



# Installation instructions BMGZ061

Robust measuring rollers for conveyor belts in calibratable designs

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BMGZ061

**This operation manual is also available in German.  
Please contact your local representative.**

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## 2 Safety instructions

All of the safety, operating and installation instructions listed here ensure the proper functioning of the device. They must be complied with at all times to ensure the safe operation of the machines. Failure to comply with the safety instructions and use of the devices outside of their specified performance data may jeopardise the safety and health of individuals.

Work involving the operation, maintenance, conversion, repair or adjustment of the device described here may only be carried out by specialists.

### 2.1 Representation of the safety instructions

#### 2.1.1 Danger that could lead to a slight or moderate breach



Danger, warning, caution

Type of danger and source

Possible consequences of disregarding

Action to avert the danger

#### 2.1.2 Note on proper functioning



Note

Note on correct operation

Simplification of operation

Ensuring functioning

### 2.2 General safety instructions



The conveyor belt scales are only able to function with the intended arrangement of the components relative to one another, otherwise serious malfunctions may occur. The installation instructions on the pages below must therefore be followed.



The local installation regulations ensure the safety of electrical systems. They are not taken into account in these operating instructions, but must be complied with at all times.



Poor earthing can lead to people receiving electric shocks, malfunctions of the entire system or damage to the evaluation electronics. Good earthing of the housing must be ensured in any case.

## 3 Product information

### 3.1 System arrangement

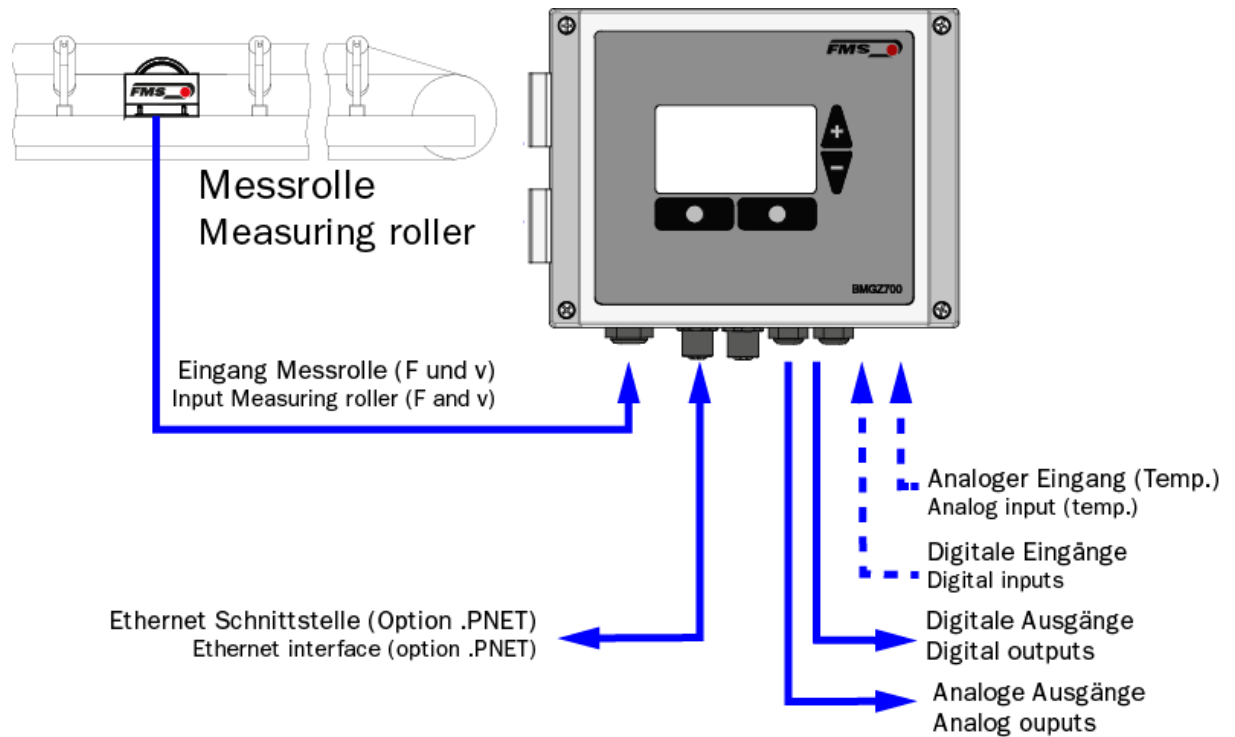


Figure 1: Measuring roller and evaluation electronics

### 3.2 Product description

FMS measuring rollers for conveyor belts are suitable for the toughest demands and permanent loads in both mobile and stationary systems for heavy bulk goods of all kinds such as gravel, ballast, chalk, coal, fertilisers, building rubble etc. Two different construction types and a wide range of different belt widths offer solutions for numerous applications.

**BMGZ061** – calibratable measuring roller (for troughed belts)

FMS are used in combination with the evaluation electronics from the BMGZ700 construction series.

**BMGZ750** – robust, calibratable evaluation electronics for conveyor belt scales –

**BMGZ750.PNET** - robust, calibratable evaluation electronics for conveyor belt scales with a PROFINET IRT interface

### 3.3 Functional description

The FMS measuring roller usually replaces a conventional bearing pulley station in the conveyor belt. The conveyor belt width determines the dimensions of the measuring roller. There is a force transducer on each shaft end of the measuring axis. The type of measurement (directly at the point of actual transmission of force) makes the system

resistant to forces that act, for example, in the direction of the running belt. Additional guides or struts to the frame of the conveyor belt to absorb these undesirable forces are not necessary and lead to very narrow dimensions. The minimal installation height means the FMS measuring rollers can be installed in even the smallest of spaces, for example in mobile crushers or sorting machines. The measuring roller support can be adjusted and can therefore be mounted on conveyor belts of varying frame widths without work needing to be carried out to adjust them. The universal installation bracket facilitates installation in existing systems and is included with the delivery. The fully encapsulated speed sensor is free from wear and maintenance and sits on a shaft end.

### 3.4 Scope of delivery

The following components are included in a full system:

**Scope of delivery:**

Measuring roller

**Accessories:**

Evaluation electronics, connection cable running from the evaluation electronics to the measuring roller (please indicate length)

**Not included in the scope of delivery:**

Power supply, additional installation material (screws, washers etc.)

### 3.5 Order code for calibratable measuring rollers

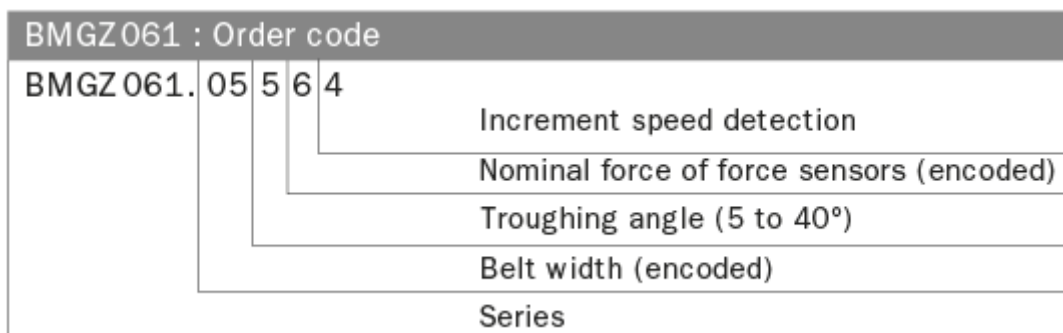


Figure 2: Order code for measuring rollers

## 4 Installation of measuring rollers

### 4.1 Installation site for the measuring rollers

Note the following points:

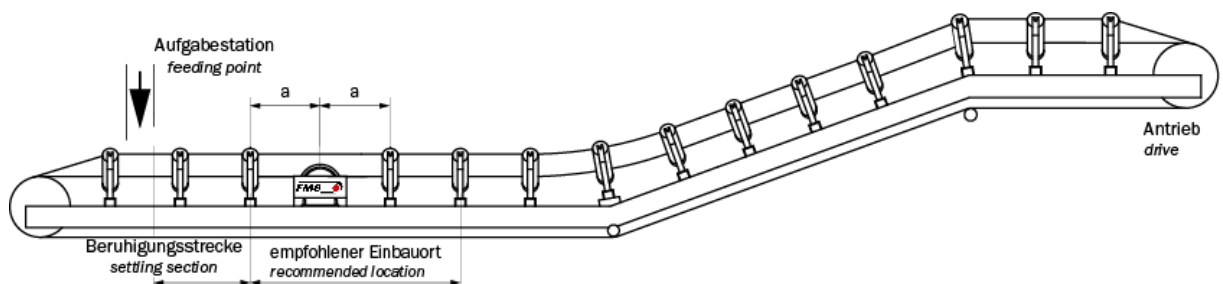
- The belt tension should be kept constant. At least one weight tensioning station should be provided where possible. Changes to the belt tension have a direct impact on the measurement.
- The gradient should only ever be high enough that the bulk goods do not slip backwards on the belt.
- The conveying capacity should be in a range from 20% to 100% of the nominal conveying capacity. The measurement accuracy decreases when the conveying capacity is low.
- The measuring roller should be positioned far enough from the material feeding station that the bulk goods have stabilised by the time they reach the measuring roller.
- Position the measuring roller as far as possible from the drive drum so the impact of belt tension is minimised.
- The measuring roller may only be positioned in a straight section of the belt with a constant level of troughing.

#### **Accuracy of the measurements**



Movements of the material being conveyed on the belt and changes to the belt tension affect the measurements and therefore increase measurement uncertainty. Proper operation is only ensured if the above points are followed.

#### Example installation position

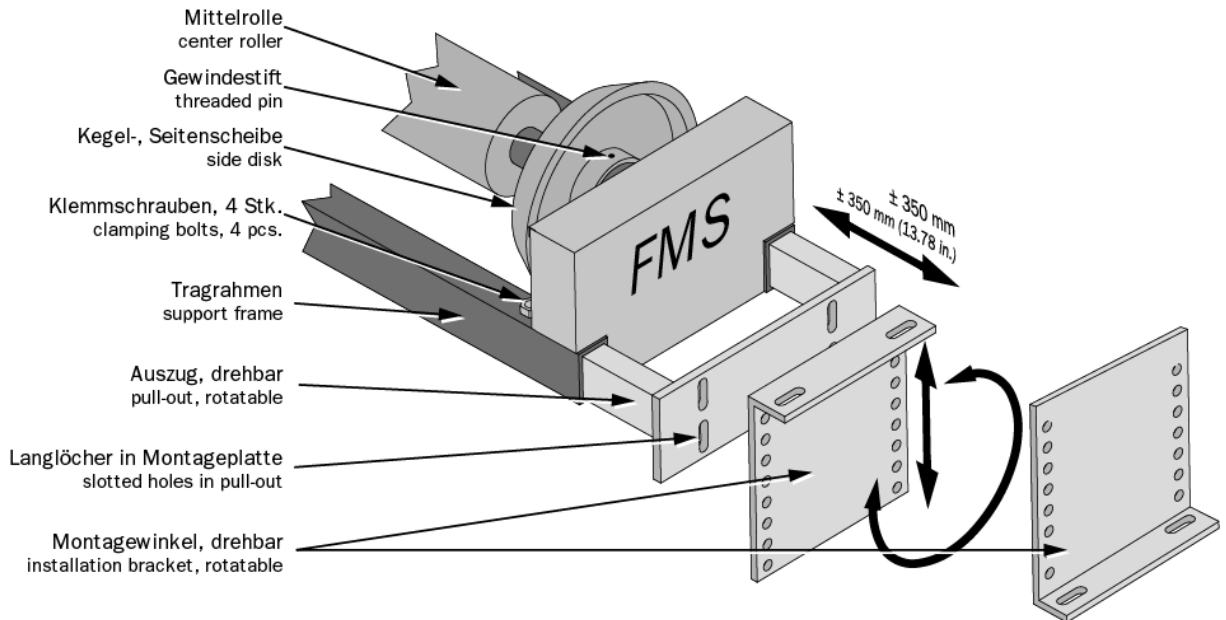


**Figure 3: Example installation position**

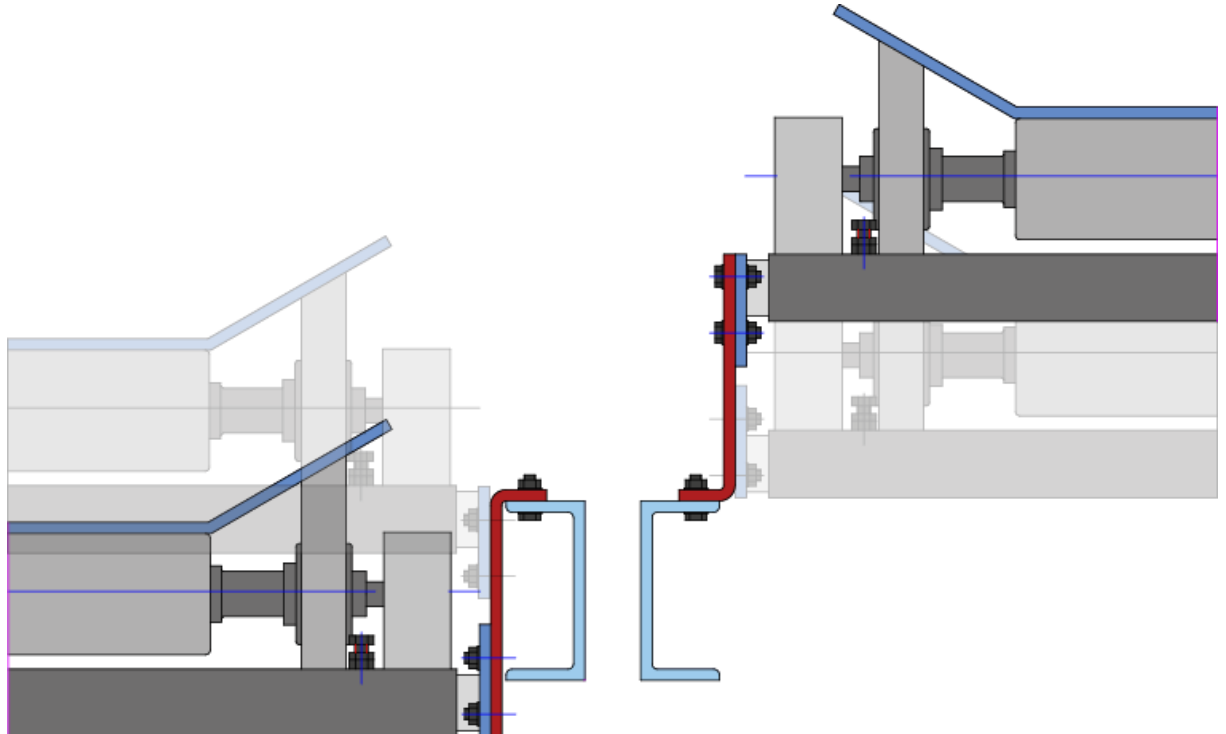
- Sufficiently long stretch to settle
- Significant distance from the drive
- Sufficient distance from the cranking of the belt. The belt must lie on the measuring roller with its own weight when no load is placed on it.
- The mass “a” has already been taken into account when designing the measuring roller and must be complied with precisely ( $\pm 25$  mm).

## 4.2 Installation of the measuring rollers

Check the alignment of the adjacent bearing pulley stations and whether they run in parallel



**Figure 4: Installation elements**



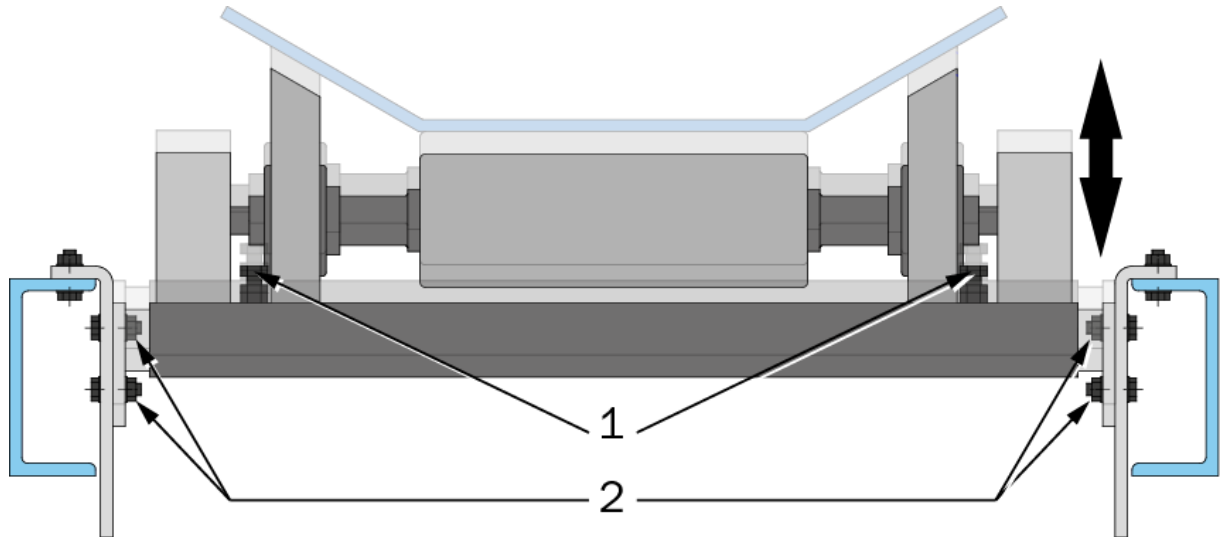
**Figure 5: Installation types, possible combinations**

This provides an initial rough estimate of the installation height of the measuring roller.

Ensure that the screws are initially approximately in the centre of the respective slotted holes. This ensures you have enough “breathing room” to make the fine adjustments.

After setting the height, check the central alignment of the measuring roller.

- Loosening the clamping screws “1” on both sides enables you to shift the support frame using the extensions.

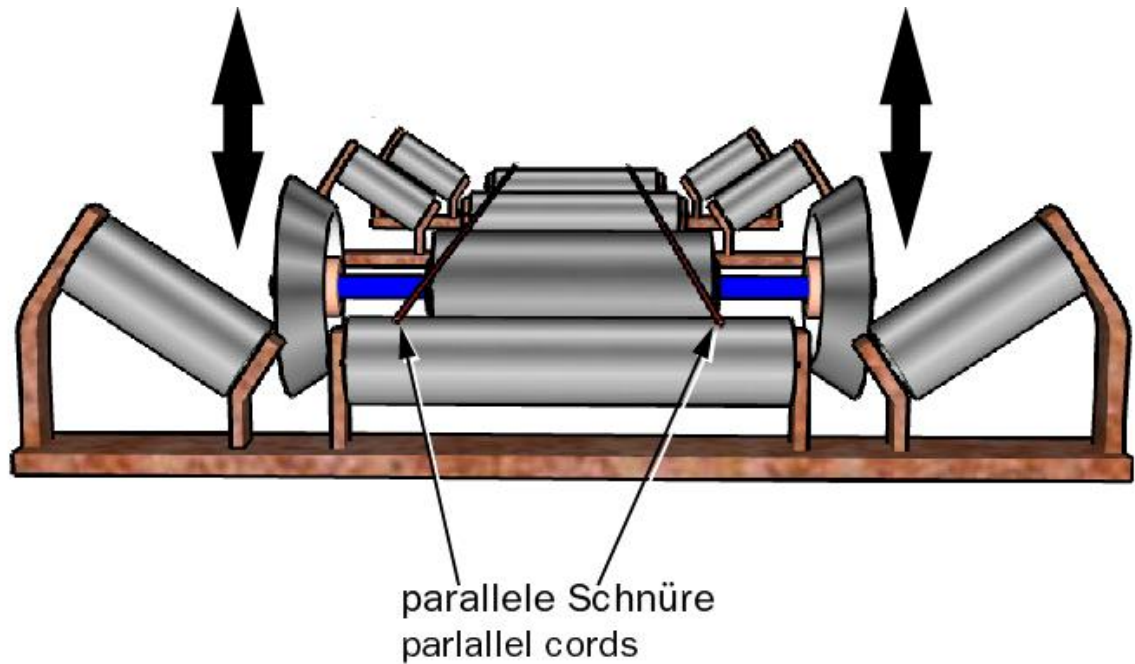


**Figure 6: Fine adjustment, screws**

Fine adjustment of the height relative to the adjacent bearing pulley stations.

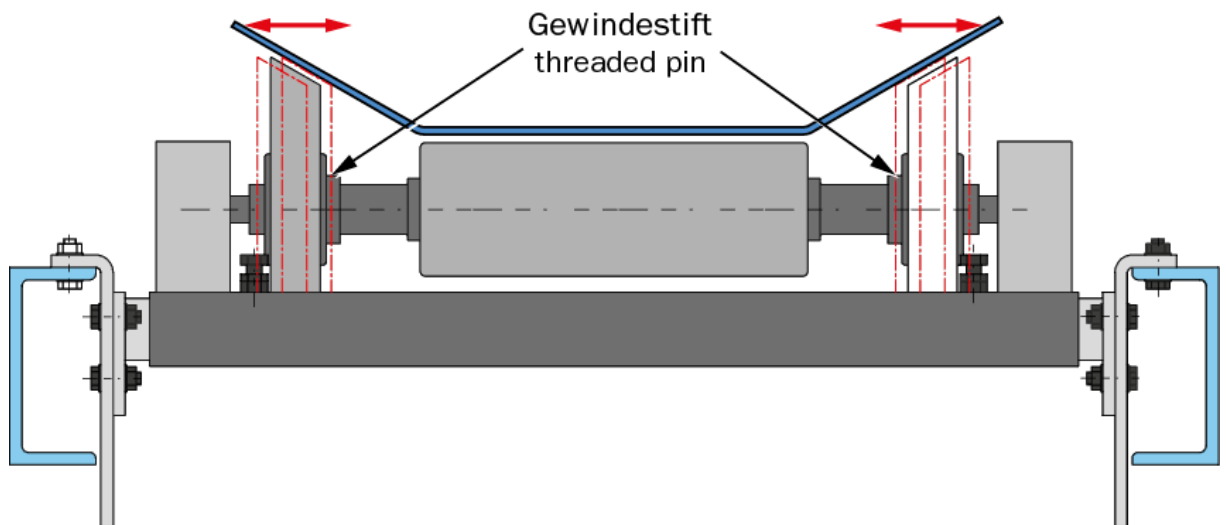
- Lift the belt with wooden wedges or similar
- Tension two cords over the adjacent load-bearing rollers
- Loosen the lateral fixing screws “2” on the installation bracket and displaceable part slightly
- Adjust the height of the measuring roller until the measuring roller contacts the cords in a straight manner
- Tighten the lateral fixing screws again





**Figure 7: Alignment with 2 cords**

You can now adjust the bevel/lateral washers (only BMGZ041). These can be shifted in a lateral direction by loosening the threaded pin.



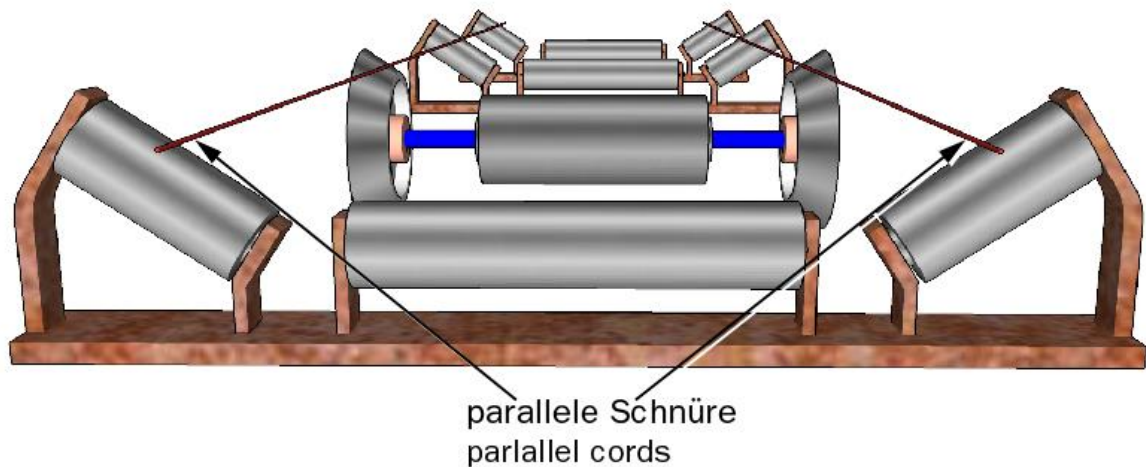
**Figure 8: Setting the bevel washers**

**Warning Damage of the axis**



Over tightening the threaded pins can lead to damages of the axis. It can lead to corrosion and it can happen that the side discs are no longer slidable on the axis.

Use a maximum torque of 20 Nm (15 ft lb)



*Figure 9: Alignment with 2 cords*

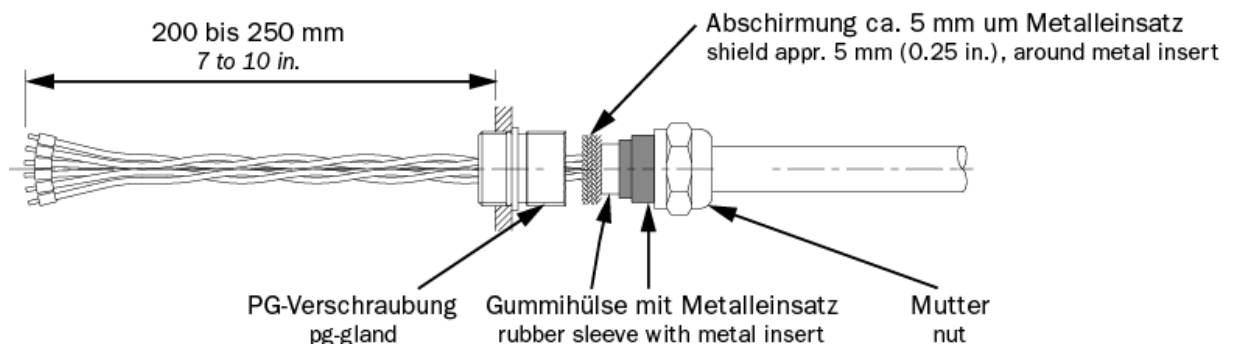
#### 4.3 Electrical connection BMGZ061 (see operating instructions for the BMGZ750 series)

The connection between the measuring roller and the evaluation electronics must be made with the 10-wire, paired cable (5x2x0.75 mm<sup>2</sup>) included with the delivery.

The cable must be routed separately from lines carrying the power so no disruptions to the measurement signal are induced. On the measuring roller side, the plastic coating on the cable is at a distance of approximately 14 cm.

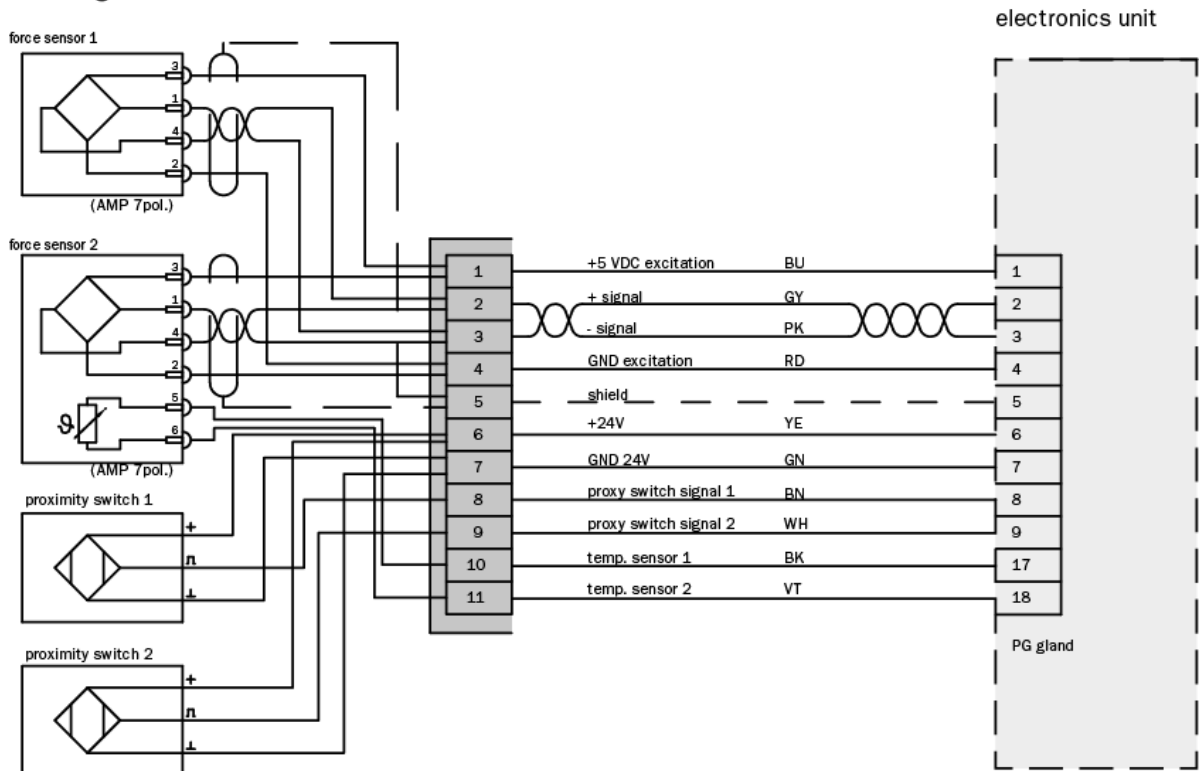
The cable shield must be connected on both sides.

When using housing version K (control cabinet), the cable is guided through the control cabinet wall using the 10-pole plug connection.



*Figure 10: Connection cable on the evaluation electronics side*

Measuring roller



**Figure 11: Connection cable on the measuring roller side BMGZ061**

Please note the two ferrite sleeves on the 10-pole connection cable!

One is located directly at the terminal box inside the housing, the other sleeve is pushed over the cable at the housing outlet.

## 5 Special features of the calibratable version



### ***Calibration by a gauger***

The operating company alone is responsible for recalibration and for calling in the gauger.

### 5.1 EU Type-examination Certificate

According Annex II Module B of the Directive 2014/32/EU

### 5.2 Accuracy class 2

The BMGZ750 is approved for accuracy class 2.

Error limits for flow rates from 20% to 100%:

- a) Max. Error during calibration test (during commissioning / calibration): +/- 1 % of the respective flow rate.
- b) Max. Error in operation (traffic error): +/- 2 % of the respective flow rate.

The test quantity for the adjustment and the official calibration acceptance corresponds to the "smallest delivery quantity".

#### 5.2.1 Limitations

Accuracy class 2 scales may only be used for weighing sand, gravel, waste and demolition material.

### 5.3 Requirements, guidelines, standards, verification test

This compilation contains a summary of the most important requirements, guidelines of applicable standards and manufacturer recommendations for the construction, testing and operation of calibratable belt scales BMGZ750.

### 5.4 Procedure of the calibration test



### ***Verification by verification officer***

The operator alone is responsible for recalibration and for calling in the verification officer.

The customer applies for the calibration to be carried out. The calibration costs are borne by the customer. FMS recommends that customers clarify the entire test procedure and the necessary precautions / resources with the verification engineer in advance.

During the verification test, check weighing of the weighed material is carried out. It must be possible to load or unload the material without loss. The check weighing must be carried out on a suitable test scale. This must be clarified in advance with the verification officer.

## 5.5 Calibration conditions, calibration test

The test quantity is the "**smallest delivery quantity**" (OIML R50-1, No. 2.3). It must not be larger than the quantity that can still be handled with reasonable effort during the verification test. The local conditions regarding the available check scale as well as the capacity of the usual transport containers and vehicles must be taken into account.

The "smallest delivery quantity" is equal to the largest quantity, which is calculated from the following three conditions:

- Full belt circulation at maximum conveying rate or
- 2 % of the quantity weighed in one hour at maximum conveying speed or
- 200 digit increments of the measured value display, see OIML 2.3.

It must be possible to adjust and calibrate the belt scale at the installation site easily and safely using original bulk material. A check scale must be available in the vicinity of the belt scale to be tested. The error limit of this scale may be max. 1/5 of the error limit of the belt scale. No bulk material may be lost during the removal and transport of the test quantity. The tests are to be carried out under normal conditions of use between 20% and 100% of the maximum conveying rate. At least two values within the error limit shall be obtained for each conveying rate value. The bulk material quantity used in the test must correspond at least to the "smallest delivery quantity". The weight check of the bulk material quantity can be carried out before or after passing through the belt scale. The conditions for testing with material shall be provided on site.

## 5.6 Location, maintenance of the conveyor belt scale

The conveyor must be installed on a solid and, if necessary, frost-proof foundation, either stationary or mobile on rails, in order to ensure vibration-free operation of the belt scale.

(OIML R50-1 / regulation test center).

### 5.6.1 Installation location

The belt scale must be installed as far away as possible from the drive drum in order to minimize belt tension influences. The belt scale may only be installed in a straight belt section with constant troughing.

(FMS recommendation).

### 5.6.2 Belt alignment and material skirting

The belt alignment must prevent the belt from moving sideways. Any lateral guide rollers that may be necessary must not be installed around the measuring section, nor must infeed skirting.

(Recommendation FMS)

### 5.6.3 Material transition length

The measuring section should be as close as possible to the material feed, but it must be ensured that the material has settled before the measuring section, i.e. the material must no longer slip or shift on the belt.

(Regulation FMS)

#### 5.6.4 Distance between idler roller stations on the measuring section

The distance between the idlers for the measuring section is specified by FMS based on the specifications and must be observed. This distance is usually in the range of 0.5 to 2 m.

(Specification FMS)

The measuring section must be at least 3 to 4-times of the belt widths away from belt transition length.

(Recommendation FMS)

#### 5.6.5 Change of installation site

If the installation location of the conveyor belt is changed, the belt scale must be checked and recalibrated if necessary.

(Regulation test center)

#### 5.6.6 Protection against the environment

If the conveyor belt is installed outdoors, protection against the effects of weather must be provided by the customer around the belt scale.

(Recommendation FMS)

#### 5.6.7 Modifications to the conveyor belt or the scale

The following changes to the conveyor belt or the scale require calibration of the conveyor belt scale:

- Replacement of adjacent idler stations.
- Replacing the conveyor belt
- Change of the inclination

#### 5.6.8 Belt tensioning device

The belt tension must be constant and kept free from temperature, wear, and load effects, among others. The conveyor belt must be equipped with a tensioning device. The wrap angle of the tensioning roller on the conveyor belt must be at least 90°.

(OIML R50-1 / regulation test center)

#### 5.6.9 Maximum belt length

The overall belt length should not exceed 100m.

(FMS recommendation).

#### 5.6.10 Belt cleaning

The conveyor belt must be provided with an effective cleaning device (e.g. scraper) in case of adhering bulk material, whereby no influence on the weighing operation must occur.

(OIML R50-1)

### 5.6.11 Adjacent idler stations

At least two idlers each before and after the measuring roller must be in the same plane as the measuring roller. The measuring roller and in each case the first idler roller before and after the measuring roller must be secured against displacement and marked with the serial number of the scale. If the diameters of the mentioned rollers are not the same, these rollers must be secured against disassembly.

(Regulation test center)

### 5.6.12 Concentricity of adjacent idlers

The adjacent idler rollers must have a precise concentricity to prevent vibrations of the conveyor belt.

(FMS regulation)

### 5.6.13 Inclination of the conveyor belt

The conveyor belt must run horizontally or with a constant inclination. The maximum slope depends on the material and must not be too large to prevent the material from moving.

(OIML R50-1, calibration requirement)

### 5.6.14 Belt emptying

Each weighing must start and end with an empty belt.

(OIML R50)

### 5.6.15 Taring, zeroing the scale

The conveyor belt scale must be zeroed after switching on and then at least every 3 hours. This procedure is fully automatic on the BMGZ750 at the press of a key during two belt cycles.

### 5.6.16 Reversible conveyor belts

With reversible belts, the calibration of the scale is only valid for the conveying direction for which the calibration was carried out. Calibration may only be carried out for one direction.

(Calibration requirement).

### 5.6.17 Error signal

If the belt scale is switched off or fails, the conveyor belt must be stopped or an acoustic or optical signal must be emitted.

(Regulation of the test center).

FMS provides a digital output (BMGZ OK) on the electronics for this purpose. The "BMGZ OK" output is active if the evaluation electronics are switched on and no error is present. The operator must ensure that if this relay drops out, the conveyor belt is stopped or an acoustic or optical signal is emitted.

# 6 Dimensions

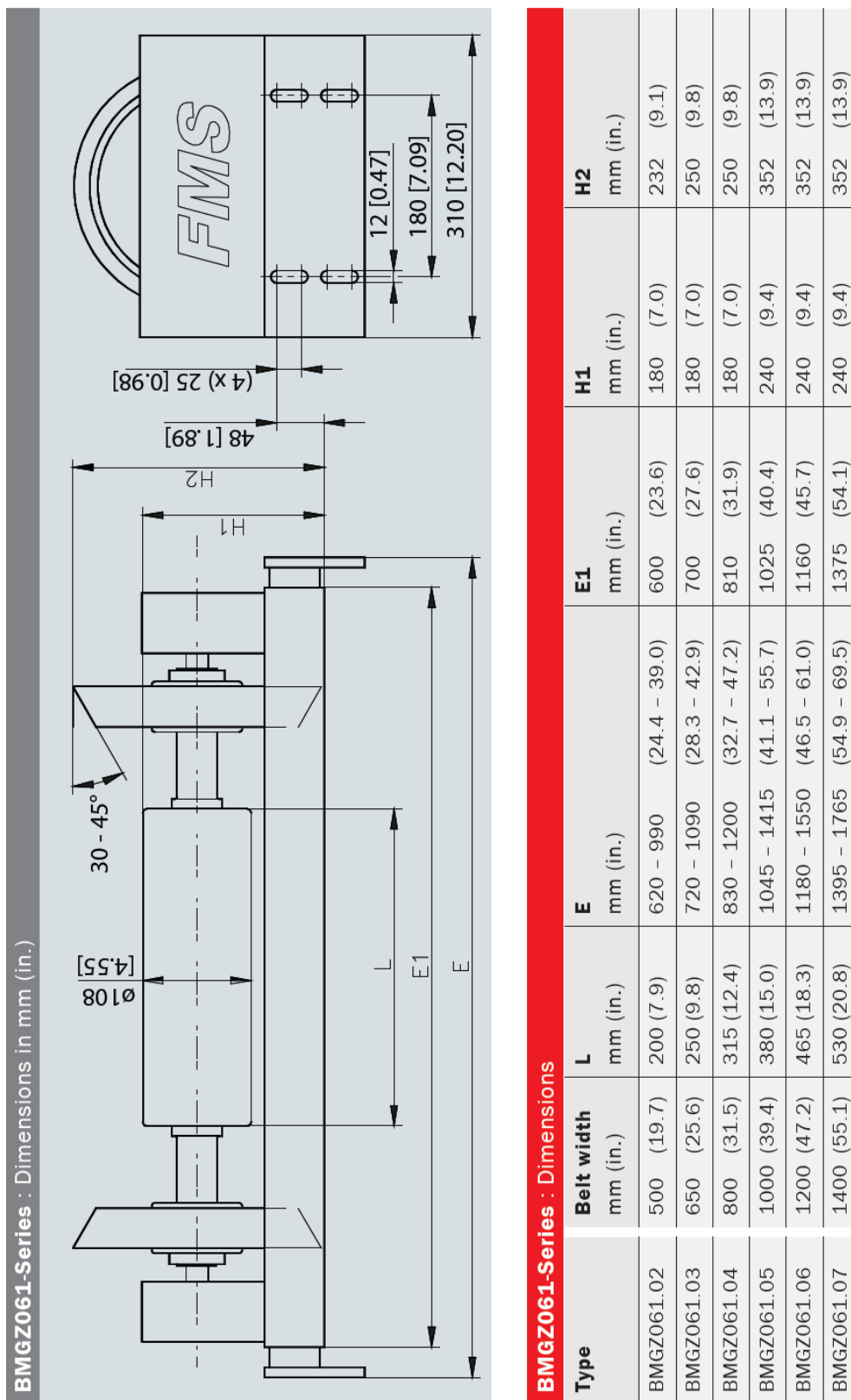


Figure 12: Dimensions BMGZ041 and BMGZ061



## 7 Technical data

BMGZ061 : Technical data	
Accuracy class	$\pm 0.3 \%$ ( $F_{Nenn}$ )
Temperature range	-10 to +60 °C (14 to 140 F)
Overload protection force sensor	10-times nominal force ( $F_{Nom}$ )
Material frame	galvanized steel
Protection class	IP67

**Table 1: Technical data on FMS measuring rollers**







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