Pancake Motor Range
Printed Motor Works are a UK manufacturer of compact electric motors and motor gearboxes providing complete solutions for motion control applications. The company is focused on two strategic areas:

**Pancake Motors**

Founded in 1963, we are Europe’s largest manufacturer of flat brushed DC pancake electric motors and motor gearboxes. As the world’s leading authority on the design and manufacture of pancake motors we continue to explore new areas of application for this unique motor design.

**Compact BLDC Motors**

We are considered a world leader in the design and manufacture of compact brushless DC electric motors for the industrial, aerospace & defence, medical, marine and other specialist markets. Our experience spans from compact motors for operating door systems to in-wheel motors for large commercial vehicles.

We have an active policy of total quality control and management throughout the company. We are ISO 9001:2008 certified by BSI British Standards.

Printed Motor Works is a name that is synonymous with quality products, proven reliability and superior performance.
**Pancake Motor Guide**

<table>
<thead>
<tr>
<th>Motor Series</th>
<th>Armature ø(cm)</th>
<th>Magnet Material</th>
<th>Armature Winding</th>
<th>Ancillaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP Series</td>
<td>9, 12, 16</td>
<td>Ferrite, Neodymium</td>
<td>Series, Parallel Winding</td>
<td>Encoder, Tacho, Brake</td>
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<tr>
<td>GM Series</td>
<td>9, 12, 16</td>
<td>AlNiCo</td>
<td>Series Winding</td>
<td>Encoder, Integral Tacho, Brake, Planetary Gearbox, Zero Backlash Gearbox</td>
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<tr>
<td>GN Series</td>
<td>9, 12, 16</td>
<td>Neodymium</td>
<td>Series Winding</td>
<td>Encoder, Integral Tacho, Brake, Planetary Gearbox, Zero Backlash Gearbox</td>
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<tr>
<td>GR Series</td>
<td>12, 16, 19</td>
<td>AlNiCo</td>
<td>Series Winding</td>
<td>Encoder, Tacho, Brake, Planetary Gearbox, Zero Backlash Gearbox</td>
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<tr>
<td>GPG Series</td>
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<td>Ferrite, Neodymium</td>
<td>Series, Parallel Winding</td>
<td>Encoder, Tacho, Brake</td>
</tr>
</tbody>
</table>
GP Series

Peak Torque 100 to 1700 Ncm
Cont. Torque 10 to 170 Ncm
Power 38 to 533 Watts
Speed 1 to 6000 rpm

The Printed Motor Works GP series is a totally enclosed DC motor in an ultra slim pancake profile. Incorporating flat armature technology, these pancake motors can provide a cost effective servo capability and are ideal for general purpose applications. Two variants of magnet are available for 9cm, 12cm, and 16cm armature diameters: standard ferrite (GPM) and high-power neodymium magnets (GPN). There are also two variants of armature winding for each size: a parallel low resistance (LR) winding which offers more speed, and a standard series winding which offers more torque.

<table>
<thead>
<tr>
<th>Motor</th>
<th>Power</th>
<th>Torque</th>
<th>Speed</th>
<th>Voltage</th>
<th>Current</th>
<th>Cont. Stall Current</th>
<th>Diameter</th>
<th>Depth</th>
<th>Depth + Encoder</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P Watt</td>
<td>T Ncm</td>
<td>RPM</td>
<td>Volt</td>
<td>I Amp</td>
<td>IS Amp</td>
<td>A mm</td>
<td>B mm</td>
<td>C mm</td>
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<td>10</td>
<td>3705</td>
<td>9.0</td>
<td>11.7</td>
<td>6.6</td>
<td>120</td>
<td>26.0</td>
<td>44.0</td>
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<td>GPM9</td>
<td>41</td>
<td>13</td>
<td>3000</td>
<td>14.5</td>
<td>6.9</td>
<td>4.5</td>
<td>120</td>
<td>26.0</td>
<td>44.0</td>
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<td>6.5</td>
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<td>44.0</td>
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<td>GPN9</td>
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<td>30</td>
<td>3000</td>
<td>22.5</td>
<td>6.9</td>
<td>4.5</td>
<td>120</td>
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<tr>
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<td>GPM12</td>
<td>110</td>
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<td>3000</td>
<td>23.5</td>
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<td>48</td>
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<td>46.0</td>
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<td>64</td>
<td>3000</td>
<td>37.5</td>
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<td>5.0</td>
<td>153</td>
<td>30.0</td>
<td>46.0</td>
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<tr>
<td>GPM16LR</td>
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<td>73</td>
<td>2905</td>
<td>24.0</td>
<td>13.4</td>
<td>8.0</td>
<td>215</td>
<td>35.6</td>
<td>51.6</td>
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<tr>
<td>GPM16</td>
<td>300</td>
<td>96</td>
<td>3000</td>
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<td>170</td>
<td>3000</td>
<td>75.8</td>
<td>8.4</td>
<td>5.7</td>
<td>215</td>
<td>35.6</td>
<td>51.6</td>
</tr>
</tbody>
</table>

Specific benefits
- Low profile
- Zero cogging
- Rapid acceleration
- High instantaneous torque
- High peak torque
- No torque drop-off at speed
- Ultra slow creep capability
- Wide speed range
- Low inductance
- Long brush life
- Design options include custom shaft, encoders, gearboxes and pulleys
- Available as an open motor for full application integration
GP Series

Applications
Servo mechanisms, motion control, industrial robots, CNC machining, printing machinery, centrifuges, logistics solutions, medical mobility, medical scanners, flight simulators, marine autopilots and high ambient temperature ventilation.

Markets
Industrial automation, automotive, medical, life sciences, aerospace & defence, printing, logistics, instrumentation, test and measurement, oil & gas and offshore marine.

Design Modifications
• Encoders
• Timing pulleys
• Long leads
• Tri-rated cable
• Open/kit option
• Customised shafts
• EMC suppression
• Connectors
• Rated for operation in 150°C ambient
• Mounting customisation

Standard Encoder Options

<table>
<thead>
<tr>
<th>Motor</th>
<th>Counts per Rev. CPR</th>
<th>Channels</th>
<th>Type</th>
<th>Supply Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPM9</td>
<td>500</td>
<td>A + B + Index</td>
<td>Optical</td>
<td>5</td>
</tr>
<tr>
<td>GPN9</td>
<td>500</td>
<td>A + B + Index</td>
<td>Optical</td>
<td>5</td>
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<td>GPM12</td>
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<td>A + B + Index</td>
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<td>5</td>
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<tr>
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<td>Optical</td>
<td>5</td>
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<td>GPM16</td>
<td>500</td>
<td>A + B + Index</td>
<td>Optical</td>
<td>5</td>
</tr>
<tr>
<td>GPN16</td>
<td>500</td>
<td>A + B + Index</td>
<td>Optical</td>
<td>5</td>
</tr>
</tbody>
</table>

Note: Standard Option also applies to LR versions. Other resolutions and differential/line driver output versions available on request.

Suggested Drives

PWM24/10
Basic motor speed control
6-30Vdc for basic speed control applications.
10Amp and 25Amp with single and twin axis control.

PWM24/25
General speed control applications
20-180Vdc for velocity and torque control with 6 digital I/O. 5Amp - 30Amp variants, RS232 communication.

JUNUS
General servo applications
20-180Vdc for velocity, torque and position control with 11 digital I/O and encoder feedback. 5Amp - 36Amp variants, RS232 and macro communication.

ACCELNET

Printed Motor Works Limited, Newman Lane, Alton, Hampshire GU34 2QW, United Kingdom
Email: sales@printedmotorworks.com Tel: +44 1420 594 140
GP Series

GPM9LR

Ke = 1.1 V/Krpm
Kd = 0.30 Ncm/Krpm
Tf = 1.2 Ncm
Rm = 0.42 Ohms

GPM9

Ke = 2.3 V/Krpm
Kd = 0.30 Ncm/Krpm
Tf = 1.2 Ncm
Rm = 1.1 Ohms

GPN9LR

Ke = 2.5 V/Krpm
Kd = 0.3 Ncm/Krpm
Tf = 1.2 Ncm
Rm = 0.42 Ohms

NOTE: The above voltages are examples, not a predefined maximum or minimum. Due to ongoing product improvements data is subject to change without notice.
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GP Series

**GP Series**

**GPN12LR**

- **Thermal limit of continuous operation**
- Ke = 5.0 V/Krpm
- Kd = 0.7 Ncm/Krpm
- Tf = 2.0 Ncm
- Rm = 0.45 Ohms

**GPN12**

- **Thermal limit of continuous operation**
- Ke = 10.1 V/Krpm
- Kd = 1.2 Ncm/Krpm
- Tf = 2.0 Ncm
- Rm = 1.0 Ohms

**GPM16LR**

- **Thermal limit of continuous operation**
- Ke = 6.3 V/Krpm
- Kd = 1.0 Ncm/Krpm
- Tf = 4.9 Ncm
- Rm = 0.42 Ohms

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Printed Motor Works Limited, Newman Lane, Alton, Hampshire GU34 2QW, United Kingdom
Email: sales@printedmotorworks.com Tel: +44 1420 594 140
GP Series

GPM16

Ke = 11.8 V/Krpm
Kd = 0.99 Ncm/Krpm
Tf = 4.9 Ncm
Rm = 0.85 Ohms

GPN16LR

Ke = 10 V/Krpm
Kd = 2.5 Ncm/Krpm
Tf = 4.9 Ncm
Rm = 0.425 Ohms

GPN16

Ke = 22.9 V/Krpm
Kd = 2.5 Ncm/Krpm
Tf = 4.9 Ncm
Rm = 0.85 Ohms

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GM Series

Peak Torque 360 to 3200 Ncm
Cont. Torque 36 to 320 Ncm
Power 113 to 1000 Watts
Speed <1 to 6000 rpm

The Printed Motor Works GM series is the original printed armature motor. Extremely powerful and accurate, the GM range brings all the benefits of printed armature technology to industrial applications. Higher torque ‘H’ versions offer more torque for the same package and weight. Low voltage versions are available for vehicle applications (details on application). The GM range is available with a host of options such as: encoders, imperial mounting, adaptors, gearboxes, tachos, resolvers and with custom mounting plates & shafts.

### Specific benefits
- High peak torque output
- Zero cogging
- Low inertia
- Rapid acceleration
- Stable up to high temperatures
- High instantaneous torque
- Long brush life
- Controllable with servo amplifiers
- Design options include custom shaft, encoders, tachometers, gearboxes and pulleys

### Motor Specifications

<table>
<thead>
<tr>
<th>Motor</th>
<th>Power (W)</th>
<th>Peak Torque (Ncm)</th>
<th>Speed (RPM)</th>
<th>Voltage (V)</th>
<th>Current (A)</th>
<th>Cont. Stall Current (Amp)</th>
<th>Diameter (mm)</th>
<th>Depth (mm)</th>
<th>Depth + Encoder (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM9</td>
<td>113</td>
<td>36</td>
<td>3000</td>
<td>24.1</td>
<td>8.7</td>
<td>6.8</td>
<td>111</td>
<td>46.0</td>
<td>88.5</td>
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<tr>
<td>GM9H</td>
<td>179</td>
<td>57</td>
<td>3000</td>
<td>31.9</td>
<td>8.6</td>
<td>6.8</td>
<td>111</td>
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<tr>
<td>GM12</td>
<td>284</td>
<td>91</td>
<td>3000</td>
<td>43.4</td>
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<td>8.1</td>
<td>142</td>
<td>52.5</td>
<td>101.5</td>
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<td>396</td>
<td>126</td>
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<td>8.1</td>
<td>142</td>
<td>70.0</td>
<td>119.0</td>
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<td>GM16</td>
<td>704</td>
<td>227</td>
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<td>82.7</td>
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<td>187.2</td>
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<td>9.8</td>
<td>187.2</td>
<td>73.0</td>
<td>122.0</td>
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</table>

The GM series is available with a host of options such as: encoders, imperial mounting, adaptors, gearboxes, tachos, resolvers and with custom mounting plates & shafts.
GM Series

Applications
Servo mechanisms, motion control, industrial robots, CNC machining, printing machinery, logistics solutions, medical mobility, medical scanners, flight simulators, marine autopilots and high ambient temperature ventilation, valve actuators and scientific instrumentation.

Markets
Industrial automation, medical, life sciences, aerospace & defence, printing, logistics, instrumentation, test and measurement, oil & gas and offshore marine.

Design Modifications
- Encoders
- Timing pulleys
- Long leads
- Tri-rated cable
- US mounting configuration
- Customised shafts
- EMC suppression
- Connectors
- Rated for operation in 150°C ambient

Standard Encoder Options

<table>
<thead>
<tr>
<th>Motor</th>
<th>Counts per Rev. CPR</th>
<th>Channels</th>
<th>Type</th>
<th>Supply Voltage V</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM9</td>
<td>5000</td>
<td>A + B + I + Complementary</td>
<td>Optical</td>
<td>+5 – 24</td>
</tr>
<tr>
<td>GM9H</td>
<td>5000</td>
<td>A + B + I + Complementary</td>
<td>Optical</td>
<td>+5 – 24</td>
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<tr>
<td>GM12</td>
<td>5000</td>
<td>A + B + I + Complementary</td>
<td>Optical</td>
<td>+5 – 24</td>
</tr>
<tr>
<td>GM12H</td>
<td>5000</td>
<td>A + B + I + Complementary</td>
<td>Optical</td>
<td>+5 – 24</td>
</tr>
<tr>
<td>GM16</td>
<td>5000</td>
<td>A + B + I + Complementary</td>
<td>Optical</td>
<td>+5 – 24</td>
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<tr>
<td>GM16H</td>
<td>5000</td>
<td>A + B + I + Complementary</td>
<td>Optical</td>
<td>+5 – 24</td>
</tr>
</tbody>
</table>

Suggested Drives

JUNUS
General speed control applications
20-180Vdc for velocity and torque control with 6 digital I/O. 5Amp - 30Amp variants, RS232 communication.

ACCELNET
General servo applications
20-180Vdc for velocity, torque and position control with 11 digital I/O and encoder feedback. 5Amp - 36Amp variants, RS232 and macro communication.

XENUS
Advanced servo control
GM Series

NOTE: The above voltages are examples, not a predefined maximum or minimum. Due to ongoing product improvements data is subject to change without notice.
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**GN Series**

Peak Torque **490 to 2550 Ncm**  
Cont. Torque **49 to 255 Ncm**  
Power **140 to 800 Watts**  
Speed **<1 to 6000 rpm**

The Printed Motor Works GN series is an exceptionally powerful and extremely accurate range of servo motors that provide all the advantages of the printed armature with the thin profile made possible by using rare earth magnet materials. The GN series is suitable for all types of industrial automation, robotics and scientific applications. GN motors are available in 3 sizes GN9, 12 and 16.

<table>
<thead>
<tr>
<th>Motor Ratings</th>
<th>Power</th>
<th>Torque</th>
<th>Speed</th>
<th>Voltage</th>
<th>Current</th>
<th>Cont. Stall Current</th>
<th>Diameter</th>
<th>Depth</th>
<th>Depth + Encoder</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P Watt</td>
<td>T Ncm</td>
<td>N RPM</td>
<td>V Volt</td>
<td>I Amp</td>
<td>IS Amp</td>
<td>A mm</td>
<td>B mm</td>
<td>C mm</td>
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<tr>
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<td>8.0</td>
<td>188</td>
<td>26.0</td>
<td>42.0</td>
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</tbody>
</table>

**Specific benefits**
- High peak torque output
- Zero cogging
- Low inertia
- Rapid acceleration
- High instantaneous torque
- Long brush life
- Controllable with servo amplifiers
- Design options include custom shaft, encoders, tachometers, gearboxes and pulleys

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Email: sales@printedmotorworks.com Tel: +44 1420 594 140
GN Series

Applications
Servo mechanisms, motion control, industrial robots, CNC machining, printing machinery, logistics solutions, medical mobility, medical scanners, flight simulators, marine autopilots and high ambient temperature ventilation, valve actuators and scientific instrumentation.

Markets
Industrial automation, medical, life sciences, aerospace & defence, printing, logistics, instrumentation, test and measurement, oil & gas and offshore marine.

Design Modifications
- Encoders
- Timing pulleys
- Long leads
- Tri-rated cable
- Customised shafts
- EMC suppression
- Connectors
- US mounting configuration

Standard Encoder Options

<table>
<thead>
<tr>
<th>Motor</th>
<th>Counts per Rev. CPR</th>
<th>Channels</th>
<th>Type</th>
<th>Supply Voltage V</th>
</tr>
</thead>
<tbody>
<tr>
<td>GN9</td>
<td>5000</td>
<td>A + B + I + Complementary</td>
<td>Optical</td>
<td>+ 5 – 24</td>
</tr>
<tr>
<td>GN12</td>
<td>5000</td>
<td>A + B + I + Complementary</td>
<td>Optical</td>
<td>+ 5 – 24</td>
</tr>
<tr>
<td>GN16</td>
<td>5000</td>
<td>A + B + I + Complementary</td>
<td>Optical</td>
<td>+ 5 – 24</td>
</tr>
</tbody>
</table>

Suggested Drives

JUNUS
*General speed control applications*
20-180Vdc for velocity and torque control with 6 digital I/O. 5Amp - 30Amp variants, RS232 communication.

ACCELNET
*General servo applications*
20-180Vdc for velocity, torque and position control with 11 digital I/O and encoder feedback. 5Amp - 36Amp variants, RS232 and macro communication.

XENUS
*Advanced servo control*
GN Series

**GN9**

- Ke = 7.6 V/Krpm
- Kd = 0.78 Ncm/Krpm
- Tf = 2.8 Ncm
- Rm = 0.85 Ohms

**GN12**

- Ke = 14.1 V/Krpm
- Kd = 1.8 Ncm/Krpm
- Tf = 2.8 Ncm
- Rm = 0.75 Ohms

**GN16**

- Ke = 30 V/Krpm
- Kd = 3.5 Ncm/Krpm
- Tf = 4.3 Ncm
- Rm = 1 Ohms

NOTE: The above voltages are examples, not a predefined maximum or minimum. Due to ongoing product improvements data is subject to change without notice.
**GR Series**

Peak Torque  **1334 to 3200 Ncm**  
Cont. Torque  **133.4 to 320 Ncm**  
Power  **420 to 1000 Watts**  
Speed  **<1 to 6000 rpm**

The Printed Motor Works GR series is an exceptionally powerful and extremely accurate range of servo motors that provide all the advantages of the printed armature with an extremely robust motor case for industrial automation and scientific applications. GR motors include air cooling ports, with removable covers, for use with external cooling fans to increase the thermal limit of continuous operation. GR motors are available in 3 sizes GR12, 16 and 19.

<table>
<thead>
<tr>
<th>Motor Ratings</th>
<th>Power P</th>
<th>Torque T</th>
<th>Speed N</th>
<th>Voltage V</th>
<th>Current I</th>
<th>Cont. Stall Current IS</th>
<th>Diameter A</th>
<th>Depth B</th>
<th>Depth + Tacho C</th>
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</thead>
<tbody>
<tr>
<td>GR12</td>
<td>420</td>
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<td>64</td>
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<td>334</td>
<td>3000</td>
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<td>9.5</td>
<td>5.7</td>
<td>187</td>
<td>87.5</td>
<td>159</td>
</tr>
<tr>
<td>GR19</td>
<td>1000</td>
<td>320</td>
<td>3000</td>
<td>83</td>
<td>14.5</td>
<td>8.6</td>
<td>230</td>
<td>107.5</td>
<td>157</td>
</tr>
</tbody>
</table>

**Specific benefits**
- High peak torque output
- Zero cogging
- Low inertia
- Rapid acceleration
- Stable up to high temperatures
- High instantaneous torque
- Long brush life
- Controllable with servo amplifiers
- Design options include custom shaft, encoders, tachometers, gearboxes and pulleys

Printed Motor Works Limited, Newman Lane, Alton, Hampshire GU34 2QW, United Kingdom
Email: sales@printedmotorworks.com Tel: +44 1420 594 140
GR Series

Applications
Servo mechanisms, motion control, industrial robots, CNC machining, printing machinery, logistics solutions, medical mobility, medical scanners, flight simulators, marine autopilots and high ambient temperature ventilation, valve actuators and scientific instrumentation.

Markets
Industrial automation, medical, life sciences, aerospace & defence, printing, logistics, instrumentation, test and measurement, oil & gas and offshore marine.

Design Modifications
- Encoders
- Timing pulleys
- Tacho output voltage
- Tri-rated cable
- US mounting configuration
- Customised shafts
- EMC suppression
- Connectors
- Rated for operation in 150°C ambient
- Protective covers

Standard Tacho Options

<table>
<thead>
<tr>
<th>Motor</th>
<th>Output Voltage Gradient V/KRPM</th>
<th>Output Tolerance %</th>
<th>Voltage Ripple %</th>
<th>Rotor Inertia g/cm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>GR12</td>
<td>3</td>
<td>+5 -0</td>
<td>5</td>
<td>350</td>
</tr>
<tr>
<td>GR16</td>
<td>3</td>
<td>+5 -0</td>
<td>5</td>
<td>350</td>
</tr>
<tr>
<td>GR19</td>
<td>3</td>
<td>+5 -0</td>
<td>5</td>
<td>350</td>
</tr>
</tbody>
</table>

Suggested Drives

JUNUS

*General speed control applications*
20-180Vdc for velocity and torque control with 6 digital I/O. 5Amp - 30Amp variants, RS232 communication.

ACCELNET

*General servo applications*
20-180Vdc for velocity, torque and position control with 11 digital I/O and encoder feedback. 5Amp - 36Amp variants, RS232 and macro communication.

XENUS

*Advanced servo control*
GR Series

**GR12CH**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Ke (V/Krpm)</th>
<th>Kd (Ncm/Krpm)</th>
<th>Tf (Ncm)</th>
<th>Rm (Ohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100V</td>
<td>17.8</td>
<td>1.95</td>
<td>4.2</td>
<td>0.95</td>
</tr>
</tbody>
</table>

**GR16CH**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Ke (V/Krpm)</th>
<th>Kd (Ncm/Krpm)</th>
<th>Tf (Ncm)</th>
<th>Rm (Ohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200V</td>
<td>39.0</td>
<td>6.44</td>
<td>7.7</td>
<td>0.95</td>
</tr>
</tbody>
</table>

**GR19CH**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Ke (V/Krpm)</th>
<th>Kd (Ncm/Krpm)</th>
<th>Tf (Ncm)</th>
<th>Rm (Ohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150V</td>
<td>25.0</td>
<td>7.76</td>
<td>9.8</td>
<td>0.65</td>
</tr>
</tbody>
</table>

NOTE: The above voltages are examples, not a predefined maximum or minimum. Due to ongoing product improvements data is subject to change without notice.
The Printed Motor Works GPG9 series offers a selection of gear reduction ratios for the GP9 motors. These gear motors offer high torque in a compact axial package and use spur gears to reduce speed and efficiently increase the torque of the 9cm pancake motors. Each unit comes with gearbox and motor fully assembled.

### Specific benefits
- High peak torque output
- Zero cogging
- Low inertia
- Rapid acceleration
- Stable up to high temperatures
- High instantaneous torque
- Long brush life
- Controllable with servo amplifiers
- Design options include custom shaft, encoders and pulleys

<table>
<thead>
<tr>
<th>Motor</th>
<th>Gear Ratio (value : 1)</th>
<th>150</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPG9F</td>
<td>Continuous (Nm)</td>
<td>17</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Current (Amp)</td>
<td>6.9</td>
<td>6.9</td>
</tr>
<tr>
<td></td>
<td>Speed (RPM) @ 24v</td>
<td>34</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>Speed (RPM) @ 12v</td>
<td>27</td>
<td>50</td>
</tr>
<tr>
<td>GPG9N</td>
<td>Continuous (Nm)</td>
<td>39</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Current (Amp)</td>
<td>6.9</td>
<td>6.9</td>
</tr>
<tr>
<td></td>
<td>Speed (RPM) @ 36v</td>
<td>31</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>Speed (RPM) @ 24v</td>
<td>23</td>
<td>44</td>
</tr>
<tr>
<td>GPG9FLR</td>
<td>Continuous (Nm)</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Current (Amp)</td>
<td>11.7</td>
<td>11.7</td>
</tr>
<tr>
<td></td>
<td>Speed (RPM) @ 24v</td>
<td>47</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>Speed (RPM) @ 12v</td>
<td>30</td>
<td>56</td>
</tr>
<tr>
<td>GPG9NLR</td>
<td>Continuous (Nm)</td>
<td>32</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Current (Amp)</td>
<td>11.4</td>
<td>11.4</td>
</tr>
<tr>
<td></td>
<td>Speed (RPM) @ 24v</td>
<td>27</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Speed (RPM) @ 12v</td>
<td>19</td>
<td>36</td>
</tr>
</tbody>
</table>
GPG9 Series

Applications
Biomedical analysis, inspection systems, X-Y tables, wheel drive, automatic door actuators, general automation, advertising screens, weld wire feed, seat elevation adjustment, turret drive.

Markets
Industrial automation, medical, life sciences, aerospace & defence, printing, logistics, instrumentation, test and measurement, oil & gas and offshore marine.

Design Modifications
- Encoders
- Timing pulleys
- Tri-rated cable
- Customised shafts
- EMC suppression
- Connectors

Standard Encoder Options

<table>
<thead>
<tr>
<th>Motor</th>
<th>Counts per Rev. CPR</th>
<th>Channels</th>
<th>Type</th>
<th>Supply Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPG9F</td>
<td>500</td>
<td>A + B + Index</td>
<td>Optical</td>
<td>+ 5</td>
</tr>
<tr>
<td>GPG9N</td>
<td>500</td>
<td>A + B + Index</td>
<td>Optical</td>
<td>+ 5</td>
</tr>
<tr>
<td>GPG9FLR</td>
<td>500</td>
<td>A + B + Index</td>
<td>Optical</td>
<td>+ 5</td>
</tr>
<tr>
<td>GPG9NLR</td>
<td>500</td>
<td>A + B + Index</td>
<td>Optical</td>
<td>+ 5</td>
</tr>
</tbody>
</table>
**GPG9 Series**

**Suggested Drives**

**PWM24/10**  
**PWM24/25**

*Basic motor speed control*

6-30Vdc for basic speed control applications. 10Amp and 25Amp with single and twin axis control.

*General speed control applications*

20-180Vdc for velocity and torque control with 6 digital I/O. 5Amp - 30Amp variants, RS232 communication.

*General servo applications*

20-180Vdc for velocity, torque and position control with 11 digital I/O and encoder feedback. 5Amp - 36Amp variants, RS232 and macro communication.

---

**GPG9F**

- 80:1
- 12v DC
- 15v DC

**GPG9N**

- 80:1
- 36v DC
- 24v DC

**GPG9FLR**

- 80:1
- 9v DC
- 6v DC

**GPG9NLR**

- 15v DC
- 12v DC

---

*NOTE: The above voltages are examples, not a predefined maximum or minimum. Due to ongoing product improvements data is subject to change without notice.*
The Printed Motor Works GPG12 series offers a wide range of gear reduction ratios for the GP12 motors. Offering high torque in a compact axial package, each unit has foot mounting capability and uses a combination of bevel and planetary gears to reduce the speed and efficiently increase the torque of the 12cm pancake motor. Each unit comes with gearbox and motor fully assembled.

**Specific benefits**
- High peak torque output
- Zero cogging
- Low inertia
- Rapid acceleration
- Stable up to high temperatures
- High instantaneous torque
- Long brush life
- Controllable with servo amplifiers
- Design options include custom shaft, encoders and pulleys
GPG12 Series

We have two designs for the GPG series depending on the ratio you require.

Please see the table below for the various ratios and the corresponding design.

| Design A       | 12:1, 40:1, 60:1, 80:1, 120:1, 206:1 |
| Design B       | 10:1, 25:1 |

Design A

All dimensions in mm

Design B

All dimensions in mm
GPG12 Series

Applications
Biomedical analysis, inspection systems, X-Y tables, wheel drive, automatic door actuators, general automation, advertising screens, weld wire feed, seat elevation adjustment, turret drive.

Markets
Industrial automation, medical, life sciences, aerospace & defence, printing, logistics, instrumentation, test and measurement, oil & gas and offshore marine.

Design Modifications
- Encoders
- Timing pulleys
- Tri-rated cable
- Customised shafts
- EMC suppression
- Connectors

Standard Encoder Options

<table>
<thead>
<tr>
<th>Motor</th>
<th>Counts per Rev. CPR</th>
<th>Channels</th>
<th>Type</th>
<th>Supply Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPGM12</td>
<td>500</td>
<td>A + B + Index</td>
<td>Optical</td>
<td>+ 5</td>
</tr>
<tr>
<td>GPGN12</td>
<td>500</td>
<td>A + B + Index</td>
<td>Optical</td>
<td>+ 5</td>
</tr>
<tr>
<td>GPGM12LR</td>
<td>500</td>
<td>A + B + Index</td>
<td>Optical</td>
<td>+ 5</td>
</tr>
<tr>
<td>GPGN12LR</td>
<td>500</td>
<td>A + B + Index</td>
<td>Optical</td>
<td>+ 5</td>
</tr>
</tbody>
</table>

Suggested Drives

PWM24/10

*Basic motor speed control*
6-30Vdc for basic speed control applications. 10Amp and 25Amp with single and twin axis control.

PWM24/25

*General speed control applications*
20-180Vdc for velocity and torque control with 6 digital I/O. 5Amp - 30Amp variants, RS232 communication.

JUNUS

*General servo applications*
20-180Vdc for velocity, torque and position control with 11 digital I/O and encoder feedback. 5Amp - 36Amp variants, RS232 and macro communication.

ACCELNET
GPG12 Series

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Drive train details</th>
<th>Backlash(degrees)</th>
<th>Arc mins</th>
<th>Radial Load (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>206:1</td>
<td>Steel Gear</td>
<td>0.24±0.05°</td>
<td>15.0</td>
<td>230</td>
</tr>
<tr>
<td>120:1</td>
<td>Steel Gear</td>
<td>0.49±0.05°</td>
<td>29.4</td>
<td>230</td>
</tr>
<tr>
<td>80:1</td>
<td>Steel Gear</td>
<td>0.11±0.05°</td>
<td>6.6</td>
<td>230</td>
</tr>
<tr>
<td>60:1</td>
<td>Steel Gear</td>
<td>0.91±0.05°</td>
<td>54.6</td>
<td>230</td>
</tr>
<tr>
<td>40:1</td>
<td>Steel Gear</td>
<td>0.45±0.05°</td>
<td>27.0</td>
<td>230</td>
</tr>
<tr>
<td>25:1</td>
<td>Steel Gear (Planetary)</td>
<td>0.46±0.05°</td>
<td>27.6</td>
<td>230</td>
</tr>
<tr>
<td>12:1</td>
<td>MC Nylon Gear</td>
<td>0.12±0.05°</td>
<td>7.2</td>
<td>230</td>
</tr>
<tr>
<td>10:1</td>
<td>MC Nylon Gear (Planetary)</td>
<td>0.46±0.05°</td>
<td>27.6</td>
<td>230</td>
</tr>
</tbody>
</table>

NOTE: The above voltages are examples, not a predefined maximum or minimum. Due to ongoing product improvements data is subject to change without notice.