



Z range - GEARLESS
Synchronous with permanent magnets
A.C drive for elevators
Technical catalogue

GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Contents

	PAGE		PAGE
Machine quick selection table.....	4	BRAKES	
GENERAL INFORMATION		Holding brake	18
Quality assurance	5	Brake characteristics	19
Standards and approvals.....	6	Recommended diagram	20
Interference suppression	8	Braking sequences.....	20
Power - Torque - Efficiency - Power Factor (Cos φ).....	9	ELEVATOR CAR DRIVE	
Electrical formulae	9	Traction pulley	21
Unit conversions	10	DIMENSIONS	
Units of measurement and standard formulae	10	Type Z2 - Z3	22
Mechanical formulae	11	Type Z6 version MR	23
ENVIRONMENT		Type Z6 version MRL	24
Environmental limitations	12	Type Z6 version BAS	25
CONSTRUCTION		Type Z10	26
Operating position and components.....	14	OPTIONAL FEATURES	
MACHINE CHARACTERISTICS		Accessories	27
General characteristics	15	Z10 chassis	28
ELECTRICAL CHARACTERISTICS		Antivibration mounts.....	29
Motor power supply and electrical connection.....	16	Secondary pulley	30
Synchronous motors	17	Incremental encoder	31
		Sin Cos encoder	32
		QUESTIONNAIRE (metric)	34

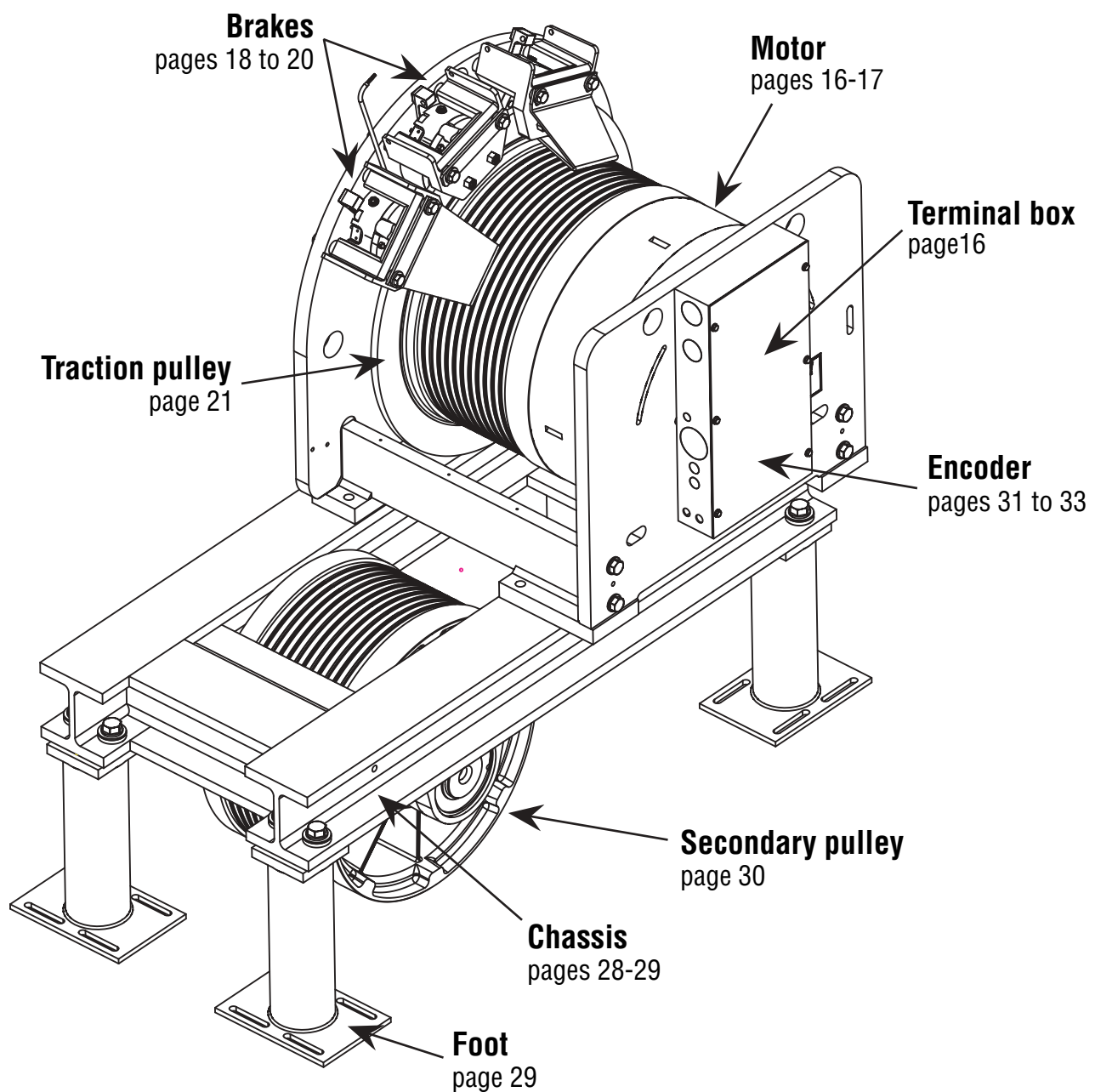
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GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Contents

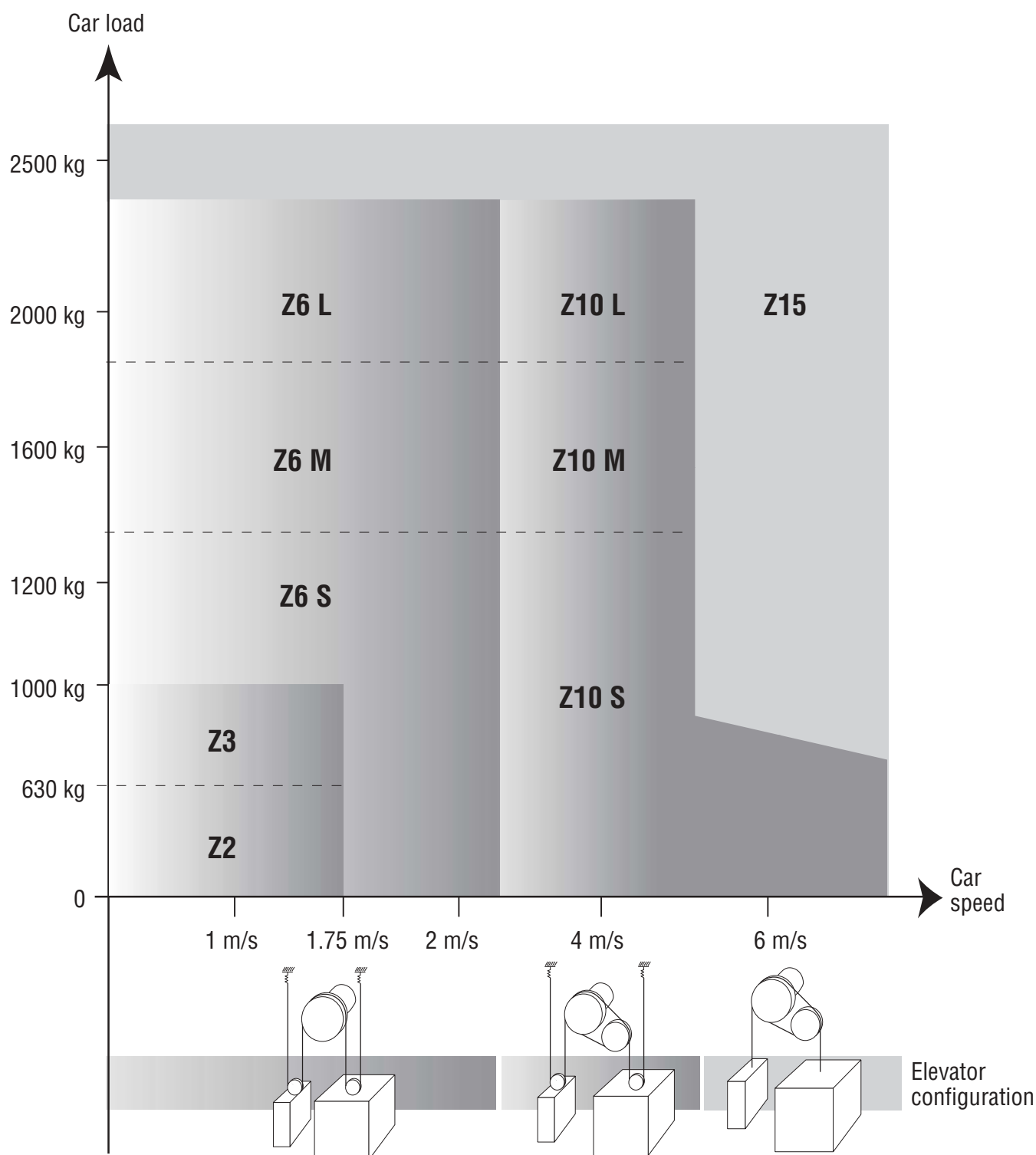


GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Machine quick selection table

Any definitive selection must be confirmed by calculating the machine characteristics for the elevator to be equipped.
See questionnaire on page 34.



GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

General information

Quality assurance

Industrial concerns are having to cope with an ever more competitive environment. Productivity depends to a considerable degree on the right investment at the right time.

LEROY-SOMER has the answer, building motors to precise standards of quality.

When carrying out quality checks on a machine's performance, the first step is to **measure the level of customer satisfaction**.

Careful study of this information tells us which points need looking at, improving and monitoring.

From the moment you place your order with our administrative staff until the motor is up and running (after design studies, launch and production activities) we keep you informed and involved.

Our own procedures are constantly under review. All our staff are involved in both operational process analysis and continuous training programmes. These initiatives help them serve you better, and increased skills bring increased motivation.

At LEROY-SOMER, we think it vital for our customers to know the importance we attach to quality.

LEROY-SOMER has entrusted the certification of its expertise to various international organizations.

Certification is granted by independent professional auditors, and recognises the high standards of the **company's quality assurance procedures**.

All activities resulting in the final version of the machine have therefore received official **ISO 9000** accreditation,

Edition 2000. Products are also

approved by official bodies who inspect their technical performance with regard to the various standards.

This is a fundamental requirement for a company of international standing.



ATTESTATION



GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

General information

Standards and approvals

ORGANIZATION OF STANDARDS AUTHORITIES

International bodies

Worldwide 	Standardization general ISO International Organization Standards TC Committees technical SC Sub- committees WG Groups working	Standardization electronics/electrotechnical IEC Electrotechnical commission international TC Committees technical SC Sub- committees WG Groups working
European 	CEN European Committee for Standardization ECISS European Committee for Standards Iron and Steel TC Technical committees	CENELEC European Committee for Standards electrotechnical TC Committees technical SC Sub- committees AHG Groups ad hoc

Country	Initials	Designation
AUSTRALIA	SAA	Standards Association of Australia
BELGIUM	IBN	Institut Belge de Normalisation
DENMARK	DS	Dansk Standardiseringsraad
FINLAND	SFS	Suomen Standardisoimisliitto
FRANCE	AFNOR including UTE	Association Française de Normalisation including: Union Technique de l'Électricité
GERMANY	DIN/VDE	Verband Deutscher Elektrotechniker
GREAT BRITAIN	BSI	British Standards Institution
ITALY	CEI	Comitato Elettrotecnico Italiano
JAPAN	JIS	Japanese Industrial Standard
NETHERLANDS	NNI	Nederlands Normalisatie - Instituut
NORWAY	NFS	Norges Standardiseringsforbund
SAUDI ARABIA	SASO	Saudi Arabian Standards Organization
SPAIN	UNE	Una Norma Española
SWEDEN	SIS	Standardiseringskommissionen i Sverige
SWITZERLAND	SEV or ASE	Schweizerischer Elektrotechnischer Verein
CIS (ex-USSR)	GOST	Gosudarstvenno Komitet Standartov
UNITED STATES	ANSI including NEMA	American National Standards Institute including: National Electrical Manufacturers

GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

General information

Standards and approvals

Approvals

Certain countries recommend or insist on approval from national organizations.
Approved products must carry the recognized mark on their identification plates.

Approvals for LEROY-SOMER GEARLESS:

Country	Initials	Certification No.	Application
NORTH AMERICA	CSA - "C" "US"	166631	Gearless
EUROPE	CE	Self-certification	Electric motors
	TUV	374394	Brakes for elevators

List of standards quoted in this document

Reference	Date	International standards
IEC/EN 60 034-1	1996	Electrical rotating machines: ratings and operating characteristics.
IEC/EN 60 034-5	1991	Electrical rotating machines: classification of degrees of protection provided by casings of rotating machines.
IEC/EN 60 034-6	1991	Electrical rotating machines (except traction): cooling methods.
IEC/EN 60 034-7	1995	Electrical rotating machines (except traction): symbols for mounting positions and assembly layouts.
IEC/EN 60 034-9	1995	Electrical rotating machines: noise limits.
IEC/EN 60 034-12	1996	Starting characteristics for single-speed 3-phase cage induction motors for supply voltages less than or equal to 660V.
IEC/EN 60 034-14	1996	Electrical rotating machines: mechanical vibrations of certain machines with a frame size above or equal to 56 mm. Measurement, evaluation and limits of vibrational intensity.
IEC 60 085	1984	Evaluation and thermal classification of electrical insulation.
IEC/EN 60 529	1989	Degrees of protection provided by enclosures.
IEC/EN 60 034-17	1998	Cage induction motors supplied by a converter.
European directive 89-336 modified by Directives 92-31 and 93-68	1999	Electromagnetic compatibility (EMC): environment.
EN 50102	1998	Degree of protection provided by the electrical housing against extreme mechanical impacts.
EN 81-1	1998	Safety rules relating to the construction and installation of elevators.
ASME A17.1 (USA)	1993	Safety code for elevators and escalators.

GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

General information

Interference suppression

Airborne interference

Emission

For standard motors, the housing acts as an electromagnetic screening, reducing electromagnetic emissions measured at 0.25 metres from the motor to approximately 5 gauss (5×10^{-4} T).

However, electromagnetic emissions may be noticeably reduced by a special construction of aluminium alloy end shields and a stainless steel shaft.

Immunity

The construction of motor housings (especially finned aluminium alloy frames) isolates external electromagnetic sources to the extent that any field penetrating the casing and magnetic circuit will be too weak to interfere with the operation of the motor.

Power supply interference

The use of electronic systems for starting, speed control or power supply can create harmonics on the supply lines which may interfere with the operation of machines. These phenomena are taken into account in determining the machine dimensions, which act as quenching chokes in this respect.

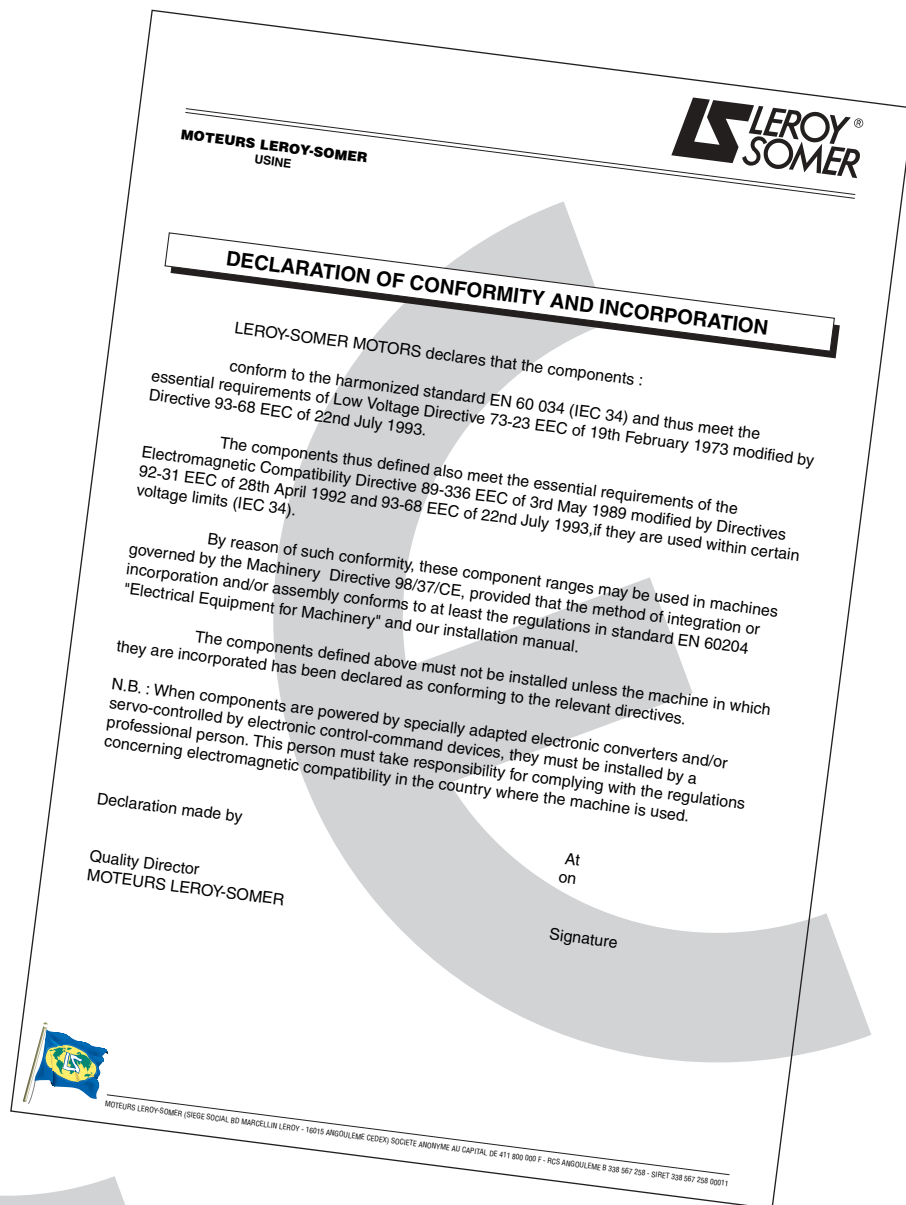
The IEC 61000 standard, currently in preparation, will define permissible rejection and immunity rates: only then will machines for general distribution (especially single-phase motors and commutator motors) have to be fitted with suppression systems.

Three-phase squirrel cage machines do not in themselves produce interference of this type. Mains connection equipment (contactors) may, however, need interference protection.

Application of Directive 89-336 modified by Directives 92-31 and 93-68 relating to electromagnetic compatibility (EMC) and concerning motors supplied by converters (with fixed or variable fundamental frequency): in this case, the motor is only a sub-assembly of a device which the system builder must ensure conforms to the essential requirements of the EMC directives.

Application of the Low Voltage Directive 73-23 EEC modified by Directive 93/68

All motors have been subject to this directive since 1 July 1997. The main requirements concern the protection of people, animals and property against risks caused by operation of the motors (see the commissioning and maintenance manual for precautions to be taken).



CE product marking

The fact that motors conform to the essential requirements of the Directives is shown by the CE mark on their nameplates and/or packaging and documentation.

GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

General information

Power - Torque - Efficiency - Power Factor (Cos φ)

DEFINITIONS

The output power (P_u) at the motor shaft is linked to the torque (M) by the equation:

$$P_u = M \cdot \omega$$

where P_u is in W, M is in N.m, ω is in rad/s and where ω is expressed as a function of the speed of rotation in min^{-1} by the equation:

$$\omega = 2\pi \cdot N / 60$$

The active power (P) drawn from the mains is expressed as a function of the apparent power

(S) and the reactive power (Q) by the equation:

$$S = \sqrt{P^2 + Q^2}$$

(S in VA, P in W and Q in VAR)

The power P is linked to the output power P_u by the equation:

$$P = \frac{P_u}{\eta}$$

where η is the efficiency of the machine.

The output power P_u at the motor shaft is expressed as a function of the phase-to-phase mains voltage (U in Volts), of the line current absorbed (I in Amps) by the equation:

$$P_u = U \cdot I \cdot \sqrt{3} \cdot \cos \varphi \cdot \eta$$

where $\cos \varphi$ is the power factor found from the ratio:

$$\cos \varphi = \frac{P}{S}$$

Electrical formulae

Title	Formula	Unit	Definitions / notes
Accelerating torque	$M_a = \frac{M_D + 2M_A + 2M_M + M_N}{6} - M_r$ General formula: $M_a = \frac{1}{N_N} \int_0^{N_N} (M_{\text{mot}} - M_r) dN$	Nm	Moment of acceleration M_a is the difference between the motor torque M_{mot} (estimated), and the resistive torque M_r . (M_D , M_A , M_M , M_N , see curve below) N = instantaneous speed N_N = rated speed
Power required by the machine	$P = \frac{M \cdot \omega}{\eta_A}$	P in W M in N.m ω in rad/s η_A no unit	η_A expresses the efficiency of the driven machine. M is the torque required by the driven machine.
Power drawn by the 3-phase motor	$P = \sqrt{3} \cdot U \cdot I \cdot \cos \varphi$	P in W U in V I in A	φ phase angle by which the current lags or leads the voltage. U armature voltage. I line current.
Reactive power absorbed by the motor	$Q = \sqrt{3} \cdot U \cdot I \cdot \sin \varphi$	Q in VAR	
Reactive power supplied by a bank of capacitors	$Q = \sqrt{3} \cdot U^2 \cdot C \cdot \omega$	U in V C in μ F ω in rad/s	U = voltage at the capacitor terminals C = capacitor capacitance ω = rotational frequency of supply phases ($\omega = 2\pi f$)
Apparent power	$S = \sqrt{3} \cdot U \cdot I$ $S = \sqrt{P^2 + Q^2}$	S in VA	
Power supplied by 3-phase motor	$P = \sqrt{3} \cdot U \cdot I \cdot \cos \varphi \cdot \eta$		η expresses motor efficiency at the point of operation under consideration.
Slip	$g = \frac{N_S - N}{N_S}$		Slip is the difference between the actual motor speed N and the synchronous speed N_S
Synchronous speed	$N_S = \frac{120 \cdot f}{p}$	N_S in min^{-1} f in Hz	p = number of poles f = frequency of the power supply

GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

General information

Unit conversions

Unit	MKSA (IS international system)	AGMA (US system)
Length	1 m = 3.2808 ft 1 mm = 0.03937 in	1 ft = 0.3048 m 1 in = 25.4 mm
Weight	1 kg = 2.2046 lb	1 lb = 0.4536 kg
Torque	1 Nm = 0.7376 lb.ft 1 N.m = 141.6 oz.in	1 lb.ft = 1.356 N.m 1 oz.in = 0.00706 N.m
Force	1 N = 0.2248 lb	1 lb = 4.448 N
Moment of inertia	1 kg.m ² = 23.73 lb.ft ²	1 lb.ft ² = 0.04214 kg.m ²
Power	1 kW = 1.341 HP	1 HP = 0.746 kW
Pressure	1 kPa = 0.14505 psi	1 psi = 6.894 kPa
Magnetic flux	1 T = 1 Wb / m ² = 6.452 10 ⁴ line / in ²	1 line / in ² = 1.550 10 ⁻⁵ Wb / m ²
Magnetic losses	1 W / kg = 0.4536 W / lb	1 W / lb = 2.204 W / kg

Units of measurement and standard formulae

NOISE AND VIBRATION

Parameters				Unit		Units and expressions not recommended
English name	French name	Symbol	Definition	SI	Non SI, but accepted	Conversion
Sound power level	Niveau de puissance acoustique	L_w	$L_w = 10 \lg(P/P_0)$ ($P_0 = 10^{-12} \text{ W}$)	dB (decibel)		$\lg$ logarithm to base 10 $\lg 10 = 1$
Sound pressure level	Niveau de pression acoustique	L_p	$L_p = 20 \lg(P/P_0)$ ($P_0 = 2 \times 10^{-5} \text{ Pa}$)	dB		

DIMENSIONS

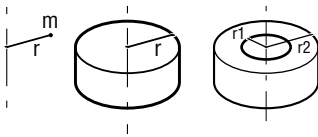
Parameters				Unit		Units and expressions not recommended
English name	French name	Symbol	Definition	SI	Non SI, but accepted	Conversion
Angle (plane angle)	Angle (angle plan)	$\alpha, \beta, T, \varphi$		rad	degree: ° minute: ' second: "	$180^\circ = \pi \text{ rad}$ $= 3.14 \text{ rad}$
Length Breadth Height Radius	Longeur Largeur Hauteur Rayon Longueur curviligne	l b h r s		m (metres)	micrometre	cm, dm, dam, hm 1 inch = 1" = 25.4 mm 1 foot = 1' = 304.8 mm μm micron μ angström: Å = 0.10 nm
Area	Aire, superficie	A, S		m ²		1 square inch = $6.45 \cdot 10^{-4} \text{ m}^2$
Volume	Volume	V		m ³	litre: l liter: L	UK gallon = $4.546 \cdot 10^{-3} \text{ m}^3$ US gallon = $3.785 \cdot 10^{-3} \text{ m}^3$

GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

General information

Mechanical formulae

Title	Formula	Unit	Definitions / notes
Force	$F = m \cdot \gamma$	F in N m in kg γ in m/s^2	A force F is the product of a mass m by an acceleration γ
Weight	$G = m \cdot g$	G in N m in kg $g = 9.81 \text{ m/s}^2$	
Moment	$M = F \cdot r$	M in N.m F in N r in m	The moment M of a force in relation to an axis is the product of that force multiplied by the distance r of the point of application of F in relation to the axis.
Power - Rotation	$P = M \cdot \omega$	P in W M in N.m ω in rad/s	Power P is the quantity of work yielded per unit of time $\omega = 2\pi N/60$ where N is the speed of rotation in min^{-1}
- Linear	$P = F \cdot V$	P in W F in N V in m/s	V = linear velocity
Acceleration time	$t = J \cdot \frac{\omega}{M_a}$	t in s J in kg.m^2 ω in rad/s M_a in Nm	J is the moment of inertia of the system M_a is the moment of acceleration Note: all the calculations refer to a single rotational speed ω . where the inertias at speed ω' are corrected to speed ω by the following calculation: $J_\omega = J_{\omega'} \cdot \left(\frac{\omega'}{\omega}\right)^2$
Moment of inertia Centre of gravity	$J = m \cdot r^2$		
Solid cylinder around its shaft	$J = m \cdot \frac{r^2}{2}$	J in kg.m^2 m in kg r in m	
Hollow cylinder around its shaft	$J = m \cdot \frac{r_1^2 + r_2^2}{2}$		
Inertia of a mass in linear motion	$J = m \cdot \left(\frac{V}{\omega}\right)^2$	J in kg.m^2 m in kg v in m/s ω in rad/s	The moment of inertia of a mass in linear motion transformed to a rotating motion.

GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Environment

Environmental limitations

NORMAL CONDITIONS OF USE

According to IEC 60034-1, standard motors can operate in the following normal conditions:

- ambient temperature within the range +5 and +40 °C
- altitude less than 1000 m
- atmospheric pressure: 1050 m bar
- operating zone 2 (absolute humidity between 5 and 23 g/m³: (see chart on next page).
- ambient air chemically neutral and dust-free

CORRECTION AS A FUNCTION OF THE ALTITUDE AND AMBIENT TEMPERATURE

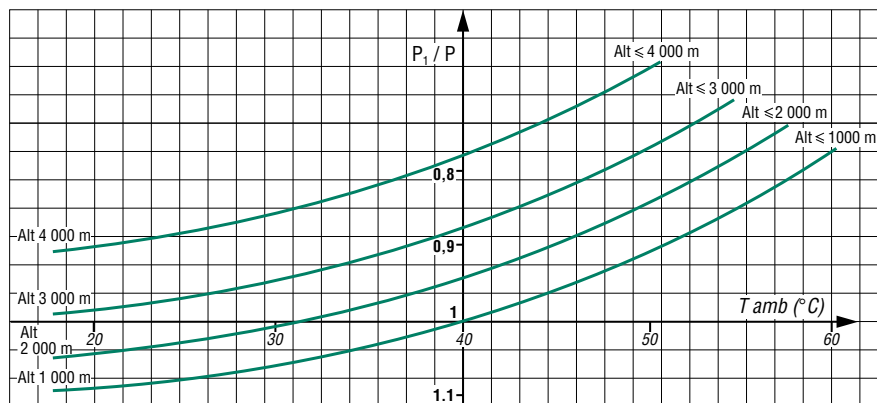
For different operating conditions, you should apply the power correction coefficient indicated on the chart opposite, maintaining the thermal reserve.

The ratio P_1/P gives the correction coefficient.

P_1 : corrected power

P : catalogue power

▼ Correction coefficients as a function of the altitude and ambient temperature.



RELATIVE AND ABSOLUTE HUMIDITY

It is vital to take account of the climatic operating conditions. The level of humidity in the atmosphere and the ambient temperature call for different constructions.

LEROY-SOMER has implemented procedures for manufacturing machines according to the different parameters. To simplify your selection and still obtain a machine suitable for your environment, you will find below all the elements to help you determine in which zone your machine is located.

Definitions:

The humidity depends on the quantity of water vapour in suspension in the air, hence the climatic conditions.

When the pressure of the water vapour contained in the atmosphere equals the maximum pressure (increasing temperature function) of the water at ambient temperature, saturation occurs.

Absolute humidity (in g/m³):

weight of water vapour contained in the air.

Relative humidity (%):

ratio between the mass of water vapour contained in a given volume of air and what this volume would contain, at the same temperature and at the same pressure, if it were saturated. It is sometimes called hydrometric status. This is given by the simplest measuring instruments.

These two values are linked.

If you do not have a special measuring instrument, you can use the two-thermometer method described below.

Measuring the humidity:

The humidity is measured with two accurate ventilated thermometers, one dry, the other wet (its bulb is wrapped in a wad of cotton wool soaked in water).

The drier the atmosphere, the greater the difference in temperature.

The absolute humidity, a function of reading both thermometers, is determined from the chart.

To determine the humidity correctly, a good air flow is required for stable readings, and accurate readings must be taken on the thermometers.

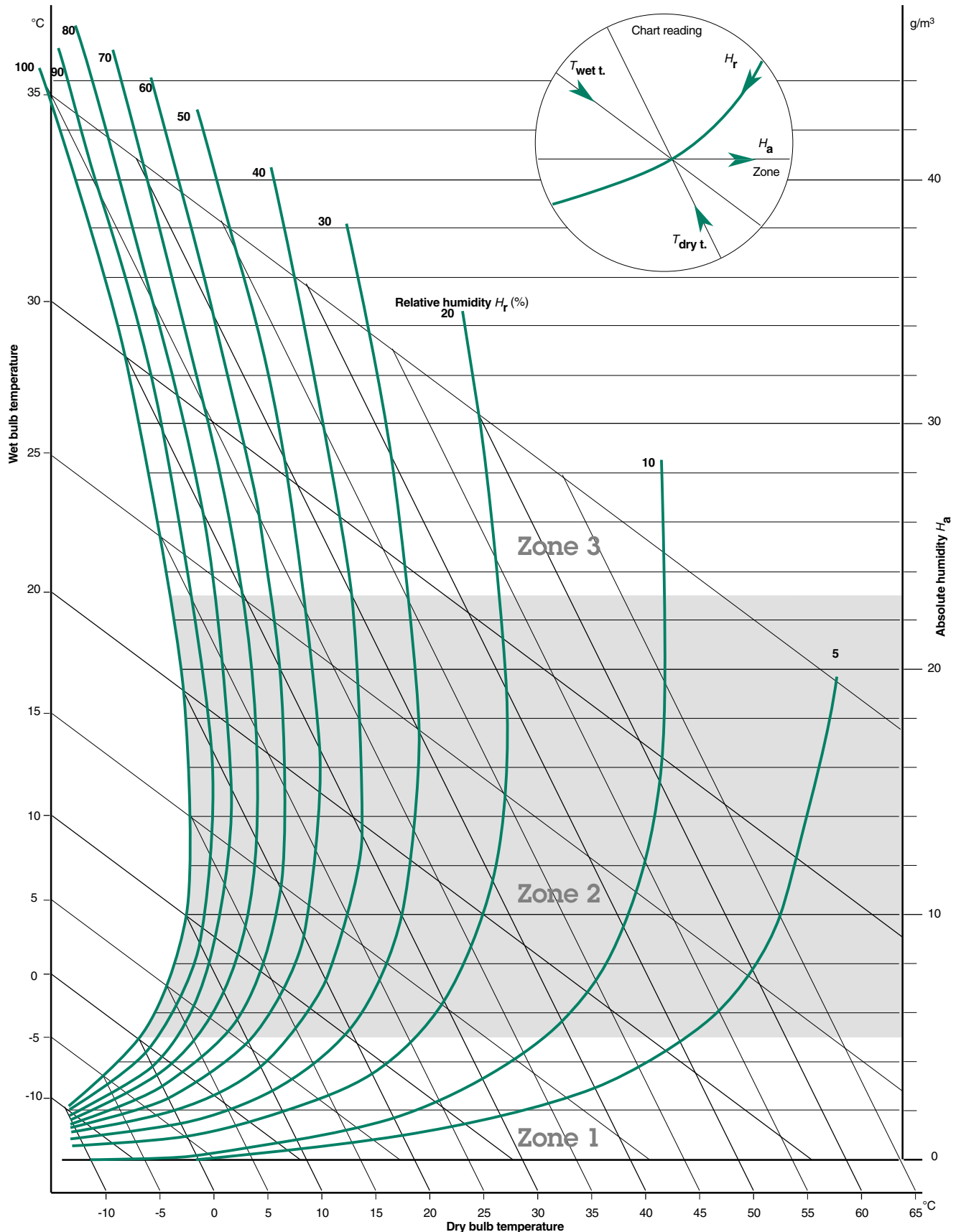
GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Environment

Environmental limitations

▼ Chart for determining the operating zone as a function of the humidity and the temperature.



GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

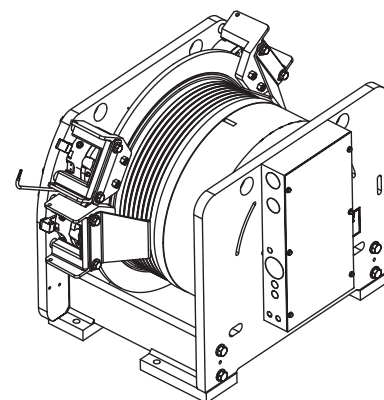
Construction

Operating position and components

OPERATING POSITION

Standard position: horizontal shaft, feet on floor, load underneath the machine.

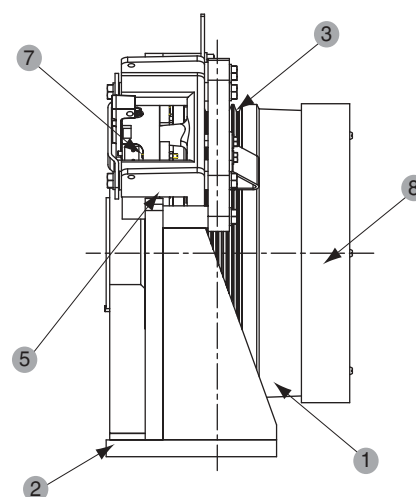
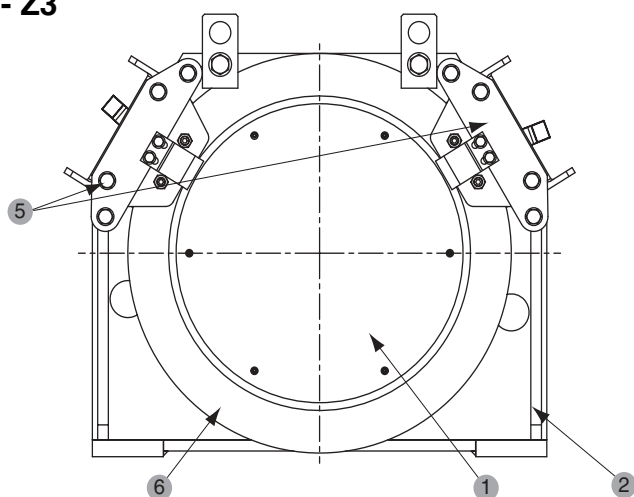
Other positions: contact LEROY-SOMER for more detailed information.



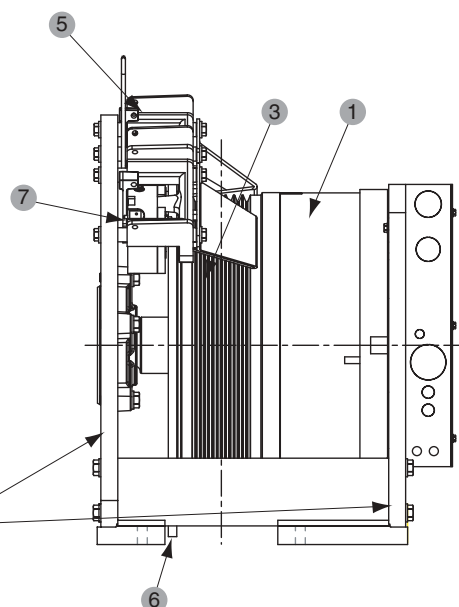
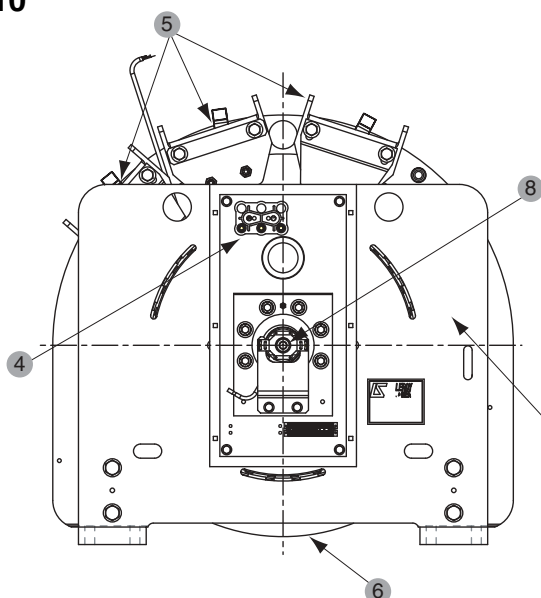
DESIGNATION

1 - Motor	4 - Terminal block	7 - Brake microswitches
2 - End shield	5 - Brake	8 - Encoder
3 - Pulley	6 - Brake disk	

Z2 - Z3



Z6 - Z10



GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Machine characteristics

General characteristics

MOTOR SIZE AND MAXIMUM LOAD

The machines are designed and manufactured in order to conform to the main elevator safety codes. (See page 7).

Each machine is defined by a maximum load on the shaft and a pulley diameter. The drive torques depend on the motor selected.

GEARLESS	Load on the shaft (kg)	Motor size and pulley diameter (mm)		
		400	530	660
Z2	2000	*		
Z3	3000	*		
Z6	6000		*	
Z10	10000		*	
Z15	15000			*

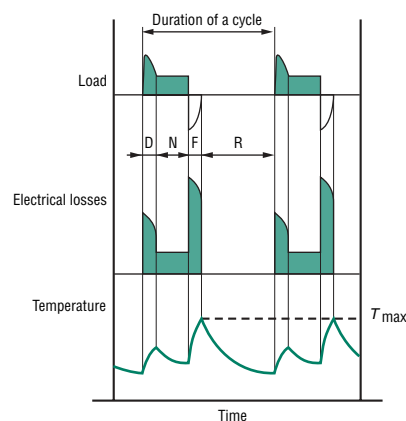
OPERATING CYCLE

The characteristics indicated in the tables (next page) are based on intensive use of 180 starts per hour with intermittent duty type S5 - 60% for models Z6 - Z10 - Z15.

The Z2-Z3 drives, in the non-ventilated version, are defined for intermittent duty S5 - 40%.

For more demanding uses, please consult Leroy-Somer.

Intermittent periodic duty with electrical braking. Type S5. ►



D = starting

N = operation at constant load

F = electrical braking

R = rest

T_{max} = maximum temperature attained during cycle

$$\text{Operating factor (\%)} = \frac{D + N + F}{D + N + F + R} \cdot 100$$

COOLING METHODS

IC 01	Self-cooling open machine.	
IC 06	Machine-mounted ventilation and circulation of free air with or without a filter.	

IP PROTECTION

IP 20	- Protected against solid objects of over 12 mm (example: finger) - No protection against liquid bodies	
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GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Electrical characteristics

Motor power supply and electrical connection

MOTORS

Designed and manufactured to operate with low-speed frequency inverters. They are calculated specifically for your application (speed, voltage).

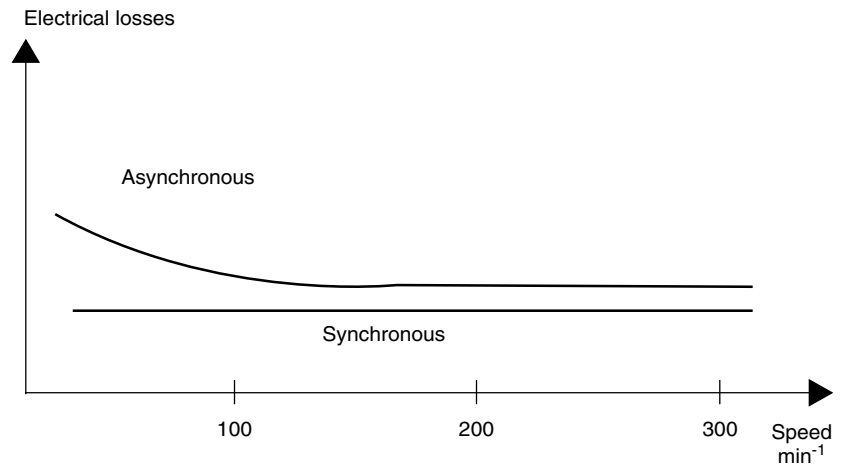
Power rating/Efficiency

We offer a range of synchronous motors specially designed for this application, and its control technique is well understood by the majority of drive manufacturers.

Synchronous motors with permanent magnets offer a higher power/volume ratio and better efficiency, especially at low speed.

LEROY-SOMER and CONTROL TECHNIQUES drives have been approved for controlling these motors.

▼ Electric losses in Synchronous/Asynchronous motors as a function of the speed

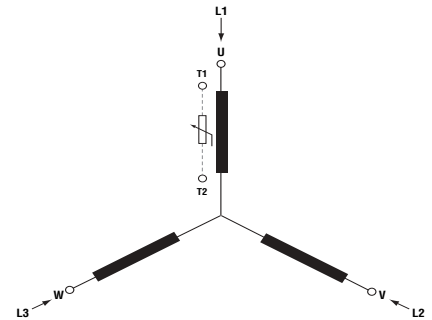


MOTOR ELECTRICAL CONNECTIONS

Electrical diagram given for information only; you should refer to the diagrams located in the terminal box.

Star connection undertaken in the factory.

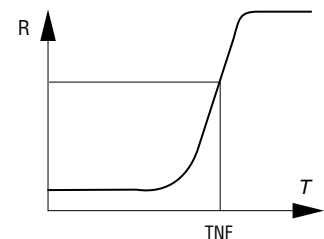
The outputs marked on these diagrams are available on the machine terminal blocks.



Thermal protection

The motors are equipped with a PTC positive temperature coefficient protection device with the following characteristics:

- 1 sensor
- max. voltage = 2.5 V
- resistance = 250 Ω max. (ambient θ)



Insulation class

The machines in this catalogue have been designed with a class H insulation system for the windings.

Class H allows for temperature rises of 125 K (measured by the resistance variation method) and maximum temperatures at the

hot spots in the machine of 155 °C (Ref. IEC 60085 and IEC 60034-1).

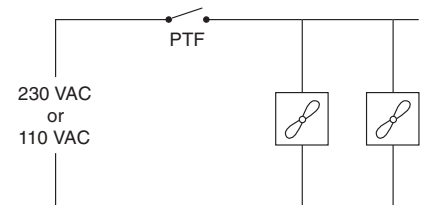
Complete impregnation with tropicalized varnish of thermal class 180 °C gives protection against attacks from the environment, such as: 90% relative humidity, interference, etc.

Some drives, especially those operating with IGBTs, generate high-frequency voltage peaks. These overvoltages must be limited to 1000 V at the motor terminals for a star connection or 800 V per winding.

Forced ventilation

Some machines are equipped with a ventilation unit if the required power exceeds the maximum acceptable threshold for a machine without ventilation. The limit values are indicated in the table of motor characteristics.

These machines are also provided with a normally open (PTF) probe which manages operation of the ventilation unit as shown in the diagram opposite.



GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Electrical characteristics

Synchronous motors

Type	Number of poles	Mechanical				Electrical			Cooling method
		Rated values				Typical values for an application on a 400V supply			
		Max. rated torque Nm	Max. acceleration torque Nm	Machine Moment of Inertia Kg.m ²	Max. speed min ⁻¹	Rated speed min ⁻¹	I rated A	I Acceleration A	
Z2	16	470	800	2.07	170	Typical values for an elevator 630 kg - 1 m/s			IC 01
						95	13	22	
						Typical values for an elevator 630 kg - 1.6 m/s			
						152	18	32	
						Typical values for an elevator 630 kg - 1.75 m/s			
167	20	36	IC 01						
Z3	16	750	1150	2.45	170	Typical values for an elevator 1000 kg - 1 m/s			IC 01
						95	21	32	
						Typical values for an elevator 1000 kg - 1.6 m/s			
						152	29	46	
						Typical values for an elevator 1000 kg - 1.75 m/s			
167	32	51	IC 01						

Type	Number of poles	Mechanical				Electrical			Cooling method: (1) if speed < 200 rpm (2) if speed > 200 rpm (1) / (2)
		Rated values				Indicative values for an application at 1 m/s on a 400V supply and for the maximum torque opposite			
		Max. rated torque Nm	Max. acceleration torque Nm	Machine Moment of Inertia Kg.m ²	Max. speed min ⁻¹	Rated speed min ⁻¹	I rated A	I Acceleration A	
Z6 S	32	1200	2200	9.42	220	72	18	36	IC 01/IC 06
Z6 M	32	1600	2850	10.67	220	72	24	48	IC 01/IC 06
Z6 L	32	1900	3600	11.91	220	72	31	61	IC 01/IC 06

Type	Number of poles	Mechanical				Electrical The electrical characteristics of these machines are calculated and defined for the installation in which they are to be installed. The calculation formulae below can be used to work out their consumption.	Cooling method: (1) if speed < 200 rpm (2) if speed > 200 rpm (1) / (2)
		Rated values					
		Max. rated torque Nm	Max. acceleration torque Nm	Machine Moment of Inertia Kg.m ²	Max. speed min ⁻¹		
Z10 S	32	1200	2200	13.1	290	I = 0.09 T_n / U_{supply} - T in Nm - V _n in min ⁻¹ - U _{supply} in V	IC 01/IC 06
Z10 M	32	1600	2850	14.4	290		IC 01/IC 06
Z10 L	32	1900	3600	15.7	290		IC 01/IC 06

Acceleration torques guaranteed up to 90% of the rated speed.

The indicated currents are approximate values, therefore allow a safety margin of at least 10%. If you do not have this margin, ask for an accurate calculation of the currents for your application.

GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Brakes

Holding brake

CHARACTERISTICS

The failsafe brakes are designed and manufactured to conform to the main elevator safety codes.

Their purpose is to hold the elevator car still and in exceptional circumstances to stop the elevator car in an emergency.

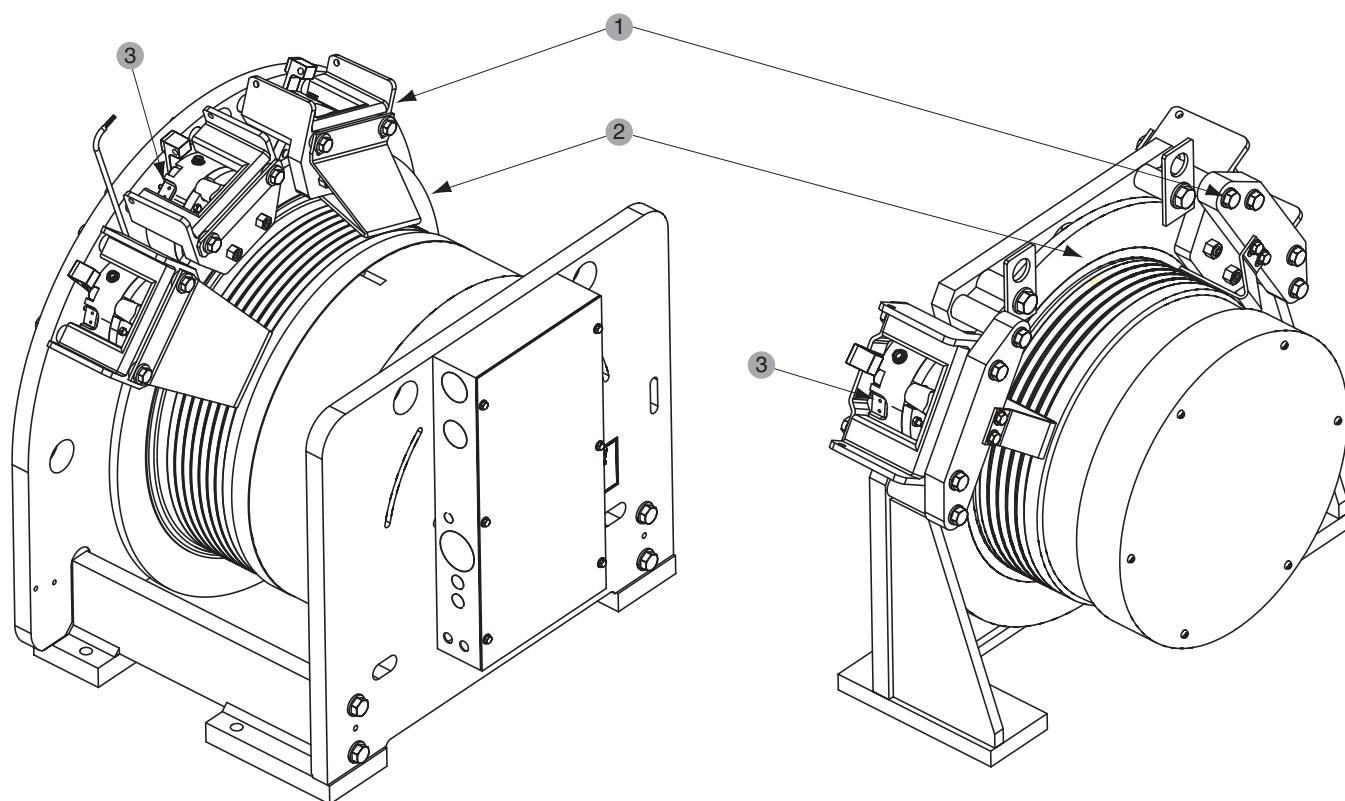
They include:

- 2, 3 or 4 brakes **1** which are applied to:
- a disk **2** integral to the traction pulley
- a microswitch **3** is mounted on each brake to relay its status (open or closed)

- The brakes are equipped with a lever which allows them to be opened manually (see options).

They can also be opened remotely using a metal cable.

Gearless brake



GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Brakes

Brake characteristics

BRAKING TORQUES

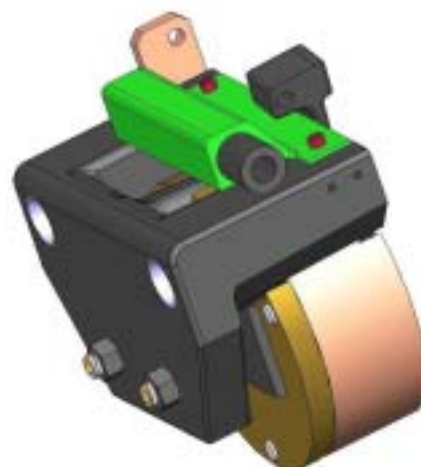
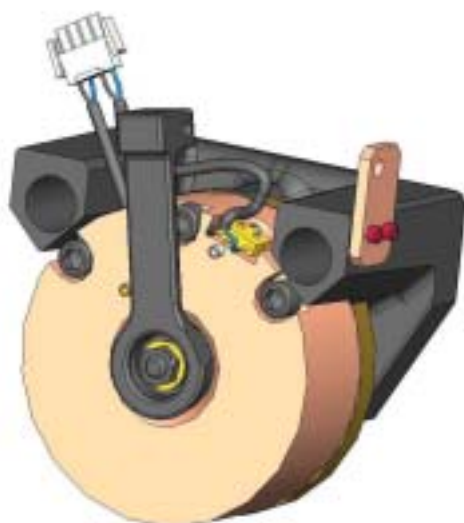
Machines	Z2	Z3	Z6 & Z10		
Number of brakes	2	2	2	3	4
Maximum braking torque (mN)	1750	1750	2200	3300	4400

ELECTRICAL CHARACTERISTICS

Brake type		210V version	95V version
Pick-up voltage	Vdc	210	95
Holding voltage	Vdc	100	45
Resistance at 20 °C	Ohms	210	57
Rated holding I	A	0.5	0.7
Rated inrush I	A	1	1.7

MICROSWITCH CHARACTERISTICS

- Voltage: 30 Vdc or 125 Vac
- Current: 100 mA
- State of contacts:
 - Closed: brake engaged
 - Open: brake released



GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range Brakes

Recommended diagram

The supply voltages can be either direct or alternating.

Formulae:

- Overvoltage:

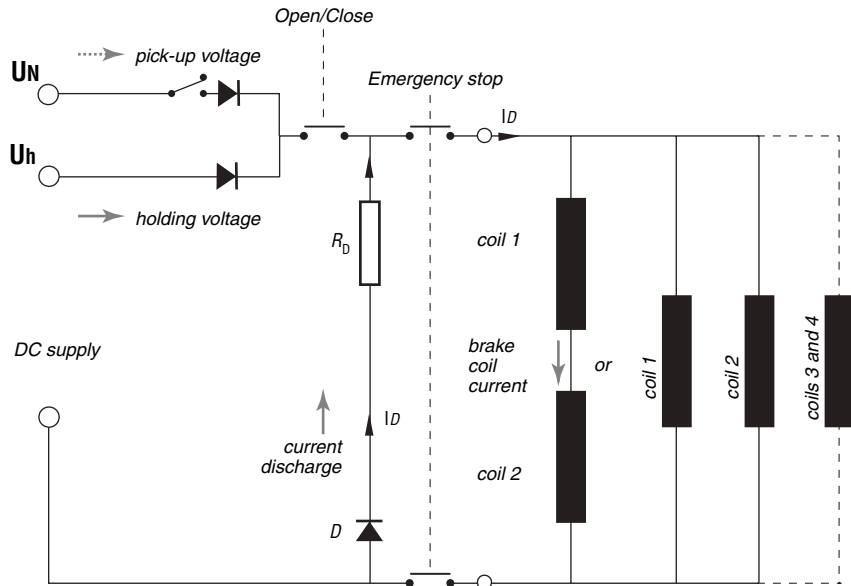
$$U_{\text{overvoltage}} = \text{approx. } (RD \cdot I_{\text{brake}}(t_4))$$

- Diode current:

$$I_{\text{discharge max}} = \text{approx. } (I_{\text{brake}}(t_4))$$

- Response time on brake engage:

$$\text{proportional to: } \frac{\text{Coil inductances}}{RD}$$



Braking sequences

BRAKING SEQUENCES

Description

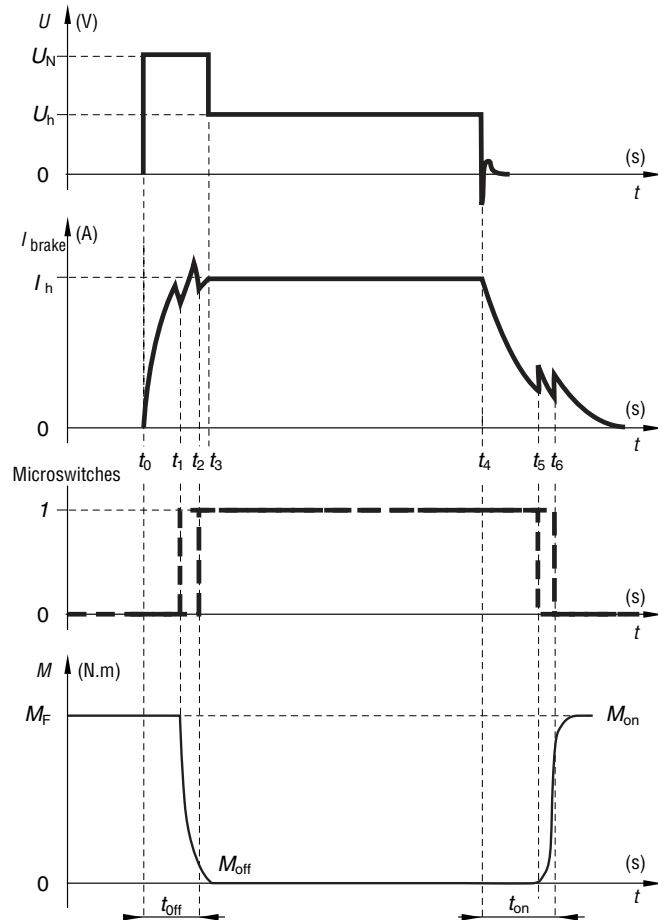
- t_0 : rated power-up
(pick-up current)
- t_1 & t_2 : decisive movements
(brake release)
- t_3 : change to holding current
(approx. 1 second)
- t_4 : disconnection of power supply
- t_5 & t_6 : decisive movements (braking)

Definition of values

- U_N : pick-up voltage =
brake rated voltage
- U_h : holding voltage =
should be calculated to obtain
enough current to hold the brake
open
- I_h : holding current
- M_{on} : adjusted braking torque
- t_{on} : brake engage time
- t_{off} : brake release time

The brake engage time and brake release times are not constant. They vary according to the voltage, the coil temperature, the adjustment of the springs, the wear of the linings, etc.

⚠ Check that all the microswitches are open before authorising the car to move. Similarly, check that all the microswitches are closed on stopping.



GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

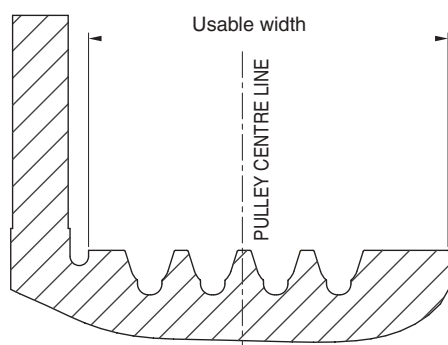
Elevator car drive

Traction pulley

- Our pulleys are made of cast iron alloy which enables us to guarantee a defined level of hardness at the heart of the material.

Standard hardness: 200 to 240 Hb

- For the Z2-Z3 and Z6, we also offer superficial heat treatment of the grooves which enables hardness of 50 HRC to be achieved.



Z2 - Z3

Motor type	Pulley diameter (mm)	Usable pulley width (mm)
Z2	400	85
Z3	400	85

Standard groove profiles:

- On these machines, LEROY-SOMER offers as standard hardened 45° V-shaped grooves for 10 and 8 mm cable.



Before selecting a groove profile, check that it is suitable for your application.
LEROY-SOMER can also manufacture specific groove profiles.

Z6 - Z10 - Z15

Motor type	Pulley diameter (mm)	Usable pulley width (mm)
Z6 S - M - L	530	140
Z10 S - M - L	530	245
Z15 (preliminary)	660	245

Groove profiles:

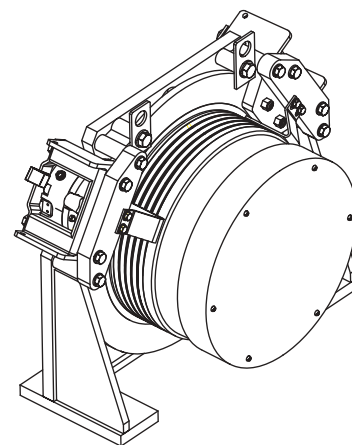
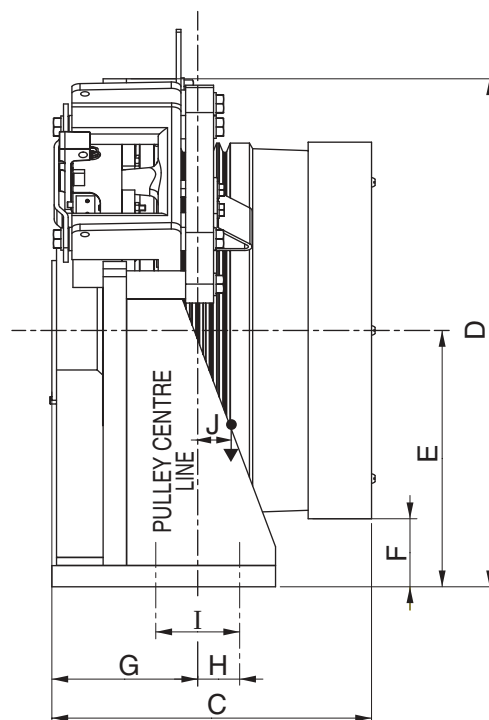
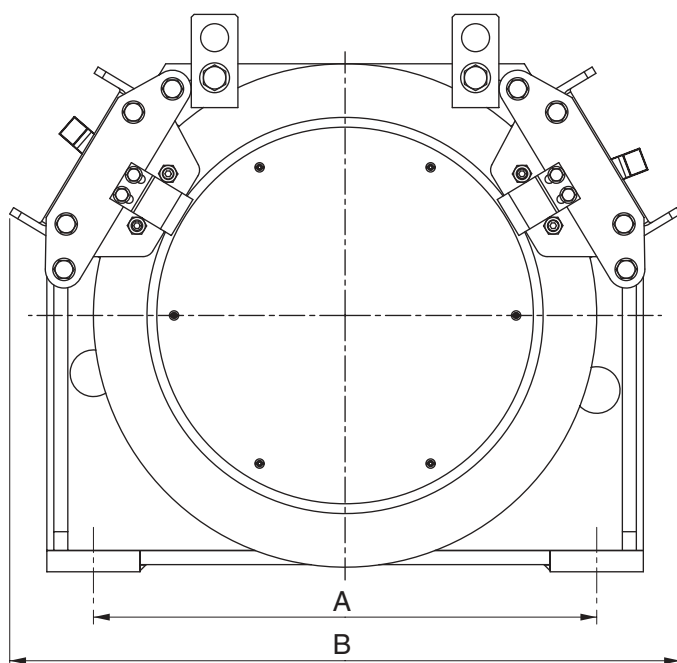
- These are machined to your requirements.
- They can be V-shaped, U-shaped or U-shaped with undercut.
- We can provide you with the contact details of companies with expertise in calculating the groove profile you will need.

GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Dimensions

Type Z2 - Z3



Type	Main dimensions (mm)										Weight
	A	B	C	D	E	F	G	H	I	J	
Z2	540	720	343	545	275	70	156.5	45	90	21	260
Z3	540	720	398	545	275	70	156.5	45	90	21	300

General tolerances: ± 10 mm

Pulley diameter: 400 mm

Appearance and dimensions subject to modification.

If you require exact dimensions, ask for a certified drawing at the time of ordering.

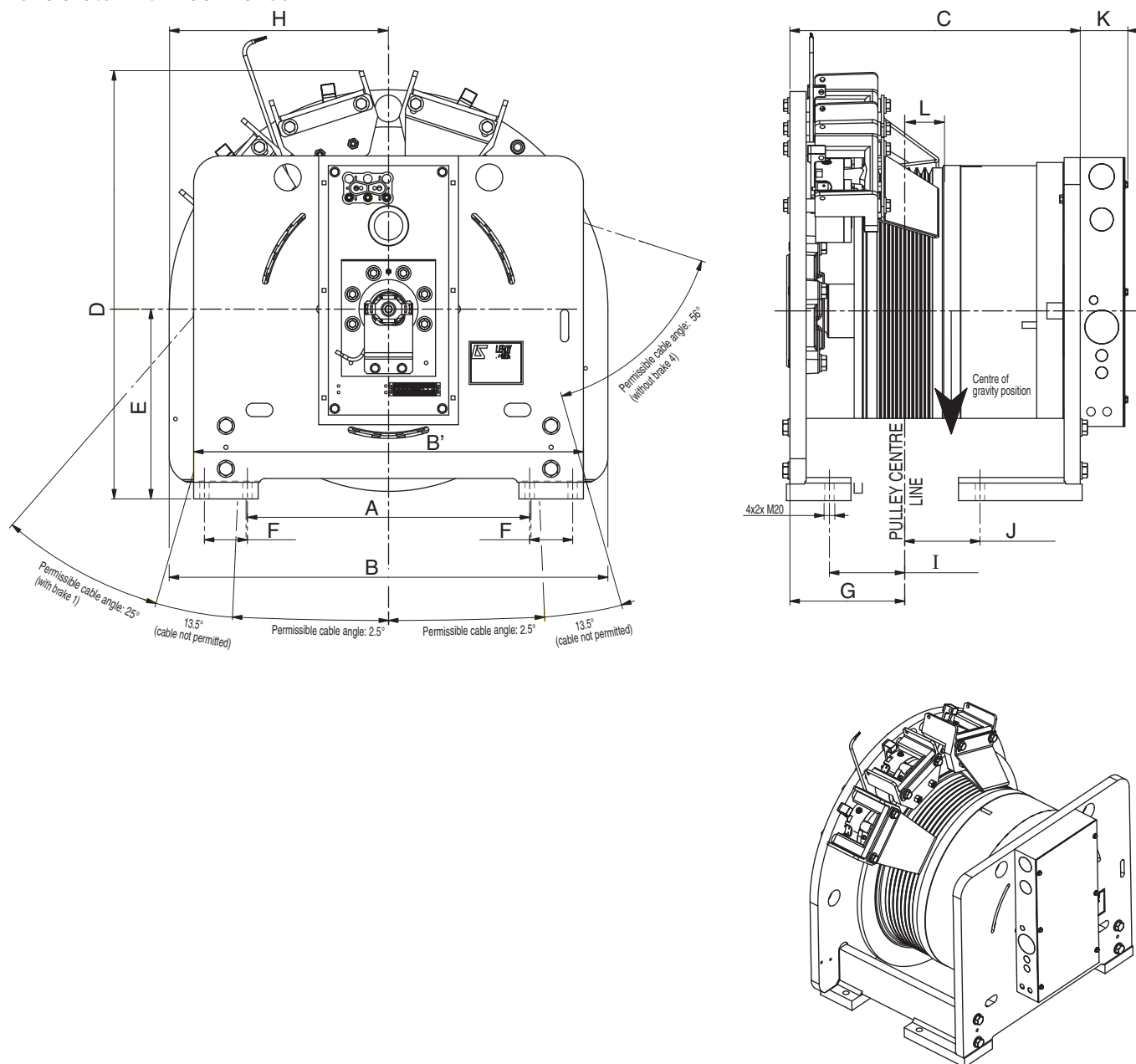
GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Dimensions

Type Z6 version MR

For elevator with machine room



Type Version MR	Main dimensions (mm)													Weight
	A	B	B'	C	D	E	F	G	H	I	J	K	W	
Z6 S	525	816	725	540	797	353	80	213.5	408	140	140	88.5	59	710
Z6 M	525	816	725	590	797	353	80	213.5	408	140	140	88.5	89	780
Z6 L	525	816	725	640	797	353	80	213.5	408	140	140	88.5	119	850

General tolerances: ± 10 mm

Pulley diameter: 530 mm

Appearance and dimensions subject to modification.

If you require exact dimensions, ask for a certified drawing at the time of ordering.

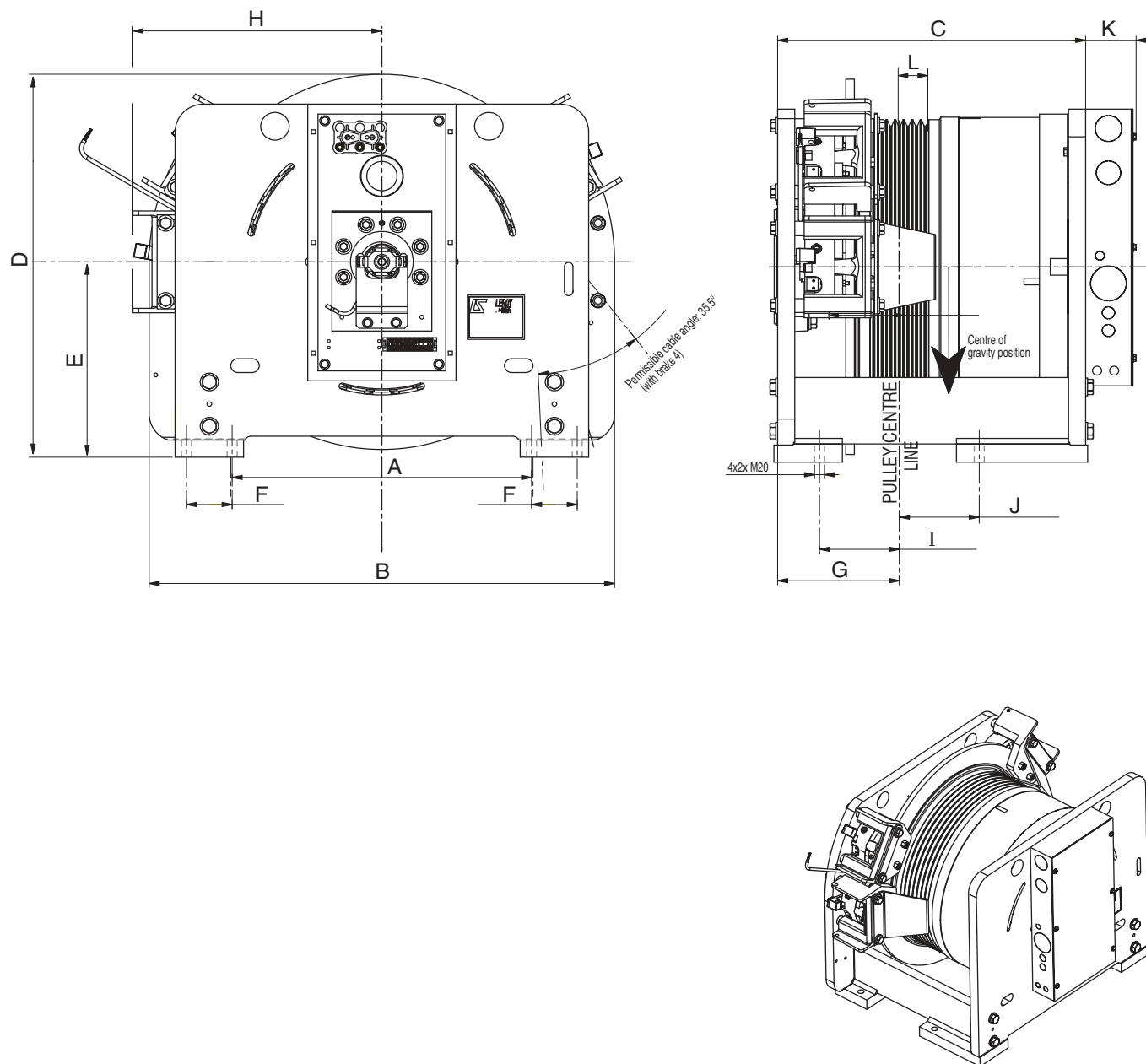
GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Dimensions

Type Z6 version MRL

For elevator without machine room



Type Version MRL	Main dimensions (mm)												
	A	B	C	D	E	F	G	H	I	J	K	W	Weight
Z6 S	525	816	540	692	353	80	213.5	436	140	140	88.5	59	710
Z6 M	525	816	590	692	353	80	213.5	436	140	140	88.5	89	780
Z6 L	525	816	640	692	353	80	213.5	436	140	140	88.5	119	850

General tolerances: ± 10 mm

Pulley diameter: 530 mm

Appearance and dimensions subject to modification.

If you require exact dimensions, ask for a certified drawing at the time of ordering.

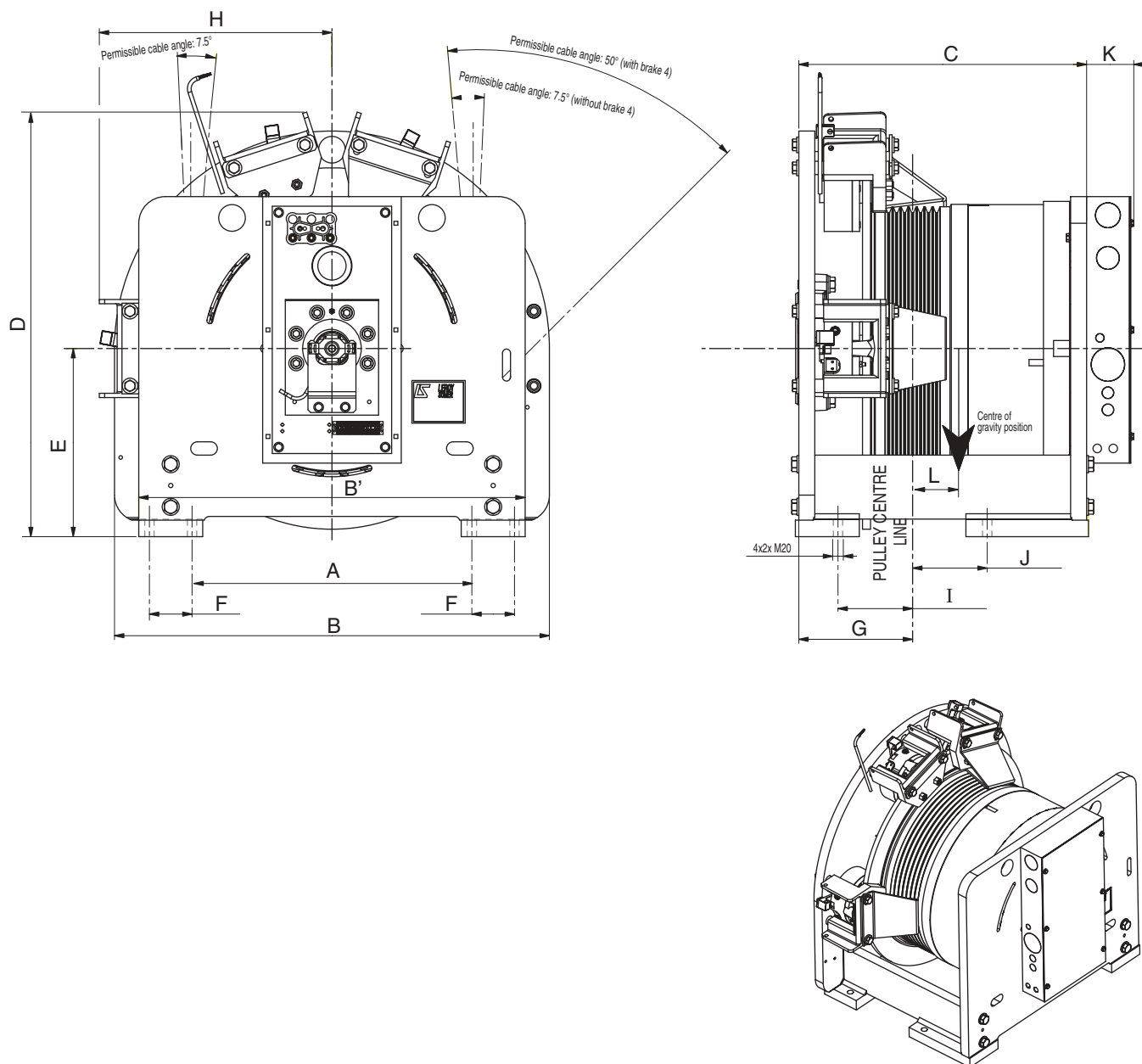
GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Dimensions

Type Z6 version BAS

For elevator with machine room at the bottom of the shaft



Type Version BAS	Main dimensions (mm)													Weight
	A	B	B'	C	D	E	F	G	H	I	J	K	W	
Z6 S	525	816	725	540	797	353	80	213.5	437	140	140	88.5	59	710
Z6 M	525	816	725	590	797	353	80	213.5	437	140	140	88.5	89	780
Z6 L	525	816	725	640	797	353	80	213.5	437	140	140	88.5	119	850

General tolerances: ± 10 mm

Pulley diameter: 530 mm

Appearance and dimensions subject to modification.

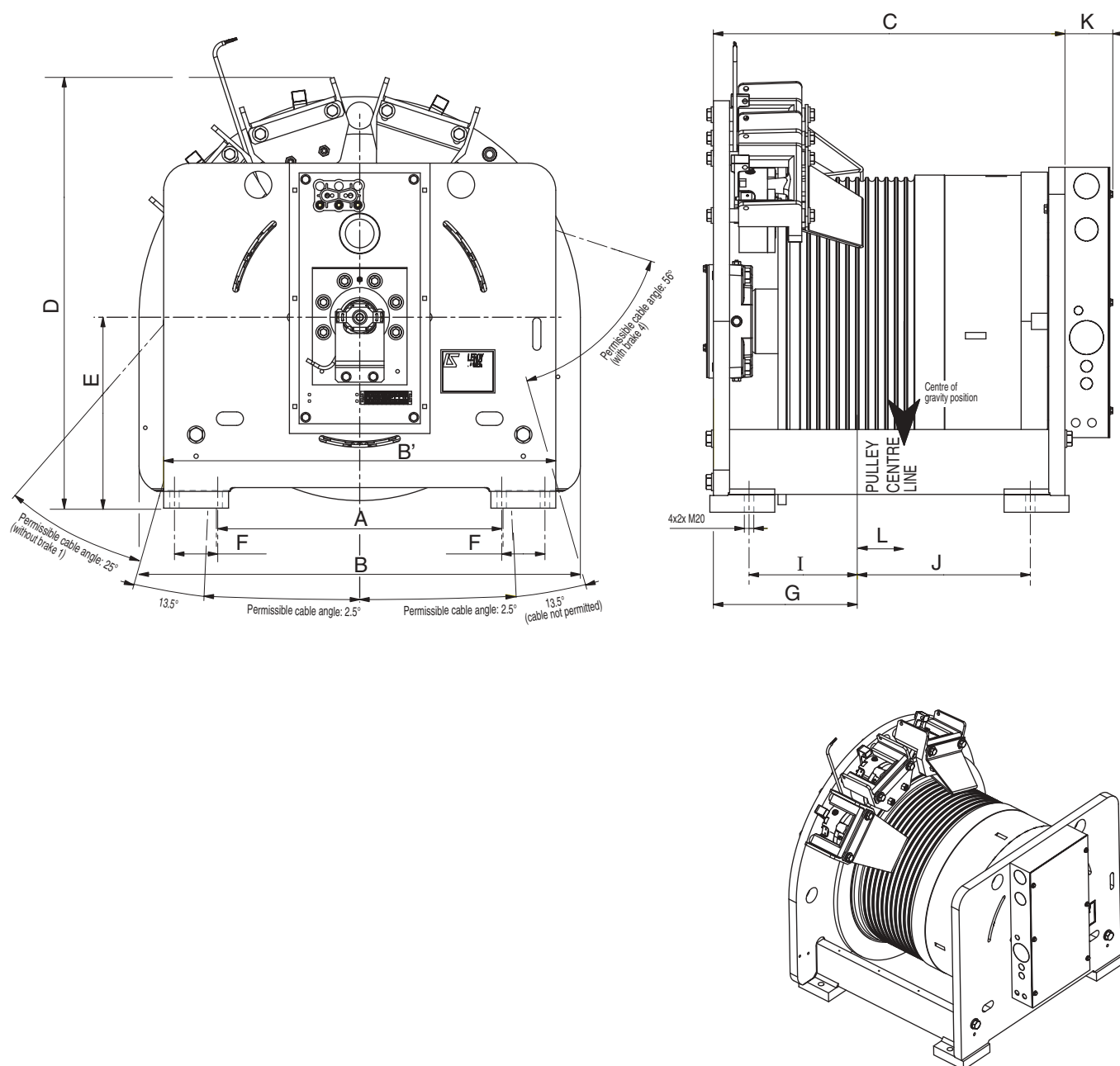
If you require exact dimensions, ask for a certified drawing at the time of ordering.

GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Dimensions

Type Z10



Type	Main dimensions (mm)													
	A	B	B'	C	D	E	F	G	H	I	J	K	W	Weight
Z10 S	525	816	725	650	797	353	80	266	408	200	320	88.5	70	800
Z10 M	525	816	725	700	797	353	80	266	408	200	370	88.5	100	870
Z10 L	525	816	725	750	797	353	80	266	408	200	420	88.5	130	940

General tolerances: ± 10 mm

Pulley diameter: 530 mm

Appearance and dimensions subject to modification.

If you require exact dimensions, ask for a certified drawing at the time of ordering.

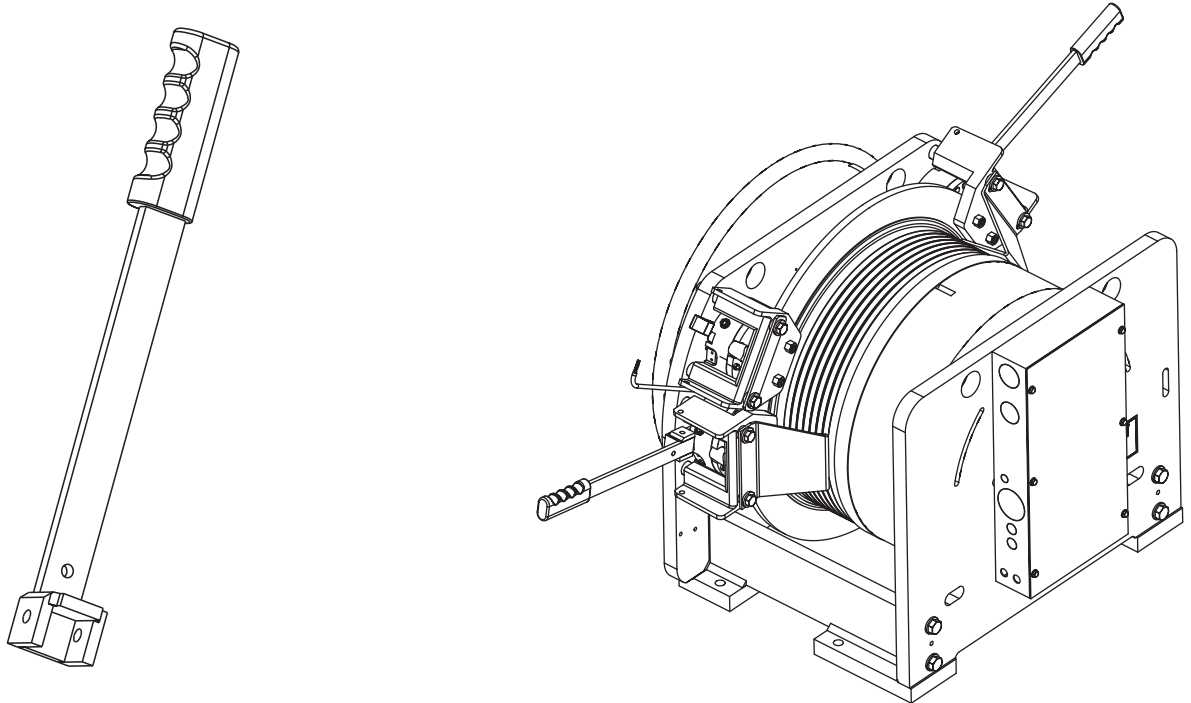
GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

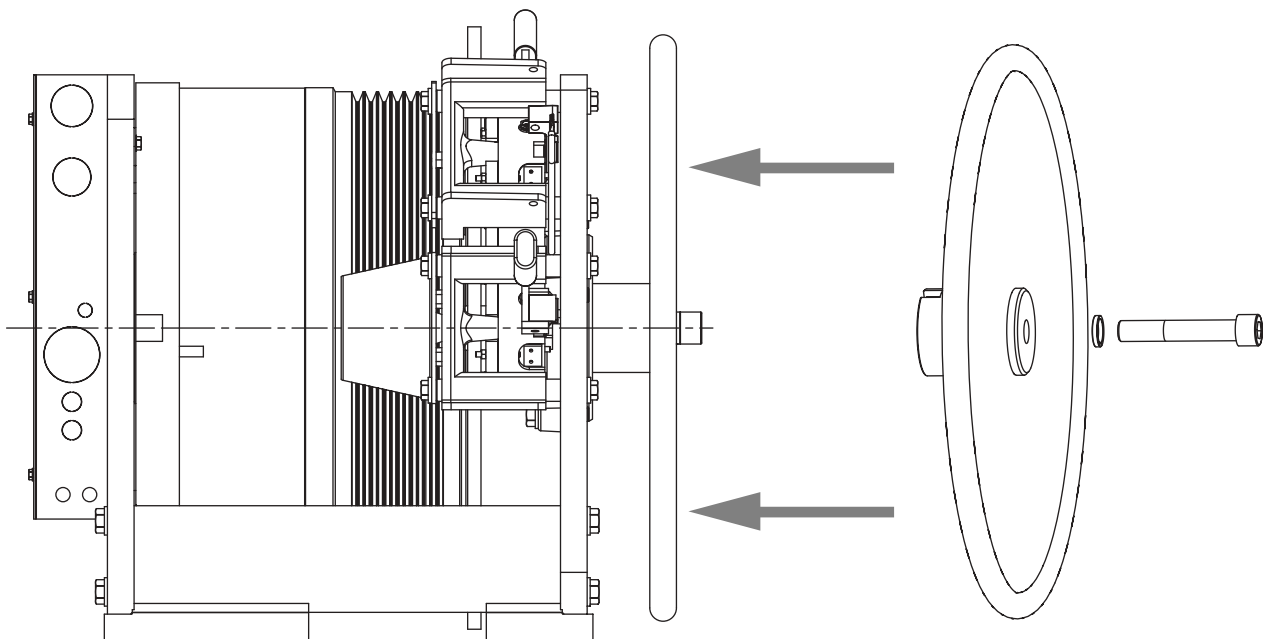
Optional features

Accessories

▼ Brake release lever



▼ Hand wheel



GEARLESS A.C. drive for elevators

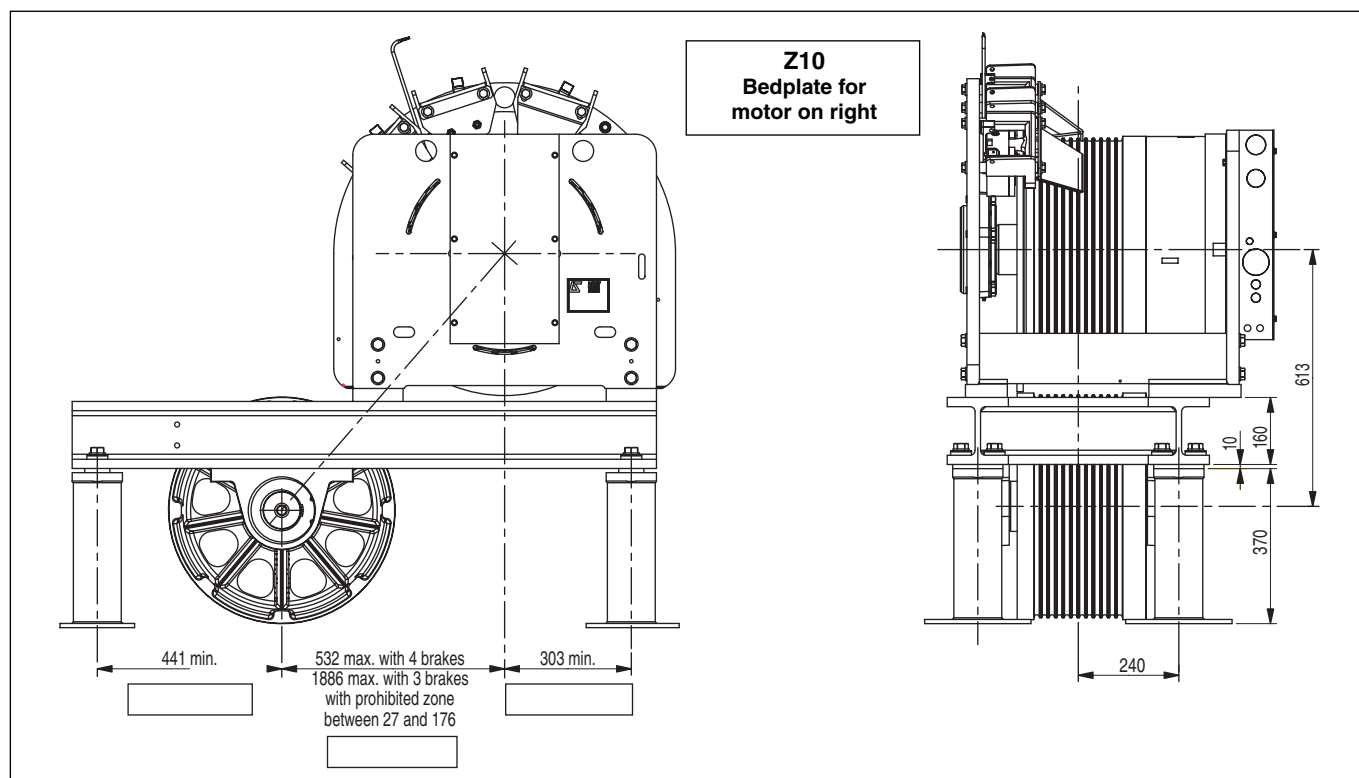
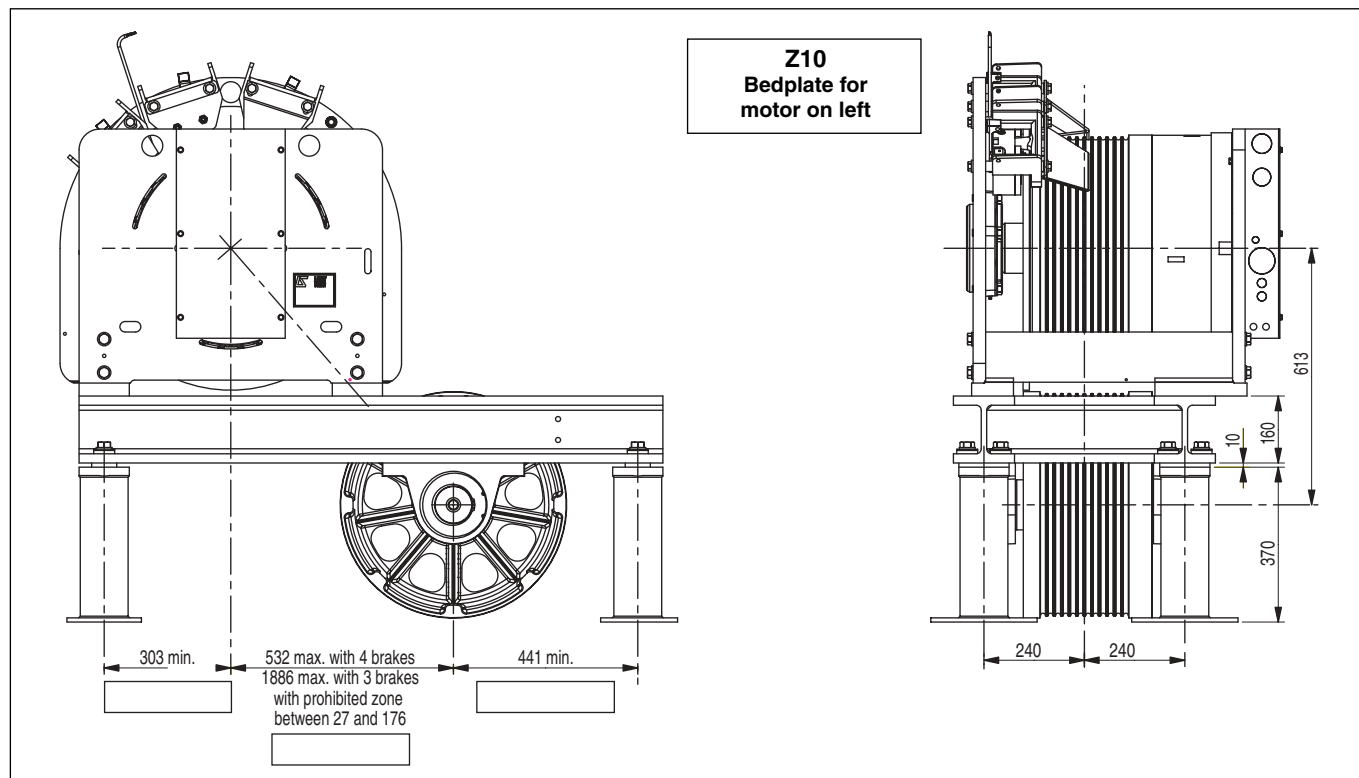
Synchronous with permanent magnets - Z range

Optional features

Z10 bedplate

Dimensions required: please complete all 5 boxes. Please tick the box corresponding to the position of the secondary pulley:

- on the right (brake side) ☐
- or
- on the left ☐



GEARLESS A.C. drive for elevators

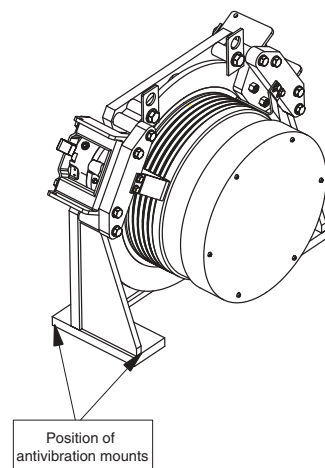
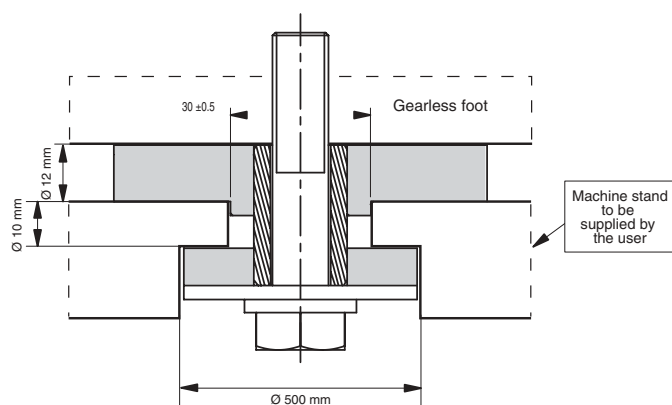
Synchronous with permanent magnets - Z range

Optional features

Antivibration mounts

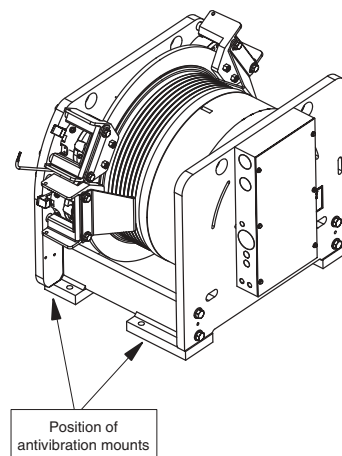
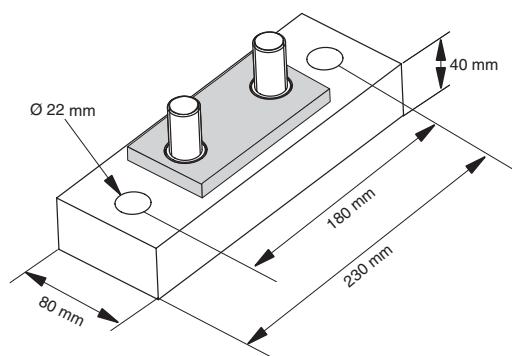
▼ Antivibration mounts for Z2-Z3

- 4 antivibration mounts



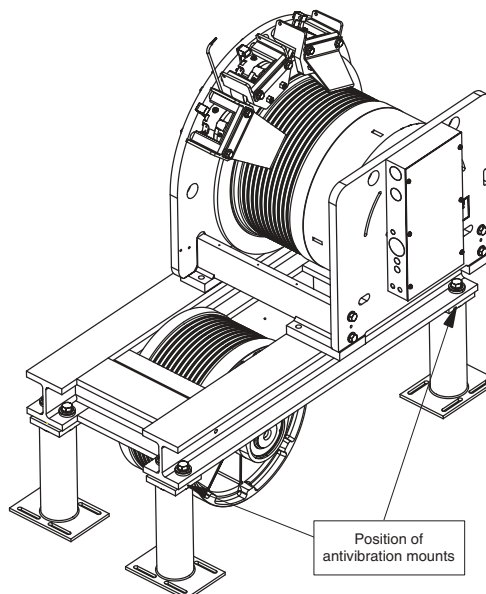
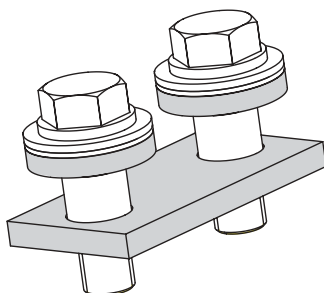
▼ Antivibration mounts for Z6

- 4 antivibration mounts



▼ Antivibration mounts for Z10

- 4 mounts integrated in the bedplate

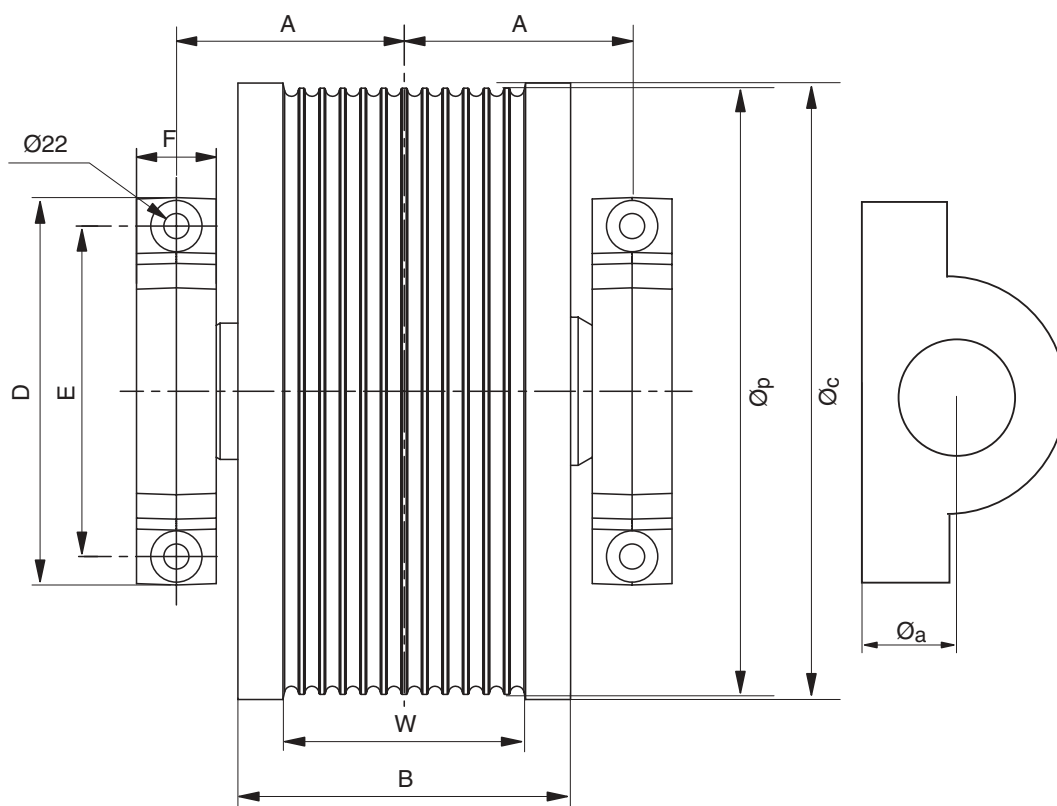


GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Optional features

Secondary pulley



CHARACTERISTICS

▼ Maximum load 10 tonnes

Motor	Pitch diameter $\varnothing_p$	Usable width (W)	Weight	Dimensions (mm)						
	mm	mm	kg	A	B	$\varnothing_c$	D	E	F	$\varnothing_a$
S	520	245	236	200	292	541	340	290	70	100
M	520	245	236	200	292	541	340	290	70	100
W	520	245	236	200	292	541	340	290	70	100

GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Optional features

Incremental encoder

Our synchronous GEARLESS drives can be equipped as standard with an incremental encoder with switching channels. The use of incremental channels for controlling speed is a simple, reliable solution. Switching channels are needed to determine the rotor position.

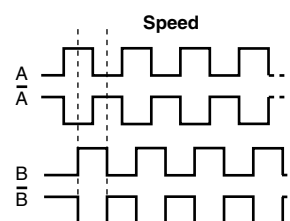
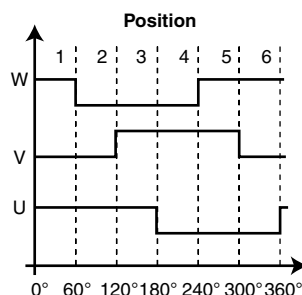
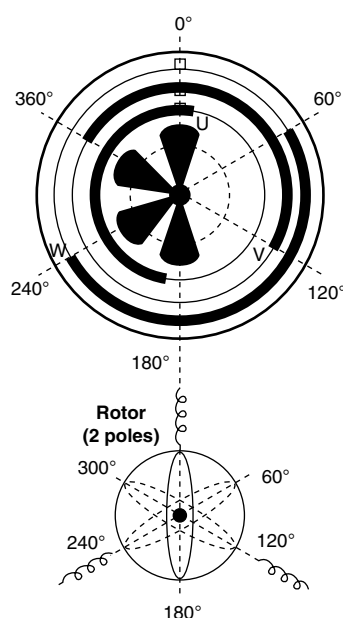
The encoder, equipped with an RS422 link, is inside a metal casing to ensure it is properly protected against electrical interference.

This type of encoder is our most competitive solution for obtaining the right level of comfort.

CHARACTERISTICS

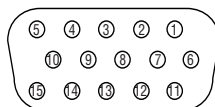
Outputs	Two complementary channels in quadrature Three complementary switching channels
Output interface	RS 422
Number of points per revolution	4096
Switching channels	3 x 8 tracks/revolution on 16-pole motors 3 x 16 tracks/revolution on 32-pole motors
Supply voltage	5V $\pm$ 10%
Output current	20 mA maximum
Length	280 mm

ENCODER PRINCIPLE



CONNECTING THE INCREMENTAL ENCODER

15 HD SUB D connector pins	Wire colour	Functions
15	Not used	Not used
7	Grey	Channel U
8	Red	Channel $\bar{U}$
9	Black	Channel V
10	Purple	Channel $\bar{V}$
11	White/Brown	Channel W
12	White/Green	Channel $\bar{W}$
1	Green	Channel A
5	Not connected	Not
6	Not connected	Not
2	Pink	Channel $\bar{A}$
3	Yellow	Channel B
4	Blue	Channel $\bar{B}$
13	Brown	+5V dc
14	White + Braid	0 V
		Screen



15 HD SUB D connector pin
(rear view)

GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Optional features

SinCos encoder

The SinCos encoder is an alternative to the Incremental encoder which offers high resolution and therefore very high-quality motion control and comfort.

Sine and cosine data are used to calculate the rotor position. As with a resolver, the position data is absolute and non-volatile, enabling the position to be read on power-up without the motor running.

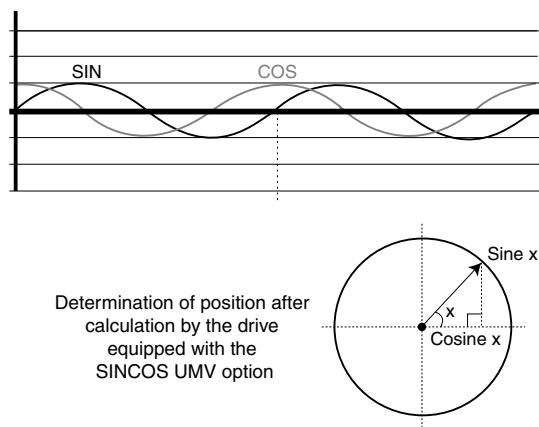
The SinCos encoder offers the advantage of combining analogue and/or digital techniques in order to provide a high-resolution signal with excellent immunity to noise.

The encoder is compatible with versions 3.2.11 or higher of LEROY-SOMER and Control Techniques drives.

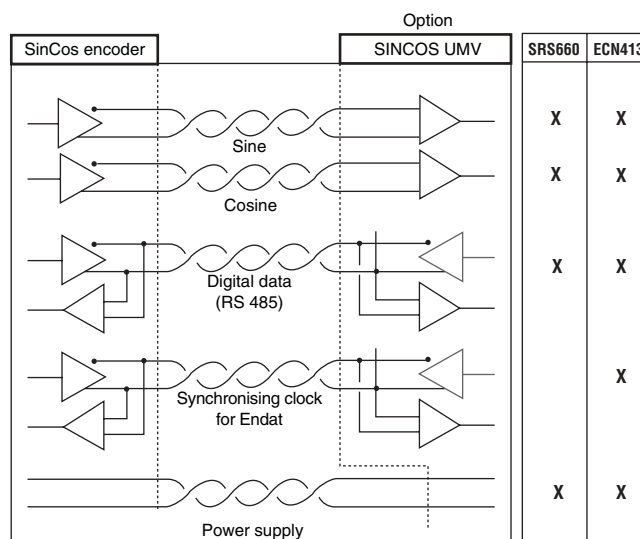
CHARACTERISTICS

Characteristics	SRS 660	ECN 413
Sine and Cosine analogue outputs	1024 periods per revolution	512 periods per revolution
Digital outputs: absolute value	32768 points per revolution	8192 points per revolution
Type of code used for the absolute value	Binary	Binary
Evolution of the binary code with clockwise rotation when viewed from shaft end	Increasing	Increasing
Link - Protocol	Hyperface	Endat or SSI
Rated supply voltage	7 - 12 V	5 V $\pm 10\%$
No-load absorbed current	100 to 130 mA	≤ 150 mA

SINCOS ENCODER PRINCIPLE



CONNECTION



A screened cable with 4 twisted pairs is adequate for connecting a SinCos encoder

GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Optional features

SinCos encoder

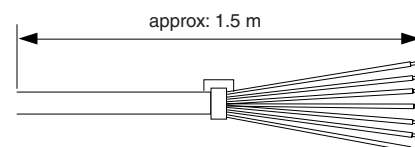
SRS 660

Connecting the Sincos encoder

PIN	Wire colour	Signal
1	Black	REFCOS
2	Grey	Data
3	N.C.	N.C.
4	N.C.	N.C.
5	White	SIN
6	Brown	REFSIN
7	Green	Data
8	Pink	COS
9*	N.C./Screen	N.C./Screen
10	Blue	Gnd
11	N.C.	N.C.
12	Red	8 V

* PIN 9 can be connected to the cable screening to ensure continuity with the encoder casing.
N.C. = Not connected

Flying leads

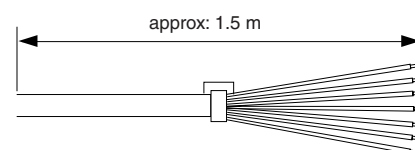


ECN 413

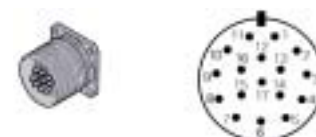
HEIDENHAIN 17-pin connection socket or base

PIN	Wire colour	Signal
1	Blue	Up
2	Black	Free
3	Red	Free
4	White	0 V
5	Green	Free
6	Brown	Free
7	Brown/Green	-
8	Purple	Clock
9	Yellow	Clock
10	White/Green	0 V (U _N)
11	-	Internal screening
12	Blue/Black	+ COS
13	Red/Black	- COS
14	Grey	Data
15	Green/Black	+ SIN
16	Yellow/Black	- SIN
17	Pink	Data

Flying leads



Connector outlet



GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Questionnaire



USINE DES AGRIERS - DMT
Z.I. des AGRIERS
16015 ANGOULEME Cédex - FRANCE
Tel: (33) 05 45 64 54 74 - Fax: (33) 05 45 64 55 44

Customer: LS representative:
Project: Quantity:
Defined by: Date: Signed:

GEARLESS DEFINITION QUESTIONNAIRE

MECHANICAL SPECIFICATIONS

GEARLESS POSITION: top ☐ bottom of shaft ☐ Without machine room ☐
WRAP: single ☐ double ☐ ROPING: 2:1 ☐ or 1.1 ☐
CAR: Load: kg Weight: kg Counterweight: %
Speed: m/s Acceleration: m/s²
TRACTION CABLE: Diam.: mm Number: Weight: Kg/m
COMPENSATION: (% of the traction cable) % Compensating pulley weight: kg
TRAVEL LENGTH: m
INSTALLATION EFFICIENCY: %
USE: Residential building ☐ Offices, administrative ☐ Public building, intensive use ☐

Our machines comply with standards EN81 and ASME 17, 1a-2002. If you require other specifications, please supply details of your requirements.

ELECTRICAL SPECIFICATIONS

SUPPLY: Voltage: VAC Max. current: A Frequency: Hz
(if limited)
MOTOR: (if imposed) Voltage: VAC Max. current: A Frequency: Hz
DRIVE: (if already defined) Switching Freq.: Hz dv/dt switching: V/ms
CABLE LENGTH BETWEEN
DRIVE AND MOTOR: m

The maximum voltage peaks per phase at the motor terminals must be limited to 1000 V.

OTHER SPECIFICATIONS IF NECESSARY:

- Max. ambient temperature: 40°C or
- Traction pulley hardness: 200 to 240 Hb or
- Brake coil voltage: 2 x 100 V or
- External finish: green (RAL 6000) or
- Packaging: machine supplied on a pallet and protected with plastic film.
- Other:
.....
.....
.....
.....

OPTIONS: (according to catalogue)

- Encoder adaptation yes ☐ no ☐
Or encoder: yes ☐ no ☐
specifications:
- Secondary pulley: yes ☐ no ☐
if yes, diameter: mm
- Brake release lever: yes ☐ no ☐
- Safety hand wheel: yes ☐ no ☐
- Bedplate yes ☐ no ☐
- Bedplate fixing feet: yes ☐ no ☐
- Antivibration mounts yes ☐ no ☐

GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Other products

Any type of drive can be designed to satisfy our customers' requirements:

- Asynchronous
- Synchronous (with permanent magnets)
- Variable reluctance
- DC

For any type of application:

- Traction
- Door control
- Etc.

GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Notes

GEARLESS A.C. drive for elevators

Synchronous with permanent magnets - Z range

Notes

I - APPLICATION AREA

Acceptance of our tenders or the placing of any order with us implies acceptance of the following conditions without exception or reservation. These conditions of sale shall prevail over all stipulations appearing on the customer's purchase order, his general conditions of purchase or any other document emanating from him and / or a third party.

A dispensation from these General Conditions of Sale applies to sales concerning foundry parts, which are subject to the European Foundries General Conditions of Sale, latest edition.

II - ORDERS

All orders, including those taken by our agents and representatives, by whatever mode of transmission, become valid only after we have accepted them in writing.

We reserve the right to modify the characteristics of our goods without prior warning. However, the customer reserves the possibility to specify technical specifications in the order. Unless such requirements have been notified in writing, the customer will not be able to refuse delivery of new modified goods.

Our company will not accept responsibility for an incorrect choice of goods if this incorrect choice results from incomplete and / or erroneous conditions of use, or conditions that have not been conveyed to the vendor by the customer.

Unless otherwise specified, our tenders and estimates are only valid for thirty days from the date of issue.

When the goods have to satisfy standards, particular regulations and / or be inspected by standards or control organisations, the price request must be accompanied by full specifications with which we must comply with. This is mentioned in the estimate. All test and inspection fees are the customer's responsibility.

III - PRICE

Our prices and price lists are shown exclusive of tax and may be revised without prior notice.

Our prices are either firm for the duration specified on the estimate, or subject to revision according to a formula accompanying the tender which, depending on the regulations, covers a change in the cost of raw materials, products, various services and salaries, an index of which is published in the B.O.C.C.R.F. ("Bulletin Officiel de la Concurrence, de la Consommation et de la Répression des Fraudes").

For any order of goods not found in our catalogue, requiring special manufacture, the invoice will include a minimum fixed sum of 600 FRF (six hundred French Francs) exclusive of tax, to cover start - up costs. Any tax due will be charged to the customer.

All related costs, such as customs clearance and special inspections, will be added on.

Customers should remember that the French Franc (or other currency) is being replaced by the Single European Currency (EURO) according to a European Community ruling. In accordance with the general principles of monetary law, references to the French Franc will then as of right be considered to refer to the Euro. This substitution will be enforced on the date and in accordance with the conditions defined by the European Community ruling.

IV - DELIVERY

Our export sales are governed by the INCOTERMS published by the International Chamber of Commerce ("I.C.C. INCOTERMS"), latest edition.

Goods are despatched in accordance with the conditions indicated on our order acknowledgement, sent out in response to any order for goods and / or services.

Unless otherwise specified, our prices refer to goods put at customer's disposal in our factories, and include standard packaging.

Unless otherwise specified, goods are always transported at the consignee's risk. Without exception, it is up to the purchaser to raise with the transporter, in the legal form and time limits, any claim concerning the condition or the number of packages received and also to send us at the same time a copy of this declaration. Failure to respect this procedure will relieve us of all responsibility.

In the case of CIF (Cost, Insurance & Freight) or CIP (Carriage & Insurance Paid to) sales, etc..., in the event of damage, our responsibility will only be engaged if any reservations and required declarations have been notified in the required time period, and will not in any case exceed the indemnity sum received from our insurers.

If the arrangements for despatch are modified, we reserve the right to invoice any additional costs arising from such changes. Packages cannot be returned.

Should the delivery of goods be delayed for a reason not attributable to the vendor, goods will be stored on the vendor's premises, at the own risk of the customer, at a charge for storage of 1% (one per cent) of the total order sum per week, beginning, without a grace period, on the day after the scheduled date of delivery indicated in the contract. After thirty days from this date, the vendor has the right to dispose of these goods as he wishes and arrange a new delivery date for the said goods with the customer. In all instances, all down payments received remain the property of the vendor as indemnity, without prejudice to other claims for damages that the vendor may wish to bring.

V - DELIVERY DATES

Delivery times are stated for information only, and do not include the month of August.

Delivery dates are counted from the issue date of the order acknowledgement from the vendor and are subject to compliance with the provisions indicated on the order acknowledgement, notably receipt of the down payment for the order, notification of the issuance of an irrevocable letter of credit conforming to all vendor requirements (especially as regards the amount, currency, validity, licence, etc.) and acceptance of the terms of payment with any guarantees which may be required, etc...

In no case does late delivery automatically entitle the customer to damages and / or penalties.

Unless otherwise specified, we reserve the right to make partial deliveries.

Delivery dates are automatically suspended without formal notice, and the vendor shall have no responsibility in cases of Force Majeure, or events beyond the control of the vendor or his suppliers such as delays, saturation, or unavailability of the planned transport methods, energy, raw materials etc., serious

accidents such as fires, explosions, strikes, lock out, or emergency measures taken by the Authorities occurring after the conclusion of the order and preventing its normal execution. Similarly, delivery dates are automatically suspended without formal notice in all cases of failure to perform or late payment by the customer.

VI - TESTS

All goods manufactured by the vendor are tested before leaving the factory in accordance with vendor's ISO 9001 certifications. Customers may attend these tests : they simply have to convey the wish to do so in writing when the order is placed.

Specific tests and acceptance tests requested by the customer, whether conducted on the customer's premises, in our factories, on-site, or by inspection organisations, must be noted on the order and are to be paid for by the customer.

Goods specially developed for a customer will have to be approved by the latter before any delivery of mass - produced goods, notified by signing and returning to us the Product Approval Schedule reference Q1. T. 034.

In the event of the customer's insistence on delivery without having signed this form beforehand, the goods will then still be considered as prototypes and the customer will assume sole responsibility for using it or supplying it to his own customers.

VII - TERMS OF PAYMENT

All our sales are considered as carried out and payable at the registered office of the vendor, without exception, whatever the method of payment, the place of conclusion of the sale and delivery.

When the customer is based in France, our invoices are payable on receipt in cash, by banker's draft, or by L.C.R. ("Lettre de Change - Relevé"), within thirty days from the end of the month following the invoice date, net and without discount.

When the customer is based outside France, our invoices are payable in cash against delivery of the dispatching documents or by irrevocable documentary credit confirmed by a first class French bank with all bank charges payable by the customer.

Payments must be made in the currency of the invoice.

In accordance with French Law N° 92.1442 dated December 31, 1992, non-payment of an invoice by its due date will give rise, after formal notice, to a penalty equal to one and a half times (1.5) the official rate of interest, and to late payment interest at the bank base rate plus five per cent. If the invoice carries V.A.T. (Value Added Tax), this is calculated on the amount, inclusive of tax, of the remaining sum due and comes into force from the due date.

Should steps have to be taken to recover the said amount, a surcharge of 15% (fifteen per cent) of the sum demanded will be payable.

Moreover, as a consequence of non - payment of an invoice or any term of payment, whatever the method of payment envisaged, the customer shall pay immediately for the whole of the outstanding amount owed to the vendor (including his subsidiaries, sister or parent companies, whether in France or overseas) for all deliveries or services, whatever their initial due date.

Notwithstanding any particular terms of payment arranged between the parties concerned, the vendor reserves the right to demand :

- payment in cash, before the goods leave the factory, for all orders in the process of manufacture, in the event of a problem with payment, or if the customer's financial situation justifies it,
- a down payment for the order.

Unless we are at fault, all down payments are non - returnable, without prejudice to our right to claim damages.

Any payment made in advance of the fixed payment date will lead to a discount of 0.2 % (zero point two per cent) per month of the amount concerned.

VIII - COMPENSATION CLAUSE

Unless prohibited by law, the vendor and the customer expressly agree between one another to compensate their respective debts arising from their commercial relationship, even if the conditions defined by law for legal compensation are not all satisfied.

In applying this clause, by vendor we mean any company in the LEROY SOMER group.

IX - TRANSFER OF RISKS - TRANSFERT OF TITLE

Transfer of risks occurs upon the handing over of the goods, according to the delivery conditions agreed at the time of ordering.

THE TRANSFER OF TITLE OF THE GOODS SOLD TO THE CUSTOMER OCCURS UPON PAYMENT OF THE WHOLE PRINCIPAL SUM AND INTEREST.

The provision of a document creating an obligation to pay (bank draft or similar) does not constitute payment.

So long as the price has not been paid in full, the customer is obliged to inform the vendor, within twenty - four hours, of the seizure, requisition or confiscation of goods to the benefit of a third party, and to take all safety measures to acquaint others with and respect our right of title in the event of intervention by creditors.

Failure to pay the amount due, whether total or partial, on the due date, for whatever reason and on whatever grounds, authorises the vendor to demand as of right and without formal notice, the return of the goods, wherever they may be, at the customer's expense and risk.

Return of the goods does not imply to cancellation of the sale .However, we reserve the option to apply the cancellation clause contained in these General Conditions of Sale.

X - CONFIDENTIALITY

The vendor and the customer undertake to maintain confidentiality of information of a technical, commercial or other nature, obtained during negotiations and / or the execution of any order.

XI - INDUSTRIAL AND INTELLECTUAL PROPERTY RIGHTS

The results, data, studies and information (whether patentable or not), or software developed by the vendor during execution of any order, and delivered to the customer, are the sole property of the vendor.

Apart from the instructions for use, servicing and maintenance, reports and documents of any type that we deliver to our customers remain our property and must be returned to us on

request, even when design fees have been charged for them, and they shall not be communicated to third parties or used without the prior written agreement of the vendor.

XII - CANCELLATION CLAUSE

We reserve the right to cancel immediately, as of right and without formal notice, the sale of our goods in case of non-payment of any part of the price by the due date, or in case of any breach in the contractual obligations of the customer. In this case, the goods will have to be returned to us immediately, at the customer's own risk and expense, subject to a penalty of 10% (ten per cent) of its value per week of delay. All payments already received shall remain our property as indemnity, without prejudice to our rights to claim damages.

XIII - WARRANTY

The vendor warrants the goods against any defect, arising from a default in material or in workmanship, for twelve months starting from the date on which they are made available, according to the conditions defined below.

The warranty for goods with special applications, or goods used 24 hours a day, is automatically reduced by half.

On the other hand, parts or accessories of other origin, which bear their own brand name, are included in our warranty only to the extent of the warranty conditions granted by the suppliers of these parts.

The vendor's warranty will only apply insofar as the goods have been stored, used and maintained in accordance with the vendor's instructions and documentation. It cannot be invoked when the default results from :

- failure to monitor, maintain or store the goods correctly,
- normal wear and tear of goods,
- intervention on or modification to the goods without the vendor's prior authorisation in writing,
- abnormal use, or use not conforming to the intended purpose,
- defective installation at the customer's and / or the final user's premises,
- non-communication, by the customer, of the intended purpose or the conditions of use of the goods,
- failure to use original manufacturer's spare parts,
- Force Majeure or any event beyond the control of the vendor,
- etc ...

In all cases, the warranty is limited to the replacement or the repair of parts or goods recognised as defective by our technical departments. If the repair is entrusted to a third party, it should only be carried out after acceptance by the vendor of the estimate for repair.

No goods should be returned without the vendor's prior authorisation in writing .

Goods to be repaired should be sent prepaid, to the address indicated by the vendor. If the goods have not been repaired under warranty, the cost of dispatching it back will be invoiced to the customer or to the end purchaser.

This warranty applies to our goods in accessible form and therefore does not cover the cost of dismantling and reinstallation of the said goods in the equipment in which they are integrated .

Repair, modification, or replacement of spare parts or goods during the warranty period will not extend the duration of the warranty.

The provisions of this article constitute the only obligation on the part of the vendor concerning the warranty for the goods supplied.

XIV - LIABILITY

The vendor will be liable for bodily injury caused by his goods or personnel.

The repair of property damages attributable to the vendor is expressly limited to a sum which may not exceed the amount of the goods found as defective.

It is expressly agreed that the vendor and the customer each waive any right to claim for indirect, consequential and / or punitive damages of any kind, such as loss of production, loss of profit, costs of withdrawal from the market or costs of recall, costs of dismantling and reinstallation of goods, loss of contracts, etc.

XV - SPARE PARTS AND ACCESSORIES

Spare parts and accessories are provided on request insofar as they are available. Related costs (carriage and any other costs) are always added to the invoice.

We reserve the right to demand a minimum quantity or invoice a minimum per order.

XVI - PARTIAL INVALIDITY

If any provision of these General Conditions of Sale is held to be unenforceable for any reason, it shall be adjusted rather than voided, if possible, in order to achieve the intent of the parties to the extent possible. In any event, all other provisions shall be deemed valid and enforceable to the full extent possible.

XVII -DISPUTES

THESE GENERAL CONDITIONS OF SALE ARE GOVERNED BY FRENCH LAW.

ANY DISPUTE RELATING TO OUR SALES, EVEN IN THE CASE OF MULTIPLE DEFENDANTS, SHALL BE, IN THE ABSENCE OF AMICABLE SETTLEMENT AND NOTWITHSTANDING ANY CLAUSE TO THE CONTRARY, SUBJECT TO THE JURISDICTION OF THE COURTS OF ANGOULEME (France).



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