Fuji Electric

Innovating Energy Technology

FRENIC-Lift

The dedicated inverter for Lift applications

An exclusive design to achieve the best performance for the elevator.
The ideal combination of strength, quality, reliability and comfort.

CE

Fuji Electric has designed FRENIC Lift inverter to fulfill the requirements of lift applications. It includes the most advanced technology to offer a product easy to set up, powerful and competitive. FRENIC Lift is the name of the technology and quality dedicated to elevator applications.

Excellent Comfort

FRENIC Lift has an excellent shaft performance: current loop bandwidth is 500 Hz, 5 times faster than its predecessor (UD series); and the accuracy of the speed control is ±0.01%, obtaining very low vibration and excellent rollback avoidance.

Powerful

Very high overload torque: can deliver 200% of rated current for 10 s. The inverter is rated for 10 kHz switching frequency, at 45°C for a duty cycle of 80% ED.

Universal Solution for elevators

FRENIC Lift is able to control asynchronous (induction) motor (with and without encoder) and permanent magnet synchronous motors.

FRENIC Lift is able to control permanent magnet synchronous motor with incremental encoder without using additional options (HTL 12-15 VDC supply voltage encoder). Other encoder types can be used by adding optional cards: Heidenhain EnDat 2.1 encoder (OPC-LM1-PS1), SinCos encoder (OPC-LM1-PR) or incremental encoder 5 VDC Line driver (OPC-LM1-IL).

For an easy control of a permanent magnet synchronous motor, FRENIC Lift includes automatic pole tuning function (first run command after power-up).

Braking transistor is included in all capacities.

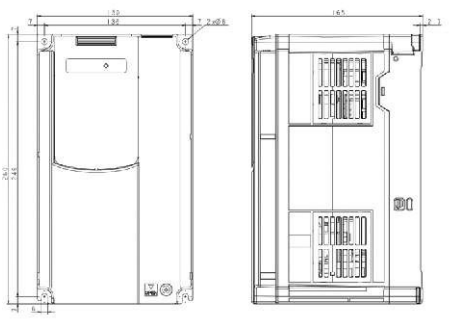
Static auto-tuning and pole tuning

FRENIC Lift is able to perform Static Auto-tuning for Asynchronous motor and Static Pole tuning for Permanent Magnet Synchronous motors; during both procedures the mechanical brake remains applied, avoiding the time-consuming task of removing the load from the motor.

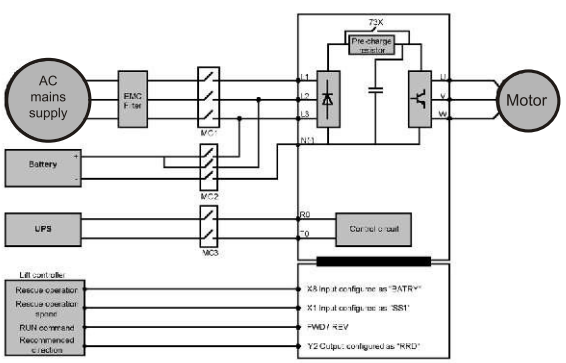
Advanced functions dedicated to Lift applications

- Excellent rollback avoidance.
- Short floor operation.
- Direct to floor operation.
- Brake control function.
- Brake monitoring function according to EN81-1+A3 (UCM).
- Main contactors control.
- Anticipated door opening function.
- Easy rescue operation. Can be supplied using batteries and/or UPS. Signal for indication of the recommended direction.
- 10 different linear accelerations/deceleration ramps.
- 14 different S ramps.
- Automatic control of the cooling fan: silent operation and energy saving.
- Ground fault protection.
- Input and output phase lost protection.
- Overheat early warning indication signal.

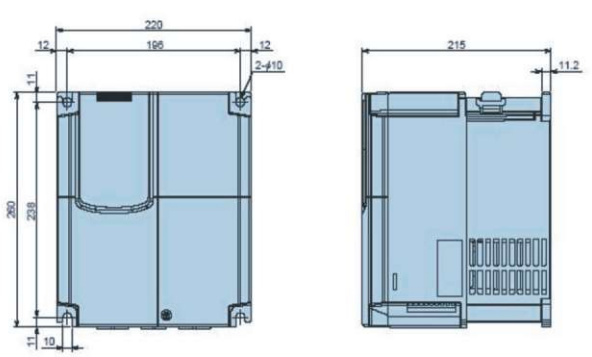
External dimensions (mm) 4.0 kW



Battery operation



External dimensions (mm) 5.5 to 11 kW



- Advanced Maintenance functions:
- Cumulative running time indication (fan and inverter).
- DC Bus capacitors measurement.
- End of life warning signal.
- Alarm history with detailed information of the last 4 alarms.

A robust inverter

- Life time of DC bus capacitors: > 61320 hours.
- Life time of electrolytic capacitors in printed circuit boards: > 61320 hours.
- Life time of cooling fans: > 43800 hours.
- Automatic reduction of the switching frequency by temperature.

Built-in communication interfaces

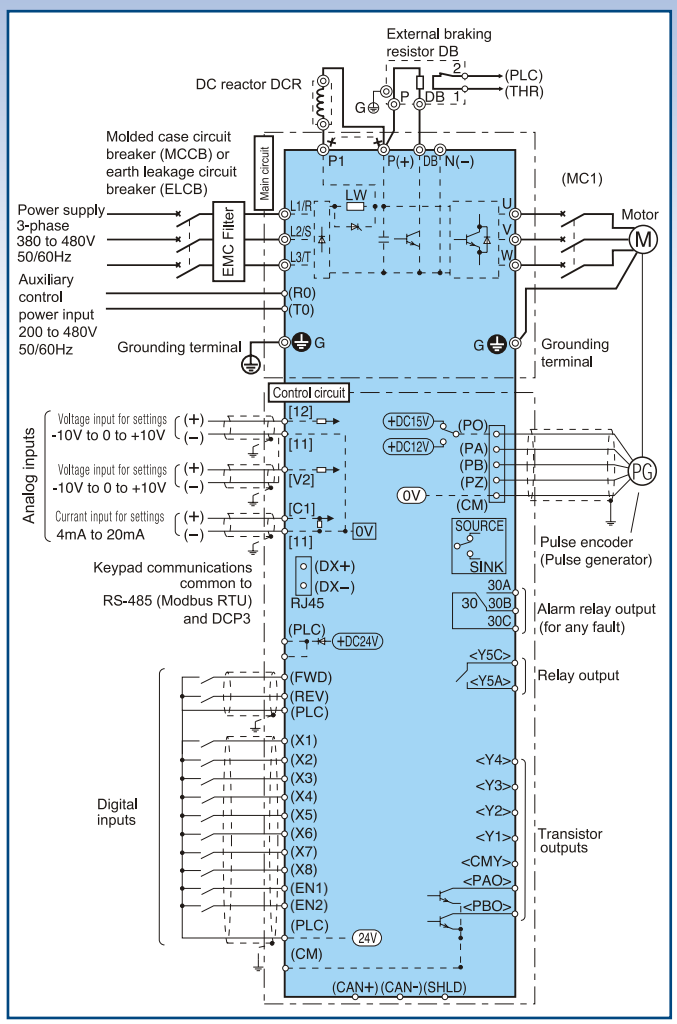
As standard includes the following communication interfaces to ease the system integration:

- RS 485 port with ModBus RTU protocol.
- CANopen port (E version).
- DCP 3 protocol (EA version).

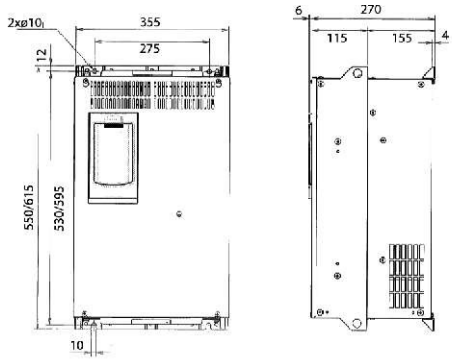
Options

- Multifunction LCD keypad (TP-G1-ELS):
  - Able to save 3 complete parameter sets.
  - Menu 0 can be defined by the user.
  - 10 European languages can be selected: English, German, French, Spanish, Italian, Russian, Greek, Czech, Polish and Turkish.
- Feedback options:
  - OPC-LM1-PS1 option card for Heidenhain EnDat 2.1 encoder.
  - OPC-LM1-PR option card for SinCos encoder.
  - OPC-LM1-IL option card for 5 VDC line driver encoder.
- EMC filter to fullfil EN 61800-3:2004 and EN 12015:2004.

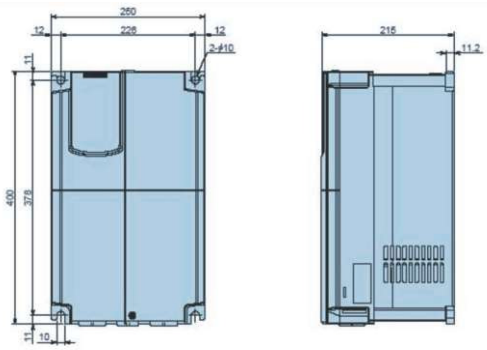
Basic Connection Diagram



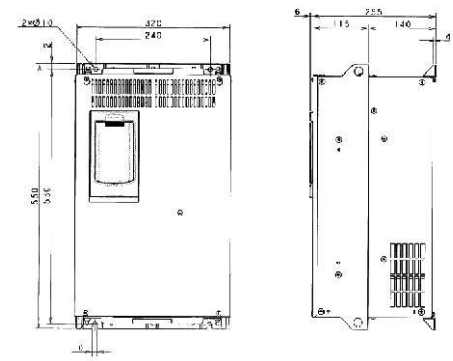
External dimensions (mm) 37 and 45 kW



External dimensions (mm) 15 to 22 kW



External dimensions (mm) 30 kW



Standard Specifications for 3-phase 400 V AC

Item				Specifications										
Model (FRN___ LM1S-4E / EA)				4.0	5.5	7.5	11	15	18.5	22	30	37	45
Output rating	Rated capacity [kVA] (*1)			6.8	10.2	14	18	24	29	34	45	57	69
	Voltage [V] (*2)			3-phase 380 to 480 V, 50/60 Hz							3-ph. 380-460 V 50/60 Hz		
	Rated current [A] (*3)			9.0	13.5	18.5	24.5	32.0	39.0	45.0	60.0	75.0	91.0
	Overload current rating [A] (10 s)			18 (3s)	27.0	37.0	49.0	64.0	78.0	90.0	108 (5s)	135 (5s)	163 (5s)
	Rated frequency [Hz]			50, 60 Hz									
Input power supply	Nominal operation	Main power: phases, voltage, frequency		3-phase, 380 to 480 V, 50/60 Hz									
		Aux. control power input: Phases, voltage, frequency		Single-phase, 200 to 480 V, 50/60 Hz									single-phase, 380 to 480 V, 50/60 Hz
		Permissible voltage and frequency fluctuation (*7)		Voltage: +10 to -15% (Voltage imbalance within 2% *4), frequency: +5% to –5%									
		Rated input current [A] (*5)	With DCR	7.5	10.6	14.4	21.1	28.8	35.5	42.2	57.0	68.5	83.2
			Without DCR	13.0	17.3	23.2	33.0	43.8	52.3	60.6	77.9	94.3	114
		Required power capacity [kVA] (*6)		5.2	7.4	10	15	20	25	30	40	48	58
	Battery operation	Main power		48 V DC or higher									
		Auxiliary control power input	Phases, voltage, frequency	Single-phase, 200 to 480 V, 50/60 Hz									single-phase, 380 to 480 V, 50/60 Hz
			Perm. Voltage + Frequ. Fluctuations	Voltage: + 10 to -15%, Frequency: + 5 to -5%									
Braking	Braking time [s]			60									
	Duty cycle (%ED) [%]			50									
	Minimum connectable resistance value [Ω]			96	48	48	24	24	16	16	10	10	8
DC REACTOR (DCR)				Option									
Applicable Safety Standard				EN50178:1997. EN ISO 13849-1 Cat. 3, PL d									EN50178:1997
Protective enclosure (IEC60529)				IP20							IP00		
Cooling system				Fan cooling									
Weight [kg]				2.8	5.6	5.7	7.5	11.1	11.2	11.7	24	33	34

(*1) The rated capacity shows the case where the output voltage is 440 V.
(*2) Voltages exceeding the power supply voltage cannot be output.
(*3) The rated current shows the case where the carrier frequency is 10 kHz, ambient temperature is 45 C or under, and the root mean squared current in cycle operation is 80% of the inverter's rated current.
(*4) Voltage imbalance [%] = (Max. voltage [V] – Min. voltage [V]) / 3-phase average voltage [V] x 67 (See IEC61800-3). When using the inverter at an imbalance rate of 2 to 3%, use an optional AC reactor (ACR).
(*5) Calculations were made based on a power supply capacity of 500 kVA (if the inverter capacity exceeds 50 kVA, the power supply capacity is 10 times the inverter capacity) and a connected power supply %X = 5%.
(*6) The inverter is equipped with a DC reactor (DCR).
(*7) These permissible fluctuations are for the main power and the auxiliary control power input.

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