

FMS Tension Control / Force Sensors

## LMGZ-Series Highly precise, stainless steel force measuring bearing

- Wide measuring range with highest resolution**  
 Measuring range 100:1  
 Accuracy class  $\pm 0.3\%$
- For a wide range of applications**  
 7 sizes with nominal force from 33 to 25'000 N  
 (7.5 to 5'620 lbf.)
- Robust and durable**  
 Overload protection up to 20-times nominal force, full stainless steel

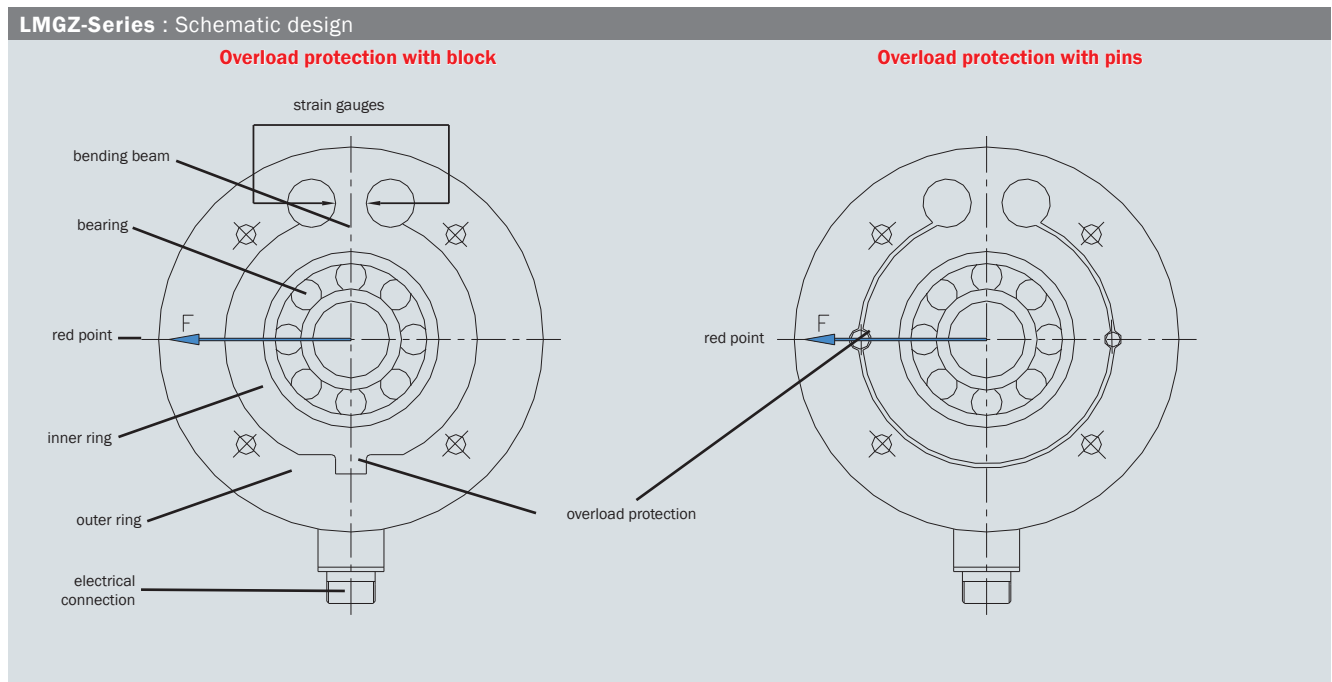


### LMGZ-Series

The force measuring bearings of the LMGZ-Series, designed for the measurement of tension on continuous material processing lines where live shaft idler rolls are utilized. The accuracy class of 0.3% and the measuring range of 100:1 allows reproducible, highly precise measurements throughout the industry. The mechanical overload protection of up to 20-times the nominal force provides unsurpassed robustness. With the superior performance of the LMGZ-Series, accurate tension readings are obtained even with low web wrap angles and high roll weights. For installations where a Pillow Block mount is required the optional bracket can be utilized.

### Functional description

The LMGZ-Series force measuring sensor combines the bearing seat and the force sensor within the same housing, thus minimizing the required installation space. The substantial overload protection translates to eliminated/minimized calibration issues due to machine upset conditions. The movement of the bending beam, which is proportional to the applied force, is detected by strain gauges arranged in a full bridge circuit and then converted into an electrical signal. This simple measurement principle delivers precise results even with low material tension and small web wrap angles. The Red Point, as located on the sensor body, should be aligned with the direction of the resultant force due to web tension.



There are 2 design Types of overload protection devices: block or pins.

**LMGZ-Series : Bearings**

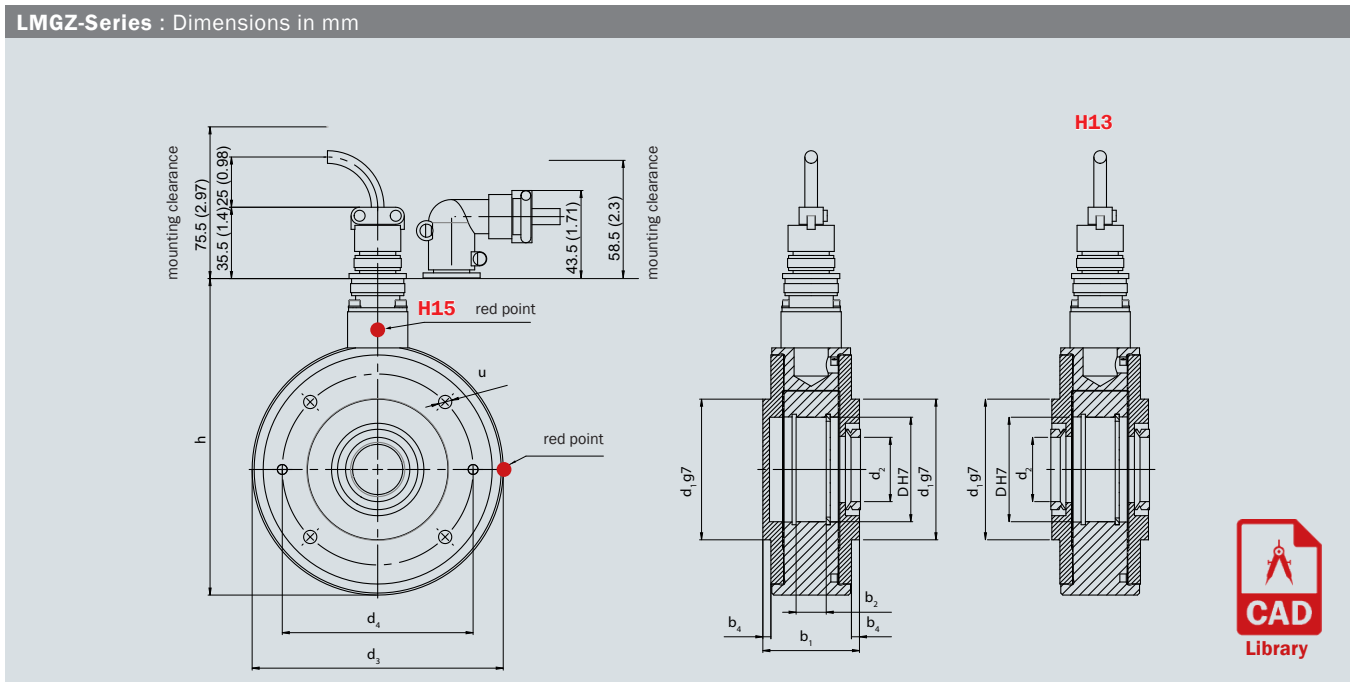
Force Sensor	Suitable bearing (bearings must be ordered separate)					
	Type	Series	Dimensions mm (in.)			
Type	Type		d	D	B	
<b>LMGZ200</b>	129	1	9 (0.3543)	26 (1.0236)	8 (0.3150)	
<b>LMGZ201</b>	1201	1	12 (0.4724)	32 (1.2598)	10 (0.3937)	
<b>LMGZ203</b>	1203	1	17 (0.6692)	40 (1.5748)	12 (0.4724)	
<b>LMGZ204</b>	1304	1	20 (0.7874)	52 (2.0472)	15 (0.5906)	
<b>LMGZ205</b>	1205	1	25 (0.9843)	52 (2.0472)	15 (0.5906)	
<b>LMGZ307</b>	1307	1	35 (1.3780)	80 (3.1496)	21 (0.8268)	
<b>LMGZ308</b>	1208	1	40 (1.5748)	80 (3.1496)	18 <sup>1)</sup> (0.7087)	
<b>LMGZ310</b>	1310	1	50 (1.9685)	110 (4.3307)	27 (1.0630)	
	21310	2	50 (1.9685)	110 (4.3307)	27 (1.0630)	
<b>LMGZ312</b>	2212	1	60 (2.3622)	110 (4.3307)	28 <sup>2)</sup> (1.1024)	
	22212	2	60 (2.3622)	110 (4.3307)	28 <sup>2)</sup> (1.1024)	
<b>LMGZ313</b>	1313	1	65 (2.5591)	140 (5.5118)	33 (1.2992)	
	21313	2	65 (2.5591)	140 (5.5118)	33 (1.2992)	
<b>LMGZ316</b>	2216	1	80 (3.1496)	140 (5.5118)	33 (1.2992)	
	22216	2	80 (3.1496)	140 (5.5118)	33 (1.2992)	

1) distance ring, in scope  
 2) thinner clip ring, in scope

**LMGZ-Series : Bearings**



Various types of bearings can be utilised with an LMGZ series sensor. FMS recommends the use of self-aligning versions to compensate for shaft alignment errors and to avoid measuring inconsistencies.



**LMGZ-Series : Dimensions**

Size Type	D mm (in.)	d1 mm (in.)	d2 mm (in.)	d3 mm (in.)	d4 mm (in.)	b1 mm (in.)	b2 mm (in.)	b4 mm (in.)	h mm (in.)	u mm (in.)
LMGZ200	26 (1.02)	50 (1.97)	14 (0.55)	94 (3.70)	64 (2.52)	37 (1.46)	8 (0.31)	3 (0.12)	126 (4.96)	5.5 (0.22)
LMGZ201	32 (1.26)	50 (1.97)	16 (0.63)	100 (3.94)	70 (2.76)	37 (1.46)	10 (0.39)	3 (0.12)	132 (5.20)	6.6 (0.26)
LMGZ203	40 (1.57)	60 (2.36)	22 (0.87)	105 (4.13)	75 (2.95)	37 (1.46)	12 (0.47)	3 (0.12)	137 (5.39)	6.6 (0.26)
LMGZ204	52 (2.05)	70 (2.76)	32 (1.26)	125 (4.92)	95 (3.74)	48.1 (1.89)	15 (0.59)	4 (0.16)	157.5 (6.20)	6.6 (0.26)
LMGZ205	52 (2.05)	70 (2.76)	32 (1.26)	125 (4.92)	95 (3.74)	48.1 (1.89)	15 (0.59)	4 (0.16)	157.5 (6.20)	6.6 (0.26)
LMGZ307	80 (3.15)	100 (3.94)	45 (1.77)	175 (6.89)	135 (5.31)	65.9 (2.59)	21 (0.83)	4 (0.16)	207.5 (8.17)	9 (0.35)
LMGZ308	80 (3.15)	100 (3.94)	50 (1.97)	175 (6.89)	135 (5.31)	65.9 (2.59)	18 (0.71)	4 (0.16)	207.5 (8.17)	9 (0.35)
LMGZ310	110 (4.33)	130 (5.12)	65 (2.56)	225 (8.86)	175 (6.89)	75.9 (2.99)	27 (1.06)	4 (0.16)	258 (10.16)	11 (0.43)
LMGZ312	110 (4.33)	130 (5.12)	70 (2.76)	225 (8.86)	175 (6.89)	75.9 (2.99)	28 (1.10) <sup>3)</sup>	4 (0.16)	258 (10.16)	11 (0.43)
LMGZ313	140 (5.51)	160 (6.30)	80 (3.15)	270 (10.63)	220 (8.66)	80.9 (3.19)	33 (1.30)	4 (0.16)	303.5 (11.95)	11 (0.43)
LMGZ316	140 (5.51)	160 (6.30)	90 (3.54)	270 (10.63)	220 (8.66)	80.9 (3.19)	33 (1.30)	4 (0.16)	303.5 (11.95)	11 (0.43)

<sup>3)</sup> actually 27 mm, but with grinded clip rings space for 28 mm bearing

**LMGZ-Series : Nominal forces, Deflection, Weight**

Size Type	Nominal force N (lbf.)	Deflection mm (in.)	Weight kg (lbs.)
LMGZ200	33, 50, 100 (7, 11, 22)	0.28 (0.0110)	1.7 (3.7)
LMGZ201	50, 125, 250, 500 (11, 28, 56, 112)	0.32 (0.0126)	1.8 (4.0)
LMGZ203	50, 125, 250, 500, 750, 1000 (11, 28, 56, 112, 169, 225)	0.32 (0.0126)	2.0 (4.4)
LMGZ204	125, 200, 375, 750, 1500 (28, 45, 84, 169, 337)	0.38 (0.0150)	3.3 (7.3)
LMGZ205	125, 200, 375, 750, 1500 (28, 45, 84, 169, 337)	0.38 (0.0150)	3.3 (7.3)
LMGZ307	375, 750, 1500, 3000 (84, 169, 337, 674)	0.12 (0.0047)	9.1 (20.1)
LMGZ308	375, 750, 1500, 3000 (84, 169, 337, 674)	0.12 (0.0047)	9.1 (20.1)
LMGZ310	375, 750, 1'500, 3'000, 6'000, 12'000 <sup>1)</sup> (84, 169, 337, 674, 1'349, 2'698 <sup>1)</sup> )	0.54 (0.0213) 0.12 (0.0047)	16.3 (35.9)
LMGZ312	375, 750, 1'500, 3'000, 6'000, 12'000 <sup>1)</sup> (84, 169, 337, 674, 1'349, 2'698 <sup>1)</sup> )	0.54 (0.0213) 0.12 (0.0047)	16.3 (35.9)
LMGZ313	2'500, 5'000, 10'000, 25'000 <sup>1)</sup> (562, 1'124, 2'248, 5'620 <sup>1)</sup> )	0.54 (0.0213) 0.12 (0.0047)	24.0 (52.9)
LMGZ316	2'500, 5'000, 10'000, 25'000 <sup>1)</sup> (562, 1'124, 2'248, 5'620 <sup>1)</sup> )	0.54 (0.0213) 0.12 (0.0047)	24.0 (52.9)

<sup>1)</sup> Types available only in H15 version

LMGZ-Series : Technical data	
<b>Sensitivity</b>	1.8 mV/V
<b>Tolerance of sensitivity</b>	< ± 0.2%
<b>Accuracy class</b>	± 0.3% (F <sub>Nom</sub> )
<b>Measuring range</b>	100:1
<b>Temperature coefficient</b>	± 0.1% / 10 K
<b>Temperature range</b>	- 10 to +60 °C (14 F to 140 F)
<b>Protection class</b>	IP42
<b>Input resistance</b>	350 Ω
<b>Power supply</b>	1 to 10 VDC
<b>Overload protection</b>	20-times nominal force
<b>Axial load</b>	20% nominal force
<b>Sensor material</b>	Stainless steel

LMGZ-Series : Order code	
<b>LMGZ</b> <b>201</b> <b>.125</b> <b>.12</b> <b>.H13.H16</b>	Options Shaft diameter in mm Nominal force rating Size Series

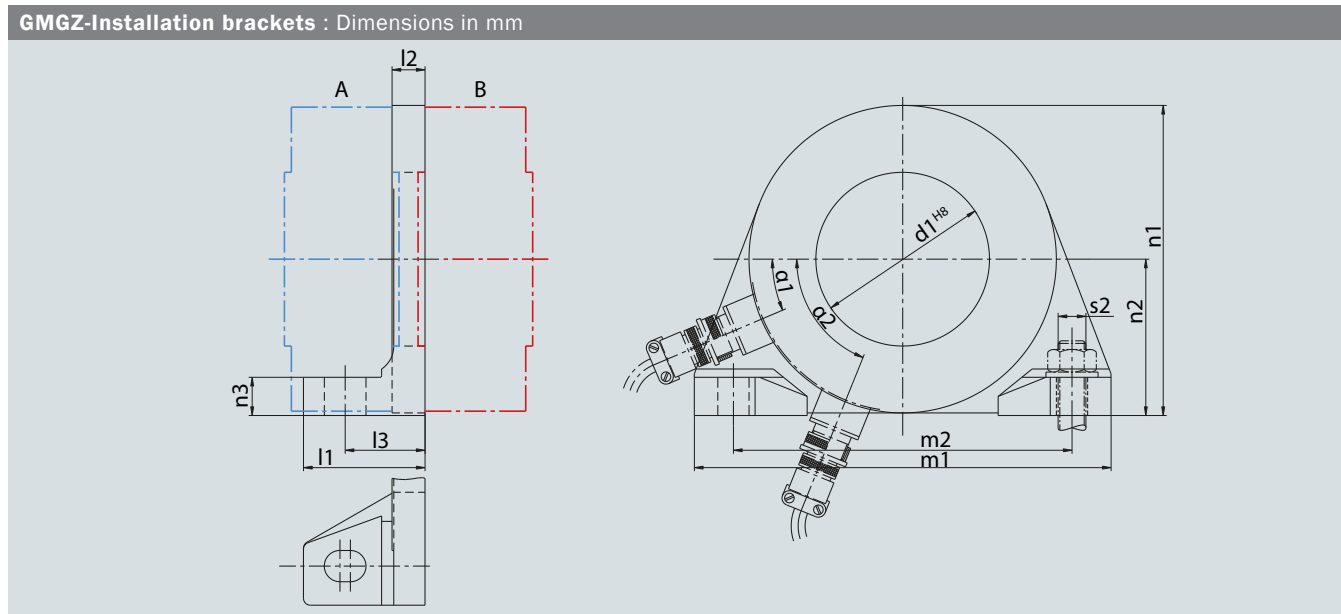
LMGZ-Series : Options	
<b>H13</b>	open covers for both sides, additional scope of supply 1 pcs. V-ring
<b>H14</b>	right-angle connector in scope of supply, replaces straight connector
<b>H15</b>	connector offset 90°, red point on connector side
<b>H16</b>	temperature range up to 120 °C (248 °F)
<b>H18</b>	with water tight, straight connector, replaces original connector
<b>H19</b>	grease nipple
<b>H21</b>	electrical connection with PG gland with 5 m (16.4 ft.) cable, replaces connector
<b>H29</b>	resistant against aggressive media, especially acids (please specify), up to 120 °C (248 °F)
<b>H30</b>	resistant against aggressive media, especially hydrocarbons (please specify) up to 120 °C (248 °F)
<b>H31</b>	for vacuum applications to 1E-7 hPa 1E-5 Torr, temperature range up to 120 °C (248 °F)
<b>H32</b>	vacuum to 1E-7 hPa 1E-5 Torr, up to 150 °C (302 °F), with pg-gland and 5 m (16.4 ft.) cable
<b>H33</b>	temperature range up to 150 °C (302 °F), with pg-gland and 5 m (16.4 ft.) cable

LMGZ-Series : Scope of supply	
● force sensor ● straight connector (female) ● open cover ● closed cover ● V-ring ● clip ring ● distance ring (for narrower bearing) ● thinner clip ring (for wider bearing)	

LMGZ-Series : Accessories	
● bearing ● installation bracket ● prefabricated cable (specify length) with connector (straight or right-angle)	

**GMGZ-Installation brackets**

When it is not conducive to mount the sensors directly onto the machine frame, the GMGZ Series supports are available for all sizes of LMGZ sensors. They are made of durable cast iron and can either be supplied blank (customer drills the sensor mounting holes in them to optimise the positioning of the sensor) or with a 360° clock-wise pattern of pre-drilled mounting holes. Mounting positions between 1 and 2 are not possible as the support foot interferes with the sensor connector.



GMGZ-Series : Dimensions													
Force Sensor Type	Suitable support Type	Weight kg	Dimensions GMGZ-installation brackets (mm)										
			d1 mm	l1 mm	l2 mm	l3 mm	m1 mm	m2 mm	n1 mm	n2 mm	n3 mm	s2	α 1 bis α 2
<b>LMGZ200</b> <b>LMGZ201</b>	GMGZ 201	0.8	50	40	10	25.25	140	115	109.5	56	12	M8	17° bis 74°
<b>LMGZ203</b>	GMGZ 203	0.8	60	40	10	25.25	140	115	109.5	56	12	M8	17° bis 74°
<b>LMGZ204</b> <b>LMGZ205</b>	GMGZ 205	1.4	70	45	12	31.75	170	140	130.5	67	16	M10	20° bis 69°
<b>LMGZ307</b> <b>LMGZ308</b>	GMGZ 307	4.5	100	70	20	46.5	240	195	178.5	90	22	M16	22° bis 60°
<b>LMGZ310</b> <b>LMGZ312</b>	GMGZ 310	9.0	130	90	25	58	290	240	232	118	28	M20	28° bis 65°
<b>LMGZ313</b> <b>LMGZ 316</b>	GMGZ 313	11.8	160	100	25	62.5	340	290	274	141	28	M20	28° bis 65°

GMGZ-Series : Dimensions													
Force Sensor Type	Suitable support Type	Weight (lbs.)	Dimensions GMGZ-installation brackets (in.)										
			d1 (in.)	l1 (in.)	l2 (in.)	l3 (in.)	m1 (in.)	m2 (in.)	n1 (in.)	n2 (in.)	n3 (in.)	s2	α 1 bis α 2
<b>LMGZ200</b> <b>LMGZ201</b>	GMGZ 201	(1.8)	(1.87)	(1.57)	(0.39)	(0.99)	(5.51)	(4.53)	(4.29)	(2.20)	(0.47)	M8	17° bis 74°
<b>LMGZ203</b>	GMGZ 203	(1.8)	(2.36)	(1.57)	(0.39)	(0.99)	(5.51)	(4.53)	(4.29)	(2.20)	(0.47)	M8	17° bis 74°
<b>LMGZ204</b> <b>LMGZ205</b>	GMGZ 205	(3.1)	(2.76)	(1.77)	(0.47)	(1.25)	(6.69)	(5.51)	(5.12)	(2.64)	(0.63)	M10	20° bis 69°
<b>LMGZ307</b> <b>LMGZ308</b>	GMGZ 307	(9.9)	(3.94)	(2.76)	(0.79)	(1.83)	(9.45)	(7.68)	(7.01)	(3.54)	(0.87)	M16	22° bis 60°
<b>LMGZ310</b> <b>LMGZ312</b>	GMGZ 310	(19.8)	(5.12)	(3.54)	(0.98)	(2.28)	(11.42)	(9.45)	(9.13)	(4.65)	(1.10)	M20	28° bis 65°
<b>LMGZ313</b> <b>LMGZ 316</b>	GMGZ 313	(26.0)	(6.30)	(3.94)	(0.98)	(2.46)	(13.39)	(11.42)	(10.63)	(5.55)	(1.10)	M20	28° bis 65°



**Other products : Tension Control**

Measuring Amplifiers	Tension Controllers	Intrinsically Safe Barrier

**About us**

FMS Force Measuring Systems AG is the market leader in the field of web tension measurement, control and specialist for web guiding solutions. For the wire industry we are the only manufacturer offering a complete range of technologies for force measurement, data processing and radio transmission of signals.

Our in house developed products are used in the manufacturing industry, converting, metals, paper, textiles, as well as in cable and wire rope production. Utilising the latest technology, high quality components and a firm understanding of customer applications, FMS supports customers worldwide in the effort to maximize the productivity of their machines. Since 1993, our highly qualified employees have been creating high-end solutions for machine builders and plant operators. As an owner-managed company, we pride ourselves on being personal and approachable with the ability to make decisive moves fast.

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