

## Magnetic Level Indicators / Gauges Model BNA

KSR KUEBLER AG · Data sheet Magnetic Level Indicator/Gauges

### Applications

- Chemical industry, petrochemistry, offshore
- Shipbuilding, engineering
- Power stations
- Pharmacie, food and beverage industry, water purification,
- environmental industry

### Special features

- Designs for temperatures from 160 °C to +450 °C
- Designs for a pressure range from full vacuum to 420 bar
- Special designs: Food industry design, interface measurement, coatings (e.g. enameled), liquid gas, heating jacket

### Description

A communicating bypass chamber is flanged to the side of a vessel, and as the liquid level in the tank rises or falls, a float with a built-in magnetic system inside the chamber rises or falls with it.

The chamber is completely sealed so that the only moving part of the apparatus in contact with the liquid is the float itself. On the dry side of the chamber is the KSR Magnetic Roller Display, a column of magnetic rollers which are white on one side and red on the other. The rollers are made from plastic (MRA) or ceramics (MRK) with a distance of 10 mm between their axes.

As the float moves up or down the bunched field of the permanent magnet mounted in its top section, pulls the rollers through a rotation

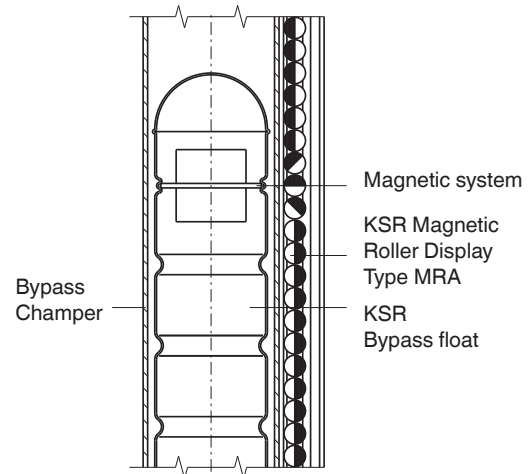
of 180°. As the float rises the rollers are turned from white to red, and as the float falls, they are changed back to white again.

This means that at any given time the amount of liquid in the tank is constantly represented by a red column without any external power supply.



## Technical Advantages

- Simple, robust, and solid design
- Pressure- and gas-proof separation of chamber and display
- Measuring and indicating of the level of aggressive, combustible, toxic, hot, agitated and contaminated liquids
- KSR Magnetic Roller Displays without external power supply
- Available for applications in all areas of industry through use of highly corrosion-resistant materials



## Approvals



94/9/EG



TÜV Süd - DGRL 97/23/EG



Germanischer Lloyd



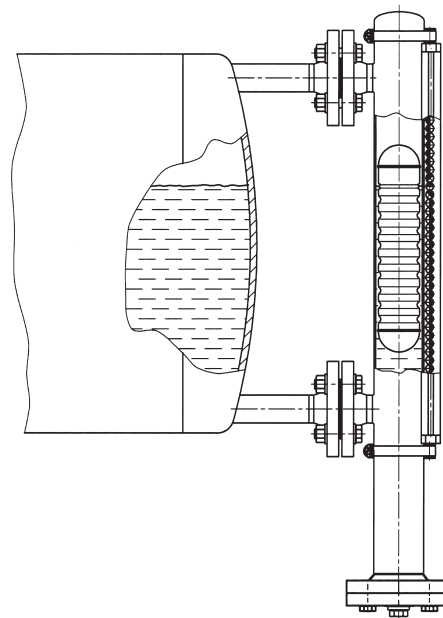
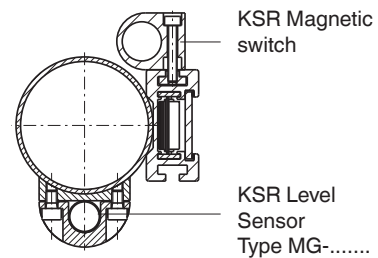
Det Norske Veritas



Rostechnadzor



American Bureau of Shipping



# Type Code

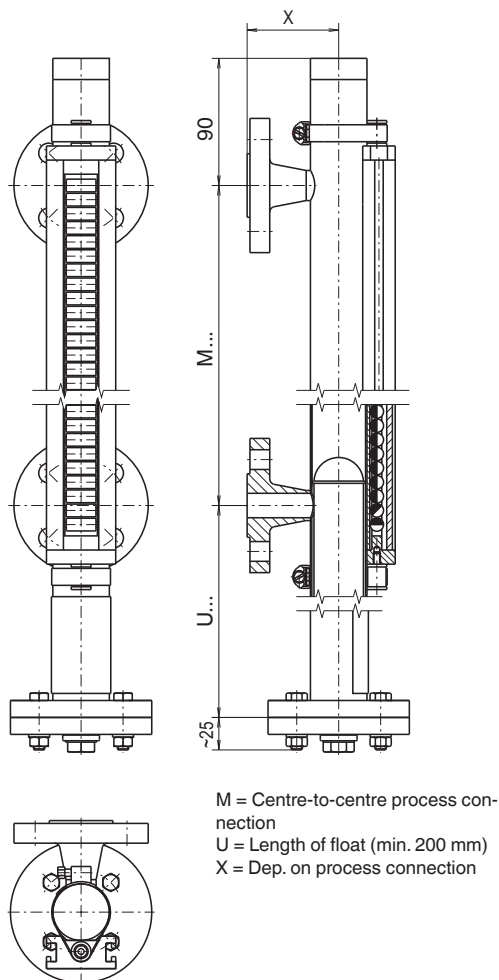
Code								
1		Basic type						
	BNA	Magnetic Level Indicator						
2		Process connections						
	.../.../...	1st Key = Nom. size	2nd Key = Nom. pressure	3rd Key = Flange face				
	EN...	EN 1092 DN 10 - DN 100	...	PN6 - PN400	...	Form B1, B2, C, D		
	...	DIN DN 10 - DN 100		PN6 - PN400		Form, C, N, F		
	...	ANSI 1/2" - 4"		Class 150 - Class 400		Form RF, SF, FF, RTJ		
	JIS...	JIS DN 10 - DN 100		5 K - 63 K		Form RF, SF, FF, RTJ		
	GN...	Thread male DIN						
	GM...	Thread female DIN						
	NPTN...	Thread male NPT						
	NPTM...	Thread female NPT						
	S...	Welding stubs						
3		Option Level Sensor (see separate type code page 25)						
...	MG	Basic type without optional code						
4		Distance centre-to-centre						
...	M...	Distance between flange centres in mm						
5		Material and chamber dimensions						
	.../...x...	1st Key = Material	2nd Key = Chamber dimensions					
	V	Stainless steel 1.4571	HC	Hastelloy C	...	Chamber OD x Wall thickness in mm		
	L	Stainless steel 1.4404	MO	SS 1.4529 (6Mo)				
	VE	Stainless steel electro-polished	M	Monel				
	VTF	Stainless steel PTFE-lined	PP	Polypropylene				
	VET	Stainless steel E-TFE-coated	PF	PVDF				
	VEC	Stainless steel E-CTFE-coated	G	Borosilicate glass				
6		Magnetic Roller Display						
	.../...	1st Key = Design	2nd Key = Scale					
	MRA	Aluminium housing with plastic rollers	SK.	with scale (plastic), graduation in cm (printed)				
	MRK	Aluminium housing with ceramic rollers	SA.	Aluminium scale graved				
	MNAV	Stainless steel housing with plastic rollers	SV.	Stainless steel graved				
	MNKV	Stainless steel with ceramic rollers	P.	with sight glass extender (for insulations) (weitere Typschlüssel auf Seite 19)				
7		Option Magnetic Switches 1st Key = Quantity, 3rd Key = Cable length						
	.../.../.../...	2nd Key = Execution	3rd Key = Cable length	4th Key = Options				
	M.	BGU	MVE.	BGU-V-E	1	1 m	R22	Pre resistance R22 for SPS
	ME.	BGU-E	MVD.	BGU-V-Exd	2	2 m	N	NAMUR circuit according DIN EN 60947-5-6
	MS12	BGU-M12	MHT	BGU-AHT	3	3 m		
	MES12	BGU-E-M12	MVHT	BGU-VHT	...	...		
	MA	BGU-A	MIL/H	BGU-AIL/H				
	MEA	BGU-A-E	MAR	BGU-AR				
	MD.	BGU-Exd	MAD	BGU-AD				
	MV.	BGU-V	MAM	BGU-AM				
8		Float (cylindrical) 2nd Key = Diameter/Length in mm						
	Z...S...	1st Key = Material	3rd Key = Pressure class	4th Key = Magnetic system				
	.V...	Stainless steel 1.4571	.G...	Borosilicate glass	PN16	PN16	R48H	R48H
	.T...	Titanium 3.7035	.VEC...	Stainless steel 1.4571	PN25	PN25	K92	K92
	.HC...	Hastelloy C		E-CTFE-coated	...	...	K74	K74
	.CF...	CF340	.TEC...	Titanium 3.7035			A90	A90
	.PP...	Polypropylene		E-CTFE-coated			A110	A110
	.PF...	PVDF					A125	A125
9		Approvals						
	...	Ex	Ex-Design					

## Ordering examples

	Basic type	Connection size	Option level sensor	Distance centre-to-centre	Material Chamber dimensions	Magnetic Roller display	Option Magnetic switch	Float design	Certificates
Code	1	2	3	4	5	6	7	8	9
	BNA	EN25/16/B1	MG	M1500	V60x2	MRA / SK	3 / M / 2	ZVSS185...	-

# Mini-Bypass Magnetic Level Indicators / Gauges of stainless steel PN40

Design: BNA - ../.. - M... - V42x2 - MRA  
 Pressure Equipment Directive 97/23/EG



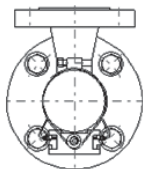
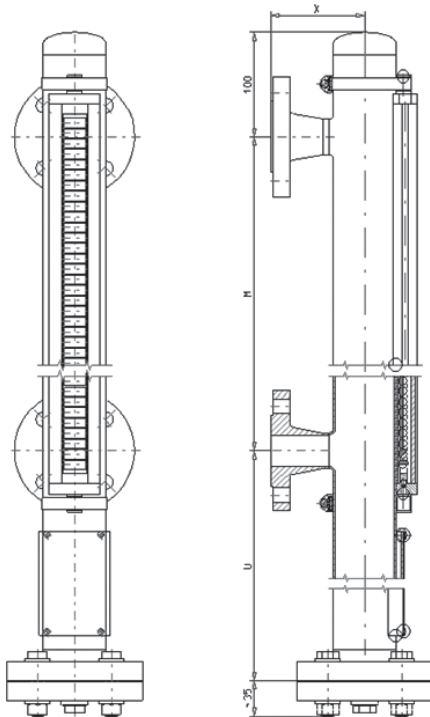
## Mini Magnetic Level Indicators / Gauges

Chamber	ø 42,4 x 2 mm
Chamber end top	Rohrboden Options: (see page 33) - Vent plug - Vent valve - Vent fl ange
Chamber end bottom	Flanged with drain plug Options: (siehe Seite 33) - Drain valve - Drain flange
Process connection	Flange EN 1092-1, DN10 - DN50, PN6 - PN40 Flange ANSI B 16.5, 1/2" - 2" Class 150 - Class 300 Thread stubs G/NPT 1/2" - 1" Welding stubs 1/2" - 1" (Options see page 34)
Distance centre-to-centre M...	Min. 150 mm to max. 5000 mm
Material	Stainless steel 1.4571
Nominal pressure	Max. 40 bar (entsprechend Schwimmerausführung)
Temperaturbereich	Max. 150 °C (according to float design)
Float	Type ZVS 32, ZTS 32 Material stainless steel 1.4571, Titanium 3.7035 S.G. min. 490 kg/m <sup>3</sup> Type ZBS35/120 Type key see page 16,18 Material Buna S.G. min. 800 kg/m <sup>3</sup> Pressure max. 6 bar Temperature max. 80 °C
Magnetic roller display	Type MRA... for technical data and further designs and options see page 20-21
Further options:	
Magnetic switches	see page 22-27
Level sensors	see page 28-32

# Bypass Magnetic Level Indicators / Gauges PN6 - PN40

Design: BNA - ../.. - M.... - ..x.. - MRA (-Ex)

Pressure Equipment Directive 97/23/EG



M = Centre-to-centre process connection  
 U = Length of float (min. 200 respectively 220 mm)  
 X = Dep. on process connection

## PN6 - PN40

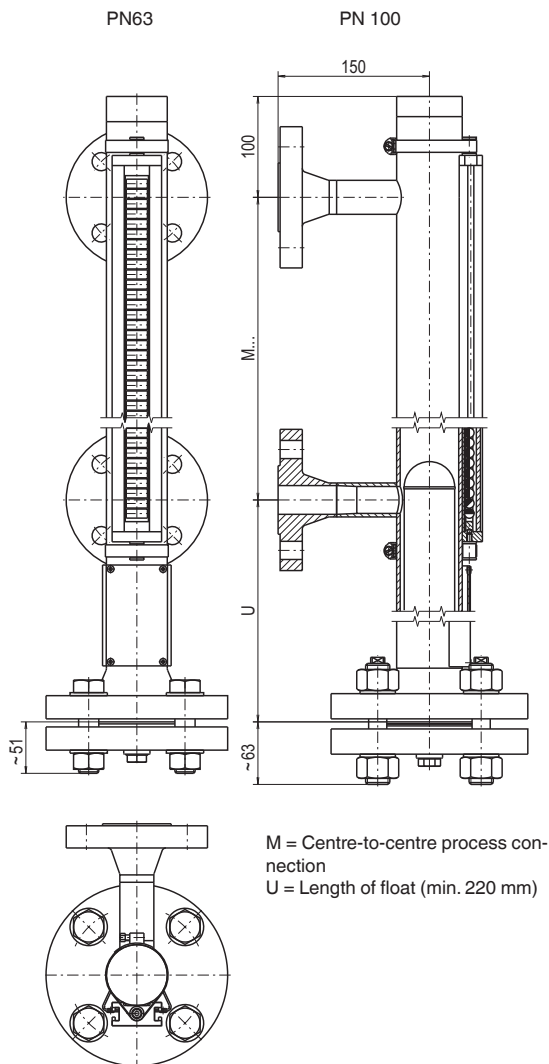
Chamber	ø 60,3 x 2 mm
Chamber end top	Welding cap or fl at top or fl angled Options: (see page 33) - Vent plug - Vent valve - Vent fl ange
Chamber end bottom	Flanged with drain plug Options: (see page 33) - Drain valve - Drain fl ange
Process connection	Flange EN 1092-1, DN10 - DN100, PN6 - PN40 Flange ANSI B 16.5, 1/2" - 4" Class 150 - Class 300 Thread stubs G/NPT 1/2" - 1" Welding stubs 1/2" - 1" (Options see page 34)
Distance centre-to-centre M...	min. 150 mm to max. 6000 mm (other dimensions on request)
Material	Stainless steel (316 Ti, 316 L, 904 L) Titanium Grade 2 Hastelloy C
Nominal pressure	Max. 40 bar (according to flange design)
Temperature range	-160 °C to +450 °C (according to design)
Float	Titan Grade 2 Stainless steel 316Ti Float design according to process parameters S.G., pressure and temperature (see type code page 16-18)
Magnetic roller display	Typ MRA-M... < 200 °C Typ MRK-M... > 200 °C for technical data and further designs and options see page 20-21
Further options:	
Magnetic switches	see page 22-27
Level sensors	see page 28-32
Electrical trace heating	on request
Chamber insulation	on request
Explosion protection (Option)	Ex II 1/2G c T1-T6 KEMA 02 ATEX 2106 X

Other designs on request

# Bypass Magnetic Level Indicators / Gauges PN63 and PN100 of stainless steel

Design: BNA - ../.. - M.... - V..x.. - MRA (-Ex)

Pressure Equipment Directive 97/23/EG



## PN63 and PN100

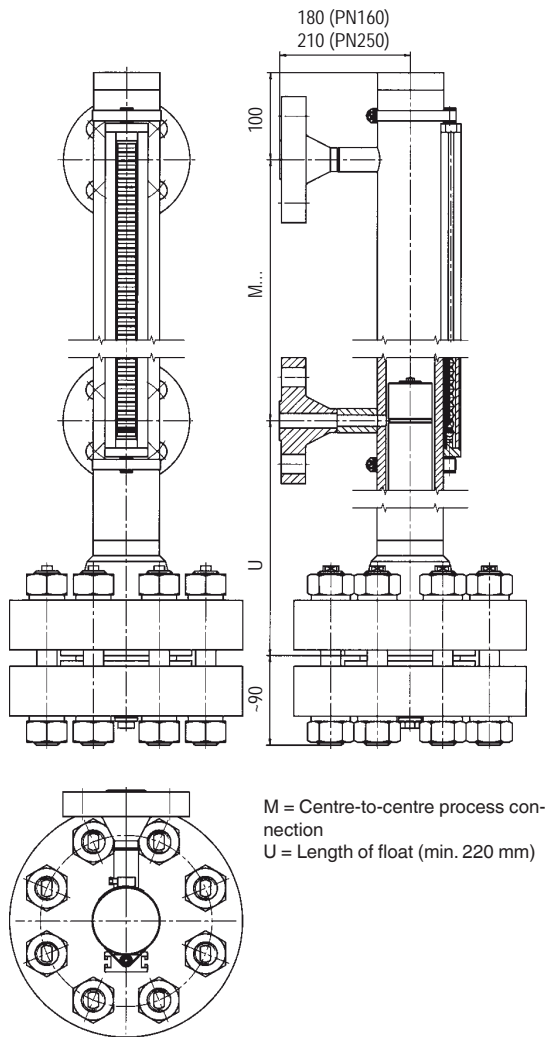
Chamber	PN63	ø 60,3 x 2 mm oder ø 60,3 x 2,6 mm
	PN100	ø 65 x 3,5 mm
Chamber end top	PN63	Welding cap or fl at top or flanged
	PN100	DN50 PN63 bzw. ANSI 2" Class 600
		DN50 PN100 bzw. ANSI 2" Class 600
		Options: (siehe Seite 30)
		- Entlüftungsschraube
		- Entlüftungsventil
		- Entlüftungsflansch
Unterer Standrohrabschluss		Flanschverbindung
		DN50 PN63 bzw. ANSI 2" Class 600
	PN63	DN50 PN100 bzw. ANSI 2" Class 600
	PN100	mit Ablassschraube
		Options: (siehe Seite 30)
		- Vent valve
		- Vent flange
Process connection		Flange EN 1092-1, DN10 - DN100, PN63 - PN100
		Flange ANSI B 16.5, 1/2" - 4" Class 600
		Thread stubs G/NPT 1/2" - 1"
		Welding stubs 1/2" - 1"
		(Options see page 31)
Distance centre-to-centre M...		Min. 150 mm to max. 6000 mm (other dimensions on request)
Material		Stainless steel 1.4571
Nominal pressure		Max. 63 bar
PN63		Max. 100 bar
	PN100	
Temperature range		-30 °C to +300 °C (according to design)
Float		Titan Grade 2
		Float design according to process parameters S.G., pressure and temperature (see type code page 19 and 20)
Magnetic roller display		Type MRA... < 200 °C
		Type MRK... > 200 °C
		for technical data and further designs and options see page 20-21
Further options:		
Magnetic switches		See page 22-27
Level sensors		See page 28-32
Electrical trace heating		on request
Chamber insulation		on request
Explosion protection (Option)		Ex II 1/2G c T1-T6 KEMA 02 ATEX 2106 X

Other designs on request

# Bypass Magnetic Level Indicators / Gauges PN160 and PN250 of stainless steel

Design: BNA - ../.. - M.... - V.x... - MRA (-Ex)

Pressure Equipment Directive 97/23/EG



## PN160 and PN250

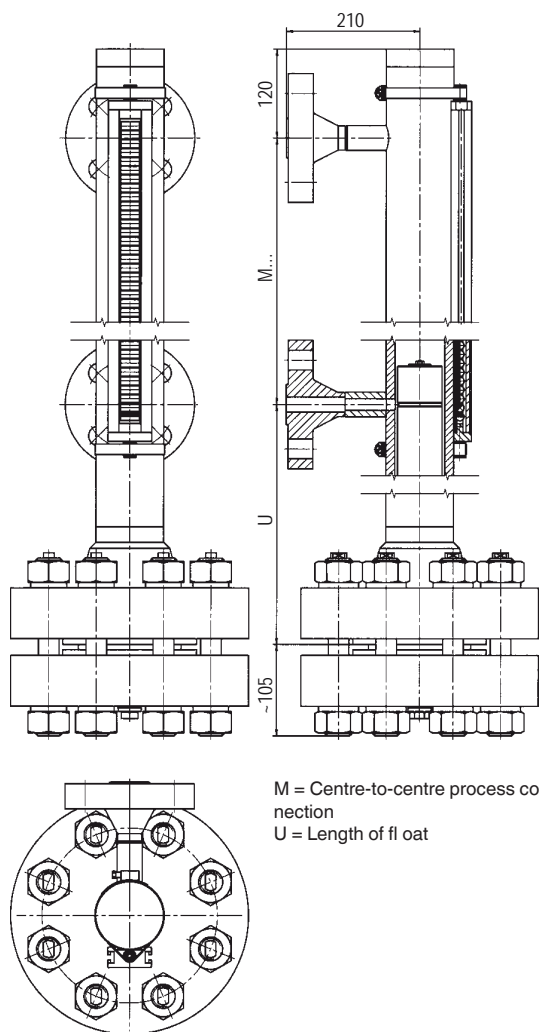
Chamber	PN160 PN250	ø 73,03 x 5,16 mm ø 71 x 7,5 mm
Chamber end top		Flat top or flanged ANSI 2 1/2" Class 1500 Options: (see page 30) - Vent plug - Vent valve - Vent flange
Chamber end bottom		Flanged ANSI 2 1/2" Class 1500 with drain plug Options: (see page 30) - Drain valve - Drain flange
Process connection		Flange EN 1092-1, DN10 - DN50, PN160 - PN250 Flange ANSI B 16.5, 1/2" - 2" Class 1500 Thread stubs G/NPT 1/2" - 1" Welding stubs 1/2" - 1" (Options see page 31)
Distance centre-to-centre M...		Min. 150 mm to max. 6000 mm (other dimensions on request)
Material		Stainless steel 1.4571
Nominal pressure PN160 PN250		Max. 160 bar Max. 250 bar
Temperature range PN160 PN250		-30 °C bis +285 °C -30 °C bis +200 °C (according to design)
Float		Titan Grade 2 Float design according to process parameters S.G., pressure and temperature (see type code page 18) CF 340 solid body material, leakage-proof
Magnetic roller display		Typ MRA... < 200 °C Typ MRK... > 200 °C Technische Daten und weitere for technical data and further designs and options see page 20-21
Further options: Magnetic switches Level sensors Electrical trace heating Chamber insulation		See page 22-27 See page 28-32 on request on request
Explosion protection (Option)		Ex II 1/2G c T1-T6 KEMA 02 ATEX 2106 X

Other designs on request

# Bypass Magnetic Level Indicators / Gauges PN400 of stainless steel

Design: BNA - ../.. - M.... - V76x10 - MRA (-Ex)

Pressure Equipment Directive 97/23/EG



M = Centre-to-centre process connection  
U = Length of float

## PN400

Chamber	ø 76 (ø 76,1) x 10 mm
Chamber end top	Flat top or flanged ANSI 2 1/2" Class 2500 Options: (see page 30) - Vent plug - Vent valve - Vent flange
Chamber end bottom	Flanged ANSI 2 1/2" Class 2500 mit Ablasschraube Optionen: (siehe Seite 30) - Drain valve - Drain flange
Process connection	Flange EN 1092-1, DN10 - DN50, PN400 Flange ANSI B 16.5, 1/2" - 2" Class 2500 Thread stubs G/NPT 1/2" - 1" Welding stubs 1/2" - 1" (Options see page 31)
Distance centre-to-centre M...	Min. 150 mm to max. 6000 mm (other dimensions on request)
Material	Stainless steel 1.4571
Nominal pressure	Max. 400 bar
Temperature range	-30 °C to +70 °C (according to design)
Float	Titan Grade 2 Float design according to process parameters S.G., pressure and temperature on request.
Magnetic roller display	Typ MRA... Technische Daten und weitere for technical data and further designs and options see page 20-21
Further options:	
Magnetic switches	See page 22-27
Level sensors	See page 28-32
Electrical trace heating	on request
Chamber insulation	on request
Explosion protection (Option)	Ex II 1/2G c T1-T6 KEMA 02 ATEX 2106 X

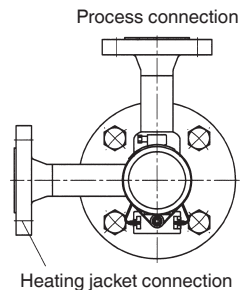
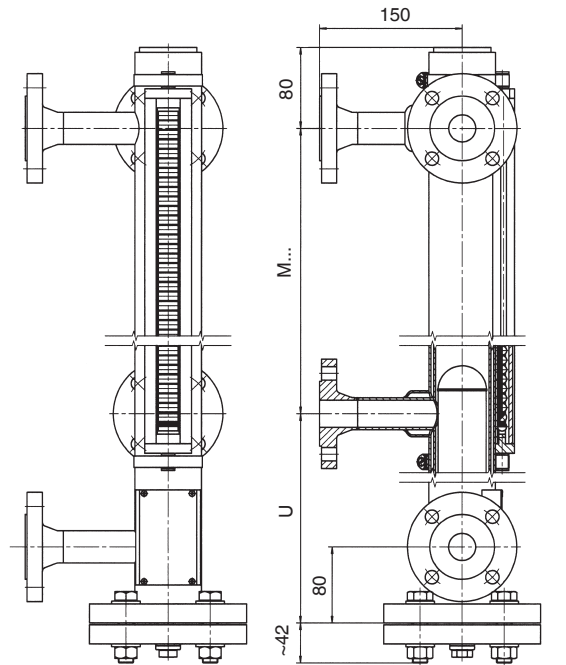
Other designs on request



# Bypass Magnetic Level Indicators / Gauges with heating jacket of stainless steel

Design: BNA - ../.. - M.... - V60/70 - MRA (-Ex)

Pressure Equipment Directive 97/23/EG



M = Centre-to-centre process connection  
U = Length of float (min. 220 mm)



## Magnetic Level Indicators / Gauges with heating jacket

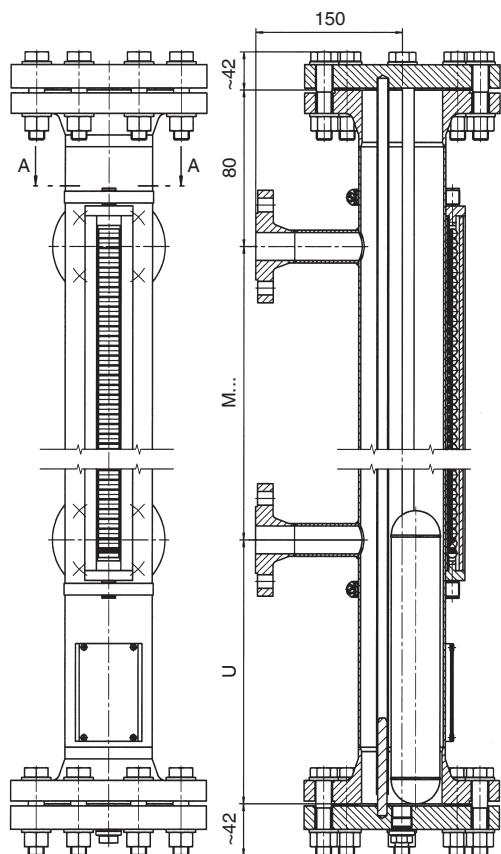
Chamber	ø 60,3 x 2 mm
Heating jacket pipe	ø 70 x 2 mm
Chamber end top	Welding cap Options: - Vent plug - Vent valve - Vent fl ange
Chamber end bottom	Flanged with drain Options: - Drain valve - Drain fl ange
Process connection	Flange EN 1092-1, DN10 - DN100, PN6 - PN40 Flange ANSI B 16.5, 1/2" - 4" Class 300 Thread stubs G/NPT 1/2" - 1" Welding stubs 1/2" - 1" (Options see page 31)
Heating jacket connection	Flange EN 1092-1, DN10 - DN10, PN40 Flange ANSI B 16.5, 1/2" - 4" Class 300 Thread stubs G/NPT 1/2" - 1" Welding stubs 1/2" - 1"
Distance centre-to-centre M...	Min. 150 mm to max. 6000 mm (other dimensions on request)
Material	Stainless steel 1.4571
Nominal pressure	
Process	Max. 16 bar to max. 40 bar (according to fl ange design)
Heating jacket	Max. 16 bar
Temperature range	-60 °C to +450 °C (according to design)
Float	Titan Grade 2 Float design according to process parameters S.G., pressure and temperature (see type code page 15-16)
Magnetic roller display	Typ MRA... < 200 °C Typ MRK... > 200 °C for technical data and further designs and options see page 20-21
Further options:	
Magnetic switches	See page 22-27
Level sensors	See page 28-32
Explosion protection (Option)	Ex II 1/2G c T1-T6 KEMA 02 ATEX 2106 X

Other designs on request

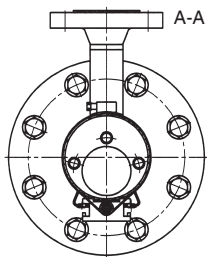
# Bypass Magnetic Level Indicators / Gauges in Liquid Gas Design of stainless steel

Design: BNA - ../.. - M... - V88x2 - MRA (-Ex)

Pressure Equipment Directive 97/23/EG



M = Centre-to-centre process connection  
U = Length of float (min. 220 mm)



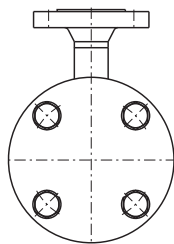
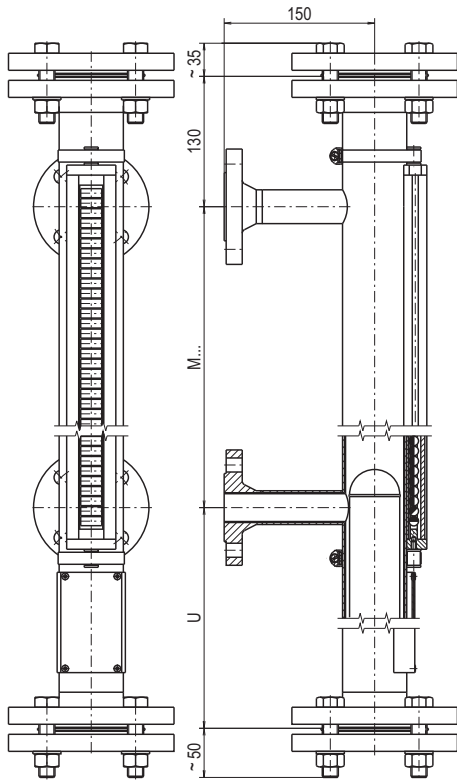
## Liquid Gas Design

Chamber	ø 88,9 x 2 mm
Chamber end top	Flanged Options: (see page 30) - Vent plug - Vent valve - Vent fl ange
Chamber end bottom	Flanged with drain plug Options: (page 30) - Drain valve - Drain flange
Process connection	Flange ANSI B 16.5, 1/2" - 4" Class 150 - Class 300 Thread stubs G/NPT 1/2" - 1" Flange EN 1092-1, DN10 - DN100, PN6 - PN40 Welding stubs 1/2" - 1" (Options see page 31)
Distance centre-to-centre M...	Min. 150 mm to max. 6000 mm
Material	Stainless steel 1.4571
Nominal pressure	Max. 25 bar (according to fl ange design)
Temperature range	-60 °C to +300 °C (according to design)
Float	Titan Grade 2 Float design according to process parameters S.G., pressure and temperature (see type code page 15)
Magnetic roller display	Typ MRA... < 200 °C Typ MRK... > 200 °C for technical data and further designs and options see page 20-21
Further options:	
Magnetic switches	See page 22-27
Level sensors	See page 28-32
Electrical trace heating	on request
Chamber insulation	on request
Explosion protection (Option)	Ex II 1/2G c T1-T6 KEMA 02 ATEX 2106 X

Other designs on request

# Bypass Magnetic Level Indicators / Gauges E-CTFE-coated

Design: BNA - .. /16 - M....-VEC64x2 - MRA  
 Pressure Equipment Directive 97/23/EG



M = Centre-to-centre process connection  
 U = Length of float (min. 220 mm)

## E-CTFE-coated

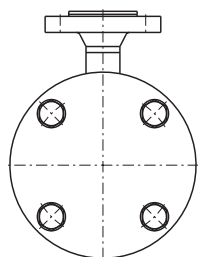
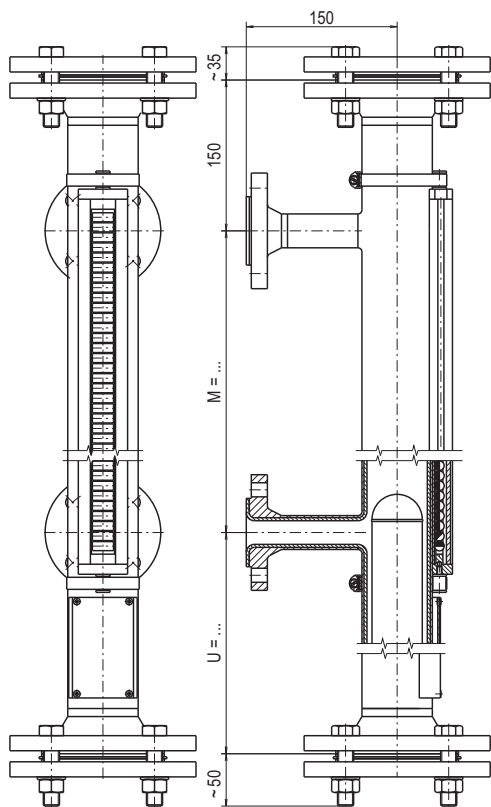
Chamber	ø 64 x 2 mm
Chamber end top	Flanged Options: - Vent flange
Chamber end bottom	Flanschverbindung Options: - drain flange
Process connection	Flange EN 1092-1, DN10 - DN100, PN16 Flange ANSI B 16.5, 1/2" - 4" Class 150 - Class 300
Distance centre-to-centre M...	Min. 150 mm to max. ... mm (overall chamber length max. 2500 mm) on dimensions > 2500 mm - chamber separated with flange
Material	Stainless steel 316 Ti (1.4571) coated E-CTFE internally, Option: anti-static
Nominal pressure	Max. 16 bar
Temperature range	depending on liquid
Float	Stainless steel 316Ti E-CTFE-coated Titanium Grade 2 E-CTFE-coated Float design according to process parameters S.G., pressure and temperature (see type code page 15)
Magnetic roller display	Typ MRA... for technical data and further designs and options see page 20-21
Further options: Magnetic switches Level sensors	See page 22-27 See page 28-32

Other designs on request

# Bypass Magnetic Level Indicators / Gauges ETFE-coated

Design: BNA - ../16 - M.... - VET70x2 - MRA

Pressure Equipment Directive 97/23/EG



M = Centre-to-centre process connection  
U = Length of float (min. 220 mm)

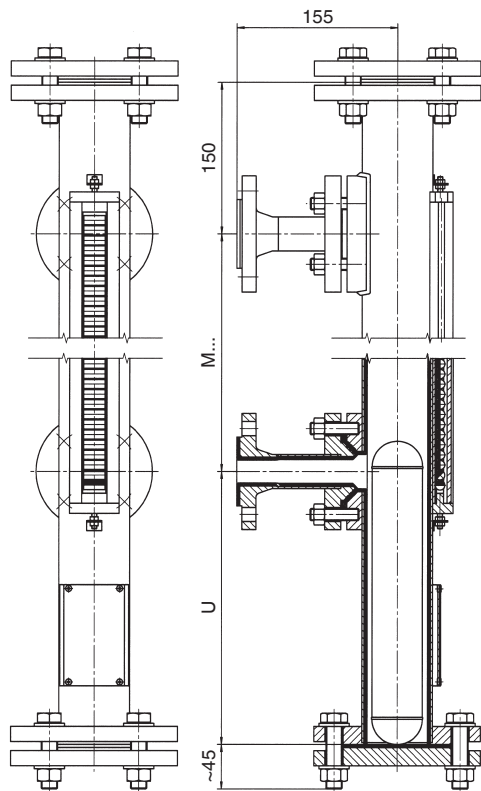
## E-TFE-coated

Chamber	ø 70 x 2 mm
Chamber end top	Flanged DN 65 PN 16 or ANSI 2 1/2" Class 150 Options: - Vent flange
Chamber end bottom	Flanged DN 65 PN 16 or ANSI 2 1/2" Class 150 Options: - Drain flange
Process connection	Flange EN 1092-1, DN10 - DN100, PN16 Flange ANSI B 16.5 1/2" - 4" Class 150 - Class 300
Distance centre-to-centre M...	min. 150 mm to max. ... mm (overall chamber length max. 2500 mm) on dimensions > 2500 mm - chamber separated with flange
Material	Stainless steel 316 Ti (1.4571) coated E-TFE internally 3 - 4 mm (Chemresist)
Nominal pressure	Max. 16 bar
Temperature range	depending on liquid
Float	Stainless steel 316Ti E-CTFE-coated Titanium Grade 2 E-CTFE-coated Stainless steel 316Ti PFA-coated Titanium Grade 2 PFA-coated Float design according to process parameters S.G., pressure and temperature (see type code page 15)
Magnetic roller display	Typ MRA... for technical data and further designs and options see page 20-21
Further options: Magnetic switches Level sensors	See page 22-27 See page 28-32

Other designs on request

## Bypass Magnetic Level Indicators / Gauges PTFE-lined

Design: BNA - .. /16 - M... - VTF70x2 - MRA  
 Pressure Equipment Directive 97/23/EG



M = Centre-to-centre process connection  
 U = Length of float (min. 220 mm)

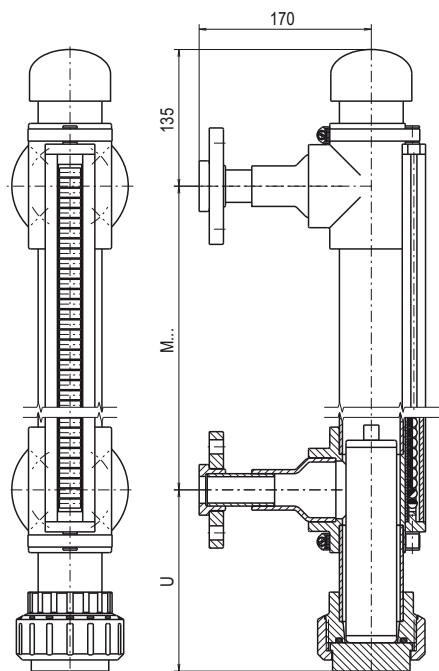
### PTFE-lined

Chamber	ø 70 x 2 mm
Chamber end top	Flanged Options: - Vent flange
Chamber end bottom	Flanged Options: - Drain flange
Process connection	Flange EN 1092-1, DN25, PN16 Flange ANSI B 16.5, 1" Class 150 - Class 300
Distance centre-to-centre M...	min. 150 mm to max. ... mm (overall chamber length max. 2000 m on dimensions > 2000 mm - chamber separated with flange)
Material	Stainless steel 316 Ti (1.4571) coated PTFE internally Lining: 3 mm wall thickness, vacuum-proof Option: anti-static
Nominal pressure	Max. 10 bar
Temperature range	depending on liquid
Float	Stainless steel 316Ti E-CTFE-coated Titanium Grade 2 E-CTFE-coated Stainless steel 316Ti PFA-coated Titanium Grade 2 PFA-coated Float design according to process parameters S.G., pressure and temperature (see type code page 15)
Magnetic roller display	Typ MRA... for technical data and further designs and options see page 20-21
Further options:	
Magnetic switches	See page 22-27
Level sensors	See page 28-32

Other designs on request

## Bypass Magnetic Level Indicators / Gauges of PVDF, PP

Design: BNA - ../16 - M.... - PF63x3 - MRA  
 BNA - ../16 - M.... - PP63x3 - MRA



M = Centre-to-centre process connection  
 U = Length of float (mind. 155 mm)

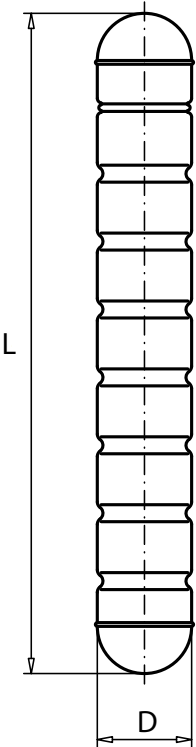
### Magnetic Level Indicators / Gauges PVDF, PP

Chamber	ø 63 x 3 mm
Chamber end top	Welding cap Options: - Threaded fitting - Vent valve - Vent flange
Chamber end bottom	Threaded fitting Options: - Drain valve - Drain flange
Process connection	Flange EN 1092-1, DN10 - DN50 PN6 - PN 16 Flange ANSI B 16.5, 1/2" - 2" Class 150 Welding stubs 1/2" - 1"
Distance centre-to-centre M...	Min. 200 mm to max. 4000 mm
Material	PVDF, PP
Nominal pressure	Max. 4 bar
Temperature range	PVDF max. 80 °C PP max. 60 °C
Float	PVDF PP Float design according to type code (see page 15)
Magnetic roller display	Typ MRA.... for technical data and further designs and options see page 20-21
Further options: Magnetic switches Level sensors	See page 22-27 See page 28-32

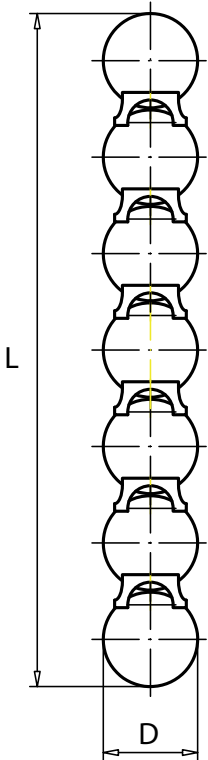
Other designs on request

# Bypass Floats

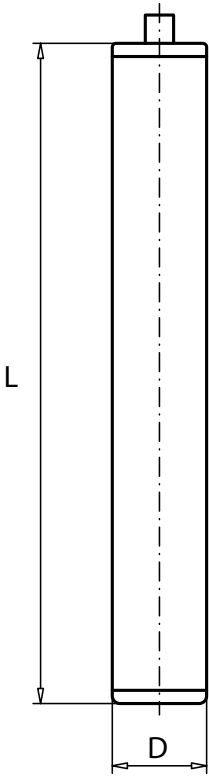
Type ZVSS  
ZTSS



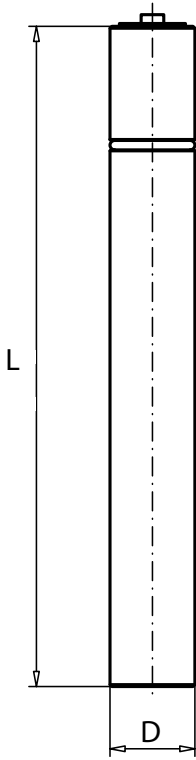
Type ZTKS



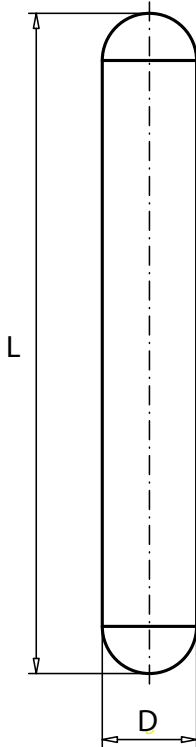
Type ZPPS  
ZPFS



Type  
ZCFS



Type ZTS  
ZVS



## Bypass Floats

Type Code	Max. Pressure bar	Max. Temperature °C	Density kg/m <sup>3</sup>	Ø mm	Length mm	Material
<b>Cylinder float PN6</b>						
ZBS 35/120	6	80	800 - 2000	35	120	Buna
ZPFS 150	6	80	1340 - 2000	50	150	PVDF
ZPFS 200	6	80	1070 - 1480	50	200	PVDF
ZPFS 250	6	80	930 - 1140	50	250	PVDF
ZPFS 300	6	80	850 - 980	50	300	PVDF
ZPFS 350	6	80	790 - 890	50	350	PVDF
ZPPS 150	6	60	1200 - 2000	50	150	PP
ZPPS 200	6	60	910 - 1320	50	200	PP
ZPPS 250	6	60	750 - 970	50	250	PP
ZPPS 300	6	60	660 - 790	50	300	PP
ZPPS 350	6	60	590 - 690	50	350	PP
<b>Cylinder float PN16</b>						
ZVS 32/125/PN16/A990	16	400	1270 - 2000	32	125	Edelstahl (1.4571)
ZVS 32/150/PN16/A990	16	400	1090 - 1350	32	150	Edelstahl (1.4571)
ZVS 32/180/PN16/A990	16	400	940 - 1110	32	180	Edelstahl (1.4571)
ZVS 32/210/PN16/A990	16	400	850 - 980	32	210	Edelstahl (1.4571)
ZVS 32/245/PN16/A990	16	400	780 - 880	32	245	Edelstahl (1.4571)
ZVS 32/285/PN16/A990	16	400	730 - 800	32	285	Edelstahl (1.4571)
<b>Cylinder float PN25</b>						
ZVSS 150	25	250	1230 - 2000	50	150	Edelstahl (1.4571)
ZVSS 200	25	250	1030 - 1250	50	200	Edelstahl (1.4571)
ZVSS 250	25	250	820 - 1050	50	250	Edelstahl (1.4571)
ZVSS 300	25	250	730 - 840	50	300	Edelstahl (1.4571)
ZVSS 350	25	250	680 - 770	50	350	Edelstahl (1.4571)
ZVSS 400	25	250	640 - 710	50	400	Edelstahl (1.4571))
ZVSS 450	25	250	600 - 660	50	450	Edelstahl (1.4571))
ZTSS 200	25	250	780 - 980	50,8	200	Titan (3.7035)
ZTSS 250	25	250	650 - 780	50,8	250	Titan (3.7035)
ZTSS 300	25	250	610 - 710	50,8	300	Titan (3.7035)
ZTSS 350	25	250	550 - 620	50,8	350	Titan (3.7035)
ZTSS 400	25	250	510 - 570	50,8	400	Titan (3.7035)
ZTSS 450	25	250	480 - 530	50,8	450	Titan (3.7035)
ZVSS 150/PN25/R48H	25	200	990 - 2000	50	150	Edelstahl (1.4571)
ZVSS 185/PN25/R48H	25	200	830 - 1010	50	185	Edelstahl (1.4571)
ZVSS 225/PN25/R48H	25	200	730 - 850	50	225	Edelstahl (1.4571)
ZVSS 275/PN25/R48H	25	200	640 - 750	50	275	Edelstahl (1.4571)
ZVSS 335/PN25/R48H	25	200	590 - 660	50	335	Edelstahl (1.4571)
ZVSS 400/PN25/R48H	25	200	550 - 610	50	400	Edelstahl (1.4571)
ZVSS 470/PN25/R48H	25	200	520 - 570	50	470	Edelstahl (1.4571)
ZVSS 555/PN25/R48H	25	200	490 - 540	50	555	Edelstahl (1.4571)
ZVSS 650/PN25/R48H	25	200	470 - 510	50	650	Edelstahl (1.4571)
ZVSS 760/PN25/R48H	25	200	460 - 490	50	760	Edelstahl (1.4571)
ZTSS 150/PN25/R48H	25	200	820 - 2000	50,8	150	Titan (3.7035)
ZTSS 180/PN25/R48H	25	200	710 - 840	50,8	180	Titan (3.7035)
ZTSS 215/PN25/R48H	25	200	600 - 730	50,8	215	Titan (3.7035)



## Bypass Floats

Type Code	Max. Pressure bar	Max. Temperature °C	Density kg/m <sup>3</sup>	Ø mm	Length mm	Material
<b>Cylinder float PN25</b>						
ZTSS 250/PN25/R48H	25	200	540 - 620	50,8	250	Titan (3.7035)
ZTSS 300/PN25/R48H	25	200	480 - 560	50,8	300	Titan (3.7035)
ZTSS 355/PN25/R48H	25	200	430 - 500	50,8	355	Titan (3.7035)
ZTSS 410/PN25/R48H	25	200	400 - 450	50,8	410	Titan (3.7035)
ZTSS 465/PN25/R48H	25	200	380 - 420	50,8	465	Titan (3.7035)
ZTSS 525/PN25/R48H	25	200	370 - 400	50,8	525	Titan (3.7035)
ZTSS 595/PN25/R48H	25	200	360 - 390	50,8	595	Titan (3.7035)
ZTSS 680/PN25/R48H	25	200	340 - 380	50,8	680	Titan (3.7035)
ZTSS 765/PN25/R48H	25	200	320 - 360	50,8	765	Titan (3.7035)
ZVS 200/2,5/200/1160/K74	25	200	1050 - 2000	50	200	Edelstahl (1.4571)
ZVS 250/2,5/200/960/K74	25	200	890 - 1170	50	250	Edelstahl (1.4571)
ZVS 300/2,5/200/850/K74	25	200	800 - 970	50	300	Edelstahl (1.4571)
ZVS 350/2,5/200/775/K74	25	200	740 - 860	50	350	Edelstahl (1.4571)
ZVS 400/2,5/200/720/K74	25	200	695 - 810	50	400	Edelstahl (1.4571)
ZVS 450/2,5/200/680/K74	25	200	660 - 770	50	450	Edelstahl (1.4571)
ZTS 150/2,5/200/1380/K74	25	200	1190 - 2000	50	150	Titan (3.7035)
ZTS 200/2,5/200/1000/K74	25	200	910 - 1340	50	200	Titan (3.7035)
ZTS 250/2,5/200/830/K74	25	200	770 - 980	50	250	Titan (3.7035)
ZTS 300/2,5/200/730/K74	25	200	690 - 810	50	300	Titan (3.7035)
ZTS 350/2,5/200/660/K74	25	200	630 - 740	50	350	Titan (3.7035)
ZTS 400/2,5/200/610/K74	25	200	590 - 690	50	400	Titan (3.7035)
ZTS 450/2,5/200/580/K74	25	200	560 - 650	50	450	Titan (3.7035)
ZTS 500/2,5/200/550/K74	25	200	540 - 620	50	500	Titan (3.7035)
<b>Cylinder float PN40</b>						
ZTS 150/PN40/K92	40	250	1060 - 2000	50,8	150	Titan (3.7035)
ZTS 180/PN40/K92	40	250	900 - 1080	50,8	180	Titan (3.7035)
ZTS 215/PN40/K92	40	250	780 - 920	50,8	215	Titan (3.7035)
ZTS 255/PN40/K92	40	250	700 - 800	50,8	255	Titan (3.7035)
ZTS 300/PN40/K92	40	250	630 - 720	50,8	300	Titan (3.7035)
ZTS 345/PN40/K92	40	250	580 - 650	50,8	345	Titan (3.7035)
ZTS 405/PN40/K92	40	250	540 - 600	50,8	405	Titan (3.7035)
ZTS 465/PN40/K92	40	250	510 - 560	50,8	465	Titan (3.7035)
ZTS 530/PN40/K92	40	250	490 - 530	50,8	530	Titan (3.7035)
ZTS 610/PN40/K92	40	250	470 - 510	50,8	610	Titan (3.7035)
ZTS 150/PN40/R48H	40	190	900 - 2000	50,8	150	Titan (3.7035)
ZTS 185/PN40/R48H	40	190	760 - 920	50,8	185	Titan (3.7035)
ZTS 225/PN40/R48H	40	190	660 - 780	50,8	225	Titan (3.7035)
ZTS 270/PN40/R48H	40	190	590 - 680	50,8	270	Titan (3.7035)
ZTS 320/PN40/R48H	40	190	540 - 610	50,8	320	Titan (3.7035)
ZTS 385/PN40/R48H	40	190	500 - 560	50,8	385	Titan (3.7035)
ZTS 465/PN40/R48H	40	190	470 - 520	50,8	465	Titan (3.7035)
ZTS 550/PN40/R48H	40	190	450 - 490	50,8	550	Titan (3.7035)
ZTS 635/PN40/R48H	40	190	430 - 470	50,8	635	Titan (3.7035)
ZTS 60/150/PN40/K74	40	200	1060 - 2000	50,8	150	Titan (3.7035)
ZTS 60/180/PN40/K74	40	200	890 - 1070	50,8	180	Titan (3.7035)

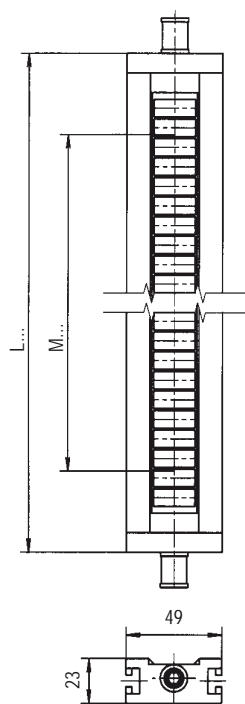
## Bypass Floats

Type Code	Max. Pressure bar	Max. Temperature °C	Density kg/m <sup>3</sup>	Ø mm	Length mm	Material
<b>Cylinder float PN40</b>						
ZTS 60/210/PN40/K74	40	200	790 - 900	50,8	210	Titan (3.7035)
ZTS 60/245/PN40/K74	40	200	700 - 800	60	245	Titan (3.7035)
ZTS 60/285/PN40/K74	40	200	640 - 710	60	285	Titan (3.7035)
ZTS 60/325/PN40/K74	40	200	590 - 650	60	325	Titan (3.7035)
ZTS 60/370/PN40/K74	40	200	550 - 600	60	370	Titan (3.7035)
ZTS 60/425/PN40/K74	40	200	520 - 560	60	425	Titan (3.7035)
ZTS 60/475/PN40/K74	40	200	500 - 530	60	475	Titan (3.7035)
ZTS 60/540/PN40/K74	40	200	470 - 510	60	540	Titan (3.7035)
ZTS 60/605/PN40/K74	40	200	460 - 480	60	605	Titan (3.7035)
ZVS 32/125/PN40/A990	40	400	1360 - 2000	32	125	Edelstahl (1.4571)
ZVS 32/155/PN40/A990	40	400	1140 - 1400	32	155	Edelstahl (1.4571)
ZVS 32/185/PN40/A990	40	400	1010 - 1180	32	185	Edelstahl (1.4571)
ZVS 32/225/PN40/A990	40	400	900 - 1020	32	225	Edelstahl (1.4571)
ZVS 32/265/PN40/A990	40	400	820 - 910	32	265	Edelstahl (1.4571)
ZVS 32/315/PN40/A990	40	400	760 - 830	32	315	Edelstahl (1.4571)
ZTS 32/125/PN40/A990	40	400	1130 - 2000	32	125	Titan (3.7035)
ZTS 32/160/PN40/A990	40	400	900 - 1140	32	160	Titan (3.7035)
ZTS 32/200/PN40/A990	40	400	770 - 910	32	200	Titan (3.7035)
ZTS 32/240/PN40/A990	40	400	670 - 780	32	240	Titan (3.7035)
ZTS 32/290/PN40/A990	40	400	610 - 680	32	290	Titan (3.7035)
ZTS 32/350/PN40/A990	40	400	560 - 620	32	350	Titan (3.7035)
ZTS 32/420/PN40/A990	40	400	530 - 570	32	420	Titan (3.7035)
ZTS 32/510/PN40/A990	40	400	490 - 540	32	510	Titan (3.7035)
<b>Cylinder float PN64</b>						
ZTS 150/PN64/K92	64	250	1190 - 2000	50,8	150	Titan (3.7035)
ZTS 180/PN64/K92	64	250	1000 - 1210	50,8	180	Titan (3.7035)
ZTS 215/PN64/K92	64	250	880 - 1020	50,8	215	Titan (3.7035)
ZTS 255/PN64/K92	64	250	780 - 900	50,8	255	Titan (3.7035)
ZTS 295/PN64/K92	64	250	710 - 800	50,8	295	Titan (3.7035)
ZTS 350/PN64/K92	64	250	660 - 730	50,8	350	Titan (3.7035)
ZTS 405/PN64/K92	64	250	610 - 680	50,8	405	Titan (3.7035)
ZTS 470/PN64/K92	64	250	580 - 630	50,8	470	Titan (3.7035)
ZTS 555/PN64/K92	64	250	550 - 600	50,8	555	Titan (3.7035)
ZTS 630/PN64/K92	64	250	530 - 570	50,8	630	Titan (3.7035)
ZTS 150/PN64/R48H	64	190	1030 - 2000	50,8	150	Titan (3.7035)
ZTS 180/PN64/R48H	64	190	880 - 1050	50,8	180	Titan (3.7035)
ZTS 215/PN64/R48H	64	190	770 - 900	50,8	215	Titan (3.7035)
ZTS 260/PN64/R48H	64	190	690 - 790	50,8	260	Titan (3.7035)
ZTS 315/PN64/R48H	64	190	630 - 710	50,8	315	Titan (3.7035)
ZTS 370/PN64/R48H	64	190	580 - 650	50,8	370	Titan (3.7035)
ZTS 445/PN64/R48H	64	190	550 - 600	50,8	445	Titan (3.7035)
ZTS 515/PN64/R48H	64	190	520 - 570	50,8	515	Titan (3.7035)
ZTS 605/PN64/R48H	64	190	500 - 540	50,8	605	Titan (3.7035)
ZTS 685/PN64/R48H	64	190	480 - 520	50,8	685	Titan (3.7035)

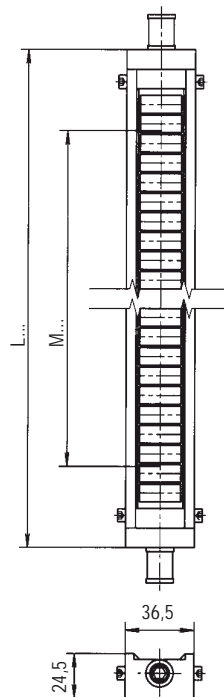
## Bypass Floats

Type Code	Max. Pressure bar	Max. Temperature °C	Density kg/m <sup>3</sup>	Ø mm	Length mm	Material
<b>Cylindrical float PN100</b>						
ZTS 150/PN100/K92	100	250	1270 - 2000	50,8	150	Titan (3.7035)
ZTS 180/PN100/K92	100	250	1080 - 1290	50,8	180	Titan (3.7035)
ZTS 210/PN100/K92	100	250	940 - 1100	50,8	210	Titan (3.7035)
ZTS 250/PN100/K92	100	250	850 - 960	50,8	250	Titan (3.7035)
ZTS 295/PN100/K92	100	250	770 - 870	50,8	295	Titan (3.7035)
ZTS 345/PN100/K92	100	250	710 - 790	50,8	345	Titan (3.7035)
ZTS 400/PN100/K92	100	250	660 - 730	50,8	400	Titan (3.7035)
ZTS 460/PN100/K92	100	250	630 - 680	50,8	460	Titan (3.7035)
ZTS 525/PN100/K92	100	250	600 - 650	50,8	525	Titan (3.7035)
ZTS 605/PN100/K92	100	250	580 - 620	50,8	605	Titan (3.7035)
ZTS 150/PN100/R48H	100	190	1100 - 2000	50,8	150	Titan (3.7035)
ZTS 185/PN100/R48H	100	190	940 - 1120	50,8	185	Titan (3.7035)
ZTS 225/PN100/R48H	100	190	830 - 970	50,8	225	Titan (3.7035)
ZTS 275/PN100/R48H	100	190	760 - 860	50,8	275	Titan (3.7035)
ZTS 330/PN100/R48H	100	190	700 - 770	50,8	330	Titan (3.7035)
ZTS 400/PN100/R48H	100	190	660 - 710	50,8	400	Titan (3.7035)
ZTS 435/PN100/R48H	100	190	630 - 670	50,8	435	Titan (3.7035)
ZTS 525/PN100/R48H	100	190	600 - 640	50,8	525	Titan (3.7035)
ZTS 625/PN100/R49H	100	190	580 - 610	50,8	625	Titan (3.7035)
<b>Ball segment float PN250</b>						
ZTKS 50/210/K74	250	250	1200 - 2000	50	207	Titan (3.7035)
ZTKS 50/260/K74	250	250	1050 - 1220	50	260	Titan (3.7035)
ZTKS 50/320/K74	250	250	960 - 1070	50	312	Titan (3.7035)
ZTKS 50/370/K74	250	250	900 - 980	50	365	Titan (3.7035)
ZTKS 50/420/K74	250	250	850 - 920	50	417	Titan (3.7035)
ZTKS 50/470/K74	250	250	810 - 870	50	470	Titan (3.7035)
ZTKS 50/530/K74	250	250	780 - 830	50	522	Titan (3.7035)
ZTKS 50/580/K74	250	250	760 - 800	50	575	Titan (3.7035)
ZTKS 59/250/K74	250	250	950 - 2000	59	245	Titan (3.7035)
ZTKS 59/310/K74	250	250	850 - 970	59	307	Titan (3.7035)
ZTKS 59/370/K74	250	250	780 - 870	59	369	Titan (3.7035)
ZTKS 59/440/K74	250	250	740 - 800	59	431	Titan (3.7035)
ZTKS 59/500/K74	250	250	700 - 760	59	493	Titan (3.7035)
ZTKS 59/560/K74	250	250	680 - 720	59	555	Titan (3.7035)
ZTKS 59/620/K74	250	250	660 - 700	59	617	Titan (3.7035)
ZTKS 59/680/K74	250	250	640 - 680	59	679	Titan (3.7035)

# Magnetic Roller Display



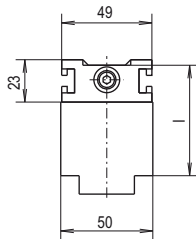
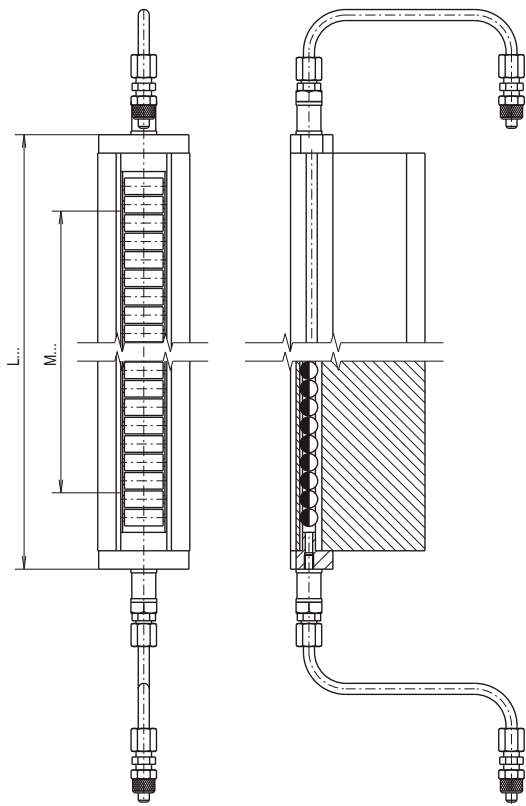
M = Measuring range  
L = M + 83



M = Measuring range  
L = M + 83

Typ MRA.... / Typ MRK....			Typ MNAV.... / Typ MNKV....		
Technical data	MRA	MRK	Technical data	MNAV	MNKV
Housing	Aluminium anodised		Housing	Aluminium, Stainless steel-lined	
Rollers	Crastin PBT red and white	Ceramics red and white	Rollers	Crastin PBT red and white	Ceramics red and white
Cover	Makrolon PC	Glass	Cover	Makrolon PC	Glass
Max. ambient temperat.	200 °C	450 °C	Max. ambient temperat.	200 °C	450 °C

# Magnet-Rollenanzeige



Sight glass extender

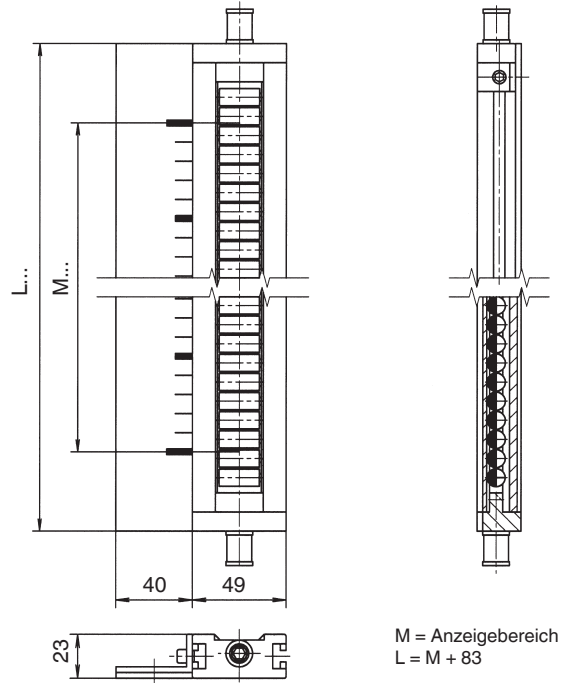
M = Measuring range  
L = M + 83  
I = Insulation thickness

Additional code Plex /P60  
chamber

= Sight glass extender for  
isolation 60 mm

chamber /P60S

= Sight glass extender for  
isolation 60 mm with purge



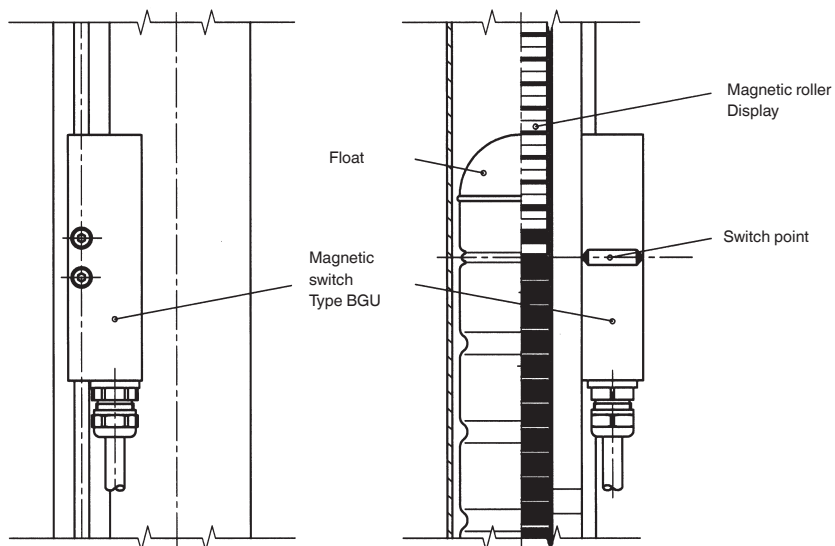
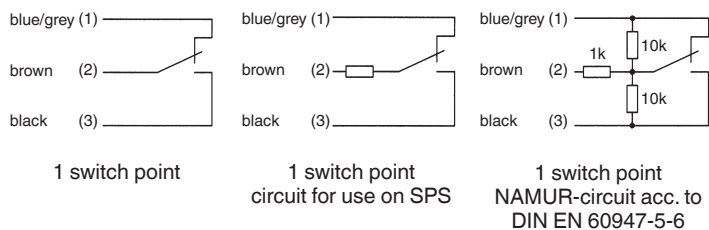
M = Anzeigebereich  
L = M + 83

Code	Description
/SKC	= Scale in cm (printed adhesive foil)
/SKP	= Scale in % (printed adhesive foil)
/SAC	= Scale aluminium engraved in cm
/SAM	= Scale aluminium engraved in mm
/SAP	= Scale aluminium engraved in %
/SAX	= Scale aluminium engraved special
/SVC	= Scale stainless steel engraved in cm
/SVM	= Scale stainless steel engraved in mm
/SVP	= Scale stainless steel engraved in %
/SVX	= Scale stainless steel engraved special

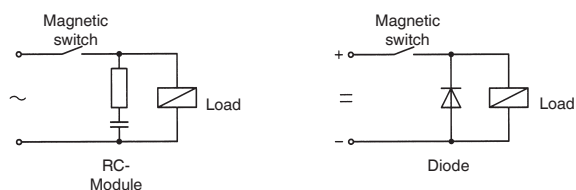
## Magnetic switches

KSR Magnetic switches are used to monitor certain limits of the level. The obtained binary signal can be forwarded to trigger alarms or other controls.

### Connection diagram

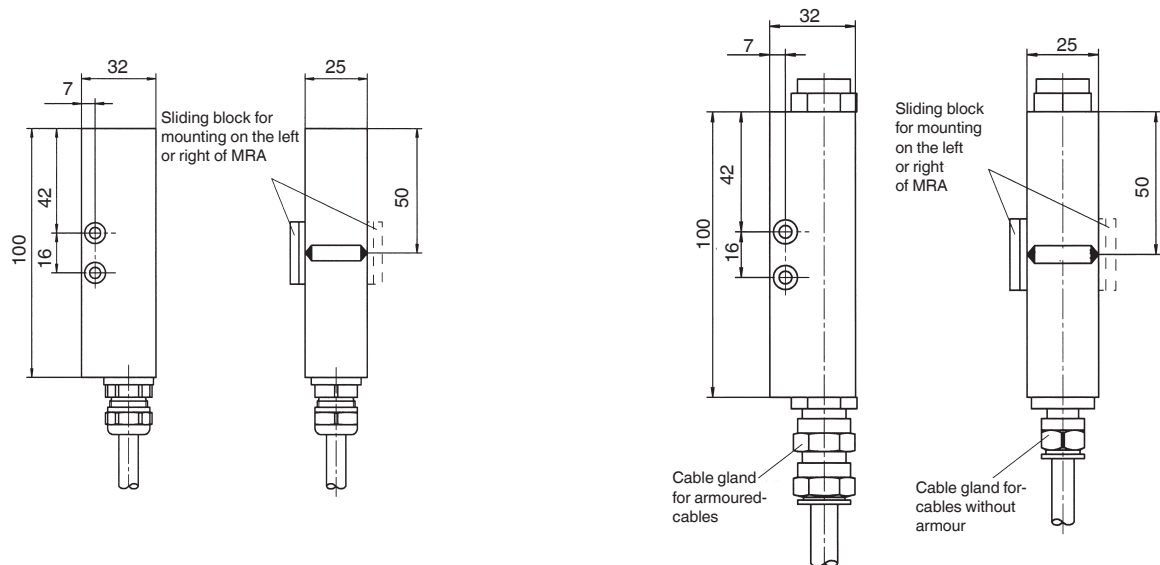


### Contact protection measures



# Magnetic Switches Reed, Aluminium housing

Design: BGU



## Cable

Code	Type
M	= BGU-1 PVC
MT	= BGU-1 Sil
ME	= BGU-E-1 PVC-blue

### Technical Data

Contact	Reed contact
Contact type	1 SPDT
Schaltverhalten	bistable
Switch rating:	
Code M, MT	230 V AC, 60 VA, 1 A; 230 V DC, 30 W, 0.5 A
Code ME	For use in intrinsically safe circuit only with max. 100 mA und max. 30 V
Code adder /N	For use in control circuits acc. to DIN EN 60947-5-6
Max. ambient temperature:	
Code M	90 °C
Code MT	150 °C
Code ME	T6 to 85 °C
Connection cable:	3 x 0.75 mm <sup>2</sup>
Code M	1 m PVC grey
Code MT	1 m Silicone
Code ME	1 m PVC blue
Housing	Aluminium, anodised
Housing protection	IP 65
Explosion protection	(Code ME only) II 1 G Ex ia IIC T6 - T3 LCIE 01 ATEX 6047 X

## Cable Ex d

Code	Type
MD	= BGU-Ex d-1 PVC
MDG	= BGU-Ex d-1 PUR
MDGA	= BGU-Ex d-1 PURA
MDT	= BGU-Ex d-1 Sil

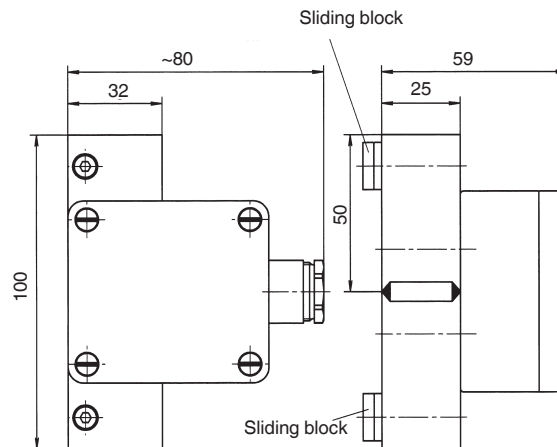
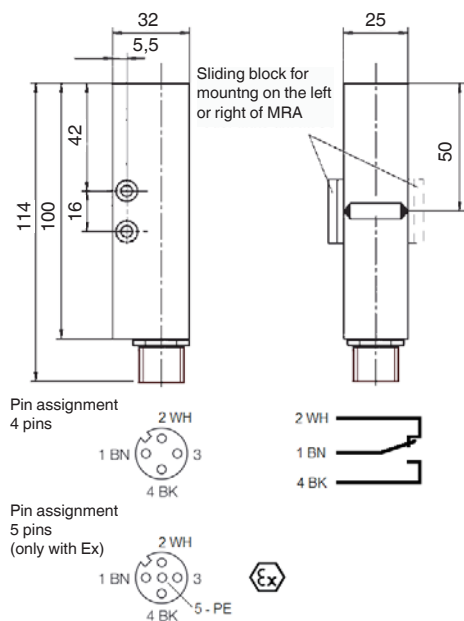
### Technical data

Contact	Reed contact
Contact type	1 SPDT
Contact behaviour	bistable
Switch rating	230 V AC, 60 VA, 1 A 230 V DC, 30 W, 0.5 A
Code adder /N	For use in control circuits acc. to DIN EN 60947-5-6
Max. ambient temperature	
Code MD, MDG and MDGA	T6 to 85 °C
Code MDT	T6 to 85 °C T5 to 100 °C T4 to 135 °C T3 to 150 °C
Connection cable	3 x 0.75 mm <sup>2</sup>
Code MD	PVC grey
Code MDG	PUR yellow
Code MDGA	PUR yellow armoured
Code MDT	Silicone
Housing	Aluminium, anodised
Housing protection	IP 68
Explosion protection	II 2 G Ex d IIC T6 - T3 LCIE 01 ATEX 6047 X
Contact protection measures	see page 22

# Magnetic Switches Reed, Aluminium housing

Design: BGU-M12

Design: BGU-A



## Plug

Code	Type
MS12	= BGU-M12
Ex MES12	= BGU-E-M12

## Terminal housing

Code	Type
MA	= BGU-A
Ex MAE	= BGU-A-E

### Technical Data

Contact	Reed contact
Contact type	1 SPDT
Contact behaviour	bistable
Switch rating:	230 V AC, 60 VA, 1 A; 230 V DC, 30 W, 0.5 A
Code MS12	for use in intrinsically safe circuit only with max. 100 mA und max. 30 V
Code MES12	For use in control circuits acc. to DIN EN 60947-5-6
Code adder /N	
Max. ambient temperature:	
Code MS12	85 °C
Code MES12	T6 to 85 °C
Connction plug:	
Code MS12	
Housing	Aluminium, anodised
Housing protection	IP 65
Explosion protextion	(Code MES12 only) II 1 G Ex ia IIC T6 - T3 LCIE 01 ATEX 6047 X

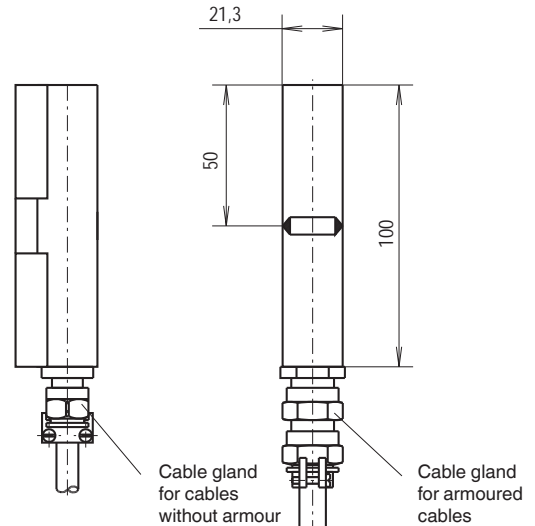
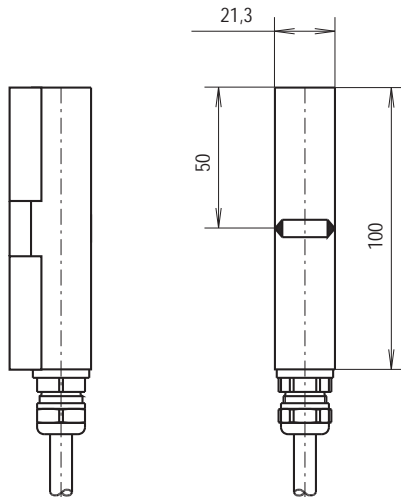
### Technical data

Contact	Reed contact
Contact type	1 SPDT
Contact behaviour	bistable
Switch rating	230 V AC, 60 VA, 1 A
Code MA	230 V DC, 30 W, 0.5 A
Code MAE	for use in intrinsically safe circuit only with max. 100 mA and max. 30 V
Code adder /N	for use in control circuits to DIN EN 60947-5-6
Max. ambient temperature	
Code MA	150 °C
Code MAE	T6 bis 85 °C T5 to 100 °C T4 bis 135 °C T3 to 150 °C
Housing	Aluminium, anodised
Housing protection	IP 65
Explosion protection	(Code MAE only) II 1 G Ex ia IIC T6 - T3 LCIE 01 ATEX 6047 X
Contact protection measures	see page 22



# Magnetic Switches Reed, Stainless Steel Housing

Design: BGU-V



## Cable

Code	Type
MV	= BGU-V- PVC
MVT	= BGU-V- Sil
MVE	= BGU-V-E- PVC-blue

## Cable Ex d

Code	Type
MVD	= BGU-V-Ex d- PVC
MVDG	= BGU-V-Ex d- PUR
MVDGA	= BGU-V-Ex d- PURA
MVDT	= BGU-V-Ex d- Sil

### Technical data

Contact	Reed contact
Contact type	1 SPDT
Contact behaviour	bistable
Switch rating	230 V AC, 60 VA, 1 A
Code MV und MVT	230 V DC, 30 W, 0,5 A
Code MVE	for use in intrinsically safe circuit only with max. 100 mA and max. 30 V
Code adder /N	for use in control circuits to DIN EN 60947-5-6
Max. ambient temperature	
Code MV	90 °C
Code MVT	150 °C
Code MVE	T6 to 85 °C
Connection cable	3 x 0,75 mm <sup>2</sup>
Code MV	PVC grey
Code MVT	Silicone
Code MVE	PVC blue
Housing	Stainless steel 1.4571
Housing protection	IP 65
Explosion protection	II 1 G Ex ia IIC T6 - T3 LCIE 01 ATEX 6047 X (Code MVE only)

Contact protection measures see page 22

### Technical data

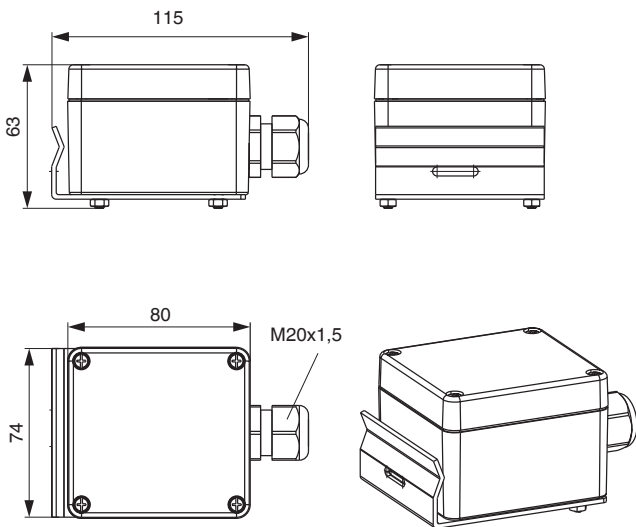
Contact	Reed contact
Contact type	1 SPDT
Contact behaviour	bistable
Switch rating	230 V AC, 60 VA, 1 A
Code adder /N	230 V DC, 30 W, 0.5 A for use in control circuits to DIN EN 60947-5-6
Max. ambient temperature	
Code MVD, MVDG and MVDGA	T6 to 85 °C
Code MVDT	T6 to 85 °C T5 to 100 °C T4 to 135 °C T3 to 150 °C
Connection cable	3 x 0.75 mm <sup>2</sup>
Code MVD	PVC grey
Code MVDG	PUR yellow
Code MVDGA	PUR yellow armoured
Code MVDT	Silicone
Housing	Stainless steel 1.4571
Housing protection	IP 68
Explosion protection	II 2 G Ex d IIC T6 - T3 LCIE 01 ATEX 6047 X

Contact protection measures see page 22

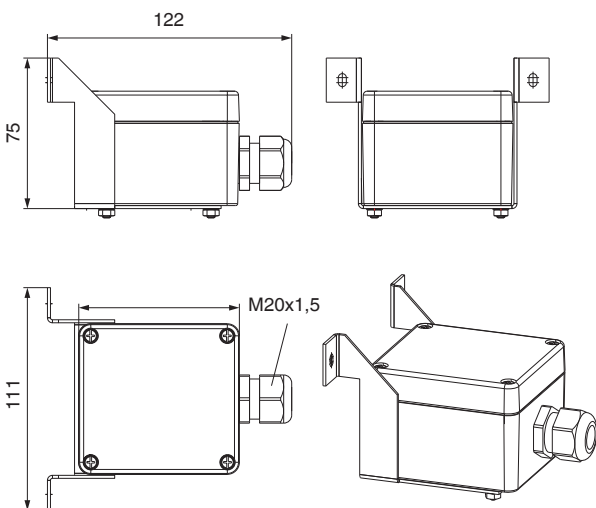
## Magnetic Switches, Reed High-Temperature

Design: BGU-AHT, Aluminium housing

Mounting with tightening straps

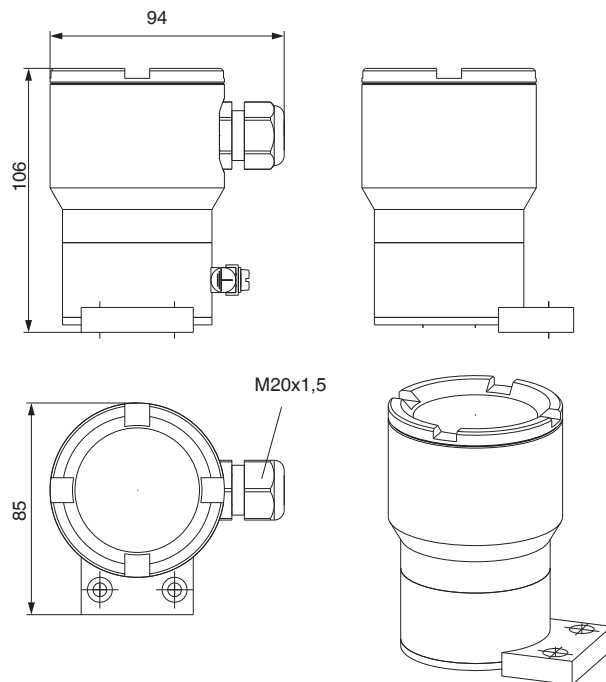


Mounting on MRA with T-slot



Design: BGU-VHT, stainless-steel housing

Mounting with tightening straps



### High Temperature

Code = Type  
MHT = BGU-AHT

Technical Data	
Contact	Reed contact
Contact type	1 SPDT
Contact behaviour	bistable
Switch rating	230 V AC, 60 VA, 1 A 230 V DC, 30 W, 0.5 A
adder /N	for use in control circuits to DIN EN 60947-5-6
Max. ambient temperature	380 °C
Housing	Aluminium
Housing protection	IP 65
Contact protection measures	see page 22

### High Temperature

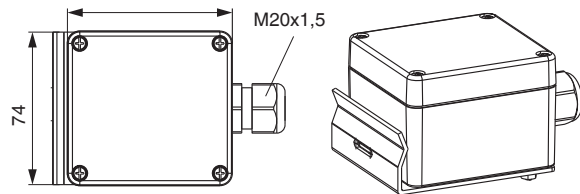
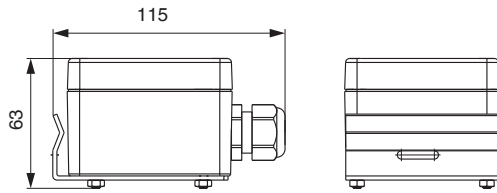
Code = Type  
MVHT = BGU-VHT

Technical Data	
Contact	Reed contact
Contact type	1 SPDT
Contact behaviour	bistable
Switch rating	230 V AC, 60 VA, 1 A 230 V DC, 30 W, 0.5 A
adder /N	for use in control circuits to DIN EN 60947-5-6
Max. ambient temperature	380 °C
Housing	Stainless-steel
Housing protection	IP 67
Contact protection measures	see page 22

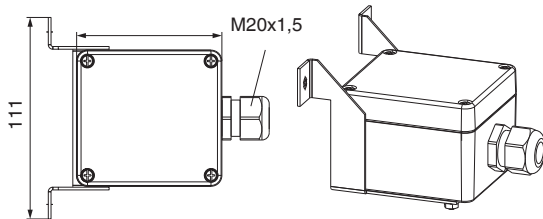
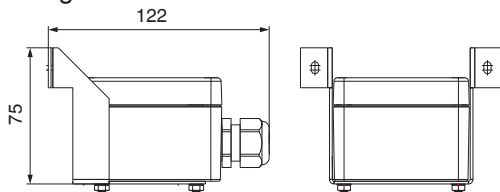
## Magnetic Switches, Initiator

Design: BGU-Ai, Aluminium housing

Mounting with tightening straps



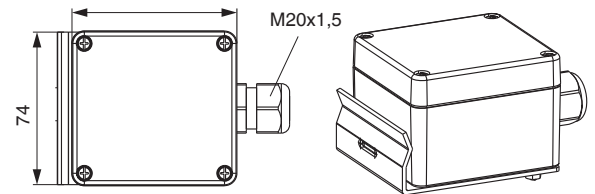
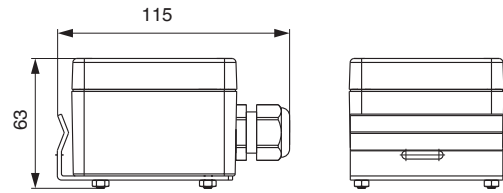
Mounting on MRA with T-slot



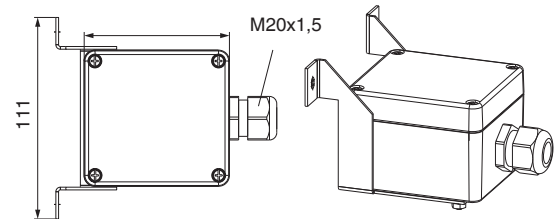
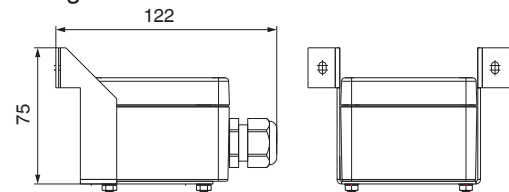
## Magnetic Switches, Rotary Magnet

Design: BGU-AR, Aluminium housing

Mounting with tightening straps



Mounting on MRA with T-slot



### Initiator

Code	Type
MIH =	BGU-AIH => closing on rising level
MIL =	BGU-AIL => closing on falling level

#### Technical Data

Contact	Inductive proximity switch
Contact behaviour	bistable
Code MIH Funktion	High alarm
Code MIL Funktion	Low alarm
Nominal voltage	8 V DC (Ri~1 kOhm)
Max. ripple	< 5 %
Supply voltage $U_B$	5 - 25 V
Power consumption	
active area free	> 3 mA
active area covered	< 1 mA
Connection cable max. resistance	< 100 Ohm
Self-inductance	160 $\mu$ H
Self-capacitance	20 nF
Ambient temperature	-40 °C to +80 °C
Housing	Aluminium
Housing protection	IP 65

### Rotary Magnet, Power Switch

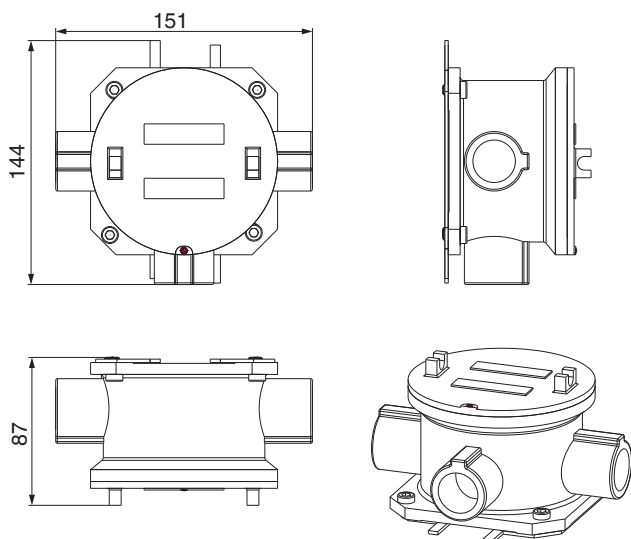
Code	Type
MAR =	BGU-AR

#### Technical Data

Contact	Rotary magnetic with rocker switch
Contact type	1 SPDT
Contact behaviour	bistable
Switch rating	250 VAC, 100 VA, 2 A 200 VDC, 40 W, 2 A
Ambient temperature	-60 °C ... +250 °C
Housing	Aluminium
Housing protection	IP 65

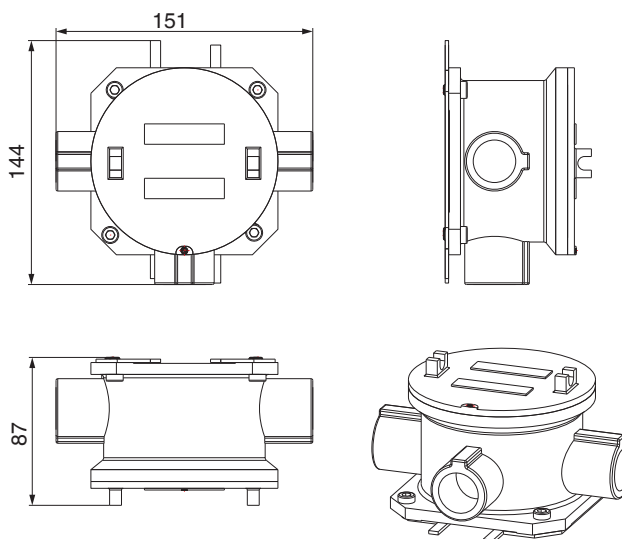
## Magnetic Switches, Reed, Ex d

Design: BGU-AD, Aluminium housing



## Magnetic Switches, Microswitch, Ex d

Design: BGU-AM, Aluminium housing



### Reed Contact

**Code** = **Type**  
MAD = BGU-AD

#### Technical Data

Contact type	Reed contact
Contact function	1 SPDT
Switch behaviour	bistable
Switching capacity	230 V AC, 60 VA, 1 A 230 V DC, 30 W, 0.5 A for use in control circuits acc. to DIN EN 60947-5-6
Code adder .../N	
Max. ambient temp.	-40 ... +55 °C

#### Terminal box

Material Terminal box	Aluminium									
Max. ambient temp.	T6 to +40 °C T5 to +55 °C tD to +95 °C									
Cable entries	<table border="0"> <tr> <td></td> <td>BGU-AD0</td> <td>1/2"NPT(F) with adapter</td> </tr> <tr> <td></td> <td>BGU-AD1</td> <td>3/4"NPT(F)</td> </tr> <tr> <td></td> <td>BGU-AD2</td> <td>M20x1,5 with adapter</td> </tr> </table>		BGU-AD0	1/2"NPT(F) with adapter		BGU-AD1	3/4"NPT(F)		BGU-AD2	M20x1,5 with adapter
	BGU-AD0	1/2"NPT(F) with adapter								
	BGU-AD1	3/4"NPT(F)								
	BGU-AD2	M20x1,5 with adapter								
Ingress protection	IP 66									
Explosion protection	Ex II 2 G/D EEx d IIC T6-T5 LCIE 02 ATEX 6056									

Contact Protection measures see page 22

### Microswitch

**Code** = **Type**  
MAM = BGU-AM

#### Technical Data

Contact type	Microswitch
Contact function	1 SPDT
Switch behaviour	bistable
Switching capacity	250 V AC, 5 A
Max. ambient temperature	-40 ... +55 °C

#### Terminal box

Material Terminal box	Aluminium									
Max. ambient temperature	T6 to +40 °C T5 to +55 °C tD to +95 °C									
Cable entries	<table border="0"> <tr> <td></td> <td>BGU-AM0</td> <td>1/2"NPT(F) with adapter</td> </tr> <tr> <td></td> <td>BGU-AM1</td> <td>3/4"NPT(F)</td> </tr> <tr> <td></td> <td>BGU-AM2</td> <td>M20x1,5 with adapter</td> </tr> </table>		BGU-AM0	1/2"NPT(F) with adapter		BGU-AM1	3/4"NPT(F)		BGU-AM2	M20x1,5 with adapter
	BGU-AM0	1/2"NPT(F) with adapter								
	BGU-AM1	3/4"NPT(F)								
	BGU-AM2	M20x1,5 with adapter								
Ingress protection	IP 66									
Explosion protection	Ex II 2 G/D EEx d IIC T6-T5 LCIE 02 ATEX 6056									

# Level Sensors

KSR Level Sensors are used to measure and transmit the level of liquids in conjunction with a KSR control unit. It is based on the float principle with magnetic transmission in a 3-wire potentiometer circuit. A float with a built-in magnetic system actuates small reed contacts through the walls of the bypass chamber. These reed switches form a resistance measuring chain that continuously generates a voltage proportional to the height of the level.

The resistance measuring chain is closely stepped and is made up from small chips soldered onto a PCB. Due to this assembly the generated voltage is approximately continuous.

Depending on requirements and design several different contact separations are available.

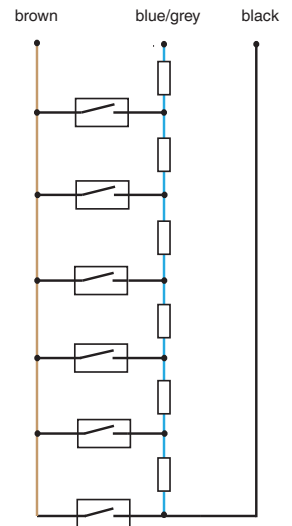
### Option:

Installation of 2-wire transmitter in terminal box possible.

### Advantage:

- use in hazardous areas possible

Internal circuit diagram level sensors



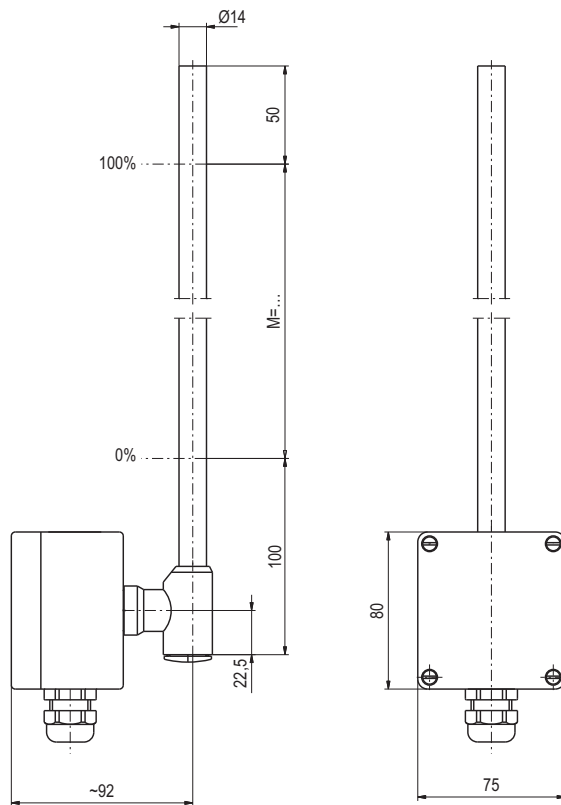
## Type code

Code						
3	Basic type					
	MG	Level sensor				
3.1	Electrical connection (terminal box)					
...	A	Aluminium - top	APL	Polyester - top (Ex-design)	AVG	Stainless steel - top with digital display
	AU	Aluminium - bottom	APLU	Polyester - bottom (Ex-design)	AVGU	Stainless steel - bottom with digital display
	AP	Polyester - top	AV4	Edelstahl - top		
3.2	APU	Polyester - bottom	AV4U	Edelstahl - bottom		
.../.../...	V	Stainless steel	K18	18 mm		Optional code
			K15	15 mm	/HT..	contact separation 5 / 10 / 15 mm only
			K10	10 mm	/TT..	High temperature +120 °C ... +200 °C
			K5	5 mm		Low temperature -10 °C ... -80 °C
3.3	(Option) Head mounted transmitter in terminal box					
...	TS	2-wire Standard				
	TE	2-wire Ex i				
	TLH	2-wire HART® with LCD display				
	TLEH	2-wire Ex i HART® with LCD display				
	T32	2-wire Ex i HART® programmable				
	T53P	Ex i Profibus PA programmable				
	T53F	Foundation Fieldbus programmable				
3.4	1st key Sensor tube length		2nd key Measuring range		3rd key Sensor tube dimensions	
.../.../...	L...	Length in mm	M...	Range in mm	14	OD Ø 14 mm
3.5	Optional code					
...	Ex	Ex Control circuit EEx ib IIC or EEx ia IIC, resistance of measuring chain: 3.2 kOhm ... 50 kOhm				

## Ordering example

Code	Basic type	Electrical connection	Material Sensor tube Contact separation	Option Head-mounted transmitter	Sensor tube-length Measuring range Sensor tube-dimensions	Optional code
	3	3.1	3.2	3.3	3.4	3.5
	MG	AU	VK10	TE	L1650 / M1500 / 14	Ex

# Level Sensors

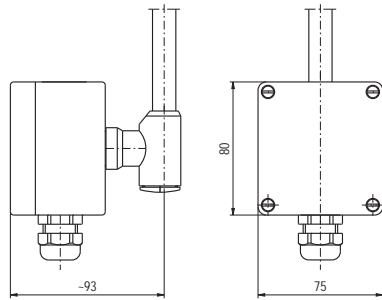


Type: MG-A.VK../..-L../M../14		Type: MG-A.VK../..-L../M../14-Ex	
Terminal box	A. = Aluminium, 80 x 75 x 57 mm AP. = Polyester, 80 x 75 x 55 mm AV4. = Stainless steel	Terminal box	A. = Aluminium, 80 x 75 x 57 mm APL. = Polyester anti-static, 80 x 75 x 55 mm AV4. = Stainless steel
Sensor tube	V = Stainless steel 1.4571 Tube Dia. 14 x 1 mm	Sensor tube	V = Stainless steel 1.4571 Tube Dia. 14 x 1 mm
Contact separation	K18 = 18 mm K15 = 15 mm (HT or TT) K10 = 10 mm (also HT or TT) K5 = 5 mm (also HT or TT)	Contact separation	K18 = 18 mm K15 = 15 mm K10 = 10 mm K5 = 5 mm
Resistance of measuring chain Standard design	depending on length and contact separation	Resistance of measuring chain Standard design	3,2 kOhm ... 50 kOhm
Ambient temperature at sensor tube	Standard design -10 °C ... +120 °C Type code HT +120 °C ... +200 °C Type code TT -10 °C ... -80 °C	Maximal permissible surface temperature at sensor tube	T4 +100 °C T5 +65 °C T6 +50 °C

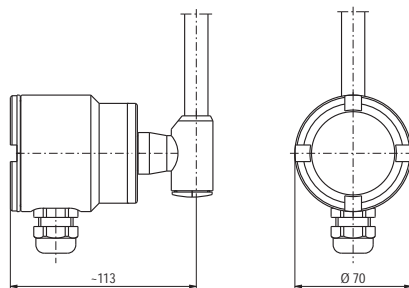
# Level Sensors

## Housing options

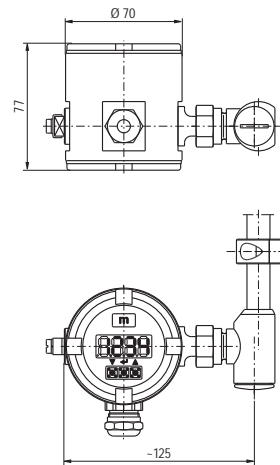
Type code A. = Aluminium 80 x 75 x 57 mm  
Type code AP. = Polyester 80 x 75 x 55 mm  
Type code APL. = Polyester 80 x 75 x 55 mm, anti-static



Typcode AV4 = Stainless steel



Typcode AVG = Stainless steel  
with digital display

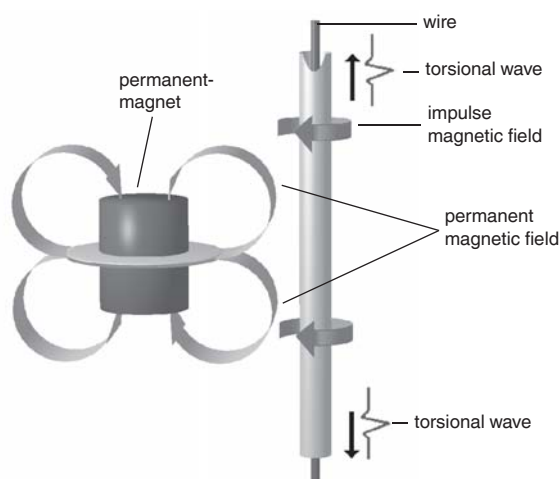


## Magnetostrictive Level Sensor

The KSR Level Sensor series is used for continuous, remote liquid level measurement and based on position monitoring of a magnetic float following the magnetostrictive principle. The sensors are mounted externally on a KSR Bypass Level Indicator.

The measuring process is initiated by a current impulse. This current generates an axial magnetic field along the length of a wire made of magnetostrictive material, which is held under tension inside the sensor tube. The Bypass Level Indicator float, which sits on the liquid surface, is fitted with permanent magnets.

The magnetic field of the float is at right angles



to the impulse magnetic field. When the pulse reaches the float the two magnetic fields interact and a torsional force results. A torsional stress wave is induced in the wire. A piezoceramic pick-up in the sensor housing at the end of the wire converts this into an electrical signal. By measuring the elapsed transit time, it is possible to determine the start point of the torsional stress wave and therefore the float position with a high degree of accuracy.

### Features

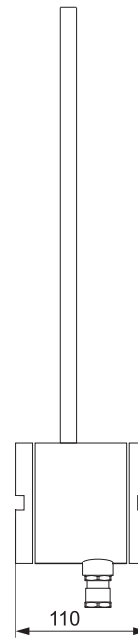
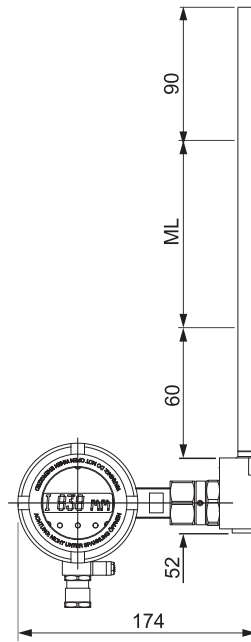
- Continuous level measurement outside on bypass
- 2-wire-technology 4-20 mA
- Signal output via digital interface and one selectable value as analog signal
- Hull parts of stainless steel (display of glass)
- Magnetostrictive level sensor with high resolution



### Type code

3	Basic type				
	FFG-BP.20	Magnetostrictive Level sensor			
3.1	Interface				
	H	4-20mA with HART® protocol			
3.2	Approval				
	1	Without (standard)			
	2	Ex ia (ATEX)			
3.3	Display				
	N	Without			
	D	With LCD display			
3.4	Position sensor head				
	U	Top			
	D	bottom			
3.5	Electrical connection				
	S	M16x1,5	N	1/2" NPT	
	T	M20x1,5			
3.6	Bypass magnetic system				
	PHO	(Phönix) 710.098/104	K92	(KSR) BNA K92	KRO
	K48	(KSR) BNA R48H	INT	(INTRA) ITA	VAI
					(KROHNE) BM (VAIHINGER) 75
3.7	Measuring length in mm (4-digit with left-hand zeros)				



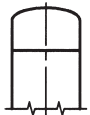


FFG-BP	
Material housing	Stainless steel 316Ti
Sensor length SL (depends on positioning and magnet system)	100 ... 3000 mm
Pressure	atmospheric
Storage temperature	-45 °C ... +85 °C
Media temperature	-200 °C ... +180 °C
Ambient temperature Standard ..N/..D	-40 °C ... +85/-20 ... +70 °C
Ambient temperature Ex i T3/T4/T5/T6	-20 °C ... +70/+70/+70/+60 °C
Ambient temperature Ex d T3/T4/T5/T6	-40 °C ... +70/+70/+70/+60 °C
Resolution	0,1 mm
Linearity	± 0,5 mm
Reproducibility	< 2,0 mm
Hysteresis (depends on float)	≤ ± 3,25 mm
Ambient temperature coeff.	< ±0,001 % of range/K
Weight	ca. 1,5 kg + 5 g/cm
Supply voltage	24 VDC (-40%/+20%)
Output current	4...20 mA (Namur)
Ambient temperature coeff.	< ± 0,01 %/K
Digital Interface	HART
Wire cross section max.	1,5 mm <sup>2</sup>
Cable length	max. 500 m bei 0,5 mm <sup>2</sup>
U °/P°	30 V/1 W
L <sub>i</sub> /C <sub>i</sub>	< 0,3 mH/10 nF
R <sub>x</sub> / C <sub>x</sub>	5,1 k / 53 nF
Ingress protection EN 60529	IP 67
Ex-classification	II 2 G Ex ia IIC T3...T6 ZELM 10 ATEX 0439 II 2 G Ex d IIB T3 ... T6 Gb ZELM 13 ATEX 0508 X
SIL level:	SIL 2

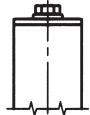
## Options Chamber ends

with dampening spring on request

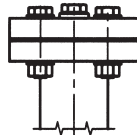
### Chamber end top



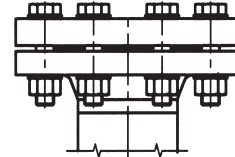
1  
Welding cap



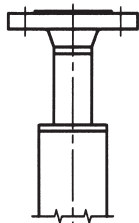
2  
Flat top with  
vent plug BSP 1/2"



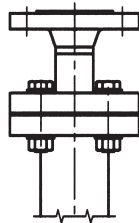
3  
Flanged with  
vent plug BSP 1/2"



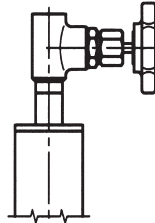
4  
Flanged e. g. flange  
facings with groove and  
tongue acc. to DIN 2512



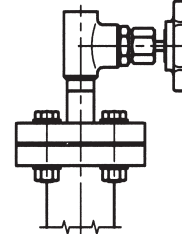
5  
Flat top with  
vent flange



6  
Flanged with  
vent flange

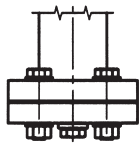


7  
Flat top with  
vent valve

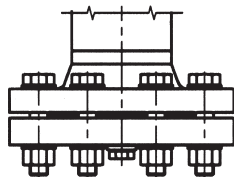


8  
Flat top with  
vent valve

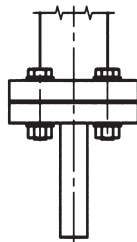
### Unterer Standrohrabschluss



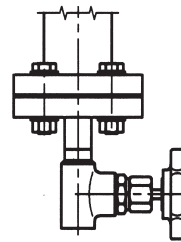
9  
Flanged with  
drain plug BSP 1/2"



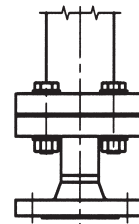
10  
Flanged with drain plug  
BSP 1/2" e.g. flange facings  
with groove and tongue  
acc. DIN 2512



11  
Flanged with  
drain nozzle

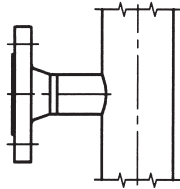


12  
Flanged with  
drain valve

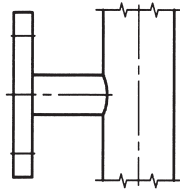


13  
Flanged with  
drain flange

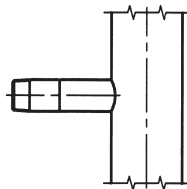
## Options Process connection



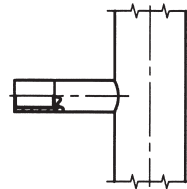
14  
Welding neck flanges  
up to DN 25 (1")



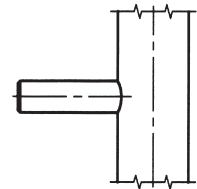
15  
Blind flange  
above DN 32  
(1 1/4")



16  
Threaded GN...  
(Male)

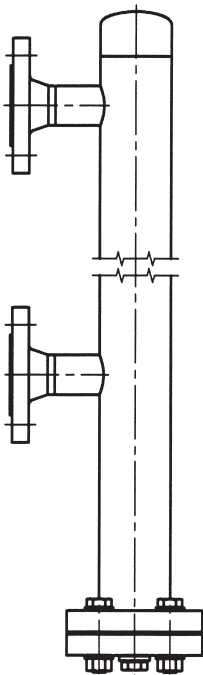


17  
Threaded GM...  
(Female)

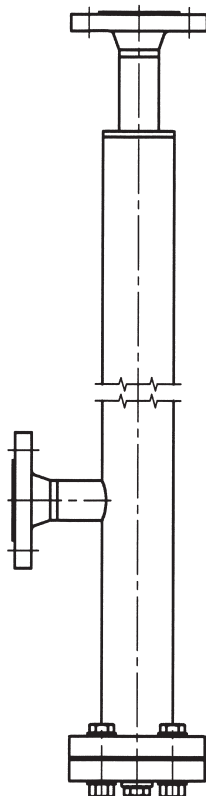


18  
Welding stub S...

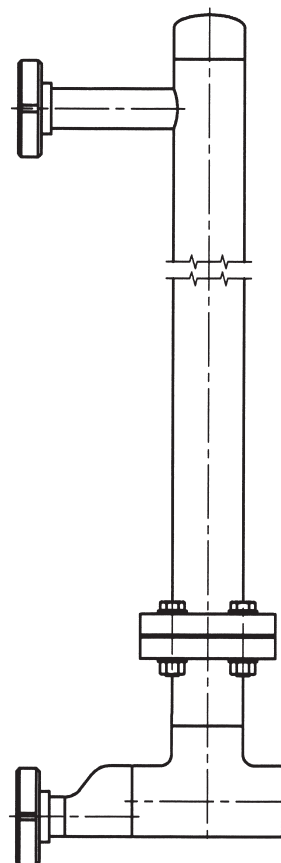
## Examples Process connection



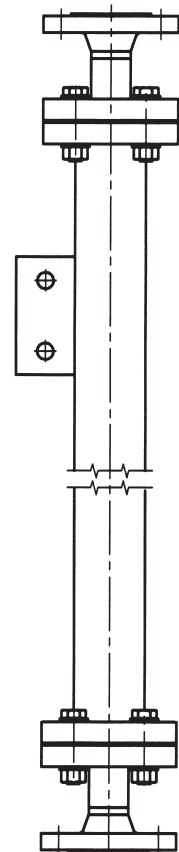
19  
Standard  
2 process connections  
side-side



20  
Process connections  
top and side



21  
2 process connections side-side  
threaded acc. to DIN 11851  
lower process connection with  
eccentric reducer



22  
2 Process connections  
top and bottom  
Option: Support brackets

Modifications may take place and materials specified may be replaced by others without prior notice.  
Specifications and dimensions given in this leaflet represent the state of engineering at the time of printing.



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