



Rotary blade level indicators Level limit switches for bulk goods





Explosion protection information

and supplement to the operating instructions

Index	Page
Marking in according to ATEX and DIN EN IEC 60079-0	2
Details on type plate	3
Equipment category appropriation by zones	4
Ambient temperature Ta, maximum surface temperature	5
Ambient temperature Ta	6
Maximum surface temperature	7
Pressure, vacuum Δ p, p (process)	8
Zone separating, pressure and vacuum, outside non-hazardous-area	9
Special conditions and instructions for safe application	0
Complete installation inside the vessel	11



Competence in Explosion protection



Marking in accordance with ATEX and DIN EN IEC 60079-0

Rotary blade level indicator as electrical device for use on the boundary from zone 20 to Zone 21. **ⓑ** II 1/2 D Ex ta/tb IIIC T70°C Da/Db Equivalent to valid ATEX-Product-Directive Equipment group II = everything except mining Category 1 for zone 20, 21 and 22 Category 2 for zone 21 and 22 Equipment category = Level indicators which are installed on the boundary between different zones **D** = Dust - Type of explosive atmosphere The Ex -symbol according to DIN EN IEC 60079-0 **t** = Protection by enclosure Device with "very high" protection standard. . . . for zone 20, 21 and 22 **b** = Device with "high" protection standard..... for zone 21 and 22 -IIIC for flammable conductive dust, flammable non-conducting dust and flammable fibres and flyings T..°C maximum surface temperature **Equipment Protection Level (EPL) D** = Dust - Type of explosive atmosphere a = Device with "very high level of protection" for use in potentially explosive atmospheres where in normal operation, foreseeable or infrequent faults/malfunctions no ignition hazard is given. **b** = Device with "high level of protection" for use in potentially explosive atmospheres where in normal operation or foreseeable faults/malfunctions no ignition hazard is given. Rotary blade level indicators as electrical devices for use in zone 1. **EXECUTE** II 2G Ex db eb IIC T6 Gb Equipment category Category 2 for zone 1 and 2 — **G** = Gas - Type of explosive atmosphere -= flameproof enclosure ${f b} = {f Device}$ with "high" protection standard. for zone 1 and 2 $\,-\,$ e = increased safety (terminal box) for all flammable gases for all flammable gases except hydrogen, acetylene or carbon disulphide Temperature class T6 = 85°C -**Equipment Protection Level (EPL) G** = Gas - Type of explosive atmosphere **b** = Device with "high level of protection" for use in potentially explosive atmospheres where in normal operation or foreseeable faults/malfunctions no ignition hazard is given. Zone separating element as non-electrical device for use on the boundary from zone 0 to non-hazardous area. for the installation of level indicators without ATEX certificate Ⅲ 1G/- Ex h IIC T6 Ga/-1 G/- = Device which is installed on the boundary from zone 0 to non-hazardous area **Ex h** = Protection by constructive safety -**T6** Temperature class **T6** / no self-heating of the device **Equipment Protection Level (EPL) G** = Gas - Type of explosive atmosphere a = Device with "very high level of protection" for use in potentially explosive atmospheres where in -

normal operation, foreseeable or infrequent faults/malfunctions no ignition hazard is given.

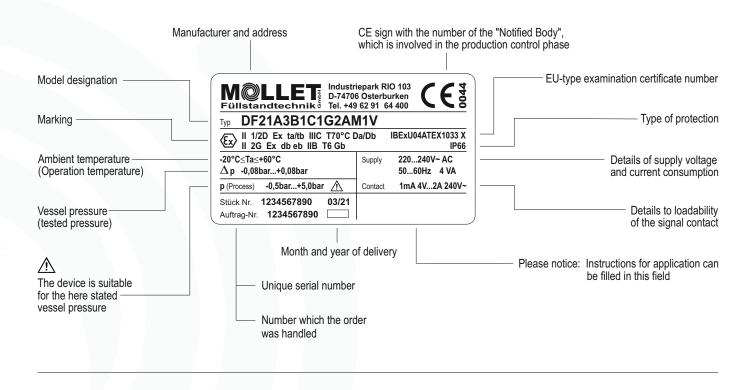




Type plate details

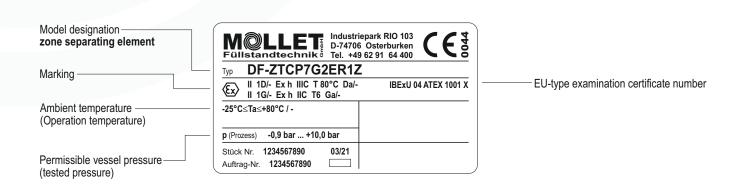


Rotary blade level indicators as electrical device for use on the boundary from zone 20 to zone 21 and for use in zone 1.



Rotary blade level indicator as electrical device combined with zone separating element as non-electrical device for use on the boundary from zone 0 to zone 1 and from zone 20 zone 21.





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



Equipment category appropriation by zones

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

Marking:

II 1D / 2D

Gas+Dust (Ex)

II 1G / 2G

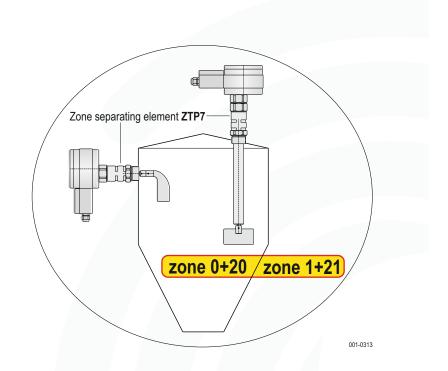
and hybrid mixtures

Device - order code A3B1 or A4B1



Zone separating element - order code ZTCP7





Installation on the boundary between different zones.

Order code A3 or A4

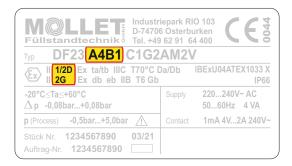
Marking:

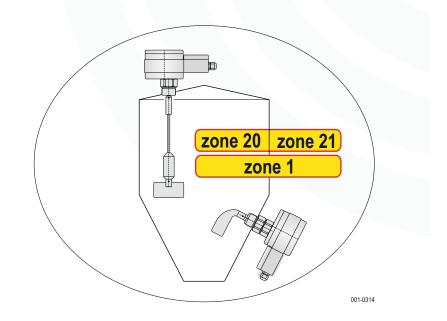
II 1D / 2D

Gas+Dust Ex

II 2G

and hybrid mixtures







Ambient temperatures Ta If inside the vessel is zone 0.

The ambient temperature **Ta** defines the maximum operating temperature of the indicators.

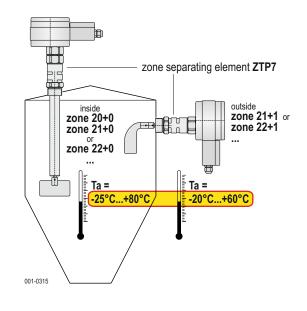
Inside the vessel this is the air or the bulk goods temperature (process temperature) nearby the device.

Device



Zone separating element





Maximum surface temperature

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

Device



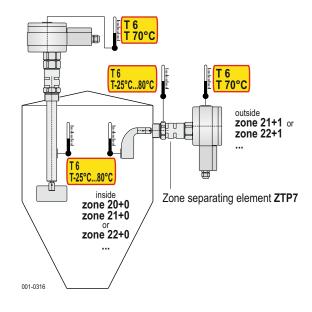
Zone separating element



If inside the vessel is zone 0.

Remark:

The surface temperature T 80°C or T6 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.





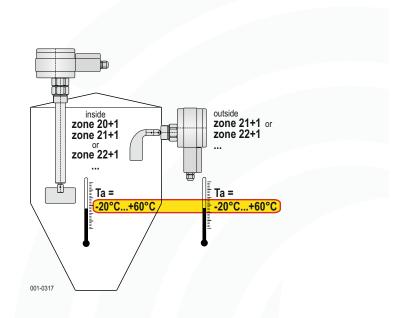
Ambient temperatures Ta Inside process temperature, outside ambient temperature.

The ambient temperature Ta defines the maximum operating temperature

Inside the vessel this is the air or the bulk goods temperature

(Process temperature) nearby the device.



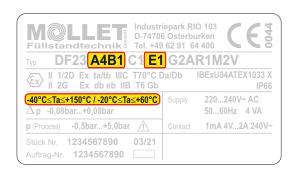


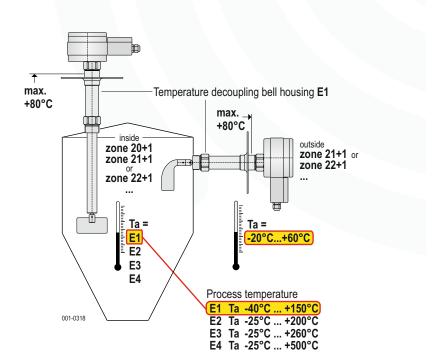
Ambient temperatures Ta Inside high process temperature, outside ambient temperature.

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.

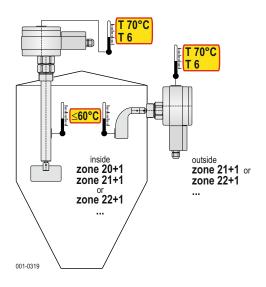
The maximum surface temperature means the hottest point that can occur at the equipment in the case of a fault.

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.



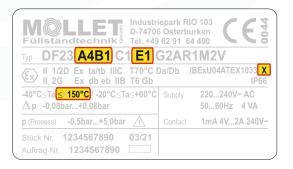


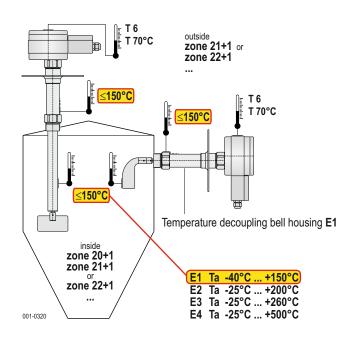
Maximum surface temperature T Inside high process temperature, outside ambient temperature.

The X refers to hints in the EU-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.







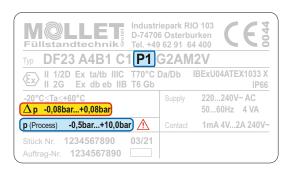
Pressure, vacuum Δ **p, p**(Process)

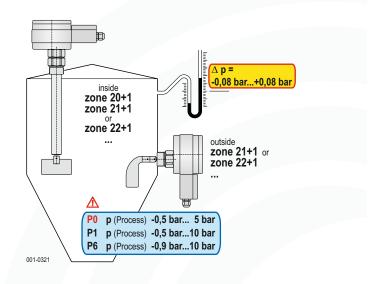
High and low pressure in the case of deviations as well as in atmospheric and in non-atmospheric conditions.

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 EU-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 2014/34/EU .

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

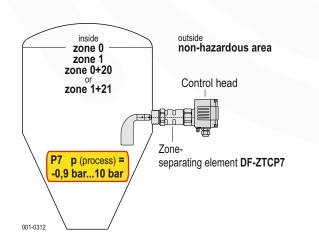
Zone separating, pressure and vacuum p(Process)

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.







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 $0.08\ \mathrm{bar}.$

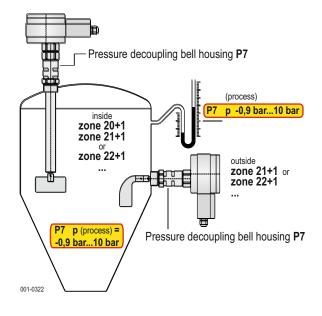
The pressure decoupling bell housing **P7** is type examined and certificated for the use in explosive hazardous areas with pressures from -0.9 bar up to 10 bar.

Device



Pressure decoupling element











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 2014/34/EU.
- 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 EU-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.

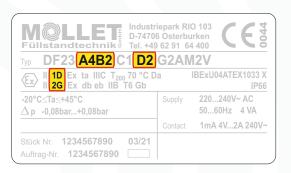
Order code A3B2..D2 or A4B2..D2

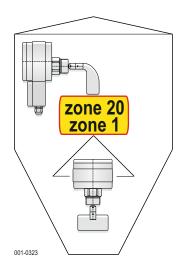
Marking:

Gas+Dust (Ex)

II 1D II 2G

and hybrid mixtures





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

see the back page



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.

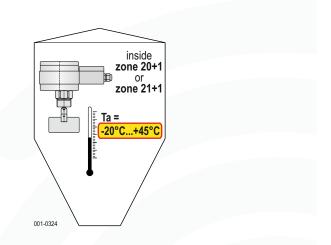


Ambient temperature Ta If the device is installed inside the vessel.

The ambient temperature ${\bf Ta}$ defines the maximum operating temperature of the indicators.

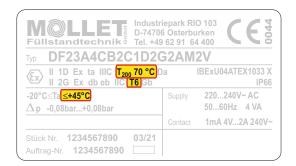
Inside the vessel this is the air or the bulk goods temperature (process temperature) nearby the device.

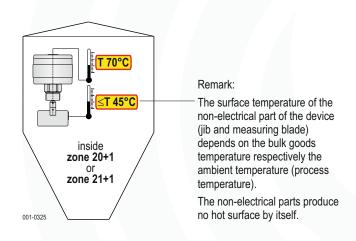




maximum surface temperature T If the device is installed inside the vessel.

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





Pressure, vacuum Δ **p, p** (Process) If the device is installed inside the vessel.



