

Unidrive ES Features



● Incoming Power:

- ☆ 3 phase, 380V~ 480V $\pm 10\%$, 48~65 Hz.
- ☆ Unidrive SP can be used as the AC Sinewave line Regeneration module (**Active Front End**) for high speed elevators. This configuration allows for near unity power factor and sinusoidal input current waveform. It eliminates dynamic braking resistor.

● Braking

- ☆ In-built Dynamic Braking transistor to be used with External Breaking Resistor.

● Motor

- ☆ Quieter Motor Operation with up to 16 kHz switching frequency.

Elevator Functions:

- ☆ All data entries are in engineering units (i.e. mm/s, mm/s², mm/s³).
- ☆ '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 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/s².
- ☆ Multiple jerk settings in mm/s³.
- ☆ Speed error monitoring in mm/s.
- ☆ Position error in mm.
- ☆ Advanced door opening is available which can reduce elevator journey times.
- ☆ Inertia compensation during starting and stopping to improve ride comfort.
- ☆ Torque feed-forward 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 control.
- ☆ 24VDC back up power supply to maintain power for control, field bus, and position information when incoming supply is removed.
- ☆ Heat sink temperature based Ventilation fan speed for quieter operation.
- ☆ High resolution encoder with up to 1 million pulses revolution.
- ☆ Built in DC Choke for reduced mains harmonics.
- ☆ Designed to meet tough elevator duty cycle.
- ☆ Secure disable input eliminates the need of using 2 motor contactors.
- ☆ Blocked car release function is available to detect a blocked car then to carry out release sequence on next start.

Automatic Rescue Operation

- ☆ 48~96VDC Battery supply for elevator rescue application, allowing full torque operation at low speed.
- ☆ **300~480 V AC** Supply 2 Phase can also be used.
- ☆ Least load direction Digital Output to lift controller from drive memory from the last travel.

Input/Output:

- ☆ Digital I/O Conforms to IEC61131-2 requirement.
- ☆ Analog Inputs: 1 high precision (16 bit plus sign) differential and 2 general purpose with update times of 250 μ s or 4ms.
- ☆ Analog outputs: 2 general purpose at 4ms update time.
- ☆ Digital inputs: 1 secure disable at <1 μ s update, 6 general purpose at 4ms update with the possibility of 2 having a 250 μ 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 I/O, 2 analog inputs, 1 analogous output, 2 relay outputs).

Universal Feedback interface:

- ☆ Support for many different types of feedback device configurations as standard, including: Quadrature (up to 500 kHz), SinCos (Single and Multi Turn, Hiperface and EnDat), SSI (Plus Grey 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 gaskets must be fitted).
- ☆ Ambient temperature -15 to +40°C, (40°C~ 50°C with derating).
- ☆ Humidity 95% Maximum, (non condensing).
- ☆ Electromagnetic immunity Complies with EN61800-3 and EN50082-2.
- ☆ Electromagnetic emission complies with EN61800-3 (second environment) with on board EMC filter. Complies with EN61800-3 (first environment), EN50081-1 and EN50081-2 with optional footprint EMC filter.

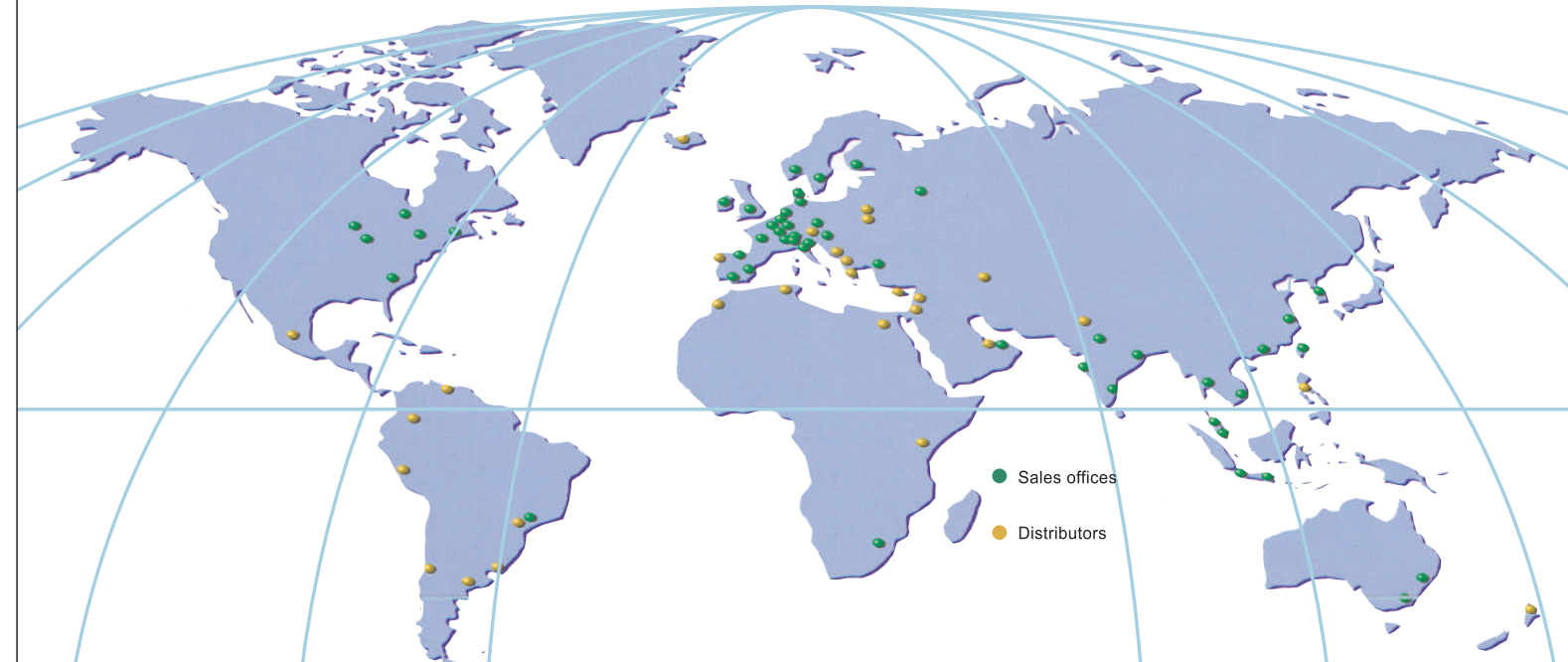
System design:

- ☆ Two universal option slots, which support application, field bus, universal encoder and expansion I/O Modules to maximize flexibility.
- ☆ Fieldbus Gateway solutions can be implemented by installing two different field bus option modules.
- ☆ Secure disable input meets the requirement of EN954-1 category 3 and EN81-1 for machine safety with cost reduction.
- ☆ **SMART-START** for simple setup, maintenance and drive parameter 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, customizable text data base, dual language, field programmable.

Driving the world ...



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EMERSON DELIVERS adaptive range of
Elevator drives of both,
cost-effective solutions and the
highest standards of
ride **COMFORT**

Unidrive ES

Elevator Solution

- Rating: 4 to 45 kW
200 V / 400 V / 575 V / 690 V
- **Geared & Gearless Machines**
- Operating modes:
 - Sensorless Vector
 - Closed Loop Flux Vector
 - Permanent Magnet Synchronous



Unidrive ES

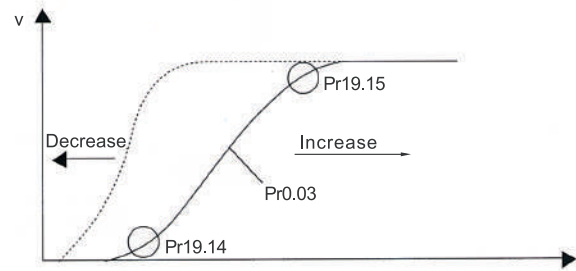
Elevator Solution



Key Features:

Optimised Speed Control

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

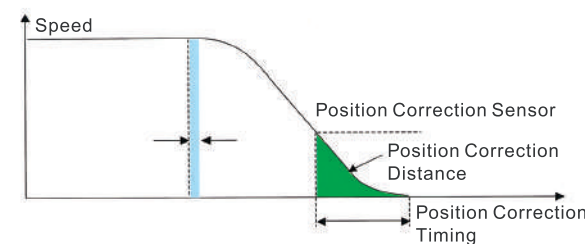


Optimised Speed Loop

Optimised speed loop with variable PI gains (Start, Run & Stop) produces high dynamic response that is crucial to the starting and stopping performance, and adaptable for superb comfort during steady speed running.

HighPrecision '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.



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

Zero Speed Holding with Position Control

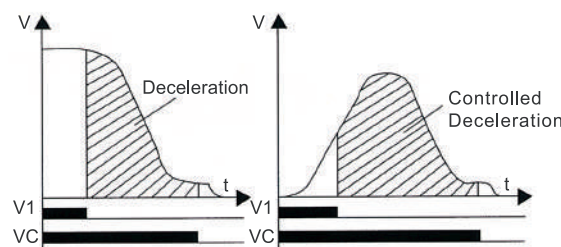
Unidrive ES is capable of holding the machine at zero speed and position by delivering maximum motor shaft stiffness at standstill. This prevents the elevator car from rolling back or surging forward during the starting phase, thus providing a smooth and comfortable starting.

Inertia and Load Compensations

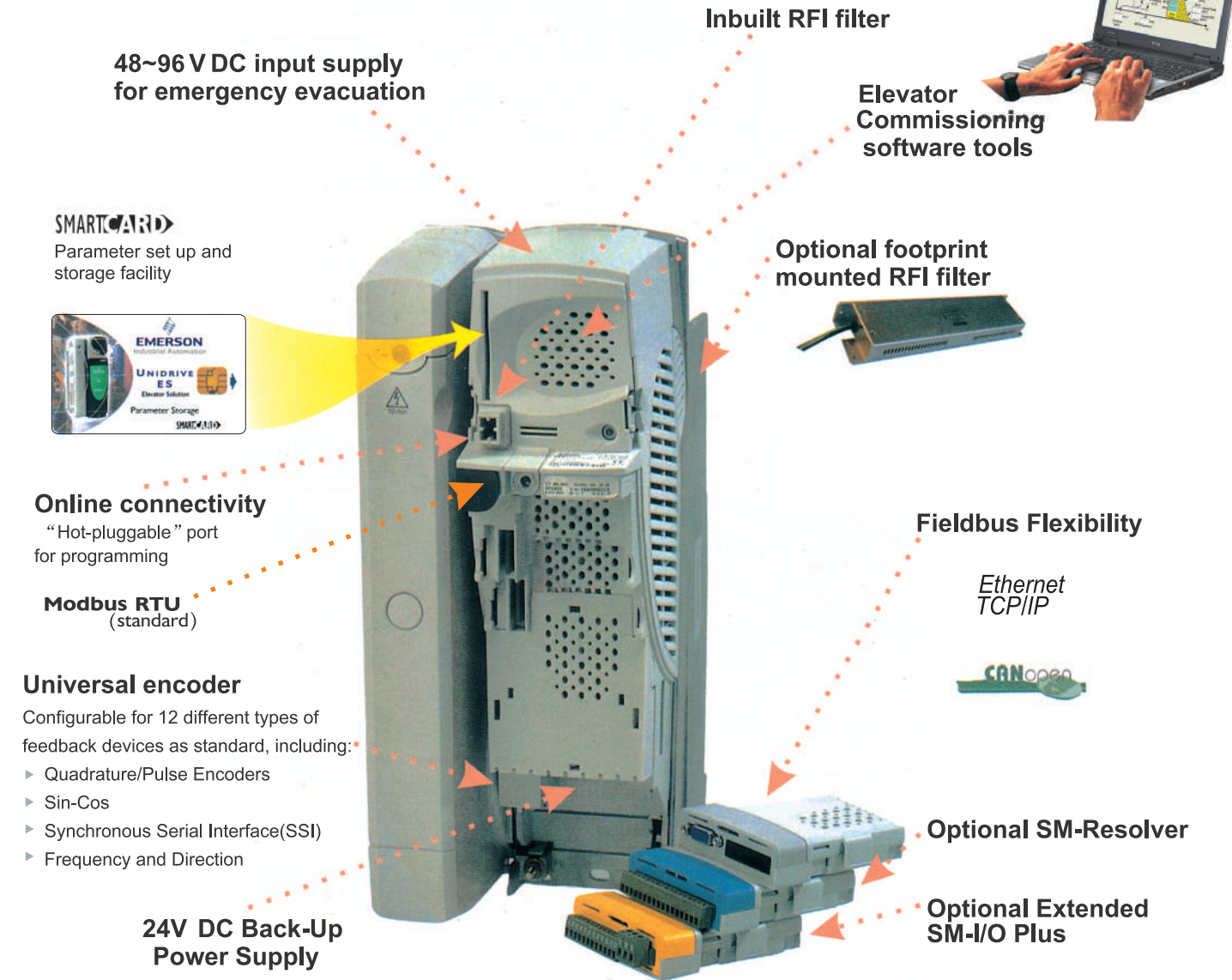
Internally calculated acceleration profile allows for inertia compensation that is summed to the speed loop output to minimise sudden changes to the torque demand. Alternatively an external torque feed-forward signal direct from the Elevator Controller which measures variable car load can also be channelled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

Optimised Running Curve

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



Elevator Drive Flexibility



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 the motor shaft by the Drive.

Conformance standard

- EMC immunity to IEC6100-6-2, 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

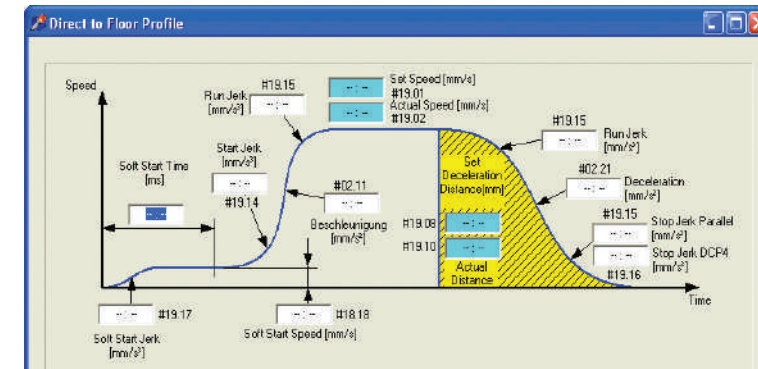


Technical Specification

Model Reference	Rated Output Current (A)	Peak Output Current (A)*	Typical Power Rating (kW@400V)	Dimensions(mm)			
				A	B	C	C1
ES1406	9.5	16.6	Up to 4.0	368	100	139	219
ES2401	13.0	22.8	4.0~5.5	368	155	139	219
ES2402	16.5	28.9	5.5~7.5				
ES2403	25.0	40.3	7.5~11.0	368	250	140	260
ES2404	29.0	50.8	11.0~15.0				
ES3401	32.0	56.0	13.0~15.0				
ES3402	40.0	70.0	15.0~18.5	510	310	200	300
ES3403	46.0	80.5	18.5~22.0				
ES4401	60.0	105.0	22.0~30.0	510	310	200	300
ES4402	74.0	129.5	30.0~37.0				
ES4403	96.0	168.0	37.0~45.0				

For higher ratings, please consult Control Techniques.

* 175% Overload for 40s Closed Loop. Where motor rated current is less than the drive rated current, higher overloads settings are achievable (200% or greater). For Gearless machines, consult Control Techniques for Drive and motor optimisation.

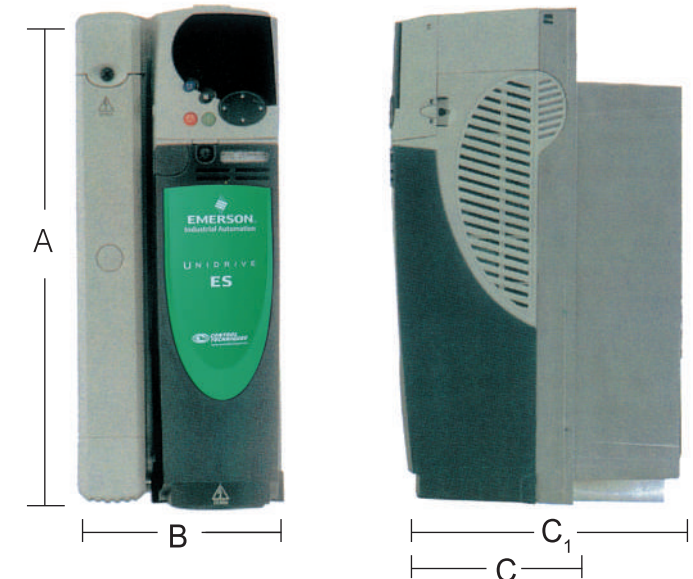


Scope function

- Windows based oscilloscope function for diagnosis and storage of operational data
- 6 freely available channels with separate scaling for analogue and digital signals
- For optimising the travel curve and controller parameters
- On-site or remote diagnosis of operational functions or control behaviour
- Multiple test runs scope datas can be stored on disk

Options

Order Code	Description
SM-Keypad	LED keypad
SM-Keypad Plus	LCD keypad
SM-CANopen	CANopen fieldbus
SM- Ethernet	TCP/IP fieldbus
DCP 4 Mode	Drive Control & Position Protocol
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)
Lift Scope	PC based oscilloscope function for diagnosis & storage of operational data
CTSoft	PC Windows based commissioning software
CT Comms Cable	For connecting between PC and Drive when using CTSoft
EMC filter	Matched to Unidrive ES
SMARTCARD	For simple set up, maintenance and drive parameter cloning



Easy start-up via PC

- Windows based start-up interface tailor-made for elevator control
- Intuitive input windows for the various elevator functions
- Parameters displayed in plain text, and inputs in standard elevator industrial units: (mm, mm/s, mm/s², etc.)

