

Rotary blade level indicators

Level limit switches for bulk goods

DF

Appliance information

Index	Page
Application Construction Function Self-monitoring	02
Technical data Electrical data Application data	03
Housing versions	04
Area separating element Overpressure enclosure und annular gap flushing	06
Level adjustment Vibration dampening	07
Process connection threads	08
Process connection flanges	09
Process connection flange F2	10
Hexagonal nuts Sealings for process connections	11
Quick couplings	12
Dairy couplings Clamp couplings	13
Flanges for textile silos Tools for the installation	14
Weather protection hood Protection from condensation	15
Electrical connection	16
Signal delay	18
Function control D9	20
Appliance heating	21
Signal lamps and function displays	23
Selection guide Setting sensitiveness	24
Measuring blades	26
Mounting positions Installation Inclination Protection from moisture .	28
Protection from impacting bulk goods Protection from heavy load	29
User informations	30
Notes	32

Application (Regular use)

The electromechanical level limit switch Type DF, is to be used as

full, empty and demand indicator.

For monitoring the filling level in:

**silos, bunkers,
containers, hoppers,
weighers, vessels,
discharge pipes etc.**

For all bulk goods up to grain size:

approx. 150 mm

With bulk weights:

0,01 t/m³ to over 2,0 t/m³.

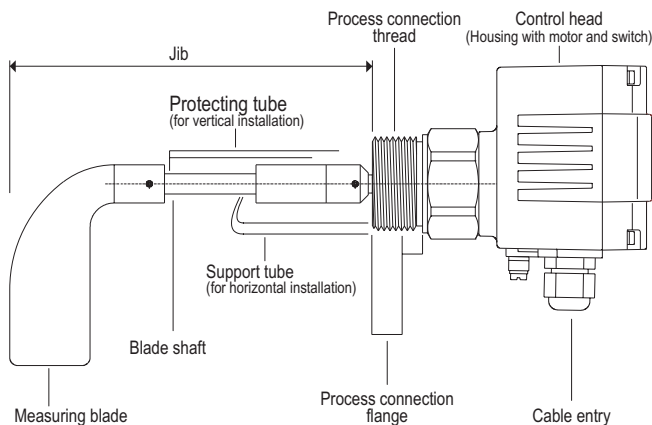
Bulk goods such as, for example:

**dust, powder, grains, balls,
granulates, pellets, plates, foams,
chips, fibres, flux threads, feathers,
germs, roots, tubers, leaves,
sand, gravel, crushed stones and macadam.**

Applications in all branches of industry:

**Chemical, pharmaceutical,
petrochemical industry, breweries,
wine cellars, dairies, foodstuff and
feedstuff industry, seeds, agricultural
industry, varnish, paint, rubber, wood
and plastics industry, recycling,
environment technology, construction
and building material industry.**

Design and construction

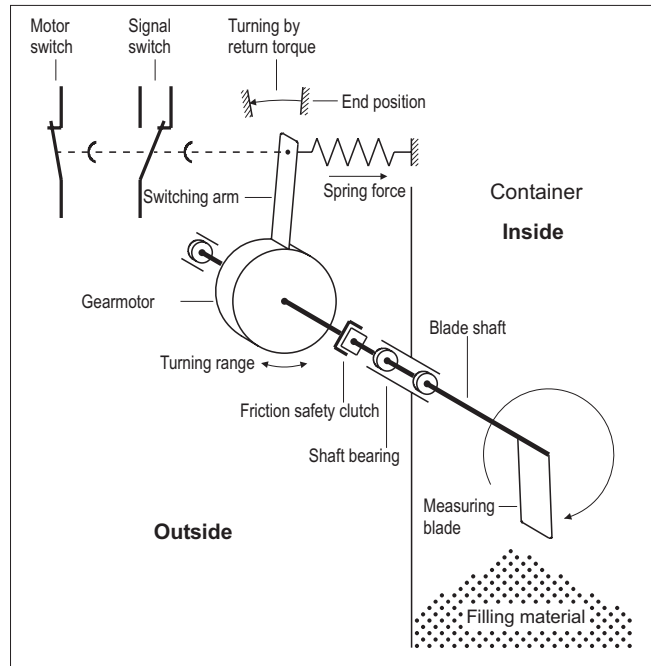


The DF construction set comprising:

**four housings,
many process connections,
diverse jib versions (with support and protecting tubes),
and many sizes of measuring blades**

enables level indicators of many types to be designed and built to solve all tasks.

Function



The rotating measuring blade projecting into the container is driven by a gearmotor.

When the bulk goods heap up to the level of the blade, this prevents the blade from turning and it comes to a standstill.

The return torque turns the fitted motor back from its end position and actuates the signal switch by a switching arm.

A second switch turns the motor delayed off.

Should the level of the bulk goods drop and the measuring blade can turn freely, a spring brings the motor back into its original end position.

At the same time the motor is turned on again and the signal switch is reset.

Self-monitoring

D1 Function monitoring (rotation control)

The optional function monitoring system recognizes any occurring equipment fault at an early stage.

The following parameters are monitored:

**wire fracture
voltage failure
DC/AC converter for motor voltage
motor
gear unit**

D2 Voltage monitoring

The following parameters are monitored:

**wire fracture and
voltage failure**

D9 Function control (rotation control)

As like as D1 but with separate independent electronic and with permanent pulsating „all-right signal“.

Technical data

Material	Housing	A1	aluminium
		A2	stainless steel 1.4408
		A3	aluminium AlMgSi1
		A4	stainless steel 1.4571
Material	process connection		aluminium or optional stainless steel 1.4301 or 1.4571
Material	shafts		stainless steel 1.4301 or 1.4571
	rope shafts		stainless steel 1.4401
	measuring blades		stainless steel 1.4301 or 1.4571
	support tubes		stainless steel 1.4301 or 1.4571
	protecting cages		stainless steel 1.4301 or 1.4571
	protecting tubes		stainless steel 1.4301 or 1.4571
Length tolerance	L		± 10 mm
Shaft bearing			grooved ball bearings dustproof beginning with 4000 mm for DF27 1 axial bearing
Shaft sealing			special sealing rings according to MON *)
Material	Sealing rings	R0	NBR, black (Standard)
		R1	PTFE/VITON
		R2	NBR, white FDA
		R5	PTFE, white FDA
		DF23 and DF24 R6	NBR, black (Standard)
		DF23 and DF24 R7	PTFE, white FDA
Lubrication	Sealing rings	R0, R2 and R6	food and FDA approved
		R1, R5 and R7	without lubrication
Sealing	DF31 and 33		by folding bellows, absolute tight
Gearing protection			Friction safety clutch for protection against torque peaks
Measuring blade speed	U1		1 rpm (standard)
	U5		5 rpm
	U8		8 rpm (only for special applications)
Response delay	U1		approx. 1.20 sec. (standard)
	U5		approx. 0.24 sec.
	U8		approx. 0.15 sec.
Response sensitivity			can be set by spring force or by geometry of the measuring blade (dependent on mounting position)
Signal delay	D3		Full indication delay
	D4		Empty indication delay
Type of protection	Housing	A1	IP66
		A2	IP66
		A3	IP66 and flameproof enclosure „d“
		A4	IP66 and flameproof enclosure „d“
		IP66	
Maintenance			<u>no</u> maintenance necessary

Electrical data


Supply voltage	C1	220 ... 240 V ~ 50-60 Hz (AC)		
	C2	110 ... 120 V ~ 50-60 Hz (AC)		
	C3	48 V ~ 50-60 Hz (AC)		
	C4	24 V ~ 50-60 Hz (AC)		
	C5	24 V = (DC) +10%/-15%		
	C6	12 V = (DC) +10%/-15%		
	C7	48 V = (DC) +10%/-15%		
Power consumption	AC	= 4 VA	DC	= 4 W
Connection clamps				max. 1.5 mm ²
Cable entry				Cable gland M20x1,5
Signal contact				change-over contact, potentialfree
Capacity of the contact		1 mA/4 V DC ... 2 A/250 V ~		
		AC multivoltage and multicurrent switch suitable for low currents and voltages as well as for medium currents with control voltages up to 250 V ~ AC		
Additional contact		Opener (with potential from the signal contact)		
	Option D1, D2, D9	(= Self-monitoring)		
	Option D3, D4	(= Signal delay)		
Capacity of the contact		up to 2 A/250 V ~ AC		adapted to the switching capacity of the signal contact
	Option D9	200 mA (with potential 24V DC only)		
Protection class				I ⊕
Function display	H1	LED, 3 mm (optional for DF11)		
		under voltage	yellow	
		container full	blue (top)	
		container empty	green (bottom)	
		rotation control	red	
Signal lamp	H2	LED, 5 mm		
		with DF21...DF33	green, full or empty (transposable with connector)	
Signal lamp, large	H8	multiple LED, green, 360°		full or empty (transposable with connector)

Application data

Ambient temperature	A1 and A2	-20 °C ... +70 °C	T_a
	A3 and A4	-20 °C ... +60 °C	
	Option B2	-20 °C ... +45 °C	
Bulk goods temperature	E0	-25 °C ... +80 °C (Standard)	T_(Process)
	E1	-25 °C ... +150 °C	
	E2	-25 °C ... +200 °C	
	E3	-25 °C ... +260 °C	
	E4	-25 °C ... +500 °C (... +1000 °C)	
	with heating E7	...-35 °C	
Vacuum and overpressure in containers	P0	-0,5 bar...5 bar	p_(Process)
	P1	-0,5 bar...10 bar	
	P2	-0,95 bar...25 bar	
	P6	-0,9 bar...10 bar	
	P7	-0,9 bar...10 bar (Pressure separation)	

*) MON = MOLLET standard

Housing versions

A1 housing for all bulk goods and optionally for explosion hazardous areas **Dust** 

Compact housing in aluminium ,RAL 7001 coated

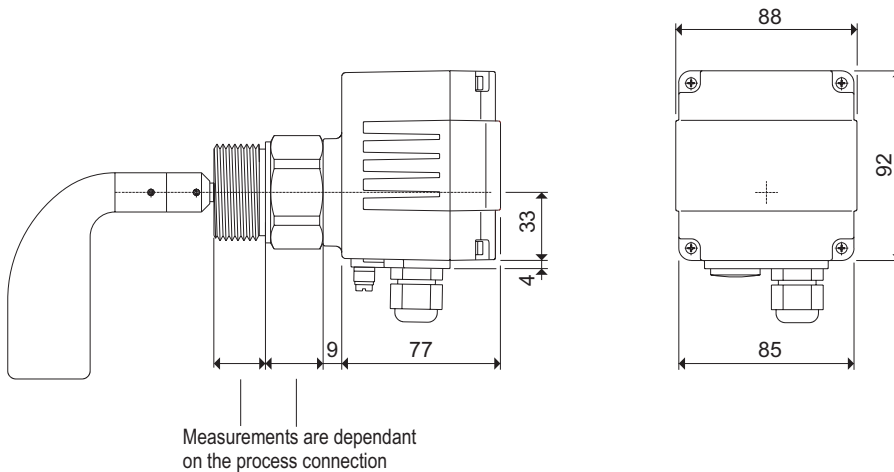
B0 Standard = CE conform and type of protection IP66


Ex type of protection

B1 ATEX  II 1/2D T80°C IP66 **Dust**

B2 ATEX  II 1D T70°C IP66 **Dust**

B3 ATEX  II 1/3D T80°C IP66 **Dust**



A2 Housing for all bulk goods and optionally for explosion hazardous areas **Dust** 

Compact housing in stainless steel 1.4408

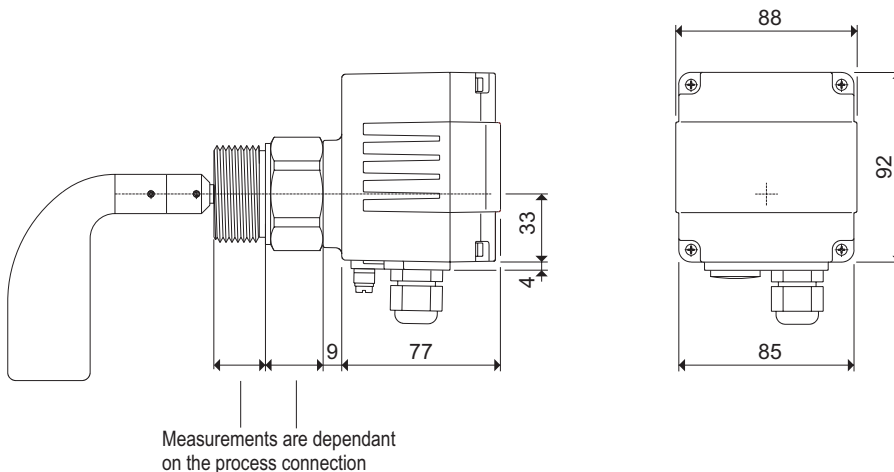
B0 Standard = CE conform and type of protection IP66

Ex type of protection


B1 ATEX  II 1/2D T80°C IP66 **Dust**

B2 ATEX  II 1D T70°C IP66 **Dust**

B3 ATEX  II 1/3D T80°C IP66 **Dust**

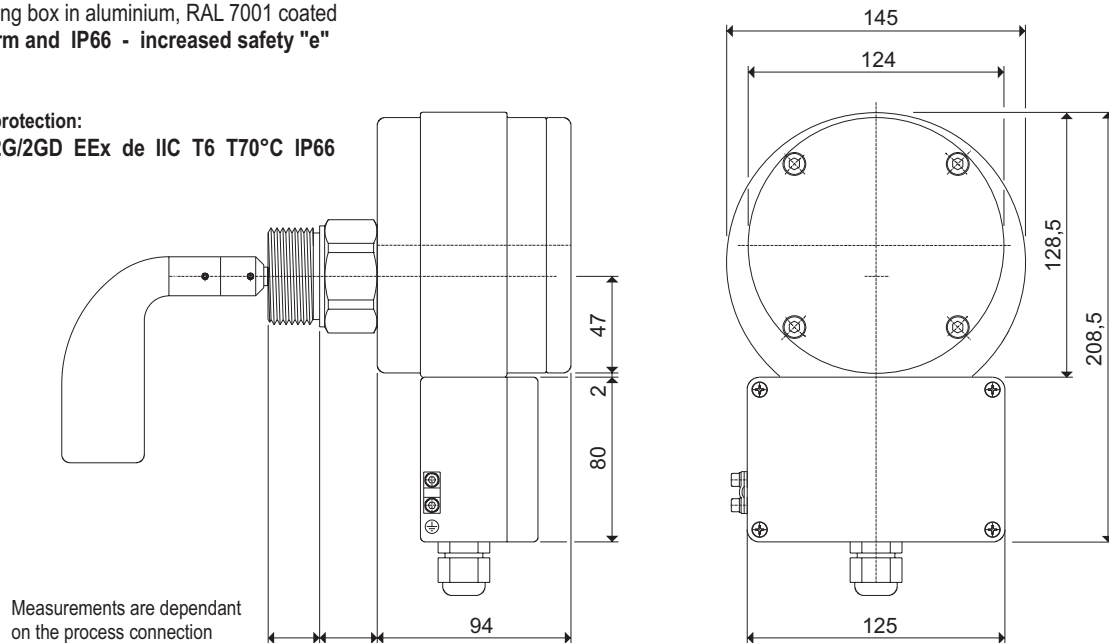



Housing versions

A3 housing for all bulk goods in gas explosion hazardous areas and for hybrid mixtures 

Round housing in aluminium AlMgSi1, conductible anodised
CE conform and IP66 - flameproof enclosure "d"
with clamping box in aluminium, RAL 7001 coated
CE conform and IP66 - increased safety "e"

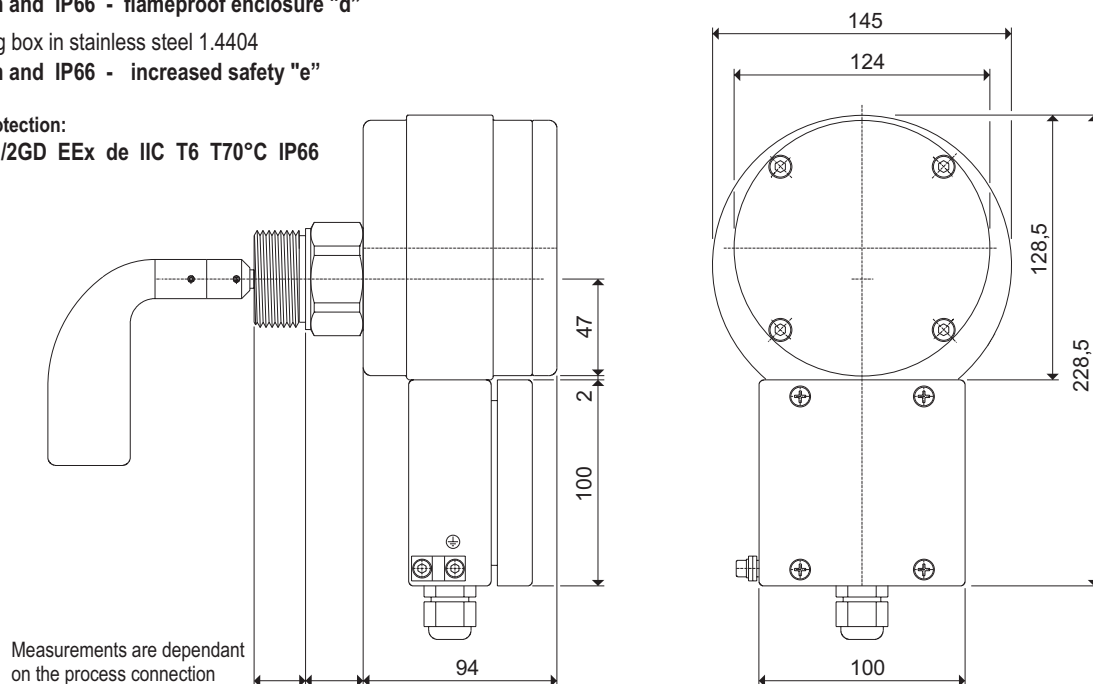
Ex type of protection:
 II 1D2G/2GD EEx de IIC T6 T70°C IP66



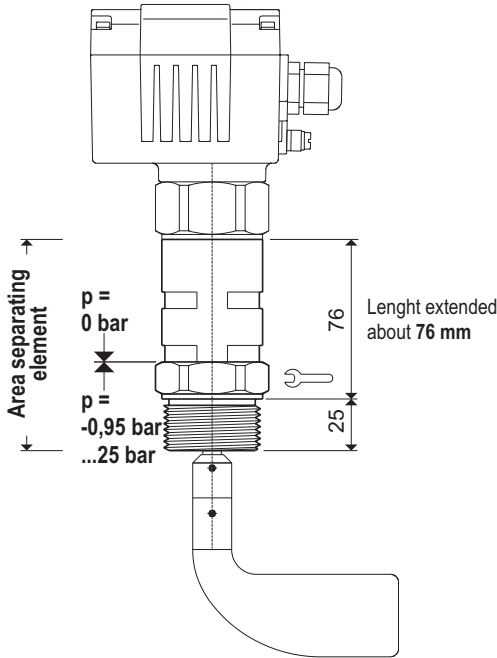
A4 housing for all bulk goods in gas explosion hazardous areas and for hybrid mixtures 

Round housing in stainless steel 1.4571
CE conform and IP66 - flameproof enclosure "d"
with clamping box in stainless steel 1.4404
CE conform and IP66 - increased safety "e"

Ex type of protection:
 II 1D2G/2GD EEx de IIC T6 T70°C IP66



Area Separating Element DF-P2



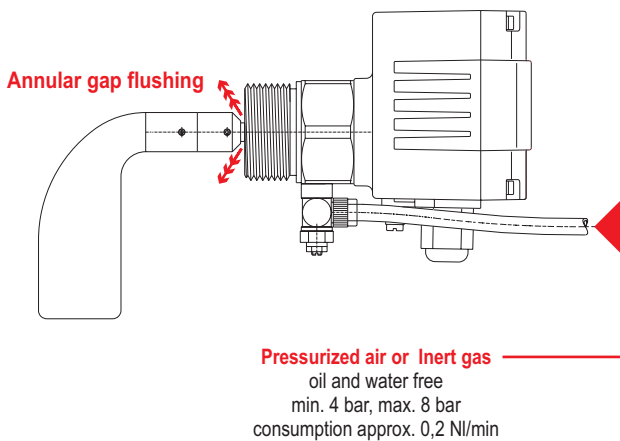
Because of the absence of shaft glands the area separating element is absolutely gas-tight and leakage-free.

The measuring blade is driven without contact by the control head via a magnetic coupling of two rotors equipped with magnets. Between the rotors there is a bulkhead sealing the process space. Thus, no gases may enter the interior of the control head or the environment..

Housing material	1.4571
Process connection	G1¼ (G2) oder G1½ (G3) and all flanges
Bulk goods temperature	-25 °C ... 180 °C $T^{(Process)}$
Container pressure	-0,95 bar ... 25 bar $p^{(Process)}$
Response delay	U1 (standard) approx. 3 sec U5 approx. 5 sec

The Technical Data presented here are to be considered as maximum values, relating only to the equipment described herein. Depending on the selection of options and instruments used, these data must be considered or reduced correspondingly.

Annular gap flushing and overpressure enclosing DS



The flushing system of the annular gap prevents jamming of the annular sealing lip and clears the gap.

The positive pressure housing protects the shaft bearing from infiltration of moisture from wet, oily or sticky bulk materials..

For flushing, pressurized air or inert gas may be used.

For use with any process connection and the following sealing rings:

- R1DS
- R5DS
- R7DS with DF23 and DF24
- R8DS with E4 (High temperature)

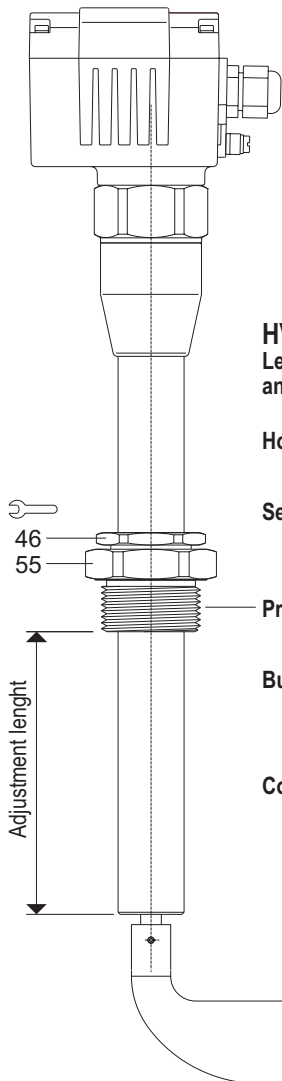
Bulk goods temperature	-25 °C ... 500 °C $T^{(Process)}$
Pressure in container	-0,5 bar ... 5 bar $p^{(Process)}$ higher pressure on demand
Pressure of the flushing gas	min. 2 bar over the "Pressure in container"

Level adjustment DF-HVP

Using the level adjustment device, various filling levels in the container can be adjusted continuously.

Adjustable length depending on jib length according to choice of options **DF28**.
For slant or horizontal mounting position, maximum length 1000mm, only with option **KD** (bearing and shaft sealing ring at the end of the pipe)

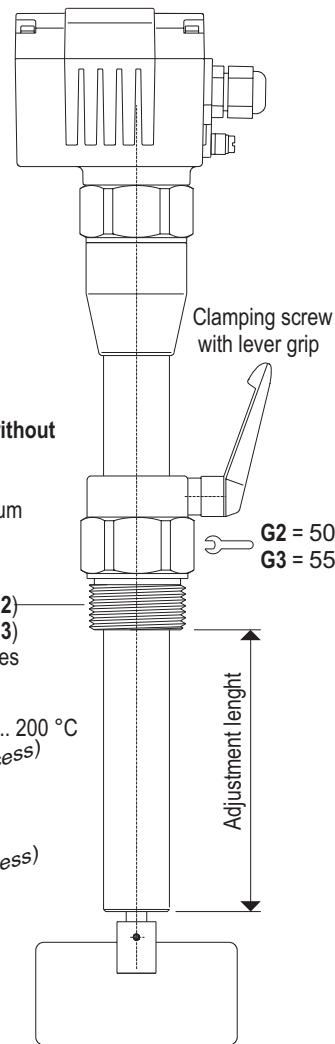
Measuring blade depending on choice of options **DF28**



HVP8
Level adjustment for pressure-tight and dust-proof operation

Housing material	1.4301 or 1.4571
Sealing	Standard NBR, black optional Silicon, white FDA
Process connection	G1½ (G3E)
Bulk goods temperature	-25 °C ... 260 °C $T_{(Process)}$
Container pressure	-0,9 bar ... 10 bar $p_{(Process)}$

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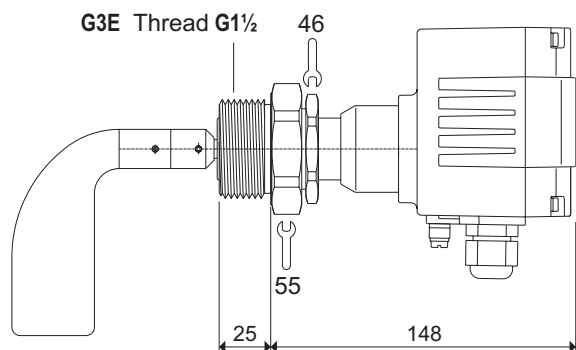


HVP9
Level adjustment for operation without pressure and dust.

Housing material	Aluminium or 1.4301
Process connection	G1¼ (G2) or G1½ (G3) and all flanges
Bulk goods temperature	-25 °C ... 200 °C $T_{(Process)}$
Container pressure	±0 bar $p_{(Process)}$

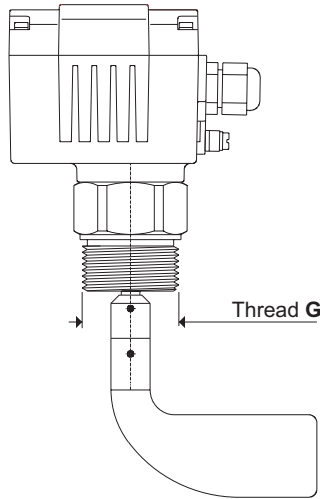
Vibration dampening DF-VD

For use of level indicators close to vibrators or beaters. Is dampening vibration an absorbs impacts transmitted to the indicator



Housing Material	1.4301 or 1.4571
Sealing	Standard NBR, black optional Silicon, white FDA
Process connection	G1½ (G3E) Flanges on demand
Bulk goods temperature	-25 °C ... 260 °C $T_{(Process)}$
Container pressure	-0,5 bar ... 2 bar $p_{(Process)}$

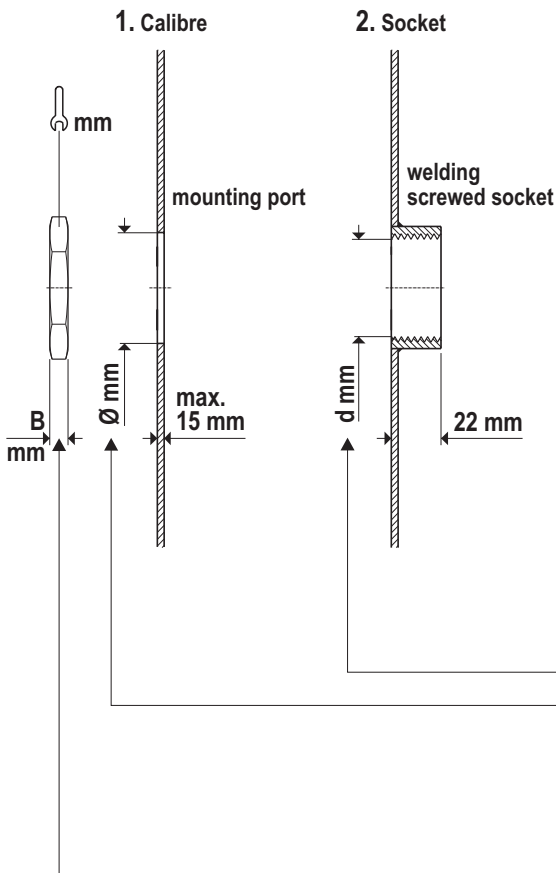
Process connection - threads



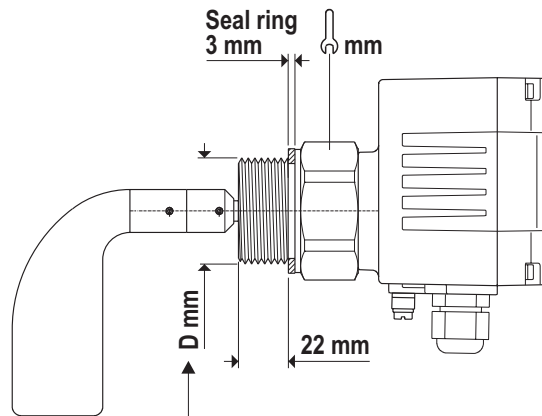
	G1 G1"	G2 G1¼"	G3 G1½"	G4 G2"	G5 M30	G6 M32
DF11	X	X	X		X	X
DF21	X	X	X		X	X
DF22	X	X	X			
DF23		X	X	X		
DF24				X		
DF26		X	X			
DF27		X	X			
DF28		X	X			
DF29		X	X			
DF30	X		X			
DF31			X			
DF32			X			

G to DIN ISO 228 M fine thread, 1,5 mm pitch

Installation variations



Observe the blade size



	G1 G1"	G2 G1¼"	G3 G1½"	G4 G2"	G5 M30	G6 M32
D mm	33,25	41,91	47,80	59,61	30,00	32,00
d mm	30,29	38,95	44,85	56,66	28,38	30,35
Ø mm	35,00	44,00	50,00	62,00	32,00	34,00

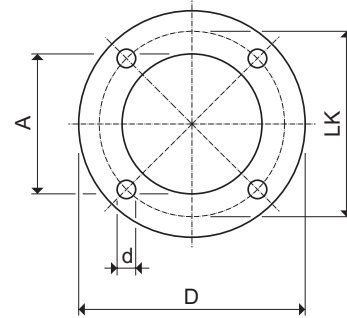
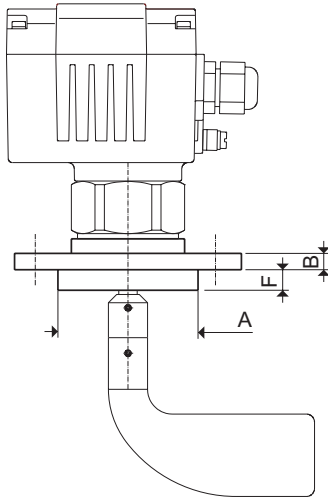
G to DIN ISO 228 M fine thread, 1,5 mm pitch

Hexagonal-nuts

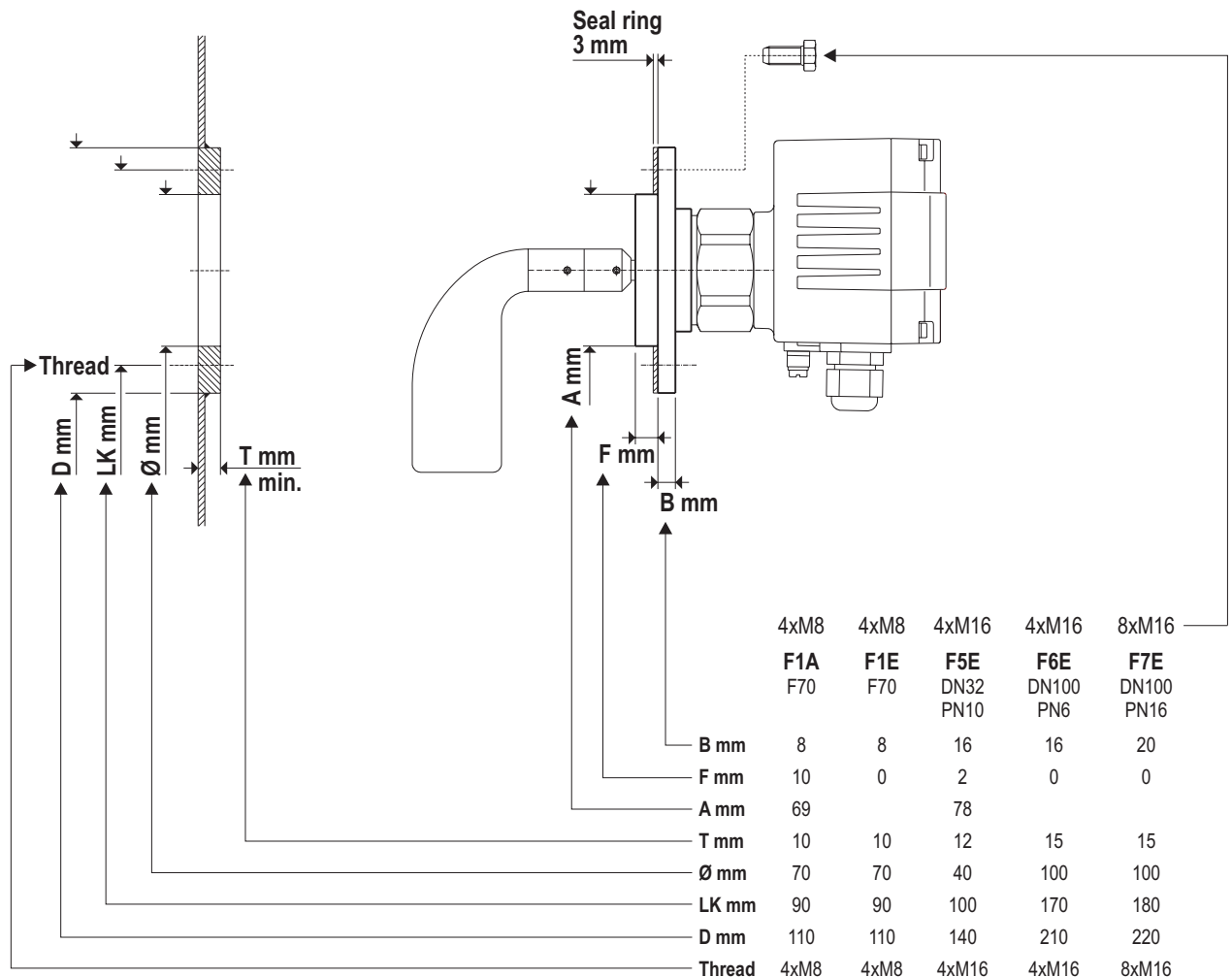
Type	DF-SM1	DF-SM2	DF-SM3	DF-SM4	DF-SM5	DF-SM6
B mm	6	8	8	10	6	6

mm	41	50	55	70	41	41
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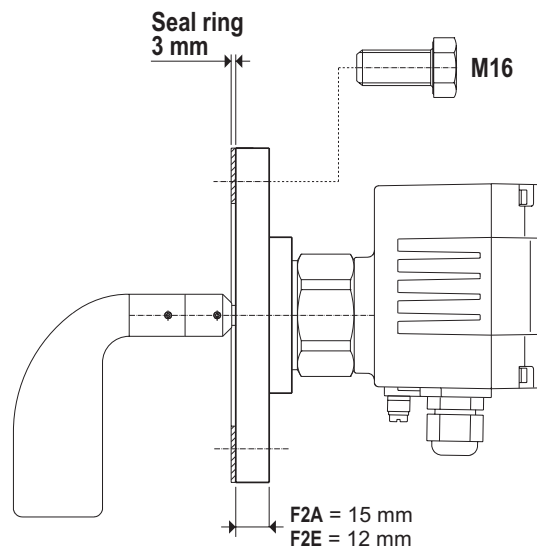
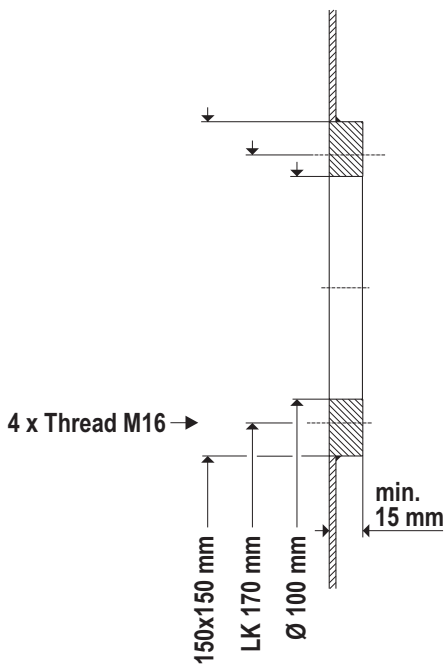
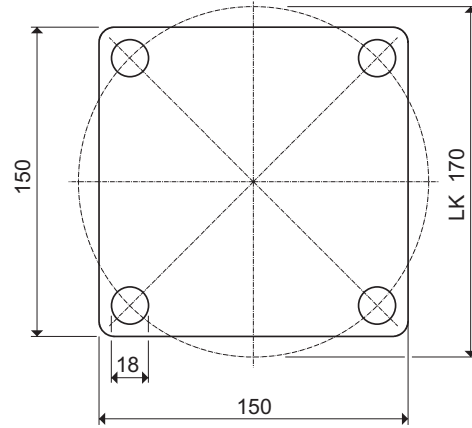
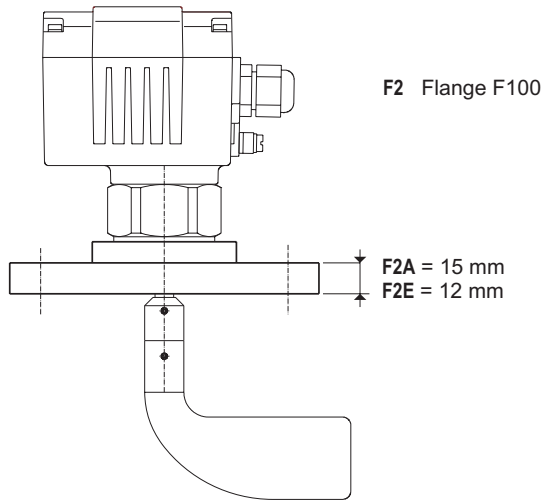
Prozess connection - flanges



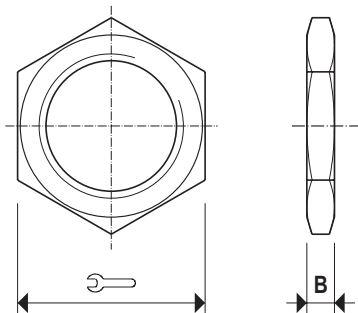
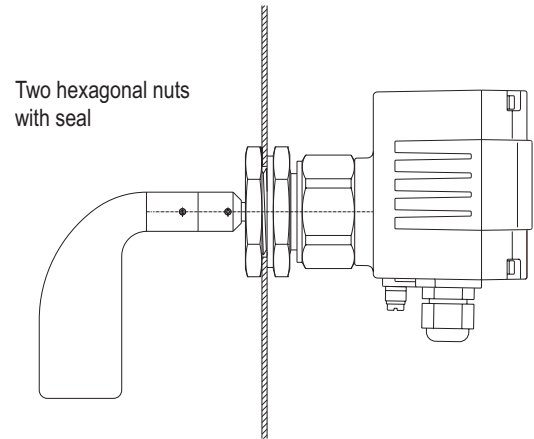
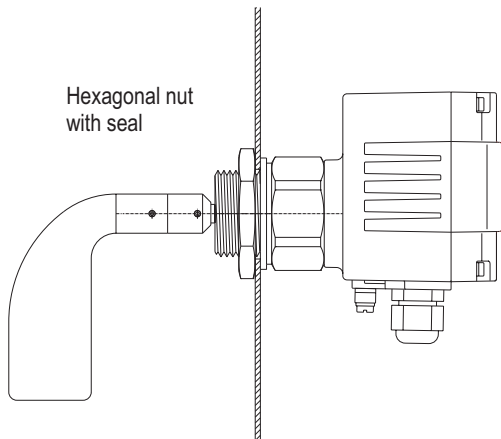
Flange	D	B	A	F	LK	d	Quantity
F1A F70	110	8	69	10	90	9	4
F1E F70	110	8		0	90	9	4
F5E DN32 PN10	140	16	78	2	100	18	4
F6E DN100 PN6	210	16		0	170	18	4
F7E DN100 PN16	220	20		0	180	18	8




Prozess connection - flanges

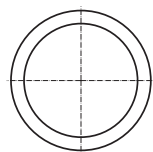


Hexagonal nuts DF-SM



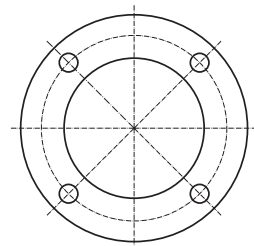
			B	
SM1	G1"	41	6	G1
SM2	G1¼"	50	8	G2
SM3	G1½"	55	8	G3
SM4	G2"	70	10	G4
SM5	M30x1,5	41	6	G5
SM&	M32x1,5	41	6	G6

Seals for process connections DF-DR

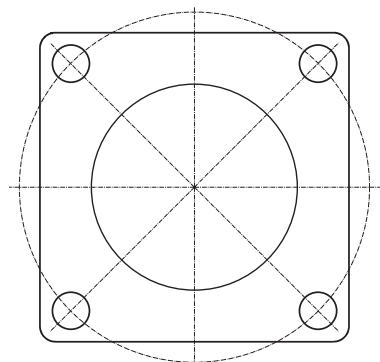


	Threads
DF-DRG1	G1"
DF-DRG2	G1¼"
DF-DRG3	G1½"
DF-DRG4	G2"
DF-DRG5	M30
DF-DRG6	M32
DF-DRG7	G½"
DF-DRG8	G¾"

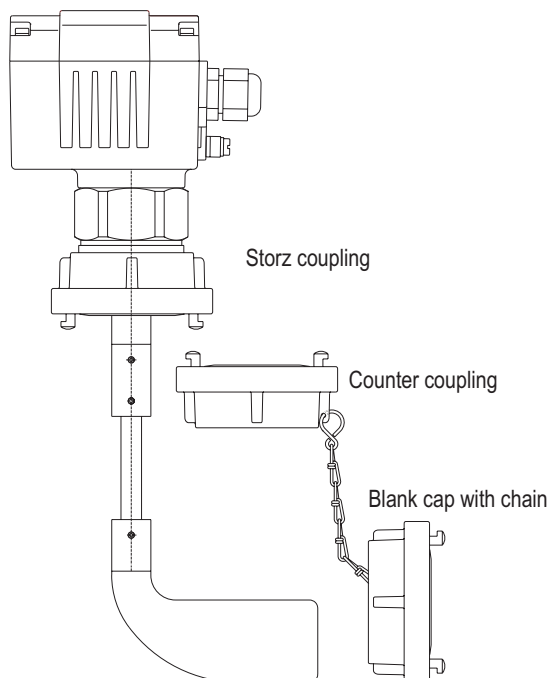
DF-DRF1
DF-DRF5
DF-DRF6
DF-DRF7



DF-DRF2



Quick couplings

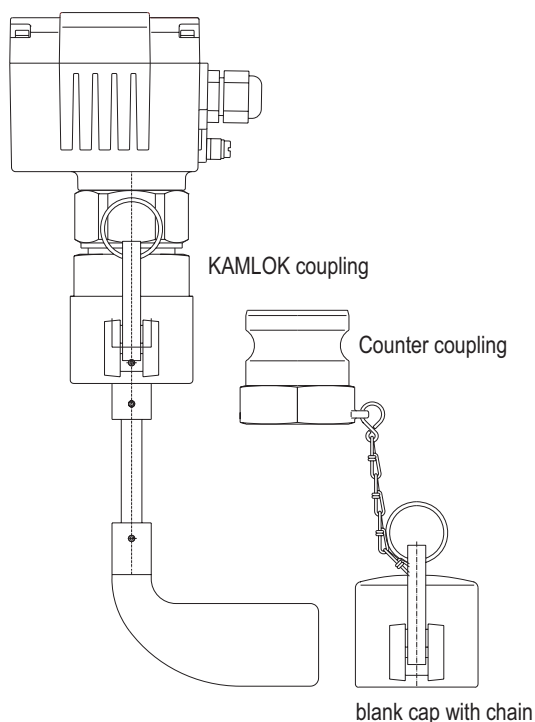


Level indicator with Storz type bayonet coupling.
For installation of the level indicator into regularly changing containers for "full" and "empty" messages during filling and emptying.

Quick and easy installation and removal without tools.

Coupling size	Storz 52 / 1½"
Counter coupling	K-FSZ052IG2 AL for attaching to the container
Blank cap	K-BSZ052-00-AL for dust-proof closure
Material	AlMgSi1
Seal ring	NBR, white FDA
Bulk goods temperature	-25 °C ... +80 °C $T_{(Process)}$
Container pressure	-0,9 bar ... 10 bar $p_{(Process)}$

Quick couplings KAMLOK



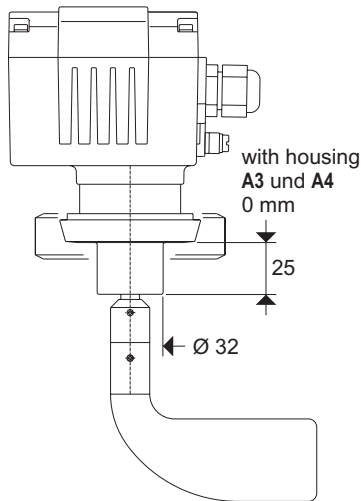
Level indicator with KAMLOK type coupling
For installation of the level indicator into regularly changing containers for "full" and "empty" messages during filling and emptying.

Quick and easy installation and removal without tools.

Coupling size	KAMLOK DN 50 / 2"
Counter coupling	K-AVKI050IG2 VA for attaching to the container
Blank cap	K-AMB050 VA for dust-proof closure
Material	1.4401
Seal ring	VITON
Bulk goods temperature	-25 °C ... +150 °C $T_{(Process)}$
Container pressure	-0,9 bar ... 10 bar $p_{(Process)}$

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Dairy coupling F42



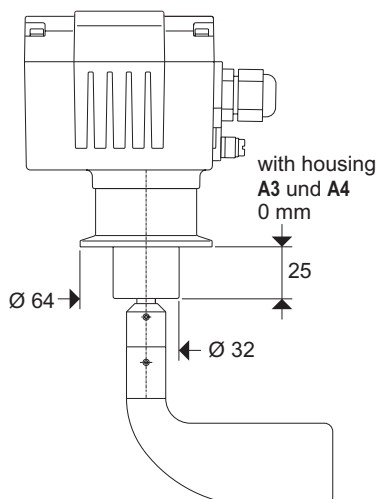
Level indicator with conical adapter and corresponding groove nut for dairy coupling.
For installation of the level indicator into containers which must be cleaned for hygienic reasons, or for quick removal of the indicators when the containers are changed.

Coupling size dairy coupling DN 50 / 2"

Material conical adapter 1.4571
groove nut 1.4404

Container pressure -0,9 bar ... 10 bar $p^{(Process)}$

Clamp Connection F46



Level indicator with clamp connection.
For installation of the level indicator into containers which must be cleaned for hygienic reasons, or for quick removal of the indicators when the containers are changed.

Clamp size DN 50 / 2"

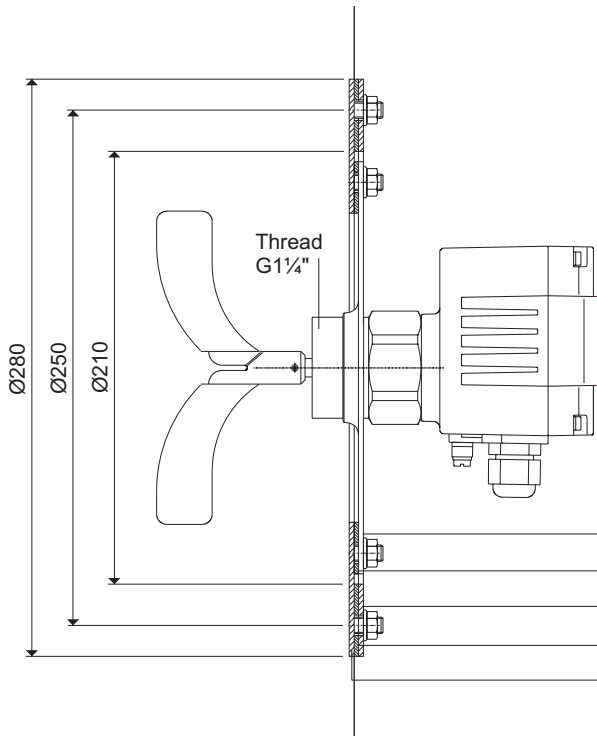
Material 1.4571

Container pressure -0,9 bar ... 10 bar $p^{(Process)}$

Clamp seal not in the delivery extent

The Technical Data presented here are to be considered as maximum values, relating only to the equipment described herein. Depending on the selection of options and instruments used, these data must be considered or reduced correspondingly.

Flanges for textile silos DF-MG2



Mounting flange with G1¼" connection thread for installing the level indicator into flexible bag silos.

Large installation port for blades up to 200 mm.

The large base area diameter amounting to 280 mm prevents false reports upon relaxation of the silo walls.

Material	steel, galvanised
Connection thread	G1¼ (G2)
Seal ring	NBR, white FDA


Mounting flange comprising:

- 1 Flange for installation of level indicator
- 1 NBR seal, light colour
- 1 Clamping flange, outside
- 1 NBR seal, light colour
- 1 Broad flange for inside with welded bolt M8 complete with required nuts and washers

Tools for the installation



For screwing into the container, use the right tools

Art.-Nr.		Material zinc-plated steel
GS41	41	
GS46	46	
GS50	50	
GS55	55	



or, preferably use the KNIPEX plier wrench

Art.-Nr.	spanning (mm) up to
86 03 250	46
86 03 300	60



For opening the housings or clamping boxes, use a

cross-tip	or	flat-bladed screwdriver
PH 2		1,0 x 6,0



For attachment in housings **A1** and **A2**, use a



cross-tip	or	flat-bladed screwdriver
PH 0		0,6 x 3,5

For attachment in clamping box **A3** and **A4** use a

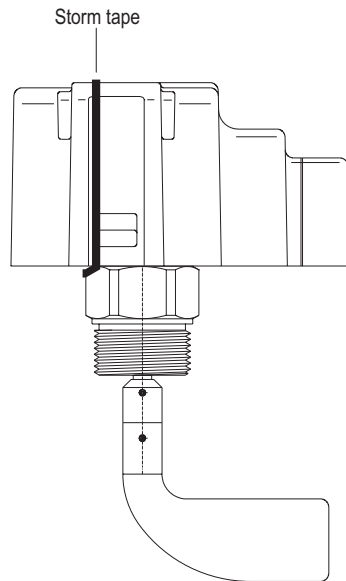
flat-bladed screwdriver
0,6 x 3,5



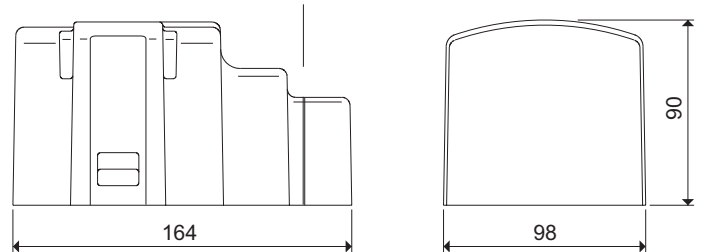
Spanner wrench for tightening the cable connection made of

plastic	metal (ATEX)
 24	 22

Weather protection hood DF-SH



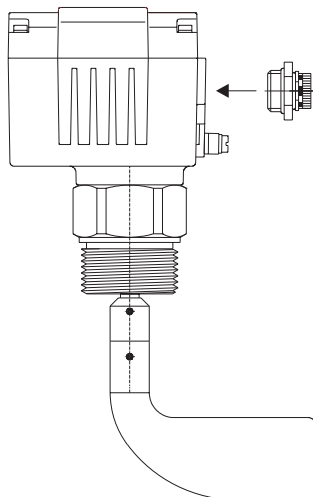
As occasion demands and depending on the wiring, cut off along the notch.



Weather protection hood for outdoor use.
Protection against control head overheating and prevents the inside of the housing from development of condensation.

Materials
Hood PVC, RAL 7001
Storm tape VITON, weather-resisting

Protection from condensation



Condensate protection valve for insertion into a threaded hole..
A watertight but vapour-permeable membrane prevents condensate formation in the interior of the housing.

Material
Seal ring Polyamid
VITON

Connection thread M20 and M12

type of protection IP66

The Technical Data presented here are to be considered as maximum values, relating only to the equipment described herein.
Depending on the selection of options and instruments used, these data must be considered or reduced correspondingly.




Electrical connection

Electrical connection is to be made in accordance with circuit diagram.

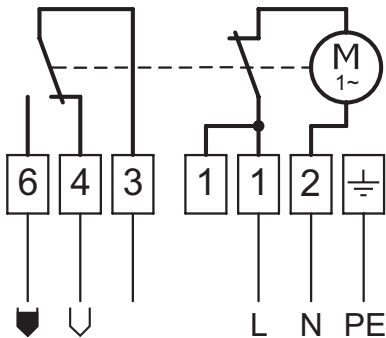
Important!

Make absolutely certain that the cable fits firmly in the union.

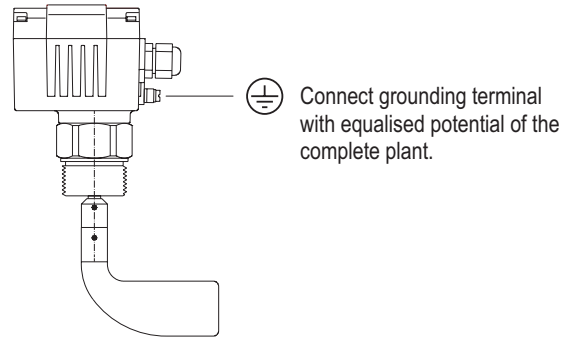
Symbol signification

-  = full
-  = empty
-  = error

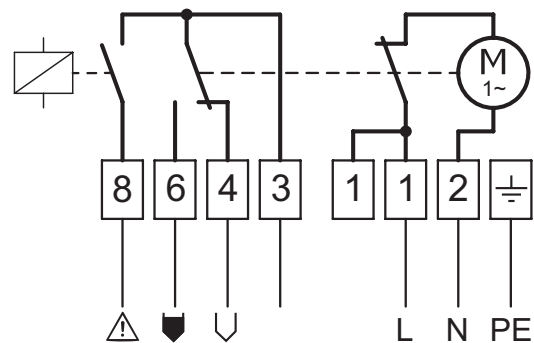
Circuit diagram AC



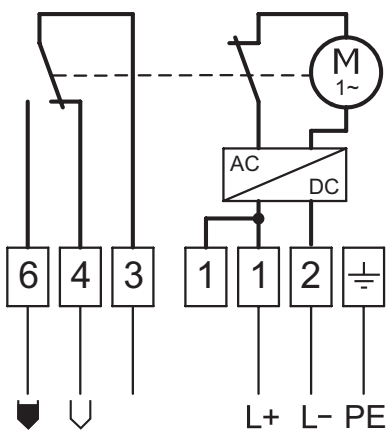
Potential compensation



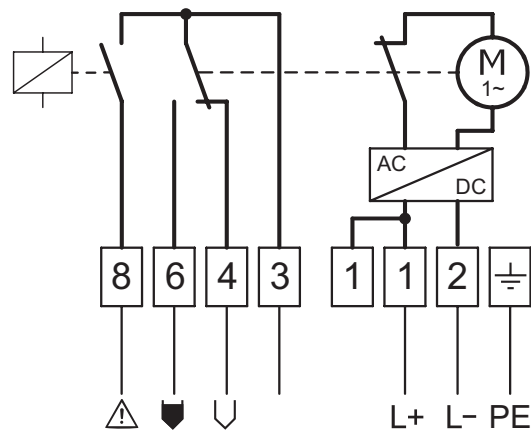
Circuit diagram AC with monitoring D1, D2



Circuit diagram DC



Circuit diagram DC with monitoring D1, D2

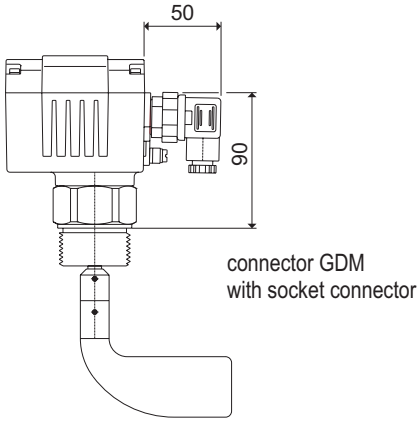


Caution! Level indicator is always to be brought into circuit so that no undesirable switching function can occur in the case of mains voltage failure.

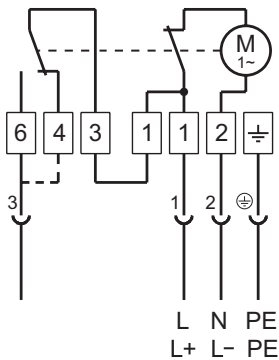
Electrical connection with plug

DF-ST3 connector 3-pin + PE

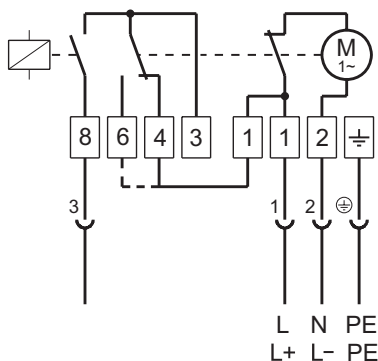
Ex type of protection: $\text{Ex II 3D T80°C IP66}$



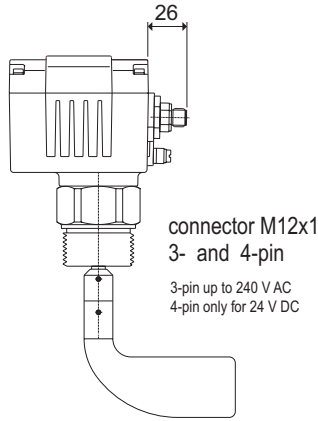
Circuit diagram for connector 3-pin + PE



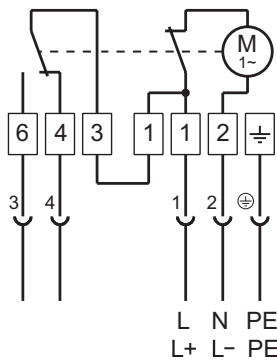
Circuit diagram for connector 3-pin + PE with monitoring D1, D2



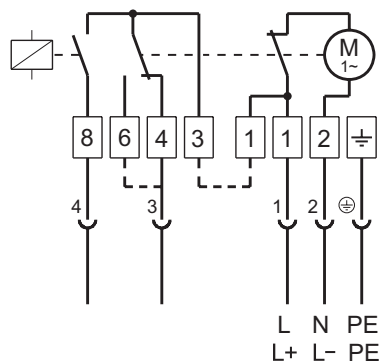
DF-ST1 connector 3-pin + PE DF-ST2 connector 4-pin + PE



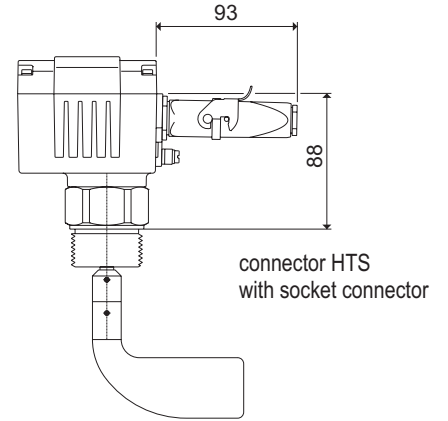
Circuit diagram for connector 4-pin + PE



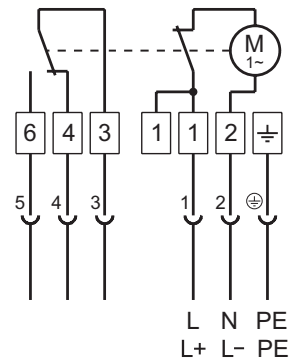
Circuit diagram for connector 4-pin + PE with monitoring D1, D2



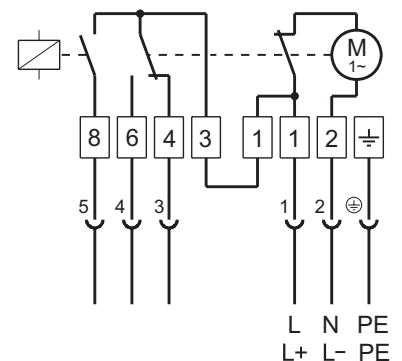
DF-ST5 connector 5-pin + PE



Circuit diagram for connector 5-pin + PE



Circuit diagram for connector 5-pin + PE with monitoring D1, D2

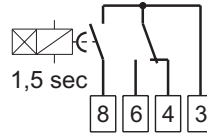
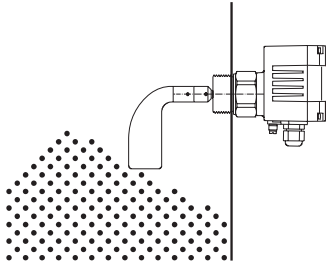


full line = wiring at the works

broken line = possible wiring

Signal delay - empty indication

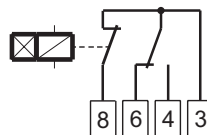
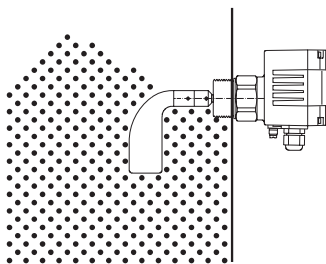
Option **D3** retards the empty indication



switching position by empty indication
(Measuring blade is rotating)
and after the delay

Upon sagging of the bulk, the "empty" message at terminal 8 is delayed for 1.5 seconds.

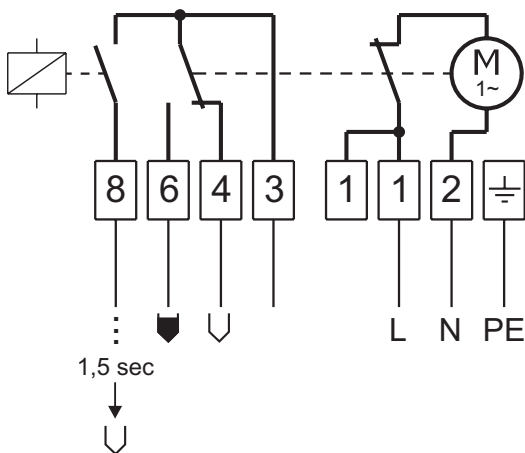
Relay contact to terminal 8 opens with a delay of 1.5 sec after contact with terminal 4 has been engaged.



Switching position by full indication
Full indication - "not empty".
(Measuring blade has stopped)

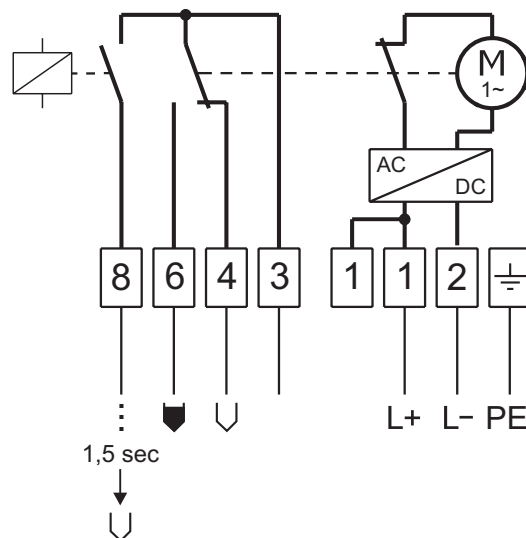
When the level of the bulk rises ("Full" message), the relay contact engages immediately without delay.

Circuit diagram AC with signal delay D3



safety-focused connection from terminal 3 to terminal 8
"full" is cancelled - stop emptying

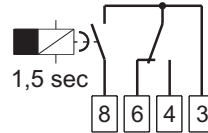
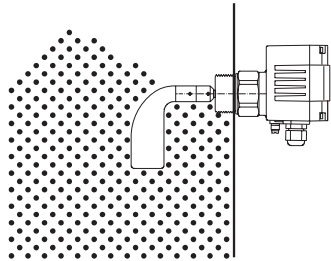
Circuit diagram DC with signal delay D3



Caution! Level indicator is always to be brought into circuit so that no undesirable switching function can occur in the case of mains voltage failure.

Signal delay - full indication

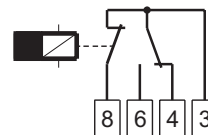
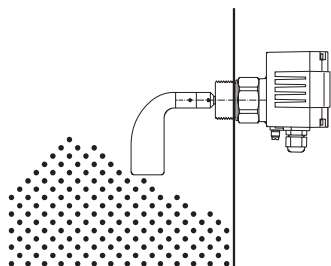
Option **D4** retards the full indication



Switching position by "full" indication
(Measuring blade has stopped)
and after delay

When the level of the bulk rises, the "full" message at terminal 8 is delayed for 1.5 seconds.

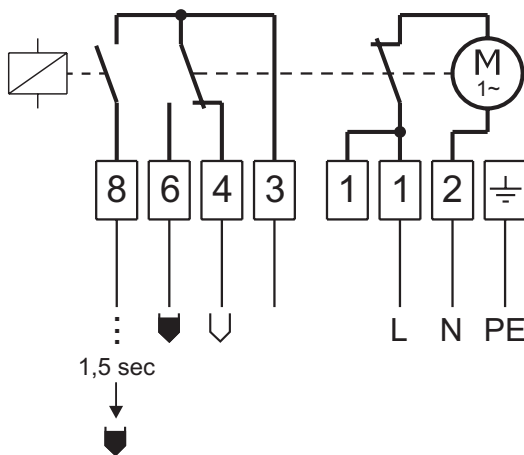
Relay contact to terminal 8 opens with a delay of 1.5 sec after contact with terminal 4 has been engaged.



Switching position by
Empty indication- "not full".
(Measuring blade is rotating)

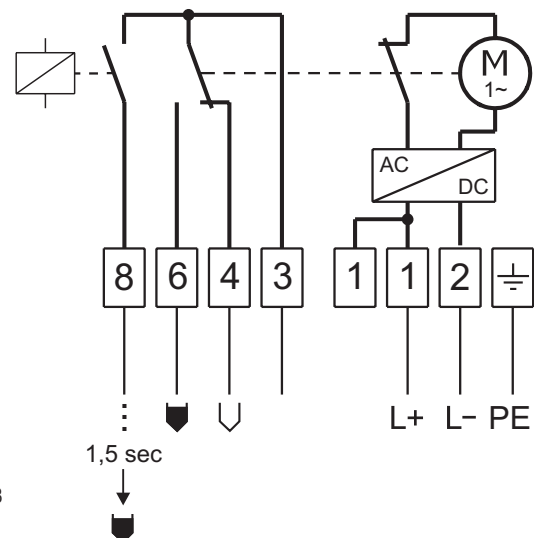
When the level of the bulk falls ("empty message"), the relay contact engages immediately without delay.

Circuit diagram AC with delay D4



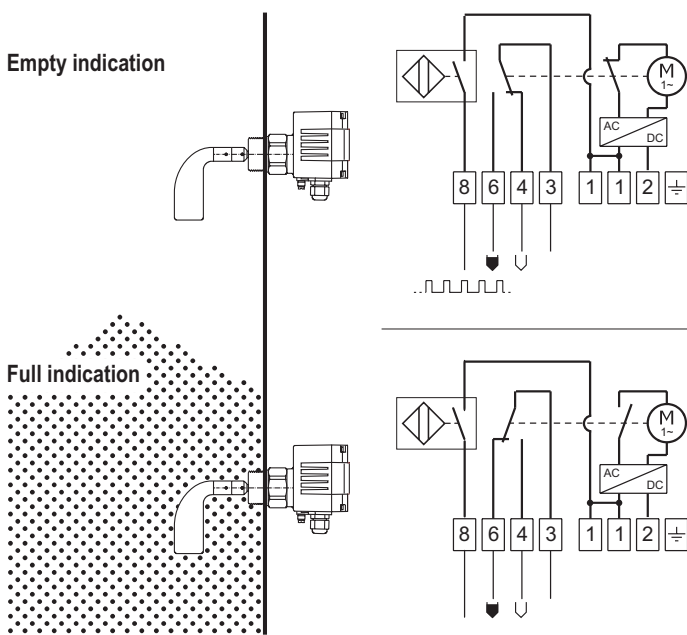
safety-focused connection from terminal 3 to terminal 8
"empty" is cancelled - stop filling

Circuit diagram DC with delay D4



Caution! Level indicator is always to be brought into circuit so that no undesirable switching function can occur in the case of mains voltage failure.

Function control D9 (Rotation control)



The function control option detects device errors early, using a separate independent electronic system. The latter outputs a pulsating signal at terminal 8 while the blade shaft is rotating.

The following are monitored: **Cable break**

Voltage failure

DC/AC-converter for motor voltage

Motor and transmission

Rotation of the blade shaft

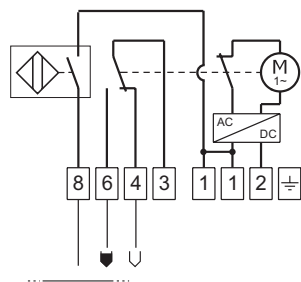
Attention!

If the device signals "full", the motor is switched off (voltage on terminal 6), the blade shaft stops rotating, and thus for the time of the "full" message no pulsating signal is produced.

Device is in idle mode.

No defect!!!

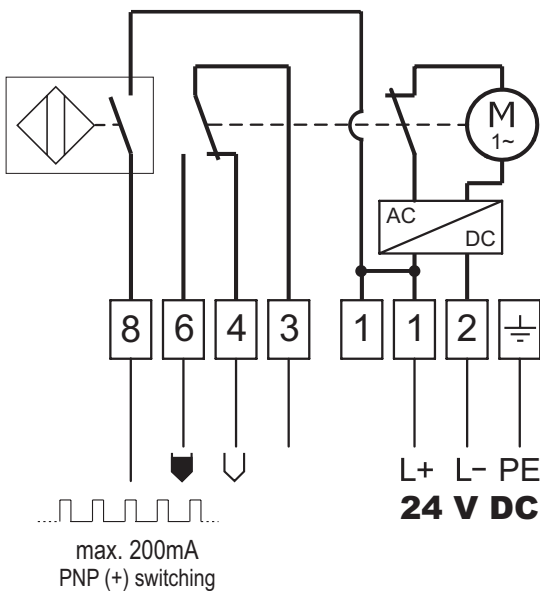
Error signal



Device error displayed

If there is a device error, or if the supply voltage is absent, the pulsation of the signal is interrupted, signalling the error

Circuit diagram



Pulse repetition



U1 (Standard = 1 U/min)

pulse duration ca. 2,5 sec

pulse pause ca. 17,5 sec
= 3 pulse/min

U5 (5 U/min)

pulse duration ca. 0,5 sec

pulse pause ca. 3,5 sec
= 15 pulse/min

Caution!

Level indicator is always to be brought into circuit so that no undesirable switching function can occur in the case of mains voltage failure.

Appliance heating E7

The lubrication of the transmission (grease) is designed for temperatures as low as -25°C. Still lower temperatures render the grease so stiff and viscous that the motor cannot be started.

For this reason, the level indicator must be heated if the temperature is below -25°C.

As long as the motor is switched on, the waste heat of the motor is enough to keep the transmission sufficiently warm.

If the motor is switched off in case of a "Full" message, a heating system is switched on to warm the transmission if option E7 or E74 has been selected.

Appliance data

Ambient temperature

With appliance heating E7 -35 °C ... +70 °C T_a
With appliance heating E74 -40 °C ... +70 °C

Bulk goods temperature

With appliance heating E7 -35 °C $T_{(Process)}$
With appliance heating E74 -40 °C

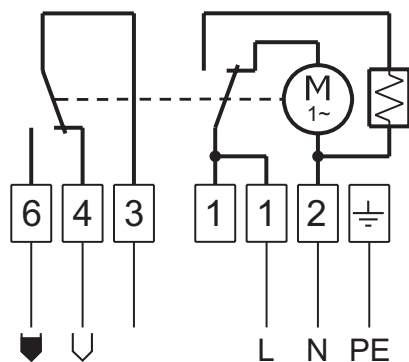
Attention!

The level indicator must be continuously supplied with power.

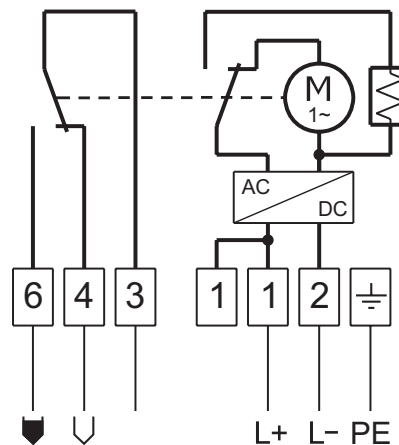
Otherwise the motor will cool down too much and cannot be restarted without external warming up.

After power failure of > 0.5 hours and temperatures below -25°C the device must be warmed up before starting.

Circuit diagram AC with appliance heating E7











Circuit diagram DC with appliance heating E7











Caution! Level indicator is always to be brought into circuit so that no undesirable switching function can occur in the case of mains voltage failure.

Switching logics, function displays and signal lamps

Symbol signification

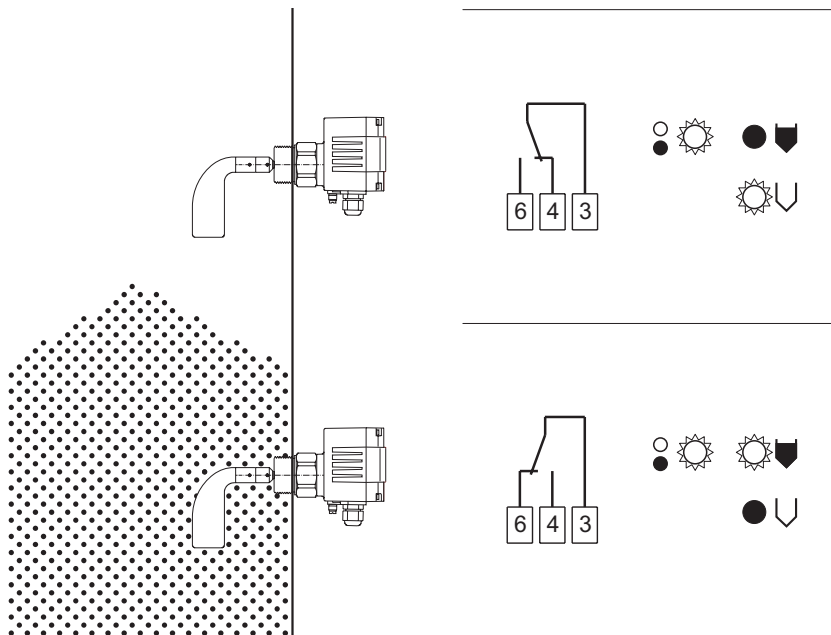
-  = under voltage
-  = full
-  = empty
-  = rotation control
-  = LED "OFF"
-  = LED "ON"
-  = relay actuated
-  = relay without current

Arrangement and colours of the four function LEDs

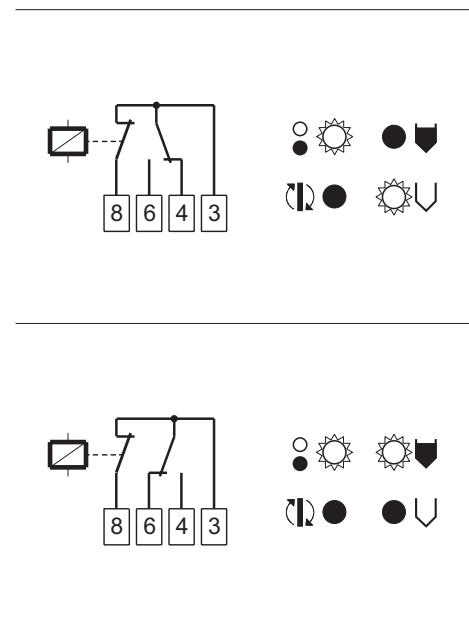
- yellow     blue
- red     green

Switching logics and function displays

Standard
Option H5 and H6 with DF11

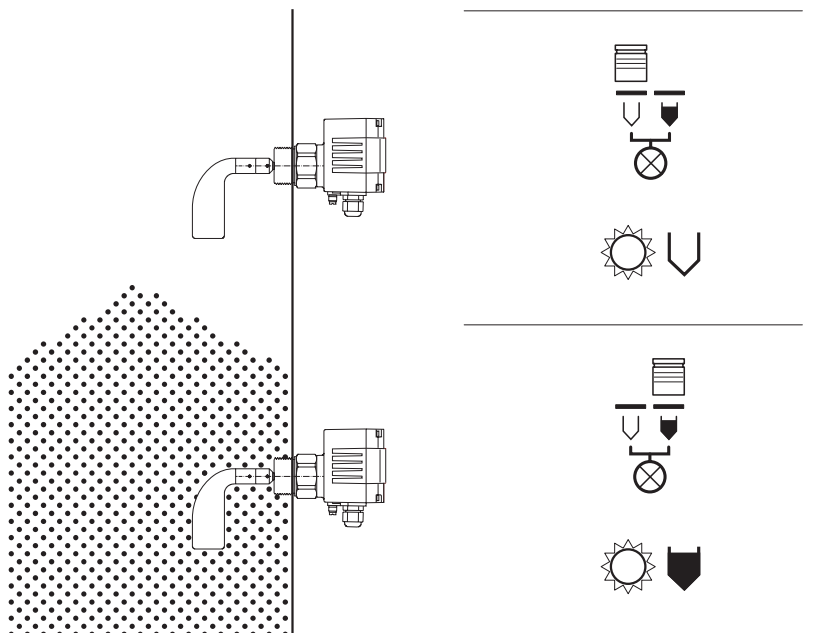


Rotation control
Option D1, H1 and H3



Signal lamps

DF21...DF33
Option H2, H3, H8



In the case of device malfunction the relay interrupts the circuit to clamp 8.

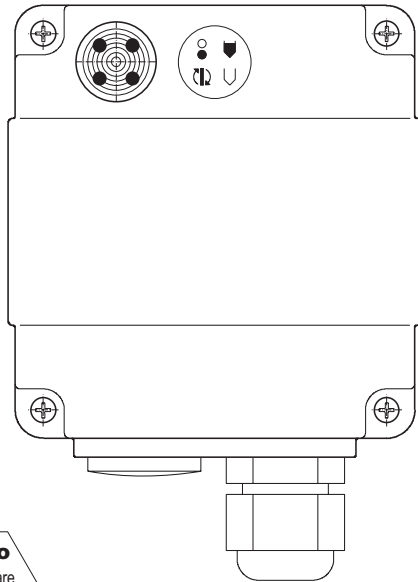
Caution!

Level indicator is always to be brought into circuit so that no undesirable switching function can occur in the case of mains voltage failure.

Signal lamps and function displays

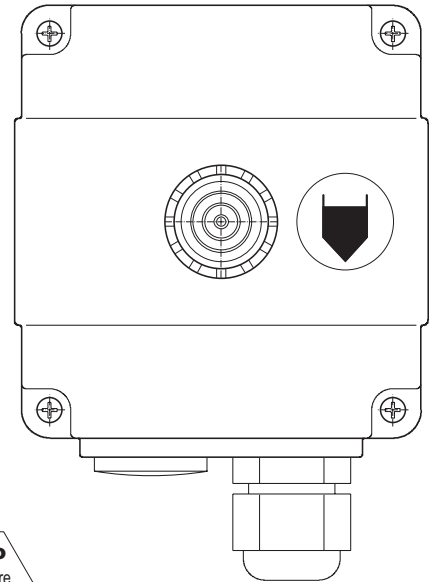
Switching logics, under DF-GI-22

Collar for function LEDs H1 and H3 as options
(in the case of DF11 option H6)



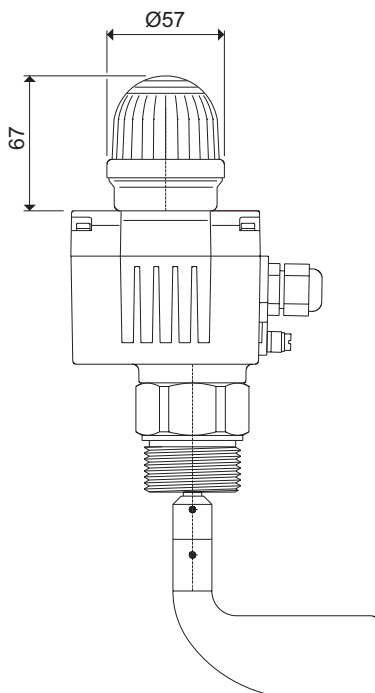
Ex type of protection: **Ex II 3D T80°C IP66**

Signal lamp, LED green H2 and H3 as options
(not available for DF11)



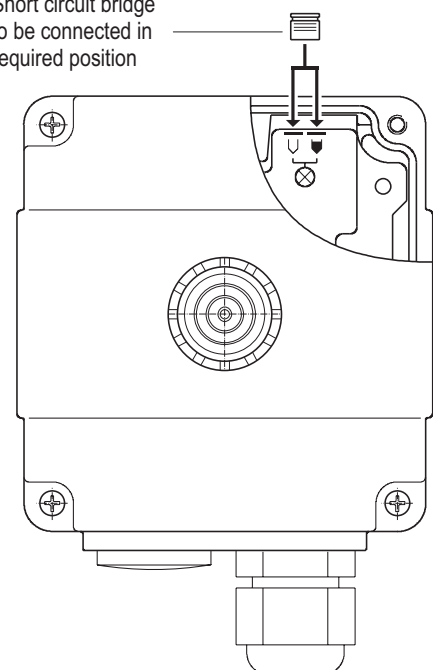
Ex type of protection: **Ex II 3D T80°C IP66**

Large signal lamp, LED green H8 as option
(not available for DF11)



Selection of lamp functions
for signal lamp H2 and large signal lamp H8

Short circuit bridge
to be connected in
required position



Collar for function LEDs together with signal lamp
H3 as option.

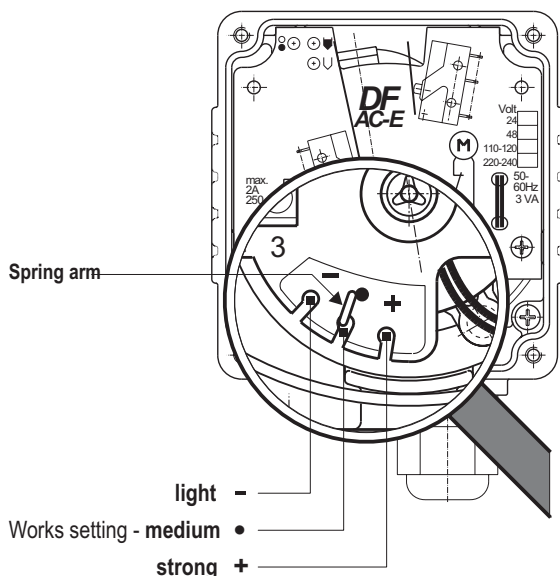
Selection guide

Application	Type												
	DF11	DF21	DF22	DF23	DF24	DF25	DF26	DF27	DF28	DF29	DF30	DF31	DF33
Full indicator	X	X	X	X	X	X	X	X	X	X	X	X	X
Demand indicator	X	X	X	X	X	X	X	X	X	X		X	X
Empty indicator	X	X	X	X	X	X	X	X	X	X		X	X
Any mounting position	X	X	X	X	X				with KD			X	X
Horizontal mounting	X	X	X	X	X	X			with KD		X	X	X
Lateral mounting	X	X	X	X	X	X			with KD			X	X
Vertical from top	X	X	X	X	X		X	X	X	X	X	X	X
Inclined from top	X	X	X	X	X				with KD			X	X
Inclined from bottom	X	X	X	X	X				with KD			X	X
Loading set	X	X		X							X		
Height adjustable									X				
For moist bulk goods	X	X	X	X	X	X	X	X	X	X	X	X	X
For wet bulk goods												X	X
Vertical from top and immersion in liquids	X						X	X	X	X			X
Lateral below the liquid level												X	X
Demand indicator for soluble bulk goods in liquids												X	X
Recognize by touch of bulk goods in liquids							X	X	X	X		X	X
For sludges vertical from top							X	X	X	X		X	X
In moist and aggressive gases		X	X	X	X	X	X	X	X	X	X	X	X
In moist gases with high temperatures												X	X
Temperatures up to 260°C		X	X	X	X	X	X	X	X	X		X	
Temperatures up to 500°C		X	X				X	X	X	X		350°C	
Temperatures up to 1000°C		X	X				X	X	X	X			

Caution! Level indicator is always to be brought into circuit so that no undesirable switching function can occur in the case of mains voltage failure.

Setting the sensitiveness

The sensitivity of the level indicator can be set according to the characteristics of the bulk goods by regulating the spring force.



Adjustment possibilities

- Changing the spring bias (see figure):
 - set **light**, for very light bulk goods: put spring in by (-) - (lesser spring tension).
 - set **medium**, suitable for almost all bulk goods: put spring in by (•) - (mean spring tension).
 - set **strong**, for heavy and sticking bulk goods: put spring in by (+) - (higher spring tension).
- Select size of the measuring blade:
 - make it more sensitive (lighter bulk goods): Choose a larger measuring blade
 - make it less sensitive: Choose a smaller measuring blade
- Changing the spring:
 - On demand .install a stronger or weaker spring (3 types available)

All values given are approximate values and depend on the characteristics of the bulk goods such as consistency and flow behaviour, for example.

Selection guide for measuring blades

Lowest bulk weight ρ_b for which the measuring blade can be set.

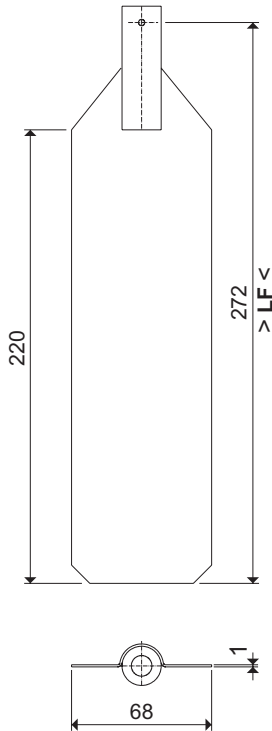
Filling level up to 100 mm above measuring blade Filling level until measuring blade is compl. covered	Bulk weight ρ_b in	
	kg/l t/m ³	t/m ³ kg/l

Measuring blade	Blade size	Spring force setting	
		light	medium
S1 Socket blade	100x30	$\frac{0,25}{0,4}$	$\frac{0,35}{0,6}$
S2 Socket blade	130x30	$\frac{0,2}{0,35}$	$\frac{0,3}{0,5}$
M1 Socket blade	90x28	$\frac{0,15}{0,3}$	$\frac{0,2}{0,5}$
M2 Socket blade	90x40	$\frac{0,1}{0,2}$	$\frac{0,15}{0,3}$
T0 Blade T200	68x220	$\frac{0,15}{0,3}$	$\frac{0,25}{0,5}$
T1 Blade T50	98x50	$\frac{0,15}{0,3}$	$\frac{0,25}{0,5}$
T2 Blade T100	98x100	$\frac{0,1}{0,2}$	$\frac{0,2}{0,45}$
T5 Blade T250	250x100	$\frac{0,015}{0,02}$	$\frac{0,02}{0,03}$
T8 Rubber blade	250x100	$\frac{0,015}{0,02}$	$\frac{0,02}{0,03}$
TK Blade TK150	150x27	$\frac{0,25}{0,4}$	$\frac{0,35}{0,6}$
TK3 3 Blade TK150	150x120	$\frac{0,15}{0,2}$	$\frac{0,2}{0,3}$
TD Blade TD140	140x85	$\frac{0,2}{0,4}$	$\frac{0,3}{0,5}$
X1 Blade X50	98x50	$\frac{0,15}{0,3}$	$\frac{0,25}{0,5}$
X2 Blade X100	98x100	$\frac{0,1}{0,2}$	$\frac{0,2}{0,45}$
X3 Blade X200	180x100	$\frac{0,025}{0,05}$	$\frac{0,075}{0,15}$
K1 Hinged blade T230	200x30	$\frac{0,05}{0,08}$	$\frac{0,07}{0,12}$
SG Blade	126x8	$\frac{0,45}{0,55}$	$\frac{0,65}{0,75}$
TG Blade	98x8	$\frac{0,5}{0,6}$	$\frac{0,7}{0,8}$

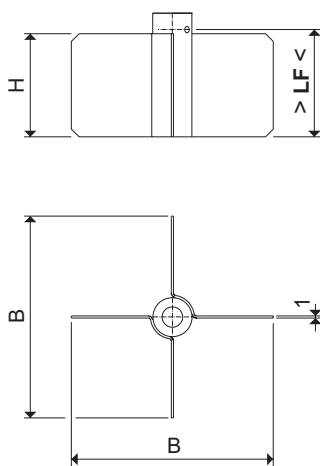
Fluidised bulk goods are lighter when being filled and delivered. This has to be taken appropriately into consideration when selecting the measuring blade and setting the spring force.

Measuring blade Ex type of protection for qll rotary blades: II 1GD c IIB TX

TO blade

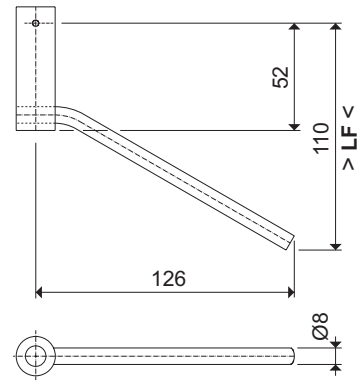


X blade

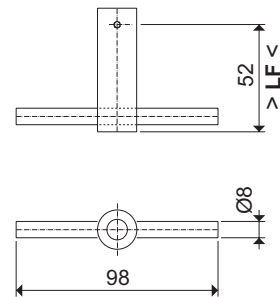


	B	H	LF
X1	98	50	52
X2	98	100	102
X3	180	100	102

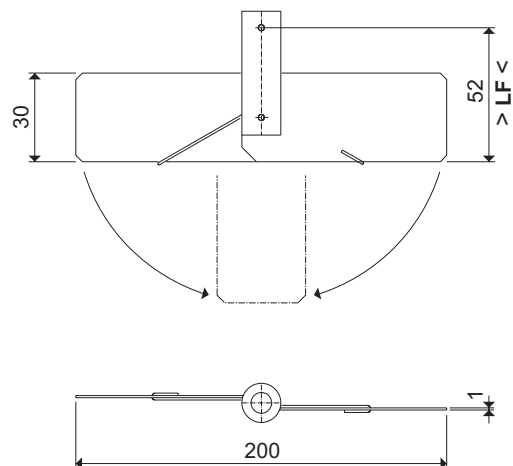
SG socket blade, reinforced



TG blade, reinforced

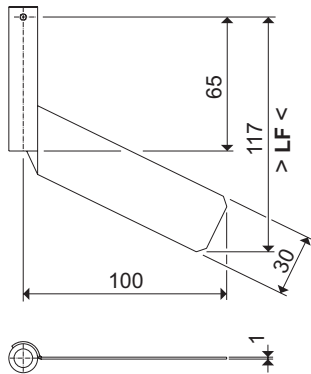


K1 hinged blade

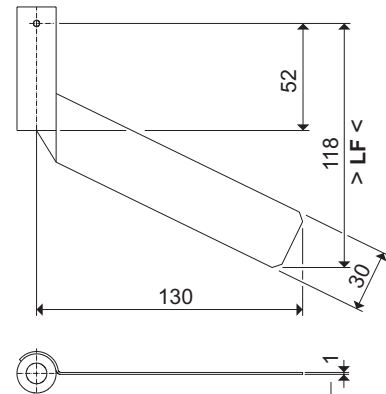


Measuring blades Ex type of protection: Ex II 1GD c IIB TX

S1 socket blade (only for DF11)

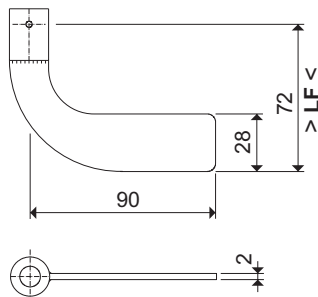


S2 socket blade

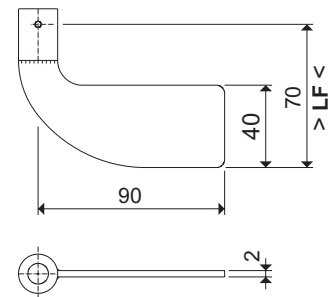


2 mm with S2V socket blade, reinforced

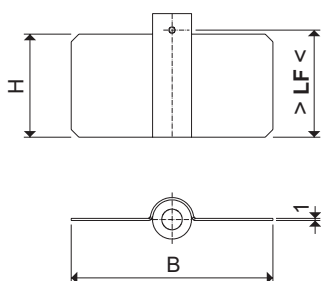
M1V socket blade, reinforced



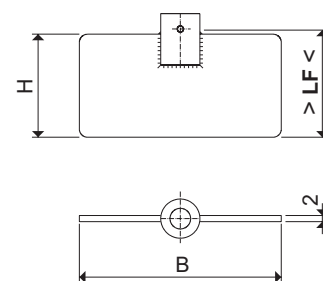
M2V socket blade, reinforced



T - blade



T - blade, reinforced



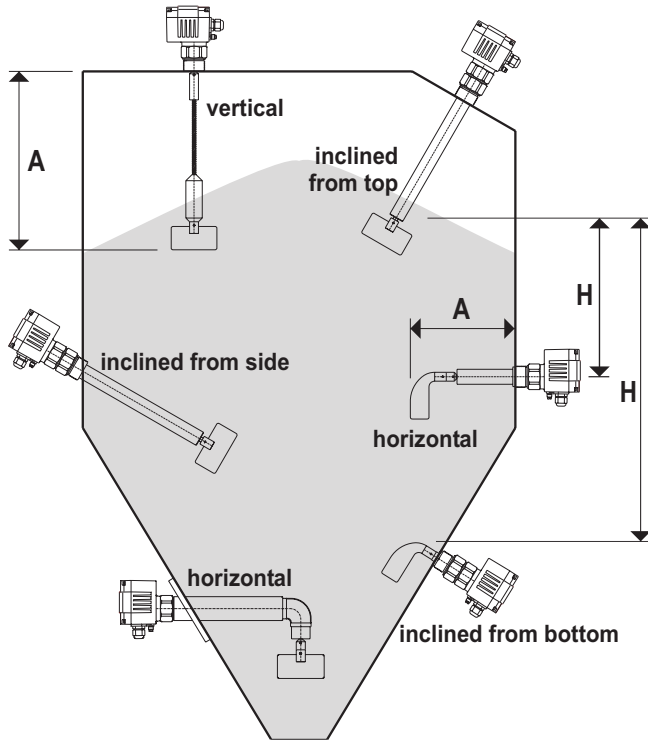
	B	H	LF
T1	98	50	52
T2	98	100	102
T3	200	100	102
T5	250	100	102
T8 ¹⁾	250	100	102

¹⁾ Blades 10 mm thick
in rubber NBR, black

	B	H	LF
T1V	98	50	52
T2V	98	100	102

Mounting positions

Provisions have been made for various mounting positions in any, inclined, vertical and horizontal position, depending on the type of device.



A Jib length

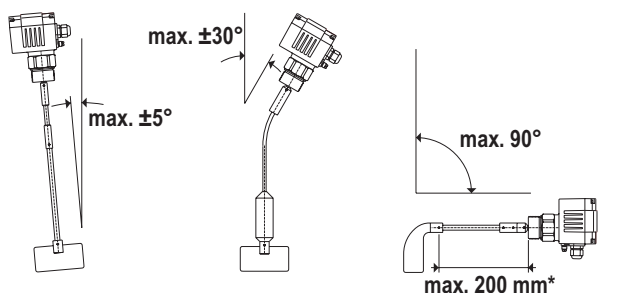
H Bulk material column above the shaft and measuring blade. Depending on height and weight of the bulk material, pay attention to "Protection from heavy load".

Inclination

The **DF26** and **DF28** level indicators may be installed only with an inclination of no more than $\pm 5^\circ$, and **DF27** with an inclination of no more than $\pm 30^\circ$.

For the **DF21** level indicator with a shaft extension up to 200 mm in length and lightweight bulk materials, an inclination of up to 90° is permissible (lateral installation with horizontal shaft).

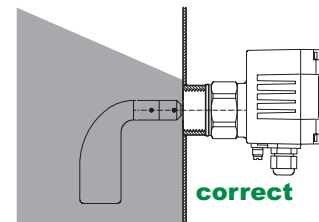
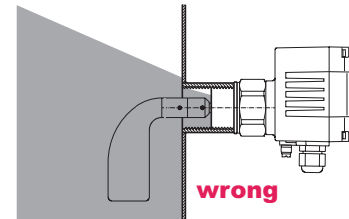
However, in that case compliance with section "Protection from heavy load" is mandatory.



* in special cases longer extensions are possible

Installation

The level indicators are mounted on the container with thread connection or flange respectively

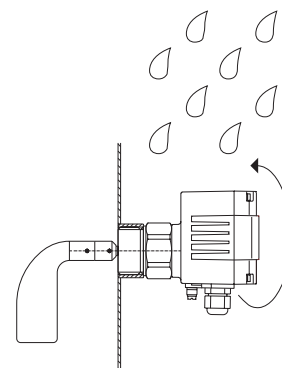


The devices should be installed, that no bulk goods can deposit in the thread or flange fittings.

Protection from moisture

After tightening the screws, adjust the control head by twisting so that the cable connection points downwards.

Advantage: optimal functioning of the device and no infiltration of moisture

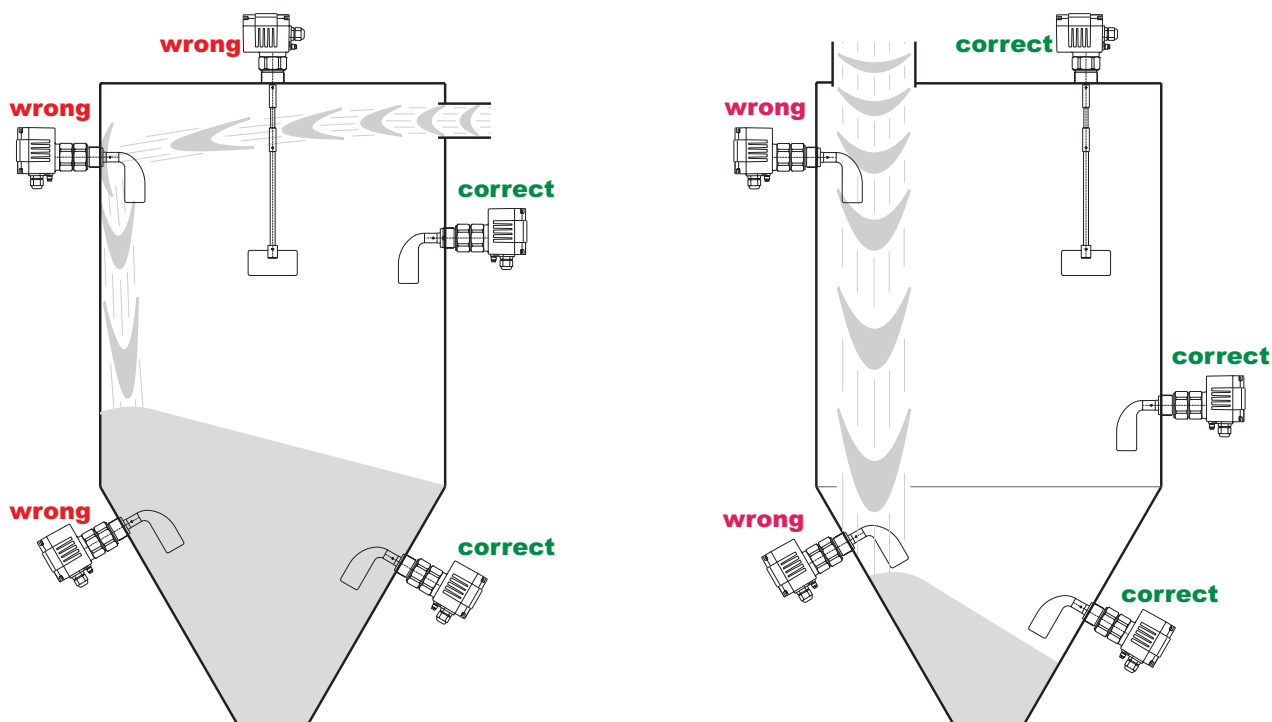


To this end the control head can be rotated by 360° relative to the process connection.

Protection from impacting bulk goods

Level indicators must not be affected by flying bulk material particles e.g. from injection pipes, filling pipes or downpipes. Therefore the bulk material stream should be directed or redirected accordingly, or the level indicator should be placed so that bulk material cannot impact directly onto the blade shaft or the measuring blade.

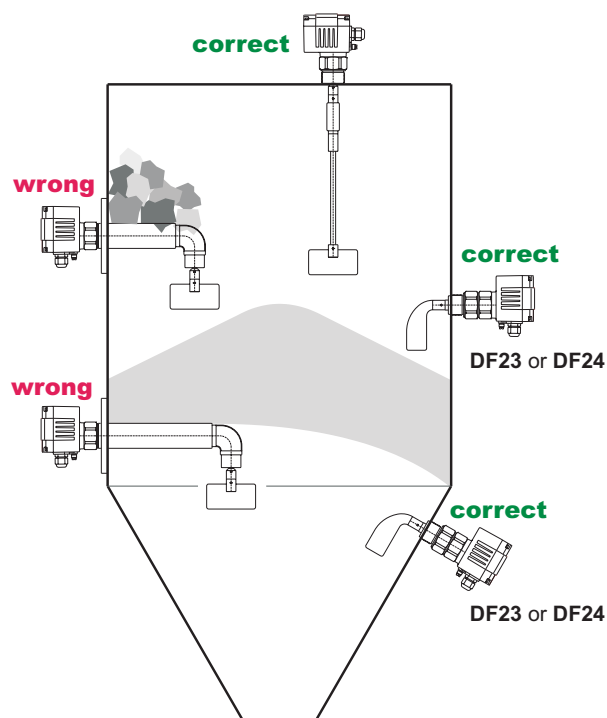
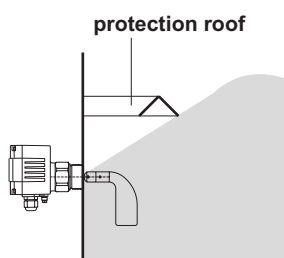
Especially for heavy bulk materials which may damage the shaft or blades, a stable deflector or protective cover should be installed if necessary to protect shaft and blades from impacting bulk materials



Protection from heavy load

If the bulk material is heavy, may agglutinate to form large lumps or is prone to cross-linking, the **DF23** or **DF24** level indicators with reinforced blade shaft should be used.

Otherwise, install a protection roof in the container above the level indicator to shield the shaft and the blades from the weight of the bulk material.



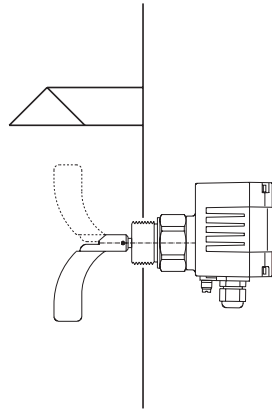
Between the protection roof and the rotating blades there must be sufficient space so the bulk material may enter but not get stuck.

Application instructions

DF11

Simple applications
any mounting position

In the case of application as empty indicator it is recommended that the blade will be cut off on the one end and if the blade will be subject to heavy loads and stress additional the installation of a protection roof is

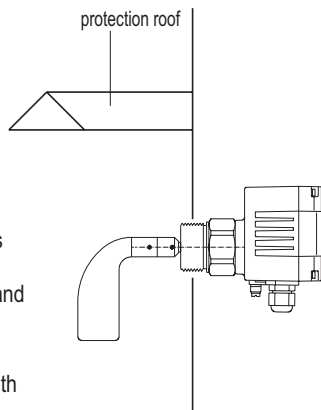
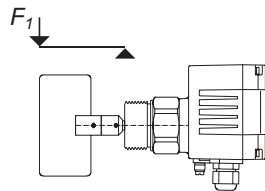


DF21 und DF22

Large range of applications
any mounting position

Loadability of the measuring blade

F_1 max. 90 N



The installation of a protection roof is recommended when the blade assembly is subject to higher loads and stress or if it will be used as empty

Or the **DF23 / DF24** is to be used with reinforced blade shaft

DF23 und DF24

With reinforced blade shaft Ø20
any mounting position

Loadability of the shaft

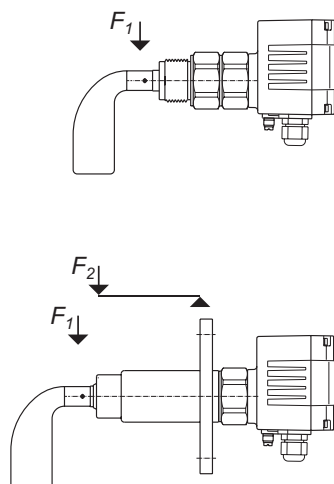
F_1 max. 780 N

Loadability of the support tube

F_2 max. 2,100 N

With reinforcement ribs

F_2 max. 11,000 N



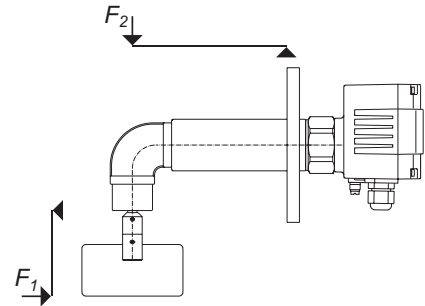
Empty indicator to be equipped with socket blade with preference.

DF25

angled jib
vertical installation

Loadability of the measuring blades

F_1 max. 90 N



Loadability of the support tube

F_2 max. 2,100 N

With reinforcement ribs

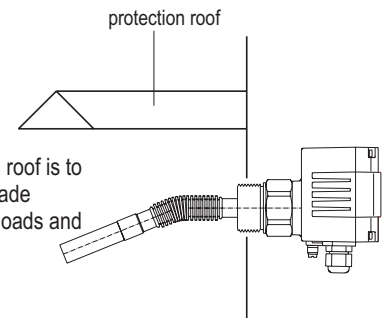
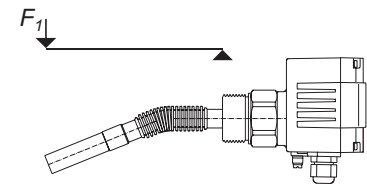
F_2 max. 11,000 N

DF31...DF33

Rotating measuring blade
any mounting position

Loadability of the measuring blades

F_1 max. 25 N

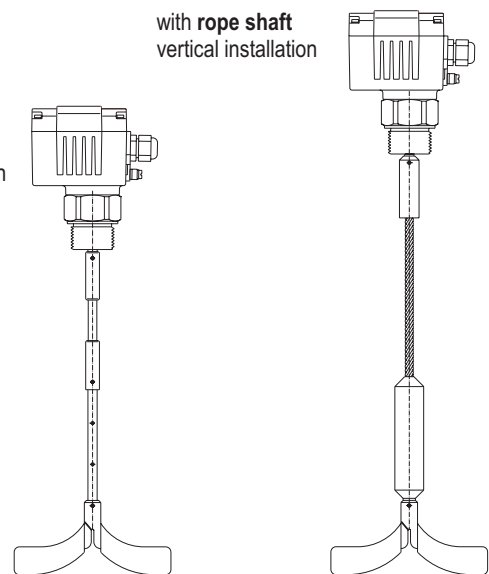


The installation of a protection roof is to be recommended when the blade assembly is subject to higher loads and stress or if it will be used as

DF11

with rope shaft
vertical installation

with pendulum shaft
vertical installation



max. permissible
traction force **1.5 kN**

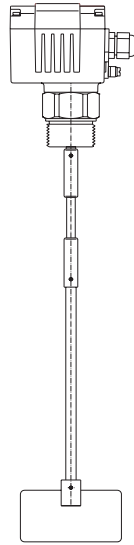
max. permissible
traction force **4 kN**

Application instructions

DF26

with **pendulum shaft**
vertical installation

max. Length > L < = 1.500 mm

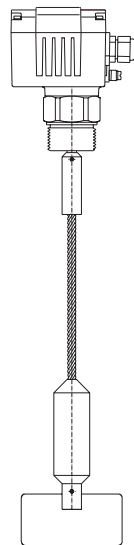


max. permissible traction force **1.5 kN** ↓

DF27

with **rope shaft**
vertical installation

max. Length > L < = 10.000 mm



Full indicator

Demand indicator

Empty indicator

with option **Z3** = reinforced axial bearing max.
permissible traction force **50 kN**

max. permissible traction force **4 kN** ↓

DF28

with **protecting tube**
vertical installation

Applicable in any mounting position up to a
length of 1,500 mm and with **KD** as option
(see below).

$L_1 = 500$ mm
 $L_2 = 1000$ mm

**Bend capacity at
the protecting tube**

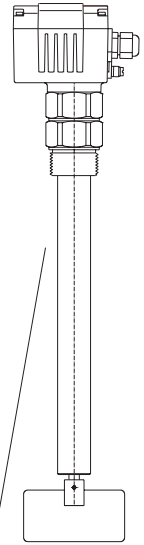
F_1 at L_1 max. **480 N**

F_1 at L_2 max. **240 N**

F_1

Deviations from vertical mounting angle up to
approx. 5° depending on length.

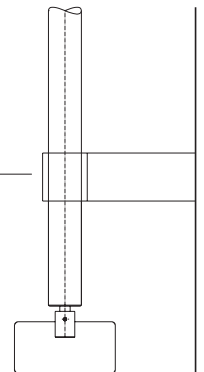
max. 5°



Support for lengths as from 2,000 mm
upwards to be recommended.

max. Length > L < = 6.000 mm

Full, demand and empty indicator



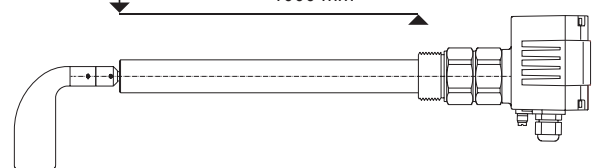
DF28

with **protecting tube**
any mounting position with **KD** option

max. Length > L < = 1.500 mm

$L_1 = 500$ mm
 $L_2 = 1000$ mm

F_1



Bend capacity at the protecting tube (Support tube)

F_1 at L_1 max. **480 N**

F_1 at L_2 max. **240 N**

Option **KD** = bearing and seal ring on tube's end

Notes