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## Original Instructions INSTRUCTION MANUAL Model GTS

### Load Cells For Under Pillow Block Applications

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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 was 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.

## INTRODUCTION

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 standard inch and 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 – UnitsType – Sxx

**Series:** GTS – Global Tension Sensor

**Size:** A, B

### Maximum

**Force:** Pounds = English Models  
Kilograms = Metric Models

**UnitsType:** Blank = English units (dimensions and force)  
M = Metric units (dimensions and force)

**Sxx:** Specials: Other variations

## AVAILABLE MODELS

English Series	Force Rating	Metric Series	Force Rating
GTSA11	11 lb	GTSA5M	5 kg
GTSA22	22 lb	GTSA10M	10 kg
GTSA55	55 lb	GTSA25M	25 kg
GTSA110	110 lb	GTSA50M	50 kg
GTSB220	220 lb	GTSB100M	100 kg
GTSB550	550 lb	GTSB250M	250 kg
GTSB1100	1100 lb	GTSB500M	500 kg
GTSB2200	2200 lb	GTSB1000M	1000 kg

## SAFETY INSTRUCTIONS

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.



- The content of these instructions must be read and followed.
- All national, state, and local requirements for installation, accident prevention and environmental protection must be followed.

The safety instructions and symbols described in this section 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 **WARNING** refers to the danger of moderate to severe bodily injuries or death.

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



**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 via an idler roller on a pillow block bearing mounted to the load cell device.
- 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 which 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 GTS load cell.



CAUTION – Possible damage to load cell.  
Do not disassemble the load cell – There is nothing inside that you can 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.

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.
4. When installing the pillow block bearing, **DO NOT EXCEED THE SPECIFIED MAXIMUM BOLT PENETRATION.** The maximum bolt penetration for the top mounting threads are given in table 1.



**CAUTION** – Possible damage to load cell.

Do not exceed the specified maximum bolt penetration.

	G TSA/M	G TSB/M
Maximum Bolt Penetration	16 mm (0.63 in.)	25.4 mm (1.0 in.)

Table 1. Maximum Bolt Penetration

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.

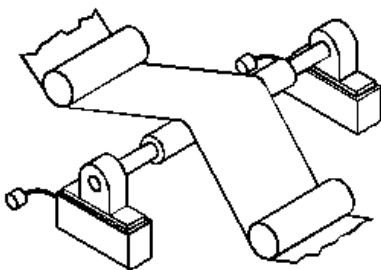


Figure 1. Typical GTS Load Cell Usage

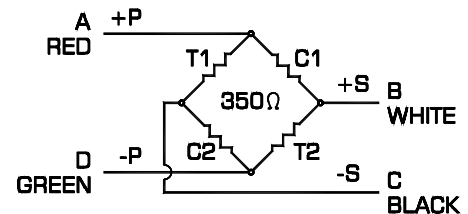
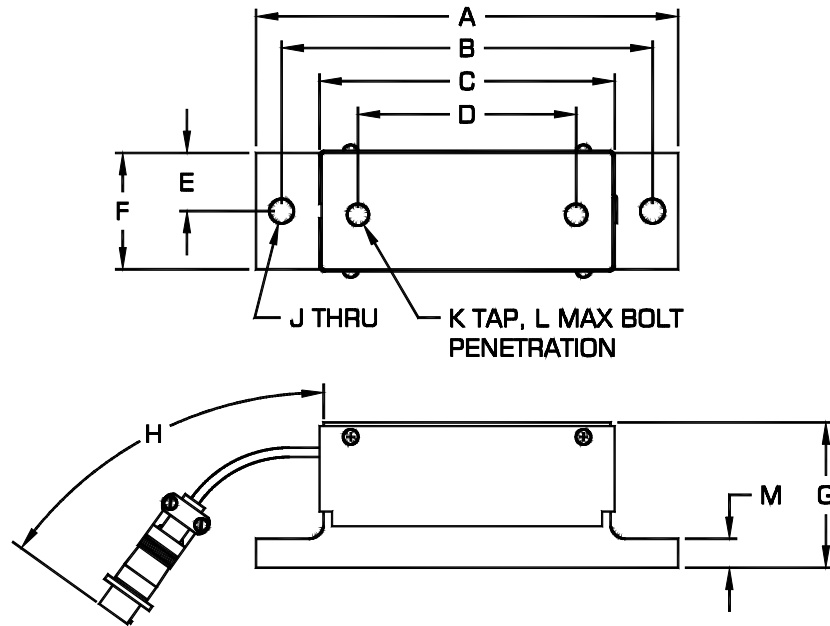


Figure 2. Load Cell Wiring



**DIMENSIONS**

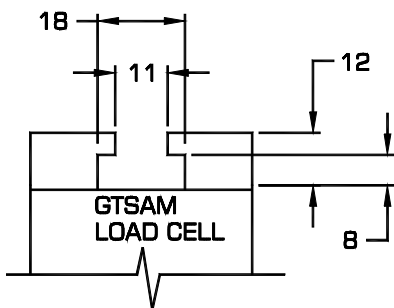
**INCH MODEL DIMENSIONS (INCHES)**

Model	A	B	C	D	E	F	G	H	J	K	L	M
G TSA	7.25	6.375	5.0	3.750	1.00	2.00	2.50	6	0.422	3/8-16	0.63	0.50
G TSB	11.19	10.000	8.0	6.250	1.25	2.50	3.88	12	0.500	7/16-14	1.00	1.00

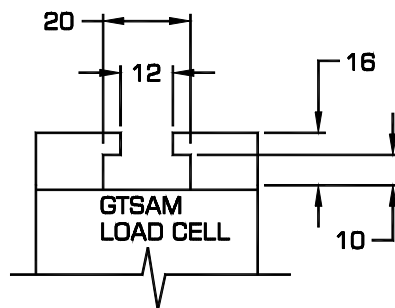
**METRIC MODEL DIMENSIONS (MILLIMETERS)**

Model	A	B	C	D	E	F	G	H	J	K	L	M
G TSAM	184	162	127	95	25	51	64	152	11	M10X1.5	16	13
G TSBM	284	254	203	159	32	64	98	305	13	M12X1.75	25	25

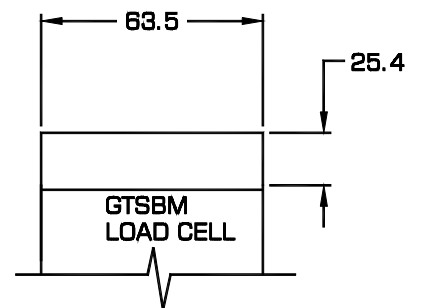
**TOP PLATE ADAPTERS**



TA1 (INSTALLED DIMENSIONS)  
T-SLOT TOP PLATE ADAPTER  
(FOR SIZE "A" LOAD CELL ONLY)



TA2 (INSTALLED DIMENSIONS)  
T-SLOT TOP PLATE ADAPTER  
(FOR SIZE "A" LOAD CELL ONLY)



TA3 (INSTALLED DIMENSIONS)  
BLANK TOP PLATE ADAPTER  
(FOR SIZE "B" LOAD CELL ONLY)

LENGTH OF "T-SLOT" ADAPTERS IS 127 mm

## 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 95°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	GTSA = 0.38 mm [0.015 in.]; GTSB220 & 550 = 0.23 mm [0.009 in.]; GTSB1100 = 0.15 mm [0.006 in.]; GTSB2200 = 0.38 mm [0.015 in.]
Weight	GTSA = 1.4 kg [3 lb.]; GTSB = 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	PT01W-10-6P; MAGPOWR mating cable assembly Part #SCE15, or mating connector Part #12B193-6 (pin A, +power; pin b, + signal; pin C, -signal; pin D, -power)
Climate Class	3K4 (EN60721)
IP Protection Classification	IP67 (EN60529)

## 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.

<u>Model No.</u>	<u>Description</u>
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

## INSTALLATION OF ADAPTER KITS



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.

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

### TA1 and TA2 Installation:

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

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

### TA3 Installation:

Drill and tap holes in the top plate adapter to accommodate the mounting of the pillow block.

Position the TA3 adapter over the (4) mounting holes in the top of the GTSBM load cell, and install the (4) screws through the counter-bored holes in the adapter plate.



CAUTION – Possible damage to load cell.

The Adapter Kit must be installed on the load cell after the pillow block mounting holes have been drilled and tapped. Do Not drill and tap holes with the Adapter Kits installed on the load cell.

## 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,**  
**T = 150 lbs., A = 180°, B = 30°, w = 50 lbs.**

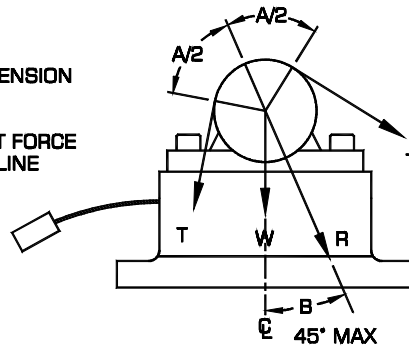
then  $L = ( 2 * T * \sin(A/2) * (\cos B + \sin B) ) + w/2$   
 $L = ( 2(150) * \sin 90^\circ * (\cos 30^\circ + \sin 30^\circ) ) + (50/2)$   
 $L = ( (300)(1)(0.866 + 0.500) ) + 25$   
 $L = 435 \text{ lbs.}$   
 Select a pair of GTSB550 load cells

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			

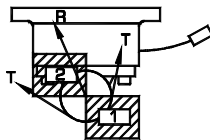
$$L = 2 T \sin(A/2) (\cos B + \sin B) \pm (W/2)$$

SEE CASES BELOW

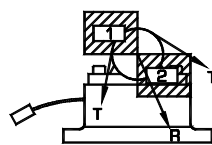
- L = LOAD CELL RATING
- T = MAXIMUM TENSION
- R = RESULTANT FORCE DUE TO TENSION
- W = ROLL WEIGHT
- A = WRAP ANGLE
- B = ANGLE BETWEEN RESULTANT FORCE DIRECTION AND THE CENTERLINE OF THE LOAD CELL



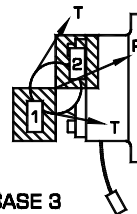
RESULTANT FORCE DIRECTION MUST BE IN QUADRANT 1 OR 2



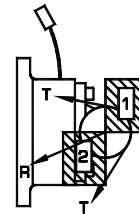
- CASE 1**
- + FOR RESULTANT IN QUADRANT 1
  - FOR RESULTANT IN QUADRANT 2 (SHOWN)



- 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.

## **SERVICE REQUESTS AND REPLACEMENT PARTS**

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

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  
Fifestrasse 1  
65779 Kelkheim  
Deutschland  
Telefon: +49-6195-7002-0  
Fax: +49-6195-7002-933  
Web: [www.maxcess.eu](http://www.maxcess.eu)

Siemensstrasse 13-15  
48683 Ahaus  
Deutschland