

**EMERSON™**  
Industrial Automation



# U N I D R I V E ES

## Elevator Solution

- Rating: 5.5 to 45KW
- Geared & Gear less Machines
- Operating modes:
  - Sensorless Vector
  - Closed Loop Flux Vector
  - Pemanent Magnet Synchronous



# UNIDRIVE ES



## Elevator Solution

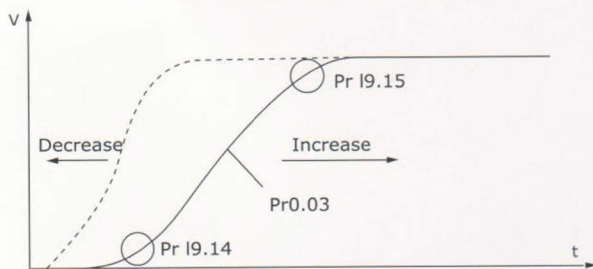


UNIDRIVE ES is the ideal drive solution for elevator controllers suitable for diverse range of geared and gearless machines. It can control asynchronous motors on Closed Loop Flux Vector or Sensorless Vector mode. The same drive also controls high performance permanent magnet synchronous motors. UNIDRIVE ES designed for the elevator industry is embedded with features tailored for easy integration to elevator controllers to provide the best riding comfort with high safety integrity.

### Key Features:

#### Optimized Speed Control:

Enhanced and flexible S-ramp with separate acceleration & deceleration rates reduces jerk and vibration during starting and stopping, thus improving ride.

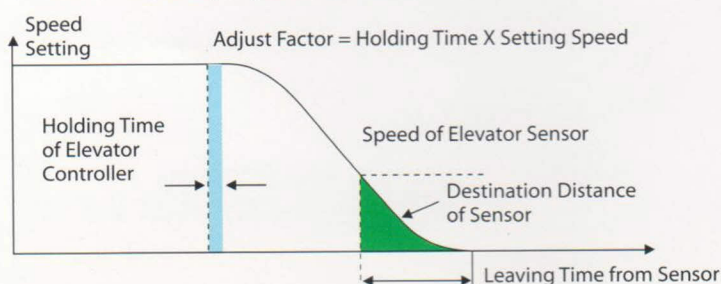


#### Optimized speed loop with variable PI gains

Produces high dynamic response that is crucial to the starting and stopping performance but adaptable for superb comfort during steady speed running condition.

#### High Precision 'Direct-to-Floor' Travel Control:

High efficiency and precise 'direct-to-floor' travel specific for high-speed elevator application allows the elimination of creeping distance control.



#### Zero Speed Holding with Position Control

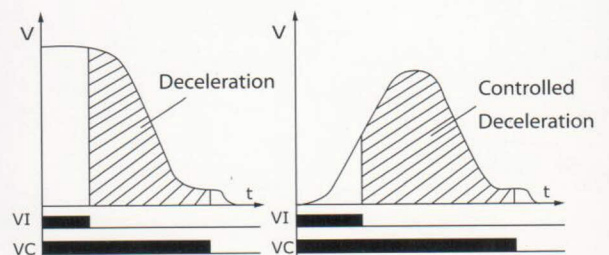
The ES drive is capable of holding the machine at zero speed and position by delivering maximum motor shaft stiffness at standstill. This prevents the elevator car from rolling back or surging forward during the starting phase thus providing a smooth and comfortable starting.

#### Inertia and Load Compensations

Internally calculated acceleration profile allows for inertia compensation that is summed to the speed loop output to minimize sudden drastic changes to the torque demand. Alternatively an external torque feed-forward signal direct from the Elevator Controller which measures variable car load can also be channeled into the ES drive for the same compensation purpose. This feature enhances the starting and stopping performance as well as maximizing comfort.

#### Optimized Running Curve

Simplify elevator control by automatically calculating the deceleration paths to minimize stopping time.



# Elevator Drive Flexibility



48~72VDC input supply  
for emergency evacuation

Inbuilt RFI filter

Commissioning  
software tools



**SMARTCARD**  
Parameter set up and  
storage facility



Optional footprint  
mounted RFI filter



**Online connectivity**

"Hot-pluggable" port  
for programming

**Fieldbus Flexibility**

Modbus RTU  
(as standard)



DeviceNet



**Universal encoder**

Configurable for 14 different types of  
feedback devices as standard, including:

- ▶ Quadrature/Pulse Encoders
- ▶ Sin-Cos
- ▶ Synchronous Serial Interface (SSI)
- ▶ Frequency and Direction

**Option SM-Resolver**

**Option Extended  
SM-I/O Plus**

**24VDC Back-up  
Power Supply**

Optional  
'Hot-pluggable' LED/LCD  
keypad



## Secure Disable Function

Meets the requirements of EN954-1 category 3 and EN81 - 1 for machine safety. This standard feature potentially eliminates or reduces the need for safety contactors by utilizing secure circuitry to prevent torque being generated on motor shaft by the Drive.



## Conformance is standard

- ▶ EMC immunity to IEC61000-6-2, IEC61800-3
- ▶ I/O to IEC61131-2
- ▶ Programming to IEC61131-3
- ▶ Machinery directive requirement EN954 - 1 Cat. 3
- ▶ 'Secure Disable' certified by BIA
- ▶ Electrical safety to EN50178
- ▶ Meets UL508C
- ▶ Conforms to EN81 - 1 for elevators



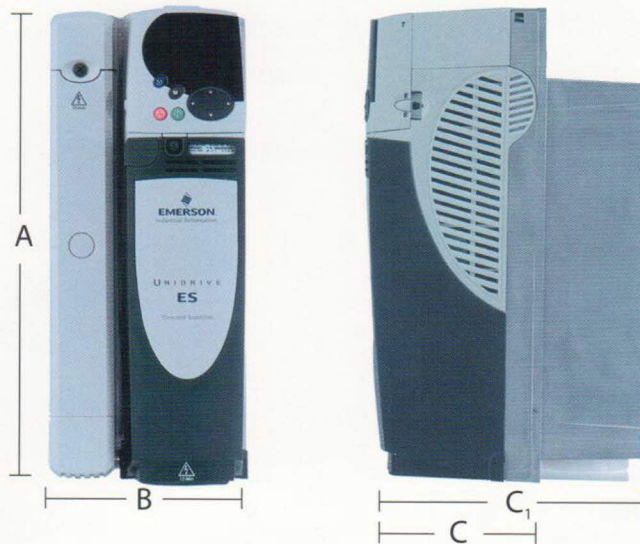
## Technical Specification

Model Reference	Supply Volts	Rated Output Current (A)	Maximum Output Current		Typical Motor Power (kW @ 400V)	Dimensions (mm)			
			Open Loop (A)*	Closed Loop (A)*		A	B	C	C <sub>1</sub>
ES2401	380~480 ± 10%	13.0	19.5	22.8	Up to 5.5	368	155	139	219
ES2402		16.5	24.8	28.9	5.5 ~ 7.5				
ES2403		25.0	37.5	43.8	7.5~11.0				
ES2404		29.0	43.5	50.7	11.0~13.0				
ES3401		32.0	48.0	56.0	13.0~15.0	368	250	140	260
ES3402		40.0	60.0	70.0	15.0~18.5				
ES3403		46.0	69.0	80.5	18.5~22.0				
ES4401		60.0	90.0	105.0	22.0~30.0	510	310	140	300
ES4402		74.0	111.0	130.0	30.0~37.0				
ES4403		96.0	144.0	168.0	37.0~45.0				


For higher ratings, please consult your local Control Techniques Drive Centre.

Note: ES2404, ES4401, ES4402 & ES4403 - Available soon

★ 175% overload for 20s (closed loop); 150% overload for 60s (Open loop). Where motor rated current is less than the drive rated current, higher overloads (200% or greater) settings are allowable.



## Options

Option Order Code	Description
SM-Keypad	LED Keypad
SM-Keypad Plus	LCD Keypad
SM-PROFIBUS-DP	Profibus-DP fieldbus
SM-DeviceNet	DeviceNet fieldbus
SM-CANopen	CANopen fieldbus
SM-INTERBUS	Interbus - S fieldbus
SM-Resolver	Resolver feedback
SM-I/O Plus	Extended I/O (3 digital inputs, 3 programmable digital inputs/ outputs, 2 analogue inputs, 1 analogue output, 2 relay outputs)
CT Soft	PC Windows based commissioning software
CT Comms Cable	For connecting between PC and Drive when using CT soft
EMC filter	Matched to the Unidrive ES
<b>SMART</b> 	For simple set up, maintenance and drive parameter cloning

## Features

- Incoming Power:
  - ☆ 3 Phase, 380V~480V  $\pm$  10%, 48~65Hz.
  - ☆ Configurable for AC Line Regeneration with near unity power factor and sinusoidal input current waveform, with Unidrive SP as the regeneration drive. It eliminates the dynamic braking resistor.
- Braking:
  - ☆ In-built Braking Transistor. Dynamic Braking resistor required to be fitted externally.
- Motor:
  - ☆ Up to 16kHz switching frequency for silent operation. Default setting is 8kHz.
  - ☆ Support embedding motor map inside encoder with serial communications.

### **Elevator Functions**

- All data entries are in engineering units (i.e. mm/s, mm/s', mm/s<sup>2</sup>)
- 'Direct-to-floor' traveling with Elevator Controller, eliminates creeping speed/distance control. Suitable for high-speed elevator application.
- Peak curve operation with Elevator Controller allows the use of single multi-speed for different floor level distances.
- Multi-Speed Control with 10 speed binary or 6 speed priority selection.
- Analog Control, available with bipolar or unipolar analog signal from Elevator controller.
- Optimized Speed Loop with variable PI gains for starting/stopping and running.
- Acceleration/Deceleration rate in mm/s'.
- Multiple jerk settings in mm/s<sup>2</sup>.
- Speed error monitoring in mm/s.
- Position error monitoring in mm.
- Two speed thresholds monitoring in mm/s.
- Inertia Compensation during starting and stopping to improve riding comfort.
- Torque feed-forward from the Elevator Controller allows the Drive to optimize its control for different passenger load.
- Brake control interface with elevator running logic, to enhance system control and safety.
- Terminal for direction control: Selectable single/two wire terminal control.
- 48~72VDC supply terminals for elevator rescue application, allowing full torque operation at low speed.
- 24VDC back up power supply to maintain power for control, fieldbus, and position information when incoming supply is removed.
- Parameter Setting: All the elevator setting and control can be done in Menu 0.

### **Input/Output**

- Digital I/O conforms to IEC61131-2 requirement.
- *Analogue inputs*: 1 high precision (16 bit plus sign) differential and 2 general purpose with update times of 250 $\mu$ s or 4ms.
- *Analogue outputs*: 2 general purpose at 4ms update time.
- *Digital inputs*. 1 Secure Disable at < 1 $\mu$ s update, 6 general purpose at 4ms update with the possibility of 2 having a 250 $\mu$ s update when configured as limit switch inputs.
- Digital outputs: 3 general purpose at 4ms update time.
- One relay output; normally open.
- Optional extended I/O (3 digital inputs, 3 programmable digital inputs/outputs, 2 analogue inputs, 1 analogue output, 2 relay outputs).

### **Universal Feedback Interface**

- Support for many different types of feedback device configurations as standard, including: Quadrature (up to 400kHz), Sin-Cos (single and multi-turn, Hiperface and EnDat), SSI (plus Gray code), Frequency and Direction, CW/CCW and Resolver.
- A second universal feedback interface with identical specification is available as a plug-in option for encoder output simulation.

### **Environment**

- Standard IP20 with the optional of IP54 (with through-hole mounting -inserts and gasket must be fitted).
- Ambient temperature - 15 to + 40°C, (40°C ~ 50°C with derating).
- Humidity 95% maximum (non condensing).
- Electromagnetic immunity complies with EN61 800-3 and EN50082-2
- Electromagnetic Emissions complies with EN61 800-3 (second environment) with on board EMC filter. Complies with EN61800-3 (first environment), EN50081-1 and EN50081-2 with optional footprint EMC filter.

### **System Design**

- Two universal option slots, which support application, fieldbus, universal encoder and expansion I/O modules to maximize flexibility.
- Fieldbus gateway solutions can be implemented by installing two different fieldbus option modules.
- Secure Disable Input meets the requirement of EN954-1 category 3 and EN81-1 for machine safety with cost reduction.
- SMART for simple set up, maintenance and drive cloning.

### **Keypad Choice**

- Optional LED keypad. 'Hot-pluggable' with 7-digit data display.
- Optional backlit LCD keypad plus; 'Hot-pluggable' plain text display, remote mountable, on-line help, real engineering units, customisable text database, dual language, field programmable.

# Driving the world...

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Fax: 613 9729 3200  
After Hours: 61 2 9963 5271

Sydney Drive Centre  
A.C.N. 003 815 281  
Tel: 61 2 9838 7222  
Fax: 61 2 9838 7764  
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Linz Drive Centre  
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After Hours: 1 800 893 2321

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Fax: 86 21 5426 0669

Beijing Application Centre  
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Cleveland Drive Centre  
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Minneapolis US Headquarters  
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Providence Drive Centre  
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● Drive & Application Centres

● Distributors

## Distributors

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