Motor Generator

Outline

Motor Generator (MG) is the integrated unit of engine starting function as starter and electric power output function as alternator. MG realizes various technology such as idle-stop, engine assist when travelling, and regeneration during deceleration etc.

Features

- Improvement of vehicle installation ability with integration of electro-mechanical structure both GX alternator technologies and power electronics technologies.
- Quiet start with belt-drive
- Quick re-start and high engine speed assist with unique control technologies.
- High efficiency generation and low noise with unique stator coil winding technologies.
**Motor Generator**

**Function**

- Motor Generator
- Quiet engine start
- Quick vehicle start
- Torque assist for vehicle travel
- Efficient and powerful generation

**Outline/Features**

- Function
- Technology
- Roadmap
- Line-up
- Effective use in vehicle
Motor Generator

Technology

**Compact**
- Electro-mechanical integrated structure
- High-density mounting for power circuit PCB
- High-integrated control circuit

**Powerful**
- Motoring by phase-shift switching control
- Full wave drive control (G1,G1R)
- Optimized cooling structure

**High-efficient**
- MOSFET active rectification
- Ultra high-density winding
- Electromagnetic steel core

**Quiet**
- Double three phase circuit
- Belt-driven start
Motor Generator

Roadmap

- **G1 12 V MG**
  - Mass production
  - Engine and assist
  - High-efficient power generation

- **G1R 12 V MG**
  - [Under development]
  - Smaller inverter
  - Standardization

- **G2 12 V MG**
  - [Under development]
  - High power

- **G2 water cooling 48 V MG**
  - [Under development]
  - Continuous High torque
  - Continuous high generation power

- **G2 air cooling 48 V MG**
  - [Under development]
  - High cranking torque
  - High assist torque
  - Strong regenerative power generation for a short time

Year

- **2015**
- **2020**
- **2025**

Outline/Features | Function | Technology | Roadmap | Line-up | Effective use in vehicle
# Motor Generator

## Line-up

<table>
<thead>
<tr>
<th>Line-up</th>
<th>Magnet</th>
<th>Starter Torque</th>
<th>Generator Power</th>
<th>Drive Output</th>
<th>Dimension (Length : Pulley 1st groove to rear end)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Short time</td>
<td>Continuous</td>
<td>Stator Dia.</td>
</tr>
<tr>
<td>48 V G2-XL</td>
<td>w</td>
<td>60 Nm</td>
<td>15 kW</td>
<td>9.0 kW</td>
<td>12 kW</td>
</tr>
<tr>
<td>(Water cooling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Under Development)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48 V G2-XL</td>
<td>w/o</td>
<td>60 Nm</td>
<td>14 kW</td>
<td>4.5 kW</td>
<td>12 kW</td>
</tr>
<tr>
<td>(Air cooling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Under Development)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 V G2-XL</td>
<td>w</td>
<td>60 Nm</td>
<td>4.5 kW</td>
<td>3.0 kW</td>
<td>3.5 kW</td>
</tr>
<tr>
<td>(Under Development)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 V G1R-XL</td>
<td>w/o</td>
<td>45 Nm</td>
<td>4.1 kW</td>
<td>2.4 kW</td>
<td>1.8 kW</td>
</tr>
<tr>
<td>(Under Development)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 V G1-L</td>
<td>w/o</td>
<td>43 Nm</td>
<td>3.9 kW</td>
<td>2.2 kW</td>
<td>1.7 kW</td>
</tr>
<tr>
<td>12 V G1R-MK</td>
<td>w/o</td>
<td>35 Nm</td>
<td>3.4 kW</td>
<td>2.1 kW</td>
<td>1.6 kW</td>
</tr>
<tr>
<td>(Under Development)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **High performance**
- **Down sizing / Low cost**

### Function
- Effective use in vehicle

### Outline/Features
- Motor Generator
- Line-up

### Technology
- Motor Generator
- Line-up

### Roadmap
- Function
- Technology
- Outline/Features

### Effective use in vehicle
- Line-up
- Motor Generator
By effectively utilizing functions of Idling stop, regenerative power generation during deceleration and torque assist in combination, MG can collect kinetic energy during deceleration and improve fuel economy.