Rotary blade level indicators

Level limit switches for bulk goods

DF

Gas+ Dust

Explosion protection information

and supplement to the operating instructions

Index	Page

MOLLET

Competence in Explosion protection

Marking in accordance with ATEX 95 and DIN EN 60079-0:2009

Rotary blade level indicator as electrical device for use on the boundary from zone 20 to Zone 21.

Equivalent to **Directive 94/9/EG** (ATEX 95)

Equipment group **II** = everything except mining

Equipment category Category **1** for zone 20, 21 and 22
Category **2** for zone 21 and 22
Category **3** for zone 22

/ = Level indicators which are installed on the boundary between different zones

Type of explosive atmosphere **D** = Dust

The **Ex** -symbol according to DIN EN 60079-0

t = Protection by enclosure

a = Device with „very high" protection standard . . . . for zone 20, 21 and 22
b = Device with „high" protection standard . . . . . for zone 21 and 22
c = Device with „upgraded" protection standard . . . . for zone 22

IIIC for flammable conductive dust, flammable non-conducting dust and flammable fibres and flyings
IIIB for flammable non-conducting dust and flammable fibres and flyings
IIIA for flammable fibres and flyings

T..°C maximum surface temperature

Rotary blade level indicators as electrical devices for use in zone 1.

Equipment category Category **1** for zone 0, 1 and 2
Category **2** for zone 1 and 2

Type of explosive atmosphere **G** = Gas

d = flameproof enclosure

a = Device with „very high" protection standard . . . . for zone 0, 1 and 2
b = Device with „high" protection standard . . . . . for zone 1 and 2
c = Device with „upgraded" protection standard . . . . for zone 2

e = increased safety (terminal box)

IIC for all flammable gases
IIB for all flammable gases except hydrogen, acetylene or carbon disulphide

Temperature class **T6** = 85°C

Zone separating element as non-electrical device for use on the boundary from zone 0 and zone 20 to non-hazardous area.
for the installation of level indicators without ATEX certificate

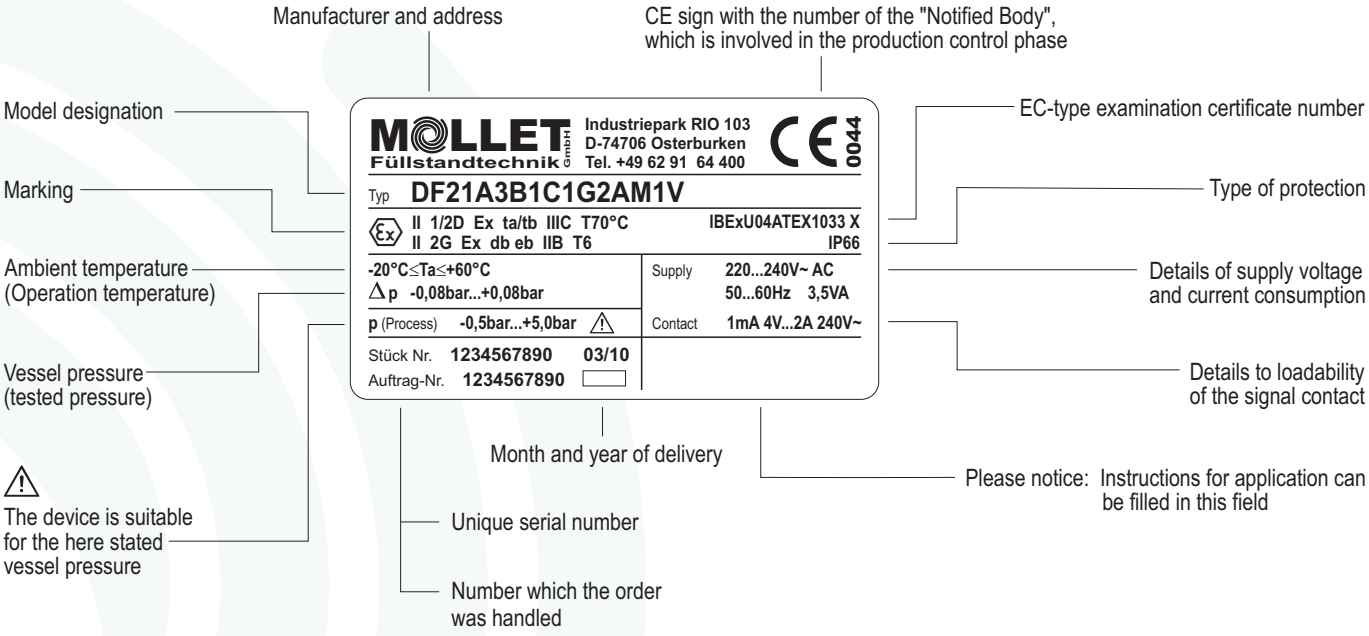
1 GD/– Device which is installed on the boundary from zone 0 and zone 20 to non-hazardous area

Type of protection **c** constructive safety

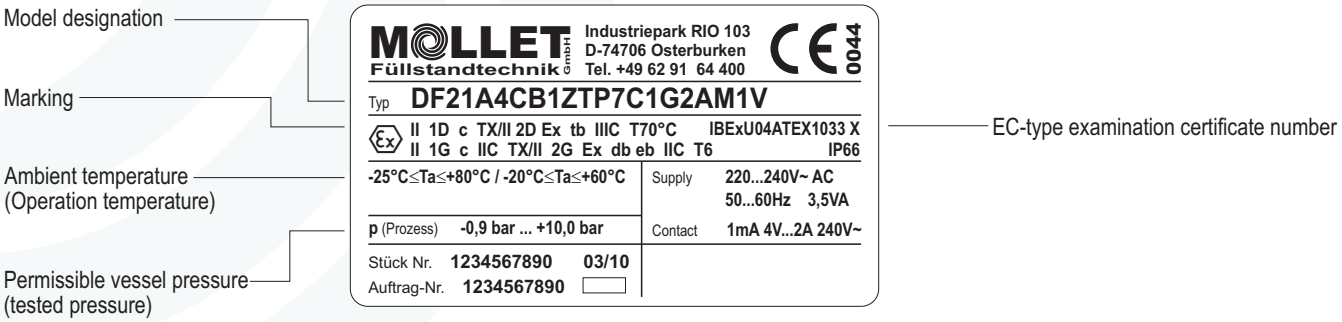
Symbol **X** behind the T hints to special temperature conditions

Type plate details Gas+Dust and hybrid mixtures

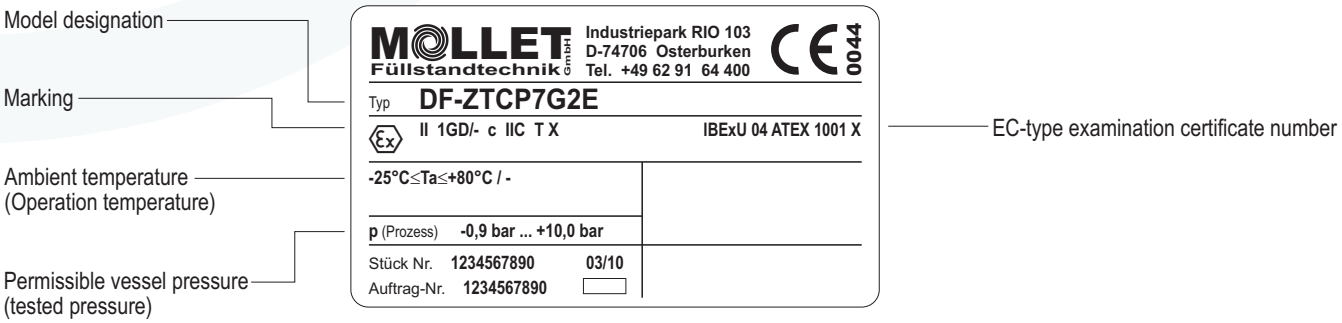
Rotary blade level indicators as electrical device for use on the boundary from zone 20 to zone 21 and for use in zone 1.



Rotary blade level indicator as electrical device for use on the boundary from zone 0 and zone 20 to zone 1 and zone 21.



Zone separating element as non-electrical device for use on the boundary from zone 0 and zone 20 to non-hazardous area.
for the installation of level indicators without ATEX certificate



Note: the **X** behind the certification number indicates special conditions for the safe application of the equipment in the appendix to the EC-type examination certificate

Equipment category appropriation by zones

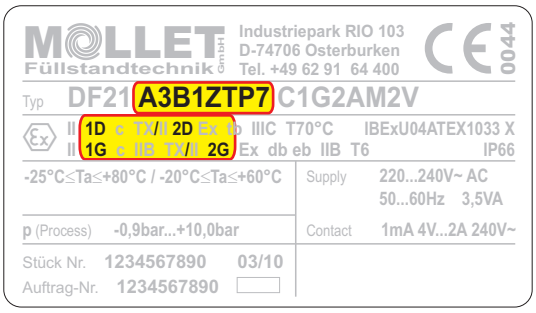
Installation on the boundary between different zones if zone 0 is inside.

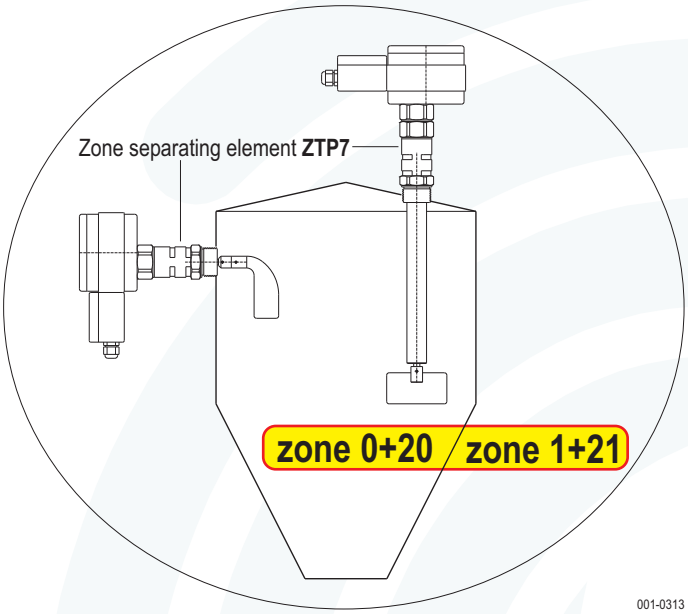
Order code **A3B1ZTP7** or **A4B1ZTP7**

Marking:

II 1D / 2D Gas+Dust

II 1G / 2G and **hybrid mixtures**





001-0313

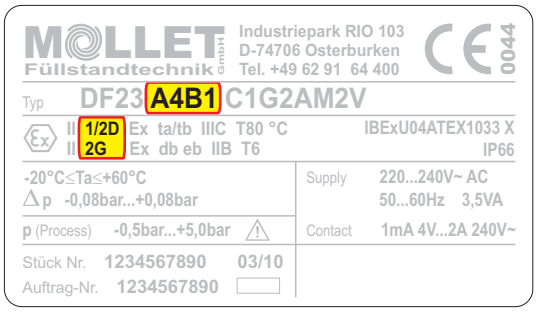
Installation on the boundary between different zones.

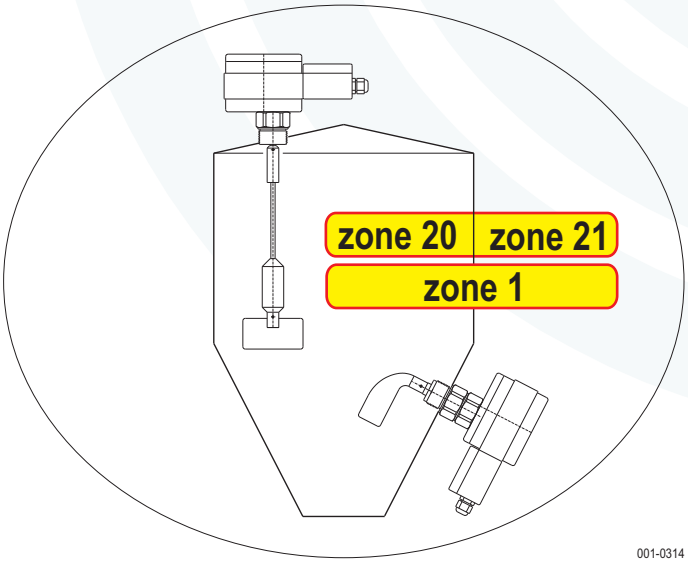
Order code **A3** or **A4**

Marking:

II 1D / 2D Gas+Dust

II 2G and **hybrid mixtures**



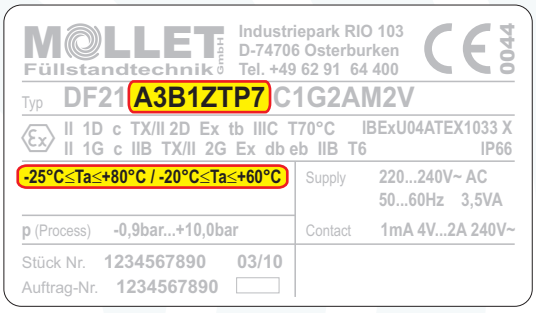


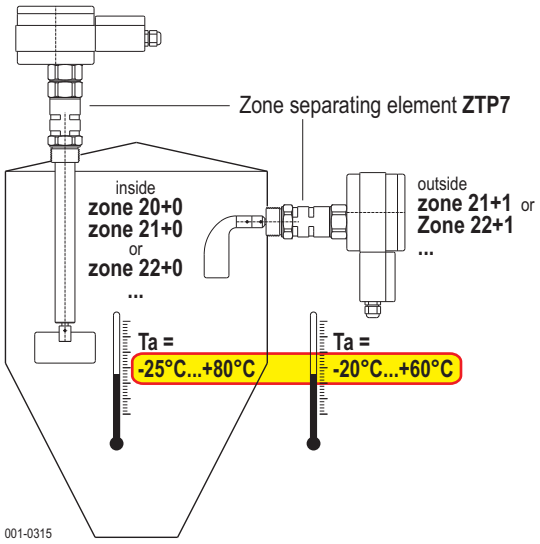
001-0314

Ambient temperatures Ta

If inside the vessel is zone 0.

The ambient temperature **Ta** defines the maximum operating temperature of the indicators.
Inside the vessel this is the air or the bulk goods temperature (Process temperature) nearby the device.





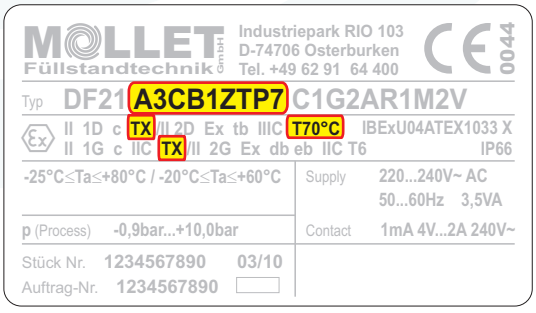
maximum surface temperature T, TX

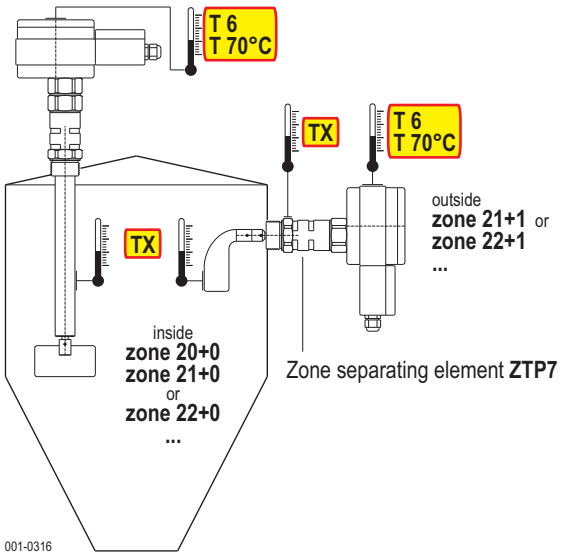
If inside the vessel is zone 0.

The maximum surface temperature means the hottest point that can occur at the equipment in the case of a fault.

Remark:

The surface temperature TX of the non-electrical part of the device (Jib and measuring blade) depends on the bulk goods temperature respectively the ambient temperature (Process temperature).
The non-electrical parts produce no hot surface by itself.

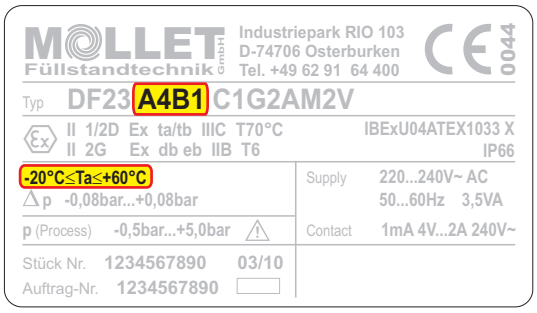


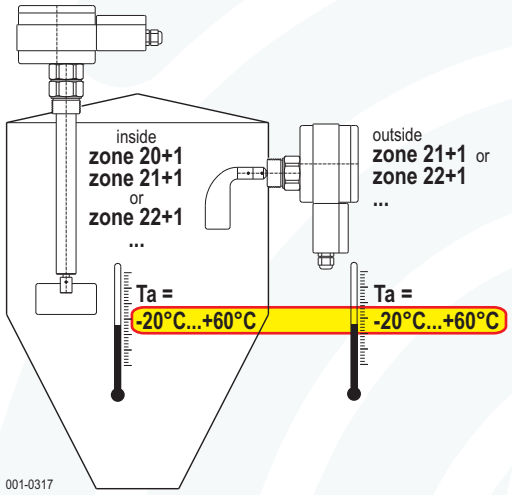


Ambient temperatures Ta

Inside process temperature, outside ambient temperature.

The ambient temperature **Ta** defines the maximum operating temperature of the indicators.
Inside the vessel this is the air or the bulk goods temperature (Process temperature) nearby the device.



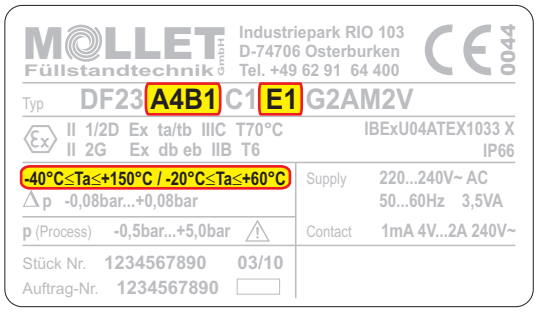


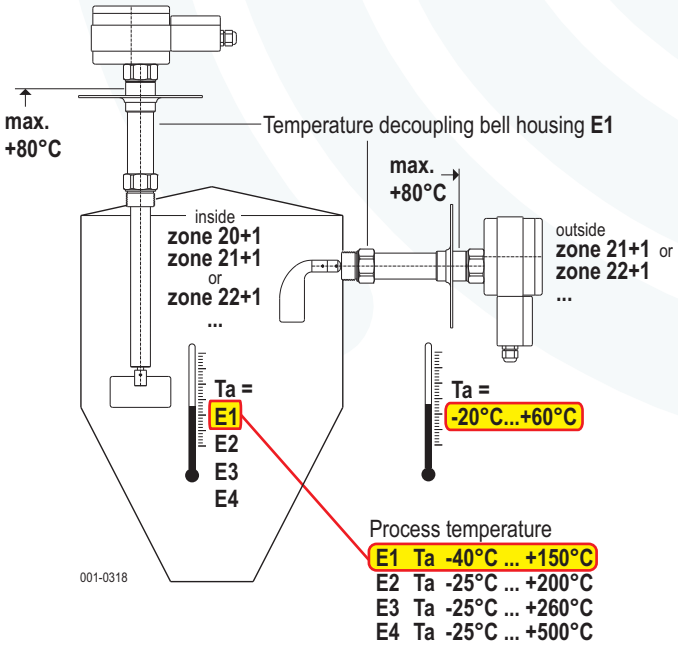
Ambient temperatures Ta

Inside high process temperature, outside ambient temperature.

The ambient temperature **Ta** defines the maximum operating temperature of the indicators.
Inside the vessel this could be the ambient and/or the bulk goods temperature and therefore the process temperature.

The temperature decoupling bell housing works as a cooling lane.
A maximum of 80 °C are allowed to reach the control head.





maximum surface temperature T

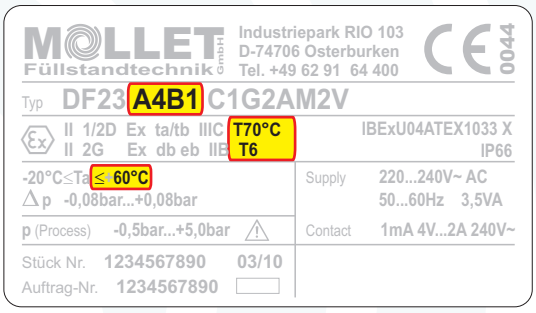
Inside process temperature, outside ambient temperature.

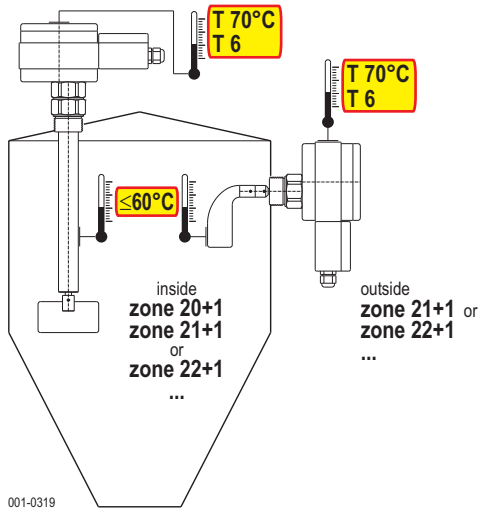
The maximum surface temperature means the hottest point that can occur at the equipment in the case of a fault.

Remark:

The surface temperature of the non-electrical part of the device (Jib and measuring blade) depends on the process temperature (Bulk goods temperature respectively the ambient temperature)

The non-electrical parts produce no hot surface by itself.





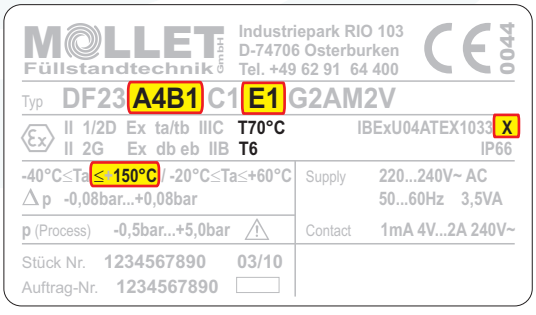
maximum surface temperature T

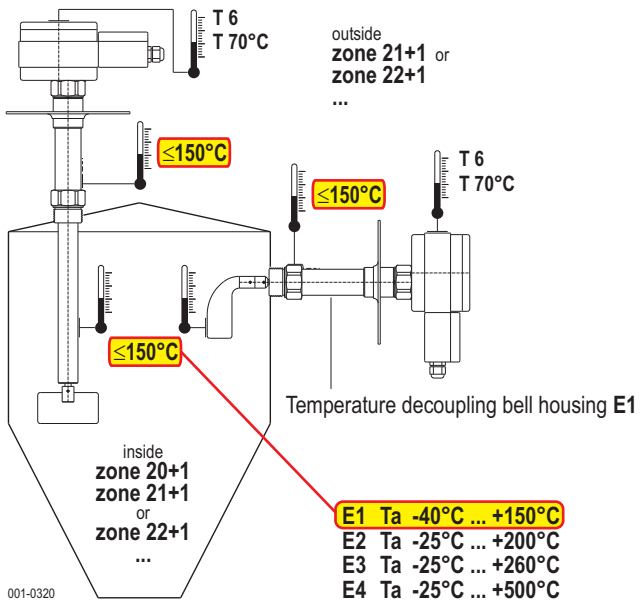
Inside high process temperature, outside ambient temperature.

The X refers to hints in the EC-type-examination certificate:

The non-electrical part of the device (Jib, measuring blade and decoupling bell housing) produces no elevation of the temperature by itself, but can transfer high temperatures from inside the vessel. Because of this reason the surface temperature has to be defined according to the process temperature (Bulk goods temperature respectively the ambient temperature) from the interior of the vessel.

The temperature decoupling bell housing works as a cooling lane and emits heat.





3

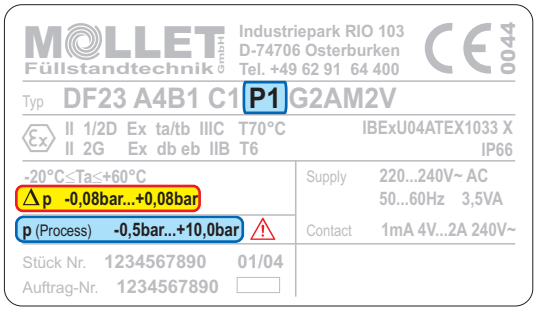
Pressure, vacuum Δp, p (Process)

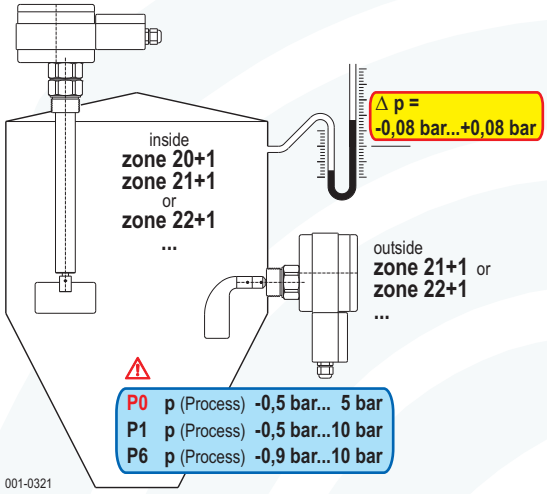
High and low pressure in the case of deviations as well as in atmospheric and in non-atmospheric conditions.

The regulations, legislation and ordinances must be strictly observed when using rotary blade level indicators in vessels with high and low pressures.

The **X** refers to hints in the EC-type-examination certificate:

The device can be installed in the walls of vessels with deviating atmospheric conditions with a difference in pressure up to 80 mbar at the shaft passage.





Please note!

The design of the devices is suitable for vessel pressures:

-0,5 bar... 5 bar in version **P0** (Standard)
-0,5 bar...10 bar in version **P1**
-0,9 bar...10 bar in version **P6**

These pressures are outside the atmospheric conditions defined by the directive 94/9/EG.

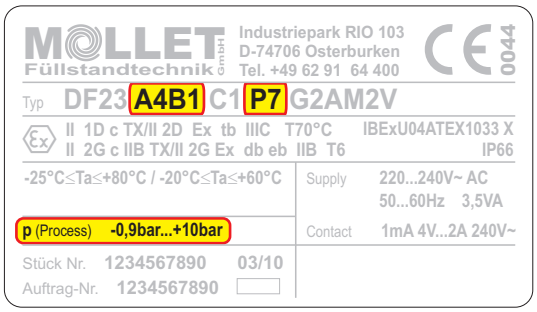
For pressures with the device models **P0**, **P1** und **P6** the EC-type-examination certificates are not valid. These devices are under the responsibility of the user (Please consider: There maybe national laws and regulations).

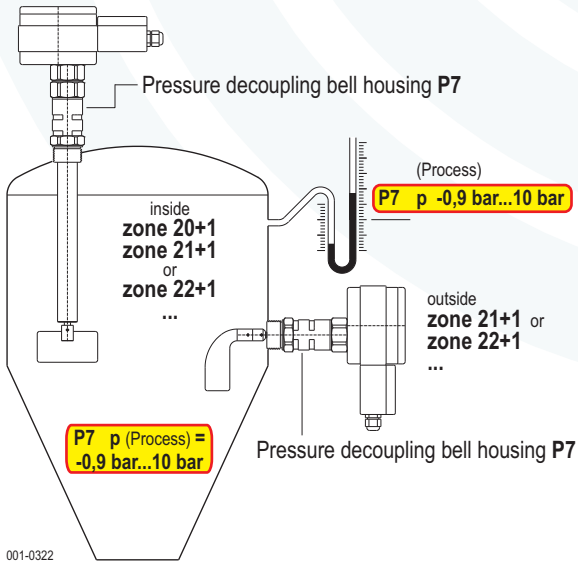
Pressure, vacuum p (Process) If inside is high process pressure.

Pressure decoupling bell housing P7

Pressure decoupling bell housings has to be used by vessel pressures above 0.08 bar.

The pressure decoupling bell housing **P7** is type examined and certificated for the use in explosive hazardous areas with pressures from -0.9 bar up to 10 bar.



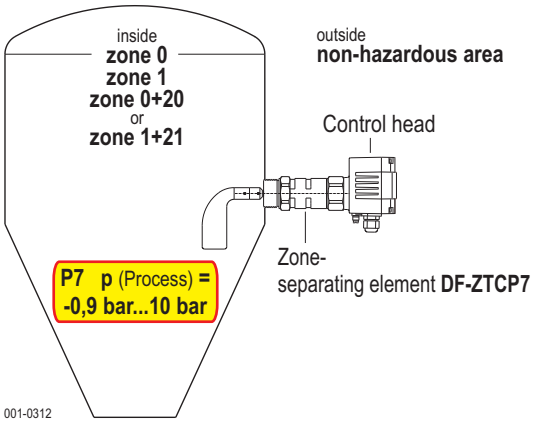


Zone separating, pressure and vacuum p (Process)

Inside the vessel zone 0 or zone 1, outside non-hazardous are, separation of the zones by zone separating element DF-ZTCP7.

The explosive hazardous area and the vessel pressure are separated from the non-hazardous area outside by the type examined zone separating element.

Within the non-hazardous area outside the vessel the control head can be used without ATEX certificate.



1. Special conditions and instructions for safe application

1.1 The installation, maintenance, initial operation, removal and repair have to be controlled resp. checked by an “authorized person” for explosion protection.

1.2 Take notice of the requirements of DIN EN 60079-14, DIN EN 60079-17 and DIN EN 1127-1, especially regarding the dust deposits and temperatures and follow the pertinent rules and regulations.

1.3 As soon as the device will be brought into the explosion hazardous area it has to be mounted immediately at the precaused place and a cable has to be brought into the cable gland.

1.4 Using the device in ambient temperatures > +60 °C, the applied connection cables have to be made for temperatures of min. +80 °C.

1.5 To secure the type of protection, the screw nut of the cable gland has to be fixed at the installation with a torsional force of min. 5.0 Nm.
ATTENTION! If it will be fastened too strong, the IP-protection can be affected.

1.6 Take notice of the specifications on the data plate.

1.7 The earth connection of the device has to be installed in such a way that mechanical damage will be excluded.

1.8 The level indicators may only be supplemented by such non-electrical components (Jib and measuring blade) which are in accordance with the demands of the directive 94/9/EC.

1.9 The maximum difference in pressure at the shaft passage must not exceed 80 mbar and the working temperature on the shaft seal must not exceed +80 °C, when installing level indicators in the silo wall under deviating atmospheric conditions.

1.10 In zone 0 or when flammable dust with a minimum ignition energy under 3 mJ or a minimum ignition temperature under +300 °C (BAM assessment) are presence, than the process connection, jib and measuring blade must be made of stainless steel.

1.11 If combustible gases and vapours of group IIC are present, sealing rings R0 and R2 must not be used.

1.12 The plastic measuring blade TK 150 must not be installed.

1.13 The X behind the EC-type-examination hint to special operation conditions:

The rotary blade level indicators DF with housing types A3 and A4 is approved for the use in hybrid mixtures.
Hybrid Mixtures according to the ATEX - directive hybrid mixtures are combustible dusts by simultaneous presence of combustible gases, vapours and fogs.

Installation in the interior of vessels or roams in which combustible gases, vapours and fogs or hybrid mixtures are present.

Equipment category appropriation by zones.

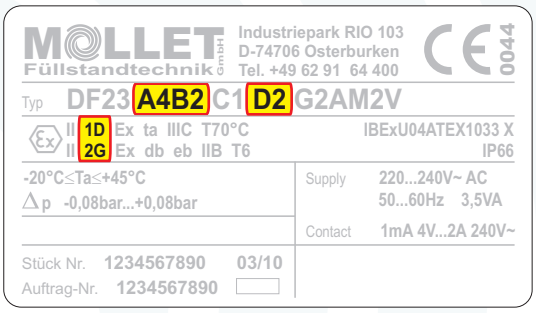
Installation in vessels if inside zone 20 and zone 1 are present.

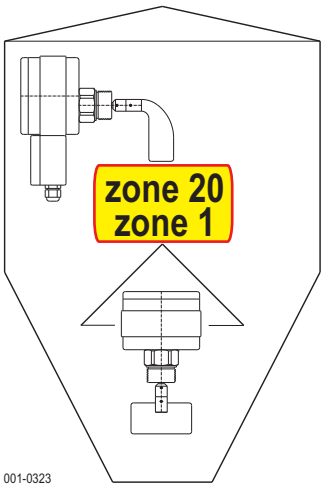
Order code A3B2..D2 or A4B2..D2

Marking:

II 1D Gas+Dust

II 2G and hybrid mixtures





Ambient temperature Ta
maximum surface temperature T
Pressure, vacuum Δp, p (process)

see the back page

II 1D
II 2G

3. Additional special conditions and instructions for safe application regarding the models DF..A3B2 and DF..A4B2

3.1 It must be ensured that the measuring blade is always covered with material before the control head housing by selecting an appropriate installation position.

3.2 If the level indicator DF is completely installed within the zone 20 and combustible dust with a minimum ignition energy under 3 mJ or a minimum ignition temperature under +300 °C (BAM assessment) exists, then the control head housing must be made of stainless steel.

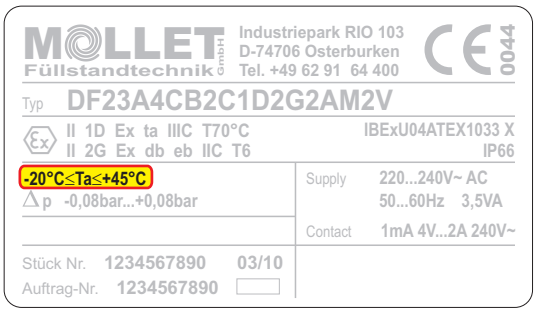
3.3 By means of an appropriate circuit it must be ensured that the level indicator is completely disconnected from the main power supply when the temperature cut-out responds and an automatic restart is prevented.

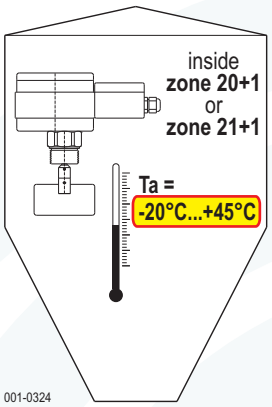
3

Ambient temperature Ta

If the device is installed inside the vessel.

The ambient temperature **Ta** defines the maximum operating temperature of the indicators.
Inside the vessel this is the air or the bulk goods temperature (Process temperature) nearby the device.

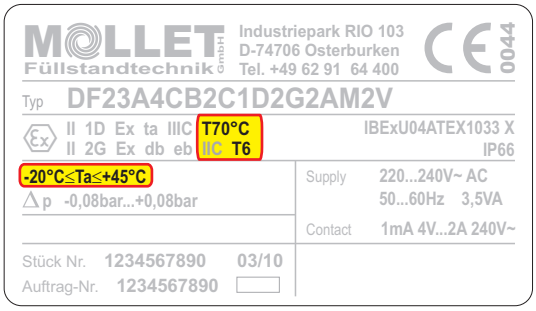


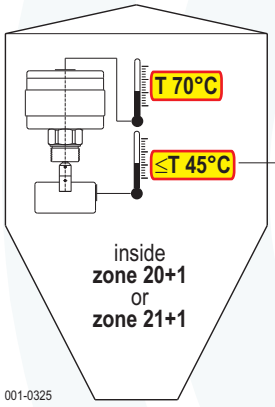


maximum surface temperature T

If the device is installed inside the vessel.

The maximum surface temperature means the hottest point that can occur at the equipment in the case of a fault.





Remark:

The surface temperature of the non-electrical part of the device (Jib and measuring blade) depends on the bulk goods temperature respectively the ambient temperature (Process temperature).

The non-electrical parts produce no hot surface by itself.

Pressure, vacuum Δp, p (Process)

If the device is installed inside the vessel.