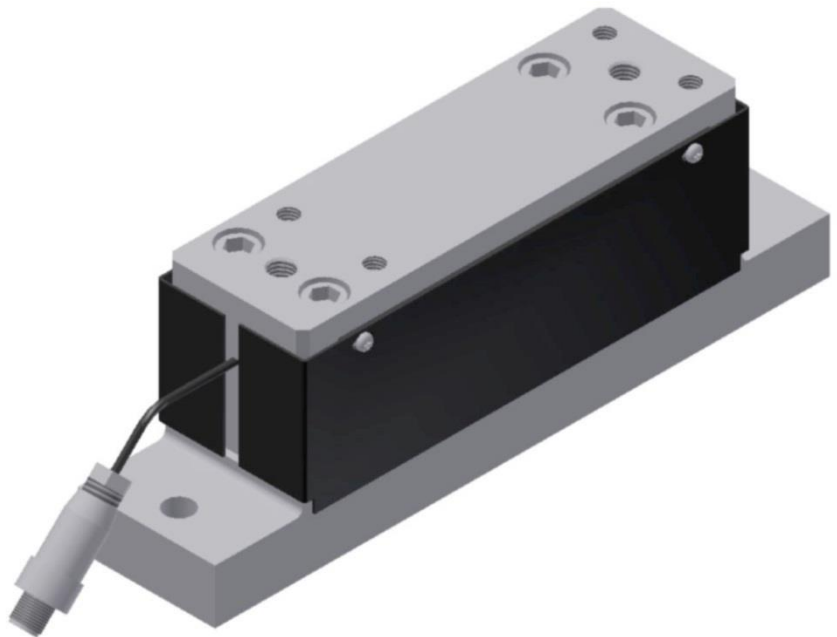




# MAGPOWR GTS Load Cell

## User Manual

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MI 850A347 1 A

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## About these operating instructions

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Periodically there will be updates to this manual. The latest version is available on our website or by calling your regional office listed on the back page of this publication.

These load cell devices must not be installed or used in a machine or system which does not comply with the machinery directive 2006/42/EC.

These load cell devices were designed and manufactured to be installed as Partly Completed Machinery into a machine or partly completed machine.

The instructions must be read and used by all persons who have the responsibility of installing and maintaining these load cell devices.

These instructions must be retained and incorporated in the technical documentation for the machine or partly completed machinery into which the load cell device is installed.

## CE marking

Only the 2006/42/EC Machinery directive applies to these devices and they are not marked with the CE sign.

### Electromagnetic Compatibility (EMC)

The load cell device is inherently benign in terms of electromagnetic compatibility and the EMC directive has not been applied. The electromagnetic compatibility of the load cell device can only be assessed in connection with the entire electrical installation including the control. The machine builder who installs this partly completed machinery into a machine is responsible for compliance with the EMC directive.

**Product overview**

The model GTS load cell is designed to be mounted under standard inch and metric pillow block bearings. All GTS load cells are pre-drilled and tapped to accept metric pillow block bearings.

Top Plate Adapter kits are also available to accommodate special mounting requirements for the metric series of GTS load cells. GTS load cells are compatible with all MAGPOWR tension readouts and controls.

**Theory of operation**

The load cell construction consists of a beam with a metal foil strain gage bonded at the bending point of the beam. The spring constant of the beam causes the beam to deflect with the applied force. The beam deflection causes the strain in the metal below the strain gage to vary linearly with the applied force. The strain gage converts the induced strain into an electrical signal which is proportional to the induced strain.

**Model number key**

Series - Size - Maximum force - Connector type -Units type - Sxx

<b>Series</b>	GTS - Global Load Cell
<b>Size</b>	Models A, B
<b>Maximum force</b>	Pounds = English Kilograms = Metric
<b>Connector type</b>	EC12
<b>Units type</b>	Blank = English units M = Metric units (dimensions and force)
<b>Sxx</b>	Specials: Other variations

## Available models

<b>English series</b>	<b>Force rating</b>
G TSA22-EC12	22 lbs
G TSA55-EC12	55 lbs
G TSA110-EC12	110 lbs
G TSB220-EC12	220 lbs
G TSB550-EC12	550 lbs
G TSB1100-EC12	1100 lbs
G TSB2200-EC12	2200 lbs

<b>Metric series</b>	<b>Force rating</b>
G TSA10-EC12M	10 kg
G TSA25-EC12M	25 kg
G TSA50-EC12M	50 kg
G TSB100-EC12M	100 kg
G TSB250-EC12M	250 kg
G TSB500-EC12M	500 kg
G TSB1000-EC12M	1000 kg

### Selection and sizing

To properly size any model GTS load cell select the case (which resembles your application) from the examples shown below. Using your known maximum tension, roll weight, and angles as shown, apply the equation to calculate a load rating "L". Select a load cell with a load rating greater than that calculated.

**Example: in Case 2 below**      then       $L = ( 2 * T * \sin(A/2) * (\cos B + \sin B) ) + w/2$   
 $T = 75 \text{ kg}$        $L = ( 2(75) * \sin 90^\circ * (\cos 30^\circ + \sin 30^\circ) ) + (20/2)$   
 $A = 180^\circ, B = 30^\circ$        $L = ( (150)(1)(0.866 + 0.500) ) + 10$   
 $w = 20 \text{ kg}$        $L = 215 \text{ kg}$   
 Select a pair of GTSB250-EC12M load cells

$L = 2 T \sin(A/2) (\cos B + \sin B) \pm (W/2)$

SEE CASES BELOW

L = LOAD CELL RATING  
 T = MAXIMUM TENSION  
 R = RESULTANT FORCE DUE TO TENSION  
 W = ROLL WEIGHT  
 A = WRAP ANGLE  
 B = ANGLE BETWEEN RESULTANT FORCE DIRECTION AND THE CENTERLINE OF THE LOAD CELL

RESULTANT FORCE DIRECTION MUST BE IN QUADRANT 1 OR 2

**CASE 1**  
 + FOR RESULTANT IN QUADRANT 1  
 - FOR RESULTANT IN QUADRANT 2 (SHOWN)

**CASE 2**  
 - FOR RESULTANT IN QUADRANT 1  
 + FOR RESULTANT IN QUADRANT 2 (SHOWN)

**CASE 3**  
 + FOR RESULTANT IN QUADRANT 1  
 - FOR RESULTANT IN QUADRANT 2 (SHOWN)

**CASE 4**  
 - FOR RESULTANT IN QUADRANT 1  
 + FOR RESULTANT IN QUADRANT 2 (SHOWN)

**NOTES**

Angle B cannot exceed 45°.

The second term (roll weight "W"/2) of the equation must not exceed 50% of the selected load cell rating. If it does exceed 50%, select the next larger load cell rating.

When the resultant force (R) is pulling in a direction away from the load cell, the signal leads must be reversed at the terminal block of the control.

Degrees	Sine	Cosine	Degrees	Sine	Cosine
0	0.0000	1.0000	50	0.7660	0.6428
5	0.0872	0.9962	55	0.8192	0.5736
10	0.1736	0.9848	60	0.8660	0.5000
15	0.2588	0.9659	65	0.9063	0.4226
20	0.3420	0.9397	70	0.9397	0.3420
25	0.4226	0.9063	75	0.9659	0.2588
30	0.5000	0.8660	80	0.9849	0.1736
35	0.5736	0.8192	85	0.9962	0.0872
40	0.6428	0.7660	90	1.0000	0.0000
45	0.7071	0.7071			

## Instructions for use

To ensure safe and problem free installation of the load cell device, the load cell must be properly transported and stored, professionally installed and placed in operation. Proper operation and maintenance will ensure a long service life of the device. Only persons who are acquainted with the installation, commissioning, operation and maintenance of the system and who possess the necessary qualifications for their activities may work on the load cell. **Note:** The safety information may not be comprehensive.



Please note the following:

The content of these operating instructions

Any safety instructions on the device

The machine manufacturer's specifications

All national, state, and local requirements for installation, accident prevention and environmental protection

## Information about safety instructions

The safety instructions and symbols described in this section are used in these operating instructions. They are used to avoid possible dangers for users and to prevent material damage.



### SIGNAL WORD

Source of danger and its results

Avoiding dangers

The signal word **DANGER** refers to the danger of death or serious bodily injuries.

The signal word **WARNING** refers to the danger of moderate to severe bodily injuries.

The signal word **CAUTION** refers to the danger of slight to moderate bodily injuries or material damage.

The signal word **NOTICE** refers to the possibility of damage to equipment.

## Symbols used

The following safety identification symbols are used in these operating instructions.



WARNING/CAUTION – General danger or important note  
Reference to general hazards that may result in bodily injuries or damage to device or material.



WARNING/CAUTION – Danger due to crushing  
Reference to danger of injury caused by crushing.



WARNING/CAUTION – Danger due to cutting  
Reference to danger of injury caused by cutting.



WARNING/CAUTION – Danger due to voltage, electric shock  
Reference to danger of injury caused by electric shock due to voltage.



WARNING/CAUTION – Danger due to hot surfaces  
Reference to risk of injury caused by burning.



## Basic safety information

### Proper use

The load cell devices are intended to be used on machines or systems to monitor the tension in a web.

Indoor operation.

### Improper use

Operation outside the technical specifications

Operation in an Ex-area or intrinsically safe area without a proper barrier.

Any other use than the proper use shall be deemed inappropriate

### Installation and commissioning

Any load cell device that is damaged must not be installed or put into operation.

Only perform installation, maintenance or repair tasks on the load cell device when the machine has been stopped and is secured from being turned on.

Only perform installation, maintenance or repair tasks on the load cell device when there is no electrical power in the system.

The load cell device must be securely mounted before being placed in operation.

No modifications may be made to the load cell device.

Do not place electrical cables under mechanical strain.



### Maintenance and repair

Warning - Danger of injury from crushing

Maintenance and repair tasks on the load cell device must be performed only when the machine has been stopped and has been secured from being turned on again.

### Decommissioning

The load cell must be disposed of in accordance with all the applicable national, state and local regulations.

## Mechanical and electrical installation



CAUTION - Possible damage to load cell.  
Do not hammer on the load cell.



CAUTION - Possible damage to load cell.  
Do not disassemble the load cell - there are no serviceable parts inside the unit.



WARNING - Danger of injury from crushing.  
Maintenance and repair tasks on the load cell device must be performed only when the machine has been stopped and has been secured from being turned on again.

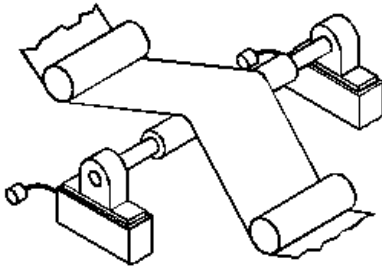


Figure 1. Typical Load Cell Usage

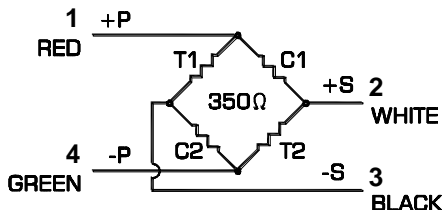


Figure 2. Load Cell Wiring

1. Select a mounting location where the wrap angle of the web does not change.
2. GTS load cells are designed to be mounted under standard, self-aligning pillow block bearings, which support an idler roll shaft. Two GTS load cells should be used to measure tension on one idler roll. Mount the load cells on opposite sides of the machine, on a clean and flat surface of the machine frame. The load cells can be mounted in any orientation.
3. Observe the wrap angle of the web, and insure that the resultant force due to web tension is in the "YES" zone as indicated on the label. If not, turn the load cell around and recheck the direction of the resultant force.

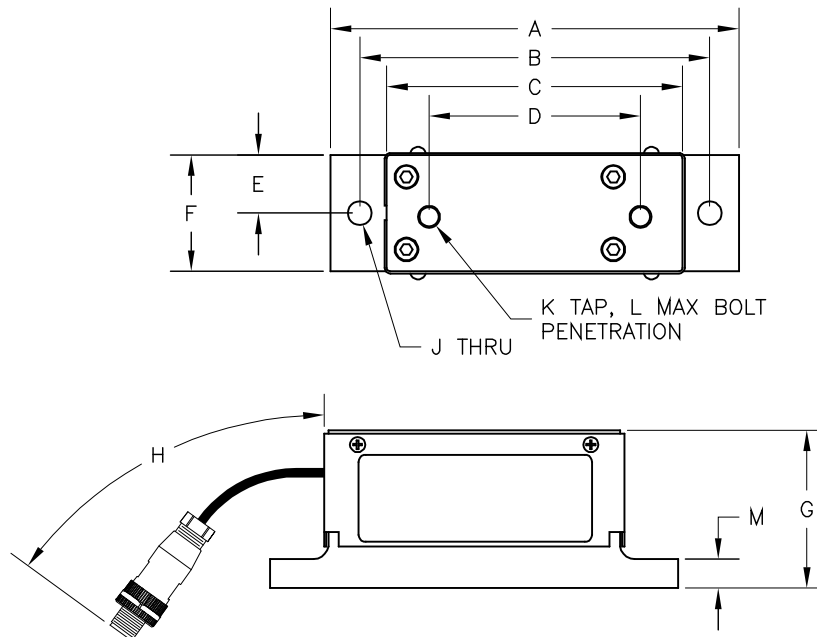
**NOTE:** If the resultant force is "upward" (away from the load cell), reverse the black (-s) and white (+s) signal leads at the readout or control terminal block.

**Mechanical and electrical installation**  
(continued)

4. When installing the pillow block bearing, DO NOT EXCEED THE SPECIFIED MAXIMUM BOLT PENETRATION. See Table 1 for the maximum bolt penetration for the top mounting threads.
5. If the shaft is exposed to higher temperatures during operation, an expansion type pillow block bearing must be used to accommodate shaft expansion.
6. The sensing roll must be concentric and balanced for high speed operation.
7. Connect the load cell to the MAGPOWR readout or control with shielded cable.

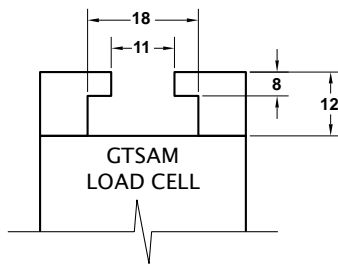
	G TSA(M)	G TSB(M)
Maximum bolt penetration	16 mm (0.63 inch)	25.4 mm (1 inch)

Table 1. Maximum Bolt Penetration

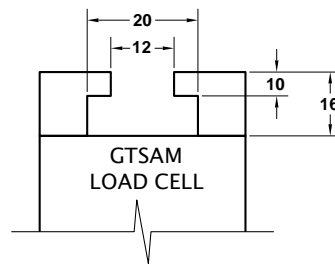


MODEL	UNITS	A	B	C	D	E	F	G	H	J	K	L	M
G TSA	INCHES	7.25	6.375	5.0	3.750	1.00	2.00	2.50	6.0	0.422	3/8-16 UNC	0.63	0.50
G TSA M	MM	184.2	161.93	127	95.25	25.4	50.8	63.5	152	10.72	M10 X 1.75	15.9	12.7
G TSB	INCHES	11.19	10.000	8.0	6.250	1.25	2.50	3.88	12.0	0.500	7/16-14 UNC	1.00	1.00
G TSB M	MM	284.2	254.00	203	158.75	31.8	63.5	98.4	304.8	12.70	M12 X 1.75	25.4	25.4

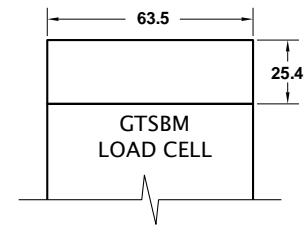
## Top plate adapters



TA1 (installed dimensions)  
T-slot top plate adapter  
For size 'A' metric load cell only



TA2 (installed dimensions)  
T-slot top plate adapter  
For size 'A' metric load cell only



TA3 (installed dimensions)  
Blank top plate adapter  
For size 'B' metric load cell only

## Top plate adapter kits

Due to the large number of metric pillow blocks, and in keeping with metric practices, mounting adapter kits are available for the metric series load cells. Order one kit for each load cell. Load cells are pre-tapped to receive the correct adapter kit.

Model	Description
TA1	11 mm T-Slot Kit for GTSAM; includes 2 rails and four M6 screws
TA2	12 mm T-Slot Kit for GTSAM; includes 2 rails and four M6 screws
TA3	Blank Top Plate Kit for GTSBM; includes plate and four M10 screws

## Adapter kit installation



**WARNING** - Danger of injury from crushing. Maintenance and repair tasks on the load cell device must be performed only when the machine has been stopped and has been secured from being turned on again.

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**CAUTION** - Possible damage to load cell. The Adapter Kit must be installed on the load cell **after** the pillow block mounting holes are drilled and tapped. **DO NOT** drill and tap holes with the Adapter Kit installed on the load cell.

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### TA1 and TA2 Installation

The TA1 and TA2 T-Slot Adapter kits can be installed on any GTSAM load cell.

1. Position the (2) T-Slot rails over the (4) mounting holes in the top of the GTSAM load cell
2. Install the (4) screws through the counter-bored holes in each rail.

### TA3 Installation

The TA3 Blank Top Plate Kit can be installed on any GTSBM load cell.

1. Drill and tap holes in the top plate adapter to accommodate the mounting of the pillow block.
2. Position the TA3 adapter over the (4) mounting holes in the top of the GTSBM load cell
3. Install the (4) screws through the counter-bored holes in the adapter plate.

## Specifications



WARNING – Do not use the devices outside of their rated specifications.

Gage Resistance	350 ohm
Gage Type	Metal foil, full bridge
Excitation Voltage	10 VDC nominal
Output Signal	21 mVDC nominal at full load rating
Operating Temperature	-30°C to 80°C
Temperature effect on zero	0.02% of rating per °C
Combined non-linearity and hysteresis	0.5% of full scale maximum
Repeatability	0.2% of full scale maximum
Overload stops	105% to 150% of full load rating
Deflection at full load	<p>GTSA(M) = 0.38 mm [0.015 in.]</p> <p>GTSA(M) = 0.38 mm [0.015 in.]</p> <p>GTSB220-EC12 = 0.23 mm [0.009 in.]</p> <p>GTSB550-EC12 = 0.23 mm [0.009 in.]</p> <p>GTSB100-EC12M = 0.23 mm [0.009 in.]</p> <p>GTSB250-EC12M = 0.23 mm [0.009 in.]</p> <p>GTSB1100-EC12 = 0.15 mm [0.006 in.]</p> <p>GTSB500-EC12M = 0.15 mm [0.006 in.]</p> <p>GTSB2200-EC12 = 0.38 mm [0.015 in.]</p> <p>GTSB1000-EC12M = 0.38 mm [0.015 in.]</p>

Weight	GTSA(M) = 1.4 kg [3 lb.]; GTSB(M) = 3.4 kg [7.5 lb.]; TA1 = 0.14 kg [0.3 lb.]; TA2 = 0.18 kg [0.4 lb.]; TA3 = 0.9 kg [1.9 lb.];
Cable Connector	12B222-1; MAGPOWR mating cable assembly Part #LCC5M, or mating connector Part #12B220-1 (pin 1, +power; pin 2, + signal; pin 3, -signal; pin 4, -power)
Climate Class	3K4 (EN60721)
IP Protection Classification	IP67 (EN60529)

## Service requests and replacement parts

To request service or to get replacement parts, contact one of the following addresses:

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Fife Corporation  
222 West Memorial Rd.  
Oklahoma City, OK, 73114, USA  
Phone: 1.405.755.1600  
Fax: 1.405.755.8425  
Web: [www.maxcessintl.com](http://www.maxcessintl.com)

Fife-Tidland GmbH		
Max-Planck-Strasse 8	OR	Siemensstrasse 13-15
65779 Kelkheim		48683 Ahaus
Deutschland		Deutschland
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