



# **Installation Manual RMGZ400B/600B**

## **Force Measuring Roller for Tension Measurement**

Version 1.2

05/2015

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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

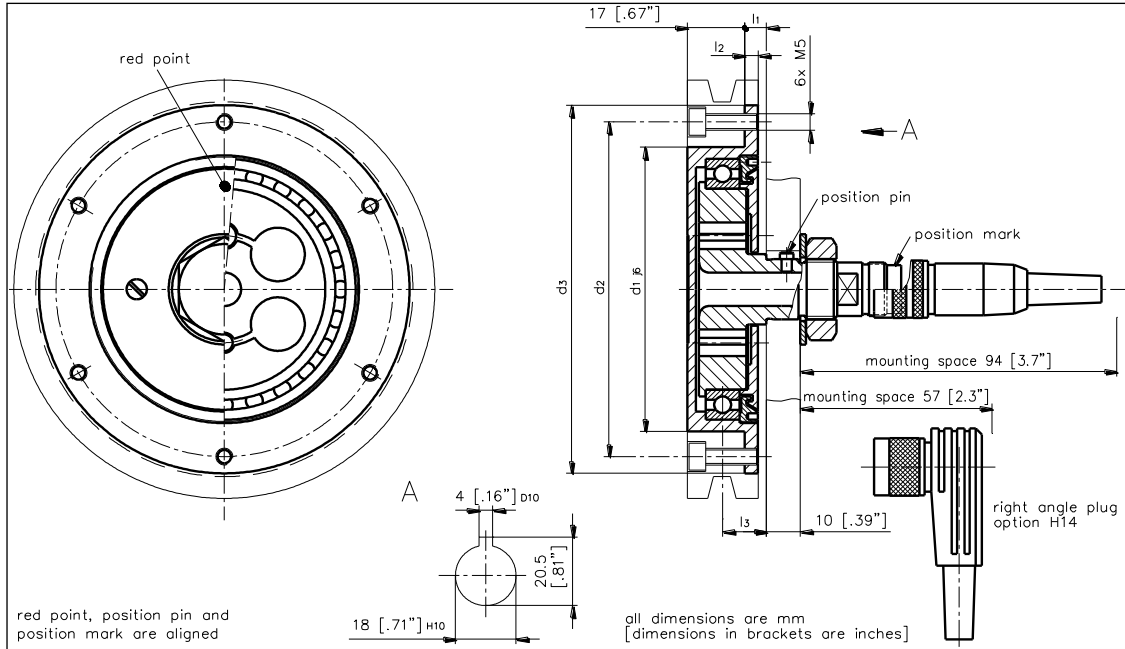
 *The Force Measuring Rollers may not be stressed over the specification limits neither during assembly nor operation. The unit's overload protection value may not be exceeded.*

 *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.*

## 2 Product Information

### 2.1 Dimensions



**Fig. 1: Dimensions, outline drawing**

R400005us

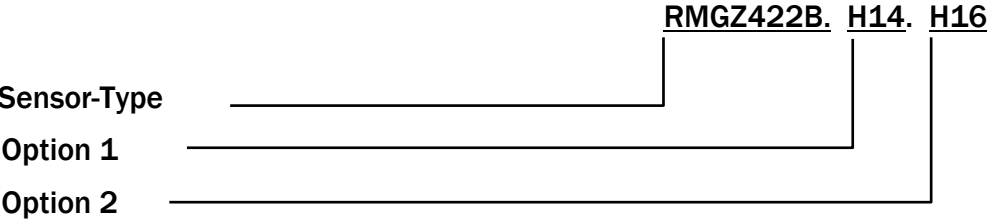
RMGZ 400B / 600B Product Range							
Nominal Force N [lbf]	Order code	Dimensions in mm and [in.]					
		d1	d2	d3	l1	l2	l3
60 [13.5]	RMGZ416B						
100 [22]	RMGZ421B	85	100	110	6.5	4	13
200 [45]	RMGZ422B	[3.35]	[3.94]	[4.33]	[.256]	[.157]	[.512]
500 [112]	RMGZ425B						
1000 [225]	RMGZ631B						
2000 [450]	RMGZ632B	110	125	136	7.5	5	13.5
4000 [900]	RMGZ634B	[4.33]	[4.92]	[5.35]	[.295]	[.197]	[.531]

## 2.2 Options

- H14 = Right angle connector
- H16 = Temperature range up to 120 °C, [248 °F]
- H31= For vacuum applications

## 2.3 Order Code

Order Code Example:



## 2.4 Scope of Delivery

1 Force Measuring Roller; 1 Straight Connector; Pin ø3x5 [0.118“ x 0.197“]  
Installation Manual

**Not included:**

Sheave; sensor cable; mounting brackets

## 3 Assembly

### 3.1 Assembly Conditions

The Force Measuring Rollers RMGZ 400B and RMGZ 600B 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 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 Force Measuring Rollers RMGZ 400B and RMGZ600B are usually mounted on a mounting bracket which is in turn installed on the machine frame or on the rotating base plate of a stranding machine. The built-in flange on the force measuring roller provides M8 thread holes for easier assembly. If mounting brackets are used, they need to have mounting holes with a spline groove (see drawing **Fig. 1, detail A**).

Mounting brackets and machine must be prepared for the installation of the force measuring rollers. The corresponding mounting holes must be drilled in the machine frame.



#### **Caution**

*If the RMGZ 400B/600B Force Measuring Rollers are used as a replacement for their predecessor products RMGZ 400A/600A, the 4mm 0[.157"] position pin must be replaced with the supplied pin  $\varnothing 3 \times 5$  [0.118" x 0.197"].*

### 3.3 Mounting the Force Measuring Roller on static Machine

The support surface for the mounting brackets on the machine frame must be meticulously crafted. The brackets are mounted on the machine. The Force Measuring Roller is screwed to the mounting holes of the mounting brackets whereas the spline groove holds the position pin preventing the roller from twisting out of position. Red point and position pin are aligned to each other (see Fig. 1). Their positions depend on the direction of the resulting force. If the force acts in the direction of the red point, the measuring amplifier will show positive measuring values.

### 3.4 Red Point Alignment in a Stranding Machine

In rotating applications (e.g. in stranding machines) the force measuring rollers are mounted such that centrifugal forces are compensated. Using FMS RMGZ sensors this can be achieved by turning the Red Point parallel to the rotation axis and in direction of the positive force component (refer to Fig. 2).

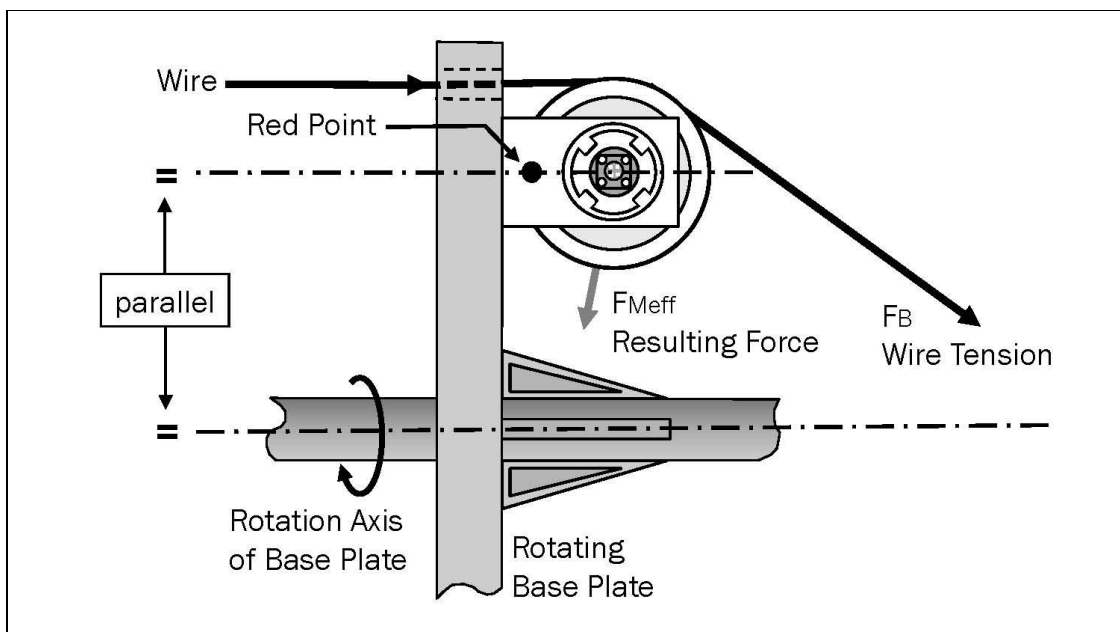


Fig. 2: RMGZ 400B / 600B Red Point alignment on rotating machines R800004d

**Caution**

*It is of paramount importance to compensate the centrifugal forces caused by the rotating base plate of the strander. In fast rotating machines already a small deviation in parallelism between rotation axis and Red Point (of e.g. 0.3°) can lead to a zero point error.*

The adjustment of the Red Point and hence the quality of the sensor adjustment as described in **chapters 3.4** can be tested after offset compensation and calibration. If the reading of an unloaded Force Measuring Roller stays at zero (e.g. 0 N) regardless of the load cell position (e.g. at 12 o'clock or at 6 o'clock position), the red point is correctly aligned.



## 4 Electrical Connection

### 4.1 Signals in the Wheatstone-bridge

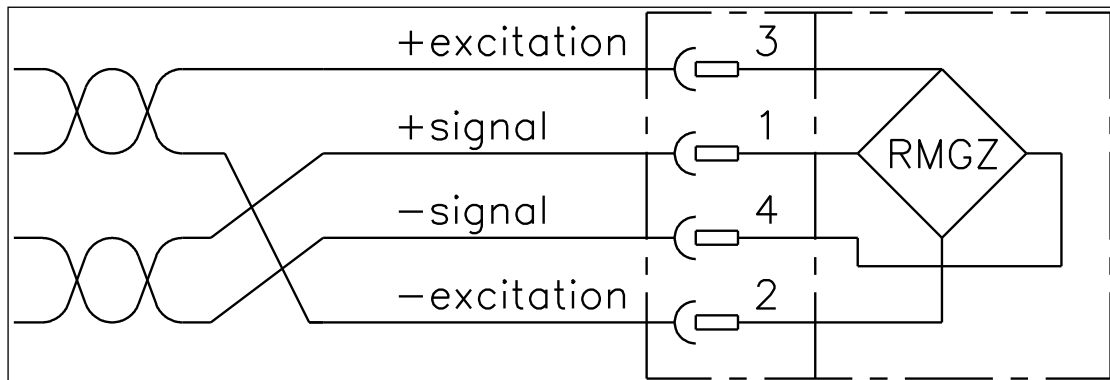


Fig. 3: Wiring diagram

R400003e

Wiring the Force Measuring Roller to the measuring amplifier is achieved by using a 2x2x0.25mm<sup>2</sup> [AWG 23] shielded twisted-pair cable. This cable must be installed away from power lines. The connection is done according to Fig.3. The shield needs to be connected only to the measuring amplifier.



#### Caution

*In order to avoid ground loops and hence electrical interferences, the cable shield needs to be connected only to the measuring amplifier. On the force measuring side the shield must stay open.*

### 4.2 Signal Assignment on Sensor Cable Connector

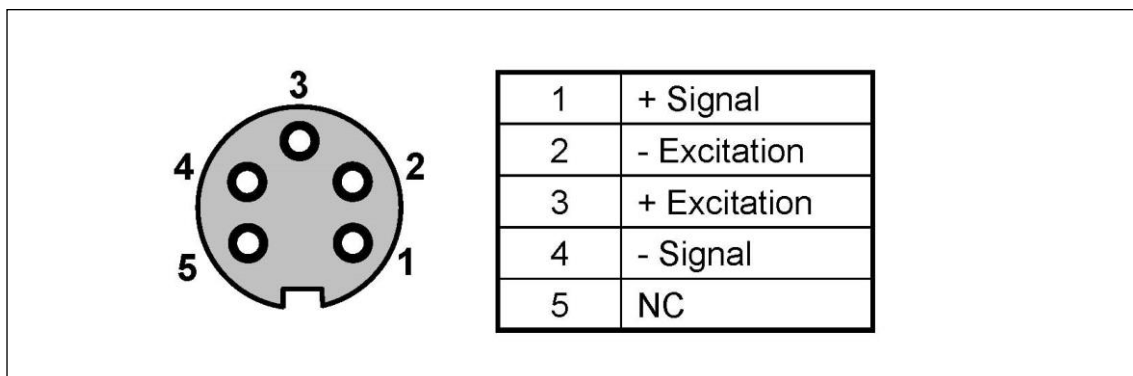


Fig. 4: Pin Assignment Connector 5-Pol Mini (seen from soldering side) R300004e

## 5 Design and Functionality

The Force Measuring Roller RMGZ 400/600 series are used to measure the tension of individual strands, wires, cables, and similar materials in stranding machines. An application specific sheave can be mounted on the rotating flange. The lifetime lubricated deep groove ball bearing is build-in. The mating parts of the ball bearing form a frictionless gap type seal for the bearing. The force sensor itself, which consists of two rings connected by a measuring body, is situated inside the stationary inner ring.

### 5.1 Functional Description

A foil type strain gauge mounted in a full Wheatstone -bridge configuration measures the actual tension. Factory set overload protection devices prevent deformation of the measuring web caused by overload. The load must be applied in the middle of the bearing so that no tilting forces can act on the bearing and the measuring body.

## 6 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 <sub>nominal</sub> )
<b>Deflection</b>	0.1 mm; [0.004"]
<b>Load rating (bearing) C dynamic</b>	RMGZ 400B: 11.8 kN; [2652.7 lbf] RMGZ 600B: 21.2 kN; [4765.9 lbf]
<b>Speed limit</b>	RMGZ 400B: 8500 rpm RMGZ 600B: 6700 rpm
<b>Temperature coefficient</b>	$\pm$ 0.1% / 10K
<b>Temperature range</b>	-10...+60 °C [14...+140 °F] (Option H16: -10...+120 °C [14...248 °F])
<b>Overload Protection [x Fn]</b>	10 times the rated nominal force
<b>Input resistance</b>	350 $\Omega$
<b>Supply voltage</b>	1...12 VDC
<b>Protection Class</b>	IP 42
<b>Electrical Connector</b>	5-pole mini connector
<b>Sensor Material</b>	Stainless steel
<b>Material of Rotating Flange</b>	Aluminium
<b>Weight</b>	RMGZ 400B: 0.75 kg; [1.65 lbs] RMGZ 600B: 0.9 kg; [1.98lbs]



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