Power Converters

Eaton standard product and custom developed DC-DC converters provide regulated power directly to accessory or main loads. Eaton DC-DC converters produce 24V power from a 12V source and 12V power from a 24V, 48V and 72V sources.

Features & Benefits
Operating with a typical efficiency of 94%, Eaton DC-DC converters are optimally ruggedized for transportation applications including state of the art vibration, emissions and abnormal use features, such as reverse polarity protection.

Options
Eaton DC-DC converters are designed to meet specific customer requirements including, SAE, ISO, E mark, CE and military standards, as well as application specific environmental requirements.

Standards & Certifications
RoHS, EMI/EMC Compliance

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage (input / output)</th>
<th>Output Current</th>
<th>Function</th>
<th>Design Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>12000 Series - UP Converters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12010C10</td>
<td>12 / 24</td>
<td>10</td>
<td>Converter</td>
<td>Switched output</td>
</tr>
<tr>
<td>12025C00</td>
<td>12 / 24</td>
<td>25</td>
<td>Converter</td>
<td>Switched output / available offset output</td>
</tr>
<tr>
<td>12040C10</td>
<td>12 / 24</td>
<td>40</td>
<td>Converter</td>
<td>Switched output with offset output</td>
</tr>
<tr>
<td>12055C02</td>
<td>12 / 24</td>
<td>55</td>
<td>Converter</td>
<td>12V or 24V selectable input</td>
</tr>
<tr>
<td>21000 Series - DOWN Converters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21005C10</td>
<td>24 / 12</td>
<td>5</td>
<td>Converter</td>
<td>IP 67, RoHS, switched and unswitched output</td>
</tr>
<tr>
<td>21008C10</td>
<td>24 / 12</td>
<td>7.5</td>
<td>Converter</td>
<td>IP 67, RoHS, switched and unswitched output</td>
</tr>
<tr>
<td>21010C10</td>
<td>24 / 12</td>
<td>10</td>
<td>Converter</td>
<td>IP 67, RoHS, switched and unswitched output</td>
</tr>
<tr>
<td>21012C10</td>
<td>24 / 12</td>
<td>12</td>
<td>Converter</td>
<td>IP 67, RoHS, switched and unswitched output</td>
</tr>
<tr>
<td>21015C10</td>
<td>24 / 12</td>
<td>15</td>
<td>Converter</td>
<td>IP 67, RoHS, switched and unswitched output</td>
</tr>
<tr>
<td>21020C10</td>
<td>24 / 12</td>
<td>20</td>
<td>Converter</td>
<td>IP 67, RoHS, switched and unswitched output</td>
</tr>
<tr>
<td>21030C10</td>
<td>24 / 12</td>
<td>30</td>
<td>Converter</td>
<td>IP 67, switched and unswitched output, RoHS</td>
</tr>
<tr>
<td>52304</td>
<td>24 / 12</td>
<td>40</td>
<td>Converter</td>
<td>High current converter</td>
</tr>
<tr>
<td>21080C00</td>
<td>24 / 12</td>
<td>60</td>
<td>Converter</td>
<td>IP 67, high current converter</td>
</tr>
<tr>
<td>21080C00</td>
<td>24 / 12</td>
<td>80</td>
<td>Converter</td>
<td>IP 67, high current converter</td>
</tr>
<tr>
<td>21100C00</td>
<td>24 / 12</td>
<td>100</td>
<td>Converter</td>
<td>IP 67, high current converter, RoHS</td>
</tr>
<tr>
<td>41020C10</td>
<td>28-70 / 113.5</td>
<td>20</td>
<td>Converter</td>
<td>IP 67, switched output / unswitched 12V output</td>
</tr>
<tr>
<td>71030i</td>
<td>57-124 / 13.5</td>
<td>30</td>
<td>Converter</td>
<td>Isolated output / unswitched 12V output</td>
</tr>
</tbody>
</table>

Trail Chargers - DC/DC Battery Chargers

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage (input / output)</th>
<th>Output Current</th>
<th>Function</th>
<th>Design Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>11010C11</td>
<td>9-14 / 14</td>
<td>10</td>
<td>Boost Converter</td>
<td>IP 67, temp. compensated output</td>
</tr>
<tr>
<td>11020C11</td>
<td>9-14 / 14</td>
<td>20</td>
<td>Boost Converter</td>
<td>IP 67, temp. compensated output</td>
</tr>
<tr>
<td>11020CL1</td>
<td>9-14 / 14</td>
<td>20</td>
<td>Boost Converter</td>
<td>IP 67, temp. compensated output, reduced current mode w/lockouts</td>
</tr>
</tbody>
</table>
Series 12000 DC Converter

**12010C10**

Eaton's 12010 Series DC Converter provides 10A of regulated 24V power from a 12V input. Allowing 24V loads to be powered from a 12V electrical system.

**Features & Benefits**
- Easily implemented into a system providing 24V power
- Allows use of 24V electrical components in a 12V electrical system providing greater system flexibility
- Clean output power able to power sensitive loads including radios and controllers
- Proven reliability with over 500,000 fielded units

**Key Differentiators**
- Sealed input and output connectors
- Switched and un-switched outputs
- IP67 Sealing
- EMC performance
- Operation to 85C
- RoHS Compliant
- Output short circuit protection
- Over temperature protection
- Low standby power draw

**Options**
- Deutsch mating connectors
- 10A to 55A models available
- Powder coated housing
- Battery Equalizer with output voltage of twice the input voltage

**Standards & Certifications**
SAE J1455, J1113, CISPR 25, E mark, RoHS

**Dimensions in Inches (mm)**

- 1.03 [26.2]
- 6.060 [153.92]
- 4.000 [101.60]
- .240 [6.10]
- 4X .280 [7.11]
- (5.14 [130.7])
- (2.5 [5.6])
- (5.62 [142.8])
Eaton’s 12040 Series DC Converter provides 24V power in a 12V system, which requires 24V power. The 12040 Series DC Converter provides an output current of 40 amps, has an enable turning on the converter and is IP67 sealed.

**Features & Benefits**
- Easily implemented into a system providing 24V power from a 12V input allowing use of 12V and 24V components on a vehicle
- Allows use of 24V electrical components in a 12V electrical system providing greater system flexibility
- With a low standby current of 0.7mA power is not used by the DC Converter when it is not required.
- Clean output power able to power sensitive loads including radios and controllers
- Proven reliability with over 200,000 fielded units

**Key Differentiators**
- IP67 Sealing
- EMC performance
- Operation to 85C
- Output short circuit protection
- Over temperature protection
- Low standby power draw
- Ignition enable
- Terminal cover
- Powder coated housing

**Options**
- 10A to 55A models available
- Output voltage offset to increase the output voltage
- Battery Equalizer with output voltage of twice the input voltage

**Standards & Certifications**
- SAE J1455, J1113, CISPR 25, E mark, RoHS
Series 21000 DC Converter
21005C10, 21008C10, 21010C10, 21012C10

The 21000 series of DC converters provide regulated 12V power from a 24V input. Featuring sealed connectors and an IP67 sealed housing, the 21000 series of DC converters provide dependable power in the most challenging environments. Available with output currents of 5A, 8A, 10A, or 12A, the 21000 series of DC converters is sized to meet your power requirements.

Features & Benefits
Easily implemented into a system providing 12V power
Allows use of 12V electrical components in a 24V electrical system providing greater system flexibility
Clean output power for sensitive loads including radios and controllers
Proven reliability with over 500,000 fielded units

Key Differentiators
Sealed input and output connectors
Switched and un-switched outputs
Full output current up to 85C
IP67 Sealing
ISO EMC performance
Continuous operation up to 85C
RoHS Compliant
Output short circuit protection
5A, 8A, 10A and 12A in same package size

Options
Deutsch mating connectors
5A to 12A models available

Standards & Certifications
SAE J1455, J1113, CISPR 25, E mark, RoHS

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage (input / output)</th>
<th>Output Current</th>
<th>Design Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>21005C10</td>
<td>24 / 12</td>
<td>5</td>
<td>IP 67, switched &amp; unswitched output</td>
</tr>
<tr>
<td>21008C10</td>
<td>24 / 12</td>
<td>7.5</td>
<td>IP 67, switched &amp; unswitched output</td>
</tr>
<tr>
<td>21010C10</td>
<td>24 / 12</td>
<td>10</td>
<td>IP 67, switched &amp; unswitched output</td>
</tr>
<tr>
<td>21012C10</td>
<td>24 / 12</td>
<td>12</td>
<td>IP 67, switched &amp; unswitched output</td>
</tr>
</tbody>
</table>

Dimensions in Inches (mm)

![Dimensions diagram]
The 21000 series of DC converters provide regulated 12V power from a 24V input. Featuring sealed connectors and an IP67 sealed housing, the 21000 series of DC converters provide dependable power in the most challenging environments. Available with output currents of 15A or 20A, the 21000 series of DC converters is sized to meet your power requirements.

### Features & Benefits
- Easily implemented into a system providing 12V power
- Allows use of 12V electrical components in a 24V electrical system providing greater system flexibility
- Clean output power for sensitive loads including radios and controllers
- Proven reliability with over 500,000 fielded units

### Key Differentiators
- Sealed input and output connectors
- Switched and un-switched outputs
- IP67 Sealing
- ISO EMC performance
- Continuous operation up to 85°C
- RoHS Compliant
- Output short circuit protection
- 15A and 20A in same package size

### Options
- Deutsch mating connectors
- 15A to 20A models available

### Standards & Certifications
- SAE J1455, J1113, CISPR 25, E mark, RoHS

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage (input / output)</th>
<th>Output Current</th>
<th>Design Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>21015C10</td>
<td>24 / 12</td>
<td>15</td>
<td>IP 67, switched &amp; un-switched output</td>
</tr>
<tr>
<td>21020C10</td>
<td>24 / 12</td>
<td>20</td>
<td>IP 67, switched &amp; un-switched output</td>
</tr>
</tbody>
</table>

### Dimensions in Inches (mm)

![Dimensions Diagram](image-url)
Series 21000 DC Converter
21030C10

The 21030C10 DC converter provides regulated 12V power from a 24V input. Featuring sealed connectors and an IP67 sealed housing, the 21030C10 DC converter provides dependable power in the most challenging environments.

Features & Benefits
Easily implemented into a system providing 12V power
Allows use of 12V electrical components in a 24V electrical system providing greater system flexibility
Clean output power for sensitive loads including radios and controllers
Proven reliability with millions of operating hours

Key Differentiators
Sealed input and output connectors
Switched and un-switched outputs
Full output current up to 85C
IP67 Sealing
ISO EMC performance
Operation to 85C
RoHS Compliant

Options
Powder coated housing
Battery Equalizer with output voltage of ½ the input voltage
Deutsch mating connectors

Standards & Certifications
SAE J1455, J1113, CISPR 25, E mark, RoHS

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage (input / output)</th>
<th>Output Current</th>
<th>Design Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>21030C10</td>
<td>24 / 12</td>
<td>30</td>
<td>IP 67, switched &amp; unswitched output</td>
</tr>
</tbody>
</table>

Dimensions in Inches (mm)
The 21000 series of DC converters provide up to 100A of 12V power from a 24V input. Providing a fixed output voltage of 13.5V, the 21000 series of DC converters provide clean and reliable power for high current 12V loads.

Features & Benefits
- Easily implemented into a system providing 12V power
- Allows use of 12V electrical components in a 24V electrical system, providing greater system flexibility
- Leverage increased power of a 24V starting and charging system without having to migrate all components to 24V.
- Proven reliability with over 200,000 fielded units

Key Differentiators
- IP67 Sealing
- Up to 100A DC Converter
- MIL 461 EMC performance
- Operation to 85°C
- Over temperature protection with reduced output current

Options
- 60A, 80A or 100A models available
- Snap on terminal cover
- Terminal barriers
- Color coded terminal labels
- RoHS

Standards & Certifications
- SAE J1455, J1113, CISPR 25, E mark

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage (input / output)</th>
<th>Output Current</th>
<th>Design Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>21060C00</td>
<td>24 / 12</td>
<td>60</td>
<td>IP 67, high current converter</td>
</tr>
<tr>
<td>21080C00</td>
<td>24 / 12</td>
<td>80</td>
<td>IP 67, high current converter</td>
</tr>
<tr>
<td>21100C00</td>
<td>24 / 12</td>
<td>100</td>
<td>IP 67, high current converter</td>
</tr>
</tbody>
</table>

Dimensions in Inches (mm)
Trail Charger Series

The Eaton Trail Charger DC/DC battery chargers allow operators to charge a remote battery bank at a temperature compensated voltage. This technology eliminates voltage loss due to long wire lengths and automatically adjusts for temperature extremes. The Trail Charger charges lift gate and other batteries at the voltage needed, working to keep batteries charged and ready for your next lift. The Trail Charger smart reduce mode also eliminates the need for additional cables.

Features & Benefits
- Compensates for voltage drop optimizing battery charge
- Temperature compensation provides optimal charge voltage
- Low standby current reduces drain on the vehicle
- Smart reduce mode circuitry ensures no interference with vehicle ABS systems

Key Differentiators
- IP 67 sealed units provide flexibility in mounting locations
- Temperature compensated charging without external sensors
- Trouble free operation with ABS systems
- Charge batteries through existing 7-way connector or dedicated single pole or double pole connectors
- Proven field reliability
- LED indicator with diagnostics

Options
- 10A & 20A models available
- Reduce feature limits output current
- LED and diagnostics output

Standards & Certifications
Eaton DC-DC trail charger are designed to meet specific customer requirements including, SAE, ISO, E mark, CE and military standards, as well as application specific environmental requirements and IP67 certification.

<table>
<thead>
<tr>
<th></th>
<th>11010C11</th>
<th>11020C11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>10A</td>
<td>20A</td>
</tr>
<tr>
<td>Lift gate motor draw</td>
<td>175A</td>
<td>175A</td>
</tr>
<tr>
<td>Seconds of lift run time</td>
<td>25 sec</td>
<td>25 sec</td>
</tr>
<tr>
<td>Amp hours used per lift</td>
<td>1.2AHr</td>
<td>1.2AHr</td>
</tr>
<tr>
<td>Lifts during daily operations</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Total Amp / hours used during day</td>
<td>60AHr</td>
<td>120AHr</td>
</tr>
<tr>
<td>Total run time required to charge battery</td>
<td>8 hours</td>
<td>8 hours</td>
</tr>
<tr>
<td>Voltage regulation</td>
<td>Temp. compensated</td>
<td>Temp. compensated</td>
</tr>
<tr>
<td>IP67 sealed</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Dimensions in Inches (mm)
Battery Equalizers

Eaton standard product and custom developed battery equalizers maintain battery balance in vehicle applications with multiple voltages and high peak load demand. Eaton battery equalizers produce 10A to 100A outputs to equalize 12V and 24V systems.

Features & Benefits
Operating with a typical efficiency of 94%, Eaton battery equalizers are optimally ruggedized for transportation applications including state of the art vibration, emissions and abnormal use features, such as reverse polarity protection. Provides robust fail safe operation for dual voltage systems.

Options
Eaton battery equalizers are designed to meet specific customer requirements including, SAE, ISO, E mark, CE and military standards, as well as application specific environmental requirements.

Standards & Certifications
RoHS, EMI/EMC Compliance

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage (input / output)</th>
<th>Output Current</th>
<th>Function</th>
<th>Design Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up Conversion Equalizers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12010E10</td>
<td>12 / 24</td>
<td>10</td>
<td>Equalizer</td>
<td>Switched output</td>
</tr>
<tr>
<td>12025E00</td>
<td>12 / 24</td>
<td>25</td>
<td>Equalizer</td>
<td>Switched output / available offset output</td>
</tr>
<tr>
<td>12040E10</td>
<td>12 / 24</td>
<td>40</td>
<td>Equalizer</td>
<td>Switched output with offset output</td>
</tr>
<tr>
<td>Down Conversion Equalizers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21030E10</td>
<td>24 / 12</td>
<td>30</td>
<td>Equalizer</td>
<td>IP 67, RoHS</td>
</tr>
<tr>
<td>52204</td>
<td>24 / 12</td>
<td>40</td>
<td>Equalizer</td>
<td>High current equalizer</td>
</tr>
<tr>
<td>21060E00</td>
<td>24 / 12</td>
<td>60</td>
<td>Equalizer</td>
<td>IP 67, high current equalizer</td>
</tr>
<tr>
<td>21080E00</td>
<td>24 / 12</td>
<td>80</td>
<td>Equalizer</td>
<td>IP 67, high current equalizer</td>
</tr>
<tr>
<td>21100E00</td>
<td>24 / 12</td>
<td>100</td>
<td>Equalizer</td>
<td>IP 67, high current equalizer</td>
</tr>
</tbody>
</table>
Series 12000 Battery Equalizer

12010E10

The 12010E10 battery equalizer provides 10A of 24V power from a 12V input, allowing 24V loads to be powered from a 12V electrical system. Efficiently convert electrical power from one voltage level to another. Used in battery balancing applications, the 12010E10 provides an output of twice the input voltage keeping batteries charged and balanced.

Features & Benefits
Easily implemented into a system providing 24V power from a 12V input allowing use of 12V and 24V components
Allows use of 24V electrical components in a 12V electrical system providing greater system flexibility
Clean output power able to power sensitive loads including radios and controllers
Proven reliability with over 25 years field experience

Key Differentiators
Sealed input and output connectors
Un-switched output
IP67 Sealing
EMC performance
Operation to 85C
RoHS Compliant
Output short circuit protection
Over temperature protection
Low standby power draw

Dimensions in Inches (mm)

Options
Deutsch mating connectors
Powder coated housing
DC converter with fixed output voltage

Standards & Certifications
SAE J1455, J1113, CISPR 25, E mark, RoHS
Series 12040E10 Battery Equalizer

Eaton’s 12040E10 Battery Equalizer provides 24V power and maintains battery balance in a 12V system, which requires 24V power. The 12040E10 Battery Equalizer has an output current of 40 amps, has a switched output with offset output and is IP67 sealed.

Features & Benefits
Easily implemented into a system providing 24V power from a 12V input allowing use of 12V and 24V components on a vehicle
Allows use of 24V electrical components in a 12V electrical system providing greater system flexibility
Leverage increased power of a 24V starting and charging system without having to migrate all components to 24V.
Clean output power able to power sensitive loads including radios and controllers
Proven reliability with over 200,000 fielded units

Key Differentiators
IP67 Sealing
EMC performance
Operation to 85°C
Output short circuit protection
Over temperature protection
Low standby power draw

Options
10A to 55A models available
Output voltage offset to increase the output voltage
DC converter with fixed output voltage

Standards & Certifications
SAE J1455, J1113, CISPR 25, E mark, RoHS

Dimensions in Inches (mm)
Series 21030 Battery Equalizer

21030E10

The 21030E10 battery equalizer maintains the balance of a 24V series battery pack, allowing large 12V loads to be powered from the 12V center tap and providing 30A of output current to maintain battery balance. The 21030E10 battery equalizer allows the inrush current of 12V loads to be supported by the batteries while maintaining battery balance. The 21030E10 reduces overall system cost and improves system reliability.

Features & Benefits
Easily implemented into a system providing 12V power with system redundancy reducing vehicle downtime
Allows use of 12V electrical components in a 24V electrical system providing greater system flexibility
Leverage increased power of a 24V starting and charging system without having to migrate all components to 24V.
Proven reliability with more than a billion fielded hours

Key Differentiators
Sealed input and output connector
Full output current up to 85C
IP67 Sealing
Voltage regulation of +/- 0.1V
ISO EMC performance
Operation to 85C
RoHS Compliant

Options
Powder coated housing
DC converter with fixed output voltage
Deutsch mating connector

Standards & Certifications
SAE J1455, J1113, CISPR 25, E mark, RoHS

Dimensions in Inches (mm)
The 21000 series of battery equalizers maintain the balance of a 24V series battery pack, allowing large 12V loads to be powered from the 12V center tap and providing 60A, 80A or 100A of output current to maintain battery balance. The 21000 series of battery equalizers allow the inrush current of 12V loads to be supported by the batteries while maintaining battery balance. The 21000 series reduces overall system cost and improves system reliability.

**Features & Benefits**
- Easily implemented into a system providing 12V power
- Allows use of 12V electrical components in a 24V electrical system providing greater system flexibility
- Leverage increased power of a 24V starting and charging system without having to migrate all components to 24V.
- Proven reliability with over 200,000 fielded units

**Key Differentiators**
- IP67 Sealing
- Up to 100A DC current
- MIL 461 EMC performance
- Operation to 85°C
- Over temperature protection with reduced output current

**Options**
- 60A, 80A or 100A
- Snap on terminal cover
- Terminal barriers
- Color coded terminal labels
- RoHS
- DC converter with fixed output voltage

**Standards & Certifications**
- SAE J1455, J1113, CISPR 25, E mark

**Dimensions in Inches (mm)**