

LIFT CONTROL SYSTEMS

LIFT • Inverter and Regenerative technology
THE NEW GENERATION OF HIGH EFFICIENCY

GEFRAN





THE ACKNOWLEDGED INTERNATIONAL LEADER

Thanks to forty years of experience, Gefran is the world leader in the design and production of solutions for **measuring, controlling, and driving industrial production processes**. We have 14 branches in 12 countries and a network of over 80 worldwide distributors.



QUALITY AND TECHNOLOGY

Gefran components are a **concentrate of technology**, the result of constant research and of **cooperation with major research centres**.

For this reason, Gefran is synonymous with **quality and expertise in the design and production of:**

- > **sensors** for measuring main variables such as **temperature, pressure, position and force**
- > **state-of-the-art components and solutions for indication and control**, satisfying demands for optimisation of processes and intelligent management of energy consumption
- > **automation platforms** of various complexities
- > **electronic drives and electric motors** in AC and DC for all industrial automation, HVAC, water treatment, lift, and photovoltaic needs.

Gefran's know-how and experience guarantee continuity and tangible solutions.



HOME LIFT



LOW RISE





LIFT CONTROL SYSTEMS

With forty years of know-how and experience on the civil lift market, Gefran offers a range of dedicated products with technology that ensures **reliability, safety and comfort**, plus **regenerative solutions** that provide maximum **energy efficiency**.

The modernisation of existing systems, new systems with and without a machine room, and applications with synchronous and asynchronous motors with and without a reducer, can all be handled in a determined and simple way with Gefran's drives.

Flexible and complete, thanks to a vast range of dedicated options and accessories, the LIFT inverters represent the most rapid and immediate solution to every sector application requirement.

The thousands of functioning systems throughout the world are the best testimony to Gefran's expertise and the high quality of the product.



SERVICES

PRE AND POST SALES

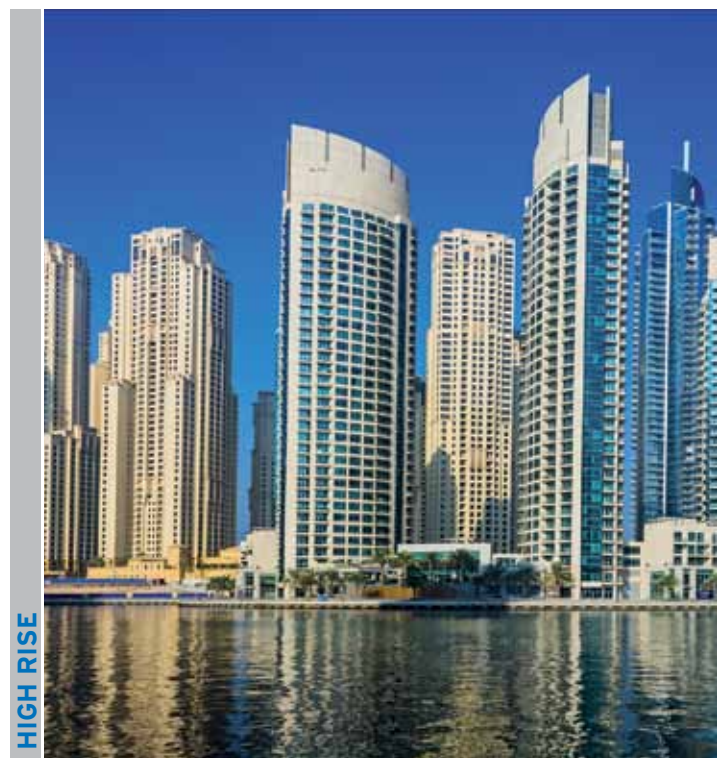
A team of Gefran experts works with the customer to select the ideal product for its application and to help install and configure devices (technohelp@gefran.com).

TRAINING

Gefran offers a wide range of courses at different levels for the technical-commercial study of the Gefran product range as well as specific courses on demand.



MEDIUM RISE



HIGH RISE

ADL300



The ADL300, designed for new installations and upgrades, is the ideal system for a wide range of applications, including very low rise (home lifts) or very high rise (skyscrapers). Its software, developed for geared (including open loop) and gearless (closed loop) lifts with absolute or incremental encoder, guarantees maximum safety and control. Precise landing at the floor, with both direct landing and creeping, and load compensation at start give passengers an extremely comfortable ride.

The ADL300's compact size and operation in contactor or contactorless mode make it perfect for Machine Room-Less (MRL) applications.

SAFETY CERTIFICATION



Safety" inputs for use with a single output contactor or in contactorless mode

Single output contactor

The ADL300 is certified for the use of a single output contactor, in accordance with UNI EN 81-1:1998 + A3:2009, article 9.11.3.

Safety Certification for a CONTACTORLESS operations

ADL300 is CERTIFIED as EN81-1:1998 + A3; SIL3 according to EN61800-5-2-2007.

WEIGHTS AND DIMENSIONS

Sizes ADL300	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
ADL300.-1...	162 x 343 x 159	6.38 x 13.50 x 6.26	5.8	12.8
ADL300.-2...	162 x 396 x 159	6.38 x 15.59 x 6.26	7.8	17,2
ADL300.-3...	235 x 401 x 179.4	9.25 x 15.79 x 7.06	10.5	23,5
ADL300.-4...	267,6 x 616 x 276	10.53 x 24.25 x 10.87	32	70,6
ADL300.-5...	311 x 767 x 331.4	12 x 30.2 x 13.05	60	132,3

GUIDE TO CHOICE OF MODEL

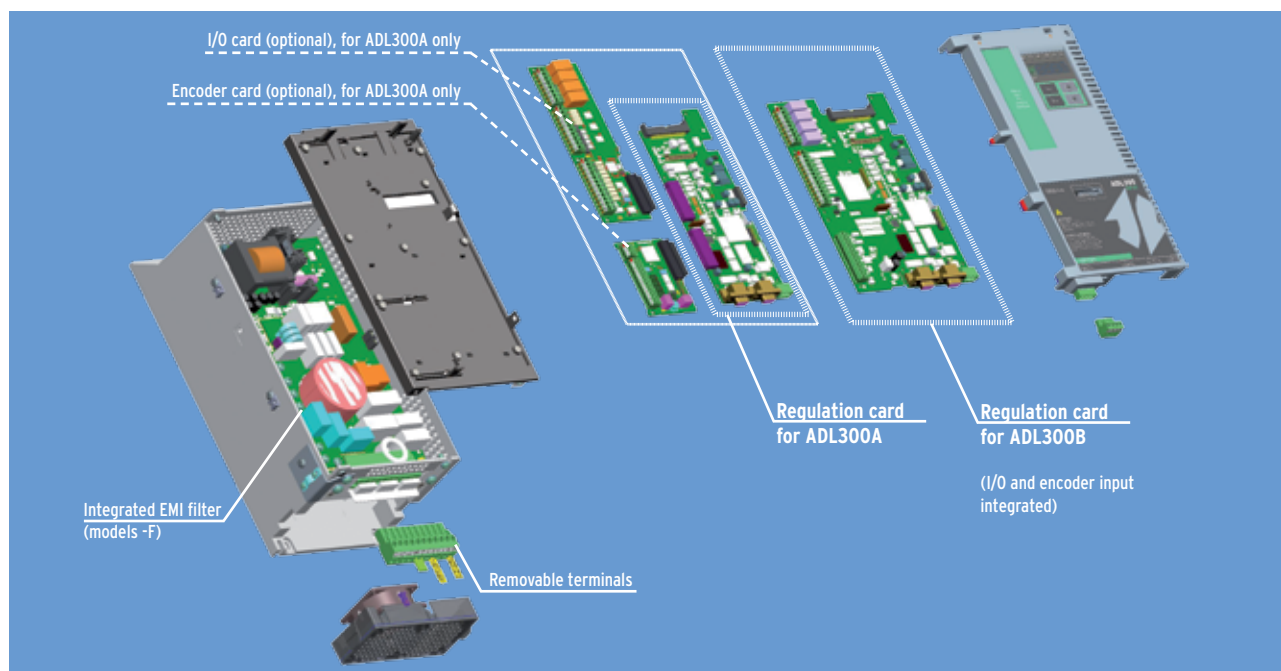
The ADL300 is available in two configurations:

- **ADL300A (Advanced)**

It is supplied as standard with no I/O or feedback cards, leaving the customer free to perform the appropriate configuration, choosing from an extensive range of options.

- **ADL300B (BASIC)**

The standard configuration is showed in the table.



Models	ADL300A (Advanced)	ADL300B (Basic)
I / O	<p>Optional Expansion cards</p> <ul style="list-style-type: none"> • EXP-IO-D4-ADL : 2 digital inputs - 2 digital outputs + enable input; • EXP-IO-D5R3-F-ADL : 5 digital inputs - 3 relays (NB: The terminals of this card are not extractable); • EXP-IO-D6A4R2-F-ADL : 6 Digital inputs + 2 analog outputs + 2 analog inputs + 2 relay outputs; • EXP-IO-D8R4-ADL : 8 digital inputs - 4 relays + enable input; • EXP-IO-D8A4R4-ADL : 8 digital inputs - 2 analog inputs - 2 analog outputs - 4 relays + enable input; • EXP-IO-D12A2R4-ADL : 8 digital inputs- 4 digital outputs - 2 analog inputs - 4 relays + enable input; • EXP-IO-D16R4-ADL : 12 digital inputs - 4 digital outputs - 4 relays + enable input. 	<ul style="list-style-type: none"> • 8 Digital inputs (NPN/PNP) + 1 Digital inputs (Enable) + 4 Relay outputs; • 8 Digital inputs (NPN/PNP) + 1 Digital inputs (Enable) + 2 analog inputs + 4 Relay outputs (ADL300B-...-AD1).
Encoder management	<p>Optional Expansion cards</p> <ul style="list-style-type: none"> • EXP-DE-I1R1F2-ADL : Digital encoder 3 Channels card + Repeat + 2 Freeze; • EXP-EN/SSI-I1R1F2-ADL : Sinusoidal encoder card - Absolute EnDat + Repeat + 2 Freeze; • EXP-HIP-I1R1F2-ADL : Hiperface encoder 3 Channels card + Repeat + 2 Freeze ; • EXP-SE-I1R1F2-ADL : Sinusoidal encoder 3 Channels card + Repeat + 2 Freeze; • EXP-SESC-I1R1F2-ADL: Sinusoidal SinCos encoder 3 Channels card + Repeat + 2 Freeze; • EXP-SESC-I1R1-V-ADL: Sinusoidal SinCos encoder 3 Channels card + Repeat (VGA connector). 	<ul style="list-style-type: none"> • Inputs for 5 Vdc TTL incremental digital encoder and absolute SinCos or Endat / SSI encoder (ADL300B - ... -ED); • Inputs for 5 Vdc TTL incremental digital encoder and absolute SinCos encoder, with VGA 15 pin connector, without freeze (ADL300B-...-AD1); • +24V IN/OUT on request (ADL300B - ... -24).

ADL300

Universal mechanical structure

The extremely compact ADL300 reduces the size of conventional lift systems and it is suitable for installation in roomless systems.

ADL300B, integrates as standard:

- 8 programmable digital inputs (NPN/PNP) + an Enable input
- 4 single-contact programmable relay outputs

I/O Management



ADL300A, optional cards on request:

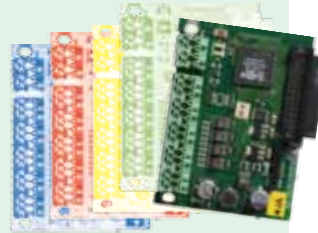
Card	Description
EXP-IO-D4-ADL	1DI (Enable) + 2 (Prog.DI) + 2 (RO)
EXP-IO-D5R3-FADL	1DI (Enable) + 5 (Prog.DI) + 3 (RO)
EXP-IO-D6A4R2-FADL	1DI (Enable) + 6 (Prog.DI) + 2 (AI) + 2 (AO) + 2 (RO)
EXP-IO-D8R4-ADL	1DI (Enable) + 8 (Prog. DI) + 4 (RO)
EXP-IO-D8A4R4-ADL	1DI (Enable) + 8 (Prog. DI) + 2 (AI) + 2 (AO) + 4 (RO)
EXP-IO-D12A2R4-ADL	1DI (Enable) + 8 (Prog. DI) + 4 (DO) + 2 (AI) + 4 (RO)
EXP-IO-D16R4-ADL	1DI (Enable) + 12 (Prog. DI) + 4 (DO) + 4 (RO)

ADL300B, integrates as standard:

- Input for 5 Vdc TTL incremental digital encoder
- Input for absolute SinCos or Endat / SSI encoder

Encoder Management

The ADL300 interfaces with all the main feedback devices.



ADL300A, optional cards on request:

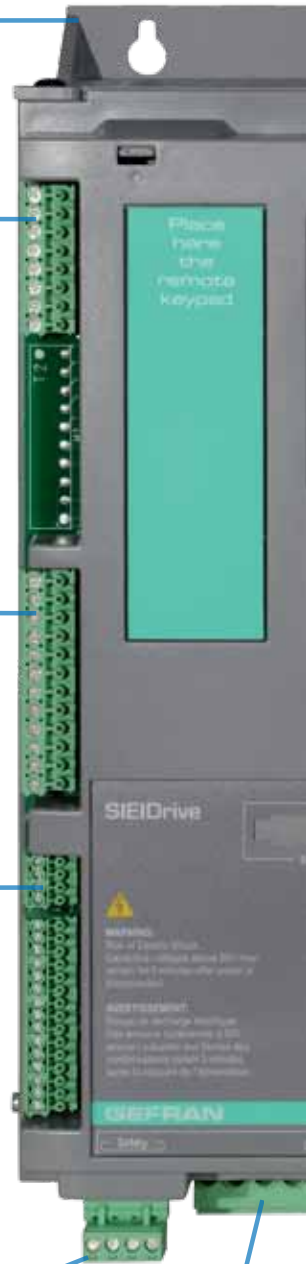
Card	Description
EXP-DE-IIRIF2-ADL	Digital encoder 3 Channels card + Repeat + 2 Freeze
EXP-EN/SSI-IIRIF2-ADL	Sinusoidal encoder card - Absolute EnDat + Repeat + 2 Freeze
EXP-HIP-IIRIF2-ADL	Hiperface encoder 3 Channels card + Repeat + 2 Freeze
EXP-SE-IIRIF2-ADL	Sinusoidal encoder 3 Channels card + Repeat + 2 Freeze
EXP-SESC-IIRIF2-ADL	Sinusoidal SinCos encoder 3 Channels card + Repeat + 2 Freeze
EXP-SESC-IIR1-V-ADL	Sinusoidal SinCos encoder 3 Channels card + Repeat (VGA connectors)

Safety" inputs

for use with a single output contactor or in contactorless mode.

Back-up power supply

The ADL300 guarantees operation even in the event of a power failure. It features an automatic return-to-floor function managed by an external device such as UPS or buffer battery via a singlephase 230V AC power supply (with EMS module).

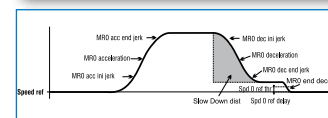
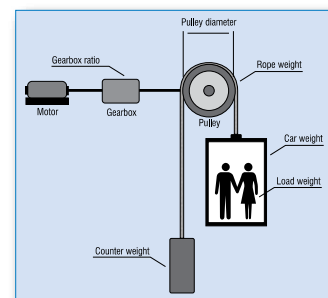




Lift control system

Basic and advanced lift functions are incorporated in a single product, to ensure maximum comfort for all systems at all times:

- Speed control: EFC (Elevator Floor Control) function: separate function for independent management of short floors, landing zone, re-starting with lift not at floor and automatic deceleration point calculation.
- Position control: EPC (Elevator Positioning Control) function: separate function for independent management of direct arrival at the floor with internal position regulator and saving of floor distances (system autotuning).
- Lift sequence: Typical sequence of input/output signals used in civil lift engineering applications such as I/O management, braking, output contactor and door control.
- Parameters in linear unit: Possibility of selecting different engineering units (also with values for the US) for the main movement parameters, rpm (fpm) or m/s for speed, m/s^2 , m/s^3 (ft/s^2 , ft/s^3) for cabin acceleration.
- Lift mechanical parameters: Mechanical system parameters such as pulley diameter and speed ratio for converting system units and weights, system for calculating inertia and speed regulation for the desired response.
- Ramp generation: Independent configuration of acceleration and deceleration ramp parameters and of the 4 jerk values for maximum travelling comfort in the lift cabin. Two independent S-shaped ramps, selectable via digital input with 4 independent jerk settings. Dedicated deceleration ramp corresponding to the stop command.



Integrated keypad

The integrated programming keypad allows fast programming and immediate start-up.

- 1-line x 4-character alphanumeric LED display with sign
- Simple parameter modification
- Menu and individual parameters displayed in numerical format
- Fast navigation keys
- Alarms / messages and startup wizard displayed in text format
- Resetting of alarms from keypad.

SD Card port

The SD memory card makes saving and loading data and configurations with the ADL300 very simple.



Special adapter required SD-ADL, cod. S574L.

Fieldbuses

The ADL300 integrates the most advanced fieldbus technology used in the lift sector:

- CANopen and CANopen Lift (CiA®417) for lift control systems.



Configuration technology

The ADL300 is fitted with RS232 serial communication with **Modbus RTU** protocol.

Serial Communication



Optional programming keypad

The optional KB-ADL programming keypad featuring full display of parameters and variables in 5 languages makes the ADL300 extremely intuitive and easy to use.

It has a strip of magnetic material on the back so that it can be attached to the front of the drive or other metal surface (e.g. door of the electrical panel).

The keypad can be used remotely from distances of up to 15 m. A 70 cm-long connection cable is supplied as standard.

Up to 5 sets of parameters can be saved using the KB-ADL keypad and sent to other drives.



- 5 line x 21 character display
- Alphanumeric plaintext
- Complete information regarding each parameter
- Fast navigation keys
- Key for displaying the last 10 parameters that have been changed
- DISP key for rapid display of operating parameters
- Uploading-Downloading and saving of 5 complete sets of drive parameters

GENERAL CHARACTERISTICS

Model	ADL300-2T	ADL300-2M	ADL300-4
Control mode	Field Oriented Control	Field Oriented Control	Field Oriented Control
Power	5.5 ... 37kW (7.5 ... 50Hp)	1.1 ... 5.5kW (1.5 ... 7.5Hp)	4 ... 75kW (5 ... 100Hp)
Voltage	3 x 200-230Vac, ±10% 50/60Hz	1 x 200 Vac, ±10% 1 x 230 Vac, -15%+10% 50/60Hz	3 x 230-400-480Vac, -15%+10%, 50/60Hz
Motor type	Asynchronous / Synchronous	Asynchronous / Synchronous	Asynchronous / Synchronous
Speed control (Accuracy)	± 0.01% Motor rated speed (1)	± 0.01% Motor rated speed (1)	± 0.01% Motor rated speed (1)
Analog inputs	ADL300B: 0; ADL300A: upon reques	ADL300B: 0; ADL300A: upon reques	ADL300B: 0; ADL300A: upon reques
Analog outputs	ADL300B: 0; ADL300A: upon reques	ADL300B: 0; ADL300A: upon reques	ADL300B: 0; ADL300A: upon reques
Digital inputs	ADL300B: 8 + 1 enable ADL300A: upon reques	ADL300B: 8 + 1 enable ADL300A: upon reques	ADL300B: 8 + 1 enable ADL300A: upon reques
Digital outputs	ADL300B : 4 (relay) ADL300A: upon reques	ADL300B : 4 (relay) ADL300A: upon reques	ADL300B : 4 (relay) ADL300A: upon reques
Overload	up to 200% In * 10" (up to 11kW) up to 180% In * 10" (≥ 15kW)	up to 200% In * 3"	up to 200% In * 10" (up to 22kW) up to 180% In * 10" (≥ 30kW)
Max output frequency	300Hz	300Hz	300Hz
EMI filter	Integrated (ADL300-F models) (EN 1201; EN 61800-3 category C2 and C3)	Optional external (EN 1201; EN 61800-3 category C2 and C3)	Integrated (EN 1201; EN 61800-3 category C2 and C3)
Choke	DC side choke: no AC side choke: external optional	no	DC side choke: integrated (sizes ≥ 4300), external optional on lower sizes AC side choke: external optional
Braking unit	Integated up to 30kW with external resistor	Integated with external resistor	Integated up to 55kW with external resistor
Port for SD card	yes		
Dimensions for roomless applications	yes		
Emergency operation	Optional (UPS or buffer battery with EMS module)		
Max system speed	1.2 m/s	1.0 m/s	4.0 m/s
Type of lift	Geared / Gearless		
Installations	New installation & Retrofitting		
Functions	<ul style="list-style-type: none"> • Speed control • Position control with direct landing at floor (EPC Elevator Positioning Control) • Automatic calculation of deceleration point • Short floor management • Off-floor stop detection • Lift sequence management • Ramp generation • Management of up to 8 Multispeeds • Load compensation • DCP3/DCP4 protocol communication • CANopen communication 	<ul style="list-style-type: none"> • CANopen -Lift (Cia® 417) communication • Configuration via keypad with LEDs • Configuration via optional keypad (5 languages) • Configuration via PC (GF-eXpress) • Wizard for commissioning • Menu for setting electrical and mechanical parameters • Programming with linear engineering units • DC power supply or emergency single-phase power supply to return to floor with optimized consumption • External +24VDC power supply • Regenerative configuration with AFE200 external modules 	
Serial communication	RS232 (2), Modbus RTU, DCP3, DCP4 e CAN		
Protection class	IP20		
Safety Certification	<ul style="list-style-type: none"> • Safety Certification for a CONTACTORLESS operations: ADL300 is CERTIFIED as EN81-1:1998 + A3; SIL3 according to EN61800-5-2:2007. • The ADL300 is certified for the use of a single output contactor, in accordance with UNI EN 81-1:1998 + A3:2009, article 9.11.3. 		
Immunity / Emissions	In compliance with EN 12015 electromagnetic compatibility directive, using internal filter (ADL300-...-2M series with optional external filter)		
Operating temperature	-10...45°C (32° ...113°F), +45°C...+50°C (+113 ... +122°F) with derating		
Altitude	Max 2000 m (up to 1000 m without derating)		
Markings	CE, UL and cUL Elevator Accessory E365347 certified also evaluated in accordance with ASME A17.5 and CSA B44.1. (3)		

(1) for standard 4-pole motors

(2) The serial port is used for programming (PC) and control (Modbus communication standard in all drives)

(3) The UL / cUL marks applies to products in the united States and Canada.

ADL300 • CHOOSING THE INVERTER - INPUT DATA

Sizes - ADL300-...-4		1040	1055	2075	2110	3150	3185	3220	4300	4370	4450	5550	5750	
U _{LN} • AC Input voltage	V _{AC}	three-phase network 230 - 400 - 480 Vac -15%+10%												
F _{LN} • Input frequency	Hz	50/60 Hz, ± 5%												
Overvoltage threshold	V _{DC}	820 V _{DC}												
Undervoltage threshold	V _{DC}	225 V _{DC} (@ 230 V _{AC}); 391 V _{DC} (@ 400 V _{AC}); 450 V _{DC} (@ 460 V _{AC}); 470 V _{DC} (@ 480 V _{AC})												
DC-Link Capacity	µF	470	680	680	1020	1500	2250	2700	2350	2800	2350	4700	5600	
In • Effective input current (@ In out)														
	@ 230 V _{AC}	A	12	17	23	31	42	50	55	55	72	89	97	136
	@ 400 V _{AC}	A	11	16	22	29	40	47	53	55	72	89	97	136
	@ 480 V _{AC}	A	10	15	20	26	37	45	50	49	65	81	89	122
THD with DC choke @ I _{2n} (according to EN 12015)		< 35%												
No-load consumption (Energy rating): Stand-by consumption "Fan Off"	W	20	20	20	20	20	20	20	25	25	25	25	25	

Sizes - ADL300-...-2T			2055	3075	3110	4150	4185	4220	5300	5370	
U _{LN} • AC Input voltage	V _{AC}	three-phase network: 200 Vac ±10% 230 Vac ±10%									
F _{LN} • Input frequency	Hz	50/60 Hz, ± 2%									
Overvoltage threshold	V _{DC}	500 V _{DC}									
Undervoltage threshold	V _{DC}	196 V _{DC} (@ 200 V _{AC}), 225 V _{DC} (@ 230 V _{AC}),									
DC-Link Capacity	µF		1020	1500	2700	2350	2350	2800	4700	5600	
In • AC input current without choke											
	@ 200-230 V _{AC}	A	31	42	53	55	72	89	97	136	
THD with DC choke @ I _{2n} (according to EN 12015)		< 35%									
No-load consumption (Energy rating): Stand-by consumption "Fan Off"	W		20	20	20	20	20	20	25	25	

Sizes - ADL300-...-2M		1011	1015	2022	2030	3040	3055	
U _{LN} • AC Input voltage	V _{AC}	single-phase network 1 x 200 -10%...+10% 1 x 230 -15%...+10%						
F _{LN} • Input frequency	Hz	50/60 Hz, ± 2%						
Overvoltage threshold	V _{DC}	410 V _{DC}						
Undervoltage threshold	V _{DC}	196 V _{DC} (@ 200 V _{AC}); 225 V _{DC} (@ 230 V _{AC})						
DC-Link Capacity	µF	2200	2200	4050	4050	4950	4950	
In • Effective input current (@ In out)								
	@ 230 V _{AC}	A	16	18	24	31	35	50
No-load consumption (Energy rating): Stand-by consumption "Fan Off"	W	20	20	20	20	20	20	

ADL300 • CHOOSING THE INVERTER - OUTPUT DATA

Sizes - ADL300-...-4		1040	1055	2075	2110	3150	3185	3220	4300	4370	4450	5550	5750
I_N • Rated output current (f _{sw} = default) @ U _{LN} =230 V _{AC} @ U _{LN} =400 V _{AC} @ U _{LN} =460 V _{AC}	A	9	13.5	18.5	24.5	32	39	45	60	75	90	105	150
	A	9	13.5	18.5	24.5	32	39	45	60	75	90	105	150
	A	8.1	12.2	16.7	22	28.8	35.1	40.5	54	67.5	81	94	135
P_N mot (Recommended motor power, f _{sw} = default) @ U _{LN} =230 V _{AC} @ U _{LN} =400 V _{AC} @ U _{LN} =460 V _{AC}	kW	2	3	4	5.5	7.5	9	11	15	18.5	22	30	37
	kW	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75
	Hp	5	7.5	10	15	20	25	30	40	50	60	75	100
Reduction factor	K _t ⁽¹⁾	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
	K _{ALT} ⁽²⁾	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Overload		200% * 10 sec with output frequency more than 3 Hz 150% * 10 sec with output frequency less than 3 Hz							180% * 10 sec with output frequency more than 3 Hz 150% * 10 sec with output frequency less than 3 Hz				
Maximum Switching frequency	kHz	10											
U₂ • Maximum output voltage		0.98 x U _{LN} (U _{LN} = AC input voltage)											
f₂ • Maximum output frequency	Hz	300											
IGBT braking unit		Standard internal (requires external resistor); braking torque 150% MAX											Optional External

Sizes - ADL300-...-2T		2055	3075	3110	4150	4185	4220	5300	5370	
AC output current (duty cycle 80%) @ U _{LN} =200-230 V _{AC}	A	24.5	32	45	60	75	90	105	150	
	kVA	9.8	12.8	17.9	23.9	29.9	35.8	41.8	59.8	
P_N mot (Recommended motor power) @ U _{LN} =200-230 V _{AC} @ U _{LN} =200-230 V _{AC}	kW	5.5	7.5	11	15	18.5	22	30	37	
	Hp	7.5	10	15	20	25	30	40	50	
Reduction factor	K _t ⁽¹⁾	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
	K _{ALT} ⁽²⁾	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
Overload		200% * 10 sec with output frequency more than 3 Hz 150% * 10 sec with output frequency less than 3 Hz						180% * 10 sec with output frequency more than 3 Hz 150% * 10 sec with output frequency less than 3 Hz		
Maximum Switching frequency	kHz	10 / 5 according to Heat-sink temperature								
U₂ • Maximum output voltage		0.98 x U _{LN} (U _{LN} = AC input voltage)								
f₂ • Maximum output frequency	Hz	300								
IGBT braking unit		Standard internal (requires external resistor); braking torque 150% MAX							Optional External	

(1) K_t : Derating factor for ambient temperature of 50°C (1% every °C above 45°C)

(2) K_{alt} : Derating factor for installation at altitudes above 1000 meters a.s.l. Value to be applied = 1.2% each 100 m increase above 1000 m.
E.g.: Altitude 2000 m, K_{alt} = 1.2% * 10 = 12% derating; In derated = (100 - 12) % = 88 % In

ADL300 • CHOOSING THE INVERTER - OUTPUT DATA

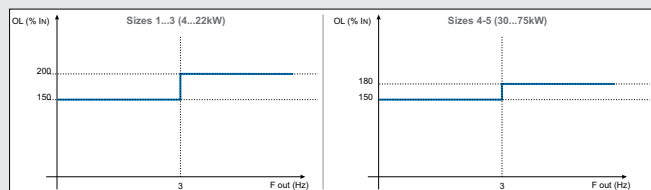
Sizes - ADL300-...-2M		1011	1015	2022	2030	3040	3055
In • Rated output current (f _{sw} = default) @ U _{LN} =230 V _{AC}	A	6	6.8	9.6	13	15	22
P _n mot (Recommended motor power, f _{sw} = default) @ U _{LN} =230 V _{AC}	kW	1.1	1.5	2.2	3	4	5.5
	Hp	1.5	1.5 - 2	2 - 3	3	5	7.5
Reduction factor	K _t ⁽¹⁾	0.95	0.95	0.95	0.95	0.95	0.95
	K _{ALT} ⁽²⁾	1.2	1.2	1.2	1.2	1.2	1.2
Overload		200% * 3 sec with output frequency more than 3 Hz 150% * 3 sec with output frequency 0 ... 3 Hz					
Maximum Switching frequency	kHz	10					
U ₂ • Maximum output voltage		0.98 x U _{LN} (U _{LN} = AC input voltage)					
f ₂ • Maximum output frequency	Hz	300					
IGBT braking unit		Standard internal (requires external resistor); braking torque 150% MAX					

(1) K_t : Derating factor for ambient temperature of 50°C (1% every °C above 45°C)

(2) K_{ALT} : Derating factor for installation at altitudes above 1000 meters a.s.l. Value to be applied = 1.2% each 100 m increase above 1000 m.
E.g.: Altitude 2000 m, K_{ALT} = 1.2% * 10 = 12% derating; In derated = (100 - 12) % = 88 % I_n

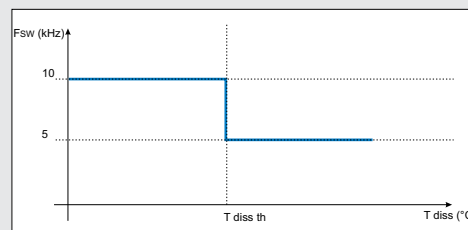
Derating values in overload condition (ADL300-...-4 - ADL300-...-2T)

In overload conditions the output current depends on the output frequency, as shown in the figure below.



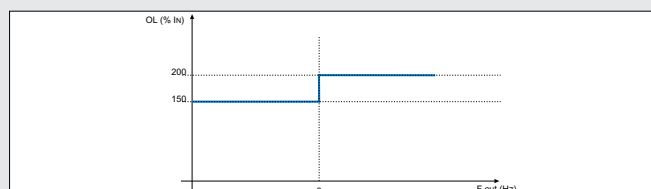
Derating values for switching frequency

The switching frequency is modified according to the temperature of the drive (measured on the heat sink), as shown in the figure below.

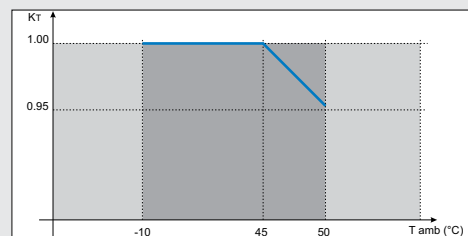


Derating values in overload condition (ADL300-...-2M)

In overload conditions the output current depends on the output frequency, as shown in the figure below.



Ambient temperature reduction factor



Function not allowed
Range of ambient temperatures allowed

GF-EXPRESS PROGRAMMING SOFTWARE

GF_eXpress is the software tool used to configure all the drives available in the Gefran catalogue. Product selection is immediate by mean of a drop down menu and thanks to the graphical interface the configuration is easy and intuitive.

Configure your Drive

The configuration of the drive is organized in various contextual menus, available in 6 different languages, where the operator through a graphical layout is guided step by step in the configuration process, with clear indication of the available parameters and the range of possible values to set. The specific menu "Lift" groups all the parameters strictly related to the elevator systems. Divided by functional contexts, the setting of parameters about mechanical data, lift sequences, acceleration and deceleration ramps, multispeed setting, is fast and easy.

For the commissioning two modes are available: easy and expert, where the operator can select to perform a faster configuration with a limited set of parameters, or a refined configuration where the setting of more parameters is required.

The selected product can be configured using a text interface or a guided graphical interface.

To check and monitor the configuration, the integrated Oscilloscope can simultaneously monitor up to 8 curves. The reference value for the curve being displayed can be selected from among all the variables that are available for the selected drive.

Save time with Wizard and Still Autotune

Thanks to the Wizard, the start-up of the motor is easy and fast by filling the parameters requested step by step.

The still autotune is quickly performed, avoiding operators to decouple the car from the ropes, assuring a safe working environment, and a faster commissioning.

Export your configuration

All details for configuration of each single device are sent out in XML format to facilitate expansion of the catalogue and parameters. The parameters can be exported and printed.

Customize the tool

Based on different needs and context, the tool allows to create and store recipes, where the configuration can be saved with a sub-set of configured parameters.

Custom parameter menus with a limited sub-set of data can be created, to enable a better and more effective device configuration.

It's possible the management of parameter archives for multiple configurations.

GF_Express is indisputably the perfect tool to allow a fast, flexible, intuitive and easy commissioning of the drive for the elevator systems.

Technical data

Operating systems:

> Windows ® 2000, XP, Vista, Windows 7.

Minimum PC requirements:

> Pentium class CPU

> 512 MB of RAM

> Free space of > 200MB

> Graphic card min. VGA (1024x768)

> 1 RS232 or USB serial port

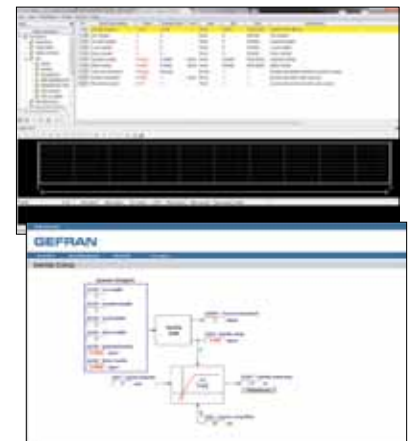
> 1 Ethernet port

> CD-ROM drive

Communication protocols supported:

> Serial communication with the device (Modbus)

> Ethernet communication with TCP Modbus devices.



SOFTSCOPE

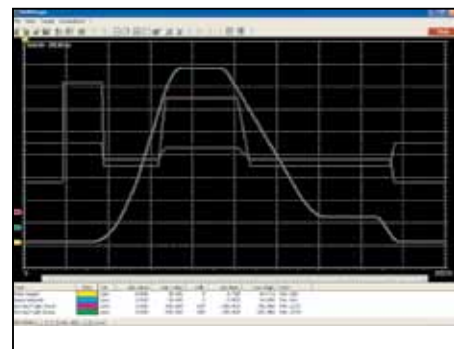
SoftScope is a software oscilloscope with synchronous sampling (buffered with a minimum sampling time of 1ms). Using SoftScope the user can fast and easily display some specific variables. To give an example: commissioning variables, variables to test performance of the systems, or variables to tune for control system optimization, can be monitored without the need of external oscilloscopes.

To understand if the approach to the floor is following the wished ramps or there is some rollback in the system, thanks to the SoftScope the analysis is faster and accurate. It's possible to analyse the speed profile of the car showing details about actual floor approach, ramps, jerks.

The curves can be displayed with different colours and they can be singularly enabled/disabled. The zoom function allows enlargement of the details, while the cursor allows detection of the signal peaks and duration.

Trigger conditions (e.g. climbing leading edge of a specific signal), recording quality (a multiple of the basic clock at 1ms), recording duration period are parameters that the tool allows to control.

The displayed curves can be printed and stored in ASCII format and can be used with the most common data processing tools (for example Excel, Matlab).



APPLICATION SOFTWARE

ELEVATOR POSITION CONTROL

The EPC (Elevator Positioning Control) function is a separate application for independent management of direct arrival at the floor with internal position regulator and saving of floor distances (system autotuning).

There are two possible configurations for this application:

- Digital I/O control, which requires the use of an I/O expansion card with an appropriate number of I/Os (EXP-IO-D16R4-ADL). To use this card the ADVANCED version is required (ADL300A).
- Remote control via CANOpen fieldbus, in which case the BASIC version (ADL300B), with built-in I/O card EXP-IO-D8R4-ADL includes a sufficient number of I/Os.

The main requirements for the EPC function are:

- › Maximum operating speed (4m/s)
- › Maximum number of floors 32
- › Stop at floor without approaching at reduced speed (positioning for direct arrival at floor)
- › Automatic management of speed and ramp times according to the floor of call and arrival
- › Management of brake and contactor command sequences
- › Availability of configurator for complete configuration and monitoring of operating variables.
- › Possibility of calling floors directly (floor booked) or of requesting stops at floors during travel
- › Possibility of entering corrections and compensations on floor levels.

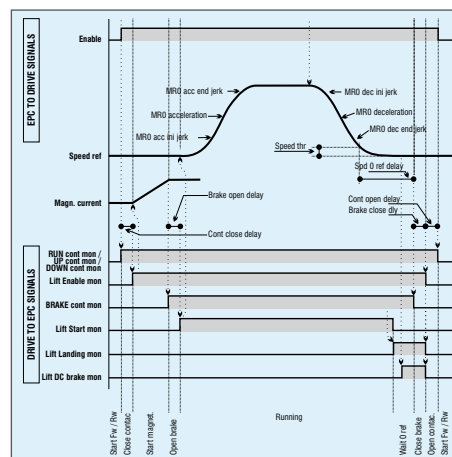
Advanced controls:

- › Inertia Compensation
- › Battery run mode with choice of preferred direction
- › Over Permissible Speed protection

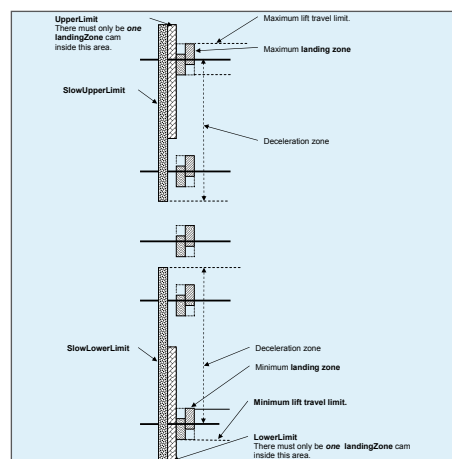
The following functions are managed externally, by an external PLC or electromechanical unit:

- › Floor call logic
- › Safety logic

The control system recognises the position of the floors via a series of cams installed along the path of the lift car. It uses a Self Study initialisation sequence to detect the position of these cams, on the basis of which it determines the level of each floor and the number of floors. The distance between floors may vary from floor to floor, subject to certain restrictions.



Lift movements and Stop sequences in case of a floor call command.



I.e. : floor management cams



Optional CD-ROM and ADL300 EPC Application Manual (cod. CD-ROM IS9DL2).

AGL50



AGL50 is the new range of Gefran inverters specifically designed to meet the application requirements for the lift sector.

The AGL50 has the latest in low cost inverter lift technology, offering a simple solution for either new innovative systems or for the retrofit market.

It features an easy to use parameter structure that guarantees rapid system start-up, high-level lift control and travelling comfort.

Gefran has developed a cost-effective and immediate solution for the use of electric drives in lift control systems.

POWER RANGE

Models	Power (kW)		
	4.0	5.5	7.5
AGL50	Size 1		

WEIGHTS AND DIMENSIONS

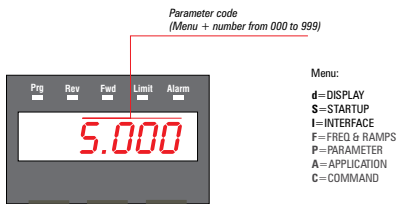
Size AGL50	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AGL 2040	130 x 221 x 176.5	5.12 x 8.7 x 6.95	3.0	6.6
AGL 2055				
AGL 2075				

AGL50 • GENERAL CHARACTERISTICS

Model	AGL50
Control mode	Space Vector
Power	4 - 5.5 - 7.5 kW (5 - 7.5 - 10Hp)
Voltage	3 x 400Vac ... 480Vac, 50/60Hz
Motor type	Asynchronous
Speed control (Accuracy)	0.5 ... 1%
Analog inputs	1
Analog outputs	1
Digital inputs	6
Digital outputs	3 (1 static and 2 relay)
Overload	up to 170% * In
Max output frequency	500Hz
EMI filter	Optional
Choke	Optional
Braking unit	Integrated with external resistor
Port for SD card	no
Dimensions for roomless applications	yes
Emergency operation	Optional (with UPS)
Max system speed	1.0 m/s
Type of lift	Geared
Installations	New installation & Retrofitting
Functions	<ul style="list-style-type: none"> • 16 multispeeds • 4 multiramps (linear, S-shaped with independent jerk settings) <ul style="list-style-type: none"> • Self-tuning of motor parameters • Integrated lift sequences • Speed expressed in m/s • Management of space calculated by the drive, even offline <ul style="list-style-type: none"> • Short floor Control • Motor contactor control • Integrated brake control
Serial communication	RS485 ⁽¹⁾ , Modbus RTU
Protection class	IP20
Immunity / Emissions	In compliance with EN 12015 electromagnetic compatibility directive using internal filter, EN 12016
Operating temperature	-10...50°C (14°...122°F). At above 40°C (104°F), 2% derating for each °C, at 50°C(122°F), 20% derating.
Altitude	Max 2000 m (up to 1000 m without derating)
Markings	CE, UL and cUL

(1) The serial port is used for programming (PC) and control (Modbus communication standard in all drives)

AGL50



Signal LEDs and display
 Menus, parameters, alarms, etc. are shown on the bright and clear LED display.

Integrated keypad
 The integrated programming keypad allows fast programming and immediate start-up.

Compact, complete and powerful

- 1 analog input
- 1 analog output
- 6 digital inputs
- 1 digital output
- 2 relay outputs
- RS485 serial line
- Single/dual-channel encoder digital input

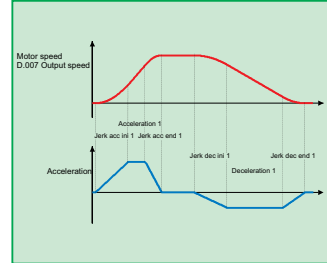
GF_express

The GF_express PC configurator makes programming flexible and intuitive.

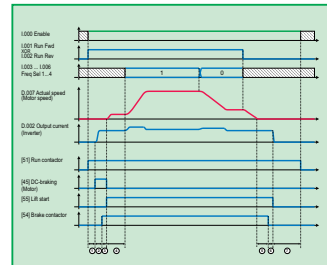


Functions Lift control

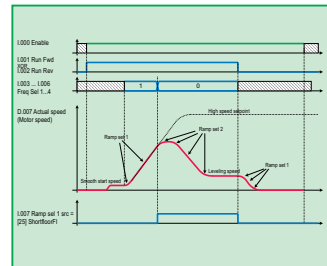
- 16 multispeeds
- 4 multiramps (linear, S-shaped with independent jerk settings)



- Self-tuning of motor parameters
- Overload capability of 170% for 10 seconds
- Integrated lift sequences



- Speed expressed in m/s
- Management of space calculated by the drive, even offline
- Short floor Control



- Motor contactor control
- Integrated brake control
- Speed regulator adaptive gain technology
- Emergency function in case of power failure and back-up operation.

AGL50 • CHOOSING THE INVERTER - INPUT AND OUTPUT DATA

AGL50 Input Data				
Sizes - AGL50		2040	2055	2075
U _{LN} • AC Input voltage	V _{AC}	three-phase network 380 V (-15%) ... 480 V (+10%)		
F _{LN} • Input frequency	Hz	50 Hz - 2 % ... 60 Hz + 2 %		
Overvoltage threshold	V _{DC}	800 V _{DC}		
Undervoltage threshold				
	@ 380-400 V _{AC}	V _{DC}	380 V _{DC}	
	@ 420-440 V _{AC}	V _{DC}	405 V _{DC}	
@ 460-480 V _{AC}	V _{DC}	415 V _{DC}		
In • AC Input current for continuous service				
Connection with 3-phase reactor @ 400 V _{AC}	A	9	13	16
Connection with 3-phase reactor @ 480 V _{AC}	A	8.2	11.7	14.3
Connection without 3-phase reactor @ 400 V _{AC}	A	9	13	16
Connection without 3-phase reactor @ 480 V _{AC}	A	10	15	20
THD of input current	%	> 100 % (without choke)		
Max short circuit power without line reactor (Z _{min} =1%)	kVA	500	650	850
Braking IGBT Unit		Standard internal (requires external resistor); Braking torque 150%.		
No-load consumption (Energy rating): Stand-by consumption "Fan Off"	W	11.6	11.6	11.6

AGL50 Output Data				
Sizes - AGL50		2040	2055	2075
I _N • Rated output current (f _{sw} = default)				
	@ U _{LN} =400V _{AC} ; f _{sw} =default	A	10.1	13
@ U _{LN} =480V _{AC} ; f _{sw} =default	A	8.6	11.7	14.9
P _N mot (Recommended motor power)				
	@ U _{LN} =400 V _{AC}	kW	4	5.5
@ U _{LN} =480 V _{AC}	Hp	5	7.5	10
Reduction factor				
	K _V (1)	0.95		
	K _T (2)	1.2		
	K _F (3)	0.85; 0.7		
K _{ALT} (4)	1.2			
I _{ovId} Overload	A	Short term overload current. 170% of I _N for 10s on 100s		
Switching frequency f _{sw} (Default) (5)	kHz	8		
Switching frequency f _{sw} (higher) (5)	kHz	10, 12		
U ₂ • Maximum output voltage	V	0.98 x U _{LN} (U _{LN} = AC input voltage)		
f ₂ • Maximum output frequency	Hz	500		
Braking unit intervention threshold (@ 400 V - 480 V)	V _{DC}	ON = 780 V _{DC} OFF = 770 V _{DC}		
Higher sw frequency	kHz	8	8	8
Lower sw frequency	kHz	4	4	4
F out	Hz	3	3	3
T (heat sink temperature)	°C	64	60	60

(1) K_V: Derating factor for mains voltage at 460 V_{AC}

(2) K_T: Derating factor for 50°C ambient temperature (2 % each °C > 40 °C)

(3) K_F: Derating factor for higher switching frequency

(4) K_{ALT}: Derating factor for installation at altitudes above 1000 meters a.s.l.. Value to be applied at each 100 m increase above 1000 m

(5) It is possible to set a fixed switching frequency (from 4 to 12 kHz depending on size and with derating where applicable). Otherwise it is possible to set a variable switching frequency between two levels (hswf and lswf) defined according to size, heat sink temperature and stator frequency.

AVRy



The Lift drive with built-in power recovery

The AVRy series inverter offers the latest technology to meet the high demands of today's civil lift engineering sector.

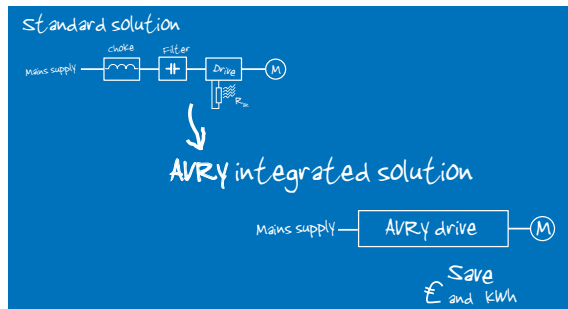
A single solution that integrates synchronous motor control and a "clean power" regeneration system. Reduced harmonic distortion (<4%), a unity power factor and cutting-edge technology all guarantee significant savings in terms of operating costs and enhanced performance in terms of dynamics and comfort.

"Clean Power" technology delivers enhanced performance and offers cost and space savings.

AVRy drives provide cutting-edge control for synchronous motors in lift applications and state-of-the-art "clean energy" recovery technology (harmonic distortion < 4%).

They represent the most advanced solution for the civil lift engineering sector and offer a number of significant advantages:

- **considerable savings in energy costs:** up to 50% compared to multi-lift systems using conventional drive control
- **considerable reduction in drive-motor sizes:** thanks to the use of high-performance lift drives
- **recovery of excess energy:** instead of wasting energy in the form of heat this is used for auxiliary services and other equipment
- **space saving:** integrated filter and inductance, no braking resistor is used
- **high performance in terms of dynamics and travelling comfort:** advanced control algorithms for medium and high-speed systems
- **environmentally-friendly "clean power" system:** cleans the supply grid to reduce harmonic distortion to less than 4% and provide a unit power factor.



WEIGHTS AND DIMENSIONS

Sizes	Dimensions: Width x Height x Depth		Weight	
	mm	inches	kg	lbs
AVRy 1 1425	350 x 670 x 150.3	13.78 x 26.38 x 5.92	28.7	63.27
AVRy 1 2545	350 x 670 x 150.3	13.78 x 26.38 x 5.92	32.0	70.55
AVRy 2 3360	420 x 788 x 180	16.53 x 31.02 x 7.09	55.0	121.25

AVRy • GENERAL CHARACTERISTICS

Model	AVRy
Control mode	Field Oriented Control
Power	11kW, 20kW and 27kW (with high voltage motors) or 7.5kW, 14kW and 17kW (with standard motors)
Voltage	3 x 400Vac, 3 x 460Vac, 50/60Hz
Motor type	Synchronous (PM gearless)
Speed control (Accuracy)	± 0.01% Motor rated speed (1)
Analog inputs	2
Analog outputs	2
Digital inputs	6
Digital outputs	4 (2 static and 2 relay)
Overload	183% In * 10"
Max output frequency	300Hz
EMI filter	Integrated (EN 12015)
Choke	Integrated (EN 12015)
Braking unit	no (Regeneration)
Port for SD card	no
Dimensions for roomless applications	yes
Emergency operation	Optional (UPS or buffer battery with EMS module)
Max system speed	3.0 m/s
Type of lift	Gearless
Installations	New installation & Retrofitting
Functions	<ul style="list-style-type: none"> • Integrated AFE regenerative technology • Speed control (EFC Elevator Floor Control function) <ul style="list-style-type: none"> • Lift sequence • Parameters in linear units • Lift mechanical parameters <ul style="list-style-type: none"> • Ramp generation.
Serial communication	RS485 ⁽²⁾ , Modbus RTU Optional: DeviceNet, Profibus DP, CANopen ®
Protection class	IP20
Temperatura ambiente	0...40°C, +40°C...+50°C with derating
Altitude	Max 2000 m (up to 1000 m without derating)
Immunity / Emissions	In compliance with EN 12015 electromagnetic compatibility directive using internal filter
Markings	CE

(1) for standard 4-pole motors

(2) the serial port is used for programming (PC) and control (Modbus communication standard in all drives)

AVRy

Noise-free operation in all conditions

The fan control logic function only allows the internal fans to be activated when the inverter is enabled, to eliminate resonance and noise in the cabin.

Universal mechanical structure

The extremely reduced depth is compatible with all installation requirements, from traditional systems to roomless lift applications.



Integrated quality

The AVRy integrates devices that are essential to guarantee the highest standards in terms of product quality and operation. These include the input choke and the mains filter, which ensure compliance with EMC EN12015 - EN12016.

Fast Access

The drive features an extremely user-friendly design. It is built for fast, simple management, from installation in the lift shaft to accessing the extractible terminal strips and shielding systems for grounding cables.

Encoder Management

The AVRy manages a wide range of encoders to guarantee the highest standard of comfort and precision for all lift systems.

- 3-channel sinusoidal incremental encoders + 3 Hall sensors for absolute position detection
- 3-channel sinusoidal absolute encoders + 2 SinCos absolute position traces
- Sinusoidal absolute encoders with 2 SinCos absolute position channels

Cables shield

OMEGA clamp to grounding 360° of shielded cables.





Dedicated functions

- Lift sequence
- Parameters in linear units
- Mechanical lift parameters
- Ramp generation
- Multi-speed
- Pre-torque
- Automatic calculation of stopping distance with direct floor approach
- Intuitive programming menu.

Integrated keypad

The integrated programming keypad allows fast programming and immediate start-up.

- LCD Display with alphanumeric text
- Fast access keys for Regen / Drive functions
- Drive operating status LEDs
- Remote control within up to 10 meters
- Function keys for intuitive programming

Options

The AVRy can manage optional DIN rail-mounted expansion cards such as fieldbus and I/O.



“Clean Power” Technology

The drive incorporates the most advanced technological solutions for motor control and maximum mains and power supply efficiency.

- THD <4% and Unit power factor

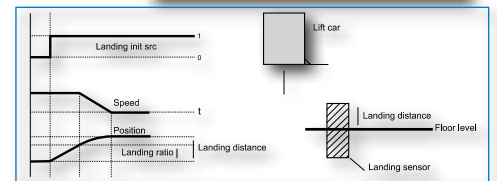
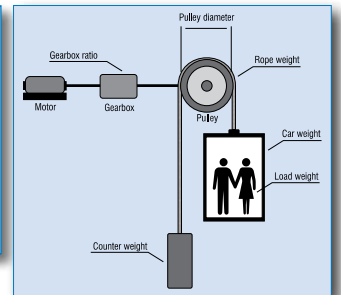
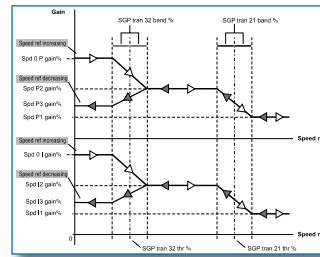


Fig.1 - Input current wave form on standard drive and AVRy

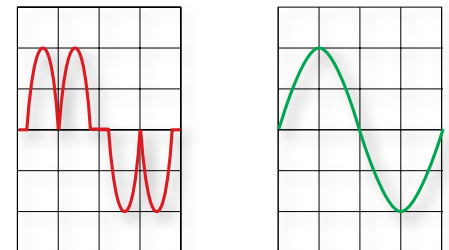
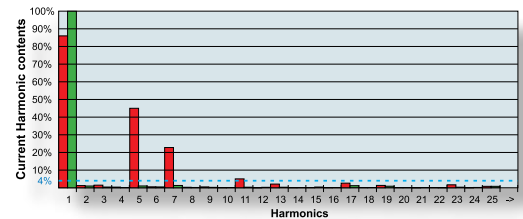


Fig. 2 - Input current harmonics on standard drive and AVRy



Serial Line

Standard integration of the RS485 serial line with Modbus RTU protocol for peer-to-peer or multidrop connections.

Back-Up Power Supply

The AVRy guarantees operation even in the event of a power failure:

- regulation card back-up via external + 24V DC power supply
- automatic return-to-floor function managed by an external device such as UPS via a single-phase 230V AC power supply.

AVRy • CHOOSING THE PRODUCT - INPUT AND OUTPUT DATA

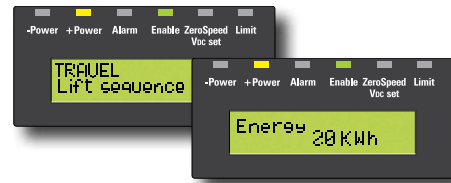
Input Data AVRy				
Drive Type		AVRy 1 1425	AVRy 1 2545	AVRy 2 3360
U _{LN} AC Input voltage	[V]	3 x 400 V -15%, 3 x 460 +15%	3 x 400 V -15%, 3 x 460 +15%	3 x 400 V -15%, 3 x 460 +15%
F _{LN} AC Input frequency	[Hz]	50/60 Hz ±5%	50/60 Hz ±5%	50/60 Hz ±5%
cosφL1		≈ +1 (motor), ≈ -1 (generator) better than ± 0.95		
Rated input power (see motor side output load cycle)	[kVA]	13	22	29
Rated input current I _{LN} @ U _{LN} = 400Vac	[A _{AC}]	18	32	42
THD of I _{LN} (ref.to I _{L1} and @ I _{sc} =100)	[%]	≤ 4	≤ 4	≤ 4
Efficiency	[%]	≥ 94 ... 96	≥ 94 ... 96	≥ 94 ... 96
Modulation type		Space vector PWM	Space vector PWM	Space vector PWM
Default modulation frequency	[kHz]	16	8	8

Output Data AVRy				
Drive Type		AVRy 1 1425	AVRy 1 2545	AVRy 2 3360
Output voltage range U ₂	[V]	0 ... 520	0 ... 520	0 ... 520
Output frequency range f ₂	[Hz]	0 ... 300	0 ... 300	0 ... 300
Modulation type		Space vector PWM	Space vector PWM	Space vector PWM
Modulation frequency	[kHz]	8	8	8
Max. output dV / dt	kV / μs	5	5	5
I _{2N} Rated output current	[A]	14	25	33
I _{oLVD} Inverter Output Overload	[A]	25	45	60

MAN-MACHINE INTERFACE

Simple, logical programming with intuitive and easily accessible menus allow AVRy users of all levels to achieve maximum efficiency. Set-up procedures are reduced to a minimum, while superior lift performance is guaranteed thanks to an advanced automatic "regeneration" algorithm and dedicated lift functions:

- setting of basic drive-motor and mechanical system parameters
- monitoring of operating parameters and variables for Regeneration and Drive sections
- control functions and system applications.



GF -EXPRESS PROGRAMMING SOFTWARE

Applications

- › Parameter configuration of Gefran devices (Instruments, Drives, Sensors)
- › Tuning of control parameters with on-line tests and trends
- › Management of parameter archive for multiple configuration

Features

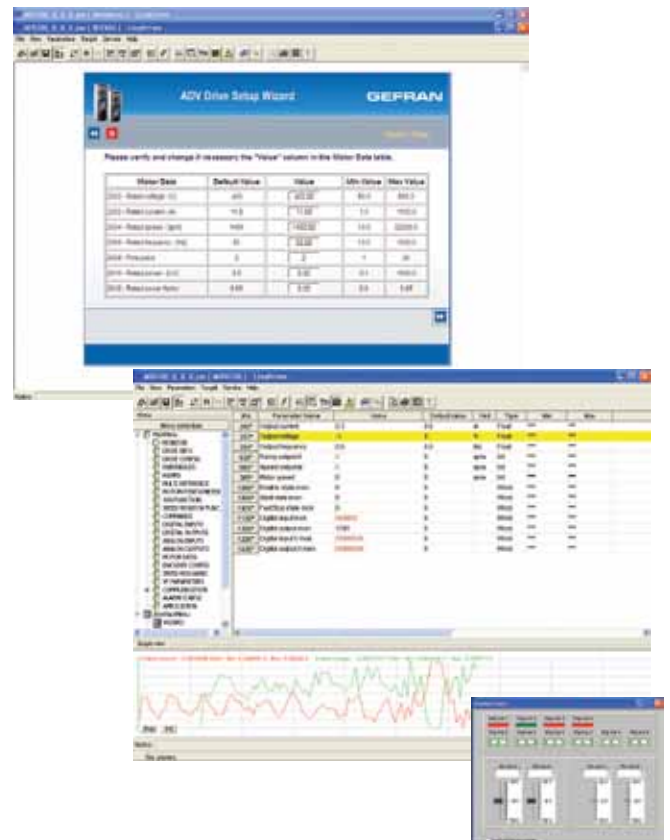
- › Guided product selection
- › Simplified settings
- › Multiple languages
- › Parameter printout
- › Creation and storing of recipes
- › Network autoscan
- › Oscilloscope

GF_eXpress is the software used to configure the parameters of the automation components, drives and sensors in the Gefran catalogue.

The procedures for selecting and configuring parameters are easy and intuitive, thanks to the graphic interface and devices are grouped according to product type and functions.

Product searches are performed by means of a context search and a visual selection from among actual images of the products. This makes it possible to have a single library of devices for all Gefran products.

All details for configuration of each single device are set out in XML format to facilitate expansion of the catalogue and parameters.





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