Alarm, measurement and control with Trimod Besta

Switch-, flange- and float modules are selected acc. to the process parameters and the desired functions. This offers problem specific solutions using standard components and optimises the price/performance ratio.

Limiting maximum/minimum

Pneumatic closed loop control

Open loop control for values pumps and valves

Open loop control for pumps and valves

Limitation of separation layers

External fill level monitoring

APPLICATION EXAMPLES

Brochure LTXEN1510, English
Reliable, user-friendly and easy to integrate at any time

Trimod Besta level switches feature a unique robustness. They are easily handled and quickly connected. Of course, the lid and screws can never be lost.

QUALITY - RIGHT DOWN TO THE DETAILS

01 Wiring diagram on inside of cover
02 Self-lifting, easily accessible ground terminal
03 Self-lifting terminals
04 The switch module can be disassembled with just two screws.
05 IP65: captive moulded seal. IP67 and IP68: O-ring seal.
06 Easily accessible equipotential bonding
07 Captive cover screws
08 Captive cover
09 Housing made of seawater resistant die cast aluminium, chromated aluminium or stainless steel (CrNiMo)
10 Simple cable routing, due to plenty of space and large cable radii allowed
11 Cable gland supplied (excluding explosion proof versions)
12 Electrical, electronic and pneumatic output signals
13 Double snap effect through magnetic repulsion and microswitch snap action
14 Mechanically rigid separation between medium and ambience
Made possible by the 3-modular concept: unlimited variety of switches

**SWITCH MODULES**
- switching elements: micro- and proximity switches
- SPDT and 2xSPDT
- pneumatic with ON/OFF output; max. 10 bar
- pneumatic with proportional output; 0.2 to 1 bar
- housings made of aluminium and CrNiMo
- high and low temperature versions; -200 to +400°C
- IP65 to IP68 protection
- explosion proof versions; ATEX, IECEx, TR CU (GostR Ex), Inmetro
- self lifting terminals for perfect connections
- Safety Integrity Level (SIL): SIL 1 and SIL 2

**FLANGE MODULES**
- stainless steel (CrNiMo) 1.4408 square flange, 92 mm pitch circle diameter
- EN/DIN, ANSI, BS and JIS compliant industrial flanges
- special flanges with 98, 105 and 114 mm pitch circle diameters
- fixed flanges made of CrNiMo
- composite flanges made of P265GH (carbon steel) and CrNiMo
- special flanges made of Hastelloy
- DN 65 to 150, 3” to 6”
- PN 16 to 320, class 150 to 2500, table E to T, 5K to 63K
- flat seal, tongue and groove, ring joint etc.

**FLOAT MODULES**
- fixed operating differential 12 mm
- adjustable operating differential for pump control, vertical max. 2840 mm, horizontal max. 557 mm
- stainless steel (CrNiMo) and Hastelloy floats
- NACE compliant floats
- plastic floats made of PP, PVDF and PTFE
- stainless steel (CrNiMo) versions up to a maximum operating pressure of 250 bar
- float modules for separation layer monitoring
- stainless steel (CrNiMo) floats with polyamide and halar coating
Customer-specific solutions based on cost-effective standard components

**SIDE MOUNT COMBINATIONS**

01 with microswitch or proximity switches, also available in explosion proof versions

02 pneumatic switch module with ON/OFF or proportional output

03 with enclosure IP68 for underwater installation

04 for explosion proof applications in a pressure-capsulated housing with microswitch or initiator

05 with heat exchanger for very high or very low operating temperatures

06 square standard flanges made of CrNiMo, 92 mm pitch circle diameter

07 industrial flange acc. to EN/DIN, ANSI, BS and JIS made of PP and PTFE

08 industrial flange acc. to EN/DIN, ANSI, BS and JIS made of CrNiMo and Hastelloy

09 with fixed operating differential

10 with rod extension for longer operating differentials

11 rod extension for switch point correction

12 with protective bellows for media with solids content

13 with adjustable operating differential for pump control

14 plastic versions for aggressive media

15 for separation layer monitoring of two media with different densities

16 for vertical mounting

17 for vertical mounting in plastics

18 for vertical mounting with rod extension

**TOP MOUNT COMBINATIONS**

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The Trimod Besta standard range: versatile, robust and economical

Trimod Besta, the flexible solution. It can be used anywhere, no matter where and when. Its versatility is unlimited, for high temperature, freezing cold, low density, vacuum or high pressure applications.

THE MOST POPULAR SWITCHES

Type A 01 041 alarm, limit and control functions

Nominal pressure PN 25 acc. to EN/DIN
Operating temperature 0 to 300°C
Ambient temperature 0 to 70°C
Density of the liquid 0.7 kg/dm³
Operating differential fixed 12 mm
Wetside material stainless steel (CrNiMo)
Switch module material seawater resistant die cast aluminium
Flange dimensions square 92 x 92 mm, PCD 92 mm
Switch element microswitch SPDT with silver contacts
Switch rating 250 VAC, 5A, 30 VDC, 5A
Enclosure IP65
Installation depth (tank) 226 mm
Safety Integrity Level (SIL) SIL 1 (Type AA 01 041: SIL 2)

SIMILAR TYPES

Type A 01 04 same as A 01 041, in addition, rod extensions G1, G2 and G3 can be used.

Type 5A 01 041 for aggressive environments, housing exclusively made of stainless steel (CrNiMo).

Type 2A 01 041 with chromated switch housing

Type A 01 07 for low densities: 0.5 kg/dm³
Type A 01 051 to A 01 054 with protective bellows for dirty media

Type A 01 051
Bellow material Perbunan
Operating temperature 0 to 120°C
Safety Integrity Level (SIL) SIL 1 (Type AA 01 051: SIL2)

Type A 01 052
Bellow material Silicone
Operating temperature 0 to 200°C
Safety Integrity Level (SIL) SIL 1 (Type AA 01 052: SIL2)

Type A 01 053
Bellow material FPM
Operating temperature 10 to 200°C
Safety Integrity Level (SIL) SIL 1 (Type AA 01 053: SIL2)

Type A 01 054
Bellow material PTFE
Operating temperature 0 to 250°C
Safety Integrity Level (SIL) SIL 1 (Type AA 01 054: SIL2)

Installation length 253 mm
Density of the liquid 0.75 kg/dm³
Other technical data same as A 01 041

SIMILAR TYPE
Type A 01 051E15 special version for waste water and waste tanks. Technical data similar to A 01 051

FOR MANUALLY ADJUSTABLE OPERATING DIFFERENTIALS

Type A 01 090 to A 01 093 ideal for 2-point control, e.g. for pump control

Type A 01 090
Adjustable operating differential 37 to 218 mm

Type A 01 091
Adjustable operating differential 56 to 317 mm

Type A 01 092
Adjustable operating differential 83 to 442 mm

Type A 01 093
Adjustable operating differential 97 to 557 mm

Installation length 278 to 561 mm, depending on type
Density of the liquid min. 0.75 kg/dm³
Safety Integrity Level (SIL) SIL 1 (Types AA 01 090 to AA 01 093: SIL 2)
Other technical data same as A 01 041
PNEUMATIC SWITCH

**Type P 01 04**
the pneumatic limit switch

- **Function**: ON/OFF (3/2 way valve)
- **Max. control pressure**: max. 10 bar
- **Nominal pressure**: PN 25 acc. to EN/DIN
- **Operating temperature**: 1 to 250°C
- **Ambient temperature**: 1 to 80°C
- **Density of the liquid**: min. 0.7 kg/dm³
- **Operating differential**: fixed 12 mm
- **Control connections**: G 1/8” (BSPP) inside thread
- **Wetside material**: stainless steel (CrNiMo)
- **Housing material**: seawater resistant die cast aluminium

**Options**

- **Type 5P 01 04**: all stainless steel (CrNiMo) design
- **Type FP 01 04**: with declaration of conformity for use in Explosion proof areas

PNEUMATIC CONTROLLER

**Type M 01 04**
the pneumatic controller

- **Function**: proportional controller
- **Supply pressure**: 1.4 bar
- **Output signal**: 0.2 to 1 bar
- **Nominal pressure**: PN 25 acc. to EN/DIN
- **Operating temperature**: 1 to 250°C
- **Ambient temperature**: 1 to 80°C
- **Density of the liquid**: min. 0.7 kg/dm³
- **Control range**: without rod: 30 mm
- **Control connections**: G 1/8” (BSPP) inside thread
- **Wetside material**: stainless steel (CrNiMo)
- **Housing material**: seawater resistant die cast aluminium

**Options**

- **Type 5M 01 04**: all stainless steel (CrNiMo) design
- **Type FM 01 04**: with declaration of conformity for use in Explosion proof areas
**VERTICAL SWITCH**

**Type A 01 140 and A 01 141** for top mount installations

**Function**
- 2-point control (pump)
- or 1 switching point (alarm)

**Nominal pressure**
- PN 16 acc. to EN/DIN

**Operating temperature**
- 0 to 300°C

**Ambient temperature**
- 0 to 70°C

**Density of the liquid**
- Pump control: min. 0.45 kg/dm³
- Alarm: min. 0.30 kg/dm³

**Operating differential**
- A 01 140: 12 to 1340 mm
- A 01 141: 12 to 2840 mm

**Wet side material**
- stainless steel (CrNiMo)

**Housing material**
- seawater resistant die cast aluminium

**Flange dimensions**
- square 92 x 92 mm, PCD 92 mm

**Switch element**
- microswitch SPDT with silver contacts

**Switch rating**
- 250 VAC, 5A, 30 VDC, 5A

**Enclosure**
- IP65

**Safety Integrity Level (SIL)**
- SIL 1 (Types AA 01 140 and AA 01 141: SIL 2)

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**COUNTERFLANGE** - for convenient mounting of float switches

**Counterflange V = 38 mm**
- Type 2829.1* Flange: P250GH Stud: 5.8
- Type 2829.2 Flange: P250GH Stud: 5.8
- Type 2831.3* Flange: 1.4404 Stud: A2
- Type 2831.4 Flange: 1.4404 Stud: A2

**Counterflange V = 80 mm**
- Type 2829.1V80* Flange: P250GH Stud: 5.8
- Type 2829.2V80 Flange: P250GH Stud: 5.8
- Type 2831.3V80* Flange: 1.4404 Stud: A2
- Type 2831.4V80 Flange: 1.4404 Stud: A2

* not for use with the test actuator

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**TEST ACTUATOR**

The test actuator allows a periodic manual function check of the level switch in operating status. The following functions can be tested: function of the switching element (microswitch, proximity switch, pneumatic valve) and movement of the float.

**Important:** Not for use with the Compact Switch.

**Type 2382** Material: CrNi O-Ring: FPM

**Type 2383** Material: CrNi O-Ring: EPDM
The Trimod Besta industrial range for challenging applications

A TYPICAL TRIMOD BESTA INDUSTRIAL SWITCH

Type A 22C 04
for alarm, limit and control functions

Nominal pressure
PN 40 acc. to EN/DIN
Operating temperature
0 to 330°C
Ambient temperature
0 to 70°C
Density of the liquid
min. 0.7 kg/dm³
Operating differential
fixed 12 mm
Wetside material
stainless steel (CrNiMo)
Slip-on flange
carbon steel P265GH zinc galvanized and passivated
Housing material
seawater resistant die cast aluminium
Flange
DN 65, PN 40 acc. to EN 1092-1 (DIN 2501)
Flange facing
smooth raised face, form B1 (form C, DIN 2526)
Switch element
microswitch SPDT with silver contacts
Switch rating
250 VAC, 5A _ 30 VDC, 5A
Enclosure
IP65
Weight
5.4 kg
Installation depth (tank)
226 mm
Safety Integrity Level (SIL)
SIL 1 (Type AA 22C 04: SIL 2)

Flanges acc. to EN 1092-1
(DIN 2501)
DN 65 to DN 150
DN 16 to PN 320

Flanges acc. to ANSI B16.5
DN 3” to DN 6”
PN cl. 150 to PN cl. 2500

Flanges acc. to BS 10
DN 3” to DN 6”
PN Table E to PN Table T

Flanges acc. to JIS B 2220
DN 65 to DN 125
PN 5K to PN 63K

The benefits of the wide spectrum of Trimod Besta switches are especially obvious in the industrial range. They are the best choice for high operating pressures, aggressive media and high process temperatures up to 400°C.

SIL
EC 61508/61511 SIL 3 Capable
The Trimod Besta plastic range for highly aggressive media

A TYPICAL TRIMOD BESTA PLASTIC SWITCH

<table>
<thead>
<tr>
<th>Type A 304 98</th>
<th>PTFE switch, alarm, limit and control functions</th>
</tr>
</thead>
</table>
| Nominal pressure | PN 6 max. 6 bar to 65°C  
|                 | max. 4.5 bar at 100°C  
|                 | max. 3 bar at 200°C  |
| Operating temperature | 0 to 200°C  |
| Ambient temperature | 0 to 70°C  |
| Density of the liquid | min. 0.75 kg/dm³  |
| Operating differential | fixed 12 mm  |
| Wetside material | PTFE with 25% glass fibre  |
| Slip-on flange | carbon steel P265GH zinc galvanized and passivated  |
| Housing material | seawater resistant die cast aluminium  |
| Flange | DN 80, PN 10 acc. to EN 1092-1 (DIN 2501)  |
| Flange facing | smooth raised face, form B1 (form C, DIN 2526)  |
| Switch element | microswitch SPDT with silver contacts  |
| Switch rating | 250 VAC, 5A, 30 VDC, 5A  |
| Enclosure | IP65  |
| Weight | 5 kg  |
| Installation depth (tank) | 235 mm  |

Flanges acc. to EN 1092-1 (DIN 2501)
Flanges acc. to ANSI B16.5
Flanges acc. to BS 10
Flanges acc. to JIS B 2220

All wetted parts are made of high grade plastics such as PP, PTFE or PVDF. The switches are available with EN/DIN, ANSI, BS and JIS industrial flanges.
Hundreds of thousands of Trimod Besta switches ensure the safe voyage of vessels on our oceans

Since 1967 Trimod Besta limit switches are a huge success in the ship building industry. They are installed in tankers, cruise ships, container ships and submarines - and even on the fastest catamaran and the strongest crane ship in the world.

### THE FAVOURITES

#### Type A 01 041

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal pressure</td>
<td>PN 25 acc. to EN/DIN</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0 to 300°C</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>0 to 70°C</td>
</tr>
<tr>
<td>Density of the liquid</td>
<td>0.7 kg/dm³</td>
</tr>
<tr>
<td>Operating differential</td>
<td>fixed 12 mm</td>
</tr>
<tr>
<td>Wetside material</td>
<td>stainless steel (CrNiMo)</td>
</tr>
<tr>
<td>Housing material</td>
<td>seawater resistant die cast aluminium</td>
</tr>
<tr>
<td>Flange dimensions</td>
<td>square 92 x 92 mm, PCD 92 mm</td>
</tr>
<tr>
<td>Switch element</td>
<td>microswitch SPDT with silver contacts</td>
</tr>
<tr>
<td>Switch rating</td>
<td>250 VAC, 5A, 30 VDC, 5A</td>
</tr>
<tr>
<td>Enclosure</td>
<td>IP65</td>
</tr>
<tr>
<td>Installation depth (tank)</td>
<td>225 mm</td>
</tr>
<tr>
<td>Safety Integrity Level (SIL)</td>
<td>SIL 1 (Type AA 01 041: SIL 2)</td>
</tr>
</tbody>
</table>

#### Type U3A 01 041

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal pressure</td>
<td>PN 25 acc. to EN/DIN</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-30 to 80°C</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-30 to 80°C</td>
</tr>
<tr>
<td>Enclosure</td>
<td>IP68, switch housing pressure tight up to 100 meters water column</td>
</tr>
<tr>
<td>Cable length</td>
<td>3 m, or as required</td>
</tr>
<tr>
<td>Cable type</td>
<td>Neoprene (H07 RN-F)</td>
</tr>
<tr>
<td>Safety Integrity Level (SIL)</td>
<td>SIL 1 (Type U3AA 01 041: SIL 2)</td>
</tr>
<tr>
<td>Other technical data</td>
<td>same as A 01 041</td>
</tr>
</tbody>
</table>
Marine approvals and registrations of Trimod Besta limit switches

Trimod Besta level switches come with the required shipping approvals and registrations. See our homepage for up to date listings.

APPROVALS

- American Bureau of Shipping, ABS
- Bureau Veritas, BV
- Det Norske Veritas, DNV
- Germanischer Lloyd, GL
- Lloyd’s Register of Shipping, LRS
- Registro Italiano Navale, RINA
- Russian Maritime Register of Shipping, RMRS

Cat Link V, the 91 meter long catamaran of the Incat Ship Yard in Australia. Its transatlantic crossing at an average speed of 41.28 knots set a new record.

Trimod Besta level switches AA 01 04 and AA 01 093 are used to monitor and control levels on board.
Trimod Besta, whenever reliability is crucial

A TYPICAL INDUSTRIAL SWITCH FOR USE IN EXPLOSION PROOF AREAS

**Type ZK8 22C 041**
- hermetically sealed for alarm, limit and control functions
- **Type of protection**: Ex ed IIC T6...T5 Ga/Gb
- **EU approval**: EPS 12 ATEX 1430X
- **Nominal pressure**: PN 40 acc. to EN/DIN
- **Operating temperature**: -10 to 145°C
- **Ambient temperature**: -45 to 80°C
- **Density of the liquid**: min. 0.7 kg/dm³
- **Operating differential**: fixed 12 mm
- **Wetside material**: stainless steel (CrNiMo)
- **Slip-on flange**: carbon steel P265GH, zinc galvanised and passivated
- **Housing material**: seawater resistant die cast aluminium
- **Flange**: DN 65, PN 40 acc. to EN 1092-1 (DIN 2501)
- **Flange facing**: raised face form B1 (form C, EN/DIN 2626)
- **Switch element**: microswitch SPDT with silver contacts
- **Switch rating**: 250 VAC, 5A, 30 VDC, 5A
- **Safety Integrity Level (SIL)**: SIL 1 (Type ZKK8 22C 041: SIL 2)
- **Enclosure**: IP67

**Type XA8 22C 041**
- pressure capsulated for alarm, limit and control functions
- **Type of protection**: Ex de IIC T6
- **EU approval**: EPS 09 ATEX 1238 X
- **Operating temperature**: -10 to 330°C
- **Housing material**: seawater resistant die cast aluminium
- **Safety Integrity Level (SIL)**: SIL 1 (Type XAA8 22C 041: SIL 2)
- **Other technical data**: same as ZK8 22C 041

Thanks to high functional safety and extreme longevity, Trimod Besta level switches are proven in petrochemical plants and on offshore platforms.

The switches are available with EN/DIN, ANSI, BS and JIS flanges.
Trimod Besta limit switches in customized float chambers

Bachofen has many years of experience concerning the use of level switches in float chambers and containers. We offer the following approvals and services:

- Manufacturer approvals
- Procedure Qualification Record
- Welding certificates
- PED conformity

WE DELIVER ACCURATE, TESTED AND PRE INSTALLED.

DOCUMENTATION AND SERVICES

- Works certificates acc. to EN 10204-2.2
- Test certificates acc. to EN 10204-3.1
- Pressure test protocols
- Detailed documentation: parts information with technical specifications and material data, including lot and charge information
- Non-destructive testing: ultrasonic, x-ray and dye penetration testing
- Mechanical testing: tension, notch and hardness tests
- Base- and protective coatings
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Quality Management
The Bachofen Ltd. quality management system acc. to ISO 9001 has been established in 1994.

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Homepage
Find your local sales and service partner under www.trimod.ch.

Please find more detailed information in our Trimod Besta catalogue.
Download under www.trimod.ch

Our markets

Shipbuilding
Oil & Gas
Chemical & Petrochemical
Power Generation
Plant engineering
Water management