**MECHANICAL SPECIFICATIONS DATA**

<table>
<thead>
<tr>
<th>Specification</th>
<th>U1 Series</th>
<th>U2, U3 &amp; U7 Series</th>
<th>U4 &amp; U8 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Rated Output Torque</td>
<td>40 oz. in.</td>
<td>65 oz. in.</td>
<td>125 oz. in.</td>
</tr>
<tr>
<td>Frame Size and Dia. of Unit</td>
<td>Size 10, 15/16 Dia.</td>
<td>Size 11, 1-1/16 Dia.</td>
<td>Size 18, 1-3/4 Dia.</td>
</tr>
<tr>
<td>Shaft Size</td>
<td>1/8&quot; Dia. &amp; 3mm</td>
<td>1/8&quot; Dia. &amp; 3mm</td>
<td>1/4&quot; Dia. &amp; 6mm</td>
</tr>
<tr>
<td>Max. Operating Load Torque</td>
<td>25 oz. in.</td>
<td>30 oz. in.</td>
<td>65 oz. in.</td>
</tr>
<tr>
<td>Starting Torque (Max.)</td>
<td>.004 oz. in.</td>
<td>.005 oz. in.</td>
<td>.03 oz. in.</td>
</tr>
<tr>
<td>Backlash (Max.) Measured at Output Shaft with 5 oz. in. Rev. Load</td>
<td>30 Min. (Max.)</td>
<td>30 Min. (Max.)</td>
<td>30 Min. (Max.)</td>
</tr>
<tr>
<td>Lubricated Per MIL Spec.</td>
<td>Oil Per MIL-L-6843a</td>
<td>Grease Per MIL-G-23827a</td>
<td></td>
</tr>
<tr>
<td>Ball Bearings</td>
<td>ABEC-5 or Better</td>
<td>Q12 or Better</td>
<td></td>
</tr>
<tr>
<td>Gear Tolerances</td>
<td>With 4 oz. Gage Load .002 In. Per In. Length Max.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaft End Play</td>
<td>With 1 lb. Gage Load .004 In. Max.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (Approx.)</td>
<td>2 oz.</td>
<td>3 oz.</td>
<td>8 oz.</td>
</tr>
<tr>
<td>Moment of Inertia at Input Shaft (Approx.)</td>
<td>.007 Gm-Cm²</td>
<td>.015 Gm-Cm²</td>
<td>135 Gm-Cm²</td>
</tr>
</tbody>
</table>

**PRECISION SPEED REDUCER**

Inch and Metric Input and Output Shafts • 15/16" Dia. • Size 10

**"D" DIMENSION**

| Inch | 1250 ± .0005 |
| Metric | 2.993 ± .005 |

Ball Bearings Throughout Unit.
Max. Rated Output Torque: 40 Oz. in.
Backlash through entire gear train less than 30°
### Precision Speed Reducer

**Inch and Metric Input and Output Shafts** • 1\(\frac{1}{4}\)" Dia. • Size 11

<table>
<thead>
<tr>
<th>No. of Gear Clusters</th>
<th>Shaft Direction of Rotation</th>
<th>*Gear Ratio (Exact)</th>
<th>Inch Part No.**</th>
<th>Metric Part No.**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Same</td>
<td>9:1</td>
<td>U2-1</td>
<td>MSR2-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10:1</td>
<td>U2-2</td>
<td>MSR2-2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12:1</td>
<td>U2-3</td>
<td>MSR2-3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15:1</td>
<td>U2-4</td>
<td>MSR2-4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20:1</td>
<td>U2-5</td>
<td>MSR2-5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25:1</td>
<td>U2-6</td>
<td>MSR2-6</td>
</tr>
<tr>
<td>2</td>
<td>Opposite</td>
<td>40:1</td>
<td>U2-7</td>
<td>MSR2-7</td>
</tr>
<tr>
<td>3</td>
<td>Same</td>
<td>50:1</td>
<td>U2-8</td>
<td>MSR2-8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60:1</td>
<td>U2-9</td>
<td>MSR2-9</td>
</tr>
</tbody>
</table>

**D** Dimension

- **Inch**: .1250 + 0000 – 0005
- **Metric**: 2.993 + 005 – 0005

Ball Bearings Throughout Unit.
Max. Rated Output Torque: 65 Oz. in.
Backlash through entire gear train less than 30'.

*For Special Ratios, Consult Factory.*

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### Precision Speed Reducer

**Inch and Metric Input and Output Shafts** • 1\(\frac{3}{4}\)" Dia. • Size 18

<table>
<thead>
<tr>
<th>No. of Gear Clusters</th>
<th>Shaft Direction of Rotation</th>
<th>*Gear Ratio (Exact)</th>
<th>Inch Part No.</th>
<th>Metric Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Same</td>
<td>4.96:1</td>
<td>U4-1</td>
<td>MSR3-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6:1</td>
<td>U4-2</td>
<td>MSR3-2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10:1</td>
<td>U4-3</td>
<td>MSR3-3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.51:1</td>
<td>U4-4</td>
<td>MSR3-4</td>
</tr>
<tr>
<td>2</td>
<td>Opposite</td>
<td>20:1</td>
<td>U4-5</td>
<td>MSR3-5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30:1</td>
<td>U4-6</td>
<td>MSR3-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40:1</td>
<td>U4-7</td>
<td>MSR3-7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50:1</td>
<td>U4-8</td>
<td>MSR3-8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60:1</td>
<td>U4-9</td>
<td>MSR3-9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>80:1</td>
<td>U4-10</td>
<td>MSR3-10</td>
</tr>
<tr>
<td>3</td>
<td>Same</td>
<td>125:1</td>
<td>U4-11</td>
<td>MSR3-11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>150:1</td>
<td>U4-12</td>
<td>MSR3-12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>200:1</td>
<td>U4-13</td>
<td>MSR3-13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>245:16</td>
<td>U4-14</td>
<td>MSR3-14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>300:3:1</td>
<td>U4-15</td>
<td>MSR3-15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>400:1</td>
<td>U4-16</td>
<td>MSR3-16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>500:1</td>
<td>U4-17</td>
<td>MSR3-17</td>
</tr>
<tr>
<td>4</td>
<td>Opposite</td>
<td>600:1</td>
<td>U4-18</td>
<td>MSR3-18</td>
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<td></td>
<td></td>
<td>1000:1</td>
<td>U4-19</td>
<td>MSR3-19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1600:1</td>
<td>U4-20</td>
<td>MSR3-20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2000:1</td>
<td>U4-21</td>
<td>——</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2500:1</td>
<td>U4-22</td>
<td>——</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3000:1</td>
<td>U4-23</td>
<td>——</td>
</tr>
</tbody>
</table>

**D** Dimension

- **Inch**: .2500 + 0000 – 0005
- **Metric**: 5.993 + 005 – 0005

Ball Bearings Throughout Unit.
Max. Rated Output Torque: 125 Oz. in.
Backlash through entire gear train less than 30'.

*For Special Ratios, Consult Factory.*

---

**DESIGN**

Phone: 800-243-6125 • FAX: 203-758-8271
E-Mail: sales@pic-design.com

11-2
PRECISION GEAR HEADS

1 1/16" Dia. • Size 11

Motor Pinion Data

- Number of Teeth: 13
- Diametral Pitch: 120
- Pressure Angle: 20°
- Testing Pitch Radius: 0.0542
- Outside Diameter: 1.125

Ball Bearings Throughout Unit.
Max. Rated Output Torque: 85 Oz. in.
Backlash through entire gear train less than 30'.
Motor and Pinion Supplied by Customer.

PRECISION GEAR HEADS

1 3/4" Dia. • Size 18

Motor Pinion Data

- Number of Teeth: 15
- Diametral Pitch: 96
- Pressure Angle: 20°
- Testing Pitch Radius: 0.0781
- Outside Diameter: 1.560

Ball Bearings Throughout Unit.
Max. Rated Output Torque: 125 Oz. in.
Backlash through entire gear train less than 30'.
Motor and Pinion Supplied by Customer.
**PRECISION SERVO GEAR BOXES**

**1/4" Shaft • Ratios From 2:1 To 625:1 • ABEC-7 Ball Bearings**

- **Ye Shaft**
- **Ratios From 2:1 To 625:1**
- **ABEC-7 Ball Bearings**
- **1/4" Shaft**

**WORM & WHEEL ASSEMBLIES — 48 & 64 PITCH**

**Shafts • ABEC-7 Ball Bearings • 1/4" to 3/16" Shafts**

**OPERATING CHARACTERISTICS**

- **Maximum Speed**
- **Static Torque Rating Output (Max.)**
- **Backlash as Measured at Output**
- **Static Torque Rating Input Shaft Locked**
- **Backlash Through Entire Train Less Than**
- **Units Can Only be Driven at Input Shaft — Cannot Be Used as Speed Increaser**
- **Input Shaft may be Turned Either Direction.**

**Oil-Impregnated Bronze Bearings Available, Consult Factory.**

**Precision Servo Gear Boxes with Anti-Backlash Gears, Special Ratios, Available, Consult Factory.**

**Material: Gears — 2024-T4 Aluminum Meshing with 303 Stainless Steel Pinions**

**Housing — Aluminum (Black Anodize)**

**All Units Lubricated with Mil Spec. Oil and Grease.**

**WORM & WHEEL ASSEMBLIES — 48 & 64 PITCH**

**OPERATING CHARACTERISTICS**

- **Maximum Speed**
- **Static Torque Rating Output (Max.)**
- **Backlash as Measured at Output**
- **Static Torque Rating Input Shaft Locked**
- **Backlash Through Entire Train Less Than**
- **Units Can Only be Driven at Input Shaft — Cannot Be Used as Speed Increaser**
- **Input Shaft may be Turned Either Direction.**

**Material: Housing — Cast Aluminum (Anodized)**

**Worm — Stainless Steel**

**Wheel — Bronze**

**All Other Parts Stainless Steel**

**Lubricated with Mil-Spec. Oil & Grease.**

**All Units Lubricated with Mil Spec. Oil and Grease.**

**1/4" Shaft • Ratios From 2:1 To 625:1 • ABEC-7 Ball Bearings**

**1/4" Shaft**

**Ratios From 2:1 To 625:1**

**ABEC-7 Ball Bearings**

**1/4" Shaft**

**Material: Housing — Cast Aluminum (Anodized)**

**Worm — Stainless Steel**

**Wheel — Bronze**

**All Other Parts Stainless Steel**

**Lubricated with Mil-Spec. Oil & Grease.**

**All Units Lubricated with Mil Spec. Oil and Grease.**

**Phone: 800-243-6125 • FAX: 203-758-8271**

E-Mail: sales@pic-design.com
**HELICAL GEAR ASSEMBLIES — 48 PITCH**

1/4" Shaft Diameter • ABEC-7 Ball Bearings

Maximum Speed 2,000 rpm
Static Torque Rating (48 Pitch) 100 in. oz.
Backlash Through Entire Train Less Than 30’

Units may be used as speed increaser by driving output shaft. Shells may be driven in either direction.

Units are assembled with R.H. helical gears and are available with L.H. helicals upon request.

### OPERATING CHARACTERISTICS

<table>
<thead>
<tr>
<th>Pitch</th>
<th>Exact Ratio</th>
<th>A</th>
<th>X</th>
<th>Y</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>1:1</td>
<td>.5895</td>
<td>2-1/64</td>
<td>DU-4</td>
<td></td>
</tr>
<tr>
<td>2:1</td>
<td></td>
<td>.841</td>
<td>3-1/32</td>
<td>DU-5</td>
<td></td>
</tr>
<tr>
<td>3:1</td>
<td></td>
<td>1.176</td>
<td>3-3/16</td>
<td>DU-6</td>
<td></td>
</tr>
</tbody>
</table>

Other Ratios and Oil-Impregnated Bearing Units are Available, Consult Factory.

Other Shaft Diameters Available, Consult Factory.

Material: Housing — Cast Aluminum (Anodized)
Pinion — Stainless Steel
Gear — 2024-T4 Aluminum (Anodized)
All Other Parts — Stainless Steel

**MITER GEAR BOXES — 48 PITCH**

1:1 Ratio • ABEC-7 Ball Bearings

Shaft 1/4

<table>
<thead>
<tr>
<th>Pitch</th>
<th>RPM (Max.)</th>
<th>Static Torque In. Oz. (Max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>2500</td>
<td>100</td>
</tr>
</tbody>
</table>

Other shaft dimensions and pitches available, Consult factory.
Available with Oil-Impregnated Bronze Bearings, Consult factory.
For reverse direction, Consult factory.

Material: Housing — Aluminum (Anodized)
Pinion — Stainless Steel
Gear — 2024-T4 Aluminum (Anodized)
All Other Parts — Stainless Steel

**BEVEL GEAR BOXES — 48 PITCH**

1/4" Shaft Diameter • 1:1 To 1:3 Ratios • ABEC-7 Ball Bearings

Shaft 1/4

<table>
<thead>
<tr>
<th>Pitch</th>
<th>Exact Ratio</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>1:1</td>
<td>1.48</td>
<td>1.500</td>
<td>2</td>
<td>2-5/16</td>
<td>3-1/2</td>
<td>2-5/8</td>
<td>2</td>
<td>2-1/4</td>
<td>BA-11</td>
</tr>
<tr>
<td>48</td>
<td>1:3</td>
<td>1.28</td>
<td>1.500</td>
<td>2</td>
<td>9/16</td>
<td>3-1/2</td>
<td>2-5/8</td>
<td>2</td>
<td>3/4</td>
<td>BA-12</td>
</tr>
</tbody>
</table>

Other Shaft Diameters & Pitches Available, Consult factory.
Available with Oil-Impregnated Bronze Bearings, Consult Factory.

Material: Housing — Aluminum (Anodized)
Pinion — Stainless Steel
Gear — 2024-T4 Aluminum (Anodized)
Bearings and Gears Lubricated with Mil. Spec. Oil and Grease
All Other Parts — Stainless Steel
Material: Gears — Aluminum Meshing with Stainless Steel Pinions Housing — Aluminum (Black Anodize)

INTERMITTENT MOTION ASSEMBLY

48 Pitch Gears • 1/4" Shaft

MATERIAL SPECIFICATIONS
Gears: 2024-T4 Aluminum Meshing with 303 Stainless Steel
Geneva: 303 Stainless Steel
Housing: Aluminum — Black Anodized
Lubricated with Mil Spec. Oil and Grease

OPERATING CHARACTERISTICS
Maximum Speed — 300 rpm
Input Travel — Either Direction and Reversible.
Backlash as Measured at Output Shaft with Input Shaft Locked — 30°

*2 Cam Followers on Driver Available, Consult Factory.
Special Output Angles, Shaft Sizes and Shaft Locations Available, Consult Factory.
Intermittent Motion Assemblies Available with Oil-Impregnated Bearings, Consult Factory.
Lightening Holes Optional, Consult Factory.

operating characteristics
maximum speed — 5,000 rpm
static torque rating output (max.) 354 n-m
backlash as measured at output shaft with input shaft locked 30° max.
ball bearing tolerance abec-7

degrees of output per each full revolution of input

<table>
<thead>
<tr>
<th>Degrees of Output</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>90°</td>
<td>EV-1</td>
</tr>
<tr>
<td>60°</td>
<td>EV-2</td>
</tr>
<tr>
<td>45°</td>
<td>EV-3</td>
</tr>
<tr>
<td>30°</td>
<td>EV-4</td>
</tr>
<tr>
<td>22° 30'</td>
<td>EV-5</td>
</tr>
<tr>
<td>10°</td>
<td>EV-6</td>
</tr>
</tbody>
</table>

*2 Cam Followers on Driver Available, Consult Factory.
Special Output Angles, Shaft Sizes and Shaft Locations Available, Consult Factory.
Intermittent Motion Assemblies Available with Oil-Impregnated Bearings, Consult Factory.
Lightening Holes Optional, Consult Factory.
**GENEVA MECHANISMS**

**Intermittent Motion • 1/4" Shaft • 72° Motion**

![Diagram of 5 Point 72° Motion]

<table>
<thead>
<tr>
<th>No. of Points</th>
<th>Intermittent Motion</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>360° Driver = 72° Driven</td>
<td>EU-2</td>
</tr>
</tbody>
</table>

Driver Travel — Either Direction and Reversible
1/8" & 3/16" Shaft Units Available, Consult Factory.

*Lighting Holes Optional, on Request.

†2 Cam Followers on Driver Available on Request.

Material: 303 Stainless Steel

---

**GENEVA MECHANISMS**

**Intermittent Motion • 1/4" Shaft • 90° Motion**

![Diagram of 4 Point 90° Motion]

<table>
<thead>
<tr>
<th>No. of Points</th>
<th>Intermittent Motion</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>360° Driver = 90° Driven</td>
<td>EU-1</td>
</tr>
</tbody>
</table>

Driver Travel — Either Direction and Reversible
1/8" & 3/16" Shaft Units Available, Consult Factory.

*Lighting Holes Optional, on Request.

†2 Cam Followers on Driver Available on Request.

Material: 303 Stainless Steel
GENEVA MECHANISMS

Intermittent Motion • 1/4" Shaft • 45° Motion

Material: 303 Stainless Steel

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GENEVA MECHANISMS

Intermittent Motion • 1/4" Shaft • 60° Motion

Material: 303 Stainless Steel