



continuous level measuring for bulk goods

# **Appliance information**

**MOLOS** 

MWF

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# **M@LLET** measures filling level

**ATEX** option

B1 Dust

✗ II 1/2D Ex ta[ia]/tb IIIC T86 ℃





nlV

#### Application (Intended use)

Continuous level measurement with integrated limit level detection for almost all bulk goods.

Independent from changing process characteristics as e.g. bulk density, conductivity, temperature, pressure, moisture and dusty milieu. Usable in small vessels just as in big silos, also with difficult vessel geometry or nearby disturbing appliances.

### **Mode of operation**

High-frequency electromagnetic impulses with low energy were generated by the sensor electronic and propagated along the probe. When these impulses hit the surface of the bulk goods, a part of the impulse energy will be reflected back up the probe to the electronic. The level will be calculated by the time difference between the impulses send and the impulses reflected and will be provided as a continuous measurement reading through its analogue output. A freely positionable switching output signal can be set.

# **Technical data**

Material Housing A1	Aluminium, coated RAL 7001
Housing A2	Stainless steel 1.4408 / 316
Process connection	Stainless steel 1 4571 / 316 Ti
Flange <b>F1</b> F70	1.4571 / 316 Ti or aluminium
Flange <b>F2</b> F100	1.4301 / 304 or aluminium
Coupling sleev	Stainless steel 1.4571 / 316 Ti
Rope	Stainless steel 1.4401 / 316
Rod	Stainless steel 1.4571 / 316 Ti
Tensioning weight	Stainless steel 1.4571 / 316 Ti
Hexagonal nut	<b>G3</b> 1.4571 / 316 Ti or 1.4301 / 304
Wire rope probe Probe length [LS]	Ø 6 mm with tensioning weight Ø 30 mm 1.0 m 20.0 m
Rod probe	Ø 6 mm
Probe length [LW]	0.5 m 3.0 m
Tolerance of the lengthen [L]	± 10 mm

#### **Electrical data**

Supply voltage	UN	12 30 V DC		
	- 11	(reverse-polarity protected)		
Analog output signal	II I <sub>N</sub>	4 20 mA (0 100 %) <b>Output</b> active current output		
Switching output	Us	0 UN DC PNP (active) NC or NO (selectable) Factory setting NC		
Lo	ad current	$\leq$ 200 mA HIGH = U <sub>N</sub> - 2 V, LOW = 0 V 1 V		
Power consumption		<70 mA with 24 V DC (no burden)		
Start-up time		<6 sec		
Response time		<100 ms		
Connection clamps		0.5 - 2 mm <sup>2</sup> , screwless		
Cable entry		Cable gland M20x1.5		
Protection class		I 🕀		
Type of protection	IP	IP66 and in the vessel intrinsically safe "ia"		

# Construction



The **MWF** consists of three components:

- the housing with the sensor electronic,
- the process connection with the feed through,
- the probe mounted on the feed through

Three probe types are deliverable:

- 27 wire rope probe with tensioning weight for all silos and vessels
- 21 rod probe, rigid for small vessels and bulk goods which exert low lateral forces at the probe

The high-frequency measuring signal will be transmitted by the sensor electronic through the feed-through to the probe in the bulk goods vessel and returned.





# Sealing face of thread Reference point [R] 120 inactive area 20 mA [oMG] adjustable 0 ... 100 % Filling level [F] Switch-points freely positionable inside the measuring range [M] Maximum measuring range Upper switch-point [oSA] Measuring range [M] Probe length [L] Lower switchpoint [uSA] adjustable 4 mA [uMG] 1 4 † inactive area 150 002-1001



#### **Technical measuring data**

Probe length [L]	Reference point <b>[R]</b> to end of probe max. measuring range < probe length		
Inactive area	wire rope rod		
below	150 mm 10 mm		
top	120 mm 120 mm		
Measuring range (analog) [M]	4 mA lower current value [uMG] 20 mA upper current value [oMG]		
Factory setting [uMG] 4 mA	Top edge tensioning weight		
Factory setting [oMG] 20 mA	depending on probe length for bulk goods: up to 3.0 m at 0.3 m up to 5.0 m at 0.4 m up to 10.0 m at 0.6 m up to 15.0 m at 0.8 m up to 20.0 m at 1.0 m beneath reference point [R] or depending on customers request		
Switch-points [oSA] [uSA] (digital)	freely positionable inside measuring range [M] with switch-hysteresis - upper and lower switch-point freely selectable - minimum distance 3 mm		
Factory setting	at 20% of probe length [L] below [R]		
Measuring accuracy	$\pm3~\text{mm}$ or max. 0.03 % of the measuring data		
Repeatability	<2 mm		
Resolution	<1 mm (at reference conditions)		
Temperature drift	<0.2 mm/K		
Measureable changes of filling level	<1 m/s		

#### **Application data**

Dielectric constant	[ <b>ɛ</b> r]	>1.8 (below 1.8 on	request)
Ambient temperature	Та	-20 °C +70 °C	Ta
Bulk goods temperature with order code E0 with order code E1	Ts Ts	-20 °C +70 °C -40 °C +150 °C	<b>T</b> (Process)
Pressure in container	р	-1 bar 40 bar	<b>P</b> (Process)

MOLLET D-74706 Osterburken Tel. +49 6291 6440-0 Fax +49 6291 9846 Appliance information 03/20 © by MOLLET

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#### **Maximum forces**



Wire rope probe	[LS]	maximum tractive force	$F_1 = 10 \text{ kN}$	
Rod probe	[LW]	maximum side load	$F_2 \times LW = 6 Nm$	

#### Dimensions



Probe length		
Wire rope probe	[LS]	1.0 m 20.0 m
Rod probe	[LW]	0.5 m 3.0 m

#### **Process connection - thread**

Thread code	Thread	) )	
G1I	G1	46	
G2I	G1¼	50	Delivery incl. Seals
G3I	G1½	55	/

#### **Hexagonal nuts**





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#### **Process connection - Flanges**





	Flange	D	в	Α	F	LK	d	Quantity
F1A	F70	110	8	69	10	90	9	4
F1E	F70	110	8	69	10	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
Delive	ery incl. Gaskets							

#### Process connection - Flange F2





Delivery incl. Gasketsl





# **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 vessels are changed.

Coupling size	Dairy coupling DN 50 / 2
Material Conical adapter Groove nut	1.4571 / 316 Ti 1.4404 / 316 L
Container pressure	-0.9 bar 10 bar <b>p</b> (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 vessels are changed.

Clamp size	DN 50 / 2
Material	1.4571 / 316 Ti
Container pressure	-0.9 bar 10 bar <b>p</b> (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.





#### Weather protection hood SH



#### Protection from condensation SDK



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	Sealings	Polyamide VITON
Connection thr	M20	
Type of protect	ion	IP66



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#### **Choice of mounting position**



If possible place the probe so that a space remains:

The probe must not touch metallic walls and bottoms. Exception: Probe will be fixe			

By spaces [C] [D] <300 mm a disturbance signal suppression has to be done.

#### Filling level [F]

If possible choose measuring height (mounting position) so ( $\sim \frac{3}{4}$  to  $\sim \frac{1}{4}$ ), that the proportion of volumes of the filling cone and the discharge hopper will be vaguely equalized.

## **Protection from impacting bulk goods**



Choose the mounting position in that way the probe will not be hit by the filling flow rate.



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#### **Protruding nozzle**



Protruding nozzle diameter	[G]	$\geq$ 100 mm
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Protruding nozzle height [H] ≤200 mm

Smaller diameters and heights >200 mm could restrict the measuring capability.

By use of thermally insulated vessels the nozzle should be also insulated in order to avoid condensation.

The protruding nozzle should be short and inside flush with the silo roof.

#### Installation in silos made of concrete



By mounting in a concrete floor the process connection should aligned with the bottom edge of the floor.

In concrete silos if possible a distance **[A]** of minimum 500 mm between concrete walls and the probe should be kept. Optimal is 1000 mm.

#### Wire rope probe locate



Fixing of the probe can be necessary if:

- vibrations can bring the probe to swing
- the probe touch at times the silo walls, the cone, installations or other metallic parts
- the probe is closer than 500 mm to a concrete wall

For fixation a thread M12 is provided in the lower end of the tensioning weight.

The probe should hang loose to avoid to high tension loading and the danger of rope break and

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either reliable earthed or reliable insulated.



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#### **Electrical connection**

#### **Connection picture**





002-AP04

#### **Potential compensation**

002-AP05



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