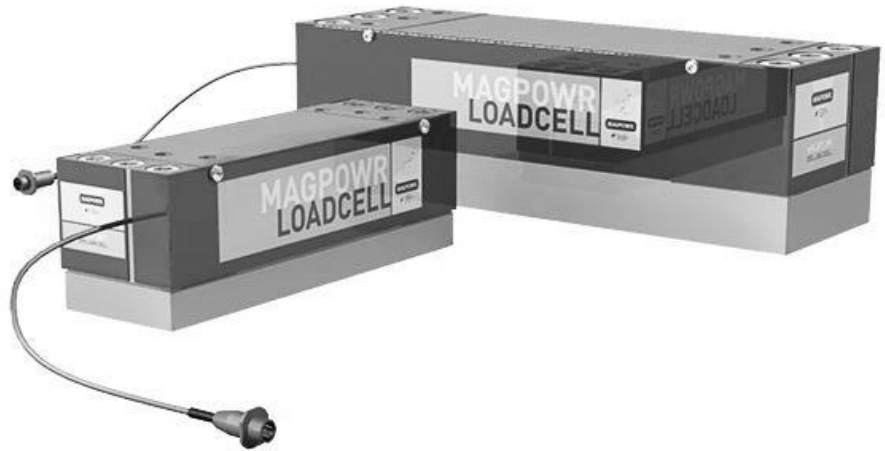




GTSCM/GTSDM Load Cells

Instruction Manual



INSTRUCTION MANUAL

Model GTSCM / GTSDM

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

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.

MODEL NUMBER KEY

Series – Size – Maximum Force – Mounting – Sxx

Series: GTS – Global Tension Sensor

Size: C, D

Maximum

Force: 2500 = 2500 kg [5500 lb]
5000 = 5000 kg [11000 lb]
7500 = 7500 kg [16500 lb]
10000 = 10000 kg [22000 lb]
15000 = 15000 kg [33000 lb]

Mounting: M = Metric dimensions (only available in metric unless special option)

Sxx: Specials: Other variations

AVAILABLE MODELS

| <u>Model No.</u> | <u>Force Rating</u> |
|------------------|---------------------|
| GTSC2500M | 2500 kg [5500 lb] |
| GTSC5000M | 5000 kg [11000 lb] |
| GTSC7500M | 7500 kg [16500 lb] |
| GTSD10000M | 10000 kg [22000 lb] |
| GTSD15000M | 15000 kg [33000 lb] |

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 or strip via an idler roller on a pillow block bearing mounted to the load cell device.

IMPROPER USE:

- Operation outside the technical specifications
- Operation in a 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.



WARNING – Danger of falling down or muscle or skeletal injury during installation.

The load cell devices, especially the larger designs, are heavy. Appropriate equipment is to be used and the safety rules of the company must be observed.

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.



WARNING – Danger of falling down or muscle or skeletal injury during maintenance and repair.

The load cell devices, especially the larger designs, are heavy. Appropriate equipment is to be used and the safety rules of the company must be observed.

INTRODUCTION

The Model GTSCM/GTSDM load cell is designed to be mounted under metric pillow block bearings. All GTSCM/GTSDM load cells are pre-drilled and tapped to accept metric pillow block bearings. Top Plate and Bottom Plate Adapter Kits are also available to accommodate special mounting requirements. GTSCM/GTSDM load cells are compatible with all MAGPOWR Tension Readouts and Controls.

INSTALLATION OF GTSCM / GTSDM LOAD CELLS



CAUTION – Possible damage to load cell.
Do not hammer on the GTSCM or GTSDM 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.



WARNING – Danger of falling down or muscle or skeletal injury during maintenance and repair.

The load cell devices, especially the larger designs, are heavy. Appropriate equipment is to be used and the safety rules of the company must be observed.

1. Select a mounting location where the wrap angle of the web does not change.
2. Use mounting bolts which have a tensile strength, yield strength and property class of at least the values listed in table 1.

| | | GTSCM | GTSDM |
|---|----------------|--------------------|---------------------|
| DIN Standard | | DIN 912 | DIN 912 |
| Property Class (minimum) | | A2/A4-70 or 8.8 | 10.9 |
| Thread | | M16 x 2 | M24 x 3 |
| Threaded Hole Capacity | | 59.1 KN (13286 Lb) | 221.5 KN (49795 Lb) |
| Top Mounting Bolts Penetration | Minimum | 16 mm [0.63 in.] | 22 mm [0.87 in.] |
| | Maximum | 23 mm [0.91 in.] | 34 mm [1.34 in.] |
| Bottom Mounting Bolts Penetration | Minimum | 16 mm [0.63 in.] | 22 mm [0.87 in.] |
| | Maximum | 40 mm [1.57 in.] | 40 mm [1.57 in.] |
| Recommended Bolt Tightening Torque | | 132 Nm [97 Lb-Ft] | 682 Nm [503 Lb-Ft] |

Table 1. Mounting Bolt Properties

3. GTSCM/GTSDM load cells are designed to be mounted under standard, self-aligning pillow block bearings, which support an idler roll shaft. Two GTSCM/GTSDM 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. The maximum and minimum bolt penetration for the bottom mounting threads are given in table 1. **DO NOT EXCEED THE SPECIFIED MAXIMUM BOLT PENETRATION.**



CAUTION – Possible damage to load cell.
Do not exceed the specified maximum bolt penetration.

4. 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.

5. When installing the pillow block bearing, **DO NOT EXCEED THE SPECIFIED MAXIMUM BOLT PENETRATION.** The maximum and minimum 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.

6. If the shaft is exposed to higher temperatures during operation, an expansion type pillow block bearing must be used to accommodate shaft expansion.
7. The sensing roll must be concentric and balanced for high speed operation.
8. Connect the load cell to the MAGPOWR readout or control with shielded cable.

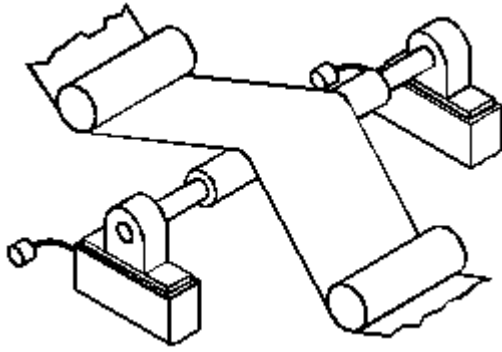


Figure 1. Typical GTS Load Cell Usage

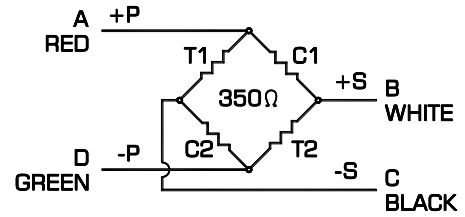


Figure 2. Load Cell Wiring

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 | Compression - 150 to 250% of full load rating Tension – None |
| Deflection at full load | GTSCM = 0.127 mm [0.005 in.]; GTSD10000M = 0.152 mm [0.006 in.]; GTSD15000M = 0.203 mm [0.0084 in.]; |
| Weight | GTSCM = 23.8 kg [52.5 lb.]; GTSDM = 60.3 kg [133 lb.]; TA4 = 9.9 kg [21.8 lb.]; for GTSC TA5 = 32.9 kg [72.5 lb.]; for GTSD BA1 = 11.0 kg [24.3 lb.]; for GTSC BA2 = 8.4 kg [18.5 lb.]; for GTSC |
| 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) |

Maximum Overload Ratings:

| Model Combinations | Quadrant (see page 7) | Resultant Force Direction (Angle Y) | |
|---|--------------------------|-------------------------------------|---------------|
| | | 0 Degrees (Normal) | <= 45 Degrees |
| GTSCM with or without any of the following adapters: TA4, BA2 or GTSDM with or without the TA5 adapter. | 1 | 200% | 150% |
| | 2 | 500% | 250% |
| GTSCM with the following bottom plate adapter BA1, and with or without the top plate adapter TA4. | 1 | 150% | 100% |
| | 2 | 500% | 250% |

TOP AND BOTTOM PLATE ADAPTER KITS

Adapter plates are available for the load cells.

| <u>Model No.</u> | <u>Description</u> |
|------------------|---|
| TA4 | Blank Top Plate Adapter Kit for GTSCM, includes four M16 screws |
| BA1 | Bottom Plate Adapter Kit for GTSCM, 410 x 70 mm mounting holes, includes six M16 screws |
| BA2 | Bottom Plate Adapter Kit for GTSCM, 254 x 76 mm mounting holes, includes six M16 screws |
| TA5 | Blank Top Plate Adapter Kit for the GTSDM, includes four M24 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.



WARNING – Danger of falling down or muscle or skeletal injury during maintenance and repair.

The load cell devices, especially the larger designs, are heavy. Appropriate equipment is to be used and the safety rules of the company must be observed.

The adapter kits include the socket head cap screws required for installation on the load cell.

The top plate adapters are installed on the top of the load cell and secured with the 4 screws installed in the 4 counterbored holes in the plate. Tighten the bolts to 132 Nm [97 Lb-Ft] for the GTSCM and 682 Nm [503 Lb-Ft] for the GTSDM.

The bottom plate adapters are installed on the bottom of the load cell and secured with the 6 screws installed in the 6 counterbored holes in the plate. Tighten the bolts to 132 Nm [97 Lb-Ft] for the GTSCM.



CAUTION – Possible damage to load cell.

The Adapter Kit must be installed on the load cell after the pillow block mounting holes or the base 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.

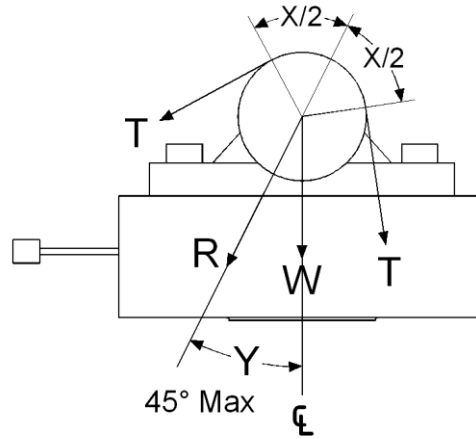
Example: In case 2 below,
T = 1500 lbs., X = 180°, Y = 30°, w = 500 lbs.

then $L = (2 * T * \sin(X/2) * (\cos Y + \sin Y)) + w/2$
 $L = (2(1500) * \sin 90^\circ * (\cos 30^\circ + \sin 30^\circ)) + (500/2)$
 $L = (3000)(1)(0.866 + 0.500) + 250$
 $L = 4348 \text{ lbs.}$
 Select a pair of GTSC2500M load cells

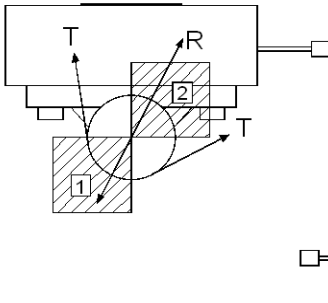
L = Sensor Load Rating
 T = Maximum Tension
 R = Resultant Force Due to Tension
 W = Roll Weight
 X = Wrap Angle
 Y = Angle Between Resultant Force Direction and the Centerline of The Load Cell

$$L = 2 * T * \sin(X/2) * (\cos(Y) + \sin(Y)) \pm (W/2)$$

See Cases Below \nearrow

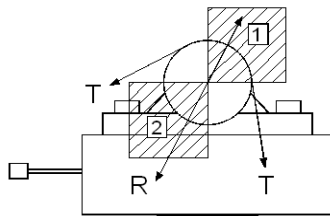


Resultant force direction must be in quadrants 1 or 2



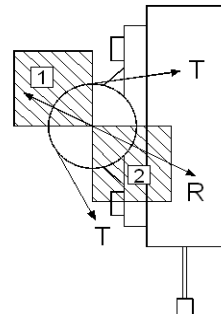
Case 1

- + For Resultant in Quadrant 1
- For Resultant in Quadrant 2 (Shown)



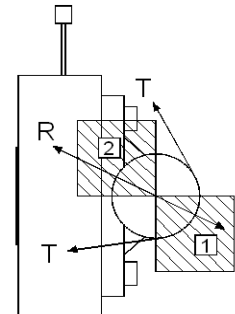
Case 2

- 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

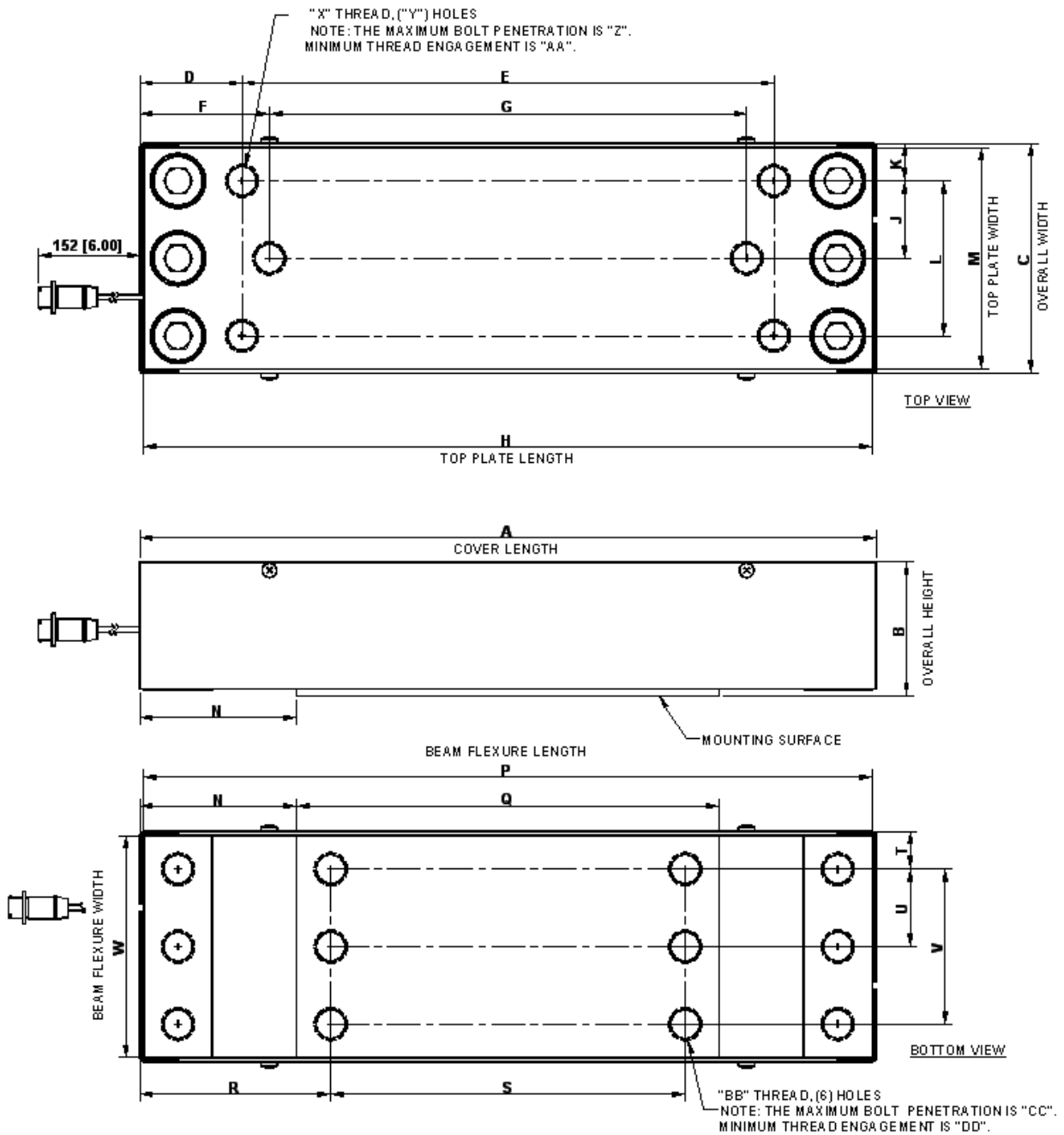
- For Resultant in Quadrant 1
- + For Resultant in Quadrant 2 (Shown)

NOTES:

- Angle Y 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 | | | |

GTSCM / GTSDM Dimensions



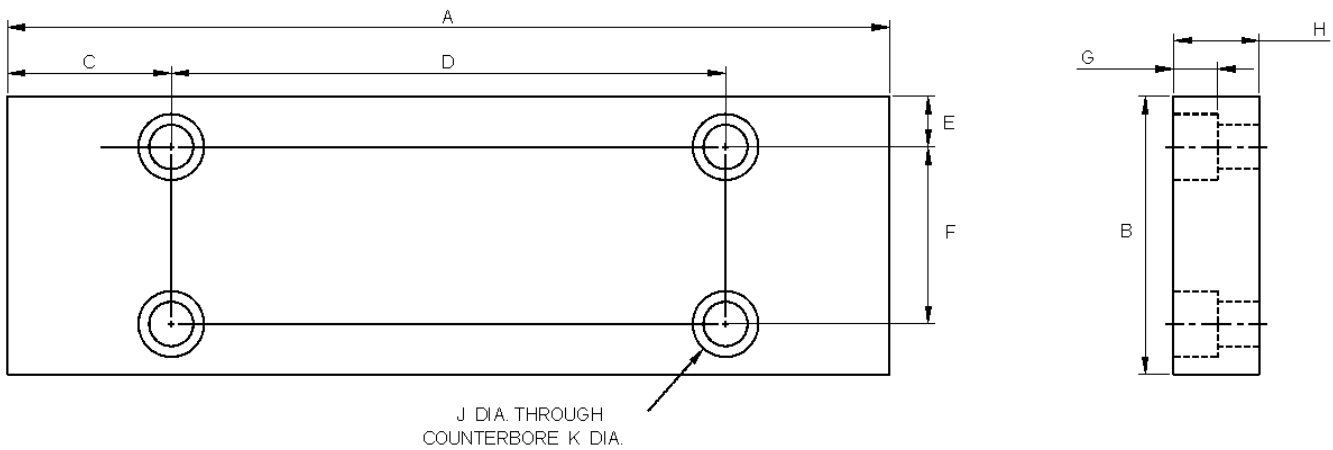
Dimensions are mm [inches]

| Model | A | B | C | D | E | F | G | H | J | K | L | M |
|-------|----------------|--------------|---------------|---------------|--------------|---------------|--------------|--------------|------------|--------------|-------------|-------------|
| GTSC | 357.7 [14.083] | 87.8 [3.457] | 116.2 [4.575] | 68.85 [2.711] | 220 [8.661] | 63.85 [2.514] | 230 [9.055] | 350 [13.780] | 35 [1.378] | 23.1 [0.909] | 70 [2.756] | 110 [4.331] |
| GTSD | 541 [21.299] | 95 [3.740] | 169.2 [6.661] | 75.5 [2.972] | 390 [15.354] | 95.5 [3.600] | 350 [13.780] | 534 [21.024] | 57 [2.244] | 27.6 [1.087] | 114 [4.488] | 163 [6.417] |

| Model | N | P | Q | R | S | T | U | V | W |
|-------|---------------|--------------|--------------|---------------|--------------|--------------|------------|-------------|-------------|
| GTSC | 77.85 [3.065] | 350 [13.780] | 202 [7.953] | 98.85 [3.892] | 160 [6.299] | 23.1 [0.909] | 35 [1.378] | 70 [2.756] | 110 [4.331] |
| GTSD | 115.5 [4.547] | 534 [21.024] | 310 [12.205] | 140.5 [5.531] | 260 [10.236] | 27.6 [1.087] | 57 [2.244] | 114 [4.488] | 163 [6.417] |

| Model | X | Y | Z | AA | BB | CC | DD |
|-------|---------|---|------------|------------|---------|------------|------------|
| GTSC | M16 x 2 | 6 | 23 [0.906] | 16 [0.630] | M16 x 2 | 40 [1.575] | 16 [0.630] |
| GTSD | M24 x 3 | 6 | 34 [1.339] | 22 [0.866] | M24 x 3 | 40 [1.575] | 22 [0.866] |

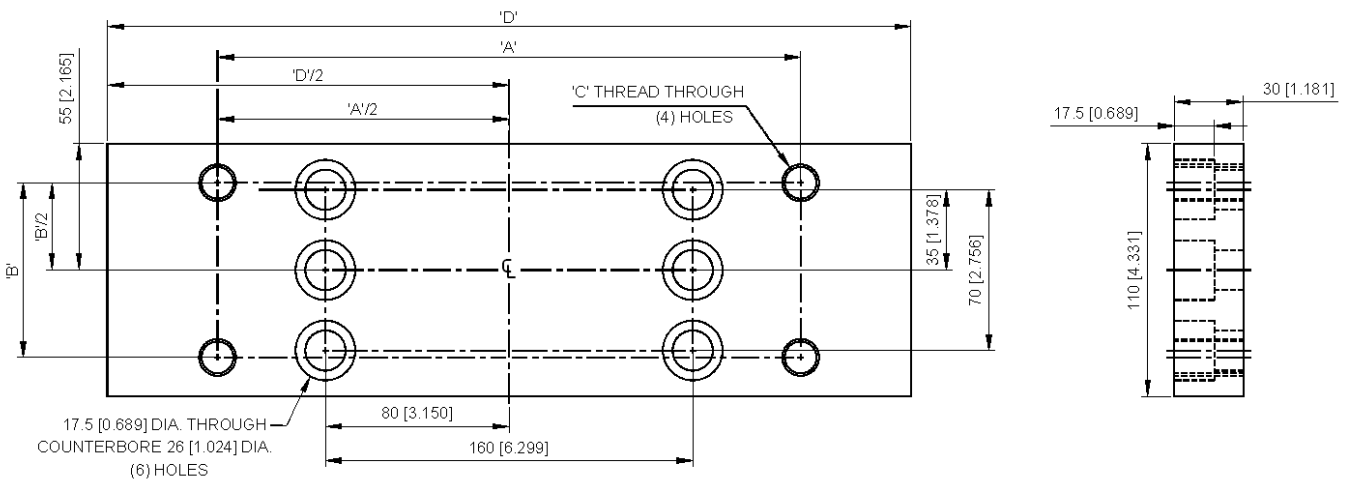
Top Plate Adapters



| Model | Size | A | B | C | D | E | F | G | H | J | K |
|-------|------|--------------|-------------|------------|--------------|--------------|-------------|--------------|------------|--------------|------------|
| TA4 | GTSC | 350 [13.780] | 110 [4.331] | 65 [2.559] | 220 [8.661] | 20 [0.787] | 70 [2.756] | 17.5 [0.689] | 34 [1.339] | 17.5 [0.689] | 26 [1.024] |
| TA5 | GTSD | 534 [21.024] | 163 [6.417] | 72 [2.835] | 390 [15.354] | 24.5 [0.965] | 114 [4.488] | 24.8 [0.976] | 50 [1.969] | 26 [1.024] | 40 [1.575] |

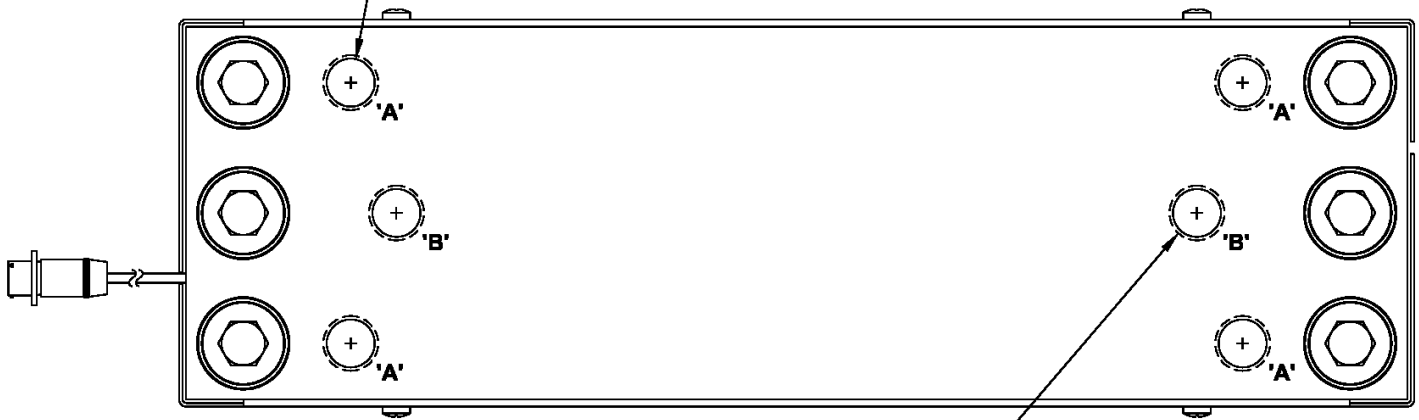
Bottom Plate Adapters

| Model | SIZE | A | B | C | D |
|-------|------|-------------|-----------|---------|-------------|
| BA1 | GTSC | 410 [16.14] | 70 [2.76] | M16 x 2 | 450 [17.72] |
| BA2 | GTSC | 254 [10.0] | 76 [3.0] | M16 x 2 | 350 [13.78] |



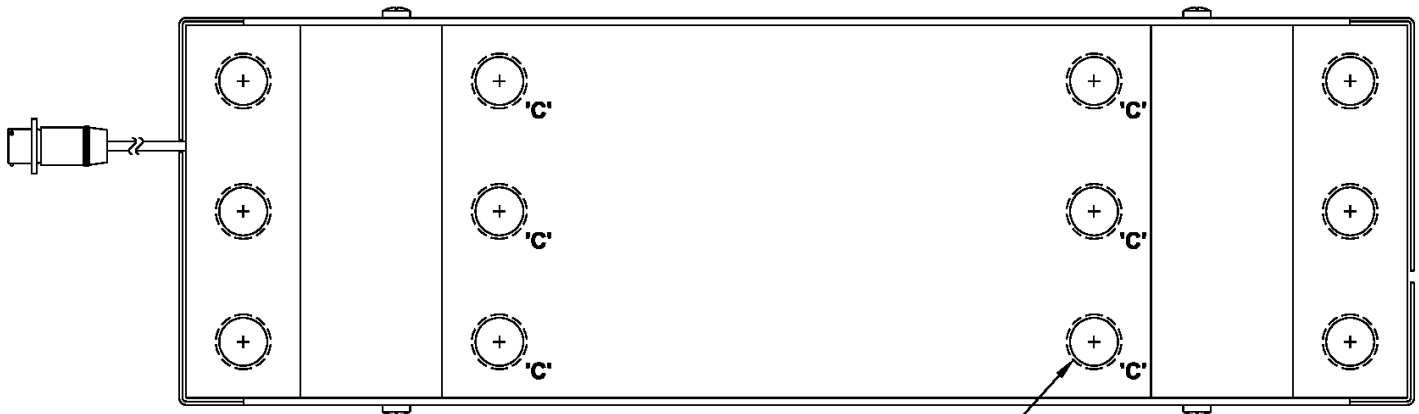
HOLE DESCRIPTIONS AND MOUNTING

HOLES MARKED 'A'
ARE FOR TOP PLATE ADAPTER MOUNTING
OR CUSTOMER MOUNTING



TOP VIEW

HOLES MARKED 'B'
ARE FOR PILLOW BLOCK MOUNTING
SEE CHART BELOW FOR STANDARD SIZES



BOTTOM VIEW

HOLES MARKED 'C'
ARE FOR CUSTOMER MOUNTING

| SIZE | MANUFACTURER | TYPE/SERIES |
|-------|--------------|------------------------|
| GTSCM | SKF | SNL213, SNL215 |
| | FAG | SNV120 |
| | NSK | SNN513-611, SNN515-612 |
| | DODGE | P2B-210, 211, 212 |
| GTSDM | SKF | SNL522-619, SNL524-620 |
| | FAG | SNV200, SNV215 |
| | NSK | SNN522-619, SNN524-620 |

SERVICE REQUESTS AND REPLACEMENT PARTS

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

Fife

222 West Memorial Rd.
Oklahoma City, OK, 73114
USA
Phone: +1.405.755.1600
Fax: +1.405.755.8425
Web: www.maxcessintl.com

Fife-Tidland GmbH

Max-Planck-Strasse 8
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Telefon: +49.6195.7002.0
Fax: +49.6195.7002.933
Web: www.maxcess.eu

OR

Siemensstrasse 13-15
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