**High Precision Linear Stages**

**GTS SERIES**

The GTS high-precision linear stages provide high sensitivity and outstanding trajectory accuracy in a compact, robust and cost efficient package. They are an excellent, high-performance solution for applications such as surface scanning, test and calibration, optical component alignment and attachment, and high-precision optical delays lines.

GTS stages are machined from stress-relieved 7075 aluminum for long-term strength and stability. All critical stage surfaces undergo multiple machining processes and precision grinding under strict temperature and quality control. The GTS’s advanced asymmetric body design with defined flexible preload provides consistent results over varying temperatures and is most insensitive to non-ideal mounting surfaces. The extra thin and compliant carriage has been optimized for different load conditions including XY configurations, and for providing a high vertical load capacity.

To ensure the most accurate trajectory control, GTS stages feature matched pairs of best-in-class anti-creep crossed roller bearings. The lack of any re-circulating elements in these bearings leads to outstanding ripple-free motion adequate for the most demanding scanning and inspection systems. Moreover, their geared retainers prevent from bearing cage migration, which can occur with other linear bearings.

- Ultra-quiet, anti-creep crossed roller bearings for outstanding straightness and flatness without cage migration
- Integrated encoder with exceptional 100 nm MIM, which ensures highly repeatable and accurate motion
- Low friction ball screw drive minimizes stick and slip effects
- Long-term strength and stability
- Plug and Play - ESP compatible

### DESIGN DETAILS

<table>
<thead>
<tr>
<th>Base Material</th>
<th>High-strength 7075 Aluminum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bearings</td>
<td>Anti-creep crossed roller bearings</td>
</tr>
<tr>
<td>Drive Mechanism</td>
<td>8 mm diameter, backlash-free, ground ball screw</td>
</tr>
<tr>
<td>Drive Screw Pitch</td>
<td>2 mm</td>
</tr>
<tr>
<td>Feedback</td>
<td>Linear steel scale, 20 µm signal period, 0.05 µm resolution, RS422 differential output</td>
</tr>
<tr>
<td>Limit Switches</td>
<td>Optical</td>
</tr>
<tr>
<td>Origin</td>
<td>Optical, at center of travel, including mechanical zero signal</td>
</tr>
<tr>
<td>Drive</td>
<td>Type DC Servo</td>
</tr>
<tr>
<td>Cable Length</td>
<td>3 m (included)</td>
</tr>
</tbody>
</table>
A high-torque DC motor with a precision ground and preloaded, low friction ball screw eliminates stick-slip effects and delivers ultra-smooth motion with 100 nm sensitivity. Because GTS stages have been designed to meet all stage performance without a tachometer feedback loop, they are compatible with a wide array of motion controllers including our popular ESP301, SMC100CC and XPS. And compared to alternative direct-drive technologies, GTS stages can be used in vertical applications with loads up to 30 N without complex counter-balance. Manual adjustments can be accomplished by a knob at the end of the motor.

Precision position feedback is provided by an optical scale with 50 nm resolution that is mounted in the center of the stage to eliminate all drive-train induced motion errors. The space-saving, fixed reading-head design avoids any moving cables inside the stage and underlines the robustness and long lasting value of the GTS stages with an MTBF of 20,000 hours.

GTS stages deliver 100 nm motion sensitivity with high reliability and stability.

GTS stages are mechanically compatible with our XM series ultra-precision linear stages, URS and RGV rotation stages, VP-25X precision compact linear stages, VP-5ZA and GTS30V vertical lift stages.

For applications requiring a vertical mounting bracket, please call Newport.

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th></th>
<th>GTS70</th>
<th>GTS150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel Range (mm)</td>
<td>70</td>
<td>150</td>
</tr>
<tr>
<td>Minimum Incremental Motion (µm)</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Uni-directional Repeatability, Typical (Guaranteed) (µm)</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Bi-directional Repeatability, Typical (Guaranteed) (µm)</td>
<td>±0.06 (±0.10)</td>
<td>±0.08 (±0.10)</td>
</tr>
<tr>
<td>Accuracy, Typical (Guaranteed) (µm)</td>
<td>±0.30 (±1.0)</td>
<td>±0.50 (±1.0)</td>
</tr>
<tr>
<td>Maximum Speed (mm/s)</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Straightness, Typical (Guaranteed) (μm)</td>
<td>±0.25 (±0.50)</td>
<td>±0.50 (±1.0)</td>
</tr>
<tr>
<td>Flatness, Typical (Guaranteed) (μm)</td>
<td>±0.25 (±0.50)</td>
<td>±0.50 (±1.0)</td>
</tr>
<tr>
<td>Pitch, Typical (Guaranteed) (μrad)</td>
<td>±15 (±30)</td>
<td>±30 (±40)</td>
</tr>
<tr>
<td>Yaw, Typical (Guaranteed) (μrad)</td>
<td>±15 (±30)</td>
<td>±25 (±40)</td>
</tr>
<tr>
<td>MTBF (h)</td>
<td>20,000</td>
<td>20,000</td>
</tr>
</tbody>
</table>

1) For the definition of Typical and Guaranteed specifications see “Motion Basics Terminology & Standards” Tutorial at www.newport.com

2) Middle 80% of travel.

3) To obtain arcsec units, divide µrad value by 4.8.
**LOAD CHARACTERISTICS AND STIFFNESS**

<table>
<thead>
<tr>
<th></th>
<th>GTS70</th>
<th>GTS150</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C_z$, Normal centered load capacity (N)</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>$C_x$, $+C_x$, Axial load capacity (N)</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>$K_{a,x}$, Compliance in roll (µrad/Nm)</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>$K_{a,y}$, Compliance in pitch (µrad/Nm)</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>$K_{a,z}$, Compliance in yaw (µrad/Nm)</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>$Q$, Off-center load (N)</td>
<td>$Q \leq C_z \div (1 + D/100)$</td>
<td></td>
</tr>
</tbody>
</table>

Where $D =$ Cantilever distance (mm)

A typical assembly with a GTS150, a GTS70 linear stage and a URS100 rotation stage.

**RECOMMENDED CONTROLLERS/DRIVERS**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XPS-D</td>
<td>1- to 8-axis universal high-performance motion controller/driver</td>
</tr>
<tr>
<td>XPS-DRV11</td>
<td>Universal digital driver card for stepper, DC and direct motors</td>
</tr>
<tr>
<td>XPS-RL</td>
<td>1- to 4-axis universal high-performance motion controller/driver</td>
</tr>
<tr>
<td>XPS-DRV01</td>
<td>PWM drive module for DC brush and stepper motors, 3 A/43 V max.</td>
</tr>
<tr>
<td>ESP301</td>
<td>1- to 3-axis motion controller/driver</td>
</tr>
<tr>
<td>SMC100CC</td>
<td>Single-axis DC motor controller/driver</td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GTS70</td>
<td>High Precision Linear Stage, 70 mm Travel</td>
</tr>
<tr>
<td>GTS150</td>
<td>High Precision Linear Stage, 150 mm Travel</td>
</tr>
</tbody>
</table>

For Need Accuracy to 1 µm

For critical positioning applications, contact Newport to learn about our micropositioning calibration services. Upon request, we will create, implement and verify an electronic compensation process to improve the absolute position accuracy of GTS70 stages to 1 µm and GTS150 stages to 1.5 µm when used with our XPS advanced motion control system. A certificate of calibration along with measured error maps is included.
DIMENSIONS

MODEL SHOWN: GTS150
DIMENSIONS IN INCHES (AND MILLIMETERS)

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>GTS70</td>
<td>5.91</td>
<td>39</td>
<td>3.35</td>
<td>5.91</td>
</tr>
<tr>
<td>GTS150</td>
<td>8.86</td>
<td>79</td>
<td>3.19</td>
<td>4.92</td>
</tr>
</tbody>
</table>

4 HOLES M6 THD ON SQR 3.97 (100.8) DEPTH: 24 (6)
4 HOLES M6 THD ON 2.98 (75.6) DEPTH: 24 (6)
4 HOLES M4 THD ON SQR 2.98 (75.6) DEPTH: 24 (6)
4 HOLES M4 THD ON 2.95 x 3.94 (75 x 100) DEPTH: 24 (6)

MOUNTING SURFACE

1.08 (27.5)

SUB-D25M CONNECTOR

4 HOLES ø.31 (7.8)
COUNTERBORED ø.45 (11.5)

MODEL SHOWN: GTS150
DIMENSIONS IN INCHES (AND MILLIMETERS)

A = 5.91 (150)
B = 3.35 (85)
C = 5.91 (150)
D = 4.92 (125)

1.53 (38.8)
0.01
0.43 (11)
2.08 (52.8)

4 HOLES ø.31 (7.8)
COUNTERBORED ø.45 (11.5)

MOUNTING SURFACE, HEIGHT: .017 (.5)

3.98 (100.8)
3.94 (100)
4.32 (10.96)
3.97 (100.8)

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