APPLICATIONS
- Laser entertainment (light show) displays
- Optical Coherence Tomography (OCT)
- Confocal Microscopy / Raster Imaging
- Optical Layout Templates
- Laser Marking

UNIQUE ScannerMAX FEATURES
- Stronger magnetic field
- Stronger rotor and shafts
- Integrated back-supporting mirror mount design
- Long-life, SV30/silicon dioxide ceramic, hybrid bearings
- Trapezoidal position sensor with high output and low noise
- Cooler-running motor magnetic design

BENEFITS
- High speed mirror positioning
- Wide-angle scanning, up to 110 degrees optical
- Low coil resistance for low heat generation during scanning
- Low thermal resistance for enhanced heat removal
- Low wobble and jitter

GENERAL DESCRIPTION
The Saturn 5B optical scanner is specifically designed to meet the high acceleration and high RMS duty cycle demands of projection and imaging applications such as laser entertainment displays, raster imaging, Confocal Microscopy and Optical Coherence Tomography. The Saturn 5B is capable of moving a 5mm beam through an optical angle of 40° at a frequency of over 1 kHz with a sinusoidal drive. Step response times with a 5mm beam can be as fast as 120 microseconds for a small optical step, and 600 microseconds for a 60° optical step, easily delivering scanning speeds of ILDA 60K / 5kHz small signal bandwidth, with a true 5mm beam.

The patented X3 magnetic circuit boasts air gap flux densities of over 14,000 Gauss. The intense magnetic field strength, combined with the very low coil resistance and low rotor inertia, gives the Saturn 5B the highest RMS-torque-to-inertia ratio of any commercially-available optical scanner capable of moving a 5mm beam. The new –74S version utilizes a coil optimized for raster imaging, further reducing heat generated by both the scanner and driver.

The Saturn 5B incorporates all of the other design features of other ScannerMAX Saturn-family scanners, including a half-inch round body diameter, back-supporting mirror mount design, and high-output, low-noise position sensor.

OUTLINE DRAWING
## SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>-46S</th>
<th>STD</th>
<th>-74S</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal Mirror Size</td>
<td>4 – 8</td>
<td></td>
<td></td>
<td>Millimeters, clear aperture</td>
</tr>
<tr>
<td>Rotation Angle (^2)</td>
<td>+/- 27.5</td>
<td></td>
<td></td>
<td>Degrees, Maximum (110 degrees optical)</td>
</tr>
<tr>
<td>Rotor Inertia</td>
<td>0.026</td>
<td></td>
<td></td>
<td>Gram • Centimeters(^2)</td>
</tr>
<tr>
<td>Torque Constant (^3)</td>
<td>30,000</td>
<td>36,000</td>
<td>46,000</td>
<td>Dyne • Centimeters per Ampere</td>
</tr>
<tr>
<td>Maximum Rotor Temperature</td>
<td>110</td>
<td></td>
<td></td>
<td>°C</td>
</tr>
<tr>
<td>Thermal Resistance (^3)</td>
<td>0.8</td>
<td>0.9</td>
<td>0.8</td>
<td>°C per Watt, Maximum</td>
</tr>
<tr>
<td>Coil Resistance (^3)</td>
<td>0.9</td>
<td>1.9</td>
<td>2.6</td>
<td>Ohms</td>
</tr>
<tr>
<td>Coil Inductance (^3)</td>
<td>98</td>
<td>130</td>
<td>225</td>
<td>µh</td>
</tr>
<tr>
<td>Back EMF Voltage (^2, 3)</td>
<td>52.3</td>
<td>62.8</td>
<td>80.2</td>
<td>µV per degree per second</td>
</tr>
<tr>
<td>Peak Current (^3)</td>
<td>7.2</td>
<td>4.7</td>
<td>4.3</td>
<td>Amperes, Maximum</td>
</tr>
<tr>
<td>RMS Current (^3)</td>
<td>120</td>
<td>140</td>
<td>250</td>
<td>µS with ScannerMAX 5mm mirror set</td>
</tr>
<tr>
<td>Small Angle Step Response (^3)</td>
<td>99.9</td>
<td></td>
<td></td>
<td>% Minimum</td>
</tr>
<tr>
<td>PD Linearity over 20 degrees p-p (^2)</td>
<td>99.5</td>
<td></td>
<td></td>
<td>% Typical</td>
</tr>
<tr>
<td>PD Linearity over 40 degrees p-p (^2)</td>
<td>600</td>
<td></td>
<td></td>
<td>µA with LED current of 20mA</td>
</tr>
<tr>
<td>PD Output Signal (Common Mode) (^2)</td>
<td>43.6</td>
<td></td>
<td></td>
<td>µA per degree, with LED current of 20mA</td>
</tr>
<tr>
<td>PD Output Signal (Differential Mode) (^2)</td>
<td>30</td>
<td></td>
<td></td>
<td>Grams</td>
</tr>
</tbody>
</table>

## NOTES

1. Graph denotes theoretical maximum performance of the scanner due to thermal limitations, with case at 50°C. Other factors may prevent the scanner from reaching this maximum, such as servo driver and power supply.
2. Angular specifications are in mechanical degrees. For most applications, optical angle = 2x mechanical angle.
3. Saturn 5B versions –46S and –74S use different coil configurations, beneficial for certain imaging applications. Saturn scanners can easily be fabricated with alternative coil configurations to achieve different specifications. Please contact us if you have different coil resistance, inductance, torque, current or connector requirements.

Specifications are at a temperature of 25°C. All mechanical and electrical specifications are +/-10%.
MORE INFORMATION

More information about the Saturn series of optical scanners, including additional application hints and tips can be found at www.ScannerMAX.com.

OEMs are strongly encouraged to work with us to make sure that the most appropriate scanner is chosen and designed-in.

LASER SCANNING BOOK AVAILABLE

Detailed information about galvanometer scanners, servo driver techniques, and scanner applications can be found in the #1 best-selling book LASER SCANNERS: Technologies and Applications, written by Pangolin’s President William R. Benner, Jr. The book can be found at www.LaserScanningBook.com.

SCANNERS AND ACTUATORS AVAILABLE FROM SCANNERMAX

- **V RAD 506**: a low-cost, open-loop rotary actuator capable of wide-angle rotation – perfect for shutters
- **Compact 506**: the lowest-cost, lightest-weight, and most versatile galvo scanner for 3mm to 1-inch beams
- **Saturn 1B**: providing the highest-speed vector scanning available, for 1mm to 4mm beams
- **Saturn 2B**: a resonant-scanner substitute for high-frequency sinusoidal scanning of 1mm to 4mm beams
- **Saturn 5B**: for both vector and raster scanning of 5mm and 6mm beams
- **Saturn 9B**: providing the best large-signal vector scanning performance for 8mm to 10mm beams
- **Saturn 9B Plus**: for 10mm raster scanning with 40% less heat generation

PATENT AND TRADEMARK INFORMATION

US Utility Patent Number: 9,530,559
US Utility Patent Number: 9,366,860
US Utility Patent Number: 9,270,144
German Patent (Utility Model) Number: 20 2013 000 369.3
German Patent (Utility Model) Number: 20 2014 000 846.9
Chinese Utility Model No. ZL201420102156.6
Chinese Application for Invention No. 201310128586.5
Other US and International Patents Pending.

*Compact 506, Saturn 1B, Saturn 5B and ScannerMAX are trademarks of Pangolin Laser Systems, Inc.*

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