Elevator Solutions

Dedicated drives and motors technology that is easy to select, set-up and optimize while providing class-leading ride comfort
Emerson Industrial Automation is a leader in the provision of drive and motor technology to the elevator industry, with over 3 million elevators in operation with our control equipment worldwide. Backed by our global network of Automation Centers we provide local expertise and support, along with quick delivery of robust and dependable products.

With solutions available for all sizes and types of building, whether for new or modernization projects, our dedicated drives and motors make installing and commissioning elevator systems simpler and therefore quicker. Intuitive user interfaces and software tools for adjusting parameters, enabling functions and system optimization, save valuable site time. Our solutions provide improved energy efficiency and dependable operation throughout the service life of an elevator system.

Smooth, reliable and quiet operation means that our drives and motors have become the products of choice for modern elevator systems. We have an extensive portfolio of applications based on numerous partnerships with leading system providers in the elevator industry. Our reputation for industry leading ride comfort is second to none.
**Drive and motor solutions to match all elevator requirements**

We can provide a dedicated elevator package that includes matched drives, motors and options for any size of building, from residential to high rise. Our drive and motor combinations are easy to select, install and set-up, while being designed and rated to give optimum performance, regardless of traffic requirements or installation preference. Ultra-high speed and smooth control provides a high quality, low noise and industry leading jerk-free ride.

### Typical application examples

<table>
<thead>
<tr>
<th>Motor</th>
<th>Cabin load (kg)</th>
<th>Speed (m/s)</th>
<th>Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>E 27</td>
<td>450 to 1,000</td>
<td>1.0 to 1.6</td>
<td>E300</td>
</tr>
<tr>
<td>XAF</td>
<td>1,000 to 2,500</td>
<td>1.0 to 2.5</td>
<td>E300</td>
</tr>
<tr>
<td>Z</td>
<td>1,250 to 5,000</td>
<td>1.0 to 5.0</td>
<td>E300</td>
</tr>
</tbody>
</table>

Roping 2:1 - Travel 30m - Counterweight ratio: 50% - Grid Voltage: 400V - Single Wrap - No rope compensation

### Simple drive and motor selection software tools

We provide easy-to-use software tools to help select the correct drive and motor package to meet your elevator system specification.
# Taking elevator drives to another level

<table>
<thead>
<tr>
<th>1. Simple selection</th>
<th>2. Quick set-up</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.jpg" alt="Image" /></td>
<td><img src="image2.jpg" alt="Image" /></td>
</tr>
</tbody>
</table>

## Product range
Full range of drives & gearless motors to cover all building sizes (residential to high rise)
Up to 5,000 kg & 5 m/s

## E27 motor
- Central sheave allows for simpler and lighter mounting support
- Optimized for 6/6.5 mm steel ropes and plastic coated ropes
- Brake management & rescue with Braking Control Unit

## Fully flexible control interface
- Analog speed reference
- Digital I/O control
- Comms control
- Digital communications control - CANopen & Ethernet

## Intelligent thermal model
Provides:
- Advanced forced cooling control
- Increased drive lifetime through IGBT control
- Elimination of nuisance trips during overload operation

## Encoder range
Flexible encoder interface supporting 15 different encoder types without the need for additional interface cards. Includes Incremental, SinCos, SSI, EnDat and Hiperface

## Lightweight chassis construction
For easier handling and installation of drives and motors

## Shielded motor cables
- Available in a range of lengths to suit your application
- Fast connectors for power supply to motor, brakes, encoder and thermal sensor (E27 motor)

## Pluggable drive terminals
All control wiring terminals are pluggable and biased to ensure correct connection
Power terminals are pluggable up to 22 kW

## Flexible drive mounting options
To ensure optimization of enclosure space

## Easy system set-up
Full access to the sheave and traction ropes
All leads (power, thermal sensor, encoder and brakes) can be connected once the mechanical installation is completed with no risk of damage (E27 motor)
throughout the lifetime of your application

### 3. Easy optimization

<table>
<thead>
<tr>
<th>Elevator specific menu structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>For quick access to make the adjustments required without needing to refer to the documentation</td>
</tr>
</tbody>
</table>

### 4. Class leading performance and maintenance support

<table>
<thead>
<tr>
<th>Diagnostics</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Trip codes fully enumerated for ease of diagnostics</td>
</tr>
<tr>
<td>• Last 10 trip codes recorded within the drive to aid trouble shooting</td>
</tr>
<tr>
<td>• Time and date stamp option with Local Remote keypad</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quiet operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>High switching frequencies and intelligent thermal management mean near silent operation is achievable. Cooling fans only operate when the power circuits require additional cooling</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flight recorder</th>
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</thead>
<tbody>
<tr>
<td>All drives have a built in data logger that acts as a flight recorder and can monitor any parameter. User configurable, for example can be set to speed reference, speed feedback, load and I/O status. In the event of a drive trip or user input these values are recorded. Time and date stamping are provided with the Local Remote keypad fitted</td>
</tr>
<tr>
<td>These files can be written to an onboard SD card or retrieved by the lift controller if a communications link is connected</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Static autotune</th>
</tr>
</thead>
<tbody>
<tr>
<td>For encoder offset detection and optimum current loop configuration without the need to lift the brake or de-rope the system</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter storage &amp; cloning with SD cards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backed-up drive configuration values can be simply &amp; quickly installed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Blockered cabin release function</th>
</tr>
</thead>
<tbody>
<tr>
<td>This assists in releasing a blocked cabin after the emergency brakes have been deployed, negating the need for human entrance into the shaft</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PC tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced graphic interface to make fine-tuning your elevator system a quick and simple process</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sleep mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>To optimize energy consumption, sleep mode can be initiated either from the elevator controller or via an internal function during quiet traffic periods. This can be configured to turn off non-essential circuits within the drive to minimize standby current consumption</td>
</tr>
</tbody>
</table>

www.emersonindustrial.com/automation
The advantages of contactorless operation

A full Emerson solution provides contactorless operation in elevator applications, bringing with it many advantages.

The Safe Torque Off (STO) function of our elevator drives provides a highly dependable method for preventing the motor from being driven, removing the need for both output motor contactors.

Our Brake Control Unit (BCU) removes the need for an external power supply unit (PSU) and power cut-off, along with brake contactors and relay.

This enables:
- Compliance with EN81-20
- Reduced EMC issues
- Reduced acoustic noise
- Minimized cabinet space
- Lower system costs
- Improved system reliability

Innovative technology that delivers solutions to simplify your installation

Designed together, our complete package is easy to integrate with a range of expansion and communication options to meet specific application requirements and to optimize performance. Control Techniques and Leroy-Somer continually work with elevator industry user groups and legislators to bring proven technology and innovative features that continue to drive safety, efficiency and value.
Benefits of incorporating our Brake Control Unit into your system

The following functions of the elevator system can be controlled by the BCU:

- Brake management
- Rescue operation
- Testing of the brakes with Brake Test Module (BTM)

Simplicity of dealing with a single supplier

Along with all the technical benefits of having a full package, there is also the practicality of having a single supplier. This includes:

- A single point of contact and purchase order, to reduce admin costs
- Quick standard lead-times for all components and consolidated shipments for specific projects
- Local round-the-clock technical and maintenance support for all Emerson elevator system components
- Assured product quality throughout the system, for reliable & optimized performance
- Customized training, onsite if required, to ensure your teams maximize the functionality of our products
- Constant analysis of product quality and delivery performance to ensure customer satisfaction
Drive features and benefits

**Rapid set-up and adjustment**
- Simple and intuitive parameter adjustment via a bright back-lit LCD keypad
- Set-up in familiar elevator language and units
- Top level menu; all your frequently needed functions in one location
- No de-roping for encoder phasing test, no need to rotate motor

**Optimum ride comfort**
- Direct-to-floor positioning
- Peak curve operation
- High resolution multi-step S-ramp for start, run, slowdown and stopping
- Ultra-fast current loop for vibration free motor control
- Advanced brake control management, no rollback on starting without the need of load sensor
- Mechanical brake control with optimum start sequencing for smoothest car movement

**Silent operation**
- No motor contactors required, advanced EN81-20 TÜV certified STO enable input
- High switching frequencies selectable up to 16 kHz
- Variable speed cooling fan

**Energy efficient**
- Standby sleep/wake mode, powers down unused circuitry during prolonged periods of standby
- Easy connection to a range of regenerative modules

**Flexible integration**
- Modbus RTU communications
- Parallel I/O interface
- +/- 10V analog reference control
- Direct RS485 comms control
- Tile mount for low profile shaft mounting
- 24 Vdc backup
- Simple UPS connection with load direction signal
- Dynamic braking transistor fitted to all drives as standard

**Robust**
- Active thermal management for tripless operation under extreme conditions
- Advanced power circuit design using latest IGBT technology
- Conformal coating for use in harsh environments
- Phase loss detection on both input and output

**Enhanced elevator data logger**
- User configurable, for example speed reference, speed feedback, current and I/O sequence can all be recorded for every car journey
- Can be stored in the event of system fault
- Available for offline viewing to aid system diagnostics

**Keypad and menu structure**
Easy to use menu structure for quick and simple access to key adjustments

![Keypad and menu structure](image-url)
Key features of E300 drive

Dedicated elevator keypad supplied as standard, providing:
- Easy-to-use menu and parameter structure
- Local and remote mounting
- Real-time clock

Easy click-in keypad connection

Slot for Smartcard / SD Card Adaptor for parameter storage back-up of drive configuration values and cloning of parameters

Terminal cover for DC bus, braking terminal and onboard EMC filter*

Power on / Drive status LED

Aluminum chassis - allows flexible mounting, with high performance extruded heatsink

User-friendly power connections with removable terminals*

Robust cable management system providing grounding point for shielded control and power cables

RS485 communications port MODBUS RTU

3 x System Integration (SI) module slots for communications, I/O, additional feedback devices and automation controllers

Single screw removable cover

Pluggable control connections

Flexible dual port universal encoder interface supporting Incremental, SinCos, SSI, EnDat and Hiperface feedback types

* Features and their locations vary on some drive sizes

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Functional testing

The E300 and E200 drives have been extensively tested with a range of elevator motor and controller technologies at the UK National Lift Tower ensuring the highest level of performance can be achieved no matter how the elevator system is configured.

The National Lift Tower is an independent 127 m (418 ft) research and development facility located in Northampton, England. There are six lift shafts of varying heights and speeds, one of which is a high speed shaft with a travel of 100 m and a theoretical maximum speed of 10 m/s.

www.nationallifttower.co.uk
**Drive ratings**

### 400 V Drives

<table>
<thead>
<tr>
<th>E300</th>
<th>E200</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>03400062A10 03400062A10 03400062A10 03400062A10 03400062A10 03400062A10 03400062A10</td>
</tr>
<tr>
<td>Peak current</td>
<td>A 12.4 15.6 20 30 34.4 54 60 70 84 94 132 154 200 268 314 400 448 540 640</td>
</tr>
<tr>
<td>Nominal current @ 40° C</td>
<td>A 6.2 7.8 10 15 17.2 27 30 35 42 47 66 77 100 134 157 200 224 270 320</td>
</tr>
<tr>
<td>Switching frequency</td>
<td>kHz 8 (Selectable 3 to 16 kHz @50 % ED)</td>
</tr>
<tr>
<td>Input voltage</td>
<td>V 3 phase 380 -480 Vac, 50-60 Hz ± 10 %</td>
</tr>
<tr>
<td>Braking transistor</td>
<td>Built in as standard</td>
</tr>
</tbody>
</table>

### 200 V Drives

<table>
<thead>
<tr>
<th>E300</th>
<th>E200</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>03200106A10 03200106A10 03200106A10 03200106A10 03200106A10 03200106A10 03200106A10</td>
</tr>
<tr>
<td>Peak current</td>
<td>A 21.2 27.4 37 50 66 88 122 150 166 232 264 352 438 566 600</td>
</tr>
<tr>
<td>Nominal current @ 40° C</td>
<td>A 10.6 13.7 18.5 25 33 44 61 75 83 116 132 176 219 283 300</td>
</tr>
<tr>
<td>Switching frequency</td>
<td>kHz 8 (Selectable 3 to 16 kHz @50 % ED)</td>
</tr>
<tr>
<td>Input voltage</td>
<td>V 3 phase 200 to 240 Vac, 50-60 Hz ± 10 %</td>
</tr>
<tr>
<td>Braking transistor</td>
<td>Built in as standard</td>
</tr>
</tbody>
</table>

Further information from your supplier is available on the following features:

- UPS operation - all drives have a dedicated rescue mode allowing operation from 200 V UPS
- DC supply - all drives have the possibility of being supplied from a DC source from 24 V to the maximum voltage rating of the product
- 500 V, 525 V, 575 V and 690 V units are also available

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**Software tools**

- Selection tool
- Elevator Connect - Drive programming and operator interface
- CTScope - Parameter oscilloscope

**Software tools**

- SI-Universal Encoder
- SI-I/O
- MCi210
- MCi200
- SI-Ethernet
- SI-EtherCAT
- SI-CANopen
- SI-Applications Plus

**Encoder**

- SinCos High Resolution (EnDat)

**Local Remote keypad**

**Software tools**

- SI-Universal Encoder
- SI-I/O
- MCi210
- MCi200
- SI-Ethernet
- SI-EtherCAT
- SI-CANopen
- SI-Applications Plus

**Brake Control Unit**

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E27
Synchronous gearless motors for elevators

450 kg to 1,000 kg, 1 or 1.6 m/s, 2:1 roping

The E27 is a dedicated motor for elevator applications, providing flexibility for system designers and compliance with all essential industry safety standards. Compact, silent and designed to ease mechanical installation constraints it enables increased ride quality, benefiting elevator manufacturers, installers and users.

Benefits of flexible counterweight ratios

The E27 motor provides different counterweight ratio possibilities, offering:

- Flexibility & rationalization
  - As an example; a 630 kg motor can be used for a 675 kg load with a counterweight ratio of 45 %
- System cost and energy savings
  - A counterweight ratio of 40 % can be used

Safety and compliance with industry standards

The E27 motor complies with:

- 95/16/CE Elevator guidelines

Technical data

<table>
<thead>
<tr>
<th>Type</th>
<th>E27 S</th>
<th>E27 M</th>
<th>E27 L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheave diameter (mm)</td>
<td>160</td>
<td>160</td>
<td>180</td>
</tr>
<tr>
<td>Sheave usable width (mm)</td>
<td>87</td>
<td>87</td>
<td>113</td>
</tr>
<tr>
<td>Shaft load (kg)</td>
<td>1,500</td>
<td>1,500</td>
<td>2,500</td>
</tr>
<tr>
<td>Number of poles</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Max. speed (min⁻¹)</td>
<td>400</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>Nominal torque (Nm)</td>
<td>125</td>
<td>175</td>
<td>305</td>
</tr>
<tr>
<td>Maximum torque (Nm)</td>
<td>190</td>
<td>260</td>
<td>445</td>
</tr>
<tr>
<td>Rated current (A)</td>
<td>7.6</td>
<td>9.5</td>
<td>16.5</td>
</tr>
<tr>
<td>Number of brakes</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Torque per brake (Nm)</td>
<td>140</td>
<td>225</td>
<td>325</td>
</tr>
<tr>
<td>Motor weight (kg)</td>
<td>93</td>
<td>106</td>
<td>167</td>
</tr>
<tr>
<td>Rotor inertia (kg.m²)</td>
<td>0.11</td>
<td>0.15</td>
<td>0.26</td>
</tr>
</tbody>
</table>
Key features of E27 motor

- Encoder mechanically encased preventing damage during transportation and installation
- Fast connectors for power supply to motor, brakes and thermal sensor allowing quick electrical installation
- Grounding points for shielded cables
- Central sheave and separated end-shields designed to provide easy mechanical installation:
  - Forces are applied on end-shields in the same direction as the load
  - Allows simplified chassis
  - Enables full access to the sheave and traction ropes
- Optional additional speed feedback allowing the Brake Control Unit (BCU) to manage the rescue independently in case of a drive or encoder failure
- Optional load cell for car load information to enhance ride quality
- Key rating data information on both sides of motor to aid system set-up
- Flexible pads supplied with the motor

For safety and optimized maintenance, brakes are independent from the motor, providing secured static braking torque. Can be dismounted and reassembled without losing the encoder phasing.

www.emersonindustrial.com/automation
Extended range of gearless elevator motors perfect for new installations or modernization projects

**XA synchronous permanent magnet motor range**

1,000 kg to 2,500 kg, 3 m/s, 2:1 roping

The XA range, featuring optimized tooth windings and high efficiency permanent magnets, provides passengers with a luxurious silent ride. This compact motor ensures a reduced installation footprint with a shaft capacity of 1 to 6 tonnes.

**Easy mechanical installation**

- Easy installation of ropes
- Compact and lightweight solution

**Enhanced ride quality**

Optimized comfort and silence is provided with:

- Noise level: <55 dB(A) at 1 m
- Vibration level: high ISO ride quality (A95)
- Absolute encoder (SC.EnDat) fitted as standard

**Safety standards**

Compliance with:

- 95/16/CE Elevator guidelines
Z external rotor gearless motor range
Up to 5,000 kg, 5 m/s, 1:1 or 2:1 roping

The Z range is particularly suitable for projects requiring double wrapping, high speed and large cabin capacities such as hospitals or high rise elevators.

Flexible mechanical options
• Damping pads
• Brake release levers

Accurate positioning
• Absolute encoder (SC.EnDat) fitted as standard

Selection software
• Motor and inverter selection
• Traction calculations for better wrapping solutions
• Rope & groove profile suggestions

Safety standards
Compliance with:
• 95/16/CE Elevator guidelines
• ASME A17.1 North American Elevator Safety Code