

Operating Instructions MBA700

Level measurement with vibrating paddle



Installation
Operation
Maintenance



Operating instructions MBA700

Status: 2022-05-25
Product Description: MBA700
Hardware: all versions
Manufacturer: MBA Instruments GmbH
Friedrich-List-Str. 7 · 25451 Quickborn · Germany

Quoted product characteristics and technical data do not constitute guaranteed declarations. © MBA Instruments GmbH. All rights reserved. Subject to change

For the purpose of safeguarding and guaranteeing the function of this device it is essential to read through these operating instructions carefully prior to assembly and commissioning!

Application

The MBA700 serves to monitor the limit level of all types of container and silo, which are filled with powder-type or granulated bulk goods. Typical materials are plastic granulate, all types of pellets, flour, cement, clay powder and many more besides. The device is intended for use with fixed installations in industrial plants (large tools).

General instructions:

- The installation, commissioning and maintenance must be carried out by qualified specialist personnel and with consideration to the local regulations.
- The devices must be utilised exclusively in accordance with the intended uses described in these operating instructions.
- In addition to the operating instructions it is necessary to observe all local laws, technical regulations and internal company operational instructions.
- The MBA 700 is a measuring device. As with all measuring devices, the MBA 700 must be handled with care. Mechanical damage can affect the measuring results or lead to a failure of the device.
- Do not remove, add or modify parts of the device. Otherwise any guarantee provided by the manufacturer and the approval for use in areas at risk of explosion shall be voided.
- Observe the specifications regarding voltage and temperature on the type plate.

Function

The signal from the electronic circuit of the MBA700 excites the blade of the instrument to vibrate on its resonance frequency of 290 Hz. When material covers the blade of the probe, the vibration stops. This is sensed by the electronic circuitry which forces its output to switch. When the blade gets uncovered, the vibration restarts and the output switches back.

Use in potentially explosive areas – ATEX:

- Check the device for ATEX approval using the type plate and accompanying documents.
- Observe the regulations of the ATEX approval.
- Install equipotential bonding.
- Prevent sparking in the container from striking metal parts.
- Carry out the installation in accordance with standard EN 61241-14

Electrical connection:

- The electrical connection of the devices may only be carried out by a qualified electrician.
- Only use connection cables that are suitable for the cable entries. The devices may only be operated if the cables for power supply and output signal are permanently installed.
- During operation, the device head and cable entry must be closed.
- Before opening the housing and making the electrical connection, make sure that all lines are de-energized.
- In order to ensure protection class 1 of the devices, it is absolutely necessary for supply voltages >50V that a protective conductor is connected to the housing.

- In accordance with DIN EN 61010-1, a main switch must be installed near the device, which is made visible as such and with which the power supply to the device and the relay circuit can be interrupted.
- If the power supply and relay contacts are not fed from the same mains, the connection strands for the supply voltage and relay contacts must be bundled separately with cable ties to prevent a conductor of the supply voltage from coming into contact with a terminal of the relay output in the event of a fault (e.g. cable break) and vice versa.

Versions:

- Standard configuration: Installation depth approx. 190 mm
- Welded pipe extension: Installation depths to 2.0 m
- Screwed pipe extension: Installation depths to 4.0 m
- Extension with suspension cable: Installation depths to 20.0 m

Technical data

Housing: Aluminium die cast, protection class IP65
One (optionally 2) cable entry M20x1.5 for cable diameters of 6 to 12 mm

Sensor: Stainless steel 1.4301 / AISI 304
Resonance frequency 290 Hz

Process connection: Thread 1½" DIN2999 (BSPT) or 1½" NPT

Time delay: 1 second after vibrations stop
2 to 5 seconds from the start of vibrations

Display: LED on electronic insert
(optionally visible externally)

Density of bulk goods: min. 20 g/litre
in special configuration up to min. 10g/l
Tensile strength of cable: max. 200 kg (with cable extension)

Pressure in container: max. 10 bar

Safety: Protection class I, overvoltage category III,
degree of contamination 2 max. height 2000m

Electronics

Multi-voltage electronics with relay output

Supply voltage: 22 ...250V AC/DC

Relay output: One (optionally 2) potential-free changeover
max. AC: 250V, 8A, 2000VA, $\cos \varphi = 1$
max. DC: 8A at 24V, 1.5A at 48V
min. DC: 24V / 100mA

Power consumption: ≤3VA

3-wire DC-Version with transistor output

Power Supply: 24V-DC ±10%

Transistor: potential free, NPN or PNP type
350mA @ 24V-DC, shorttime max. 1A, max. power 20W, power loss max. 3V, max. leakage current 100µA, short circuit proof

power consumption: < 1 VA (blocked transistor)

max. lead diameter for power supply and output signal: 2,5 mm²

cable glands for cable Ø 7...13mm

CE- Conformity

See: Certificate of Conformity

Permissible temperatures:

	Standard sensor	High temperature sensor
Process temp.	-40...+80°C	--15 .. +150°C
Ambient temp. housing	-40...+70°C	-15...+70°C
Ambient temp. housing with ATEX	-20...+70°C	-15...+60°C

Installation

The following must always be observed when installing the MBA 700:

- The switching point is dependent on the density of the bulk goods: With heavy bulk goods such as sand it is sufficient for only the tip of the vibrating rod to be covered, in order to damp the vibrations. In contrast, with very light materials the entire vibrating rod must be covered in order that the output actuates.
- The MBA 700 must be installed such that the sensor does not protrude into the filling flow.
- In order to keep the ambient temperature of the electronics within the permissible range of a max. 70°C, the housing should be protected against direct solar radiation. If necessary erect a shade.
- If the temperature outside the container close to the container wall exceeds 70°C as a result of the high temperature of the filling material then the container wall must be insulated against the housing. Alternatively, the electronic equipment can be installed in a separate housing or a temperature adapter may be used (special models can be supplied).
- In the event of strong container vibrations, caused for example by a vibrator, the electronic equipment should be installed in a separate housing (special models can be supplied).

Lateral installation

- The MBA 700 is suitable for lateral installation. In the case of devices with sensor extensions it may be necessary to support the extension pipe.
- With lateral installations it is recommended that the sensor be installed at an approx. 20° downward angle in order that the filling material can flow downward with ease and no deposits accumulate on the sensor.
- The sensor must be installed such that it is not reached by the filling flow of the medium and cannot be damaged in this way. However, if the installation site is reached by the flow, the sensor must be protected against damage by a suitable guard plate. This type of guard plate must always be installed if the device is to be used in the bottom section of a container as a minimum level alarm.
- The installation takes place by screwing the connection piece into the intended sleeve with the aid of a 50 mm open-ended wrench.
- The screwed connection must be sealed with conventional sealant, e.g. Teflon tape.
- With a lateral installation it is necessary to ensure that the surfaces of the vibrating rod are vertical so that the filling material can flow downward with ease and is not deposited on the vibrating rod, triggering an erroneous alarm. The vertical positioning of the vibrating rod is displayed by the two markings in the hexagon of the connection piece. These indicate – top and bottom – when the surfaces are vertical (see figure: Installation examples).

Orientation of the cable glands:

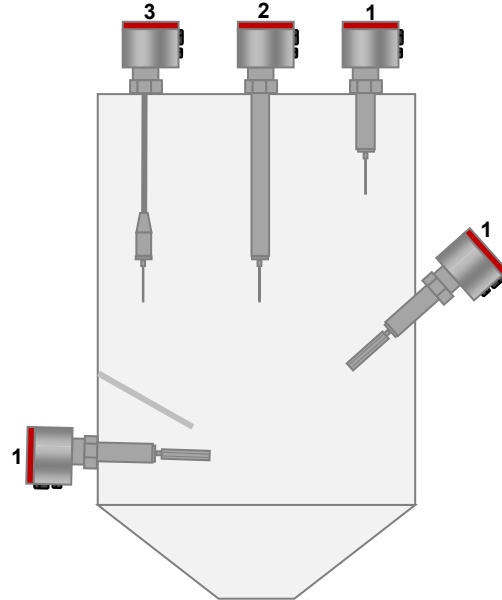
- When the device is screwed in, make sure that the cable glands point downwards to prevent moisture from penetrating the cable glands into the housing:
- Loosen the fastening screw on the side of the housing.
- Turn the housing until the cable glands point downwards
- Tighten the fastening screw again, torque 3 Nm
- Put on the housing cover and screw tight.

Vertical installation

A vertical installation is possible with all versions of the MBA 700 and takes place as described with the lateral installation. The version with cable extension can only be installed vertically.

Installation examples:

1. Short immersion depth
2. Pipe extension
3. Cable extension



Electrical connection

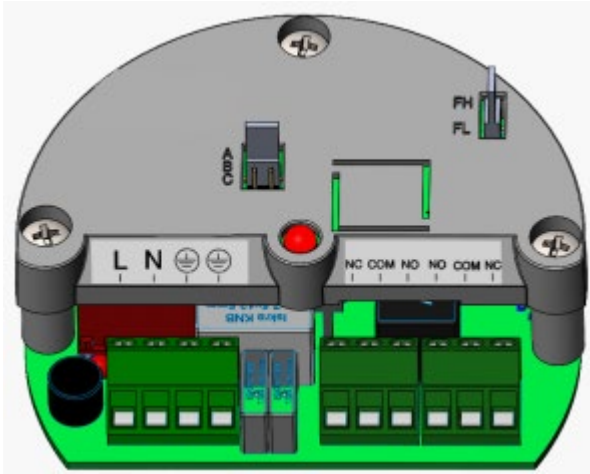
The electrical connection is made according to the labeling on the electronic insert of the respective types. The following safety instructions must be observed.

Safety instructions:

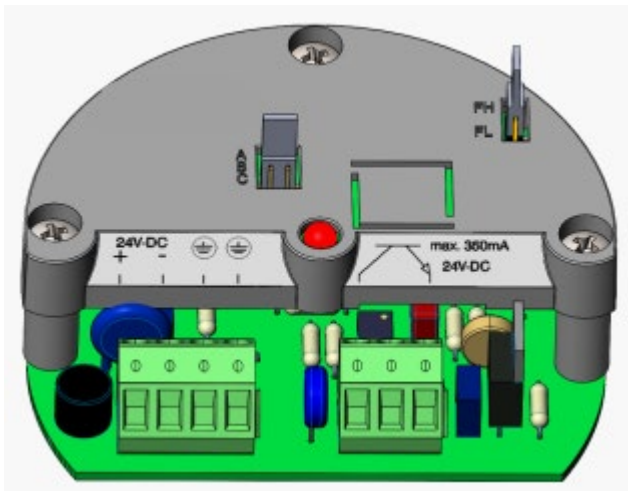
- The devices may only be operated if the cables for power supply and output signal are permanently installed.
- The electrical connection of the devices may only be carried out by a qualified electrician.
- Before opening the housing and making the electrical connection, make sure that all lines are de-energized.
- According to DIN EN 61010-1, a main switch must be installed near the device, which is made visible as such and with which the voltage supply of the device and the relay circuit can be interrupted.
- In order to ensure protection class 1 of the devices, it is absolutely necessary for supply voltages
- 50V that a protective conductor is connected to the housing.
- If the power supply and relay contacts are not fed from the same mains, the connection strands for the supply voltage and relay contacts must be bundled separately with cable ties to prevent a conductor of the supply voltage from coming into contact with a terminal of the relay output in the event of a fault (e.g. cable break) comes and vice versa.

Important:

The supplied cable glands have a clamping range of 7 to 13mm. To ensure tightness, it is therefore important to ensure that the lines inserted have an outer diameter of between a minimum of 7 and a maximum of 13mm.



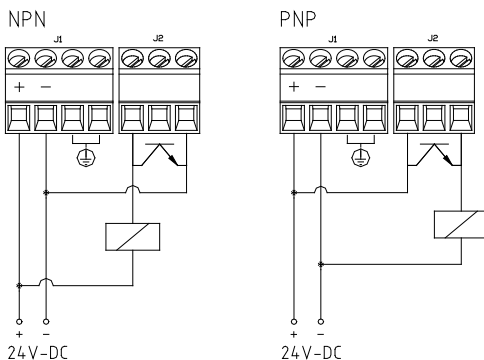
Wide range power supply 22...250V / relay output DPDT



Power Supply 24V-DC / Transistor Output

PNP / NPN-mode

Depending on the wiring the transistor output can be either PNP or NPN type, see sketch.



Settings

Safety switching MAX / MIN (H / L):

Minimum alarm: Jumper in position FL:
The output goes into alarm status (relay dropped out, position NC, red LED flashing) when the filling material **does not cover** the vibrating paddle.

Maximum alarm: Jumper in position FH:
The output goes into alarm status (relay dropped out, position NC, red LED flashing) when the filling material **covers** the vibrating paddle.

With a failure of the supply voltage to the device the relay will also drop out and the LED is off with both versions in this case.

Sensitivity settings:

Setting with jumper:

Position A: For light bulk goods with material densities of up to 20 g/l, maximum sensitivity setting.

Position B: Standard setting, suitable for almost all materials.

Position C: For medium-heavy to heavy materials, which tend to form a build-up easily. With the sensitivity of the devices low in position C it is not possible for very light media to be detected in this position!

	Faile-Save-Low		Faile-Safe-High	
	Relay output	Transistor output	Relay output	Transistor output
Material not covering (diagram)	NC COM NO LED on leuchtet	conductive leitet LED on leuchtet	NC COM NO LED on leuchtet	conductive leitet LED on leuchtet
Material covering (diagram)	NC COM NO LED flashes blinkt	non-conduct. sperrt LED flashes blinkt	NC COM NO LED flashes blinkt	non-conduct. sperrt LED flashes blinkt

Failsafe low: jumper in position FL:
the relay is de-energized, transistor blocked when the blade is **not covered** by material.

Failsafe high: jumper in position FH:
the relay is de-energized, transistor blocked when the blade is **covered** by material.

Output signals alarm as well at power failure.
If power fails the LED is off.

Special Model „Extreme Sensitivity“

This special model is for applications where extremely light material has to be detected. It works for materials with bulk densities down to 10 grams per litre. A standard probe is driven by a special electronics. This model also has three sensitivity settings ABC but even Pos. C is more sensitive than Pos. A of the standard model.

Special Model SEDIMENT

This model is available for all types of MBA700 and can be used for detecting sediments in liquids, for example sand in water. Installation is similar to the standard models.

Important:

The outlook of this special model is similar to the outlook of the standard models. In order to prevent mix up, the probes of SEDIMENT-models are marked with labels „special model SEDIMENT“.

Label

MBA700Zxx1xxxxx **MBA**

PN: xxx SN: xxx mm/jjjj

Power: 20 ... 250V AC/DC 3VA

-20°C ≤ Ta ≤ +60°C -20°C ≤ Tin ≤ +80°C IP65

⊕ 1/2 D Ex ta/tb IIIC T95°C Da/Db IBExU11ATEX1035

WARNUNG: NICHT UNTER SPANNUNG ÖFFNEN
WARNING: DO NOT OPEN WHEN ENERGIZED

MBA Instruments GmbH • Friedrich-List-Straße 5
D-25451 Quickborn • Made in Germany

MBA Instruments GmbH

Friedrich-List-Str. 3-7 · 25451 Quickborn · Germany

Phone +49 4106/123 88-80

www.mba-instruments.de · info@mba-instruments.de

