UL-Certification

ServoOne product range
ServoOne CM multi-axis automation system
c-line Drives product range
Integrated drives
LeviOne junior
UL-Certification
Id No : 0927.01B.1-01
Date: 12/2016

We reserve the right to make technical changes.
The content of our documentation was compiled with the greatest care and attention,
and based on the latest information available to us.
We should nevertheless point out that this document cannot always be updated in line
with ongoing technical developments in our products.
Information and specifications may be subject to change at any time. For information on
the latest version please visit www.lti-motion.com.
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## ServoOne Product range

### ServoOne product matrix - what is available and which UL approval

<table>
<thead>
<tr>
<th>Model no.</th>
<th>BG2</th>
<th>BG3</th>
<th>BG4</th>
<th>BG5</th>
<th>BG6</th>
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<td>SO84.030</td>
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<td>SO84.036</td>
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</tr>
</tbody>
</table>

**Table 1.1** ServoOne product matrix

### Legende:
- xx.xxx = Model no.
- **= Product version available uL, uR or cUR certification included!**
- | = Product version available. But without uL or uR certification only!
- = Product version not available!
- ZZ = Any digit or number
- uL, uR, cUR = Product version available uL, uR or cUR certification in process!
1.1 ServoOne junior UL certification

Common terms to comply with the UL certification (UL508C) for all sizes ServoOne Junior

Multiple rated equipment. Operation only within the technical ratings of the drive, details see in technical ratings appendix instruction manual.

Ensure that surrounding air temperature does not exceed the maximum approbate ambient temperature, refer to model tables listed below.

For use only in electric supply mains with maximum overvoltage category III and for circuits not more than maximum short circuit current capability of symmetrical Amperes @ maximum voltage, when protected by fuses as required. Ratings and class refer to model tables listed below.

Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance to the manufacturer instructions, National Electrical Code and any additional local codes.

Use in a pollution degree 2 environment according to IEC60664-1 only. This means device shall be mounted in a suitable switchgear cabinet.

Use UL-certified device wiring (mains, motor and control cables) only

- use copper conductors rated min. 60/75 °C.
- tightening torques for terminals, refer to model tables listed below.

Motor over temperature sensing (such as thermal sensor or switch embedded in the motor) must connected during operation of these drives.

In case the device is used in combination with an externally mounted brake resistor, over-temperature protection shall be provided separately to the brake resistor avoiding excessive temperatures.

Auxiliary supply voltage 24 Vdc.

For control outputs (OSDxx) use an isolated source only, rated 25 Vac or 24-30 Vdc as appropriate for rating of the given output.

A fuse in accordance with UL248 must be connected between the source and the output, rated 4 A/100 V.

Valid

For all models ServoOne junior with wall mounting air cooler in combination with or without internal brake resistor.

For 3 x 230/400-480 V three-phase ac fed models only, max. 277 V RMS to ground.

Including all versions of communication interfaces and/or optional interfaces.

Functional safety models are not included.

Internal overload protection

The internal overload protection operates within max. 10 sec seconds when reaching 200 % of the Motor Full Load Current. Details see in technical ratings appendix to instruction manual. Adjustment of internal overload protection see document “ServoOne device help”.

Special conditions for cold plate version

The SO22.003 and SO24.002 (size BG2) are incomplete in construction and need an external heatsink (cold plate version) at end-users application.

The external cooling must at least be equivalent to a steel plate with dimensions of 140 mm by 490 mm, 3 mm nominal thickness.

The temperature conditions shall be conducted in the end-use in situation when the products are going to be installed to a smaller plate/heatsink.
Keep the specific conditions for the different models ServoOne junior

<table>
<thead>
<tr>
<th>Size</th>
<th>Device</th>
<th>Electric supply mains</th>
<th>Short circuit capability</th>
<th>Tightening torque</th>
<th>max. mains fuse</th>
<th>Max. ambient temperature</th>
<th>Certification</th>
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<tbody>
<tr>
<td>BG2</td>
<td>SO22.003.0</td>
<td>1 x 230 V</td>
<td></td>
<td>5 - 7 lb-in</td>
<td>1 x 10 A</td>
<td>250 V</td>
<td>RK5</td>
</tr>
<tr>
<td>BG3</td>
<td>SO24.002.0</td>
<td>3 x 400-480 V</td>
<td></td>
<td>5 - 7 lb-in</td>
<td>3 x 6 A</td>
<td>600 V</td>
<td>RK5</td>
</tr>
<tr>
<td></td>
<td>SO22.006.0</td>
<td>1 x 230 V</td>
<td></td>
<td>5 - 7 lb-in</td>
<td>1 x 20 A</td>
<td>250 V</td>
<td>RK5</td>
</tr>
<tr>
<td></td>
<td>SO24.004.0</td>
<td>3 x 400-480 V</td>
<td>5 kA RMS</td>
<td>5 - 7 lb-in</td>
<td>3 x 15 A</td>
<td>600 V</td>
<td>RK5</td>
</tr>
<tr>
<td>BG4</td>
<td>SO22.008.0</td>
<td>1 x 230 V</td>
<td></td>
<td>4.4 - 5.3 lb-in</td>
<td>1 x 25 A</td>
<td>250 V</td>
<td>RK5</td>
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<tr>
<td></td>
<td>SO24.007.0</td>
<td>3 x 400-480 V</td>
<td></td>
<td>4.4 - 5.3 lb-in</td>
<td>3 x 20 A</td>
<td>600 V</td>
<td>RK5</td>
</tr>
<tr>
<td>BG5</td>
<td>SO24.012.0</td>
<td>3 x 400-480 V</td>
<td></td>
<td>7 lb-in</td>
<td>3 x 30 A</td>
<td>600 V</td>
<td>RK5</td>
</tr>
<tr>
<td></td>
<td>SO24.016.0</td>
<td>3 x 400-480 V</td>
<td></td>
<td>7 lb-in</td>
<td>3 x 40 A</td>
<td>600 V</td>
<td>RK5</td>
</tr>
</tbody>
</table>

Table 1.2 Tightening torques, fuses etc. for ServoOne junior
1.2 ServoOne single-axis system

Common terms to comply with the UL certification (UL508C) for all the sizes ServoOne AC

Multiple rated equipment. Operation only within the technical ratings of the drive, details see in technical ratings appendix instruction manual.

Ensure that surrounding air temperature does not exceed the maximum approbate ambient temperature, refer to model tables.

For use only in electric supply mains with maximum overvoltage category III and for circuits delivering not more than maximum short circuit current capability of symmetrical Amperes @ maximum voltage, when protected by fuses as required. Ratings and fuse classes refer to model tables listed below.

Integral solidstate short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance to the manufacturer instructions, National Electrical Code and any additional local codes.

Use in a pollution degree 2 environment according to IEC60664-1 only. This means device shall be mounted in a suitable switchgear cabinet.

Use UL-certified device wiring (mains, motor and control cables) only

- use copper conductors rated min. 75 °C.
- tightening torques for terminals, refer to model tables listed below.

Motor over temperature sensing (such as thermal sensor or switch embedded in the motor) must connected during operation of these drives.

In case the device is used in combination with an externally mounted brake resistor, over-temperature protection shall be provided separately to the brake resistor avoiding excessive temperatures.

Auxiliary supply voltage 24 Vdc.

For relay outputs (REL, RSH) on control board use an isolated source only, rated 24 Vdc.

A fuse in accordance with UL248 must be connected between the source and the output, rated 4 A.
1.2.1 AC fed drives sizes BG1 - BG4

Valid

For all models ServoOne AC with wall mounting air cooler in combination with or without internal brake resistor, with or without functional safety. For all models size 3 + 4 with liquid cooling, with or without functional safety, without internal brake resistor.

For 3 x 230/400-480 V three-phase ac fed models only, max. 277 V RMS to ground.

Including all versions of communication interfaces and/or optional interfaces.

Void

Not valid for cold plate or push through cooler models.

<table>
<thead>
<tr>
<th>Size</th>
<th>Device</th>
<th>Electric supply mains</th>
<th>Tightening torque</th>
<th>max. mains fuse</th>
<th>Certifica- tion</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG1</td>
<td>S082.004.0</td>
<td>1 x 230 V</td>
<td>5 - 7 lb-in (0.56 - 0.79 Nm)</td>
<td>250 V K5</td>
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<tr>
<td>BG2</td>
<td>S084.004.0</td>
<td>3 x 230/ 400-480 V</td>
<td>5 - 7 lb-in (0.56 - 0.79 Nm)</td>
<td>600 V K5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S084.006.0</td>
<td>3 x 230/ 400-480 V</td>
<td>5 - 7 lb-in (0.56 - 0.79 Nm)</td>
<td>600 V K5</td>
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</tr>
<tr>
<td>BG3</td>
<td>S084.008.0</td>
<td>3 x 230/ 400-480 V</td>
<td>5 - 7 lb-in (0.56 - 0.79 Nm)</td>
<td>600 V RK5</td>
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</tr>
<tr>
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<td>S084.012.0</td>
<td>3 x 230/ 400-480 V</td>
<td>5 - 7 lb-in (0.56 - 0.79 Nm)</td>
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<td>S084.016.0</td>
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<td>15 lb-in (1.7 Nm)</td>
<td>600 V RK5</td>
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</tr>
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<td>S084.020.0</td>
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<td>15 lb-in (1.7 Nm)</td>
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<td>S084.032.0</td>
<td>3 x 230/ 400-480 V</td>
<td>15 lb-in (1.7 Nm)</td>
<td>600 V K5</td>
<td></td>
</tr>
</tbody>
</table>

Table 1.3 Tightening torques, fuses etc. for ServoOne AC fed drives size BG1 - BG4

Special conditions for liquid cooled models

The coolant pressure may be a maximum of 200 kPA / 29 PSI (2 bar).

Coolant flow 3 liter/min or more.

Minimum inlet temperature T_{in} = T_{amb} - 10 °C to avoid condensation. Max. temperature 50 °C. Use as coolant water with a corrosion preventing additive such as ethylene glycol or equivalent.

Internal overload protection

The internal overload protection operates within max. 10 sec seconds when reaching 200 % of the Motor Full Load Current. Details see in technical ratings appendix to instruction manual. Adjustment of internal overload protection see document “ServoOne device help”.

ServoOne Product range
1.2.2 AC fed drives size BG5

Valid
For all models ServoOne AC with wall mounting air cooler, push through cooler or liquid cooled models and in combination with or without internal brake resistors, with or without functional safety.

For 3 x 230/400-480 V three-phase ac fed models only, max. 277 V RMS to ground. Including all versions of communication interfaces and/or optional interfaces.

Void
Not valid for cold plate cooler models.

Special conditions for liquid cooled models
The coolant pressure may be a maximum of 200 kPA / 29 PSI (2 bar).
Coolant flow 8 or more liter/min.
Minimum inlet temperature $T_{in} = T_{amb} - 10 \degree C$ to avoid condensation, max. temperature 50 °C.

Use as coolant water with a corrosion preventing additive such as ethylene glycol or equivalent.

Internal overload protection
The internal overload protection operates within max. 3 sec (30 sec for liquid cooled models) when reaching 200 % of the Motor Full Load Current. Details see in technical ratings appendix to instruction manual. Adjustment of internal overload protection see document “ServoOne device help”.

### Keep the specific conditions for the different models ServoOne AC BG5

<table>
<thead>
<tr>
<th>Size</th>
<th>Device</th>
<th>Electric supply mains</th>
<th>Voltage</th>
<th>Short circuit capability</th>
<th>Tightening torque</th>
<th>max. mains fuse</th>
<th>Max. ambient temperature</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>mains terminal, brake resistor L+, L-</td>
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<td>BG5</td>
<td>S084.045.0</td>
<td>3 x 230/400-480 V</td>
<td></td>
<td>10 kA RMS</td>
<td>22 lb-in (2.5 Nm)</td>
<td>3 x 50 A</td>
<td>600 V RK1</td>
<td>UL listed</td>
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<td>S084.060.0</td>
<td>3 x 230/400-480 V</td>
<td></td>
<td></td>
<td>22 lb-in (2.5 Nm)</td>
<td>3 x 80 A</td>
<td>600 V RK1</td>
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</tr>
<tr>
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<td>S084.072.0</td>
<td>3 x 230/400-480 V</td>
<td></td>
<td></td>
<td>22 lb-in (2.5 Nm)</td>
<td>3 x 80 A</td>
<td>600 V RK1</td>
<td></td>
</tr>
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</table>

Table 1.4 Tightening torques, fuses etc. for ServoOne AC fed drives size BG5
1.2.3 AC fed drives size BG6

Valid

For all models ServoOne AC with wall mounting air cooler, push through cooler. All ServoOne AC liquid cooled models and in combination with or without internal brake resistor.

For 3 x 230/400-480 V three-phase ac fed models only, max. 277 V RMS to ground. Including all versions of communication interfaces and/or optional interfaces.

Void

Not valid for Functional safety models.

All models ServoOne AC with wall mounting air cooler, push through cooler and in combination with internal brake resistors.

Special conditions for liquid cooled models

The coolant pressure may be a maximum of 200 kPA / 29 PSI (2 bar).

Coolant flow 11-13 liter/min.

Minimum inlet temperature $T_{in} = T_{amb} - 10 ^\circ C$ to avoid condensation.

Use as coolant water with a corrosion preventive additive such as ethylene glycol or equivalent.

Internal overload protection

The internal overload protection operates within max. 30 sec (10 sec for 143-210 A models) when reaching 200 % of the Motor Full Load Current. Details see in technical ratings appendix to instruction manual. Adjustment of internal overload protection see document “ServoOne device help”.

Keep the specific conditions for the different models ServoOne AC BG6 type W, D or L

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<thead>
<tr>
<th>Size</th>
<th>Device</th>
<th>Electric supply mains</th>
<th>Voltage</th>
<th>Short circuit capability</th>
<th>Tightening torque</th>
<th>max. mains fuse</th>
<th>Max. ambient temperature</th>
<th>Certification</th>
</tr>
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<tbody>
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<td>BG6</td>
<td>SO84.090.0</td>
<td>3 x 230/400-480 V</td>
<td>mains terminal</td>
<td>88 - 177 lb-in (10 - 20 Nm)</td>
<td>88 - 177 lb-in (10 - 20 Nm)</td>
<td>53 - 70 lb-in (6 - 8 Nm)</td>
<td>3 x 100 A</td>
<td>600 V</td>
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<tr>
<td></td>
<td>SO84.110.0</td>
<td>3 x 230/400-480 V</td>
<td>mains terminal</td>
<td>88 - 177 lb-in (10 - 20 Nm)</td>
<td>88 - 177 lb-in (10 - 20 Nm)</td>
<td>53 - 70 lb-in (6 - 8 Nm)</td>
<td>3 x 125 A</td>
<td>600 V</td>
</tr>
<tr>
<td></td>
<td>SO84.143.0</td>
<td>3 x 230/400-480 V</td>
<td>mains terminal</td>
<td>88 - 177 lb-in (10 - 20 Nm)</td>
<td>132 - 265 lb-in (15 - 30 Nm)</td>
<td>53 - 70 lb-in (6 - 8 Nm)</td>
<td>3 x 175 A</td>
<td>600 V</td>
</tr>
<tr>
<td></td>
<td>SO84.170.0</td>
<td>3 x 230/400-480 V</td>
<td>mains terminal</td>
<td>88 - 177 lb-in (10 - 20 Nm)</td>
<td>132 - 265 lb-in (15 - 30 Nm)</td>
<td>53 - 70 lb-in (6 - 8 Nm)</td>
<td>3 x 200 A</td>
<td>600 V</td>
</tr>
<tr>
<td></td>
<td>SO84.210.0</td>
<td>3 x 230/400-480 V</td>
<td>mains terminal</td>
<td>88 - 177 lb-in (10 - 20 Nm)</td>
<td>132 - 265 lb-in (15 - 30 Nm)</td>
<td>53 - 70 lb-in (6 - 8 Nm)</td>
<td>3 x 250 A</td>
<td>600 V</td>
</tr>
</tbody>
</table>

Table 1.5 Tightening torques, fuses etc. for ServoOne AC fed drives size BG6
1.2.4 AC fed drives size BG7

Valid
For all ServoOne AC liquid cooled models.
For 3 x 400-480 V three-phase ac fed models only, max. 277 V RMS to ground.
Including all versions of communication interfaces and/or optional interfaces.

Void
Not valid for Functional safety models.
All models ServoOne AC with wall mounting air cooler, push through cooler. All models in combination with internal brake resistors.

Special conditions for liquid cooled models
The coolant pressure may be a maximum of 200 kPA / 29 PSI (2 bar).
Coolant flow 12-14 liter/min.
Minimum inlet temperature $T_{in} = T_{amb} - 10 \, ^\circ C$ to avoid condensation.

Keep the specific conditions for the different models ServoOne AC BG7 type W, D or L

<table>
<thead>
<tr>
<th>Size</th>
<th>Device</th>
<th>Electric supply mains</th>
<th>Short circuit capability</th>
<th>Tightening torque</th>
<th>max. mains fuse</th>
<th>Max. ambient temperature</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG7</td>
<td>SO84.250.0</td>
<td>3 x 400-480 V</td>
<td>30 kA RMS</td>
<td>Bus bar terminals M12 221 - 265 lb-in (25-30Nm)</td>
<td>Bus bar term. M10 177 - 221 lb-in (20-25Nm)</td>
<td>3 x 250 A 600 V RK1</td>
<td>40 °C</td>
</tr>
<tr>
<td>BG7</td>
<td>SO84.325.0</td>
<td>3 x 400-480 V</td>
<td></td>
<td>Bus bar terminals M12 221 - 265 lb-in (25-30Nm)</td>
<td>Bus bar term. M10 177 - 221 lb-in (20-25Nm)</td>
<td>3 x 350 A 600 V RK1</td>
<td></td>
</tr>
<tr>
<td>BG7</td>
<td>SO84.450.0</td>
<td>3 x 400-480 V</td>
<td></td>
<td>Bus bar terminals M12 221 - 265 lb-in (25-30Nm)</td>
<td>Bus bar term. M10 177 - 221 lb-in (20-25Nm)</td>
<td>3 x 450 A 600 V RK1</td>
<td></td>
</tr>
</tbody>
</table>

Table 1.6 Tightening torques, fuses etc. for ServoOne AC fed drives size BG7

Use as coolant water with a corrosion preventive additive such as ethylene glycol or equivalent.

Special conditions for busbar terminals
Use properly sized UL listed ZMVV connector lugs and follow the instruction manual for proper wire sizes and installation or contact manufacturer to purchase proper lugs.

Internal overload protection
The internal overload protection operates within max. 30 sec seconds when reaching 150 % of the Motor Full Load Current. Details see in technical ratings appendix to instruction manual. Adjustment of internal overload protection see document “ServoOne device help”.

Keep the specific conditions for the different models ServoOne AC BG7 type W, D or L
1.3 ServoOne multi-axis system

Common terms to comply with the UL certification (UL508C) for all the sizes ServoOne DC and PSU

Multiple rated equipment. Operation only within the technical ratings of the drive, details see in technical ratings appendix instruction manual.

Ensure that surrounding air temperature does not exceed the maximum approbate ambient temperature, refer to model tables.

As the inverter do not incorporate internal MOV’s at DC input, they may only be connected to a proper DC-source in which voltage transients are controlled and limited in accordance with UL1449 to the maximum level of 4 kV (DC models) or overvoltage category III (for PSU models). Suitable for use in circuits delivering not more than maximum short circuit current capability of symmetrical Amperes @ maximum voltage. Ratings refer to model tables listed below.

These inverter do not employ dc-capacitor pre-charging circuitry. Consideration shall be given to prevent current inrush when connecting the units to the dc power source. A suitable pre-charging circuitry or component shall be provided externally in the end-use applications.

These inverter are provided with internal semiconductor fuses connected in dc+ and dc- input respectively and suitable for branch circuit protection. These fuses are factory assembled and cannot be replaced by the end-user.

Use in a pollution degree 2 environment according to IEC60664-1 only. This means device shall be mounted in a suitable switchgear cabinet.

Use UL-certified device wiring (mains, motor and control cables) only

  - use copper conductors rated min. 75 °C.
  - tightening torques for terminals, refer to model tables listed below.

Motor over temperature sensing (such as thermal sensor or switch embedded in the motor) must connected during operation of these drives.

In case the device is used in combination with an externally mounted brake resistor, over-temperature protection shall be provided separately to the brake resistor avoiding excessive temperatures.

Auxiliary supply voltage 24 V DC.

For relay outputs (REL, RSH) on control board use an isolated source only, rated 24 Vdc.

A fuse in accordance with UL248 must be connected between the source and the output, rated 4 A.
1.3.1 DC fed drives size BG1 - BG4

Valid
For all models ServoOne DC size 1 - 4 with wall mounting air cooler and for all models size 3 + 4 with liquid cooler. For all with or without functional safety and all without internal brake resistor. For dc fed models only, max. 770 V dc.

Keeping all versions of communication interfaces and/or optional interfaces.

Void
Not valid for push through cooler or cold plate cooler models.
Not valid for any combination with internal braking resistor.

Special conditions for liquid cooled models
The coolant pressure may be a maximum of 200 kPA / 29 PSI (2 bar).
Coolant flow 3 liter/min or more.
Minimum inlet temperature $T_{in} = T_{amb} - 10 \degree C$ to avoid condensation, max. temperature $50 \degree C$.
Use as coolant water with a corrosion preventing additive such as ethylene glycol or equivalent.

Internal overload protection
The internal overload protection operates within max. 30 sec or 10 sec when reaching 200 % of the motor full load current. Details see in technical ratings appendix to instruction manual. Adjustment of internal overload protection see document “ServoOne device help”.

---

<table>
<thead>
<tr>
<th>Size</th>
<th>Device</th>
<th>Electric supply mains Voltage</th>
<th>Short circuit capability</th>
<th>Tightening torque Mains terminal</th>
<th>Motor terminal , brake resistor L+, L-</th>
<th>Max. ambient temperature</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG1</td>
<td>SO84.004.1</td>
<td>565 - 770 V DC</td>
<td>5 kA RMS</td>
<td>5 - 7 lb-in (0.56 - 0.79 Nm)</td>
<td>UL recognized and CSA recognized</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SO84.006.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BG2</td>
<td>SO84.008.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SO84.012.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BG3</td>
<td>SO84.016.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SO84.020.1</td>
<td></td>
<td></td>
<td>15 lb-in (1.7 Nm)</td>
<td>40 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BG4</td>
<td>SO84.024.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SO84.032.1</td>
<td></td>
<td></td>
<td>7 lb-in (0.79 Nm)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1.7 Tightening torques, overload protection etc. for ServoOne DC fed drives size BG1 - BG4
1.3.2 DC fed drives size BG5

Valid
For all models ServoOne DC with wall mounting air cooler or liquid cooled models.
For dc fed models only, max. 770 V DC.
Including all versions of communication interfaces and/or optional interfaces.

Void
Not valid for push through cooler or cold plate cooler models.
Not valid for any combination with internal braking resistor.

Special conditions for liquid cooled models
The coolant pressure may be a maximum of 200 kPA / 29 PSI (2 bar).
Coolant flow 8-11 liter/min.
Minimum inlet temperature $T_{\text{in}} = T_{\text{amb}} - 10 \, ^\circ\text{C}$ to avoid condensation, max. temperature 50 °C.
Use as coolant water with a corrosion preventing additive such as ethylene glycol or equivalent.

Internal overload protection
The internal overload protection operates within max. 3 sec (30 sec for liquid cooled models) when reaching 200% of the motor full load current. Details see in technical ratings appendix to instruction manual. Adjustment of internal overload protection see document “ServoOne device help”.

Keep the specific conditions for the different models ServoOne DC BG5

<table>
<thead>
<tr>
<th>Size</th>
<th>Cooler type</th>
<th>Device</th>
<th>Electric supply mains Voltage</th>
<th>Short circuit capability</th>
<th>Overload protection DC input terminal</th>
<th>Tightening torque motor terminal</th>
<th>Max. ambient temperature</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG5</td>
<td>W wall mounting air cooler</td>
<td>S084.045.1</td>
<td>770 V DC</td>
<td>5 kA DC</td>
<td>200 % @ 3 sec</td>
<td>22 - 39.8 lb-in (2.5 - 4.5 Nm)</td>
<td>40 lb-in (4.5 Nm)</td>
<td>40 °C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S084.060.1</td>
<td>770 V DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S084.072.1</td>
<td>770 V DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>L liquid cooler</td>
<td>S084.045.1</td>
<td>770 V DC</td>
<td>10 kA DC</td>
<td>200 % @ 30 sec</td>
<td>22 - 39.8 lb-in (2.5 - 4.5 Nm)</td>
<td>40 lb-in (4.5 Nm)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S084.060.1</td>
<td>770 V DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S084.072.1</td>
<td>770 V DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1.8 Tightening torques, overload protection etc. for ServoOne DC fed drives size BG5
1.3.3 DC fed drives size BG6

Valid
For all models ServoOne DC with wall mounting air cooler or liquid cooled models. For dc fed models only, max. 770 V dc.
Including all versions of communication interfaces and/or optional interfaces.

Void
Not valid for Functional safety models.
Not valid for push through cooler or cold plate cooler models.
Not valid for any combination with internal braking resistor.

Special conditions for liquid cooled models
The coolant pressure may be a maximum of 200 kPA / 29 PSI (2 bar).
Coolant flow 11 - 13 liter/min.
Minimum inlet temperature \( T_{\text{inl}} = T_{\text{amb}} - 10 \degree \text{C} \) to avoid condensation.
Use as coolant water with a corrosion preventing additive such as ethylene glycol or equivalent.

Internal overload protection
The internal overload protection operates within max. 30 sec or 10 sec when reaching 200 % of the motor full load current. Details see in technical ratings appendix to instruction manual. Adjustment of internal overload protection see document “ServoOne device help”.

Keep the specific conditions for the different models ServoOne DC BG6

<table>
<thead>
<tr>
<th>Size</th>
<th>Cooler type</th>
<th>Device</th>
<th>Electric supply mains</th>
<th>Overload protection</th>
<th>Tightening torque</th>
<th>Max. ambient temperature</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG6</td>
<td>W + L</td>
<td>S084.090.1</td>
<td>770 V DC</td>
<td>200 % @ 30 sec</td>
<td>177 lb-in (20 Nm)</td>
<td>40 \degree C</td>
<td>UL recognized</td>
</tr>
<tr>
<td></td>
<td>wall mounting air cooler and liquid cooler</td>
<td>S084.110.1</td>
<td>770 V DC</td>
<td>10 kA DC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S084.143.1</td>
<td>770 V DC</td>
<td>200 % @ 10 sec</td>
<td>270 lb-in (30 Nm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S084.170.1</td>
<td>770 V DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S084.210.1</td>
<td>770 V DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1.9 Tightening torques, overload protection etc. for ServoOne DC fed drives size BG6
1.3.4  DC fed drives size BG7

Valid
For all ServoOne DC liquid cooled models.
For DC fed models only, max. 770 V DC. To be supplied by LTI Motion AC Drive Models SO84.450, SE84.450, SO84.540 or SE84.540 only.
Including all versions of communication interfaces and/or optional interfaces.

Void
Not valid for Functional safety models.
All models ServoOne DC with wall mounting air cooler, push through cooler. All models in combination with internal brake resistors.

Special conditions for liquid cooled models
The coolant pressure may be a maximum of 200 kPA / 29 PSI (2 bar).
Coolant flow 12-14 liter/min.
Minimum inlet temperature $T_{\text{in}} = T_{\text{amb}} - 10 \, ^\circ\text{C}$ to avoid condensation.
Use as coolant water with a corrosion preventing additive such as ethylene glycol or equivalent.

Special conditions for busbar terminals
Use properly sized UL listed ZMVV connector lugs and follow the instruction manual for proper wire sizes and installation or contact manufacturer to purchase proper lugs.

Internal overload protection
The internal overload protection operates within max. 30 sec seconds when reaching 150 % of the Motor Full Load Current. Details see in technical ratings appendix to instruction manual. Adjustment of internal overload protection see document “ServoOne device help”.

Keep the specific conditions for the different models ServoOne DC BG7 type W, D or L

<table>
<thead>
<tr>
<th>Size</th>
<th>Cooler type</th>
<th>Device</th>
<th>Electric supply mains</th>
<th>Short circuit capability</th>
<th>Overload protection</th>
<th>Tightening torque</th>
<th>max. mains fuse</th>
<th>Max. ambient temperature</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG7</td>
<td>liquid cooler</td>
<td>SO84.250.1</td>
<td>770 V DC</td>
<td>30 kA DC</td>
<td>150 % @ 30 sec</td>
<td>Bus bar terminals M12 221 - 265 lb-in (20 - 25 Nm)</td>
<td>2 x 400 A</td>
<td>A70QS400-4 or -4k</td>
<td>45 °C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SO84.325.1</td>
<td>770 V DC</td>
<td>30 kA DC</td>
<td>150 % @ 30 sec</td>
<td>M10 177 - 221 lb-in (20 - 25 Nm)</td>
<td>2 x 400 A</td>
<td>A70QS400-4 or -4k</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SO84.450.1</td>
<td>770 V DC</td>
<td>30 kA DC</td>
<td>150 % @ 30 sec</td>
<td>Bus bar terminals M12 221 - 265 lb-in (20 - 25 Nm)</td>
<td>3 x 600 A</td>
<td>A70QS600-4 or -4k</td>
<td></td>
</tr>
</tbody>
</table>

Table 1.10  Tightening torques, overload protection etc. for ServoOne DC fed drives size BG7
1.3.5 Power supply unit (PSU) size BG5

Valid

For all models ServoOne PSU with wall mounting air cooler or liquid cooled models and in combination with internal brake resistors.

For 3 x 400-480 V three phase ac models only, max. 277 V RMS to ground. Including all versions of communication interfaces and/or optional interfaces. The recommended line connection sets (filter choke, set-up choke and mains filter) shall be used.

Void

Not valid for Functional safety models, cold plate cooler models.

Keep the specific conditions for the different models ServoOne PSU BG5

<table>
<thead>
<tr>
<th>Size</th>
<th>Device</th>
<th>Mains voltage</th>
<th>Short circuit capability</th>
<th>Tightening torque</th>
<th>max. mains fuse</th>
<th>Max. ambient temperature</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG5</td>
<td>SO84.040.S</td>
<td>3 x 400-480 V</td>
<td>5 kA RMS</td>
<td>40 lb-in (4.5 Nm)</td>
<td>3 x 100 A</td>
<td>600 V</td>
<td>RK1</td>
</tr>
<tr>
<td>BG5</td>
<td>SO84.076.S</td>
<td>3 x 400-480 V</td>
<td>10 kA RMS</td>
<td>22 - 39.8 lb-in (2.5 - 4.5 Nm)</td>
<td>3 x 100 A</td>
<td>600 V</td>
<td>RK1</td>
</tr>
</tbody>
</table>

Table 1.11 Tightening torques, fuses etc. for ServoOne PSU size BG5

Special conditions for liquid cooled models

The coolant pressure may be a maximum of 200 kPA / 29 PSI (2 bar).

Coolant flow 8-11 liter/min.

Minimum inlet temperature $T_{in} = T_{amb} - 10 \, ^\circ C$ to avoid condensation.

Use as coolant water with a corrosion preventing additive such as ethylene glycol or equivalent.
1.3.6 Power supply unit (PSU) size BG6

Valid

For all models ServoOne PSU with wall mounting air cooler or liquid cooled models and in combination with internal brake resistors.

For 3 x 400-480 V three phase ac models only, max. 277 V RMS to ground.

Including all versions of communication interfaces and/or optional interfaces.

The recommended line connection sets (filter choke, set-up choke and mains filter) shall be used.

Void

Not valid for Functional safety models, push through models.

Special conditions for liquid cooled models

The coolant pressure may be a maximum of 200 kPA / 29 PSI (2 bar).

Coolant flow 11-13 liter/min.

Minimum inlet temperature T_{in} = T_{amb} - 10 °C to avoid condensation.

Use as coolant water with a corrosion preventing additive such as ethylene glycol or equivalent.

Keep the specific conditions for the different models ServoOne PSU BG6

<table>
<thead>
<tr>
<th>Size</th>
<th>Device</th>
<th>Mains voltage</th>
<th>Short circuit capability</th>
<th>Tightening torque</th>
<th>max. mains fuse</th>
<th>Max. ambient temperature</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG6</td>
<td>S084.115.S</td>
<td>3 x 400-480 V</td>
<td>10 kA RMS</td>
<td>270 lb-in (30 Nm)</td>
<td>3 x 200 A</td>
<td>600 V</td>
<td>UL recognized</td>
</tr>
<tr>
<td></td>
<td>S084.170.S</td>
<td>3 x 400-480 V</td>
<td>10 kA RMS</td>
<td>175 lb-in (20 Nm)</td>
<td>3 x 200 A</td>
<td>RK1</td>
<td>40 °C</td>
</tr>
</tbody>
</table>

Table 1.12 Tightening torques, fuses etc. for ServoOne PSU size BG6
1.3.7 Power supply unit (PSU) size BG7

Currently no UL Certification for ServoOne PSU size7 available!
2 ServoOne CM Multi-axis automation System

2.1 Axis controller SOCM-1.00xx, SOCM-2.00xx, SOCM-3.00xx

Common terms to comply with the UL certification (UL 61800-5-1) for all the sizes ServoOne CM axis controller.

Multiple rated equipment. Operation only within the technical ratings of the drive, details see in technical ratings appendix instruction manual. Use SOCM axis controller in combination with SOCM-P central supply unit only.

Ensure that surrounding air temperature does not exceed the maximum approbate ambient temperature, see model table below.

As the axis controller do not incorporate internal MOV’s at DC input, they may only be connected to a proper DC-source in which voltage transients are controlled and limited in accordance with UL1449 to the maximum level of 4 kV. Suitable for use in circuits delivering not more than 5000 A DC maximum short circuit current capability of symmetrical Amperes @ 700 V DC maximum voltage.

Integral solid-state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance to the manufacturer instructions, National Electrical Code and any additional local codes.

These axis controller are not provided with internal semiconductor fuses connected in the DC+ and DC- input.

Proper fuse rating shall be implemented at the ac supply devices. Refer to Table 2.2 central supply unit SO CM-P.

The internal overload protection operates within max. 10 sec (exception: 2 sec for 16, 18 and 32 A device,) when reaching 200 % of the motor full load current. Details see in technical ratings appendix to instruction manual. Adjustment of internal overload protection see document “ServoOne CM device help”.

Use in a pollution degree 2 environment according to IEC60664-1 only. This means device shall be mounted in a suitable switchgear cabinet.

Use UL-certified device wiring (mains, motor and control cables) only

- use copper conductors rated min. 75 °C.
- use recommended terminal connectors and tightening torques for terminals, see instruction manual.

Motor over temperature sensing (such as thermal sensor or switch embedded in the motor) must connected during operation of these drives.

Auxiliary supply voltage 24 V DC.

Valid:
For all models with software configuration V1.40-13 and higher.
## ServoOne CM Multi-axis automation System

Keep the specific conditions for the different models ServoOne CM axis controller

<table>
<thead>
<tr>
<th>Size</th>
<th>Cooler type</th>
<th>Device</th>
<th>Mains voltage Voltage</th>
<th>Short circuit capability</th>
<th>Overload protection mains terminal</th>
<th>Overload protection motor terminal</th>
<th>Tightening torque</th>
<th>Max. ambient temperature</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG1</td>
<td>Wall mounting heat sink, air-cooled and cold plate models</td>
<td>SOCIM-1.0001</td>
<td>325 V DC to 678 V DC</td>
<td>5000 A DC</td>
<td>200 % @ 10 sec</td>
<td>Not relevant, because spring-cage terminal blocks</td>
<td>18.5 lb-in (2.1 Nm)</td>
<td>45 °C</td>
<td>UL listed, CSA listed, C22.2, UL, cUL for wall mounting models; UR, cUR for cold plate models</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOCIM-2.0001</td>
<td></td>
<td></td>
<td>200 % @ 10 sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOCIM-2.0001</td>
<td></td>
<td></td>
<td>200 % @ 10 sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOCIM-3.0001</td>
<td></td>
<td></td>
<td>200 % @ 10 sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOCIM-1.0003</td>
<td></td>
<td></td>
<td>200 % @ 10 sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOCIM-2.0003</td>
<td></td>
<td></td>
<td>200 % @ 10 sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOCIM-3.0003</td>
<td></td>
<td></td>
<td>200 % @ 10 sec</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOCIM-1.0006</td>
<td></td>
<td></td>
<td>200 % @ 10 sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOCIM-2.0006</td>
<td></td>
<td></td>
<td>200 % @ 10 sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOCIM-3.0006</td>
<td></td>
<td></td>
<td>200 % @ 10 sec</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOCIM-1.0012</td>
<td></td>
<td></td>
<td>200 % @ 10 sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOCIM-1.0018</td>
<td></td>
<td></td>
<td>200 % @ 10 sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BG2</td>
<td>Wall mounting heat sink, air-cooled and cold plate models</td>
<td>SOCIM-2.0012</td>
<td>325 V DC to 678 V DC</td>
<td>5000 A DC</td>
<td>200 % @ 10 sec</td>
<td>Not relevant, because spring-cage terminal blocks</td>
<td>18.5 lb-in (2.1 Nm)</td>
<td>45 °C</td>
<td>UL listed, CSA listed, C22.2, UL, cUL for wall mounting models; UR, cUR for cold plate models</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOCIM-3.0012</td>
<td></td>
<td></td>
<td>200 % @ 10 sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOCIM-2.0016</td>
<td></td>
<td></td>
<td>200 % @ 10 sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOCIM-1.0024</td>
<td></td>
<td></td>
<td>200 % @ 10 sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOCIM-1.0032</td>
<td></td>
<td></td>
<td>200 % @ 10 sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2.1 Tightening torques, rating etc. for ServoOne CM BG1 + BG2
2.2 Supply unit SOCM-P-0010, SOCM-P-0022

Common terms to comply with the UL certification (UL 61800-5-1) for all the sizes ServoOne CM-P central supply unit.

Multiple rated equipment. Operation only within the technical ratings of the drive, details see in technical ratings appendix instruction manual.

Use SOCM-P central supply unit in combination with SOCM axis controller only.

For auxiliary supply use 2 x 400-480 VAC.

Ensure that surrounding air temperature exceeds not the maximum approbate ambient temperature, see model table below.

For use only in electric supply mains with maximum overvoltage category III and for circuits delivering not more than maximum short circuit current capability of 5000 A RMS symmetrical Amperes @ maximum voltage, when protected by fuses as required.

Ratings and fuse classes refer to model tables listed below.

Connect to wye sources only where the voltage to ground does not exceed 300 V maximum.

Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance to the manufacturer instructions, National Electrical Code and any additional local codes.

The internal overload protection operates within max. 1 sec when reaching 200 % of the full load current. Details see in technical ratings appendix to instruction manual.

Use in a pollution degree 2 environment according to IEC60664-1 only. This means device shall be mounted in a suitable switchgear cabinet.

In case the device is used in combination with an externally mounted brake resistor, over-temperature protection shall be provided separately to the brake resistor avoiding excessive temperatures.

External brake resistor must provide at least basic insulation (4000 V impulse voltage withstand) between resistor's live parts and ground.

Use UL-certified device wiring (mains, motor and control cables) only

- use copper conductors rated min. 75 °C.
- use recommended terminal connectors and tightening torques for terminals, see instruction manual.

Valid:

For all models with software configuration V1.40-13 and higher.
<table>
<thead>
<tr>
<th>Size</th>
<th>Device</th>
<th>Mains voltage Voltage</th>
<th>Short circuit capability</th>
<th>Mains terminal</th>
<th>DC Output terminal (Busbar)</th>
<th>Max mains fuse Rating</th>
<th>Voltage</th>
<th>class</th>
<th>Max total Bus capacitance</th>
<th>Max. ambient temperature</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG1</td>
<td>SOCM-P:0010</td>
<td>3 x 230 to 480 V AC</td>
<td>5000 A RMS</td>
<td>spring-cage terminal blocks</td>
<td>18.5 lb-in (2.1 Nm)</td>
<td>3 x 70 A 600 V RK1</td>
<td>2000 µF</td>
<td></td>
<td>45 °C</td>
<td>UL listed CSA listed C22.2</td>
<td></td>
</tr>
<tr>
<td>BG2</td>
<td>SOCM-P:0022</td>
<td>18 lb-in (2.0 Nm)</td>
<td>18.5 lb-in (2.1 Nm)</td>
<td>3 x 100 A 600 V RK1</td>
<td>4000 µF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>UL, cUL for wall mounting models; UR, cUR for cold plate models</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.2  
Tightening torques, fuse rating etc. for ServoOne CM-P BG1 + BG2
The devices are certified according to UL508C. The following conditions have to be observed:

1. Use in systems with a maximum overvoltage category III.
2. Use in a maximum pollution degree 2 environment only.
3. Use UL-certified 60/75 °C copper conductors only.
4. Internal overload protection operates at 180 % of the motor full load current after 30 seconds.
5. Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the Manufacturer Instructions, National Electrical Code and any additional local codes.
6. Suitable for use on a circuit capable of delivering not more than 5000 A RMS, symmetrical, 230 V maximum (CDA32.XXX), 460 V maximum CDA34.XXX), when protected by H or K5 Class fuses.
7. Suitable for use on a circuit capable of delivering not more than 5000 A RMS. Symmetrical, 230 V maximum (CDA32.XXX), 460 V maximum CDA34.XXX), when protected by H or K5 Class fuses.

Ratings see Table 3.1.

Motor overtemperature sensing (such as thermal sensor or switch imbedded in the motor) must be connected during operation of these drives.

<table>
<thead>
<tr>
<th>Wire cross-section</th>
<th>Mains fuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWG 16 N/M</td>
<td>10 A</td>
</tr>
<tr>
<td>AWG 14 N / AWG 16 M</td>
<td>15 A</td>
</tr>
<tr>
<td>AWG 16 N/M</td>
<td>10 A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wire cross-section</th>
<th>Mains fuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWG 10 N/M</td>
<td>30 A</td>
</tr>
<tr>
<td>AWG 8 N/M</td>
<td>50 A</td>
</tr>
</tbody>
</table>

Table 3.1  Cable cross-sections - mains (N), motor (M)
The devices are certified according to UL508C. The following conditions have to be observed:

1. Use in systems with a maximum overvoltage category III.
2. Use in a maximum pollution degree 2 environment only.
3. Use UL-certified 60/75 °C copper conductors only.
4. Internal overload protection operates at 180 % of the motor full load current after 30 seconds.
5. Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the Manufacturer Instructions, National Electrical Code and any additional local codes.
6. Suitable for use on a circuit capable of delivering not more than 5000 A RMS, symmetrical, 230 V maximum (CDD32.XXX), 460 Volts maximum CDD34.XXX), when protected by H or K5 Class fuses. Ratings see Table 3.2.
7. Motor overtemperature sensing (such as thermal sensor or switch imbedded in the motor) must to be connected during operation of these drives.

<table>
<thead>
<tr>
<th>Tightening torque of grounding lead terminals</th>
<th>Tightening torque of mains/motor terminals</th>
<th>Device</th>
<th>Wire cross-section</th>
<th>Mains fuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 ... 0.6 Nm</td>
<td>0.5 ... 0.6 Nm</td>
<td>CDD32.004</td>
<td>AWG 16 N/M</td>
<td>10 A</td>
</tr>
<tr>
<td>0.5 ... 0.6 Nm</td>
<td>0.5 ... 0.6 Nm</td>
<td>CDD32.006</td>
<td>AWG 14 N / AWG 16 M</td>
<td>15 A</td>
</tr>
<tr>
<td>0.5 ... 0.6 Nm</td>
<td>0.5 ... 0.6 Nm</td>
<td>CDD32.008</td>
<td>AWG 14 N / AWG 16 M</td>
<td>20 A</td>
</tr>
<tr>
<td>0.5 ... 0.6 Nm</td>
<td>0.5 ... 0.6 Nm</td>
<td>CDD34.003</td>
<td>AWG 16 N/M</td>
<td>10 A</td>
</tr>
<tr>
<td>0.5 ... 0.6 Nm</td>
<td>0.5 ... 0.6 Nm</td>
<td>CDD34.005</td>
<td>AWG 16 N/M</td>
<td>10 A</td>
</tr>
<tr>
<td>0.5 ... 0.6 Nm</td>
<td>0.5 ... 0.6 Nm</td>
<td>CDD34.006</td>
<td>AWG 16 N/M</td>
<td>10 A</td>
</tr>
<tr>
<td>0.5 ... 0.6 Nm</td>
<td>0.5 ... 0.6 Nm</td>
<td>CDD34.008</td>
<td>AWG 14 N/M</td>
<td>15 A</td>
</tr>
<tr>
<td>0.5 ... 0.6 Nm</td>
<td>0.5 ... 0.6 Nm</td>
<td>CDD34.010</td>
<td>AWG 14 N/M</td>
<td>15 A</td>
</tr>
<tr>
<td>0.5 ... 0.6 Nm</td>
<td>0.5 ... 0.6 Nm</td>
<td>CDD34.014</td>
<td>AWG 12 N/M</td>
<td>20 A</td>
</tr>
<tr>
<td>0.5 ... 0.6 Nm</td>
<td>0.5 ... 0.6 Nm</td>
<td>CDD34.017</td>
<td>AWG 12 N/M</td>
<td>25 A</td>
</tr>
<tr>
<td>1.2 ... 1.5 Nm</td>
<td>1.2 ... 1.5 Nm</td>
<td>CDD34.024</td>
<td>AWG 10 N/M</td>
<td>30 A</td>
</tr>
<tr>
<td>1.2 ... 1.5 Nm</td>
<td>1.2 ... 1.5 Nm</td>
<td>CDD34.032</td>
<td>AWG 8 N/M</td>
<td>50 A</td>
</tr>
</tbody>
</table>

Table 3.2  Cable cross-sections - mains (N), motor (M)
3.3  CDD34.017, DKS

The devices are certified according to UL508C. The following conditions have to be observed:

1. Use in systems with a maximum overvoltage category III.
2. Use in a maximum pollution degree 2 environment only.
3. Use UL-certified 60/75 °C copper conductors only.
4. Tightening torque of input and motor terminals: 0.5…0.6 Nm
5. Internal overload protection operates at 180 % of the motor full load current after 30 seconds.
6. Suitable for use on a circuit capable of delivering not more than 5000 A RMS, symmetrical, 650 V maximum when protected by H Class fuses 25 A maximum.
7. Motor overtemperature sensing (such as thermal sensor or switch imbedded in the motor) must to be connected during operation of these drives.
3.4 CDE/CDB3000

Common terms to comply with the UL certification (UL508C) for all the sizes

3.4.1 Conditions to comply for UL approval for BG1 to BG5

1. Use in systems with a maximum overvoltage category III.
2. Use in a maximum pollution degree 2 environment only.
3. Use UL-certified 60/75 °C copper conductors only.
4. Internal overload protection operates at 180 % of the motor full load current after 30 seconds.
   Only CDE34.010,S: Internal Overload Protection Operates at 25 A after 40 seconds, see instruction manual for protection level at other switching frequencies.
5. Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the Manufacturer Instructions, National Electrical Code and any additional local codes.
6. Suitable for use on a circuit capable of delivering not more than 5000 A RMS. symmetrical, 230 V maximum (CDB/CDE32.XXX), 460 V maximum (CDA34.XXX), when protected by H or K5 Class fuses. (CDE34.010,S: RK5 Class fuses) Ratings see Table 3.3.
7. Motor overtemperature sensing (such as thermal sensor or switch imbedded in the motor) must be connected during operation of these drives. Model CDE34.010,S only: Motor overtemperature sensing must be connected to terminal X3 in the end-use.
8. Model CDE34.010,S only: Multiple rated equipment. See instruction manual for ratings.
9. External supply controller board:
   Intended for connection only to a secondary isolating source rated max. 24 V DC. Fuse in accordance with UL248, rated max. 4 A must be connected between the isolating source and the unit.
### Table 3.3

<table>
<thead>
<tr>
<th>Device</th>
<th>Tightening torque of mains terminals</th>
<th>Cable cross-section</th>
<th>Mains fuse Class H or K5</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDE/CDB32.003</td>
<td>0.5 ... 0.6 Nm</td>
<td>AWG 16 N/M</td>
<td>10 A</td>
</tr>
<tr>
<td>CDE/CDB32.004</td>
<td>0.5 ... 0.6 Nm</td>
<td>AWG 16 N/M</td>
<td>10 A</td>
</tr>
<tr>
<td>CDE/CDB32.008</td>
<td>0.5 ... 0.6 Nm</td>
<td>AWG 14 N / AWG 16 M</td>
<td>20 A</td>
</tr>
<tr>
<td>CDE/CDB34.001</td>
<td>0.5 ... 0.6 Nm</td>
<td>AWG 16 N/M</td>
<td>6 A</td>
</tr>
<tr>
<td>CDE/CDB34.003</td>
<td>0.5 ... 0.6 Nm</td>
<td>AWG 16 N/M</td>
<td>10 A</td>
</tr>
<tr>
<td>CDE/CDB34.005</td>
<td>0.5 ... 0.6 Nm</td>
<td>AWG 16 N/M</td>
<td>10 A</td>
</tr>
<tr>
<td>CDE/CDB34.006</td>
<td>0.5 ... 0.6 Nm</td>
<td>AWG 16 N/M</td>
<td>10 A</td>
</tr>
<tr>
<td>CDE/CDB34.008</td>
<td>0.5 ... 0.6 Nm</td>
<td>AWG 14 N / AWG 16 M</td>
<td>15 A</td>
</tr>
<tr>
<td>CDE/CDB34.010</td>
<td>0.5 ... 0.6 Nm</td>
<td>AWG 14 N/M</td>
<td>15 A</td>
</tr>
<tr>
<td>CDE/CDB34.010,S</td>
<td>0.7 ... 0.8 Nm</td>
<td>AWG 12 N/M</td>
<td>30 A RK5</td>
</tr>
<tr>
<td>CDE/CDB34.014</td>
<td>0.5 ... 0.6 Nm</td>
<td>AWG 12 N/M</td>
<td>20 A</td>
</tr>
<tr>
<td>CDE/CDB34.017</td>
<td>0.5 ... 0.6 Nm</td>
<td>AWG 12 N/M</td>
<td>25 A</td>
</tr>
<tr>
<td>CDE/CDB34.024</td>
<td>1.2 ... 1.5 Nm</td>
<td>AWG 10 N / AWG 16 M</td>
<td>30 A</td>
</tr>
<tr>
<td>CDE/CDB34.032</td>
<td>1.2 ... 1.5 Nm</td>
<td>AWG 8 N/M</td>
<td>50 A</td>
</tr>
</tbody>
</table>

3.4.2 Conditions to comply for UL approbation for BG6, 7, 7a

1. Switch cabinet mounting with IP54 protection and contamination level 2 is mandatory.
2. In conformance to UL 508C, the devices may only be operated on systems of overvoltage category III.
3. The devices’ internal short-circuit protection does not replace the externally required branch circuit protection. The operating conditions at the location of use and the national and regional standards and regulations relating to wiring protection must be observed. Only UL-approved circuit-breakers and fuses (RK1 class) may be used. For details on trip characteristics and fuse ratings see table.
4. The connecting cables (mains power, motor and control cables) must be UL-approved: CDE/CDB34.xxx: Min. 600 V cables (mains/motor):
   - Cu 75 °C min.
c-line Drives Product Range

- Marking of copper portion of wiring 60/70 °C
- Marking of appropriate tightening torque for terminals. (see table)

5. Maximum temperature of ambient air: Dependent on device type (see technical data) 40 °C, 45 °C or 55 °C.

6. The internal device overload protection must permit twice the device rated current for minimum 3 seconds.

7. If the devices are operated with an encapsulated external braking resistor, it must be protected separately against overheating.

8. For devices with liquid cooling (abbreviation: LC, LB):
   - Max. possible pressure for liquid cooling system: 2 bar (29.0 Psi)
   - To avoid condensation of the cooling system, the internal temperature of the coolant must be > 40°C.
   - Water, glycol, a mixture of water and glycol, oil or another coolant tested for the purpose may be used as coolant for the cooling system.

9. The devices are operable in systems with a maximum current capacity of 10000 A with phase-symmetrical current and a max. voltage of 480 V.

### Table 3.4  
**Cable cross-sections - mains (N), motor (M) for BG6, BG7 and BG7a**

<table>
<thead>
<tr>
<th>Device</th>
<th>Tightening torque of protective conductor terminals</th>
<th>Tightening torque of mains terminals</th>
<th>Motor power max. 0 - 265 V</th>
<th>Motor power max. 0 - 460 V</th>
<th>Mains fuse class</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDE/CDB34.044</td>
<td>2.5 ... 4.5 Nm</td>
<td>2.5 ... 4.5 Nm</td>
<td>17.5 hp</td>
<td>29.5 hp</td>
<td>3 x 50 A</td>
</tr>
<tr>
<td>CDE/CDB34.058</td>
<td>2.5 ... 4.5 Nm</td>
<td>2.5 ... 4.5 Nm</td>
<td>23 hp</td>
<td>40 hp</td>
<td>3 x 50 A</td>
</tr>
<tr>
<td>CDE/CDB34.070</td>
<td>2.5 ... 4.5 Nm</td>
<td>2.5 ... 4.5 Nm</td>
<td>28 hp</td>
<td>50 hp</td>
<td>3 x 80 A</td>
</tr>
<tr>
<td>CDE/CDB34.088</td>
<td>15 ... 20 Nm</td>
<td>15 ... 20 Nm</td>
<td>36 hp</td>
<td>63 hp</td>
<td>3 x 100 A</td>
</tr>
<tr>
<td>CDE/CDB34.108</td>
<td>15 ... 20 Nm</td>
<td>15 ... 20 Nm</td>
<td>43 hp</td>
<td>74 hp</td>
<td>3 x 125 A</td>
</tr>
<tr>
<td>CDE/CDB34.140</td>
<td>25 ... 30 Nm</td>
<td>25 ... 30 Nm</td>
<td>58 hp</td>
<td>100 hp</td>
<td>3 x 175 A</td>
</tr>
<tr>
<td>CDE/CDB34.168</td>
<td>25 ... 30 Nm</td>
<td>25 ... 30 Nm</td>
<td>70 hp</td>
<td>121 hp</td>
<td>3 x 220 A</td>
</tr>
<tr>
<td>CDE/CDB34.208L</td>
<td>25 ... 30 Nm</td>
<td>25 ... 30 Nm</td>
<td>70 hp</td>
<td>121 hp</td>
<td>3 x 250 A</td>
</tr>
</tbody>
</table>

#### 3.5 CDF3000

The devices are certified according to UL508C. The following conditions have to be observed:

- Use in a maximum pollution degree 2 environment only.
- Maximum surrounding temperature 45 °C.
- Use UL-certified 60/75 °C copper conductors only.
- Suitable for use on a circuit capable of delivering not more than 5000 A RMS symmetrical amperes, 60 V DC maximum when protected by (DIVQ) listed circuit breaker 16 A maximum.
- Tightening torque:
  - Terminals of X1: 0.5…0.6 Nm
  - Terminals of X1: 0.22…0.25 Nm

5. Motor over-temperature sensing (such as thermal sensor or switch imbedded in the motor) must be connected during operation of these drives’.

6. Internal overload protection operates at 200 % of the motor full load current after 30 seconds. For adjustment see CDE/CDB/CDF3000 Application Manual.
3.6 CDF30.002 light

The devices are certified according to UL508C. The following conditions have to be observed:

1. Current-Protection: Motor Supply Fuse 4 A, Control Supply Fuse 2 A.
2. Maximum surrounding temperature 45 °C.
3. Use 60/75 °C copper conductors only.
4. This device is intended to be used with a Class 2 power source or Class 2 transformer in accordance with UL1310 or UL1585. As an alternative a LV/LC (Limited Voltage / Limited Current) power source with one of the following properties can be used:
   - An isolating device such that the maximum open circuit voltage potential available to the circuit is not more than 24 V DC and the current is limited to a value not exceeding 8 amperes measured after 1 minute of operation.
   - A suitable isolating source in conjunction with a fuse in accordance with UL248. The fuse shall be rated max. 4 A and be installed in the 24 V DC power supply to the device in order to limit the available current.
5. Field installed conductors shall be segregated from field and factory installed conductors and uninsulated live parts of other circuits operating at over 150 V to ground so that a minimum permanent 2 inch (50.8 mm) separation is maintained, unless the field wiring conductors have been provided with recognized insulating material which has an equal or higher voltage rating than the other circuit involved.
6. Motor over-temperature sensing is not provided by the drive.
7. Device has no provision for motor overload protection. External overload protection shall be provided.
The devices are certified according to UL508C. The following conditions have to be observed:

1. Max. surrounding air temperature 40 °C.
2. Internal overload protection operates within 30 seconds when reaching 200% of the motor full load current.
3. Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the Manufacturer Instructions, National Electrical Code and any additional local codes.
4. Suitable for use on a circuit capable of delivering not more than 5000 A RMS symmetrical 240 V maximum, when protected by fuses.
5. Use in a pollution degree 2 environment only.
6. Use 60/75 °C copper conductors only.
7. Motor overtemperature sensing (such as thermal sensor or switch embedded in the motor) must to be connected during operation of these drives.

8. For 24 V supply use secondary isolating source rated 24 V DC only. Fuse in accordance with UL248, rated max. 4 A must be connected between the source and the supply input.
9. Multiple rated equipment. Ratings see Instruction manuel.

3.8  CDB32.004,CX.X,SH,H24 and CDB32.008,CX.X,SH,H24 UL certification

The controls are UL-recognized according to UL60730 Description of control:
1. Indication of purpose: Operating control
2. Construction of control: Incorporated Control
3. The control runs as Type 1 action

The following conditions have to be observed:

1. If controller-board is supplied by external power-source use supply from class 2 circuit. (Input rating of controller board 24 V DC, 24 V A)
2. Ambient temperature of control: 5 °C – 40 °C
3. Maximum pollution degree: 2
4. Maximum overvoltage category (II) (Impulse voltages 2500 V mains ➔ PE, 4000 V mains ➔ SELV/PELV)
4 Integrated Drives

4.1 IDD3000

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Figure 4.1 Connections IDD32.001, S/P

Measures to maintain UL recognized approbation

1. Protection: Only UL-listed circuit-breakers type S201UP K6A manufactured by ABB.
2. The devices are usable in systems with a maximum current capacity of 5000 A RMS, 230 V AC.
3. The connecting cables must be UL approved. 300 V cables (mains), Cu 75 °C min.
4. Internal overload protection works at 110 % of nominal motor current. Nominal motor current can be adjusted by parameter 158 MOCNM.

Attention:
Maximum Surrounding temperature 50 °C.
The following conditions have to be observed:

- Use in a pollution degree 2 environment according to IEC60664-1 only.
- Maximum surrounding air temperature 40 °C, or 50 °C/60 °C with power reduction.
- Multiple rated equipment. Ratings see Instruction manual.
- Use UL-certified device wiring (mains, motor and control cables) only.
- Use 60/75 °C copper conductors only.

Tightening torque and wire size for field wiring terminals see Table 5.1.