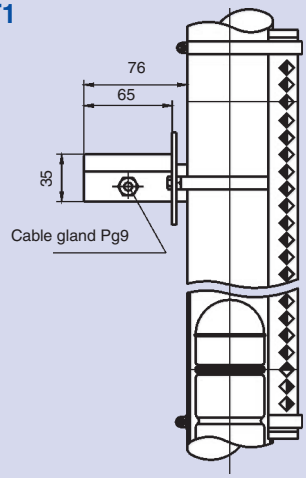
## GK-Housing




## GK 03




## GK HT1




## Description

Apart from the GK HT1 which has a microswitch, all other limit switches have bi-stable reed contacts.
As the float rises with the liquid level the magnet system will switch-over the contact. This contact status will remain until the float passes again and the switch status returns to its original position.
During installation the contact status can be set with a ring magnet or the float.
The limit switches are designed for quick and easy installation; only a screw driver is needed to tighten the stainless steel clamps. They can be mounted in any position around the bypass tube, however the cable direction should preferably be downward.

The switch hysteresis depends on the position of the switch on the bypass tube and is smallest when the switches are installed closely along the indication rail.

## Technical Data:

| | |
|---|---|
| **GK 01** | Limit switch |
| Housing: | Aluminum, completely potted |
| Cable: | Silicone isolation, 4 x 1,5 mm², length 1 m, other lengths on request |
| Protection class: | IP65 |
| Contact rating: | 220 V AC / 1 A / 60 VA, 220 V DC / 1 A / 40 W |
| Temperature limits: | –55 °C...140 °C |
| **GK 01-L** | Limit switch with red and green LED indicating the switch over status |
| Housing: | Aluminum, completely potted |
| Cable: | PVC isolation, 5 x 0,5 mm², length 1 m, other lengths on request |
| Protection class: | IP65 |
| Contact rating: | 24 V DC / 1A / 40 W |
| Temperature limits: | –25 °C...80 °C |
| **GK 03** | Limit switch |
| Housing: | 1.4305 and M 16 x 1,5 cable gland |
| Cable: | Silikon 3 x 0,5 mm², lengths 1, 3 or 5 m, or PVC 3 x 0,34 mm² other lengths or versions on request |
| Protection class: | IP65 |
| Approval: | EX II GD EEx ia IIC T6/ISSeP03ATEX119X (on reqest) |
| Contact rating: | 220 V AC / 1,0 A / 60 VA, 220 V DC / 1,0 A / 40 VA |
| Temperature limits: | -55 °C....+140 °C |
| Option: | Grounding clip |
| **GK HT1** | Limit switch for high temp. with SPDT switch |
| Housing: | Aluminum 65 x 65 x 40 mm, PG9 cable gland |
| Protection class: | IP65 |
| Contact rating: | 220 V AC / 1 A / 80 VA |
| Temperature limits: | –55 °C...350 °C |

When larger contact ratings are needed as the reed contacts allow, (60 VA and 30 VA for EEx)relays must be used.

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

06 / 05 BNA US 01/1

# Floats

The newly designed floats have less weight, are therefore shorter than the earlier versions and we have reduced our stock to the versions listed below. The type .../15 is designed to simply match the indication for fluids with higher densities by adding weight in the float through the M4 plug.
The required total weight of the float is calculated with the formula:

283 x $\gamma$ (Density) of the medium = weight in g

The ../20 types are vented floats with automatic condensers (VAE) and designed for pressures over 40 bar.

| Type | Float material | Length in mm LS | P max in bar | T max in °C | in g | Wght. in cm³ | Volum. in g/cm³ | $\gamma$ min ** | 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 | |
| VA 50/20 | 1.4571 | 200 | VAE | 150 | | 360 | 0,65 | with VAE tube | |
| TT 50/10 | Titanium | 200 | 40 | 320 | 186 | 360 | 0,56 | --- | |
| TT 50/15 | Titanium | 200 | 40 | 320 | 191 | 360 | 0,57 | with M4 plug | |
| TT 50/20 | Titanium | 200 | VAE | 320 | | 360 | 0,60 | with VAE tube | |
| VA 30/02 | 1.4571 | 200 | 25 | 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 | 140 | 253 | 393 | 0,66 | give fluid density* | |

* The plastic floats are now, with the new magnet system, very light and will be weight-corrected at all times. Please enter the fluid density of the medium in your order.

** Minimum advised medium density based upon 175 mm (or 87.5%) immersion of the float. The ideal immersion depth of the 200-floats is 150 mm, but an immersion depth of 175 mm is absolutely sufficient for most of the applications. Only in very viscous or dirty media a "last-buoyancy" of 25 mm only is not recommended.

For very light media like some hydrocarbons we offer special floats please consult factory.

## Maximum Pressures

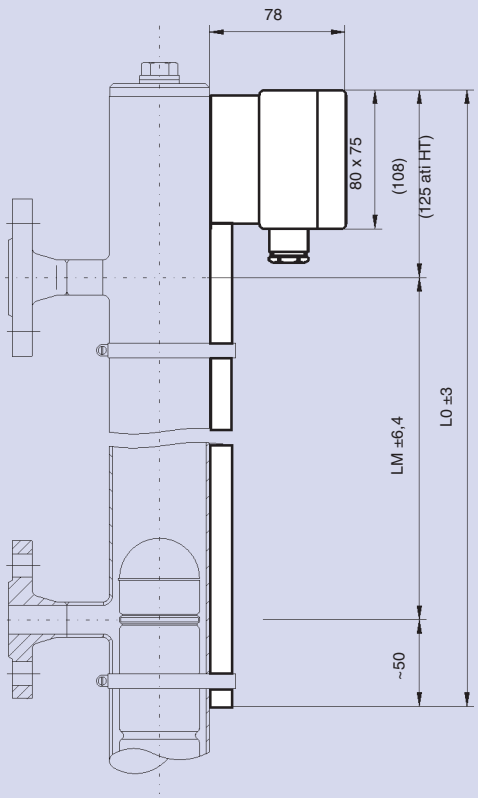
Higher temperatures will reduce the maximum pressure the system might be exposed to. According to DIN 2413 are these pressure limits (in bar) for our SS tubes, material No 1.4571 (SS316Ti) as follows:

| Outer diameter in mm | Wall thickness in 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 |

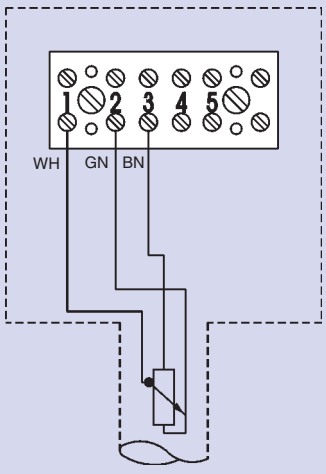
For the bypass sytems in engineered plastics we have the following pressure limits (in bar):

| Medium temperat. | -40 °C | -20 °C | 0 °C | 20 °C | 40 °C | 60 °C | 80 °C | 100 °C | 120 °C | 100 °C |
|---|---|---|---|---|---|---|---|---|---|---|
| max. pressure | bar | bar | bar | bar | bar | bar | bar | bar | bar | bar |
| PVDF | 10 | 10 | 10 | 10 | 10 | 8,6 | 6,5 | 4,6 | 3 | 2 |
| PP | --- | 10 | 10 | 10 | 8,2 | 5 | 2,5 | 0,7 | --- | --- |
| PVC | --- | --- | 6 | 6 | 6 | 1 | --- | --- | --- | --- |

# Continuous Level Indicating Transmitters XM, XMi




**Electrical connection KX4**




## Description

The network is fitted in a 13 ø mm stainless steel tubing and is connected to the bypass tube with SS clamps, an electrical connection box made of aluminum houses the electrical terminals. This design enables also retrofitting on existing bypass tubes.

Maximum deviation is ±1 mm and due to the screen of 6,4 mm there are two switching cycles per square flag.

Two versions are available:

XM - Standard version
XMi - EEx i for intrinsically safe applications

## Standard versions

**XM** with potentiometer output. Max. resistance 100 kOhm.

| | |
|---|---|
| Temperature limits: | -10 °C...+90 °C or –50 °C...+150 °C for the high temperature version |
| Tubing: | Material No 1.4571 (SS 316Ti), Ø 13 mm, |
| Total length (L0) | is indication length (LM) + 158 mm, however LM +175 mm for the high temp. version up to +150 °C |
| Connection box: | KX4, KLS, in Aluminum, 75 x 80 x 50 mm, screw terminals, protection class IP65 |
| Ind. Length (LM): | same length as the indication rail, as spare part order please give LM |

**Order number example XM- / XT-:**

**XM-HT-R12-LM2500**

- LM2500 — Indication length LM in mm
- R12 — Grid R12
- HT — HT High temperature version (Option)
- XM / XT — Type: XM = KX4; XT = KLS (incl. transducer)

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

| | |
|---|---|
| Temperature limits: | T1...T4 to 100 °C,<br>T5 to 65 °C,<br>T6 to 50 °C |
| Total length (L0) | is indication length (LM) + 158 mm |

**Attention:** Intrinsical safety is only applicable with an approved current / power limiting device (Ui: 24 V DC). Total length (L0) max. 6000 mm acc. approval.

**Order number example XMi- / XTi- (Ex-model):**

**XMi-R12-LM2500**

- LM2500 — ndication length LM in mm
- R12 — GridR12
- XMi / XTi — Type: XMi = KX4; XTi = KLS (incl. transducer)

06 / 05 BNA US 01/1

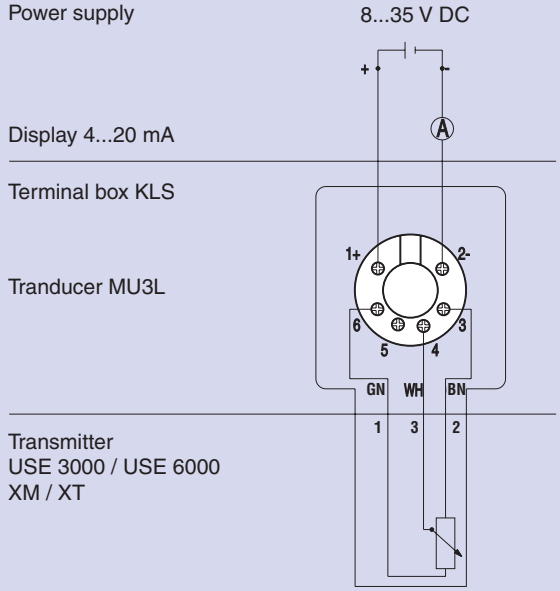
# Continuous Level Indicating Transmitters XT, XTi



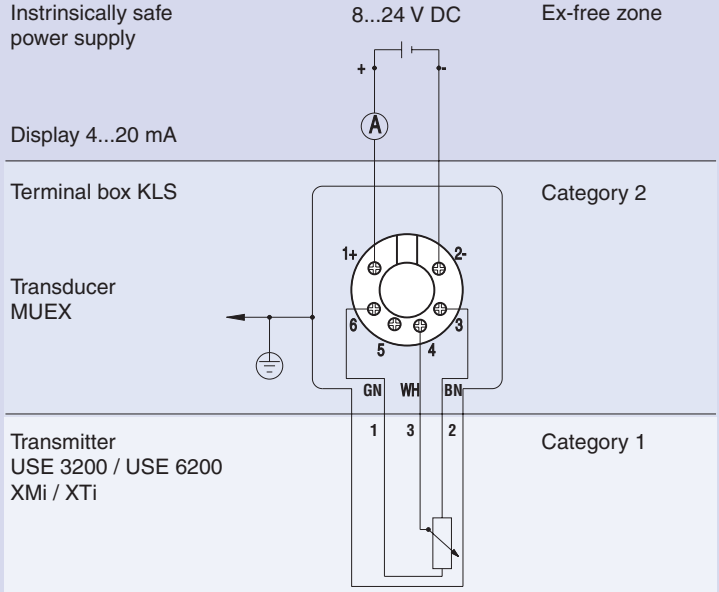


## Connection Scheme

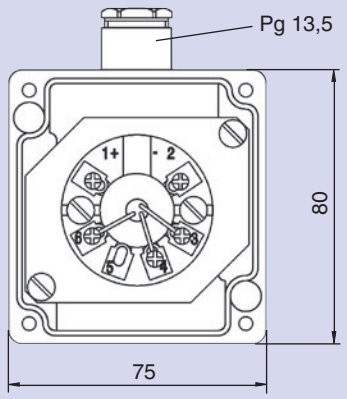
### Level sensor with transmitter - Non-Ex-application




### Level Sensor with Transmitter - Ex-application




## Dimensions (in mm)




## Description

The measuring principle is the same as the XM series how-ever the XT series has signal conditioners built into the connection box.

These signal conditioners convert the resistance ( poten-tio-meter) network into a two wire 4...20 mA signal.
For interface measurement the output can easily be inver-ted 20...4mA. As option there is also a version with signal linearisation available.

Two versions are available:

| | |
|---|---|
| XT | Standard |
| XTi | EEx i Intrinsically safe for hazardous areas |

### XT Standard version

Transmitter with type MU3L: Circuit monitoring and selec-tive output (Namur NE 43) 3,5 mA or 23 mA in case of a failure. Protection against wiring failure and short circuit.

| | |
|---|---|
| Supply power: | 8...35 VDC, max. 10% rest ripp-le |
| Output: | 4...20 mA, reversed polarity protected |
| Load: | max. 700 Ohm at 24 V |
| Temperature limits: | -40 °C...+85 °C |
| Response time: | 0,33 sec |
| Accuracy: | max. ±0,2% f. s. |

### XTi Intrinsically safe version

Transmitter with type MUEX, intrinsically safe with ATEX-approval EExia IIC T1...T6, reversed polarity protected and circuit monitoring and selective output (Namur NE 43) 3,5 mA or 23 mA.

| | |
|---|---|
| Supply power: | 8...24 VDC, max. 10% rest ripp-le |
| Output: | 4...20 mA, reversed polarity protected |
| Load: | max. 700 Ohm at 24 V |
| Temperature limits: | T1...T4: -40 °C...+85 °C<br>T5 and T6: -40 °C...+60 °C |
| Response time: | 0,33 sec |
| Accuracy: | max. ±0,2% f. s. |

If not ordered different the standard configuration of the selective output is set at ≤3,5 mA.

# Type UAS 3 - V3

**Trip amplifier for pressure, temperature, level, etc., digital display, 4 switching outputs and 1 analog output, accuracy class 0,2% f. s.**


## Features

8-digit 14-segment LCD display with bargraph and trend indication, microprocessor-controlled, self monitoring, all parameters are configured by keypad, units selectable, high accuracy, selective keypad lock, quick scanning rate (1 ms)

**Display Range** (free scalable): -9999...+9999

## Applications

OEM-applications, hydraulics and pneumatics,
test beds, heavy industry

## Technical Data

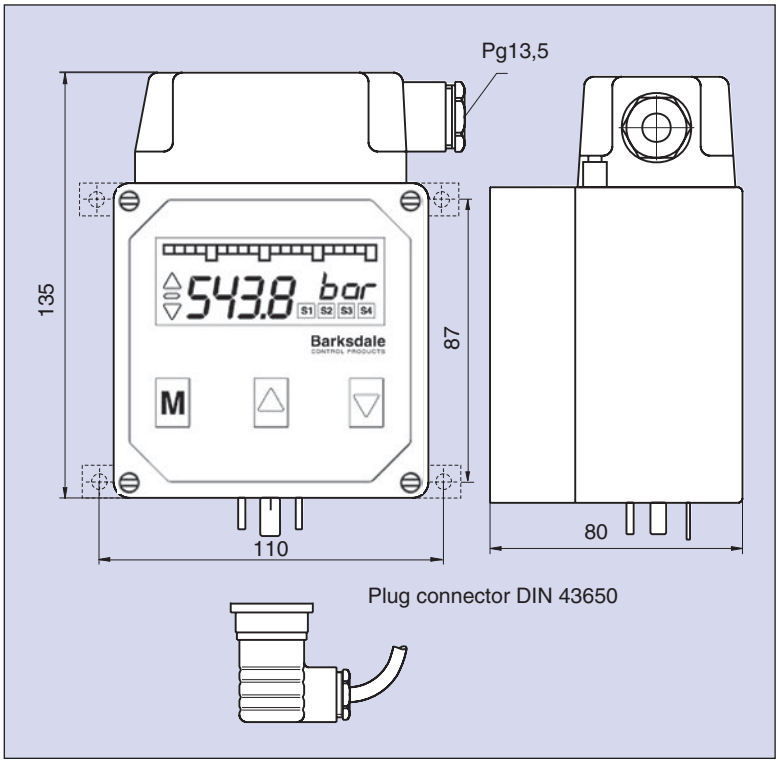
| | |
|---|---|
| Measuring Principle | : Amplifier with 12 Bit A/D-converter |
| Materials : | |
| Housing (Electronics) | : Aluminum cast G AL SI 12 |
| Seal (Housing) | : Neoprene |
| Keypad | : Polyester foil |
| Operating Elements | : Keypad with easy response pushbuttons |
| Protection Class | : IP65 |
| Dimensions | : 100 (W) x 135 (H) x 80 (D) mm |
| Weight | : appr. 1080 g |
| Analog Inputs | |
| Current Input | : 4...20 mA |
| Voltage Input | : 0...10 V DC |
| Resistance Input | : 0,5...100 kOhm |
| Temperature | : PT100 element acc. to IEC751, see UTS 3 |
| Linearity Error | : <±0,2% f. s. at 25 °C |
| A/D-Converter: | |
| Resolution | : 12 bit (4096 steps per measuring span) |
| Scanning Rate | : 1000 / s |
| Operating Display | : 8-digit 14-segment LCD display, height 12 mm, red |
| Bargraph | : 20-segment for actual value |
| Trend Arrows | : Last changes |
| Display Range | : -9999...+9999 (scalable) |
| Display Rate | : 4/s |
| Display Unit | : All technical units |
| Sensor Connection | : Plug 3-pin acc. to DIN 43650 incl. electrical plug |
| Electrical Connection | : Plug-in, terminal strip with 14 screws for 1,5 mm², AWG14 slots |
| Cable Gland | : 1 x PG 13,5 side entry = standard 2 x PG 13,5 top entry = optional |

| | |
|---|---|
| Temperature Influence | : <±0,05% f. s. / 10K |
| Compensation Range | : -10 °C...+70 °C |
| Repeatability | : ≤±0,01% f. s. |
| Temperature Range | : -10 °C...+ 70 °C (Electronics)<br>-30 °C...+ 80 °C (Storage) |
| Power Supply | : 18... 30 V DC, reversed polarity protected |
| Power Consumption | : appr. 350 mA at Ub = 24 V DC (without load) |
| Analog Output | |
| Current Output | : 4... 20 mA |
| Load | : max. Rl = (Ub-12 V) / 20 mA<br>Rl = 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, short circuit-proof |
| Adjustment Range | : 25%...100% f. s. |
| 4 x Relay Output(s) - SPDT-Contacts | |
| Contact Rating | : max. 120 V DC / 250 V AC<br>max. 120 W / 1250 VA |
| Cycles | : 1 Mio. at 24 V DC / 2 A |
| Switching Rate | : max. 20 / s |
| Delay | : 0,0 ms... 9,9 s adjustable |
| Operation Time | : 1 ms |
| Status Display | : S1 ... S4 on LCD display |
| Options | : Mounting bracket, shock mounts |

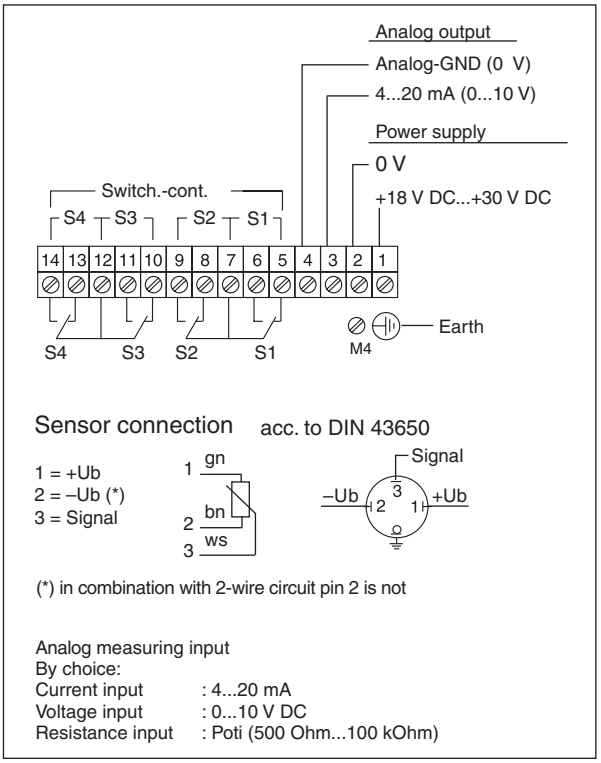
06 / 05 BNA US 01/1

# Type UAS 3 - V3

## Dimensions (in mm)




## Electrical Connection




## Order Numbers

| Electronic trip amplifier with 4 relais outputs, 1 input and multi-function digital display | | |
|---|---|---|
| **Analog input** | **Analog output** | **Order Number** |
| 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 |
| resistance 0,5 ... 100 kOhm | --- | 0003-029 |
| resistance 0,5 ... 100 kOhm | 4...20 mA | 0003-027 |
| resistance 0,5 ... 100 kOhm | 0...10 V | 0003-028 |

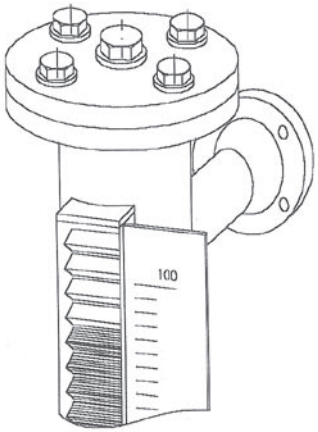
## Accessories

| Order Number | Description |
|---|---|
| 0099-001 | Mounting traverse, standard (1 set = 2 pcs.) |
| 0099-002 | Mounting traverse, Hydac-compatible (1 set = 2 pcs.) |
| 914-0107 | Vibration dampers (1 set = 4 pcs.) |

# Accessories

## Calibrated scales

**SK:**




To quantify the visual indication provided by the rotary flag assembly, a calibrated scale can be attached to the indication rail. The scales are available in various designs, in black ink on silver background up to 150 °C, or engraved in aluminum with filled-in red or black painted markings for higher temperatures.

Any unit of measure can be inscribed; we just need following data:

- units of measure,
- scale start and end values,
- LM (Indication length)
- scale marking in cm, dm, inch, etc.
- any special requests, like non linear scale markings, size of markings, special materials...etc

## Isolation

**PO:** For outdoor or applications where moisture or dust can be expected we recommend the use of our protective shrink tubing for the indication rail. Temperature limits: –55 °C...+135 °C.

**AR:** Armaflex Isolation: For installations where energy must be saved or the media can have temperatures lower than the ambient and condensation or a build-up of ice must be avoided we suggest this isolation of foam rubber. Temperature limits –40 °C...+105 °C.

**GL:** Glass Isolation: For personnel protection against skin burning when the media is over 60 °C, we offer a woven glass isolation around the tube, temperature limits –40 °C...+500°C.

Other isolations like mineral fibers with aluminum cover - also in combination with electrical heating - can de supplied upon request.

## Heating and double wall design

**EL:** Electrical trace heating: Tape type heating cable can be supplied with thermostat control to maintain temperatures between –30...65 °C. Nominal voltage 230 VAC.

**ELX:** Electrical heating for hazardous areas: Special type heating cable with EEx aprovals, can be supplied with EEx thermostat control to maintain temperatures between –30...65 °C. Nominal voltage 230 VAC.

**D:** Double tube**:** When locally available steam or hot / cold water could be the right media to keep the bypass tube at the required temperature. For these applications we offer another tube welded over the bypass chamber. Process connections for this utility medium are threaded R 1/2“ or R 3/4“, or flanged DN 15 or DN 25 on the back or on the side of this double tube. The total length L0 can increase minimal depending on the process connections.

## Tests and certificates

- X-ray transmission test of welding seams
- Pressure test with certificates
- Certificates of compliance 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.

06 / 05 BNA US 01/1

# Order Data BNA-S21 / -S22

**Bypass Level Indicator**
**Type:**
BNA-S21 PN 25, G½ female process connections top and bottom, Makrolon indication rail
BNA-S22 PN 25, side mounted process connections, Makrolon indication rail

**Side connections:**
R 1/2" female threads
1/2" NPT female threads
DN 15 flanges according to DIN 2635 (flange faces Form C)
DN 20 flanges according to DIN 2635 (flange faces Form C)
DN 25 flanges according to DIN 2635 (flange faces Form C) OD tube remains 21,3 mm outer ø
flanges according to ANSI B 16,5 300 lbs
flanges according to ANSI B 16,5 300 lbs
flanges according to ANSI B 16,5 300 lbs, OD tube remains 21,3 mm outer ø

**Indicator length in mm:**
2000/1 (example): LM = 2000 mm / in one piece
3600/2 (example): LM = 3600 mm / in two pieces

**Float(s):**
VA 30/10 material 1.4571, max. 25 bar / 150 °C, min. density: 0,85 g/cm³
TT 30/02 material Titanium, max. 40 bar / 150 °C, min. density: 0,85 g/cm³
BN 32/100 material Buna N, max. 10 bar / 90 °C, min. density: 0,62 g/cm³

**Indication rail:**
MA Makrolon = Standard, max. T 150 °C

**Isolation:** (AR and PO are also together available)
AR Armaflex, foam rubber isolation, temp. limits: –40 °C...+105 °C
GL protective cover; glass fiber tape, temp. limits:–40 °C...+500 °C
PO Poliolefin shrink tubing; weather and dirt protection

**Limit switch:** (Please note: The first digit inducates the quantity)
1GK01 one limit switch GK01, temp. limits: -55 °C...+140 °C
1GK01-L as above, with red and green LED
1GK03 one limit switch GK03, temp. limits: -55 °C...+140 °C

**Analog output:**
XM potentiometer resistive output
XMi as above with EEx i approval
XT with signal cond. 4...20 mA
XTi with 4...20 mA output EExi

**Trace heating:**
EL El. trace heating
ELX El. trace heating with EEx d spec.

Detailed specification needed in order to process orders

**BNA-S22- DN15- 2600/1-VA 30/10-MA-AR- 2GK01L- XTi- EL (Example)**

# Order Data BNA-S31 bis BNA-S46

| **Type:** | Version: |
|---|---|
| BNA-S31 | PN 16, top and bottom G1/2 process conn., service-flange only bottom |
| BNA-S32 | PN 16, side conn., indication rail Makrolon, service-flange only bottom |
| BNA-S35 | PN 16, top and bottom G1/2 process conn., indication rail Makrolon, service-flange top and bottom |
| BNA-S36 | PN 16, side conn., indication rail Makrolon, service-flange top and bottom |
| BNA-S41 | PN 40, top and bottom G1/2 process conn., indication rail Makrolon, service-flange only bottom |
| BNA-S42 | PN 40, side conn., indication rail Makrolon, service-flange only bottom |
| BNA-S45 | PN 40, top and bottom G1/2 process conn., indication rail Makrolon, service-flange top and bottom |
| BNA-S46 | PN 40, side conn., indication rail Makrolon, service-flange only bottom |

**Side connections:**

| | |
|---|---|
| R 1/2" or 1/2" NPT | female threads |
| R 3/4" or 3/4" NPT | female threads |
| R 1" or 1" NPT | female threads |
| 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, with concentric reducer from DN 40 to DN 32 |
| DN 50 | flange, as above, with concentric reducer from DN 50 to DN 32 |
| 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, as above, with concentric reducer from DN 32 to DN 40 |
| 2" | flange, as above,with concentric reducer from DN 32 to DN 50 |

**Dimensions in mm** (Examples)**:**

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

**Float:**

| | |
|---|---|
| VA 50/10 | material: 1.4571, max. 25 bar / 150 °C, min. density: 0,62 g/cm³ |
| VA 50/15 | material: 1.4571, as above, with plug M4 |
| TT 50/10 | material: Titanium, max. 40 bar / 320 °C, min. density: 0,56 g/cm³ |
| TT 50/15 | material: Titanium, as above, with plug M4 |

**Indication rail:**

| | |
|---|---|
| MA | Makrolon = standard, max. temp.: 150 °C |
| A2 | Aluminum painted, max. temp.: 350 °C |

**Isolation:**

| | |
|---|---|
| AR | Armaflex, foam rubber isolation, temp. limits: –40 °C...+105 °C |
| GL | protective cover; glass fiber tape, temp. limits:–40 °C...+500 °C |
| PO | Poliolefin shrink tubing; weather and dirt protection |

**Limit switch:** (Please note: The first digit indicates the quantity)

| | |
|---|---|
| 1GK01 | one limit switch GK01, temp. limits: –55 °C...+140 °C |
| 1GK01-L | as above, with red and green LED. |
| 1GK03 | one limit switch GK03, temp. limits: -55 °C...+140 °C |
| 2GKHT1 | two limit switches high temperature, temp.: –55 °C...+350 °C |

**Analog output:**

| | |
|---|---|
| XM | potentiometer resistive output |
| XMi | as above with EEx i approval |
| XT | with signal cond. 4...20 mA |
| XTi | with 4...20 mA output EExi |

**Scale**

| | |
|---|---|
| SK | scale |

**Heating:**

| | |
|---|---|
| EL | electr. trace heating |
| ELX | in EEx d |
| D | double tube |

Detailed specification needed in order to process orders

**BNA-S32- DN25- 2600/1- VA 50/15- MA- AR- 2GK01- XTi- SK- EL (Example)**

06 / 05 BNA US 01/1

# Order Data BNA-S51 / -S52

**Type:** Version:
BNA-S51 PN 64, top and bottom G1/2 process conn. in DIN2527, blind flange DN 65 top + bottom, indication rail Makrolon
BNA-S52 PN 64, side/side connections, service-flanges DIN2527, blind flange DN 65 top + bottom, indication rail Makrolon

**Side connections:**
DN 15 flange DIN 2637
DN 20 flange DIN 2637
DN 25 flange DIN 2637
DN 32 flange DIN 2637
DN 40 flange DIN 2637, with concentric reducer from DN 40 to DN 32
DN 50 lange DIN 2636, with concentric reducer from DN 50 to DN 32
1/2" flange 600 lbs ANSI 16,5
3/4" flange 600 lbs ANSI 16,5
1" flange 600 lbs ANSI 16,5
1 1/4" flange 600 lbs ANSI 16,5
1 1/2" flange 600 lbs ANSI 16,5, with concentric reducer from DN 40 to DN 32
2" flange 600 lbs ANSI 16,5, with concentric reducer from DN 50 to DN 32

**Dimensions in mm** (Examples)**:**
2000/1 LM = 2000 mm / in one piece
3600/2 LM = 3600 mm / in two pieces

**Float:** vented with condensate tube (VAE)
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. temp.: 150 °C
A2 Aluminum painted, max. temp.: 350 °C

**Isolation:**
AR Armaflex, foam rubber isolation, temp. limits: –40 °C...+105 °C
GL protective cover; glass fiber tape, temp. limits:–40 °C...+500 °C
PO Poliolefin shrink tubing; weather and dirt protection

**Limit switch:** (Please note: The first digit indicates the quantity)
1GK01 one limit switch GK01, temp. limits: –55 °C...+140 °C
1GK01-L as above, with red and green LED.
1GK03 one limit switch GK03, temp. limits: -55 °C...+140 °C
2GKHT1 two limit switches high temperature, temp.: –55 °C...+350 °C

**Analog output:**
XM potentiometer resistive output
XMi as above with EEx i approval
XT with signal cond. 4...20 mA
XTi with 4...20 mA output EExi

**Scale**
SK scale

**Heating:**
EL electr. trace heating
ELX in EEx d
D double tube

Detailed specification needed in order to process orders

**BNA-S52- DN25- 2600/1-VA 50/20- MA- AR- 2GK01- XTi- SK- EL (Example)**

# Order Data BNA-K301 / K401 / K701
# BNA-K302.0 / K402.0 / K702.0

**Type:** Version:

BNA-K301 PVC top and bottom threaded process connection, indication rail Makrolon, service port bottom only
BNA-K302.0 PVC top and bottom flanged process connection, indication rail Makrolon, service port bottom only

BNA-K401 PVDF top and bottom threaded process connection, indication rail Makrolon, service port bottom only
BNA-K402.0 PVDF top and bottom flanged process connection, indication rail Makrolon, service port bottom only

BNA-K 701 PP top and bottom threaded process connection, indication rail Makrolon, service port bottom only
BNA-K 702.0 PP top and bottom flanged process connection, indication rail Makrolon, service port bottom only

**Thread connections:**

| | |
|---|---|
| G1/2 | female threads |
| G3/4 | female threads |
| G1 | female threads |
| 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 |
| 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 |

**Dimensions in mm** (Examples)**:**

| | |
|---|---|
| 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/cm³ |
| PP 50/10 | max. 2,5 bar / 80 °C, min. density: 0,45 g/cm³ |
| PVDF 50/10 | max. 6,0 bar / 140 °C, min. density: 0,66 g/cm³ |
| | When ordering, please specify density of the medium and we will calibrate the float accordingly |

**Isolation:**

| | |
|---|---|
| AR | Armaflex, foam rubber isolation, temp. limits: –40 °C...+105 °C |
| PO | Poliolefin shrink tubing; weather and dirt protection |

**Limit switch:** (Please note: The first digit indicates the quantity)

| | |
|---|---|
| 1GK01 | one limit switch GK01, temp. limits: –55 °C...+140 °C |
| 1GK01-L | as above, with red and green LED. |
| 1GK03 | one limit switch GK03, temp. limits: -55 °C...+140 °C |

**Analog output:**

| | |
|---|---|
| XM | potentiometer resistive output |
| XMi | as above with EEx i approval |
| XT | with signal cond. 4...20 mA |
| XTi | with 4...20 mA output EExi |

**Scale:**

| | |
|---|---|
| SK | scale |

**Heating:**

| | |
|---|---|
| EL | el. trace heating |
| ELX | in EEx d |

Detailed specification needed in order to process orders

**BNA-K 701-DN25-2600/1-PP 50/10 PO- 2GK01-XTi- SK- EL (Example)**

06 / 05 BNA US 01/1

# Order Data BNA-K302.1 / K402.1 / K702.1
# BNA-K303 / K403 / K703

06 / 05 BNA US 01/1

**Type:** Version:

BNA-K302.1 PVC top and bottom lap joint flange. DIN 8063 PN10 DN50
BNA-K303 PVC side / side lap joint flanges DN 50, service-flanges top and bottom

BNA-K402.1 PVDF top and bottom lap joint flange. DIN 8063 PN10 DN50
BNA-K403 PVDF side / side lap joint flanges DN 50, service-flanges top and bottom

BNA-K702.1 PP top and bottom lap joint flange. DIN 8063 PN10 DN50
BNA-K703 PP side / side lap joint flanges DN 50, service-flanges top and bottom

**Side connections:**

DN 15 flange, lap joint with stub end acc. PN10 / DIN 8063, reduced from DN 50 T-piece
DN 20 flange, lap joint with stub end acc. PN10 / DIN 8063, reduced from DN 50 T-piece
DN 25 flange, lap joint with stub end acc. PN10 / DIN 8063, reduced from DN 50 T-piece
DN 32 flange, lap joint with stub end acc. PN10 / DIN 8063, reduced from DN 50 T-piece
DN 40 flange, lap joint with stub end acc. PN10 / DIN 8063, reduced from DN 50 T-piece
DN 50 flange, lap joint with stub end acc. PN10 / DIN 8063
1/2” flange, lap joint with stub end acc. PN10 / DIN 8063, reduced from DN 50 T-piece
3/4” flange, lap joint with stub end acc. PN10 / DIN 8063, reduced from DN 50 T-piece
1” flange, lap joint with stub end acc. PN10 / DIN 8063, reduced from DN 50 T-piece
1 1/4” flange, lap joint with stub end acc. PN10 / DIN 8063, reduced from DN 50 T-piece
1 1/2” flange, lap joint with stub end acc. PN10 / DIN 8063, reduced from DN 50 T-piece
2” flange, lap joint with stub end acc. PN10 / DIN 8063

**Dimensions in mm** (Examples)**:**
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/cm³
PP 50/10 max. 2,5 bar / 80 °C, min. density: 0,45 g/cm³
PVDF 50/10 max. 6,0 bar / 140 °C, min. density: 0,66 g/cm³
When ordering, please specify density of the medium and we will calibrate the float accordingly.

**Isolation:**
AR Armaflex, foam rubber isolation, temp. limits: –40 °C...+105 °C
PO Poliolefin shrink tubing; weather and dirt protection

**Limit switch:** (Please note: The first digit indicates the quantity)
1GK01 one limit switch GK01, temp. limits: –55 °C...+140 °C
1GK01-L as above however with red and green LED.
1GK03 one limit switch GK03, temp. limits: -55 °C...+140 °C

**Analog output:**
XM potentiometer resistive output
XMi as above with EEx i approval
XT with signal cond. 4...20 mA
XTi with 4...20 mA output EExi

**Scale:**
SK scale

**Heating:**
EL el. trace heating
ELX in EEx d

Detailed specification needed in order to process orders

**BNA-K703- DN50- 2600/1-PP 50/10 AR- 2GK01- XT- SK- EL (Example)**

# The fastest way to more information:

. . . just complete the order form below and fax it!

**Fax to :** **Barksdale GmbH**
Dorn-Assenheimer Strasse 27
D-61203 Reichelsheim / Germany
**Fax: +49 (0) 60 35 - 9 49-111**

**From :**

| | |
|---|---|
| Name | : ..... |
| Company | : ..... |
| Department | : ..... |
| Street / P.O.Box | : ..... |
| Post Code / City | : ..... |
| Telephone | : ..... |
| Fax | : ..... |
| e-mail | : ..... |

**Date :** .....

Please send me detailed information about:

- ☐ Mechanical Pressure Switches
- ☐ Electronic Pressure Sensors
- ☐ Electronic Pressure Switches
- ☐ Level Switches
- ☐ Continuous Tank Level Indicating Systems
- ☐ Level Probes
- ☐ Bypass Level Indicating Systems
- ☐ Flow Switches
- ☐ Mechanical Temperature Switches
- ☐ Electronic Temperature Sensors
- ☐ Electronic Temperature Switches
- ☐ Shear Seal- / Air Suspension Valves

☐ Please send me the Barksdale product CD with all available information about the complete product range (format: PDF).

06 / 05 BNA US 01/1

In addition to the Bypass Level Indicators listed in this catalog our product range includes various other instrumentation and control equipment to monitor, measure and control

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**Temperature**

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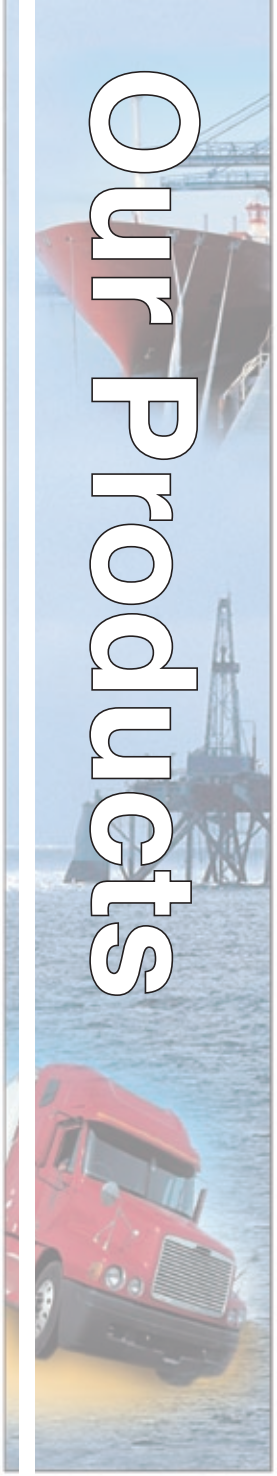


06 / 05 BNA US 01/1

Barksdale Bypass Level Indicators



Represented by

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

**Barksdale GmbH**
Dorn-Assenheimer Strasse 27
D-61203 Reichelsheim / Germany

Tel.: +49 - 60 35 - 9 49-0
Fax: +49 - 60 35 - 9 49-111 and 9 49-113
e-mail: info@barksdale.de
www.barksdale.de

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