

ENG

ADL500

INVERTER FOR ELEVATOR



GEFRAN

BEYOND TECHNOLOGY



R241

J10

R242

R251

R252

Z21

Z21

I22

K6

47
25
F09

IC13

IC29

IC28

IC32

IC2

TP1
IGND

IC36

J12

S10

S5

100
16
F11

100
16
F11



GEFRAN

BEYOND TECHNOLOGY

Over fifty years of experience, an organisation highly focused on the customer's needs and constant technological innovation make Gefran a benchmark in the design and production of sensors and components for industrial process automation and control.

Expertise, flexibility and process quality are the factors that distinguish Gefran in the production of integrated tools and systems for specific applications in various industrial fields, with consolidated know-how in the plastics, mobile hydraulics, heating and lift sectors.

Technology, innovation and versatility represent the catalogue's added value in addition to the ability to create specific application solutions in association with the world's leading machine manufacturers.



In the last decade the elevators have been under a tremendous evolution from the technology standpoint like never before. Safety, comfort travel, efficiency, reliability, remote access combined with the use of smartphones and tablets are the major changes that we daily experience versus the old generation systems.

Gefran has developed **the new ADL500 inverter series specific for elevators EN81-20 / EN81-50 certified.**

The series is composed of three lines **ADL550**, **ADL530** and **ADL510** designed to answer the requirements of high rise, medium rise and low rise buildings, without to forget the big market of the modernization.

- **ADL510**: designed to be simple and easy to install in case of **asynchronous motors** typical of low-rise buildings or modernization both in open and close loop.
- **ADL530**: designed to control both **geared and gearless** motors **integrated On-board Universal encoder interface** (EnDat, SinCos, BiSS and Digital Incremental) and **integrated CAN port** for communication by **CAN Open 301** and **CAN Open Lift 417** are ready to use.
- **ADL550**: with the advanced safety functions, **Safe Torque Off SIL3** (*Phase contactor-less*), **Safe Brake Test (SBT)** to check the motor brakes effectiveness, and the **Electronic Brake Control (EBC) SIL3** that replaces the electro-mechanical brakes contactors by internal electronics (*Brake contactor-less*). **Elevator Positioning Control (EPC)** that allows to have a better comfort with the *direct approach* and *precise floor levelling* even for very high demanding elevators. **Stand-by management**, where the power part of the drive is shut off to eliminate the energy consumption during the idle state.
- **ADL550-ICS**, **the Integrated Control System** creating one single environment between the inverter and the control card, optimizing the commissioning and the start-up of the electronic parts of the elevator.

APPLICATIONS



	HIGH RISE	MID RISE	LOW RISE	HOME LIFT *
Profile	<ul style="list-style-type: none"> Height: 90+ m Floors: 30+ Speed Range: 2.5...5 m/s 	<ul style="list-style-type: none"> Height: 18...90 m Floors: 6...30 Speed Range: 0.8...2.5 m/s 	<ul style="list-style-type: none"> Height: 12...18 m Floors: 3...6 Speed Range: 0.6 ... 0.8 m/s 	<ul style="list-style-type: none"> Height: 4...8 m Floors: 1...2 Speed Range: 0.3 ... 0.6 m/s
Requirements	<ul style="list-style-type: none"> High Speed Reliability Smooth Acceleration and Ride comfort Limited passengers' waiting and travel time Regenerative Solution 	<ul style="list-style-type: none"> Cost Saving Space Saving Low Energy Consumption Smooth Acceleration and Ride comfort Regenerative Solution 	<ul style="list-style-type: none"> Cost Saving Space Saving (MRL) Low Energy Consumption Easy Commissioning 	<ul style="list-style-type: none"> Cost Saving Space Saving (MRL) Low Energy Consumption Easy Commissioning
Specific functions	<ul style="list-style-type: none"> Advanced safety functions Remote monitoring Pre-torque and precise landing at floor Contactor-less Door pre-opening AFE regenerative units. 	<ul style="list-style-type: none"> Optimized hardware solutions Pre-torque and precise landing at floor AFE Regenerative units. 	<ul style="list-style-type: none"> Optimized hardware solutions Contactor-less External +24VDC power supply for stand-by control Rapid commissioning. 	<ul style="list-style-type: none"> Optimized hardware solutions Contactor-less External +24VDC power supply for stand-by control Rapid commissioning.

GUIDE TO SELECTION

	HIGH RISE	MID RISE	LOW RISE	HOME LIFT
Regenerative	<p>AFE200 + ADL500</p>			
Non Regenerative	<p>ADL550</p>	<p>ADL530</p>	<p>ADL510</p>	<p>ADL550-2M *</p>

(*) in preparation.

FIELDS OF APPLICATION



TRAFFIC PROFILES

Although an application may be defined initially in terms of floor number and car speed, the various traffic profiles are another essential factor for its better definition.

Buildings used for offices, apartments, businesses or public services require an adequate analysis of their traffic profile in order to choose the best system and all of its components.

The number of people, direction of movement, and specific time bands determine different traffic profiles, characterized by:

- people entering or leaving the loading lobby;
- inter-floor traffic;
- traffic on specific floors;
- peak hours;
- average car load.

Each type of building will have different traffic profiles to be managed by the lift system.

. OFFICE BUILDINGS

These have two peak periods: up-peak in the morning and down-peak in the evening, with inter-floor traffic limited to specific floors (restaurants, car parks, and common areas).

The system must be designed to reduce waiting times for people entering the loading lobby in the morning, to efficiently receive calls from people leaving in the evening, and to manage full loads at peak hours.

Homing functions are typically used, in which the car automatically goes to the floor in specific time bands.

Functions such as door **pre-opening and express arrival** (available in the ADL500 family) **reduce waiting times and increase the traffic handled.**

Functions such as pre-torque increase comfort regardless of the number of people in the car.



. HOTELS

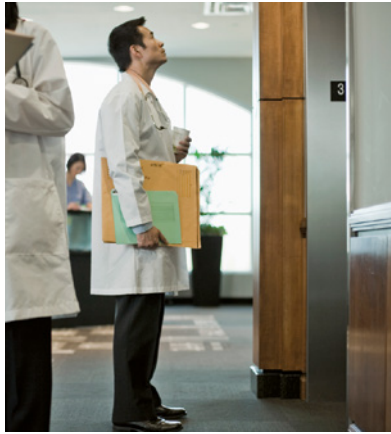
There is a peak in the morning to the restaurant floor for breakfast and to the exit, whereas incoming traffic has no specific peaks.

Inter-floor traffic mainly regards the hotel staff or specific floors (leisure, catering).

The entire system is improved by functions that reduce waiting times and that best manage full cars.

The ADL500 provides functions such as pre-torque and door pre-opening **to improve system performance.**

The integrated STO allows to avoid installations on contactors, **reducing the switching noise.**



. HOSPITALS

Peak hours are during visiting hours (if concentrated in specific time bands).

Hospitals have heavy inter-floor traffic due to patients moving from one ward to another and to movements of personnel.

Hospitals can **greatly reduce energy costs by using regenerative solutions**, even in Low and Mid Rise applications.

Regardless of height, comfort and landing speed are critical for handling emergencies and for moving people with physical limitations.

Functions such as **precise landing at the floor and comfort** when running and starting/arriving are requirements that cannot be entrusted to general purpose drives.

The ADL500, designed for civil lift applications, is the best answer.

The 24 h x 365 days **remote monitoring** open the possibility to the predictive maintenance reducing the down service.



. RESIDENTIAL BUILDINGS

Residential buildings have no peak traffic hours, although traffic in the morning and in the evening is higher than the daily average. There is practically no inter-floor traffic.

Because of the progressively aging population, system down-time must be reduced to an absolute minimum, and all components must be selected on the basis of quality and reliability.

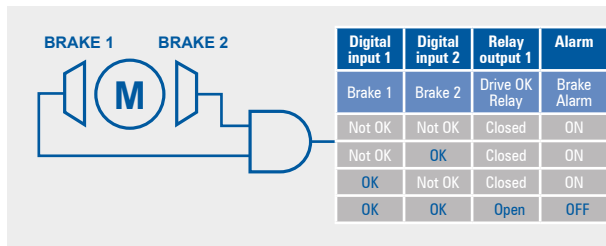
Thanks to **the stand-by management it is possible to save energy** limiting the power consumption to a few watts in not operative elevator time bands.

The noise especially in the night can be dramatically reduced by the contactorless configuration.

INTEGRATED SAFETY FUNCTIONS

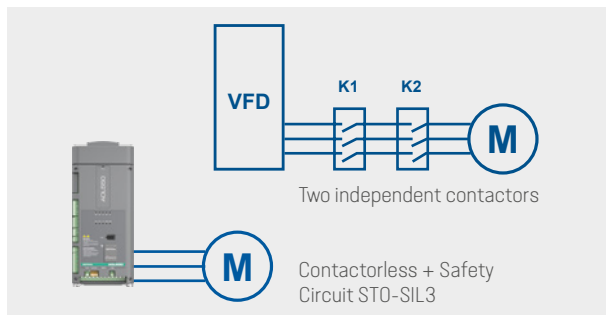
Since years Gefran aims to increase more and more the level of safety of the inverters, helping the operators to reduce installation and maintenance costs avoiding the use of external components.

The ADL550 series integrates multiple safety features that are requested by the current standard EN81-20/EN81-50.



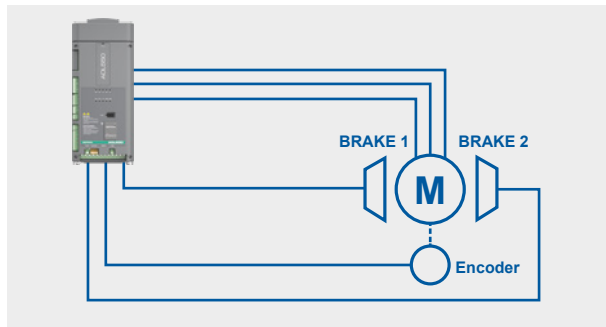
UCM (UNINTENDED CAR MOVEMENT)

As reported in the paragraph 5.6.7 in the EN81-20, it is requested the immediate stop of the car in case of movement with doors open. To answer this requirement, Gefran introduced the continuous independent monitoring of the brakes feedback.



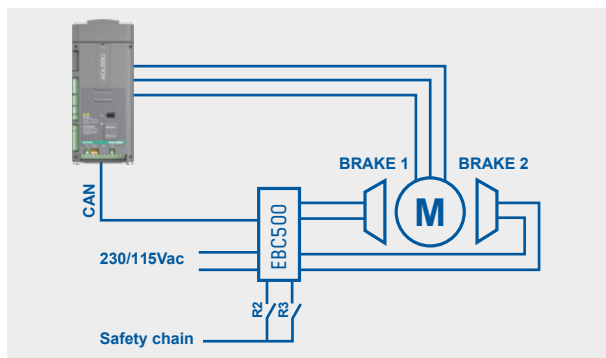
STO (SAFE TORQUE OFF) SIL3

Based on the paragraph 5.9.2.5 in the EN81-20, in order to cut the motor power supply that cause the motor rotation it is requested to use two independent contactors that increase the cost of the installation and the noise of the switch. Gefran integrated the STO-SIL3 certified safety circuit that allows to avoid the installation of external contactors between the motor and the inverter.



SBT (SAFE BRAKE TEST)

Gefran has developed a specific function to test the holding torque of the motor brakes (operational or holding brake) in motor with encoder, both with the two brakes active or for each brake independently. If, during the test, the rotor moves beyond an acceptable range an alarm is raised.



EBC500 - ELECTRONIC BRAKE CONTROL SIL3

The EBC500 (Electronic Brake Control) is an external optional module designed by GEFRAN for the new inverter family ADL550/ADL550-ICS, that enable the safe control and monitoring of the motor's brakes. The traditional electro-mechanical brakes contactors, subject to wear and failures are replaced by internal electronics featuring longest lifetime (ZERO CONTACTORS SOLUTION) reducing the maintenance cost and increasing the durability of the service life of the brakes.

CONNECTIVITY

WI-FI CONNECTION AND CLOUD SERVICE: THE NEW ERA OF ACCESSIBILITY



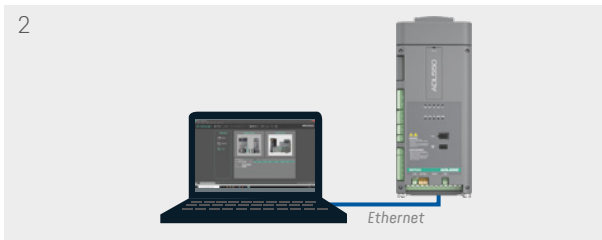
The ADL500 series introduce operators in a new era of inverter management. Together with the traditional approach by cabled keypad or cabled PC, that oblige the operators to be on-site; Gefran introduces a new generation of inverter management based on the modern telecommunication technology.

Thanks to **GF_Liftouch**, the web application designed by Gefran, operations like the start-up, tuning, monitoring and the alarm check, can be easily achieved by mobile phone or tablet with a simple WI-FI connection, or can be fulfilled from remote, thanks to the Gefran Portal, the cloud infrastructure that allows customers to create their own Elevator Management System.



GF_Liftouch [WebApp connection](#)

- > Direct Wi-Fi connection using Wi-Fi Drive link optional module (1).
- > Direct connection or through LAN using the Modbus TCP protocol (2).
- > Remote connection with drive connected to a gateway with SIM card and data connection. By logging onto the Gefran portal, it is possible to monitor and manage the in-field drives and access them directly (3).



GF_DriveLabs [Configuration tool](#)

- > Direct connection or through LAN using the Modbus TCP protocol (2).



ADL500 • GENERAL CHARACTERISTICS

EXPANSION CARDS

EXTRA I/O CONFIGURATION

All in one board with:

- > 4 Digital Inputs
- > 2 Relay Output

OR

DCP3 and DCP4 Protocols

DCP3 for use in EFC (Elevator Floor Control) mode.

DCP4 for use in EPC (Elevator Positioning Control) mode.

DCP³ **DCP⁴**

OPTIONAL PROGRAMMING KEYPAD

The optional programming keypad is easy to use and always ready.

GREEN SOLUTIONS AND FEATURES

- > Regenerative configuration with the AFE200 external modules.
- > Reduced consumption thanks to system stand-by management logic combined with external +24Vdc power supply.
- > Hybrid power supply with supercapacitors.
- > Regenerative energy calculation.



INPUT / OUTPUT

	ADL550	ADL530	ADL510
Analog input	1+PTC	1+PTC	1
Digital input	8-1 Enable	8-1 Enable	8-1 Enable
Digital output	4 (Relays)	4 (Relays)	4 (Relays)
Fast digital input	2	-	-

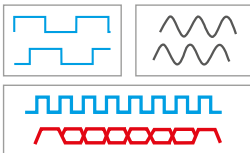
USB PORT



- > Uploading and downloading parameters file.
- > Motor selection and upload of data plate information from database.
- > Uploading languages and SW applications on board the drive.
- > Smart FW update.

UNIVERSAL INTEGRATED MULTI-ENCODER

Selects the encoder type from the parameter without adding dedicated boards, such as: SinCos, Endat, Biss, Digital Incremental.



SAFETY FUNCTIONS

Safety features to prevent accidental motor start:

- > SBT Safe Brake Test
- > EBC Electronic Brake Control SIL3 ⁽¹⁾
- > STO Contactorless SIL3 (Category PLe).

⁽¹⁾ with external accessory module (in preparation)



ETHERNET PORT

Built-in Ethernet communication with Modbus TCP protocol for direct/LAN connection to monitor and configure the drive or for remote gateway connection.



Modbus TCP



CANopen PORT

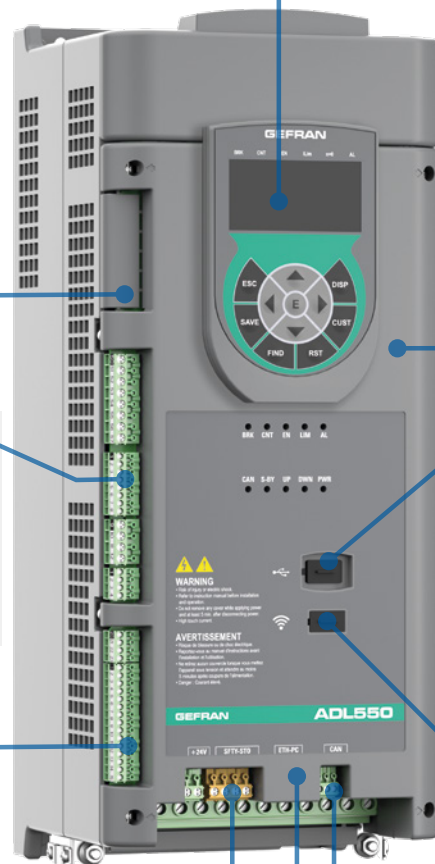
- > CANopen 301.
- > CANopen Lift 417 with dedicated SW.



CANopen

Wi-Fi COMMUNICATION

Plug-in for optional Drive Link Wi-Fi module for wireless communication via GF_Liftouch APP.



MODEL	ADL510	ADL530	ADL550
Control Mode	SSC (Sensorless Scalar Control), Asyn FOC (Field Oriented Control)		SSC (Sensorless Scalar Control), Asyn / Syn FOC (Field Oriented Control)
Motor Type	Asynchronous		Asynchronous, Synchronous
Input Voltage (Output Power)	3 x 400VAC (4-15kW)		3 x 230VAC (2-7.5kW) 3 x 400VAC (4-15kW) 3 x 480VAC (5-20kW)
Speed Accuracy	± 0.01% rated motor speed		
Analog Inputs	1		
Digital Inputs	8 + 1 Enable		
Digital outputs	4 (relay)		
Fast Freeze Inputs	0	0	2
Overload	183% x 10s	183% x 10s	183% x 10s / 200% x 2s
+24Vdc external supply	No	No	Yes
PTC input	No	Yes	Yes
Regulation terminals	Removable		
IO extension	No		4DI + 2RO
Max Output Freq.	300Hz		
EMI Filter	Integrated (in the ADL5x0-...-F version)		
Braking Unit	Integrated		
USB Port	No	Yes	Yes
Wi-Fi Module	No	Optional	Optional
Encoder	TTL/HTL	Universal multi-encoder card integrated (TTL/HTL/Endat/Biss/SinCos/SSI)	
Emergency operation	Battery powered (48-96VDC) with integrated EMS module, UPS (1 x 230VAC)		
Functions	<ul style="list-style-type: none"> > Wizards for: <ul style="list-style-type: none"> - drive set-up - start-up - optimization of comfort and performance - troubleshooting > Management of built-in incremental digital encoder with repetition > Multi-speed control (EFC) > Calculation of energy savings in regenerative configuration. 	In addition to the functions of the 510: <ul style="list-style-type: none"> > Universal multi-encoder card integrated > Wireless control through GF_Liftouch APP for smartphone > USB port for: <ul style="list-style-type: none"> - import/export parameter file - FW download - drive language selection - setting motor data from DB > CANopen Lift 417 > Datalogger. 	In addition to the functions of the 530: <ul style="list-style-type: none"> > Safety functions > System stand-by management > Optimized management of emergency battery consumption > DCP3 – DCP4 with optional card > Motors with peripheral encoder control. > Position Control - Direct Arrival (EPC)
Communication	Modbus TCP (RJ45 port) via GF_DriveLabs configurator		
Protection level	IP20		
Safety features	No		<ul style="list-style-type: none"> > Safe torque off SIL3 (Contactorless). > Safe brake test (SBT) > Electronic Brake Control SIL3 (with external module)
Operating temperature	40°C (without derating) 50°C (with derating)		50°C (without derating)
Altitude	Max 2000 m. (up to 1000 m without derating)		
Marks	CE *, cULus, EAC. <small>* Compliant with CE directive on low-voltage equipment (Directives LVD 2014/35/EU, EMC 2014/30/EU, Lift 2014/33/EU, RoHS 2011/65/EU, Reach 1907/2006)</small>		
Standards	Climatic conditions: EN 60721-3-3; Electrical safety: EN 61800-5-1, ASME17.5/CSA B44.1, UL840 pollution degree 2; EMC compatibility: EN 12015 (with integrated filter), EN 12016. Other elevator standards: EN 81-20, EN 81-50.		

ADL500 • INPUT DATA

SIZES		1040	1055	1075	2110	2150
ULN • AC Input voltage	VAC	ADL550: Three-phase 230 - 380 - 400 - 460 - 480 Vac -15%+10% ADL530: Three-phase 230 - 380 - 400 - 460 - 480 Vac 15%+10% ADL510: Three-phase 380 - 400 Vac -15%+10%				
FLN • Input frequency	Hz	50/60 Hz, ± 5%				
Connection to TT and TN Networks		Yes, standard version				
Connection to IT Networks		Yes, dedicated version available upon request ⁽¹⁾				
Choke		Optional (DC or AC)				
Oversvoltage threshold	VDC	820 Vdc				
Undervoltage threshold	VDC	@ 480 Vac = 470 Vdc @ 460 Vac = 450 Vdc @ 400 Vac = 391 Vdc @ 380 Vac = 371 Vdc @ 230 Vac = 225 Vdc				
In • Effective input current (@ In out)						
@ 230 VAC	A	12	17	23	31	42
@ 400 VAC	A	11	16	22	29	40
@ 480 VAC	A	10	15	20	26	37
THD @ I2n With optional external choke, according to EN 12015		< 35%				
No-load consumption (Energy rating):						
Ready (no-load) ⁽²⁾ consumption "Fan Off"	W	20	20	20	20	20
Fan consumption	W	8	10	10	10	16
Ready (no-load) ⁽²⁾ consumption "Fan On"	W	28	30	30	30	36

- (1) ADL500 can only operate on IT networks devoid of any faults (between active parts and PE) or in the presence of temporary faults. Therefore an insulation monitor MUST be used to detect and enable prompt removal of any fault condition.
- (2) Power consumption when drive is powered from the three-phase mains and is ready to start.

COOLING

SIZES		1040	1055	1075	2110	2150
Pv, Heat dissipation ⁽³⁾ (@ULN=230 ... 460VAC)	W	150	250	350	400	600
Fan capacity						
Heat sink	m ³ /h	2 x 35	2 x 58	2 x 58	2 x 58	2 x 58
Internal	m ³ /h	-	-	-	-	-
Minimum cabinet opening for cooling	cm ²	72	144	144	144	328

- (3) Values that refer to operation at default switching frequency.

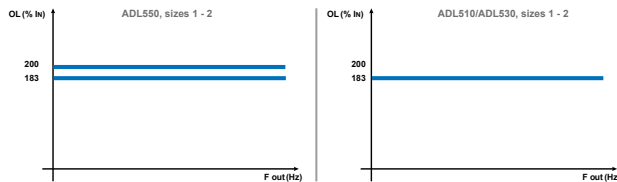
ADL500 • OUTPUT DATA

SIZES		1040	1055	1075	2110	2150
In • Rated output current (fsw = default)						
@ ULN=230 VAC	A	9	13.5	18.5	24.5	32
@ ULN=400 VAC	A	9	13.5	18.5	24.5	32
@ ULN=460 VAC	A	8.1	12.2	16.7	22	28.8
Pn mot (Recommended motor power, fsw = default)						
@ ULN=230 VAC	kW	2	3	4	5.5	7.5
@ ULN=400 VAC	kW	4	5.5	7.5	11	15
@ ULN=460 VAC	Hp	5	7.5	10	15	20
Reduction factor						
K_v (1)		0.95	0.95	0.95	0.95	0.95
K_T ADL550 (2)		1	1	1	1	1
K_T ADL510-530 (3)		0.90	0.90	0.90	0.90	0.90
KALT (4)		1.2	1.2	1.2	1.2	1.2
Overload		ADL510, ADL530: 183% x 10 s ADL550: 183% x 10 s / 200% x 2 s				
Maximum Switching frequency	kHz	10				
U2 • Maximum output voltage		0.98 x ULN (ULN = AC Input voltage)				
f2 • Maximum output frequency	Hz	300				
IGBT braking unit		Standard internal (requires external resistor); braking torque 150% MAX				

- (1) K_v : Derating factor for mains voltage at 460Vac and power supply from AFE200.
- (2) K_t (ADL550): no derating.
- (3) K_t (ADL510/ADL530): Derating factor for ambient temperature of 50°C (1% every °C above 40°C).
- (4) 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, $K_{alt} = 1.2\% \times 10 = 12\%$ derating; I_n derated = $(100 - 12)\% = 88\% I_n$

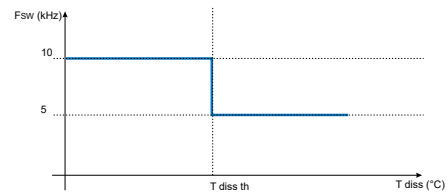
Derating values in overload condition (ADL5.0-...-4)

In overload conditions the output current DO NOT depends on the output frequency, as shown in the figure below.

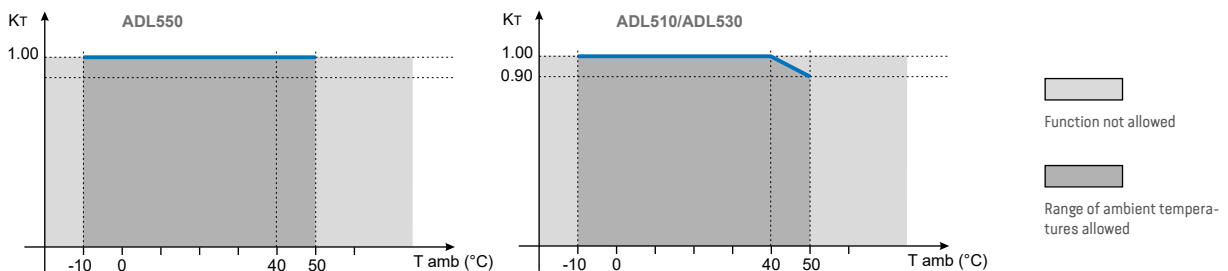


Derating values for switching frequency

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

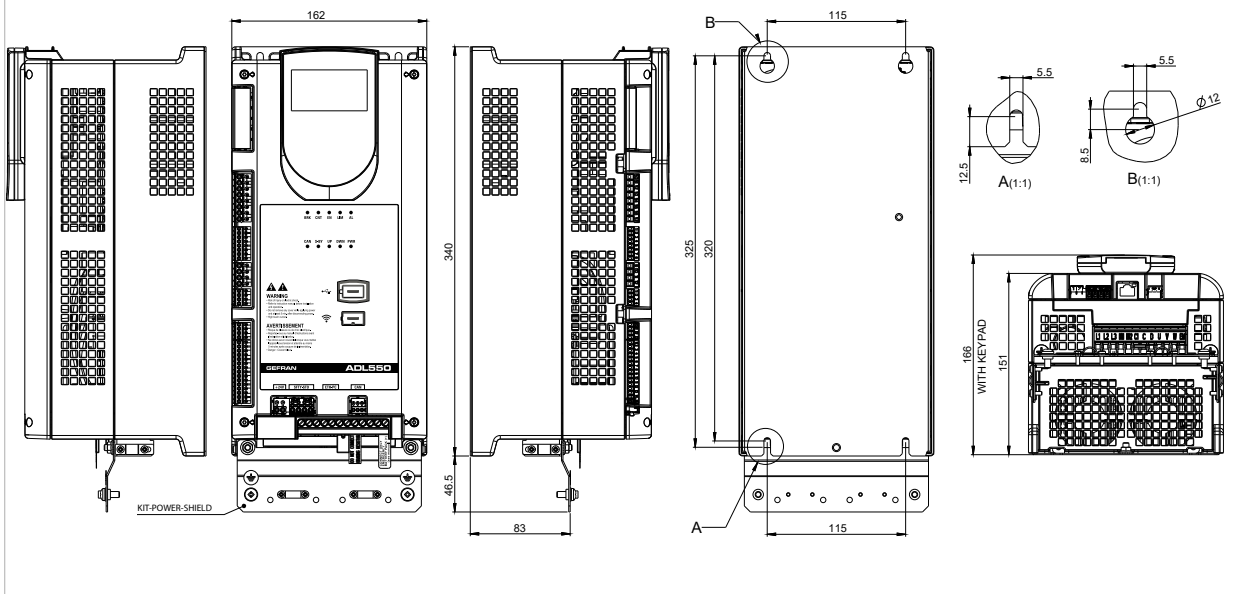


Ambient temperature reduction factor

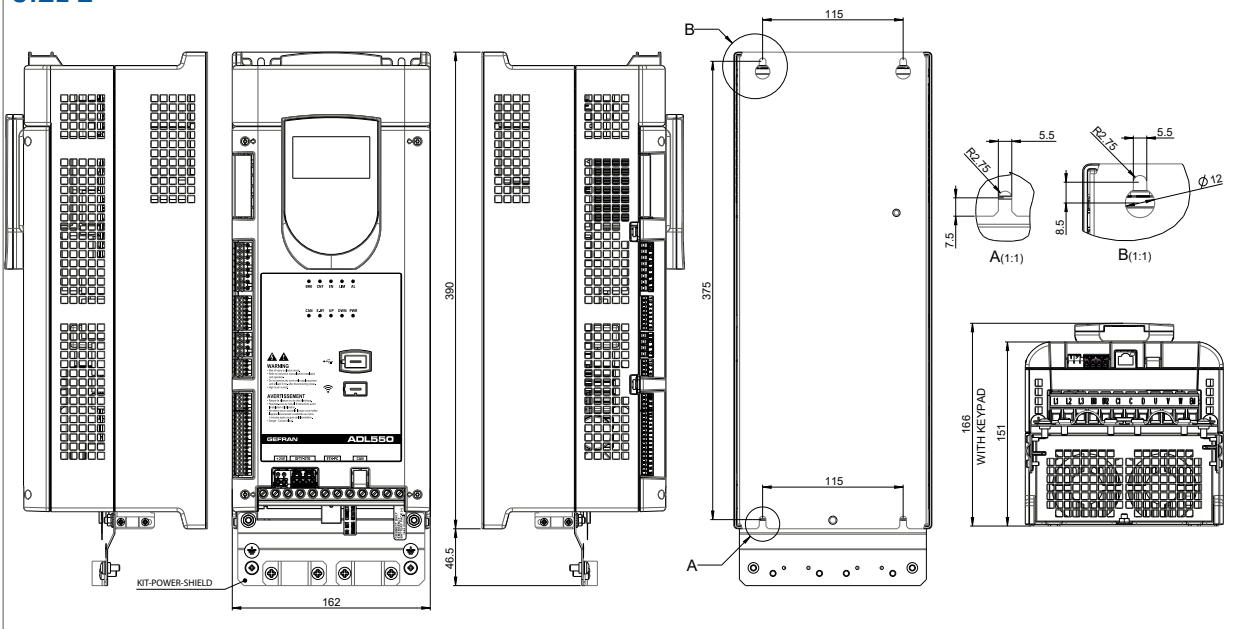


ADL500 • DIMENSIONS AND WEIGHTS

SIZE 1



SIZE 2



Sizes	Dimensions: Width x Height x Depth *		Weight	
	mm	inches	kg	lbs
ADL510/530/550-1...	162 x 340 x 151	6.38 x 13.38 x 5.9	5.5	12.1
ADL510/530/550-2...	162 x 390 x 151	6.38 x 15.35 x 5.94	7.0	15.4

* Without optional power shield (KIT-POWER-SHIELD).

ADL500 • ORDERING CODES

PRODUCT IDENTIFICATION

ADL550 1 040-XBL-F-4-EMS

Emergency Supply module:	[empty] = not included, EMS = integrated
Rated voltage:	4 = 230-400-480Vac, three-phase
EMI Filter:	[empty] = not included F = integrated
Lift application:	L = included
Braking unit:	X = not included, B = included
Keypad:	X = without integrated keypad
Inverter power in kW:	040 = 4kW , 055 = 5.5kW, 075 = 7.5kW, 110 = 11kW, 150 = 15kW
Mechanical dimensions of the drive:	1 = size 1 , 2 = size 2
inverter series:	ADL550 , ADL530, ADL510

ADL510 - 400V_{AC} THREE-PHASE

- Feedback for Incremental Digital + Sinusoidal Encoder

CODE	TYPE	Pn at 400Vac	CONFIGURATION
S9DL5101	ADL510-1040-XBL-4	4kW	Integrated Braking Module - External EMC Filter
S9DL5102	ADL510-1055-XBL-4	5.5kW	Integrated Braking Module - External EMC Filter
S9DL5103	ADL510-1075-XBL-4	7.5kW	Integrated Braking Module - External EMC Filter
S9DL5104	ADL510-2110-XBL-4	11kW	Integrated Braking Module - External EMC Filter
S9DL5105	ADL510-2150-XBL-4	15kW	Integrated Braking Module - External EMC Filter
S9DL5121	ADL510-1040-XBL-F-4	4kW	Integrated Braking Module - Integrated EMC Filter
S9DL5122	ADL510-1055-XBL-F-4	5.5kW	Integrated Braking Module - Integrated EMC Filter
S9DL5123	ADL510-1075-XBL-F-4	7.5kW	Integrated Braking Module - Integrated EMC Filter
S9DL5124	ADL510-2110-XBL-F-4	11kW	Integrated Braking Module - Integrated EMC Filter
S9DL5125	ADL510-2150-XBL-F-4	15kW	Integrated Braking Module - Integrated EMC Filter
S9DL5141	ADL510-1040-XBL-4-EMS	4kW	Integrated Braking Module - External EMC Filter - Integrated EMS module
S9DL5142	ADL510-1055-XBL-4-EMS	5.5kW	Integrated Braking Module - External EMC Filter - Integrated EMS module
S9DL5143	ADL510-1075-XBL-4-EMS	7.5kW	Integrated Braking Module - External EMC Filter - Integrated EMS module
S9DL5144	ADL510-2110-XBL-4-EMS	11kW	Integrated Braking Module - External EMC Filter - Integrated EMS module
S9DL5145	ADL510-2150-XBL-4-EMS	15kW	Integrated Braking Module - External EMC Filter - Integrated EMS module
S9DL5161	ADL510-1040-XBL-F-4-EMS	4kW	Integrated Braking Module - Integrated EMC Filter - Integrated EMS module
S9DL5162	ADL510-1055-XBL-F-4-EMS	5.5kW	Integrated Braking Module - Integrated EMC Filter - Integrated EMS module
S9DL5163	ADL510-1075-XBL-F-4-EMS	7.5kW	Integrated Braking Module - Integrated EMC Filter - Integrated EMS module
S9DL5164	ADL510-2110-XBL-F-4-EMS	11kW	Integrated Braking Module - Integrated EMC Filter - Integrated EMS module
S9DL5165	ADL510-2150-XBL-F-4-EMS	15kW	Integrated Braking Module - Integrated EMC Filter - Integrated EMS module

ADL530 - 230-400-480V_{AC} THREE-PHASE

- Feedback for Multi Encoder

CODE	TYPE	Pn at 400Vac	CONFIGURATION
S9DL5301	ADL530-1040-XBL-4	4kW	Integrated Braking Module - External EMC Filter
S9DL5302	ADL530-1055-XBL-4	5.5kW	Integrated Braking Module - External EMC Filter

CODE	TYPE	Pn at 400Vac	CONFIGURATION
S9DL5303	ADL530-1075-XBL-4	7.5kW	Integrated Braking Module - External EMC Filter
S9DL5304	ADL530-2110-XBL-4	11kW	Integrated Braking Module - External EMC Filter
S9DL5305	ADL530-2150-XBL-4	15kW	Integrated Braking Module - External EMC Filter
S9DL5321	ADL530-1040-XBL-F-4	4kW	Integrated Braking Module - Integrated EMC Filter
S9DL5322	ADL530-1055-XBL-F-4	5.5kW	Integrated Braking Module - Integrated EMC Filter
S9DL5323	ADL530-1075-XBL-F-4	7.5kW	Integrated Braking Module - Integrated EMC Filter
S9DL5324	ADL530-2110-XBL-F-4	11kW	Integrated Braking Module - Integrated EMC Filter
S9DL5325	ADL530-2150-XBL-F-4	15kW	Integrated Braking Module - Integrated EMC Filter
S9DL5341	ADL530-1040-XBL-4-EMS	4kW	Integrated Braking Module - External EMC Filter - Integrated EMS module
S9DL5342	ADL530-1055-XBL-4-EMS	5.5kW	Integrated Braking Module - External EMC Filter - Integrated EMS module
S9DL5343	ADL530-1075-XBL-4-EMS	7.5kW	Integrated Braking Module - External EMC Filter - Integrated EMS module
S9DL5344	ADL530-2110-XBL-4-EMS	11kW	Integrated Braking Module - External EMC Filter - Integrated EMS module
S9DL5345	ADL530-2150-XBL-4-EMS	15kW	Integrated Braking Module - External EMC Filter - Integrated EMS module
S9DL5361	ADL530-1040-XBL-F-4-EMS	4kW	Integrated Braking Module - Integrated EMC Filter - Integrated EMS module
S9DL5362	ADL530-1055-XBL-F-4-EMS	5.5kW	Integrated Braking Module - Integrated EMC Filter - Integrated EMS module
S9DL5363	ADL530-1075-XBL-F-4-EMS	7.5kW	Integrated Braking Module - Integrated EMC Filter - Integrated EMS module
S9DL5364	ADL530-2110-XBL-F-4-EMS	11kW	Integrated Braking Module - Integrated EMC Filter - Integrated EMS module
S9DL5365	ADL530-2150-XBL-F-4-EMS	15kW	Integrated Braking Module - Integrated EMC Filter - Integrated EMS module

ADL550 - 230-400-480V_{ac} THREE-PHASE

- Feedback for Multi Encoder

CODE	TYPE	Pn at 400Vac	CONFIGURATION
S9DL5501	ADL550-1040-XBL-4	4kW	Integrated Braking Module - External EMC Filter
S9DL5502	ADL550-1055-XBL-4	5.5kW	Integrated Braking Module - External EMC Filter
S9DL5503	ADL550-1075-XBL-4	7.5kW	Integrated Braking Module - External EMC Filter
S9DL5504	ADL550-2110-XBL-4	11kW	Integrated Braking Module - External EMC Filter
S9DL5505	ADL550-2150-XBL-4	15kW	Integrated Braking Module - External EMC Filter
S9DL5521	ADL550-1040-XBL-F-4	4kW	Integrated Braking Module - Integrated EMC Filter
S9DL5522	ADL550-1055-XBL-F-4	5.5kW	Integrated Braking Module - Integrated EMC Filter
S9DL5523	ADL550-1075-XBL-F-4	7.5kW	Integrated Braking Module - Integrated EMC Filter
S9DL5524	ADL550-2110-XBL-F-4	11kW	Integrated Braking Module - Integrated EMC Filter
S9DL5525	ADL550-2150-XBL-F-4	15kW	Integrated Braking Module - Integrated EMC Filter
S9DL5541	ADL550-1040-XBL-4-EMS	4kW	Integrated Braking Module - External EMC Filter - Integrated EMS module
S9DL5542	ADL550-1055-XBL-4-EMS	5.5kW	Integrated Braking Module - External EMC Filter - Integrated EMS module
S9DL5543	ADL550-1075-XBL-4-EMS	7.5kW	Integrated Braking Module - External EMC Filter - Integrated EMS module
S9DL5544	ADL550-2110-XBL-4-EMS	11kW	Integrated Braking Module - External EMC Filter - Integrated EMS module
S9DL5545	ADL550-2150-XBL-4-EMS	15kW	Integrated Braking Module - External EMC Filter - Integrated EMS module
S9DL5561	ADL550-1040-XBL-F-4-EMS	4kW	Integrated Braking Module - Integrated EMC Filter - Integrated EMS module
S9DL5562	ADL550-1055-XBL-F-4-EMS	5.5kW	Integrated Braking Module - Integrated EMC Filter - Integrated EMS module
S9DL5563	ADL550-1075-XBL-F-4-EMS	7.5kW	Integrated Braking Module - Integrated EMC Filter - Integrated EMS module
S9DL5564	ADL550-2110-XBL-F-4-EMS	11kW	Integrated Braking Module - Integrated EMC Filter - Integrated EMS module
S9DL5565	ADL550-2150-XBL-F-4-EMS	15kW	Integrated Braking Module - Integrated EMC Filter - Integrated EMS module

OPTIONS

DC INPUT CHOKE - ADL510/530/550-.....-4

CODE	TYPE	1040	1055	1075	2110	2150
S7AI10	LDC-004	1				
S7AI11	LDC-005		1			
S7AI12	LDC-007			1		
S7AI13	LDC-011				1	
S7AI14	LDC-015					1

AC OUTPUT CHOKES - ADL510/530/550-.....-4

CODE	TYPE	1040	1055	1075	2110	2150
S7FG3	LU3-005	1	1	1		
S7FG4	LU3-011				1	
S7FH2	LU3-015					1

EXTERNAL BRAKING RESISTORS - ADL510/530/550-.....-4

CODE	TYPE	1040	1055	1075	2110	2150
S8SZ3	RFPR 750 D 68R	1	1			
S8SZ4	RFPR 1200 D 49R			1		
S8SZ5	RFPR 1900 D 28R				1	1

EXTERNAL BRAKING UNIT - ADL510/530/550-.....-4

CODE	TYPE	DESCRIPTION
S9D55	BUy 1020	In = 20A, UL mark
S9D56	BUy 1050	In = 50A, UL mark
S9D57	BUy 1085	In = 85A

VARIOUS

CODE	TYPE	DESCRIPTION
S5DL408	EXP-IO1-ADL500	I/O Expansion (4 digital inputs + 2 relays)
S5DL434	EXP-DCP-ADL500	DCP3-DCP4 protocol card (in preparation)
S52969WF	Wi-Fi Drive Link	Wi-Fi plug-in module
S5P11T	KB-ADL500	Programming Keypad
S5P11TK1	KIT REMOTE KB-ADL500 5MT	RJ45 keypad remoting kit, L=5m
S5P11TK2	KIT REMOTE KB-ADL500 10MT	RJ45 keypad remoting kit, L=10m
S72684S12	KIT-POWER-SHIELD S1	Power cable shielding kit for Size 1
S72684S13	KIT-POWER-SHIELD S2	Power cable shielding kit for Size 2

ADL550-ICS • GENERAL CHARACTERISTICS

OPTIONAL PROGRAMMING KEYPAD

The optional programming keypad is easy to use and always ready.

INTEGRATED KEYPAD

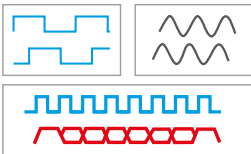
The built-in programming keypad enables quick and easy drive setup.

INPUT / OUTPUT

Analog input	1+PTC
Digital input	8-1 Enable
Digital output	4 (Relays)
Fast digital input	2

UNIVERSAL INTEGRATED MULTI-ENCODER

Selects the encoder type from the parameter without adding dedicated boards, such as: SinCos, Endat, Biss, Digital Incremental.



SAFETY FUNCTIONS

Safety features to prevent accidental motor start:

- > SBT Safe Brake Test
- > EBC Electronic Brake Control SIL3 ⁽¹⁾
- > STO Contactorless SIL3 (Category PLe).

⁽¹⁾ with external accessory module (in preparation)



ETHERNET PORT

Built-in Ethernet communication with Modbus TCP protocol for direct/LAN connection to monitor and configure the drive or for remote gateway connection.



Modbus TCP



GREEN SOLUTIONS AND FEATURES

- > Regenerative configuration with the AFE200 external modules.
- > Reduced consumption thanks to system stand-by management logic combined with external +24Vdc power supply.
- > Hybrid power supply with super-capacitors.
- > Indicator of system regeneration potential.



LIFT CONTROL CARD

Card integrated to control Lift functions: safety chain, 6 relay outputs and 16 digital inputs.

USB PORT

- > Uploading and downloading parameters file.
- > Motor selection and upload of data-plate information from database.
- > Uploading languages and SW applications on board the drive.



Wi-Fi COMMUNICATION

Plug-in for optional Drive Link Wi-Fi module for wireless communication via GF_Liftouch APP.



CANopen

MODEL	ADL550-ICS
Control Mode	SSC (Sensorless Scalar Control), Asyn / Syn FOC (Field Oriented Control)
Input Voltage (Output Power)	3 x 230VAC (2-7.5kW), 3 x 400VAC (4-15kW), 3 x 480VAC (5-20kW)
Motor Type	Asynchronous and Synchronous
Speed Accuracy	± 0.01% rated motor speed
Analog Inputs	1 (Inverter) + 1 (Car Roof Card)
Digital Inputs	24 (Inverter) + 14 (Car Roof Card) + 1 Enable
Digital outputs	10 (Inverter) + 1 (Car Roof Card)
Fast Freeze Inputs	2
Overload	183% x 10s / 200% x 2s
Max Output Freq.	300Hz
EMI Filter	Integrated (ADL550-...-F models)
Braking Unit	Integrated
USB Port	Yes
Wi-Fi Module	Optional
Emergency operation	Battery powered (48-96VDC) with integrated EMS module, UPS (1 x 230VAC)
Functions	Maintenance and Inspection mode, Independent Run mode, Operator mode, Return to floor in case of fire, Firefighter control, Automatic return to floor, Return to floor at night, Deceleration at floor, Overload, Earthquake, Anti-vandalism, Call management with full car, Double stop management, Time management, Energy savings.
Number of elevators	Simplex - Duplex - Group (up to 8)
Number of stop	Up to 64
Number of floor	Up to 64
Speed range	Up to 5 m/s
Car door operation	Up to 3 independent doors
Car display/button panel	Up to 2
Communication & Wiring system type	CAN bus serial communication (shielded cables) or RS485 serial communication
Call management	Full Selective - Down Selective - Up Selective
Protection level	IP20
Safety features	> Safe torque off SIL3 (Contactorless). > Safe brake test (SBT) > EBC Electronic Brake Control SIL3 (with external module)
Operating temperature	50°C (without derating)
Altitude	Max 2000 m. (up to 1000 m without derating)
Marks	CE *, cULus, EAC. <i>* Compliant with CE directive on low-voltage equipment (Directive LVD 2014/35/EU, EMC 2014/30/EU, Lift 2014/33/EU, RoHS 2011/65/EU, Reach 1907/2006)</i>
Standards	Climatic conditions: EN 60721-3-3; Electrical safety: EN 61800-5-1, ASME17.5/CSA B44.1, UL840 pollution degree 2; Energy consumption: ISO 25745; EMC compatibility: EN 12015 (with integrated filter), EN 12016. Other elevator standards: EN 81-20, EN 81-50.
Options	The following options are available to complete the system: > ICS-CR (Integrated Control System Car Roof card) manages the complete operation of the car and sends all the information to the controller via a dedicated CAN bus communication; > ICS-COP (Integrated Control System Car Operator Panel) card that interfaces between control panels and Car Roof Card. It collects commands such as call booking or special commands like fire brigade calls; > ICS-CD (Integrated Control System Car Display) 7 inch TFT car display, shows floor indications, direction, overload, etc. It communicates with the ICS-CPU control system via a dedicated CAN channel (CAN 1) or RS485 > ICS-FD (Integrated Control System Floor Display) a choice of many LCD or TFT displays are available.

ADL550-ICS • INPUT DATA

SIZES		1040	1055	1075	2110	2150	
ULN • AC Input voltage	VAC	Three-phase 230 - 380 - 400 - 460 - 480 Vac -15%+10%					
FLN • Input frequency	Hz	50/60 Hz, ± 5%					
Connection to TT and TN Networks		Yes, standard version					
Connection to IT Networks		Only on request ⁽¹⁾ , please contact the Gefran Customer Service.					
Choke		Optional (DC or AC)					
Overvoltage threshold	VDC	820 Vdc					
Undervoltage threshold	VDC	@ 480 Vac = 470 Vdc @ 460 Vac = 450 Vdc @ 400 Vac = 391 Vdc @ 380 Vac = 371 Vdc @ 230 Vac = 225 Vdc					
In • Effective input current (@ In out)							
	@ 230 VAC	A	12	17	23	31	42
	@ 400 VAC	A	11	16	22	29	40
	@ 480 VAC	A	10	15	20	26	37
THD @ I2n With optional external choke, according to EN 12015		< 35%					
No-load consumption (Energy rating):							
Ready (no-load) ⁽²⁾ consumption "Fan Off"	W	20	20	20	20	20	
Fan consumption	W	8	10	10	10	16	
Ready (no-load) ⁽²⁾ consumption "Fan On"	W	28	30	30	30	36	

(*) ADL550-ICS can only operate on IT networks devoid of any faults (between active parts and PE) or in the presence of temporary faults.

Therefore an insulation monitor MUST be used to detect and enable prompt removal of any fault condition.

(2) Power consumption when drive is powered from the three-phase mains and is ready to start.

COOLING

SIZES		1040	1055	1075	2110	2150
Pv, Heat dissipation ⁽³⁾ (@ULN=230 ... 460VAC)	W	150	250	350	400	600
Fan capacity						
	Heat sink	m ³ /h	2 x 35	2 x 58	2 x 58	2 x 58
	Internal	m ³ /h	-	-	-	-
Minimum cabinet opening for cooling	cm ²	72	144	144	144	328

(3): values that refer to operation at default switching frequency.

ADL550-ICS • OUTPUT DATA

SIZES		1040	1055	1075	2110	2150
In • Rated output current (fsw = default)						
@ ULN=230 VAC	A	9	13.5	18.5	24.5	32
@ ULN=400 VAC	A	9	13.5	18.5	24.5	32
@ ULN=460 VAC	A	8.1	12.2	16.7	22	28.8
Pn mot (Recommended motor power, fsw = default)						
@ ULN=230 VAC	kW	2	3	4	5.5	7.5
@ ULN=400 VAC	kW	4	5.5	7.5	11	15
@ ULN=460 VAC	Hp	5	7.5	10	15	20
Reduction factor						
Kv (1)		0.95	0.95	0.95	0.95	0.95
Kt (2)		1	1	1	1	1
KALT (3)		1.2	1.2	1.2	1.2	1.2
Overload		183% x 10 s / 200% x 2 s				
Maximum switching frequency	kHz	10				
U2 • Maximum output voltage		0.98 x ULN (ULN = AC Input voltage)				
f2 • Maximum output frequency	Hz	300				
IGBT braking unit		Standard internal (requires external resistor); braking torque 150% MAX				

- (1) Kv : Derating factor for mains voltage at 460Vac and power supply from AFE200.
- (2) Kt: no derating.
- (3) Kalt : 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, Kalt = 1.2% * 10 = 12% derating; In derated = (100 - 12) % = 88 % In

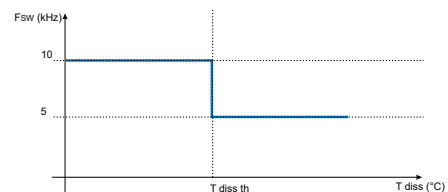
Derating values in overload condition

In overload conditions the output current DO NOT depends on the output frequency, as shown in the figure below.

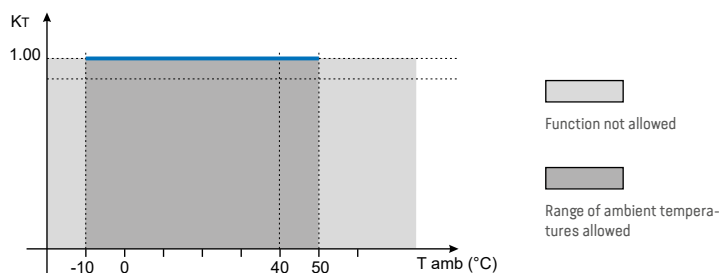


Derating values for switching frequency

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

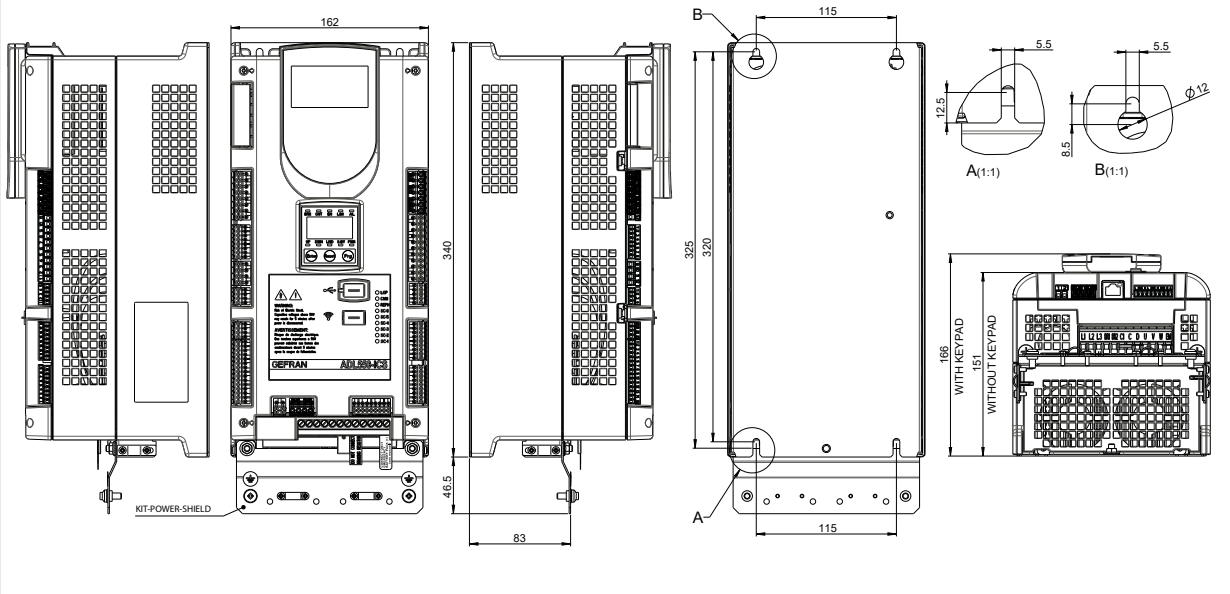


Ambient temperature reduction factor

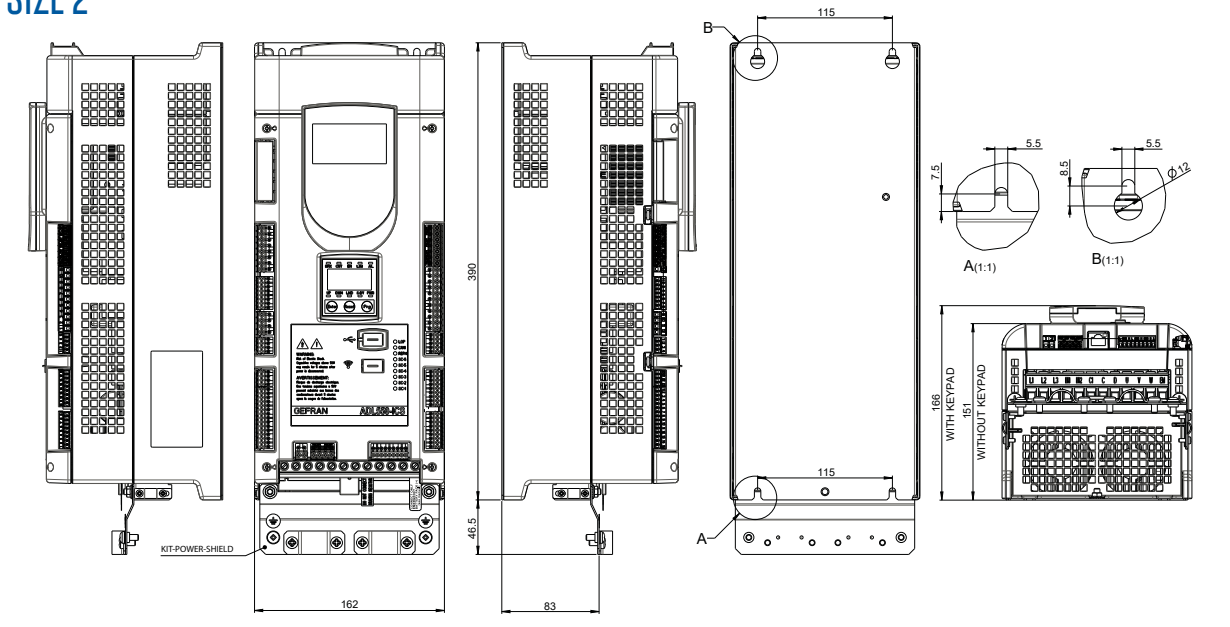


ADL550-ICS • DIMENSIONS AND WEIGHTS

SIZE 1



SIZE 2



Sizes	Dimensions: Width x Height x Depth *		Weight	
	mm	inches	kg	lbs
ADL550-ICS-1...	162 x 340 x 151	6.38 x 13.38 x 5.9	5.5	12.1
ADL550-ICS-2...	162 x 390 x 151	6.38 x 15.35 x 5.94	7.0	15.4

* Senza supporto metallico opzionale (KIT-POWER-SHIELD).

ADL550-ICS • ORDERING CODES

PRODUCT IDENTIFICATION

ADL550-ICS 1 040-KB L-F-4-EMS

Emergency Supply module:	[empty] = not included, EMS = integrated
Rated voltage:	4 = 230-400-480Vac, three-phase
EMI Filter:	[empty] = not included F = integrated
Lift application:	L = included
Braking unit:	X = not included, B = included
Keypad:	K = integrated Keypad 1-line x 4-character alphanumerical LED display
Inverter power in kW:	040 = 4kW , 055 = 5.5kW, 075 = 7.5kW, 110 = 11kW, 150 = 15kW
Mechanical dimensions of the drive:	1 = size 1 , 2 = size 2
Inverter series ADL550-ICS	

ADL550-ICS - 230-400-480V_{AC} THREE-PHASE

CODE	TYPE	Pn at 400Vac	CONFIGURATION
S9DLI5501	ADL550-ICS-1040-KBL-4	4kW	Integrated Lift Control card - Integrated Braking Module - External EMC Filter
S9DLI5502	ADL550-ICS-1055-KBL-4	5.5kW	Integrated Lift Control card - Integrated Braking Module - External EMC Filter
S9DLI5503	ADL550-ICS-1075-KBL-4	7.5kW	Integrated Lift Control card - Integrated Braking Module - External EMC Filter
S9DLI5504	ADL550-ICS-2110-KBL-4	11kW	Integrated Lift Control card - Integrated Braking Module - External EMC Filter
S9DLI5505	ADL550-ICS-2150-KBL-4	15kW	Integrated Lift Control card - Integrated Braking Module - External EMC Filter
S9DLI5521	ADL550-ICS-1040-KBL-F-4	4kW	Integrated Lift Control card - Integrated Braking Module - Integrated EMC Filter
S9DLI5522	ADL550-ICS-1055-KBL-F-4	5.5kW	Integrated Lift Control card - Integrated Braking Module - Integrated EMC Filter
S9DLI5523	ADL550-ICS-1075-KBL-F-4	7.5kW	Integrated Lift Control card - Integrated Braking Module - Integrated EMC Filter
S9DLI5524	ADL550-ICS-2110-KBL-F-4	11kW	Integrated Lift Control card - Integrated Braking Module - Integrated EMC Filter
S9DLI5525	ADL550-ICS-2150-KBL-F-4	15kW	Integrated Lift Control card - Integrated Braking Module - Integrated EMC Filter
S9DLI5541	ADL550-ICS-1040-KBL-4-EMS	4kW	Integrated Lift Control card - Integrated Braking and EMS modules - External EMC Filter
S9DLI5542	ADL550-ICS-1055-KBL-4-EMS	5.5kW	Integrated Lift Control card - Integrated Braking and EMS modules - External EMC Filter
S9DLI5543	ADL550-ICS-1075-KBL-4-EMS	7.5kW	Integrated Lift Control card - Integrated Braking and EMS modules - External EMC Filter
S9DLI5544	ADL550-ICS-2110-KBL-4-EMS	11kW	Integrated Lift Control card - Integrated Braking and EMS modules - External EMC Filter
S9DLI5545	ADL550-ICS-2150-KBL-4-EMS	15kW	Integrated Lift Control card - Integrated Braking and EMS modules - External EMC Filter
S9DLI5561	ADL550-ICS-1040-KBL-F-4-EMS	4kW	Integrated Lift Control card - Integrated Braking Module, EMC Filter and EMS module
S9DLI5562	ADL550-ICS-1055-KBL-F-4-EMS	5.5kW	Integrated Lift Control card - Integrated Braking Module, EMC Filter and EMS module
S9DLI5563	ADL550-ICS-1075-KBL-F-4-EMS	7.5kW	Integrated Lift Control card - Integrated Braking Module, EMC Filter and EMS module
S9DLI5564	ADL550-ICS-2110-KBL-F-4-EMS	11kW	Integrated Lift Control card - Integrated Braking Module, EMC Filter and EMS module
S9DLI5565	ADL550-ICS-2150-KBL-F-4-EMS	15kW	Integrated Lift Control card - Integrated Braking Module, EMC Filter and EMS module

OPTIONS

DC INPUT CHOKE - ADL550-ICS-.....-4

CODE	TYPE	1040	1055	1075	2110	2150
S7AI10	LDC-004	1				
S7AI11	LDC-005		1			
S7AI12	LDC-007			1		
S7AI13	LDC-011				1	
S7AI14	LDC-015					1

AC OUTPUT CHOKES - ADL550-ICS-.....-4

CODE	TYPE	1040	1055	1075	2110	2150
S7FG3	LU3-005	1				
S7FG3	LU3-005		1			
S7FG3	LU3-005			1		
S7FG4	LU3-011				1	
S7FH2	LU3-015					1

EXTERNAL BRAKING RESISTORS - ADL550-ICS-.....-4

CODE	TYPE	1040	1055	1075	2110	2150
S8SZ3	RFPR 750 D 68R	1	1			
S8SZ4	RFPR 1200 D 49R			1		
S8SZ5	RFPR 1900 D 28R				1	1

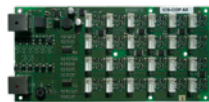
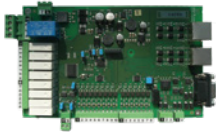
EXTERNAL BRAKING UNIT - ADL550-ICS-.....-4

CODE	TYPE	DESCRIPTION
S9D55	BUy 1020	In = 20A, UL mark
S9D56	BUy 1050	In = 50A, UL mark
S9D57	BUy 1085	In = 85A

VARIOUS

CODE	TYPE	DESCRIPTION
S52969WF	Wi-Fi Drive Link	Wi-Fi plug-in module
S5P11T	KB-ADL500	Programming Keypad
S5P11TK1	KIT REMOTE KB-ADL500 5MT	RJ45 keypad remoting kit, L=5m
S5P11TK2	KIT REMOTE KB-ADL500 10MT	RJ45 keypad remoting kit, L=10m
S72684S12	KIT-POWER-SHIELD S1	Power cable shielding kit for Size 1
S72684S13	KIT-POWER-SHIELD S2	Power cable shielding kit for Size 2

CARDS, PANELS AND DISPLAY



CODE	TYPE	DESCRIPTION
On request	ICS-CR	Integrated Control System Car Roof card. The ICS-CR card manages complete cabin operation, sending all information to the controller via a dedicated CAN bus communication.
On request	ICS-COP	Integrated Control System Car Operator Panel Card that interfaces between button panels and Car Roof Card (ICS-CR).
On request	ICS-CD	Integrated Control System Car Display Cabin Display: 7 inch TFT. Communication with ICS-CPU control system via dedicated CAN channel (CAN 1) or RS485.
On request	ICS-FD	Integrated Control System Floor Display This display is positioned in the floor. It is possible to select the display based on the wished technology (e.g. LCD, TFT). The communication with the ICS-CPU can be via CAN or RS485.
On request	Push buttons and covers	This are optional parts, Gefran can provide these parts, in alternative the customers are free to connect their selected parts.

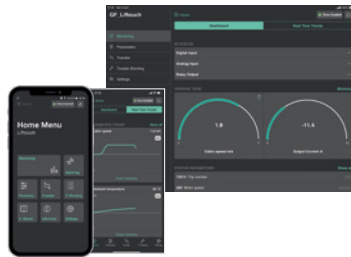


Floor Display

Push buttons

ADL500 and ADL550-ICS • DRIVE PROGRAMMING

GF_Liftouch - WEBAPP



Fully responsive WebApp, compatible with all major browsers on smartphones, tablets and PCs, and with any operating system.

Ease to use

Always keep track of the drive status, but with the intuitiveness of a common mobile app.

Internet security

Secure communications guaranteed by 4 different password protected access profiles.

CONNECT EASILY YOUR MOBILE TO YOUR ADL500

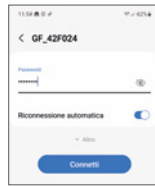
In less than one minute

1 Mount Wifi Drive Link Module on ADL530 or ADL550.



2

Detect Wifi Drive Link network within your Wi-Fi networks on your mobile device.
Enter the password and press «connect».



3

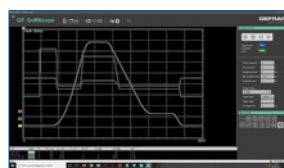
Open web browser to access the home page (<http://192.168.4.1/>) and log-in with your access level.



GF_DriveLabs – CONFIGURATOR



Enhancement of Gefran PC configurator features in the same “family feeling” programming.



Digital Oscilloscope

Built-in synchronous sampling Softscope with 1ms period, integrated with the configuration software.

Simple use with 4 wizards and function diagrams.

THE ADVANTAGES OF REGENERATION

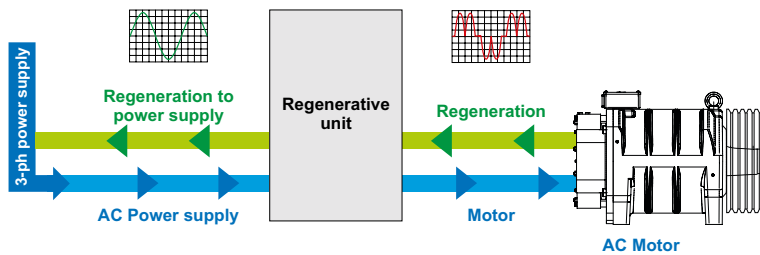


LOWER OPERATING COSTS

Regenerative units in lift systems provide significant benefits in terms of Building Automation and Energy Efficiency.

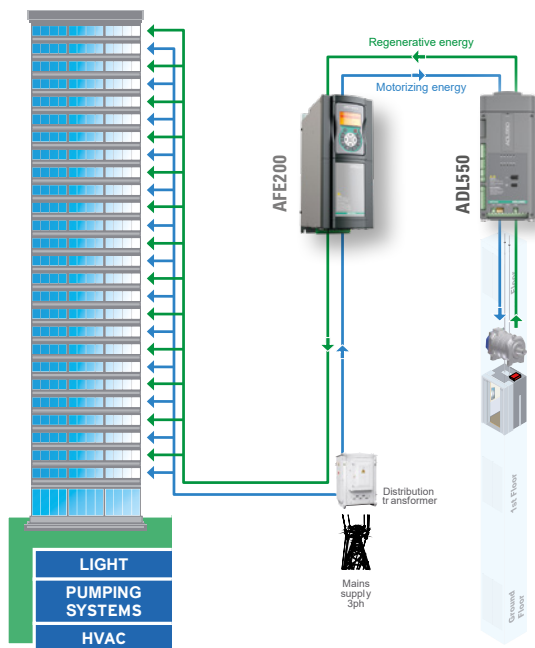
Where justified by traffic profiles, a system with regenerative units provides both economic and technical advantages.

The operating principle is simple: when the empty car goes up or the full car goes down, the mechanical system generates potential energy that the electric motor, "pulled" by the car load, converts into electrical energy.



CLEAN ENERGY

The regenerative unit transforms the electrical energy generated by the motor into clean energy, namely with reduced harmonic distortion (THD <4%), making it reusable by other electrical equipment in the building.

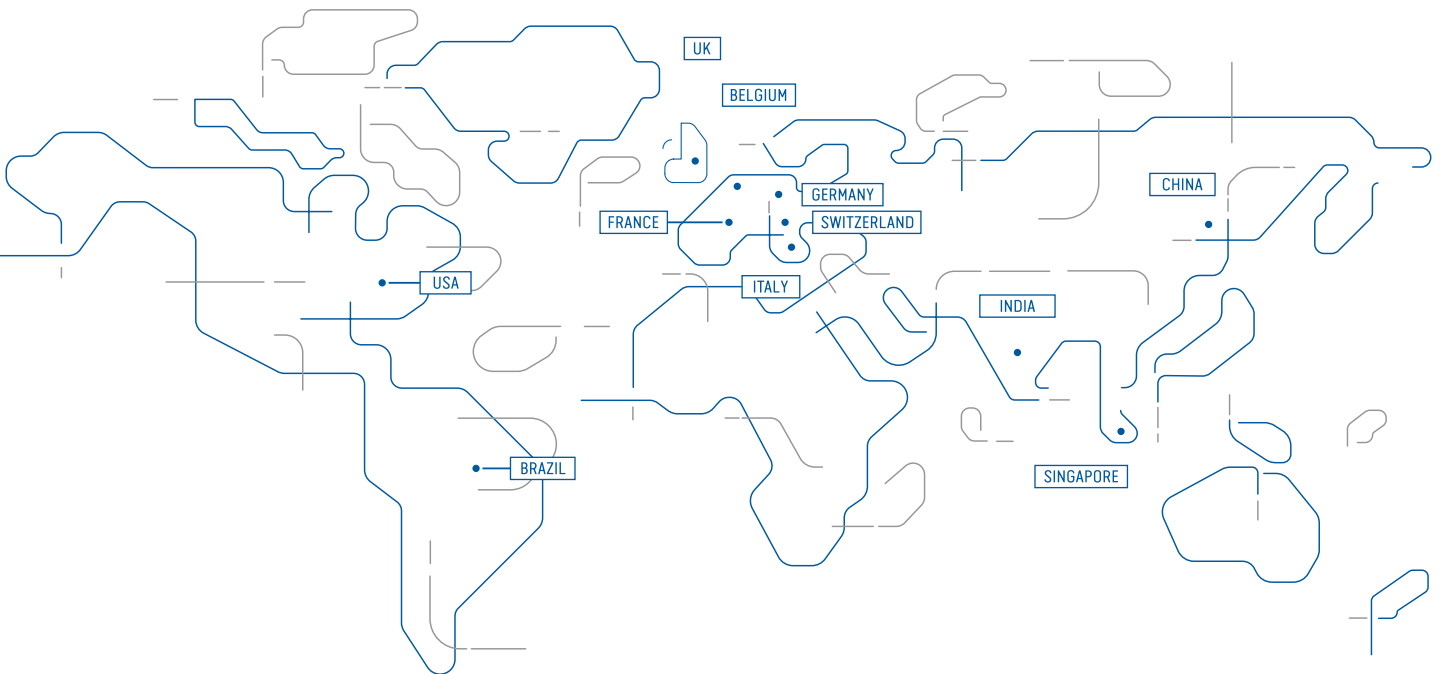


MORE EFFICIENT BUILDINGS

In addition to reducing installation space (because braking resistors are no longer needed), this solution reduces the building's energy consumption, most of which is attributable to air conditioning systems, refrigeration, pump systems, and lifts.

Regenerative systems can be used with external Active Front End (AFE) solutions (coupled with the ADL500 series).

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