



# Installation Manual IMGZ

## Force Measuring Roller with integrated Sensors

Version 31.1

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This installation manual is also available in German.  
Please contact your local FMS representative.

Diese Montageanleitung ist auch in Deutsch erhältlich.  
Bitte kontaktieren Sie Ihren nächstgelegenen FMS Vertreter.

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# 1 Safety Instructions

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to the equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. Do not stress the equipment over the specification limits neither during assembly nor operation. To do so can be potentially harmful to persons or equipment in the event of a fault to the equipment.

## 1.1 Description Conditions

a) Danger of health injury or loss of life



### **Danger**

*This symbol refers to high risk for persons to get health injury or loss life. It has to be followed strictly.*

b) Risk of damage of machines



### **Caution**

*This symbol refers to information, that, if ignored, could cause heavy mechanical damage. This warning has to be followed absolutely.*





c) Note for proper function



### **Note**

*This symbol refers to an important information about proper use. If not followed, malfunction can be the result.*

## 1.2 List of Safety Instructions

-  The Measuring Rollers may not be stressed over the specification limits neither during assembly nor operation. The unit's overload protection value may not be exceeded.**
-  The attachment points for the Force Measuring Rollers on the machine frame must be properly designed. The bearings need to be appropriately mounted.**
-  For correct installation and operation, follow the electrical wiring diagram and instructions in this manual.**
-  The built-in measuring elements and the roller are delicate parts and may be damaged by improper handling! The maintenance must be carried out by trained service personal only.**

## 2 Product Information

### 2.1 Dimensions

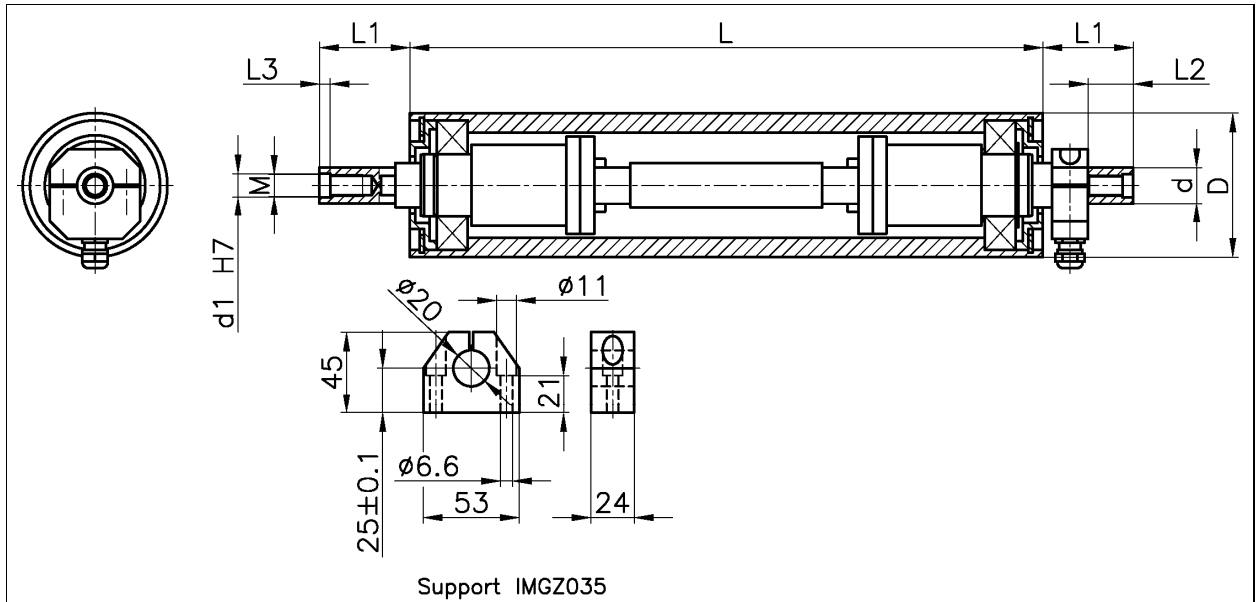


Fig 1: Dimensions Force Measuring Roller IMGZ

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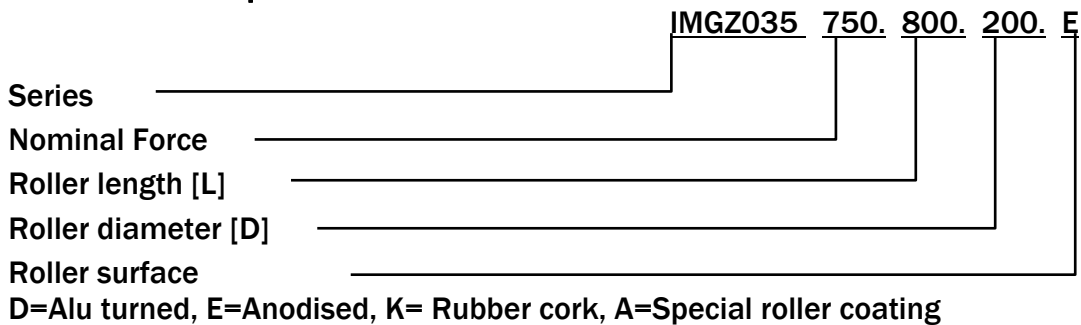
| IMGZ Force Measuring Roller • Nominal Forces / Dimensions |               |                    |    |    |    |                  |    |    |                 |              |
|---|---------------|--------------------|----|----|----|------------------|----|----|-----------------|--------------|
| Roller Type   | Nominal Force | Dimensions in [mm] |    |    |    |                  |    |    |                 | Bearing Type |
|   |               | L <sup>1)</sup>    | L1 | L2 | L3 | M                | d  | d1 | D <sup>2)</sup> |              |
| IMGZ035   | 200           | 400 - 3000         | 50 | 25 | 6  | M12x18<br>M12x23 | 20 | 13 | 80              | 1207         |
|   | 400           |                    |    |    |    |                  |    |    | 100             |              |
|   | 750           |                    |    |    |    |                  |    |    | 120             |              |
|   | 1500          |                    |    |    |    |                  |    |    | 140             |              |
|   | 3000          |                    |    |    |    |                  |    |    | 160<br>200      |              |
| IMGZ070   | 750           | 400 - 3000         | 80 | 50 | 10 | M12x28<br>M12x40 | 50 | 22 | 140             | 1214         |
|   | 1500          |                    |    |    |    |                  |    |    | 160             |              |
|   | 3000          |                    |    |    |    |                  |    |    | 200             |              |
|   | 6000          |                    |    |    |    |                  |    |    | 250             |              |
|   | 12000         |                    |    |    |    |                  |    |    | 300             |              |

| IMGZ Force Measuring Roller • Nominal Forces / Dimensions |               |                     |    |    |      |                    |      |      |                 |         |
|---|---------------|---------------------|----|----|------|--------------------|------|------|-----------------|---------|
| Roller Type   | Nominal Force | Dimensions in [in.] |    |    |      |                    |      |      |                 | Bearing |
|   | [lbf]         | L <sup>1)</sup>     | L1 | L2 | L3   | M                  | d    | d1   | D <sup>2)</sup> | Type    |
| IMGZ035   | 45            | 15.7 - 118          | 2  | 1  | 0.23 | M12x0.7<br>M12x0.9 | 0.79 | 0.5  | 3.15            | 1207    |
|   | 90            |                     |    |    |      |                    |      |      | 3.94            |         |
|   | 169           |                     |    |    |      |                    |      |      | 4.72            |         |
|   | 337           |                     |    |    |      |                    |      |      | 5.51            |         |
|   | 674           |                     |    |    |      |                    |      |      | 6.30            |         |
| IMGZ070   | 169           | 15.7 - 118          | 80 | 50 | 0.39 | M12x1.1<br>M12x1.6 | 1.97 | 0.87 | 5.51            | 1214    |
|   | 337           |                     |    |    |      |                    |      |      | 6.30            |         |
|   | 674           |                     |    |    |      |                    |      |      | 7.87            |         |
|   | 1349          |                     |    |    |      |                    |      |      | 9.84            |         |
|   | 2700          |                     |    |    |      |                    |      |      | 11.8            |         |

- 1) Intermediate sizes in 100mm [3.94"] increments; other lengths on request
- 2) Other diameters on request

## 2.2 Order Code

Order Code Example:



## 2.3 Scope of Delivery

**Scope of delivery:**

1 force measuring roller, Sensor cable 5m [200"], operation manual

**Not included:**

Mounting supports

## 3 Assembly

### 3.1 Assembly Conditions

The Force Measuring Rollers IMGZ are defined as “partly completed machinery” according to the **Directives 2006/42/EC, article 2**. In order to assure a proper functionality of the parts and guarantee the essential health and safety requirements of operators working with it, the following conditions for the assembly must be met:



#### **Caution**

*The Force Measuring Rollers may not be stressed over the specification limits neither during assembly nor operation. The unit's overload protection value may not be exceeded.*



#### **Caution**

*The attachment points for the Force Measuring Rollers on the machine frame must be properly designed. The bearings need to be appropriately mounted.*



#### **Caution**

*For correct installation and operation, follow the electrical wiring diagram and instructions in this manual.*

### 3.2 Assembly Preparations

The IMGZ-roller is either directly mounted to the side of the machine frame or installed using mounting brackets. The machine must be prepared for both mounting configurations.

### 3.3 Mounting the IMGZ Directly to the Machine Frame

The shaft ends of the IMGZ contain centred threaded holes M12x18mm for the IMGZ035-series or M20x28 for the IMGZ070-series. The machine frame must have mounting holes of Ø13 mm for the IMGZ035-series or Ø21 mm for IMGZ070-series. The roller can then be mounted with mounting screws of the type M12 respectively M20 with appropriate length to the beforehand prepared machine frame.

### 3.4 Mounting the IMGZ with Supports

Also for this mounting configuration the machine frame must be prepared to accept the mounting brackets (supports IMGZ035 or IMGZ070). For this purpose M6 or M12 threaded holes need to be tapped in the machine frame according to the drawing Fig. 1 bottom part. Threaded holes on the machine frame are suitable for thick-walled machine frames. For thin-walled machine frame the assembly can also be carried out by means of through-holes in the machine frame including a screw-nut connections. Once the machine frame is prepared the supports IMGZ035 or IMGZ070 are mounted to the rollers by simply sticking the shaft ends through the corresponding holes. Then, the complete assembly can be mounted on the beforehand prepared machine frame.



#### **Note**

*The red point on the connector shows the direction which will yield a positive measuring signal.*

## 4 Maintenance

The IMGZ Force Measuring Rollers are maintenance-free. The built-in bearings are lifetime lubricated. If any maintenance should be necessary, we recommend contacting FMS customer service and to send the unit FMS for maintenance.



### **Caution**

***The built-in measuring elements and the roller are delicate parts and may be damaged by improper handling! The maintenance must be carried out by trained service personal only.***



## 5 Electrical Connection

### 5.1 Sensor Cable and Signals

Wiring the IMGZ to the measuring amplifier is achieved by using a 2x2x0.25mm<sup>2</sup> shielded twisted-pair cable [AWG 23]. This cable must be installed away from power lines. The connection is done according to **table below**.

| Connection to Measuring Amplifier |               |
|-----------------------------------|---------------|
| Strand colour                     | Signal        |
| green                             | -Excitation   |
| yellow                            | + Excitation  |
| brown                             | + Signal      |
| white                             | -Signal       |
| shield                            | Connect to PE |



#### **Caution**

*In order to avoid ground loops and hence electrical interferences, cable shield needs to be connected only to the measuring amplifier.*

## 6 Design and Functionality

### 6.1 Design and Applications

FMS force measuring rollers IMGZ are used to measure web tensions in machines processing plastic foils, textiles, paper and similar materials. The measuring sensors are fully integrated in the roller tube resulting in particularly space-saving solutions.

### 6.2 Functional Description

The operating principle of IMGZ is based on a double flexion beam measuring body with built-in overload protection. A foil type strain gauge mounted in a full Wheatstone - bridge configuration measures the actual tension. This measuring principle ensures tension measurement with the highest accuracy and reliability under the most stringent requirements. Even with low material wrap angles and high roller weights, tension will still be measured accurately.

The built in mechanical hard-stop provides high overload protection and ensures that frequent calibration is not required.

## 7 Technical Specification

|                                   |   |
|-----------------------------------|---|
| <b>Sensitivity</b>                | 1.8mV/V $\pm 2\%$                                     |
| <b>Tolerance of Sensitivity</b>   | $< \pm 0.2\%$   |
| <b>Accuracy class</b>             | $\pm 0.5\%$ (based on $F_{\text{nominal}}$ )          |
| <b>Force Measuring Range</b>      | 20 : 1  |
| <b>Temperature coefficient</b>    | $\pm 0.1\%$ / 10K                                     |
| <b>Temperature range</b>          | -10...+60 °C [14...+140 °F]                           |
| <b>Input resistance</b>           | 175 $\Omega$  |
| <b>Supply voltage</b>             | 1...12 VDC  |
| <b>Protection Class</b>           | IP 42   |
| <b>Overload Protection [x Fn]</b> | 10 times the rated nominal force                      |
| <b>Sensor Material</b>            | Stainless steel                                       |
| <b>Roller Material</b>            | Turned aluminium<br>Other roller surfaces on request. |



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