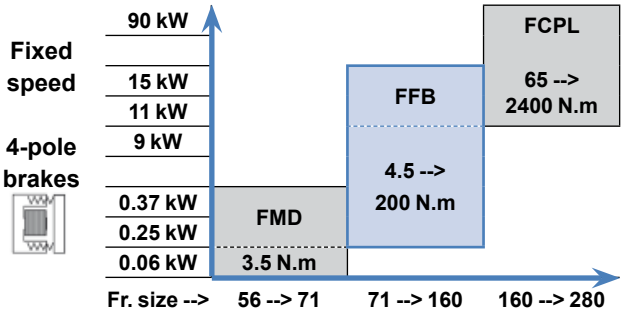
IMfinity®
FFB Brake Motors

NIE Standard Efficiency and IE2/IE3 High Efficiency
Variable Speed and Fixed Speed
Frame Size 71 to 160
Power 0.25 to 15 kW

Leroy-Somer™

EMERSON™
Industrial Automation

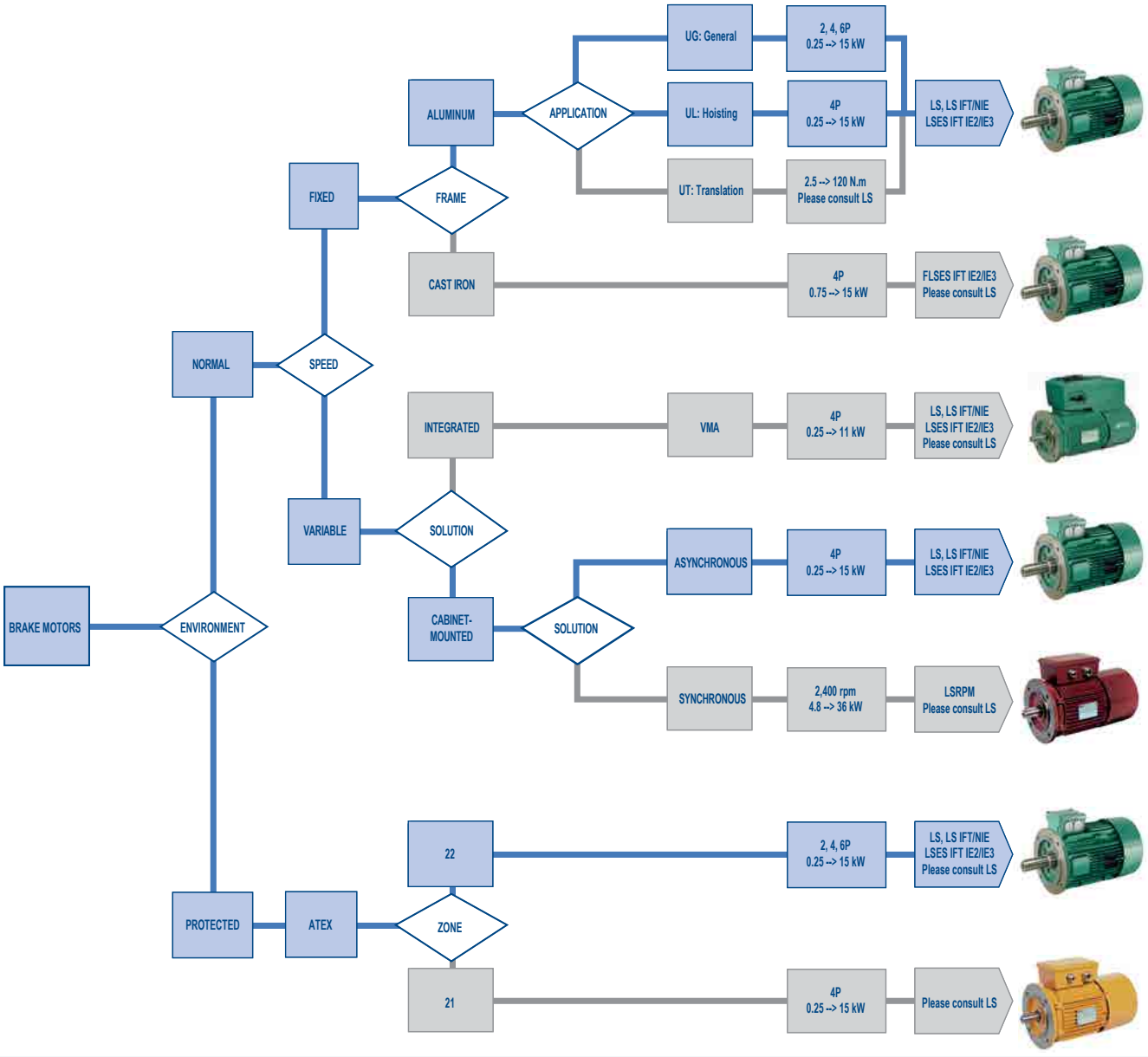
Brake Ranges



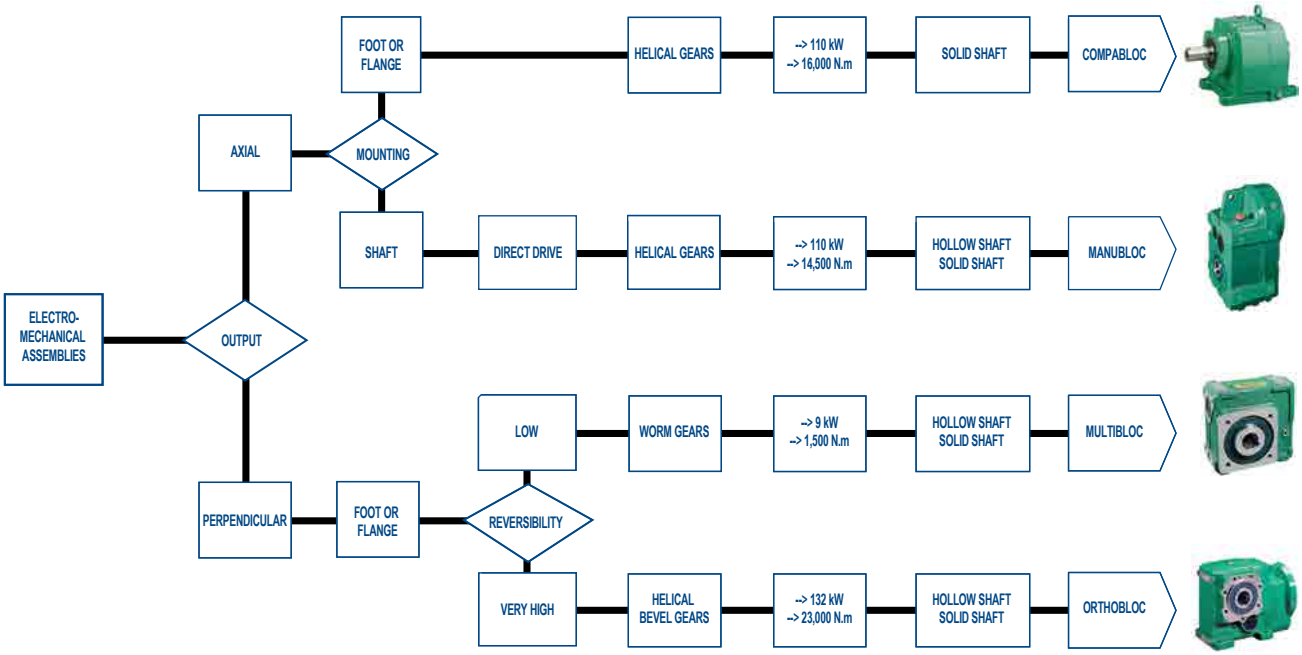
Environment				
		Normal		Dust-protected
		Commissioning		
FFB brochure	FFB catalog	FFB installation	FFB maintenance	Ex II3D II2D
5281	5329	5286	5287	Pending

All brake motors in this catalogue that don't fall within the scope of regulation 640/2009 in directive 2009/125/EC can be offered for sale* on the European Union market.
* according to the definition relating to application of European Union regulations concerning products.

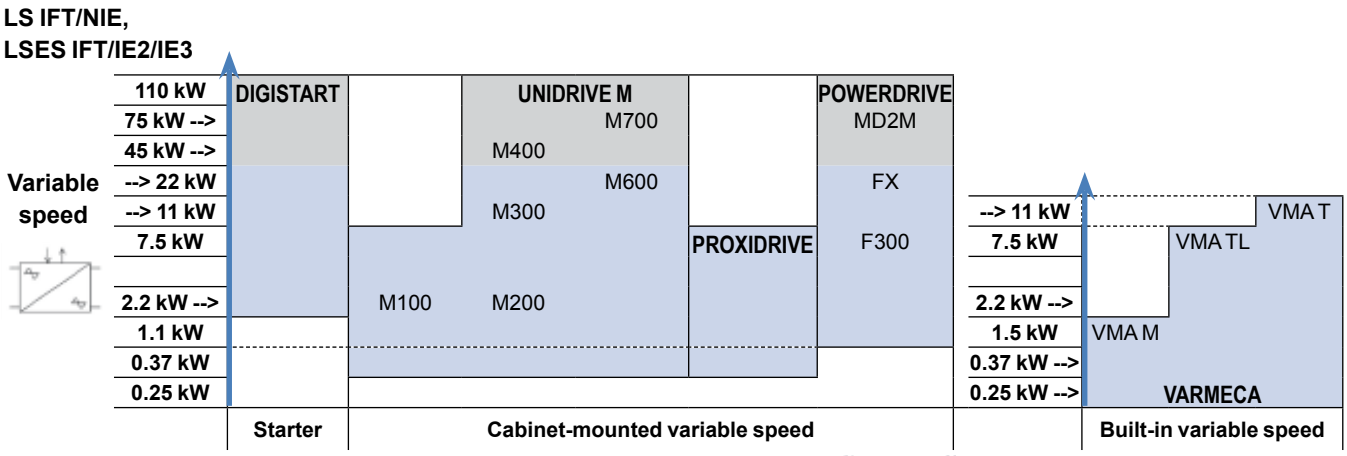
FFB Brake Motors Offer



Associated Gearbox Ranges



Associated Drive Ranges







Contents

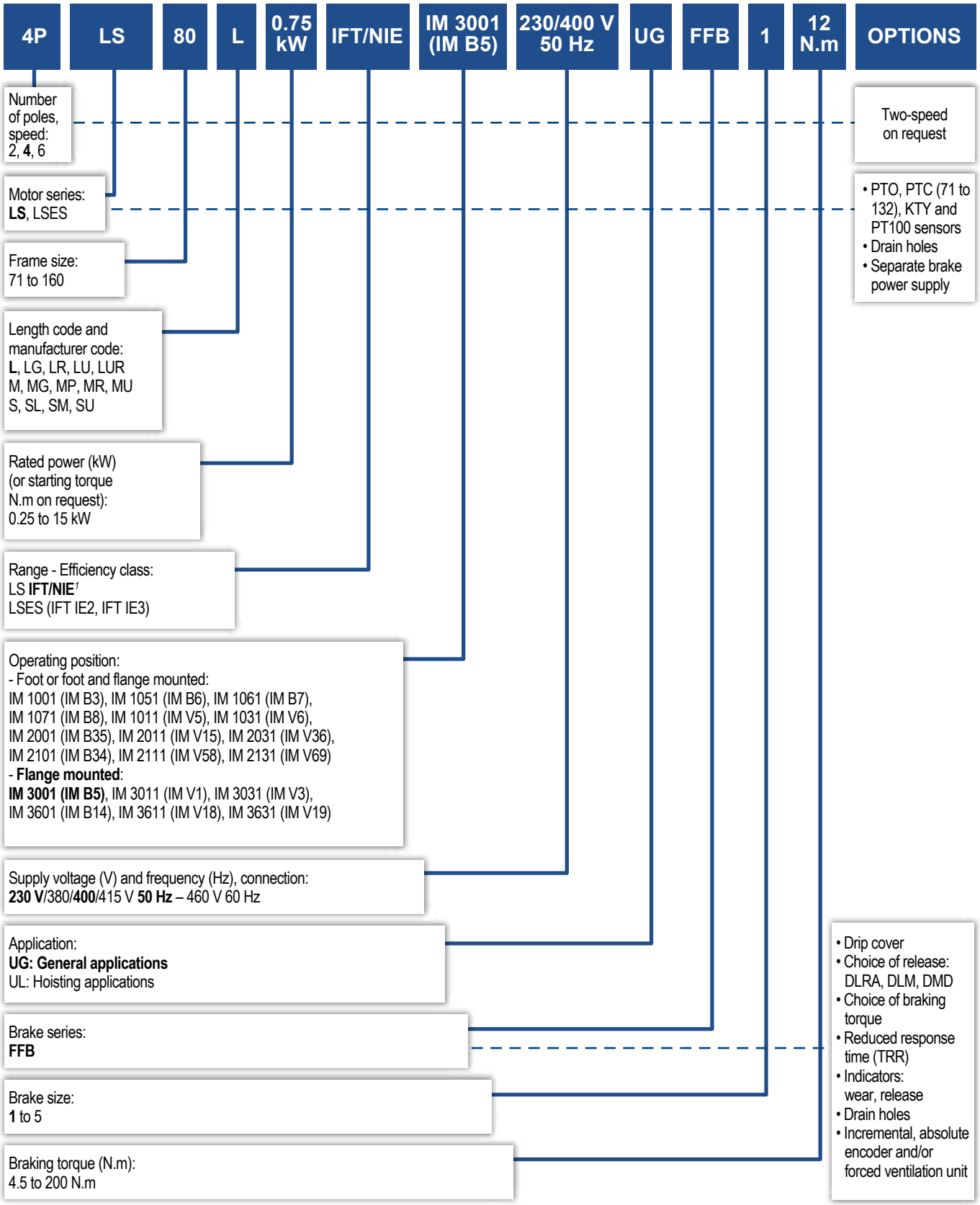
Index

Glossary

BA	Shaft extension
Cb	Compabloc
Cos φ	Power factor
OF	Operating factor (%)
F_d	Starting frequency
F_J	Inertia factor
η	Efficiency
R.H.	Relative humidity
Fr. S	Frame size
I_d	Starting current
I_n	Rated current
J	Moment of inertia
J_c	Moment of inertia of the driven load
kg	Brake motor weight
KVA_n	Apparent rated power
kW	Kilowatt
LS(ES)	Motor series
Mb	Multibloc
M_d	Starting torque
M_f	Braking torque
M_m	Maximum torque
M_n	Rated torque
M_R	Resistive torque

Mub	Manubloc
n	Number of starts
NIE	Not in any efficiency class
N_n	Rated speed
Ot	Orthobloc
P_n	Rated power
P_u	Output power
T	Cycle time
A.T.	Ambient temperature
t	Travel time
t_1	Release response time
t_2	Application response time
$t_{2\,DC}$	Application response time with DC switch-off
t_c	Total cycle time
t_F	Braking time
t_m	Motor running time in the cycle
t_{roc}	Control device response time
U.G.	General applications
U.L.	Hoisting applications
Z_c	Cycle starting frequency
Z_o	Brake motor starting frequency
Z_{oc}	Cycle equivalent starting frequency

Construction
Designation



[1] *NIE: not in any efficiency class*

Construction
Description of LS(ES) FFB

Description of LS(ES) FFB brake motors

Component	Materials	Comments
Finned housing	Aluminum alloy	- with integral feet (4 fixing holes), or without feet - lifting ring for frame size ≥ 100 - ground terminal with an optional jumper screw
Stator	Insulated low-carbon magnetic steel laminations Electroplated copper	- low carbon content guarantees long-term lamination pack stability - semi-enclosed slots - class F insulation - PTC for motor ≥ frame size 160
Rotor	Insulated low-carbon magnetic steel laminations Aluminum	- inclined cage bars - rotor cage pressure die-cast in aluminum (or alloy for special applications) - rotor balanced dynamically, 1/2 key
Shaft	Steel	- for all frame sizes with centre hole fitted with: • a screw and a washer • closed keyway
End shields	Cast iron	- DE and NDE, assembled using tie rods
Bearings		- protected ball bearings, permanently greased - bearings preloaded at non drive end
Lipseals **Labyrinth seal**	Synthetic rubber	- DE and NDE lipseals or deflectors to ensure IP55 sealing on the shaft - O ring seals to ensure IP55 sealing of the brake (motor NDE shield/backplate, brake disk/splined sleeve, armature/yoke)
Fan	Composite material	- bi-directional: straight blades
Fan cover	Pressed steel	- fitted, on request, with a drip cover for operation in vertical position, shaft end facing down
Terminal box	Aluminum alloy	- IP55, can be turned in 4 directions for flange mounted version, on opposite side from the feet for foot or foot and flange mounted version for frame size ≥ 80 - fitted with a terminal block with 6 steel terminals as standard (brass as an option) - terminal box fitted with threaded plugs (supplied without cable glands) (cable glands as an option) - 1 ground terminal in each terminal box - fixing system consisting of a cover with captive screws
Brake	Cast iron: yoke, backplate, release handle Anti-corrosion hardened steel: armature, screws, release lever Stainless steel: pressure springs, encoder extension Copper: brake coil	FFB: failsafe brake with factory-set braking torque, already run in • 4.5 to 200 N.m of braking torque in accordance with IEC 60034, 60072, EN 50281 • built-in power supply (including brake power supply unit); if it is separate (as an option) the power supply is independent of the motor (including brake power supply unit) • electromagnet encased in plastic to ensure it is fully sealed
External finish		- System Ia, shade RAL 6000 (green) - resistance to saline mist: 72 hrs (in accordance with NFX 41002)

From 0.25 to 15 kW in accordance with IEC 60034, as standard brake motors are wound as 230/380/400/415 V 50 Hz, 460 V 60 Hz with:
- power ratings ≤ 5.5 kW: ⅄ connection
- power ratings ≥ 7.5 kW: Δ connection
  They are available in 2, 4 and 6-pole versions.

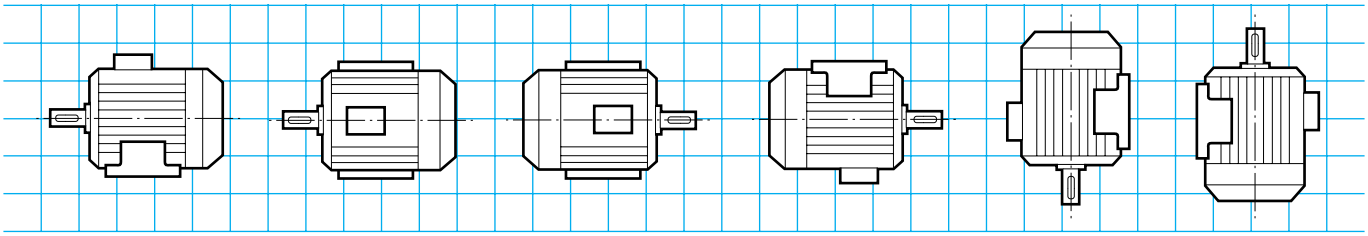
Adaptation to variable speed applications:
- LS, LS IFT/NIE, LSES IFT/IE2 or IE3 series Cabinet-mounted drive (offer on page 3):
- LS, LS IFT/NIE, LSES IFT/IE2 or IE3 series drive integrated in the VARMECA series brake motor

Adaptation to particular environments:
- Dust (ATEX certification pending, IP55 in zone 22)
- Mineral industry

Equipment and options:
- brake release (auto-return hand release (DLRA), release lock off system (DLM) and remote lock off system (DMD))
- indicator lamps (release, wear)
- reduced response time (TRR)
- drain hole (non-standard positions: B3, B5, B14)
- encoder: incremental or absolute, and/or forced ventilation unit
- applications: UG General, UL Hoisting (UT Translation on request)

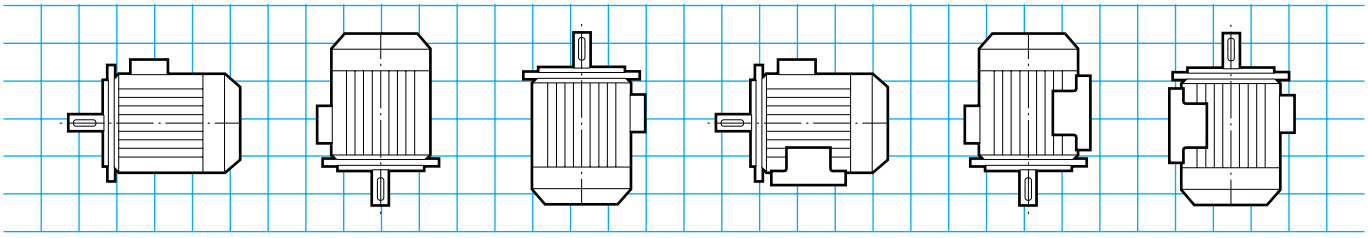
Construction
Mounting Arrangements

Foot mounted



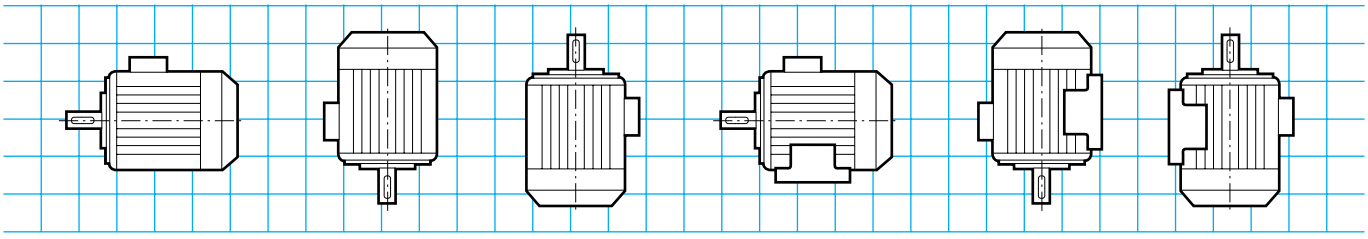
IM 1001 (IM B3) | **IM 1051** (IM B6) | **IM 1061** (IM B7) | **IM 1071** (IM B8) | **IM 1011** (IM V5) | **IM 1031** (IM V6)

Flange mounted (FF)



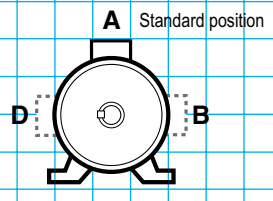
IM 3001 (IM B5) | **IM 3011** (IM V1) | **IM 3031** (IM V3) | **IM 2001** (IM B35) | **IM 2011** (IM V15) | **IM 2031** (IM V36)

Face mounted (FT)



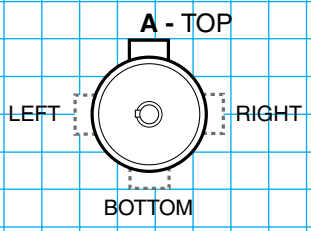
IM 3601 (IM B14) | **IM 3611** (IM V18) | **IM 3631** (IM V19) | **IM 2101** (IM B34) | **IM 2111** (IM V58) | **IM 2131** (IM V69)

Terminal box positions

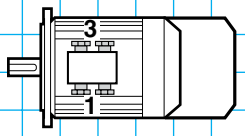


Foot mounted motor
A - Top: standard

Optional cable gland positions



Flange mounted motor
A - Top: Standard



1 - Right
3 - Left

Operation
Definition of the Brake Motor

The brake motor combines, in a single electromechanical assembly
- a motor: rotor + stator which forms the drive mechanism
- a control device: electromagnet + springs which apply or release the brake
- friction: lining + mating surface which provide the braking action

Areas of use

Intermittent duty: a mechanical device driven by a motor on its own takes a long time to stop if there is little friction. The brake motor ensures **shorter, accurate and safe stopping times**. It is used in handling where accuracy on stopping is required, and on production lines where the basic operations should be as done as quickly as possible.

Emergency stops: on dangerous machinery such as presses, machine-tools, woodworking machines, the brake motor brings the machinery to a stop almost instantly and ensures **the operator's safety**. The brake motor can also improve product quality and the machine usage rate.

Indeed, on machines operating at continuous flow (printing or production line), **stopping quickly when a defect or fault** appears limits the effects and reduces the time taken to get started again.

Holding a device under load: the brake motor can be used to hold the motor in standstill position, even if torque is still applied. Since the motor is powered off in UL hoisting applications (hoists, elevators, elevating platforms, etc.), the brake stops and then **holds the load**.

Failsafe brake

It brakes when the power is switched off, and can stop the motor and the driven machine and keep them immobile.

When the brake motor power is switched on, the electromagnet attracts the armature, compresses the springs and releases the brake.

When the brake motor power is switched off, the electromagnet lets the armature go. The thrust from the springs generates friction between the brake disk, the armature and the backplate, resulting in braking.

Braking is brought about by the thrust from the springs, hence without external energy input. This is safety braking: it is the most commonly used control mode.

Use with variable speed:

The brake must be supplied separately from the motor. The brake is controlled by the drive (see Installation section).

Using the BRAKE motor at constant torque (0 to 87 Hz)

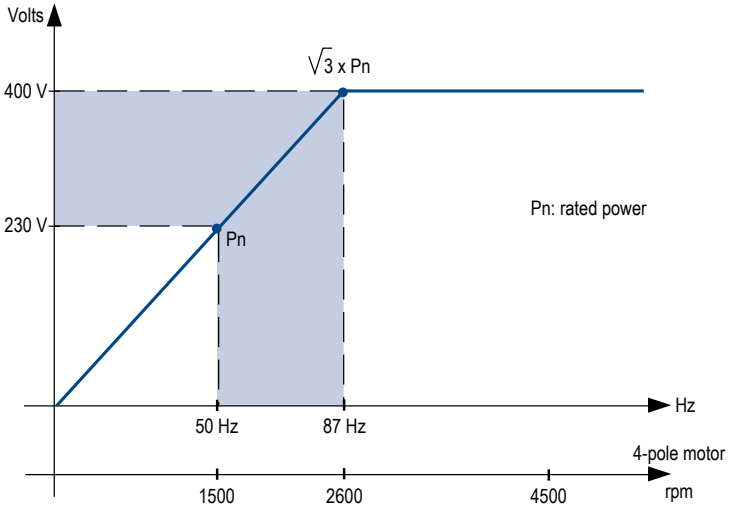
Using the brake motor with a Δ connection combined with a frequency inverter can increase the constant torque range from 50 to 87 Hz, which increases the power in the same ratio.

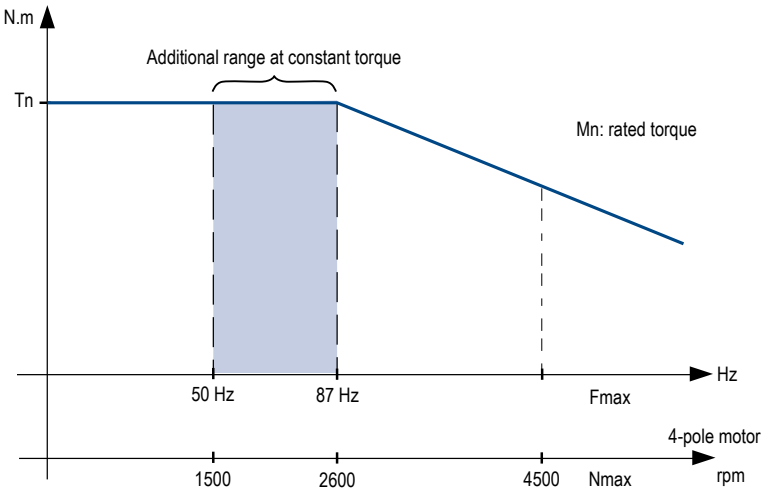
The size of the frequency inverter is determined by the current value in 230 V and programmed with a voltage/ frequency ratio of 400 V, 87 Hz.

WARNING

Maximum mechanical speed allowed: 4,500 rpm.

See the relevant characteristics pages at 87 Hz, power supply with drive on pages 19, 23, 25.





Characteristics of motors on drives
230 V Δ connection 400 V 50 Hz supply

Operation
Duty Cycle Definitions

CONDITIONS AND DUTY CYCLES

CONDITIONS

By “condition”, we mean all the electrical and mechanical values that typify machine operation at a given time.

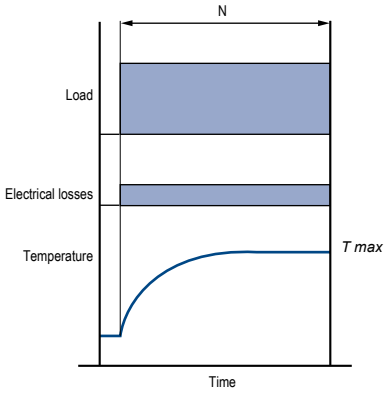
DUTY CYCLES (according to IEC 60034-1)

By “duty”, we mean the stipulated conditions to which the machine is subjected, their respective durations and order of succession over time.

1 - Continuous duty - Type S1

Operation at constant load of sufficient duration for thermal equilibrium to be reached (see figure 1). 5 starts maximum per hour.

Fig. 1. - Continuous duty. Type S1.



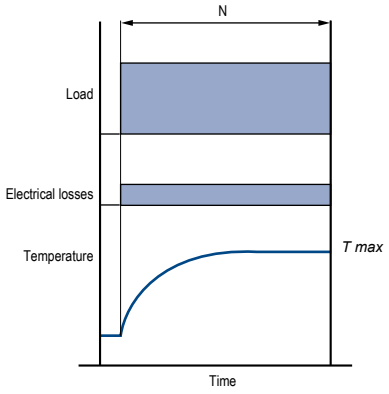
N = operation at constant load

Tmax = maximum temperature attained

2 - Short-time duty - Type S2

Operation at constant load during a given time, less than that required for thermal equilibrium to be reached, followed by a rest and de-energized period of sufficient duration to re-establish machine temperatures within 2 K of the coolant (see figure 2).

Fig. 2. - Short-time duty. Type S2.



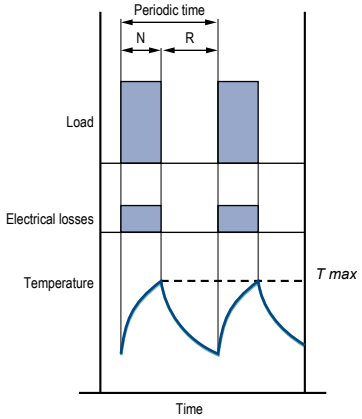
N = *operation at constant load*

T_{max} = maximum temperature attained

3 - Intermittent periodic duty - Type S3

A sequence of identical duty cycles, each consisting of a period of operation at constant load and a rest and de-energized period (see figure 3). Here, the cycle is such that the starting current does not significantly affect the temperature rise (see figure 3).

Fig. 3. - Intermittent periodic duty. Type S3.



N = *operation at constant load*

R = rest

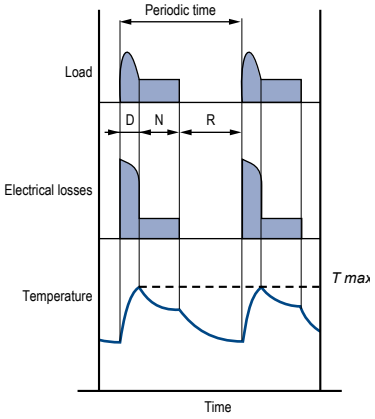
T_{max} = maximum temperature attained

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

4 - Intermittent periodic duty with starting - Type S4

A sequence of identical duty cycles, each consisting of a significant starting period, a period of operation at constant load and a rest and de-energized period (see figure 4).

Fig. 4 - Intermittent periodic duty with starting - Type S4.



D = *starting*

N = operation at constant load

R = rest

T_{max} = maximum temperature attained during cycle

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

Operation
Duty Cycle Definitions

S4 OPERATING RATES

The different number of starts and driven loads can result in excessive temperature rise in the brake motor.
Select the motor so that $Z_o \geq Z_{oc}$
(Z_o brake motor starting frequency).

Z_{oc} : EQUIVALENT CYCLE STARTING FREQUENCY (h^{-1})

$$Z_{oc} = Z_c \frac{J_c + J_m}{J_m}$$

Z_c : CYCLE STARTING FREQUENCY (h^{-1})

$$Z_c = \frac{n}{t_c}$$

J_m : MOTOR MOMENT OF INERTIA ($kg.m^{-2}$)

J_c : MOMENT OF INERTIA OF THE DRIVEN LOAD ($kg.m^{-2}$)

n : NUMBER OF CYCLE STARTS DURING t_c

t_c : TOTAL CYCLE TIME (h)

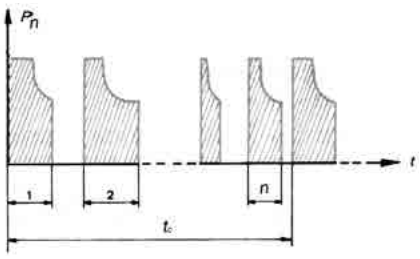
OF : OPERATING FACTOR (%)

$$FM = \frac{t_m}{t_c} \times 100$$

t_m : MOTOR RUNNING TIME IN THE CYCLE (h)

S4 DUTY TYPE

For each type of brake motor, the Z_o values are given for ***OFs*** of 25%, 40%, 60%. These starting frequencies are valid for motors at rated power where J_c = 0. They correspond to the standard brake motor.
There are several ways to obtain higher starting frequencies:
- early release
- motor derating
- for special versions, please consult Leroy-Somer.



n = Number of starts in a cycle t_c
P_n = Rated motor power
t = Travel time (s)
t_c = Total cycle time (h)

NO-LOAD STARTING FREQUENCY: Z_0

(For $\Delta T = 100°$, values expressed in h-1)

4 poles - 1500 rpm IFT/NIE

(except motors in italics)

Motor type	Brake type	P_n kW	Operating factor		
			25%	40%	60%
LS 71 M	*FFB1*	*0.25*	*4400*	*3500*	*3000*
LS 71 M	*FFB1*	*0.37*	*4400*	*3500*	*3000*
LS 71 L	*FFB1*	*0.55*	*4400*	*3500*	*3000*
LS 80 L	FFB1	0.55	2800	2000	1650
LS 80 L	FFB1	0.75	2800	2000	1650
LS 80 L	FFB1	0.9	2800	2000	1650
LS 90 SL	FFB2	1.1	1400	1200	1000
LS 90 L	FFB2	1.5	1400	1200	1000
LS 90 L	FFB2	1.8	1400	1200	1000
LS 100 L	FFB2	2.2	1800	1500	1300
LS 100 L	FFB3	3	1800	1500	1300
LS 112 M	FFB3	4	900	800	700
LS 132 S	FFB3	5.5	700	600	500
LS 132 M	FFB4	7.5	350	320	290
LS 132 M	FFB4	9	350	320	290
LS 160 MP	FFB5	11	300	270	250
LS 160 LR	FFB5	15	300	270	250

4 poles - 1500 rpm - IFT/IE2
General applications: UG

Motor type	Brake type	P_n kW	Operating factor		
			25%	40%	60%
LSES 80 LG	FFB1	0.75	2400	1800	1500
LSES 80 LG	FFB1	0.9	2400	1800	1500
LSES 90 SL	FFB2	1.1	1200	1000	800
LSES 90 L	FFB2	1.5	1200	1000	800
LSES 90 LU	FFB2	1.8	1200	1000	800
LSES 100 L	FFB2	2.2	1500	1300	1000
LSES 100 LR	FFB3	3	1500	1300	1000
LSES 112 MU	FFB3	4	800	700	600
LSES 132 SU	FFB3	5.5	600	500	400
LSES 132 M	FFB4	7.5	320	300	280
LSES 132 M	FFB4	9	320	300	280
LSES 160 MR	FFB5	11	280	250	220
LSES 160 L	FFB5	15	250	220	200

4 poles - 1500 rpm - IFT/IE3
General applications: UG

Motor type	Brake type	P_n kW	Operating factor		
			25%	40%	60%
LSES 80 LG	FFB1	0.75	2000	1500	1000
LSES 80 LG	FFB1	0.9	1200	1000	800
LSES 90 SL	FFB2	1.1	1100	900	800
LSES 90 LU	FFB2	1.5	1000	800	700
LSES 100 L	FFB2	1.8	1500	1300	1000
LSES 100 LR	FFB2	2.2	1500	1300	1000
LSES 100 LG	FFB3	3	800	700	600
LSES 112 MU	FFB3	4	600	500	400
LSES 132 SM	FFB4	5.5	300	280	250
LSES 132 MU	FFB4	7.5	300	280	250
LSES 160 MR	FFB4	9	280	250	220
LSES 160 M	FFB5	11	250	220	200
LSES 160 LUR	FFB5	15	200	180	150

Operation
Electromagnet Characteristics

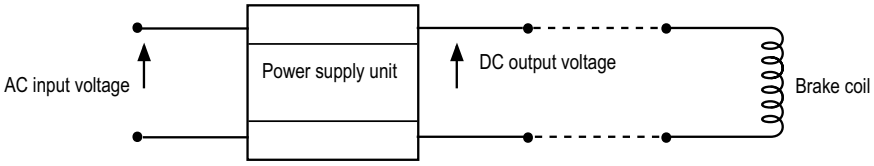
The DC electromagnet consists of a resin-coated coil in a cast iron yoke.
The yoke and the armature form the magnetic circuit.
All our coils are made for a DC voltage of 180 VDC (400 or 230 VAC supply) or 20 VDC (24 VAC supply). All the electromagnets are class F and can be continuously supplied with power.
Since it is difficult to distinguish between some DC coils by size alone, the coil resistance should be measured with an appropriately rated ohmmeter and compared with the value given in the table below.
These values are theoretical, calculated for an ambient temperature of 20°C.

Electromagnet characteristics ±5%, at 20°C

Type brake	180 V coil			20 V coil		
	Current A	Resistance Ω	Power W	Current A	Resistance Ω	Power W
FFB1	0.232	776	42	1.974	10.1	39
FFB2	0.295	610	53	2.633	7.6	53
FFB3	0.345	522	62	2.793	7.2	56
FFB4	0.339	530	61	3.602	5.6	72
FFB5	0.547	329	98	4.211	4.8	84

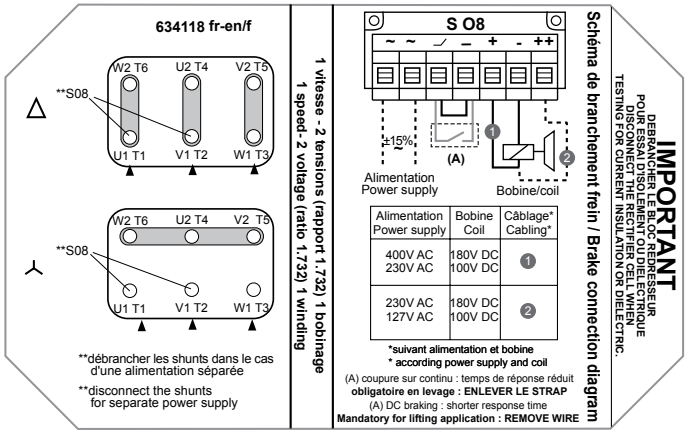
Brake Power Supply Unit Characteristics

OPERATING PRINCIPLE

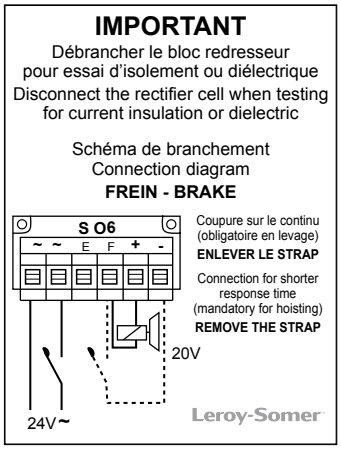


DEFINITION OF BUILT-IN OR SEPARATE POWER SUPPLY

Built-in power supply:
The rectifier power supply unit is connected in parallel on the motor power supply.
S08 cubicle, 180 VDC coil for standard single-speed brake motor.



Separate power supply:
The motor and rectifier unit power supplies are independent. In this instance the AC input voltage to be used to supply the rectifier unit should be stated.
S06 cubicle, 20 VDC coil, 24 V separate power supply



Operation
Braking Torques

The braking torque *Mf* is obtained from the friction between a lining made of fibrous composite material and a mating surface. If the braking torque is higher than the highest motor torque, there is a risk of the drivetrain becoming fatigued or breaking. It is therefore advisable to use:

$$Mf = 1.5 \times M_n$$

and never to exceed M_D.

The stated dynamic braking torque

is optimum (tolerance from -10 to +40%). A standard is determined as a function of the motor power and its efficiency class: see the selection tables in the Characteristics Tables section.
A non-standard braking torque is possible as an option (see Optional Braking Torque section).
If you encounter any difficulty relating to standards, please consult Leroy-Somer.

Influence of the environment

The brake components are treated with anti-corrosion protection to prevent sticking and oxidation of mechanical parts in a damp environment.

Influence of temperature

The heat released during successive braking operations increases the temperature. The resulting reduction in braking torque can be as much as 15% of the rated value.

Wear

This is inevitable and requires regular brake adjustment. For each braking operation it is proportional to:

$$0.5 \times (J_m + J_c) \times \omega_N^2$$

It is therefore advisable to avoid braking operations at high rotation speeds (3,000 pm and above) to reduce the amount of wear.
Wear also occurs, to a lesser extent, on release.
Motor starting and brake release occur simultaneously. For a short time, the braking torque is reduced before reaching zero; this results in brake wear and overheating of the motor. This can be avoided with early release (which consists of releasing the brake before starting the motor, using a time-delay contact.
An optional indicator lamp supplements monitoring and advises when it is necessary to adjust the air gap or change the lining (see Indicator: release/application, wear section).

Number of braking operations allowed

4 poles - 1500 rpm - IFT/NIE *(except motors in italics)*

Motor type	Brake type	P_n kW	Maximum number of braking operations (10^6)					Number of braking operations before air gap adjustment (10^6)				
			F_J=1	F_J=5	F_J=10	F_J=15	F_J=20	F_J=1	F_J=5	F_J=10	F_J=15	F_J=20
LS 71 M	*FFB1*	*0.25*	*24.64*	*8.21*	*4.48*	*3.08*	*2.35*	*4.93*	*1.64*	*0.90*	*0.62*	*0.47*
LS 71 M	*FFB1*	*0.37*	*20.87*	*6.96*	*3.79*	*2.61*	*1.99*	*4.17*	*1.39*	*0.76*	*0.52*	*0.40*
LS 71 L	*FFB1*	*0.55*	*17.03*	*5.68*	*3.10*	*2.13*	*1.62*	*3.41*	*1.14*	*0.62*	*0.43*	*0.32*
LS 80 L	FFB1	0.55	14.84	4.95	2.70	1.85	1.41	2.97	0.99	0.54	0.37	0.28
LS 80 L	FFB1	0.75	11.24	3.75	2.04	1.41	1.07	2.25	0.75	0.41	0.28	0.21
LS 80 L	FFB1	0.9	8.71	2.90	1.58	1.09	0.83	1.74	0.58	0.32	0.22	0.17
LS 90 SL	FFB2	1.1	11.46	3.82	2.08	1.43	1.09	2.29	0.76	0.42	0.29	0.22
LS 90 L	FFB2	1.5	9.75	3.25	1.77	1.22	0.93	1.95	0.65	0.35	0.24	0.19
LS 90 L	FFB2	1.8	8.67	2.89	1.58	1.08	0.83	1.73	0.58	0.32	0.22	0.17
LS 100 L	FFB2	2.2	7.66	2.55	1.39	0.96	0.73	1.53	0.51	0.28	0.19	0.15
LS 100 L	FFB3	3	6.21	2.07	1.13	0.78	0.59	1.24	0.41	0.23	0.16	0.12
LS 112 M	FFB3	4	5.23	1.74	0.95	0.65	0.50	1.05	0.35	0.19	0.13	0.10
LS 132 S	FFB3	5.5	2.66	0.89	0.48	0.33	0.25	0.53	0.18	0.10	0.07	0.05
LS 132 M	FFB4	7.5	4.91	1.64	0.89	0.61	0.47	0.74	0.25	0.13	0.09	0.07
LS 132 M	FFB4	9	4.23	1.41	0.77	0.53	0.40	0.63	0.21	0.12	0.08	0.06
LS 160 MP	FFB5	11	3.41	1.14	0.62	0.43	0.32	0.51	0.17	0.09	0.06	0.05
LS 160 LR	FFB5	15	2.92	0.97	0.53	0.37	0.28	0.44	0.15	0.08	0.05	0.04

4 poles - 1500 rpm - IFT/IE2 - General applications: UG

Motor type	Brake type	P_n kW	Maximum number of braking operations (10^6)					Number of braking operations before air gap adjustment (10^6)				
			F_J=1	F_J=5	F_J=10	F_J=15	F_J=20	F_J=1	F_J=5	F_J=10	F_J=15	F_J=20
LSES 80 LG	FFB1	0.75	7.96	2.65	1.45	0.99	0.76	1.59	0.53	0.29	0.20	0.15
LSES 80 LG	FFB1	0.9	6.77	2.26	1.23	0.85	0.65	1.35	0.45	0.25	0.17	0.13
LSES 90 SL	FFB2	1.1	9.38	3.13	1.71	1.17	0.89	1.88	0.63	0.34	0.23	0.18
LSES 90 L	FFB2	1.5	7.85	2.62	1.43	0.98	0.75	1.57	0.52	0.29	0.20	0.15
LSES 90 LU	FFB2	1.8	7.38	2.46	1.34	0.92	0.70	1.48	0.49	0.27	0.18	0.14
LSES 100 L	FFB2	2.2	6.05	2.02	1.10	0.76	0.58	1.21	0.40	0.22	0.15	0.12
LSES 100 LR	FFB3	3	5.18	1.73	0.94	0.65	0.49	1.04	0.35	0.19	0.13	0.10
LSES 112 MU	FFB3	4	2.82	0.94	0.51	0.35	0.27	0.56	0.19	0.10	0.07	0.05
LSES 132 SU	FFB3	5.5	2.33	0.78	0.42	0.29	0.22	0.47	0.16	0.08	0.06	0.04
LSES 132 M	FFB4	7.5	4.25	1.42	0.77	0.53	0.41	0.64	0.21	0.12	0.08	0.06
LSES 132 M	FFB4	9	3.69	1.23	0.67	0.46	0.35	0.55	0.18	0.10	0.07	0.05
LSES 160 MR	FFB5	11	2.94	0.98	0.53	0.37	0.28	0.44	0.15	0.08	0.06	0.04
LSES 160 L	FFB5	15	1.59	0.53	0.29	0.20	0.15	0.24	0.08	0.04	0.03	0.02

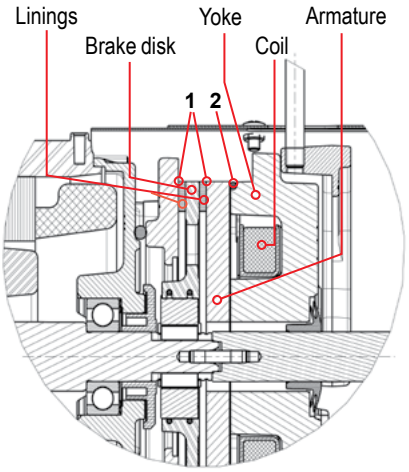
4 poles - 1500 rpm - IFT/IE3 - General applications: UG

Motor type	Brake type	P_n kW	Maximum number of braking operations (10^6)					Number of braking operations before air gap adjustment (10^6)				
			F_J=1	F_J=5	F_J=10	F_J=15	F_J=20	F_J=1	F_J=5	F_J=10	F_J=15	F_J=20
LSES 80 LG	FFB1	0.75	6.42	2.14	1.17	0.80	0.61	1.28	0.43	0.23	0.16	0.12
LSES 80 LG	FFB1	0.9	5.69	1.90	1.03	0.71	0.54	1.14	0.38	0.21	0.14	0.11
LSES 90 SL	FFB2	1.1	7.85	2.62	1.43	0.98	0.75	1.57	0.52	0.29	0.20	0.15
LSES 90 LU	FFB2	1.5	6.48	2.16	1.18	0.81	0.62	1.30	0.43	0.24	0.6	0.12
LSES 100 L	FFB2	1.8	6.11	2.04	1.11	0.76	0.58	1.22	0.41	0.22	0.15	0.12
LSES 100 LR	FFB2	2.2	5.18	1.73	0.94	0.65	0.49	1.04	0.35	0.19	0.13	0.10
LSES 100 LG	FFB3	3	3.19	1.06	0.58	0.40	0.30	0.64	0.21	0.12	0.08	0.06
LSES 112 MU	FFB3	4	2.61	0.87	0.47	0.33	0.25	0.52	0.17	0.09	0.07	0.05
LSES 132 SM	FFB4	5.5	4.30	1.43	0.78	0.54	0.41	0.64	0.21	0.12	0.08	0.06
LSES 132 MU	FFB4	7.5	2.98	0.99	0.54	0.37	0.28	0.45	0.15	0.08	0.06	0.04
LSES 160 MR	FFB4	9	2.59	0.86	0.47	0.32	0.25	0.39	0.13	0.07	0.05	0.04
LSES 160 M	FFB5	11	1.59	0.53	0.29	0.20	0.15	0.24	0.08	0.04	0.03	0.02
LSES 160 LUR	FFB5	15	1.21	0.40	0.22	0.15	0.11	0.18	0.06	0.03	0.02	0.02

Operation
Braking Torques

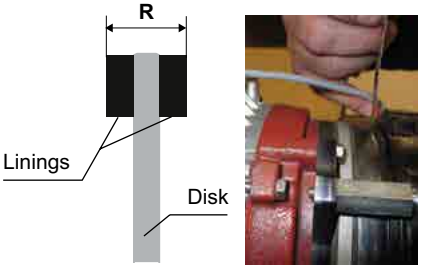
Air gap
In order to be able to apply and release the brake, there needs to be displacement of the lining and the armature; this displacement is the air gap. The air gap must be adjusted after the lining is worn down by a maximum of 3 mm (1.5 mm on each side). The thickness of the lining must be checked on each adjustment to ensure that the wear does not exceed dimension R in mm (R/2 on each side of the disk).
It must be changed when the following measurement is found between the two linings:

Brake size	Minimum R dimension
FFB1, FFB2, FFB3	9 mm
FFB4, FFB5	15 mm



1: air gap with coil energized, brake released
2: air gap with coil de-energized, brake applied

Running-in
The lining allows for a running-in period during which the braking torque is at its maximum value. All the brake linings are run in at the factory prior to assembly on the motor.



Moments of Inertia

The moments of inertia of all our brake motors are given in the characteristics table, in the section with the same name, where J is expressed in kg.m^2.

Brake Response Time and Stopping Distance

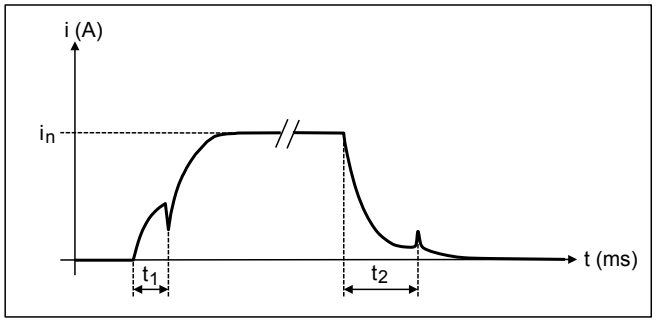
DEFINITION OF RESPONSE TIMES

Brake release response time t_1:

Time between the moment when the coil is supplied with power and the moment when the armature is in contact with the yoke; this moment is shown on the current curve below as a peak. This interval includes the magnetization time and the armature travel time.

Brake application (engage) response time t_2:

Time between the moment when the coil power supply is cut and the moment when the armature is in contact with the disk; this moment is shown on the current curve below as a peak. This interval includes the demagnetization time and the armature travel time.



i: current (Amps)
i_n: rated current
t_1: Release response time (milliseconds ms)
t_2: Application response time (milliseconds ms)

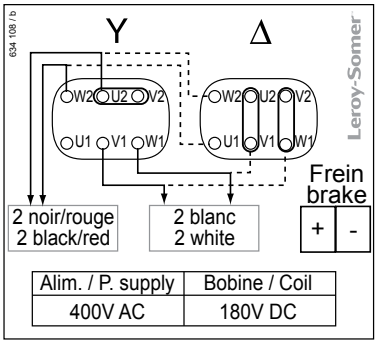
The brake response time depends on the value of the air gap adjustment. It should therefore be checked regularly (see above).

Option:

TRR response time reduced by electronic booster: offered exclusively with built-in power supply and connected at the factory.

Using this option allows the frequency of starts to be increased and improves accuracy on stopping by reducing the response time and application time by a third or a half depending on the size of the brake.

In addition, it saves the cost of wiring up a DC switch-off device, which is no longer needed.



This option is not compatible with motors for operation on a drive. It is not compatible with separate brake power supply (and built-in power supply on two-speed motors).

Operation
Brake Response Time and Stopping Distance

RESPONSE TIME VALUES

The response times below are given for a brand-new brake (air gap at its rated value), supplied independently of the motor and at a coil temperature of 20°C ±5%.

Brake type	Mf N.m	180 V coil			20 V coil		
		Brake release response time t_1 (ms)	Response time brake application t_2 (ms)		Brake release response time t_1 (ms)	Response time brake application t_2 (ms)	
		Standard	AC switch-off	DC switch-off	Standard	AC switch-off	DC switch-off
FFB1	4.5	25	198	< 5	28	177	< 5
	6	28	159	< 5	30	142	< 5
	7.5	30	134	< 5	32	120	< 5
	9	32	117	< 5	34	105	< 5
	10.5	34	104	< 5	36	93	< 5
	12	36	94	< 5	37	84	< 5
FFB2	11	52	416	< 5	58	235	< 5
	15	56	295	< 5	58	178	< 5
	19	59	226	< 5	57	143	< 5
	23	62	182	< 5	57	120	< 5
	26	65	151	< 5	57	103	< 5
	30	67	129	< 5	57	90	< 5
FFB3	37	85	166	< 20	75	216	< 5
	45	91	132	< 20	78	189	< 5
	52	97	108	< 20	81	168	< 5
	59	102	91	< 20	84	152	< 5
	67	107	79	< 20	86	140	< 5
	74	112	69	< 20	88	129	< 5
FFB4	41	71	574	< 10	61	248	< 5
	55	82	382	< 10	72	179	< 5
	69	92	278	< 10	82	138	< 5
	83	101	215	< 10	91	112	< 5
	96	109	173	< 10	99	94	< 5
	110	117	143	< 10	107	81	< 5
FFB5	120	102	517	< 20	134	282	< 5
	140	113	427	< 20	146	236	< 5
	160	123	361	< 20	157	203	< 5
	180	133	311	< 20	168	177	< 5
	200	142	273	< 20	178	157	< 5

Noise Level

The noise levels displayed are the least favorable for values measured in side and axial positions. As a result, in numerous cases, our brake motors perform better. Please consult Leroy-Somer for actual values, giving any application constraints.

Brake type	Mf N.m16	180 V coil			20 V coil		
		Noise level on brake release	Noise level on brake application		Noise level on brake release	Noise level on brake application	
			AC switch-off	DC switch-off		AC switch-off	DC switch-off
		dBa	dBa	dBa	dBa	dBa	dBa
FFB1	4.5	51	50	58	42	48	58
	6	52	52	60	43	51	60
	7.5	53	54	62	44	54	62
	9	53	55	63	44	57	63
	10.5	54	56	65	45	59	64
	12	54	57	66	45	61	65
FFB2	11	47	32	45	47	32	45
	15	47	33	50	47	33	48
	19	48	34	54	48	34	50
	23	48	34	58	48	34	51
	26	48	35	60	48	35	53
	30	48	35	63	48	35	54
FFB3	37	52	50	61	52	50	61
	45	53	53	63	53	53	63
	52	54	55	65	54	55	65
	59	55	57	66	55	57	66
	67	55	58	67	55	58	67
	74	56	60	68	56	60	68
FFB4	41	60	48	64	60	56	65
	55	60	51	67	61	57	68
	69	60	53	69	63	58	70
	83	60	54	71	64	60	72
	96	60	56	73	64	62	73
	110	60	57	74	65	63	75
FFB5	120	70	49	70	61	57	68
	140	69	51	71	61	59	70
	160	69	53	72	61	61	72
	180	69	54	73	61	63	74
	200	69	56	74	61	64	75

STOPPING TIME AND DISTANCE CALCULATIONS

STOPPING TIME (in ms): t_a

$$t_a = t_c + t_2 + t_F$$

t_c: Control device response time (in ms) (see opposite)
t_2: Brake application response time (in ms)
t_F: Brake application response time (in ms)

BRAKING TIME (in s): t_F

$$t_F = \frac{(J_m + J_c)\ \omega_N}{M_f \pm M_R}$$

J_M: Motor moment of inertia (in kgm^2)
J_c: Load moment of inertia (in kgm^2)
ω_N: Motor angular speed (in rd/s)
M_f: Brake motor braking torque (in N.m)
M_R: Load resistive torque (in N.m)
(+ if it is braking, - if it is driving)

MOMENT OF INERTIA OF THE LOAD APPLIED TO THE 'MOTOR SHAFT (kgm^2): $J_{C/M}$

$$J_{C/M} = J_1 + J_2\left(\frac{\omega_2}{\omega_N}\right) + m\left(\frac{v}{\omega_N}\right)$$

J_1: Moment of inertia rotating at (in kgm^2)
ω_N: Motor angular speed (in rd/s)
J_2: Moment of inertia rotating at (in kgm^2)
ω_2: Angular speed (in rd/s)
m: Mass travelling at (in kg)
v: Linear speed (in m/s)

STOPPING DISTANCE (in m): l_a

$$l_a = v\left(t_c + t_2 + \frac{t_F}{2}\right)$$

v: Linear speed (in m/s)
t_c, t_2, t_F: Time (in s)

NUMBER OF REVOLUTIONS BEFORE THE MOTOR STOPS (in ms): a

$$a = \frac{\omega_N}{2\pi}\left(t_c + t_2 + \frac{t_F}{2}\right)$$

ω_N: Motor angular speed (in rd/s)
t_c, t_2, t_F: Time (in s)

ACCURACY ON STOPPING (%)

Accuracy on stopping or repeatability of braking depends on many factors: temperature, air gap, brake wear, drivetrain backlash, etc.
It is reasonable to assume accuracy on stopping of ± 20%.
AC electromagnet, or DC electromagnet with DC switch-off, and taking special care: ± 10%.

BRAKE WEAR CALCULATION

INERTIA FACTOR: FJ

$$FJ = \frac{J_{C/M}}{J_M}$$

$J_{C/M}$: Moment of inertia of the load applied to the brake motor shaft
J_M: Brake motor moment of inertia

Operation
Brake Response Time and Stopping Distance

Loads Applied to the Motor (Main) Shaft

In pulley and belt couplings, the shaft extension carrying the pulley is subjected to a radial force. Formulae and charts can be read in the IMfinity® Motors catalog ref. 5147. In the same catalog, the axial force on the shaft can be found for a bearing life L10h of 25,000 and 40,000 hours.

Example of Selection

CUSTOMER REQUEST: Normal, non-corrosive environment, General applications. 0.75 kW 4p brake motor for motorizing a 15-tonne trolley.

- Linear speed: 15 m/min
- Accuracy on stopping: to be stated
- Safety brake and release by a lever
- Running time: 12 s, stopping: 33 s
- Control device response time: 0.01 s
- Drivetrain efficiency: 0.8
- Rolling resistance coefficient Kr = 0.1 N/kg
- Mounted on standard flange

CONVERSION TO SI UNITS

$\omega = 1400 \times \frac{2\pi}{60} = 147$ rd/s

Under load

$v = \frac{15}{60} = 0.25$ m/s

OPERATING CYCLE

Cycle time

$T = 12 + 33 = 45$ s

Operating factor

$OF = \frac{12}{45} = 25\%$

STARTING FREQUENCY

$Z_{oc} = Z_C \times \frac{J_M + J_C}{J_M} = 25\%$

$Z_C = \frac{n}{t_C} = \frac{1}{45/3600} = 80$ h-1

$J_C = m \times \left(\frac{v}{\omega}\right)^2 = 15{,}000 \times \left(\frac{0.25}{147}\right)^2 = 0.043$ kgm^2

The flow chart on page 2 leads us to select the FFB brake series. The 4p, 0.75 kW brake motor inertia is:

JM = 0.0019 kgm^2 (see page 18)

$Z_{oc} = 80 \times \frac{0.0019 + 0.043}{0.0019} = 1890$ h-1

$Z_o \geq Z_{oc}$ (the table on page 12 indicates 2800 st/h-1) for a 4p, 0.75 kW brake motor with non-IE efficiency class (NIE):

4p - LS - 80L - 0.75 kW - IM B5 -230/400V 50 Hz - UG - FFB1 - 12 Nm - + auto-return hand brake release
Code : 4988074

BRAKING TIME

Resistive torque:

$M_R = m \times kr \times \frac{v}{\omega} \times \frac{1}{\eta} = 15000 \times 0.1 \times \frac{0.25}{147} \times \frac{1}{0.8} = 3$ Nm

t_F rated = $(Jm + Jc) \times \frac{\omega_N}{M_F + M_R} = (0.0019 + 0.043) \times \frac{147}{12 + 3} = 0.44$ s

0.44 s = rated braking time
for M_F +40% = 17 Nm → t_F = 0.33 s (minimum)
for M_F -10% = 11 Nm → t_F = 0.47 s (maximum)

STOPPING DISTANCE AND ACCURACY

$la = v\,(t_r + t_2 + \frac{t_F}{2}) = 0.25 \times (0.01 + 0.094 + \frac{0.44}{2}) = 0.0810$ m rated stopping distance

Accuracy on stopping:
for t_F min. 0.33 s → la = 0.0673 m minimum stopping distance
for t_F max. 0.47 s → la = 0.0848 m maximum stopping distance

NUMBER OF BRAKING OPERATIONS BEFORE ADJUSTMENT

Inertia factor calculation

$Fj = \frac{J_{C/M}}{J_M} = \frac{0.043}{0.0019} = 22$

The table on page 14 gives us directly the number of braking operations before adjustment, say for a non-IE 4p, 0.75 kW IFT = 0.21 x 10^6 = 210,000 braking operations.

Characteristics
Characteristics Tables

IFT/NIE BRAKE MOTORS

4 poles - 1500 rpm - IFT/NIE (*except motors in italics*) - AC power supply
LS FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	Rated power	Rated torque	Starting torque/ Rated torque	Maximum torque/ Rated torque	Starting current/ Rated current	Moment of inertia	Braking torque[1]	400 V - 50 Hz				Weight IM B3/B5[2]
									Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	
		P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	M_f N.m	N_n rpm	I_n A	η % 4/4	Cos φ 4/4	kg
LS 71 M	***FFB1***	*0.25*	*1.68*	*2.73*	*2.93*	*4.63*	*0.00094*	*4.5*	*1425*	*0.80*	*67.0*	*0.65*	*9.4*
LS 71 M	***FFB1***	*0.37*	*2.49*	*2.41*	*2.81*	*4.91*	*0.00111*	*4.5*	*1420*	*1.06*	*70.0*	*0.70*	*10.3*
LS 71 L	***FFB1***	*0.55*	*3.75*	*2.32*	*2.53*	*4.81*	*0.00136*	*12*	*1400*	*1.62*	*68.0*	*0.70*	*11.3*
LS 80 L	**FFB1**	0.55	3.75	2.15	2.30	3.90	0.00154	12	1405	1.70	66.9	0.71	11.5
LS 80 L	**FFB1**	0.75	5.1	1.80	2.15	4.25	0.00190	12	1400	2.05	69.3	0.77	13.5
LS 80 L	**FFB1**	0.9	6.05	3.10	3.10	5.55	0.00266	12	1425	2.45	73.0	0.73	13.9
LS 90 SL	**FFB2**	1.1	7.35	1.50	2.15	4.50	0.00349	19	1425	2.50	76.1	0.84	18.2
LS 90 L	**FFB2**	1.5	10	1.90	2.40	5.25	0.00421	19	1430	3.30	79.2	0.83	20.0
LS 90 L	**FFB2**	1.8	12	2.00	2.55	5.60	0.00464	26	1435	3.95	79.9	0.82	21.0
LS 100 L	**FFB2**	2.2	14.6	2.30	2.70	5.70	0.00514	26	1435	4.80	80.2	0.82	24.9
LS 100 L	**FFB3**	3	20	2.60	3.10	6.65	0.00654	52	1435	6.35	82.2	0.83	29.1
LS 112 M	**FFB3**	4	26.7	2.65	3.05	5.85	0.00704	52	1430	8.95	81.4	0.79	29.6
LS 132 S	**FFB3**	5.5	36.1	2.55	3.20	6.95	0.01534	67	1456	11.5	85.4	0.81	44.6
LS 132 M	**FFB4**	7.5	49.4	2.30	3.00	5.90	0.02508	110	1450	15.6	86.8	0.80	62.5
LS 132 M	**FFB4**	9	59.3	2.40	2.95	6.60	0.02868	110	1450	17.8	87.5	0.83	67.4
LS 160 MP	**FFB5**	11	72.3	2.90	3.30	6.85	0.03366	140	1452	22.1	88.8	0.81	82.9
LS 160 LR	**FFB5**	15	98.5	2.85	3.35	7.45	0.04153	180	1454	30.0	89.1	0.81	96.1

1. Values given for information only; for standards-related restrictions, please consult Leroy-Somer.

2. These values are given for information only.

4 poles - 1500 rpm - IFT/NIE - DRIVE power supply
LS FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Separate brake power supply - Factory-set braking torque

Motor type	Brake type	Rated power	400 V - 50 Hz			% Rated torque				
			Rated speed	Rated current	Power factor	M_n at				
		P_n kW	N_n rpm	I_n A	Cos φ 4/4	10 Hz	17 Hz	25 Hz	50 Hz	87 Hz
LS 80 L	**FFB1**	0.75	1380	2.10	0.81	65%	80%	100%	100%	57%
LS 80 L	**FFB1**	0.9	1415	2.50	0.77	65%	80%	100%	100%	57%
LS 90 SL	**FFB2**	1.1	1410	2.68	0.87	75%	85%	90%	100%	57%
LS 90 L	**FFB2**	1.5	1420	3.52	0.86	75%	85%	90%	100%	57%
LS 90 L	**FFB2**	1.8	1425	4.23	0.85	75%	85%	90%	100%	57%
LS 100 L	**FFB2**	2.2	1425	5.11	0.86	75%	85%	90%	100%	57%
LS 100 L	**FFB3**	3	1425	6.78	0.86	60%	85%	90%	100%	57%
LS 112 M	**FFB3**	4	1420	9.32	0.84	60%	85%	90%	100%	57%
LS 132 S	**FFB3**	5.5	1450	11.9	0.86	70%	85%	100%	100%	57%
LS 132 M	**FFB4**	7.5	1445	15.7	0.82	90%	100%	100%	100%	57%
LS 132 M	**FFB4**	9	1440	18.8	0.86	90%	100%	100%	100%	57%
LS 160 MP	**FFB5**	11	1450	22.3	0.83	90%	100%	100%	100%	57%
LS 160 LR	**FFB5**	15	1450	30.3	0.83	90%	100%	100%	100%	57%

Characteristics
Characteristics Tables

IFT/NIE BRAKE MOTORS

4 poles - 1500 rpm - IFT/NIE (*except motors in italics*) - AC power supply
LS FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Built-in power supply - Factory-set braking torque

			380 V - 50 Hz				415 V - 50 Hz					460 V - 60 Hz			
		Rated power	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	Rated power	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor
Motor type	**Brake type**	P_n kW	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	P_n kW	N_n rpm	I_n A	η% 4/4	Cos φ 4/4
LS 71 M	***FFB1***	*0.25*	-	-	-	-	-	-	-	-	-	-	-	-	-
LS 71 M	***FFB1***	*0.37*	-	-	-	-	-	-	-	-	-	-	-	-	-
LS 71 L	***FFB1***	*0.55*	-	-	-	-	-	-	-	-	-	-	-	-	-
LS 80 L	**FFB1**	0.55	1390	1.65	67.5	0.75	1415	1.75	65.5	0.67	0.63	1710	1.60	71.6	0.70
LS 80 L	**FFB1**	0.75	1380	2.05	68.3	0.81	1410	2.05	69.0	0.73	0.86	1705	1.95	73.3	0.76
LS 80 L	**FFB1**	0.9	1415	2.45	73.0	0.77	1435	2.50	72.0	0.70	1.04	1715	2.20	75.5	0.78
LS 90 SL	**FFB2**	1.1	1410	2.60	74.3	0.87	1435	2.45	77.0	0.82	1.27	1730	2.40	78.8	0.84
LS 90 L	**FFB2**	1.5	1420	3.40	77.8	0.86	1440	3.25	79.5	0.80	1.73	1735	3.20	81.2	0.83
LS 90 L	**FFB2**	1.8	1425	4.10	78.8	0.85	1445	4.00	80.3	0.78	2.07	1735	3.90	81.8	0.82
LS 100 L	**FFB2**	2.2	1425	4.90	79.3	0.86	1445	4.90	80.6	0.78	2.53	1735	4.70	82.4	0.82
LS 100 L	**FFB3**	3	1425	6.50	81.3	0.86	1440	6.30	82.7	0.80	3.45	1735	6.15	83.8	0.84
LS 112 M	**FFB3**	4	1420	8.90	80.9	0.84	1440	9.10	81.4	0.75	4.60	1735	8.70	83.4	0.80
LS 132 S	**FFB3**	5.5	1450	11.4	85.1	0.86	1458	11.6	85.2	0.77	6.33	1756	11.1	86.7	0.83
LS 132 M	**FFB4**	7.5	1445	15.9	86.5	0.83	1456	16.5	86.4	0.73	8.63	1740	14.8	87.9	0.83
LS 132 M	**FFB4**	9	1440	18.4	86.5	0.86	1452	17.6	88.0	0.81	10.4	1745	17.2	88.7	0.85
LS 160 MP	**FFB5**	11	1450	22.8	88.5	0.83	1458	23.3	88.7	0.74	12.7	1745	20.8	89.7	0.85
LS 160 LR	**FFB5**	15	1450	31.0	88.7	0.83	1458	32.2	88.9	0.73	17.3	1745	28.4	89.8	0.85

4 poles - 1500 rpm - IFT/NIE - DRIVE power supply
LS FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Separate brake power supply - Factory-set braking torque

			400 V - 87 Hz Δ[1]			Maximum mechanical speed
		Rated power	Rated speed	Rated current	Power factor	
Motor type	**Brake type**	P_n kW	N_n rpm	I_n A	Cos φ 4/4	rpm
LS 80 L	**FFB1**	1.31	2500	2.89	0.81	4500
LS 80 L	**FFB1**	1.57	2490	3.65	0.77	4500
LS 90 SL	**FFB2**	1.91	2525	4.34	0.87	4500
LS 90 L	**FFB2**	2.61	2520	4.66	0.86	4500
LS 90 L	**FFB2**	3.13	2530	6.13	0.85	4500
LS 100 L	**FFB2**	3.83	2535	7.36	0.86	4500
LS 100 L	**FFB3**	5.22	2535	8.90	0.86	4500
LS 112 M	**FFB3**	6.96	2535	11.8	0.84	4500
LS 132 S	**FFB3**	9.57	2530	16.2	0.86	4500
LS 132 M	**FFB4**	13.05	2560	20.6	0.82	4500
LS 132 M	**FFB4**	15.66	2555	27.3	0.86	4500
LS 160 MP	**FFB5**	19.14	2550	32.7	0.83	4500
LS 160 LR	**FFB5**	26.10	2560	38.7	0.83	4500

1. Data only applicable to motors: 400 V 50 Hz Y.

Characteristics
Characteristics Tables

IFT/NIE BRAKE MOTORS

2 poles - 3000 rpm - IFT/NIE (*except motors in italics*)

LS FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	Rated power	Rated torque	Starting torque/ Rated torque	Maximum torque/ Rated torque	Starting current/ Rated current	Moment of inertia	Braking torque[1]	400 V - 50 Hz				Weight IM B3/B5[2]
									Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	
		P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	M_f N.m	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	kg
LS 71 M	***FFB1***	*0.37*	*1.26*	*3.30*	*3.14*	*5.20*	*0.00060*	*4.5*	*2800*	*0.98*	*50.0*	*0.60*	*9.4*
LS 71 L	***FFB1***	*0.55*	*1.88*	*3.24*	*2.91*	*5.98*	*0.00066*	*4.5*	*2800*	*1.32*	*68.4*	*0.80*	*10.3*
LS 71 L	***FFB1***	*0.75*	*2.58*	*3.29*	*3.92*	*6.00*	*0.00079*	*4.5*	*2780*	*1.70*	*75.7*	*0.80*	*12.1*
LS 80 L	**FFB1**	0.75	2.55	2.15	2.40	5.05	0.00096	4.5	2820	1.75	73.0	0.85	11.2
LS 80 L	**FFB1**	1.1	3.70	2.35	2.60	5.30	0.00116	12	2830	2.50	75.0	0.84	12.7
LS 90 SL	**FFB1**	1.5	4.95	2.50	3.00	6.10	0.00166	12	2880	3.35	77.2	0.84	16.5
LS 90 L	**FFB2**	2.2	7.30	2.75	2.90	6.10	0.00294	19	2870	4.65	79.7	0.86	21.8
LS 100 L	**FFB2**	3	10.0	2.85	2.90	6.00	0.00304	19	2860	6.45	81.5	0.82	25.7
LS 100 L	**FFB2**	3.7	12.2	3.65	3.90	8.05	0.00374	26	2905	7.80	82.7	0.83	31.0
LS 112 M	**FFB2**	4	13.2	3.55	3.55	7.90	0.00374	26	2890	8.20	83.1	0.85	31.0
LS 132 S	**FFB3**	5.5	18.0	2.30	3.15	7.35	0.00874	52	2925	11.0	84.7	0.85	42.4
LS 132 S	**FFB3**	7.5	24.4	2.65	3.50	7.70	0.01044	52	2930	15.8	86.5	0.79	46.0
LS 132 M	**FFB4**	9	29.3	2.15	2.95	6.55	0.01688	96	2935	18.0	86.8	0.83	65.2
LS 160 MP	**FFB4**	11	35.8	2.20	3.05	6.65	0.01846	96	2935	22.4	87.6	0.81	76.2
LS 160 LR	**FFB4**	15	48.8	2.65	3.25	7.70	0.02086	96	2935	28.3	88.7	0.86	87.0

1. Values given for information only; for standards-related restrictions, please consult Leroy-Somer.

2. These values are given for information only.

Characteristics
Characteristics Tables

IFT/NIE BRAKE MOTORS

6 poles - 1000 rpm - IFT/NIE (*except motors in italics*) - AC power supply
LS FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	Rated power	Rated torque	Starting torque/ Rated torque	Maximum torque/ Rated torque	Starting current/ Rated current	Moment of inertia	Braking torque[1]	400 V - 50 Hz				Weight IM B3/B5[2]
									Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	
		P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	J kg.m²	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	kg
LS 71 L	***FFB1***	*0.25*	*2.6*	*1.7*	*1.7*	*3.04*	*0.00156*	*4.5*	*915*	*1.15*	*50.0*	*0.60*	*10.9*
LS 80 L	**FFB1**	0.37	3.7	2.1	2.5	3.85	0.00346	12	954	1.30	61.7	0.66	12.7
LS 80 L	**FFB2**	0.55	5.5	2.55	3.0	3.4	0.00446	12	956	2.15	61.0	0.60	14.0
LS 90 SL	**FFB2**	0.75	7.5	1.9	2.4	3.7	0.00414	19	952	2.25	70.0	0.68	21.0
LS 90 L	**FFB2**	1.1	11.2	1.85	2.2	3.85	0.00464	19	940	3.05	72.9	0.71	22.2
LS 100 L	**FFB2**	1.5	15.4	1.95	2.3	3.75	0.00521	26	930	4.00	75.2	0.72	26.5
LS 112 MG	**FFB3**	2.2	21.9	2.05	2.4	4.75	0.01604	52	960	5.60	77.7	0.73	37.0
LS 132 S	**FFB3**	3	29.8	2.35	2.7	5	0.02032	52	960	7.65	79.7	0.71	45.0
LS 132 M	**FFB4**	4	39.6	2.15	2.6	5.35	0.03116	96	964	9.25	81.4	0.77	62.3
LS 132 M	**FFB4**	5.5	54.4	2.55	2.8	5.6	0.03615	96	966	13.1	83.1	0.73	68.5

1. Values given for information only; for standards-related restrictions, please consult Leroy-Somer.

2. These values are given for information only.

Characteristics
Characteristics Tables

IFT/IE2 BRAKE MOTORS

4 poles - 1500 rpm - IFT/IE2 - AC power supply
LSES FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	Rated power	Rated torque	Starting torque/ Rated torque	Maximum torque/ Rated torque	Starting current/ Rated current	Moment of inertia	Braking torque[1]	400 V - 50 Hz				Weight IM B3/B5[2]
									Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	
		P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	M_f N.m	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	kg
LSES 80 LG	FFB1	0.75	4.95	1.95	2.8	5.85	0.00291	12	1445	1.70	80.9	0.78	14.6
LSES 80 LG	FFB1	0.9	6.00	1.90	2.5	6.25	0.00342	12	1435	1.95	80.5	0.82	17.1
LSES 90 SL	FFB2	1.1	7.30	1.90	2.7	6.05	0.00420	19	1440	2.35	82.1	0.82	20.1
LSES 90 L	FFB2	1.5	9.95	2.25	2.9	6.25	0.00502	19	1440	3.15	83.5	0.82	22.4
LSES 90 LU	FFB2	1.8	11.9	2.60	2.3	6.60	0.00534	26	1440	3.80	83.9	0.81	26.6
LSES 100 L	FFB2	2.2	14.6	2.50	3.1	6.75	0.00651	26	1440	4.50	85.0	0.83	28.8
LSES 100 LR	FFB3	3	19.9	2.75	3.2	6.70	0.00761	52	1440	6.25	85.8	0.81	32.0
LSES 112 MU	FFB3	4	26.4	2.20	3.0	6.20	0.01396	52	1445	7.90	87.2	0.84	41.0
LSES 132 SU	FFB3	5.5	36.1	2.65	3.1	7.10	0.01695	67	1454	11.2	88.5	0.80	48.7
LSES 132 M	FFB4	7.5	49.3	2.55	3.4	7.50	0.02874	110	1452	14.4	89.4	0.84	66.6
LSES 132 M	FFB4	9	58.9	2.80	3.6	8.00	0.03310	110	1458	17.1	90.0	0.84	73.6
LSES 160 MR	FFB5	11	71.9	3.10	3.7	8.40	0.04160	140	1460	20.9	90.6	0.84	95.3
LSES 160 L	FFB5	15	97.8	2.50	3.1	8.10	0.07703	180	1464	28.2	91.2	0.84	107

1. Values given for information only; for standards-related restrictions, please consult Leroy-Somer.
2. These values are given for information only.

4 poles - 1500 rpm - IFT/IE2 - DRIVE power supply
LSES FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Separate brake power supply - Factory-set braking torque

Motor type	Brake type	Rated power	400 V - 50 Hz			% Rated torque				
			Rated speed	Rated current	Power factor	M_n at				
		P_n kW	N_n rpm	I_n A	Cos φ 4/4	10 Hz	17 Hz	25 Hz	50 Hz	87 Hz
LSES 80 LG	FFB1	0.75	1425	1.75	0.78	90%	100%	100%	100%	57%
LSES 80 LG	FFB1	0.9	1400	1.95	0.82	90%	100%	100%	100%	57%
LSES 90 SL	FFB2	1.1	1415	2.50	0.82	90%	100%	100%	100%	57%
LSES 90 L	FFB2	1.5	1415	3.30	0.82	90%	100%	100%	100%	57%
LSES 90 LU	FFB2	1.8	1435	3.80	0.81	90%	100%	100%	100%	57%
LSES 100 L	FFB2	2.2	1420	4.80	0.83	90%	100%	100%	100%	57%
LSES 100 LR	FFB3	3	1415	6.50	0.81	90%	100%	100%	100%	57%
LSES 112 MU	FFB3	4	1420	8.50	0.84	90%	100%	100%	100%	57%
LSES 132 SU	FFB3	5.5	1435	11.5	0.80	90%	90%	100%	100%	57%
LSES 132 M	FFB4	7.5	1435	15.1	0.84	90%	90%	100%	100%	57%
LSES 132 M	FFB4	9	1440	17.8	0.84	90%	90%	100%	100%	57%
LSES 160 MR	FFB5	11	1445	21.9	0.84	85%	95%	100%	100%	57%
LSES 160 L	FFB5	15	1452	29.9	0.84	85%	95%	100%	100%	57%

Characteristics
Characteristics Tables

IFT/IE2 BRAKE MOTORS

4 poles - 1500 rpm - IFT/IE2 - AC power supply
LSES FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	380 V - 50 Hz					415 V - 50 Hz				460 V - 60 Hz				
		Rated power	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	Rated power	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor
		P_n kW	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	P_n kW	N_n rpm	I_n A	η% 4/4	Cos φ 4/4
LSES 80 LG	FFB1	0.75	1435	1.75	79.7	0.82	1450	1.70	80.77	0.76	0.75	1754	1.50	83.0	0.75
LSES 80 LG	FFB1	0.9	1430	2.05	80.3	0.84	1440	1.95	80.70	0.80	0.9	1750	1.75	82.5	0.79
LSES 90 SL	FFB2	1.1	1430	2.45	81.4	0.84	1445	2.35	82.53	0.80	1.1	1750	2.05	84.9	0.79
LSES 90 L	FFB2	1.5	1430	3.25	82.8	0.85	1445	3.10	84.09	0.80	1.5	1752	2.75	86.2	0.79
LSES 90 LU	FFB2	1.8	1435	3.95	82.8	0.84	1445	3.75	84.10	0.79	1.8	1756	3.30	86.8	0.79
LSES 100 L	FFB2	2.2	1435	4.65	84.3	0.85	1450	4.45	85.56	0.81	2.2	1754	3.95	87.5	0.80
LSES 100 LR	FFB3	3	1430	6.35	85.5	0.84	1445	6.20	86.07	0.78	3	1752	5.45	87.9	0.78
LSES 112 MU	FFB3	4	1435	8.30	86.5	0.85	1450	7.75	87.74	0.82	4	1756	6.80	89.7	0.82
LSES 132 SU	FFB3	5.5	1445	11.4	87.9	0.83	1458	11.2	88.62	0.77	5.5	1762	9.75	90.5	0.78
LSES 132 M	FFB4	7.5	1445	14.8	88.7	0.86	1458	14.3	89.66	0.81	7.5	1762	12.6	91.1	0.82
LSES 132 M	FFB4	9	1450	17.7	89.4	0.87	1460	16.9	90.30	0.82	9	1764	15.0	91.6	0.83
LSES 160 MR	FFB5	11	1452	21.5	89.9	0.87	1462	20.6	90.82	0.82	11	1766	18.3	91.7	0.83
LSES 160 L	FFB5	15	1460	29.1	90.6	0.86	1468	27.8	91.50	0.82	15	1772	24.6	92.8	0.83

4 poles - 1500 rpm - IFT/IE2 - DRIVE power supply
LSES FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Separate brake power supply - Factory-set braking torque

Motor type	Brake type	Rated power	400 V - 87 Hz Δ[1]			Maximum mechanical speed
			Rated speed	Rated current	Power factor	
		P_n kW	N_n rpm	I_n A	Cos φ 4/4	rpm
LSES 80 LG	FFB1	1.31	2535	3.05	0.78	4500
LSES 80 LG	FFB1	1.57	2510	3.64	0.82	4500
LSES 90 SL	FFB2	1.91	2525	4.32	0.82	4500
LSES 90 L	FFB2	2.61	2525	5.76	0.82	4500
LSES 90 LU	FFB2	3.13	2545	6.86	0.81	4500
LSES 100 L	FFB2	3.83	2530	8.30	0.83	4500
LSES 100 LR	FFB3	5.22	2525	11.34	0.81	4500
LSES 112 MU	FFB3	6.96	2530	14.81	0.84	4500
LSES 132 SU	FFB3	9.57	2545	19.98	0.80	4500
LSES 132 M	FFB4	13.1	2545	26.24	0.84	4500
LSES 132 M	FFB4	15.7	2550	30.98	0.84	4500
LSES 160 MR	FFB5	19.1	2555	38.09	0.84	4500
LSES 160 L	FFB5	26.1	2562	51.97	0.84	4500

1. Data only applicable to motors: 400 V 50 Hz Y.

Characteristics
Characteristics Tables

IFT/IE3 BRAKE MOTORS

4 poles - 1500 rpm - IFT/IE3 - AC power supply
LSES FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	Rated power	Rated torque	Starting torque/ Rated torque	Maximum torque/ Rated torque	Starting current/ Rated current	Moment of inertia	Braking torque[1]	400 V - 50 Hz				Weight IM B3/B5[2]
									Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	
		P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	M_f N.m	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	kg
LSES 80 LG	FFB1	0.75	4.95	2.20	2.9	6.20	0.0036	12	1450	1.65	83.2	0.80	16.6
LSES 80 LG	FFB1	0.9	5.90	2.58	3.1	6.42	0.0041	12	1450	1.90	83.5	0.80	17.1
LSES 90 SL	FFB2	1.1	7.25	2.45	3.2	6.90	0.0050	19	1450	2.30	84.8	0.81	22.4
LSES 90 LU	FFB2	1.5	9.85	2.90	3.7	7.65	0.0061	19	1452	3.20	85.6	0.79	26.6
LSES 100 L	FFB2	1.8	11.8	2.40	2.7	6.59	0.0065	26	1452	3.70	86.0	0.82	28.8
LSES 100 LR	FFB2	2.2	14.4	3.20	3.8	8.05	0.0076	26	1454	4.60	87.1	0.79	32.0
LSES 100 LG	FFB3	3	19.6	2.45	3.3	7.15	0.0124	52	1460	6.05	88.3	0.81	37.6
LSES 112 MU	FFB3	4	26.2	2.70	3.1	7.05	0.0140	52	1458	8.10	88.8	0.80	43.6
LSES 132 SM	FFB4	5.5	35.9	2.80	3.6	8.55	0.0287	69	1462	10.3	90.3	0.85	66.5
LSES 132 MU	FFB4	7.5	49.1	2.95	3.4	8.00	0.0355	110	1458	14.0	90.6	0.86	77.1
LSES 160 MR	FFB4	9	58.7	3.10	3.7	8.85	0.0416	110	1464	16.7	91.2	0.85	92.3
LSES 160 M	FFB5	11	71.7	2.25	3.1	7.25	0.0770	140	1466	20.5	91.6	0.85	110
LSES 160 LUR	FFB5	15	97.6	2.55	3.5	8.35	0.1012	180	1468	27.7	92.3	0.85	117

1. Values given for information only; for standards-related restrictions, please consult Leroy-Somer.
2. These values are given for information only.

4 poles - 1500 rpm - IFT/IE3 - DRIVE power supply
LSES FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Separate brake power supply - Factory-set braking torque

Motor type	Brake type	Rated power	400 V - 50 Hz			% Rated torque				
			Rated speed	Rated current	Power factor	M_n at				
		P_n kW	N_n rpm	I_n A	Cos φ 4/4	10 Hz	17 Hz	25 Hz	50 Hz	87 Hz
LSES 80 LG	FFB1	0.75	1450	1.70	0.80	90%	100%	100%	100%	83%
LSES 90 SL	FFB2	1.1	1450	2.43	0.81	90%	100%	100%	100%	83%
LSES 90 LU	FFB2	1.5	1452	3.31	0.79	90%	100%	100%	100%	83%
LSES 100 LR	FFB2	2.2	1454	4.77	0.79	90%	100%	100%	100%	83%
LSES 100 LG	FFB3	3	1460	6.37	0.81	90%	100%	100%	100%	83%
LSES 112 MU	FFB3	4	1458	8.37	0.80	90%	100%	100%	100%	83%
LSES 132 SM	FFB4	5.5	1462	11.0	0.85	90%	90%	100%	100%	83%
LSES 132 MU	FFB4	7.5	1458	14.9	0.86	90%	90%	100%	100%	83%
LSES 160 MR	FFB4	9	1464	17.8	0.85	90%	90%	100%	100%	83%
LSES 160 M	FFB5	11	1466	21.6	0.85	85%	95%	100%	100%	83%
LSES 160 LUR	FFB5	15	1468	29.2	0.85	85%	95%	100%	100%	83%

Characteristics
Characteristics Tables

IFT/IE3 BRAKE MOTORS

4 poles - 1500 rpm - IFT/IE3 - AC power supply
LSES FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	380 V - 50 Hz					415 V - 50 Hz				460V - 60 Hz				
		Rated power	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	Rated power	Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor
		P_n kW	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	P_n kW	N_n rpm	I_n A	η% 4/4	Cos φ 4/4
LSES 80 LG	FFB1	0.75	1440	1.65	82.6	0.82	1452	1.60	83.3	0.78	0.75	1758	1.45	85.1	0.76
LSES 80 LG	FFB1	0.9	1440	2.00	83.0	0.82	1452	1.80	83.6	0.78	0.9	1758	1.70	85.6	0.76
LSES 90 SL	FFB2	1.1	1445	2.35	84.1	0.83	1454	2.30	85.4	0.79	1.1	1760	2.05	86.6	0.78
LSES 90 LU	FFB2	1.5	1445	3.25	85.3	0.82	1456	3.20	85.8	0.77	1.5	1760	2.80	87.3	0.76
LSES 100 L	FFB2	1.8	1445	3.90	85.4	0.83	1454	3.90	86.2	0.79	1.8	1760	3.30	87.0	0.78
LSES 100 LR	FFB2	2.2	1445	4.70	86.7	0.82	1456	4.60	87.3	0.77	2.2	1760	4.15	88.4	0.76
LSES 100 LG	FFB3	3	1452	6.20	87.74	0.84	1462	6.05	88.4	0.78	3	1766	5.35	90.0	0.79
LSES 112 MU	FFB3	4	1450	8.30	88.6	0.83	1462	8.05	88.9	0.78	4	1764	7.10	90.2	0.79
LSES 132 SM	FFB4	5.5	1456	10.7	89.64	0.87	1466	10.2	90.4	0.83	5.5	1768	9.05	91.7	0.83
LSES 132 MU	FFB4	7.5	1450	14.5	90.4	0.87	1462	13.6	90.9	0.85	7.5	1766	12.1	92.0	0.84
LSES 160 MR	FFB4	9	1458	17.4	90.6	0.86	1466	16.5	91.5	0.83	9	1768	14.7	92.4	0.83
LSES 160 M	FFB5	11	1462	21.1	91.4	0.86	1470	19.8	91.9	0.84	11	1774	17.8	92.8	0.84
LSES 160 LUR	FFB5	15	1464	28.7	92.1	0.86	1472	26.8	92.5	0.84	15	1774	24.2	93.3	0.93

4 poles - 1500 rpm - IFT/IE3 - DRIVE power supply
LSES FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Separate brake power supply - Factory-set braking torque

Motor type	Brake type	Rated power	400 V - 87 Hz Δ[1]			Maximum mechanical speed
			Rated speed	Rated current	Power factor	
		P_n kW	N_n rpm	I_n A	Cos φ 4/4	rpm
LSES 80 LG	FFB1	1.31	2511	2.96	0.80	4500
LSES 90 SL	FFB2	1.91	2511	4.23	0.81	4500
LSES 90 LU	FFB2	2.61	2514	5.76	0.79	4500
LSES 100 LR	FFB2	3.83	2518	8.30	0.79	4500
LSES 100 LG	FFB3	5.22	2528	11.1	0.81	4500
LSES 112 MU	FFB3	6.96	2525	14.6	0.80	4500
LSES 132 SM	FFB4	9.57	2532	19.1	0.85	4500
LSES 132 MU	FFB4	13.1	2525	25.9	0.86	4500
LSES 160 MR	FFB4	15.7	2535	31.0	0.85	4500
LSES 160 M	FFB5	19.1	2538	37.6	0.85	4500
LSES 160 LUR	FFB5	26.1	2542	50.8	0.85	4500

1. Data only applicable to motors: 400 V 50 Hz Y.

Characteristics
Characteristics Tables

IFT/IE3 BRAKE MOTORS

2 poles - 3000 rpm - IFT/IE3 - AC power supply
LSES FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	Rated power	Rated torque	Starting torque/ Rated torque	Maximum torque/ Rated torque	Starting current/ Rated current	Moment of inertia	Braking torque[1]	400 V - 50 Hz				Weight IM B3/B5[2]
									Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	
		P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	M_f N.m	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	kg
LSES 80 L	FFB1	0.75	2.50	3.45	3.50	7.75	0.00121	4.5	2890	1.60	81.7	0.83	12.9
LSES 80 LG	FFB1	1.1	3.65	2.65	3.20	6.85	0.00249	12	2885	2.25	83.7	0.85	17.1
LSES 90 SL	FFB1	1.5	4.95	2.95	3.30	7.45	0.00249	12	2890	3.00	85.0	0.85	18.6
LSES 90 L	FFB1	1.8	6.00	3.10	3.36	7.52	0.00319	12	2890	3.75	85.5	0.85	20.8
LSES 90 LU	FFB2	2.2	7.25	3.10	3.40	8.00	0.00376	19	2895	4.25	86.3	0.86	26.6
LSES 100 L	FFB2	3	9.95	3.55	3.50	8.35	0.00448	19	2885	5.80	87.3	0.86	30.8
LSES 100 LG	FFB2	3.7	12.1	2.08	3.00	7.44	0.01025	26	2920	6.65	88.2	0.89	41.4
LSES 112 MG	FFB2	4	13.1	2.00	2.90	7.00	0.01025	26	2920	7.30	88.6	0.89	38.9
LSES 132 S	FFB3	5.5	18.0	2.30	3.10	7.40	0.01200	52	2925	10.3	89.6	0.87	45.8
LSES 132 SM	FFB4	7.5	24.4	2.10	2.90	6.75	0.01690	55	2935	13.9	90.7	0.86	70.2
LSES 132 M	FFB4	9	29.2	2.15	3.30	7.70	0.01791	96	2945	16.6	91.2	0.86	73.8
LSES 160 MP	FFB4	11	35.7	1.90	2.90	6.85	0.01976	96	2940	20.2	91.6	0.86	84.5
LSES 160 M	FFB4	15	48.6	2.30	2.80	7.80	0.05486	96	2945	26.7	92.1	0.88	110

1. Values given for information only; for standards-related restrictions, please consult Leroy-Somer.
2. These values are given for information only.

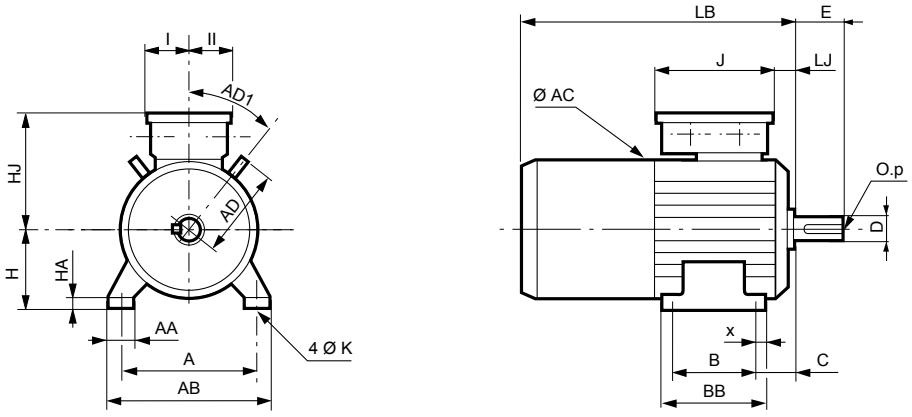
6 poles - 1000 rpm - IFT/IE3 - AC power supply
LSES FFB brake - 230Δ/380Y/400Y/415Y-460Y or 400 V Δ - IP55 - Built-in power supply - Factory-set braking torque

Motor type	Brake type	Rated power	Rated torque	Starting torque/ Rated torque	Maximum torque/ Rated torque	Starting current/ Rated current	Moment of inertia	Braking torque[1]	400 V - 50 Hz				Weight IM B3/B5[2]
									Rated speed	Rated current	Efficiency IEC 60034-2-1 2007	Power factor	
		P_n kW	M_n N.m	M_d/M_n	M_m/M_n	I_d/I_n	J kg.m²	M_f N.m	N_n rpm	I_n A	η% 4/4	Cos φ 4/4	kg
LSES 90 SL	FFB2	0.75	7.55	1.85	2.3	4.45	0.00462	19	950	1.90	79.1	0.72	22.2
LSES 90 LU	FFB2	1.1	11.0	2.35	2.7	4.85	0.00603	19	956	2.75	81.9	0.71	27.7
LSES 100 LG	FFB2	1.5	14.8	2.35	2.8	5.65	0.01607	26	966	3.60	83.5	0.72	36.2
LSES 112 MU	FFB3	2.2	21.7	2.30	2.8	5.45	0.01983	52	966	5.40	84.5	0.70	43.6
LSES 132 SM	FFB4	3	29.5	2.75	3.2	6.55	0.03116	55	972	6.85	86.5	0.73	54.6
LSES 132 M	FFB4	4	39.3	2.65	2.9	6.45	0.03615	96	972	9.00	87.4	0.73	68.5
LSES 132 MU	FFB4	5.5	54.4	2.60	2.9	6.35	0.04287	96	966	11.8	88.2	0.76	77.6
LSES 160 MU	FFB5	7.5	73.2	2.00	3.1	6.00	0.13533	140	978	18.6	89.6	0.72	99.3

1. Values given for information only; for standards-related restrictions, please consult Leroy-Somer.
2. These values are given for information only.

LS - LSES FFB Dimensions
Foot Mounted IM B3 (IM 1001)

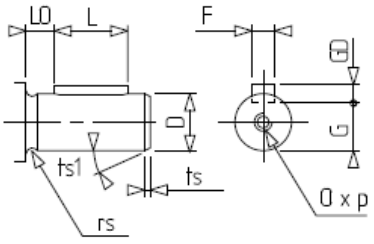
Dimensions in millimeters



Motor type	Brake type	Main dimensions																		
		A	AA	AB	AC[1]	AD	AD1	B	BB	C	H	HA	HJ	J	I	II	K	LB	LJ	x
LS 71 M	FFB1	112	23	126	140	-	-	90	104	45	71	9	130	160	55	55	7	286	12	7.5
LS 71 L	FFB1	112	23	126	140	-	-	90	104	45	71	9	130	160	55	55	7	296	12	7.5
LS 80 L	FFB1, 2	125	29	157	170	-	-	100	120	50	80	10	141	160	55	55	9	312	13.5	10
LSES 80 L	FFB1	125	29	157	170	-	-	100	120	50	80	10	141	160	55	55	9	312	13.5	10
LSES 80 LG	FFB1	125	31	157	185	-	-	100	125	50	80	10	151	160	55	55	9	389	13.5	14
LS 90 L	FFB2	140	39	172	190	-	-	125	162	56	90	11	151	160	55	55	10	389	13.5	28
LS 90 SL	FFB1, 2	140	39	172	190	-	-	125	162	56	90	11	151	160	55	55	10	389	13.5	28
LSES 90 SL	FFB1, 2	140	39	172	190	-	-	125	162	56	90	11	151	160	55	55	10	389	13.5	28
LSES 90 L	FFB1, 2	140	39	172	190	-	-	125	162	56	90	11	151	160	55	55	10	389	13.5	28
LSES 90 LU	FFB2	140	39	172	190	-	-	125	162	56	90	11	151	160	55	55	10	389	13.5	28
LS 100 L	FFB2, 3	160	40	196	200	118	45	140	165	63	100	13	156	160	55	55	12	437	14.5	12
LSES 100 L	FFB2	160	40	196	200	118	45	140	165	63	100	13	156	160	55	55	12	437	14.5	12
LSES 100 LR	FFB2, 3	160	40	196	200	118	45	140	165	63	100	13	156	160	55	55	12	437	14.5	12
LSES 100 LG	FFB2, 3	160	49	196	230	-	-	140	170	63	100	13	165	160	55	55	12	423	23.5	11
LS 112 M	FFB2, 3	190	45	220	200	118	45	140	165	70	112	14	156	160	55	55	12	437	14.5	13
LS 112 MG	FFB3	190	52	220	235	-	-	140	165	70	112	14	165	160	55	55	12	448	23.5	12
LSES 112 MG	FFB2	190	52	220	235	-	-	140	165	70	112	14	165	160	55	55	12	448	23.5	12
LSES 112 MU	FFB3	190	52	220	235	-	-	140	165	70	112	14	165	160	55	55	12	448	23.5	12
LS 132 S	FFB3	216	42	250	220	130	45	140	170	89	132	16	168	160	55	55	16	490	40.5	16
LSES 132 S	FFB3	216	42	250	220	130	45	140	170	89	132	16	168	160	55	55	12	490	40.5	16
LSES 132 SU	FFB3	216	42	250	220	130	45	140	170	89	132	16	168	160	55	55	12	490	40.5	16
LSES 132 SM	FFB4	216	50	250	265	140	45	140	208	114	132	15	186	160	55	55	12	621	50	15
LS 132 M	FFB4	216	50	250	265	140	45	178	208	89	132	15	186	160	55	55	12	596	25	15
LSES 132 M	FFB4	216	50	250	265	140	45	178	208	89	132	15	186	160	55	55	12	596	25	15
LSES 32 MU	FFB4	216	50	250	265	140	45	178	208	89	132	15	186	160	55	55	12	596	25	15
LS 160 MP	FFB4, 5	254	64	294	264	155	45	210	294	108	160	25	186	160	55	55	14	671	66.5	20
LSES 160 MP	FFB4	254	64	294	264	155	45	210	294	108	160	25	186	160	55	55	14	671	66.5	20
LSES 160 MR	FFB5	254	64	294	264	155	45	210	294	108	160	25	186	160	55	55	14	671	66.5	20
LS 160 LR	FFB5	254	64	294	264	155	45	254	294	108	160	25	186	160	55	55	14	671	66.5	20
LSES 160 M	FFB4, 5	254	60	294	312	-	-	254	294	108	160	25	235	160	55	55	14.5	679	50.8	20
LSES 160 L	FFB5	254	60	294	312	-	-	254	294	108	160	25	235	160	55	55	14.5	679	50.8	20
LSES 160 LUR	FFB5	254	60	294	312	-	-	254	294	108	160	25	235	160	55	55	14.5	674	50.8	20
LSES 160 MU	FFB5	254	60	294	312	-	-	254	294	108	160	25	235	160	55	55	14.5	674	50.8	20

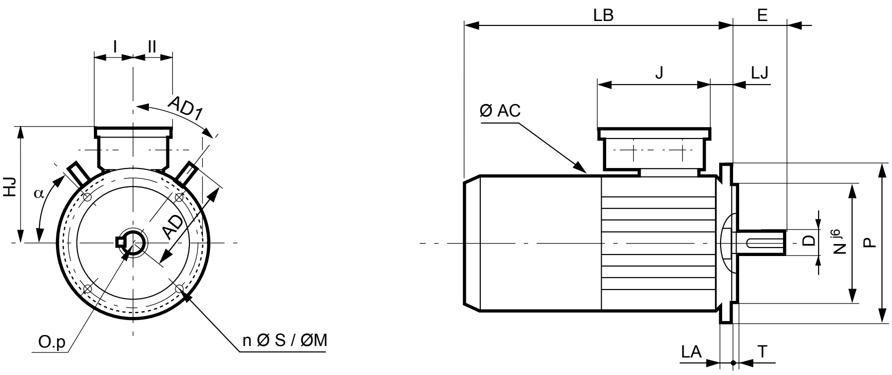
1. Housing diameter without lifting rings

Motor type	Brake type	Output shaft details										
		D	E	F	G	GD	L	LO	rs	ts	ts1	M.OxP
LS 71	FFB1	14j6	30	5	11	5	25	4	-	-	-	M5x15
LS(ES) 80	FFB1, 2	19j6	40	6	15.5	6	30	6	0.5	2	20	M6x16
LS(ES) 90	FFB1, 2	24j6	50	8	20	7	40	6	0.5	2	20	M8x19
LS(ES) 100	FFB2, 3	28j6	60	8	24	7	50	6	0.5	2	20	M10x22
LS(ES) 112	FFB2, 3	28j6	60	8	24	7	50	6	0.5	2	20	M10x22
LS(ES) 132	FFB3, 4	38k6	80	10	33	8	63	10	0.5	2	20	M12x28
LS(ES) 160	FFB4, 5	42k6	110	12	37	8	100	6	0.8	1	45	M16x36



LS - LSES FFB Dimensions
Flange Mounted (FF) IM B5 (IM 3001)

Dimensions in millimeters

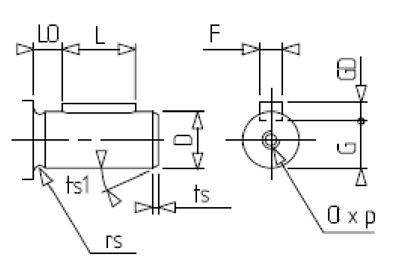


Motor type	Brake type	Main dimensions								
		AC[1]	AD	AD1	HJ	J	I	II	LB	LJ
LS 71 M	FFB1	140	-	-	130	160	55	55	286	12
LS 71 L	FFB1	170	-	-	141	160	55	55	296	14.5
LS 80 L	FFB1, 2	170	-	-	141	160	55	55	312	14.5
LSES 80 L	FFB1	170	-	-	141	160	55	55	312	13.5
LSES 80 LG	FFB1	185	-	-	151	160	55	55	409	34.5
LS 90 L	FFB2	190	-	-	151	160	55	55	409	33
LS 90 SL	FFB1, 2	190	-	-	151	160	55	55	409	33.5
LSES 90 SL	FFB1, 2	190	-	-	151	160	55	55	409	33.5
LSES 90 L	FFB1, 2	190	-	-	151	160	55	55	409	33.5
LSES 90 LU	FFB2	190	-	-	151	160	55	55	409	33.5
LS 100 L	FFB2, 3	200	-	-	156	160	55	55	437	14.5
LSES 100 L	FFB2	200	-	-	156	160	55	55	437	14.5
LSES 100 LR	FFB2, 3	200	-	-	156	160	55	55	437	14.5
LSES 100 LG	FFB2, 3	235	-	-	165	160	55	55	423	13.5
LS 112 M	FFB2, 3	200	-	-	156	160	55	55	437	14.5
LS 112 MG	FFB3	235	-	-	165	160	55	55	448	23.5
LSES 112 MG	FFB2	235	-	-	165	160	55	55	448	23.5
LSES 112 MU	FFB3	235	-	-	165	160	55	55	448	23.5
LS 132 S	FFB3	220	130	45	168	160	55	55	490	40.5
LSES 132 S	FFB3	220	130	45	168	160	55	55	490	40.5
LSES 132 SU	FFB3	220	130	45	168	160	55	55	490	40.5
LSES 132 SM	FFB4	265	140	45	186	160	55	55	621	50
LS 132 M	FFB4	265	140	45	186	160	55	55	596	25
LSES 132 M	FFB4	265	140	45	186	160	55	55	596	25
LSES 132 MU	FFB4	265	140	45	186	160	55	55	596	25
LS 160 MP	FFB4, 5	264	155	45	186	160	55	55	671	66.5
LSES 160 MP	FFB4	264	155	45	186	160	55	55	671	66.5
LSES 160 MR	FFB5	264	155	45	186	160	55	55	671	66.5
LS 160 LR	FFB5	264	155	45	186	160	55	55	671	66.5
LSES 160 M	FFB4, 5	312	-	-	235	160	55	55	679	50.8
LSES 160 L	FFB5	312	-	-	235	160	55	55	679	50.8
LSES 160 LUR	FFB5	312	-	-	235	160	55	55	674	50.8
LSES 160 MU	FFB5	312	-	-	235	160	55	55	674	50.8

IEC symbol	Flange (FF) output dimensions							
	M	N	P	n	α°	S	T	LA
FF130	130	110	160	4	45	10	3.5	10
FF130	130	110	160	4	45	10	3.5	10
FF165	165	130	200	4	45	12	3.5	10
FF165	165	130	200	4	45	12	3.5	10
FF165	165	130	200	4	45	12	3.5	10
FF165	165	130	200	4	45	12	3.5	10
FF165	165	130	200	4	45	12	3.5	10
FF165	165	130	200	4	45	12	3.5	10
FF165	165	130	200	4	45	12	3.5	10
FF165	165	130	200	4	45	12	3.5	10
FF165	165	130	200	4	45	12	3.5	10
FF215	215	180	250	4	45	14.5	4	12
FF215	215	180	250	4	45	14.5	4	12
FF215	215	180	250	4	45	14.5	4	12
FF215	215	180	250	4	45	14.5	4	12
FF215	215	180	250	4	45	15	4	12
FF215	215	180	250	4	45	15	4	12
FF215	215	180	250	4	45	15	4	12
FF215	215	180	250	4	45	15	4	12
FF265	265	230	300	4	45	14.5	4	14
FF265	265	230	300	4	45	14.5	4	14
FF265	265	230	300	4	45	14.5	4	14
FF265	265	230	300	4	45	14.5	4	14
FF265	265	230	300	4	45	14.5	4	14
FF265	265	230	300	4	45	14.5	4	14
FF265	265	230	300	4	45	14.5	4	14
FF300	300	250	350	4	45	18.5	5	14
FF300	300	250	350	4	45	18.5	5	14
FF300	300	250	350	4	45	18.5	5	14
FF300	300	250	350	4	45	18.5	5	14
FF300	300	250	350	4	45	18.5	5	14
FF300	300	250	350	4	45	18.5	5	14
FF300	300	250	350	4	45	18.5	5	14

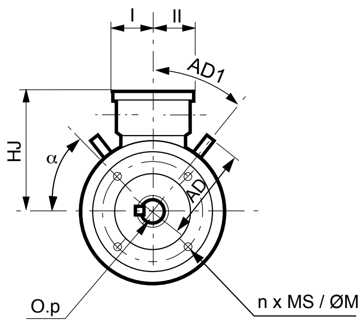
1. Housing diameter without lifting rings

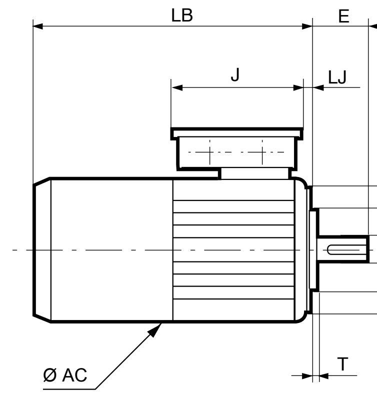
Motor type	Brake type	Output shaft details									
		D	E	F	G	GD	L	LO	rs	ts	ts1	M.OxP
LS 71	FFB1	14j6	30	5	11	5	25	4	-	-	-	M5x12.4
LS(ES) 80	FFB1, 2	19j6	40	6	15.5	6	30	6	0.5	2	20	M6x16
LS(ES) 90	FFB1, 2	24j6	50	8	20	7	40	6	0.5	2	20	M8x19
LS(ES) 100	FFB2, 3	28j6	60	8	24	7	50	6	0.5	2	20	M10x22
LS(ES) 112	FFB2, 3	28j6	60	8	24	7	50	6	0.5	2	20	M10x22
LS(ES) 132	FFB3, 4	38k6	80	10	33	8	63	10	0.5	2	20	M12x28
LS(ES) 160	FFB4, 5	42k6	110	12	37	8	100	6	0.8	1	45	M16x36



LS - LSES FFB Dimensions
Face mounted (FT) IM B14 (IM 3601)

Dimensions in millimeters



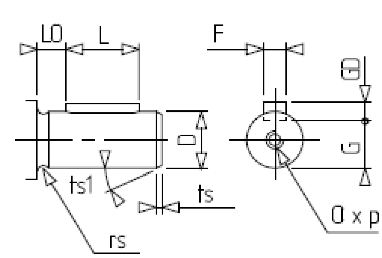


Motor type	Brake type	Main dimensions								
		AC[1]	AD	AD1	HJ	J	I	II	LB	LJ
LS 71 M	FFB1	140	-	-	130	160	55	55	286	12
LS 71 L	FFB1	170	-	-	141	160	55	55	296	12
LS 80 L	FFB1, 2	170	-	-	141	160	55	55	312	14.5
LSES 80 L	FFB1	170	-	-	141	160	55	55	312	14.5
LSES 80 LG	FFB1	185	-	-	151	160	55	55	389	13.5
LS 90 L	FFB2	190	-	-	151	160	55	55	389	13.5
LS 90 SL	FFB1, 2	190	-	-	151	160	55	55	389	13.5
LSES 90 SL	FFB1, 2	190	-	-	151	160	55	55	389	13.5
LSES 90 L	FFB1, 2	190	-	-	151	160	55	55	389	13.5
LSES 90 LU	FFB2	190	-	-	151	160	55	55	389	13.5
LS 100 L	FFB2, 3	200	-	-	156	160	55	55	437	14.5
LSES 100 L	FFB2	200	-	-	156	160	55	55	437	14.5
LSES 100 LR	FFB2, 3	200	-	-	156	160	55	55	437	14.5
LSES 100 LG	FFB2, 3	235	-	-	165	160	55	55	423	13.5
LS 112 M	FFB2, 3	200	-	-	156	160	55	55	437	14.5
LS 112 MG	FFB3	235	-	-	165	160	55	55	448	23.5
LSES 112 MG	FFB2	235	-	-	165	160	55	55	448	23.5
LSES 112 MU	FFB3	235	-	-	165	160	55	55	448	23.5
LS 132 S	FFB3	220	130	45	168	160	55	55	490	40.5
LSES 132 S	FFB3	220	130	45	168	160	55	55	490	40.5
LSES 132 SU	FFB3	220	130	45	168	160	55	55	490	40.5
LSES 132 SM	FFB4	265	140	45	186	160	55	55	621	50
LS 132 M	FFB4	265	140	45	186	160	55	55	596	25
LSES 132 M	FFB4	265	140	45	186	160	55	55	596	25
LSES 132 MU	FFB4	265	140	45	186	160	55	55	596	25
LS 160 MP	FFB4, 5	264	155	45	186	160	55	55	671	66.5
LSES 160 MP	FFB4	264	155	45	186	160	55	55	671	66.5
LSES 160 MR	FFB5	264	155	45	186	160	55	55	671	66.5

IEC symbol	Faceplate (FT) output dimensions						
	M	N	P	n	α°	MS	T
FT85	85	70	105	4	45	M6	2.5
FT85	85	70	105	4	45	M6	2.5
FT100	100	80	120	4	45	M6	3
FT100	100	80	120	4	45	M6	3
FT100	100	80	120	4	45	M6	3
FT115	115	95	140	4	45	M8	3
FT115	115	95	140	4	45	M8	3
FT115	115	95	140	4	45	M8	3
FT115	115	95	140	4	45	M8	3
FT115	115	95	140	4	45	M8	3
FT130	130	110	160	4	45	M8	3.5
FT130	130	110	160	4	45	M8	3.5
FT130	130	110	160	4	45	M8	3.5
FT130	130	110	160	4	45	M8	3.5
FT130	130	110	160	4	45	M8	3.5
FT130	130	110	160	4	45	M8	3.5
FT130	130	110	160	4	45	M8	3.5
FT130	130	110	160	4	45	M8	3.5
FT215	215	215	250	4	45	M12	4
FT215	215	215	250	4	45	M12	4
FT215	215	215	250	4	45	M12	4
FT215	215	215	250	4	45	M12	4
FT215	215	215	250	4	45	M12	4
FT215	215	215	250	4	45	M12	4
FT215	215	215	250	4	45	M12	4
FT215	215	215	250	4	45	M12	4
FT215	215	215	250	4	45	M12	4
FT215	215	215	250	4	45	M12	4

1. Housing diameter without lifting rings

Motor type	Brake type	Output shaft details										
		D	E	F	G	GD	L	LO	rs	ts	ts1	M.OxP
LS 71	FFB1	14j6	30	5	11	5	25	4	-	-	-	M5x12.4
LS(ES) 80	FFB1, 2	19j6	40	6	15.5	6	30	6	0.5	2	20	M6x16
LS(ES) 90	FFB1, 2	24j6	50	8	20	7	40	6	0.5	2	20	M8x19
LS(ES) 100	FFB2, 3	28j6	60	8	24	7	50	6	0.5	2	20	M10x22
LS(ES) 112	FFB2, 3	28j6	60	8	24	7	50	6	0.5	2	20	M10x22
LS(ES) 132	FFB3, 4	38k6	80	10	33	8	63	10	0.5	2	20	M12x28
LS(ES) 160	FFB4, 5	42k6	110	12	37	8	100	6	0.8	1	45	M16x36



Equipment and Options
List and compatibility of options

	Non-std flange	DLRA	DLM	DMD	Optional Mf	Indicator release	Indicator wear	TRR	Cover drip	Holes drain	FV	Separate power supply	Absolute encoder	Incremental encoder	Sensors
Non-std flange	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Auto-return hand brake release (DLRA)	•	-	-	•	•	•	•	•	•	•	•	•	•	•	•
Release lock off system (DLM)	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
Remote lock off system (DMD)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Optional braking torque	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Release indicator (RD)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Wear indicator (WI)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Reduced response time (TRR)	•	•	•	•	•	•	•	•	•	•	•	-	-	-	•
Drip cover (DC)	•	•	•	•	•	•	•	•	•	•	-	•	•	•	•
Drain holes	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Axial forced ventilation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Separate brake power supply: 180 VDC coil 400 VAC supply	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Adaptation and AE series absolute encoder	•	-	•	•	•	•	•	•	•	•	•	•	•	-	•
Adaptation and IE series incremental encoder	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
PTO - PTC protection devices[1], PT100 - KTY thermal sensors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

[1] PTC: as standard for frame size ≥ 160

•	Compatibility
-	Not available

Equipment and Options
Mechanical Options

OPTIONAL FLANGES FOR LS(ES) SERIES

Motor type	Flange mounted (FF) motor (IM B5)							
	FF 85x70x105	FF 100x80x120	FF 115x95x140	FF 130x110x160	FF 165x130x200	FF 215x180x250	FF 265x230x300	FF 300x250x350
LS 71		■	■	●	◆			
LS(ES) 80	■	■	■	■	●	◆		
LS(ES) 80 LG/90	◆	◆	◆	◆	●	◆		
LS(ES) 100 L/LR	■	■	■	■	■	●	■	
LS(ES) 100 LG			■	■	■	●	◆	
LS(ES) 112 M/MR	■	■	■	■	■	●	■	
LS(ES) 112 MG/MU				■	■	●	◆	
LS(ES) 132 S/SU					■	◆	●	
LS(ES) 132 SM/M/MU					■	■	●	◆
LS(ES) 160 MR/LR/MP					■	◆	■	●
LS(ES) 160 M/L/LU/LUR							◆	●

● Standard ■ Modified bearing location ◆ Adaptable without shaft modifications

Motor type	Face mounted (FT) motors (IM B14)							
	FT 65x50x80	FT 75x60x90	FT 85x70x105	FT 100x80x120	FT 115x95x140	FT 130x110x160	FT 165x130x200	FT 215x180x250
LS 71	◆	◆	●	◆				
LS(ES) 80	◆	◆	◆	●	◆	■		
LS(ES) 80 LG			◆	●	◆	■	◆	■
LS(ES) 90			◆	◆	●	■	◆	■
LS(ES) 100 L/LR			◆	◆	◆	●	◆	◆
LS(ES) 100 LG					◆	●	◆	◆
LS(ES) 112 M/MR			◆	◆	◆	●	◆	◆
LS(ES) 112 MG/MU					◆	●	◆	◆
LS(ES) 132 S/SU						◆	◆	●
LS(ES) 132 SM/M/MU						■	■	●
LS(ES) 160 MP, MR								●

Equipment and Options
Mechanical Options

RELEASE SYSTEMS

FFB brake motors can be equipped with a manual or electrical brake release system for carrying out maintenance operations such as adjustment and/or manual operation of the system being driven.

Auto-return hand brake release (DLRA)

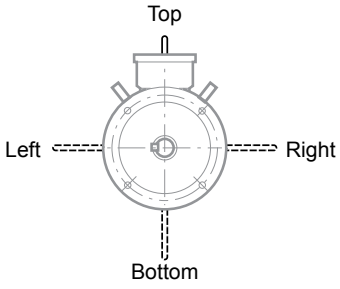
Whenever the brake has been released, make sure that it is engaged once any maintenance operations have been completed.
As standard, the DLRA lever faces upwards like the terminal box; as an option and only on versions with a round frame, it can be mounted on the left, on the bottom, on the right counter-clockwise as seen from the drive end, independently of the terminal box.

Lock off release system (DLM)

The DLM lever is added to the DLRA lever which it follows in its operating position.

Remote lock off release system (DMD)

The DMD lever is added to the auto-return hand brake release which it follows in its operating position.

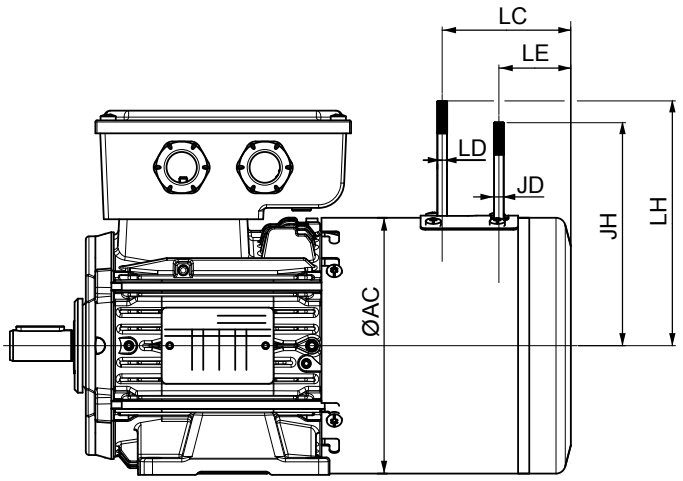


Release	DLRA	DLM	DMD
Release action	Pull the lever rod towards the non-drive end (NDE)	Pull the lever rod (the one nearest the terminal box) towards the non-drive end (NDE), then swivel the DLM rod to lock	Electrical release: supply the brake coil with power separately from the motor
Keeping the brake released	Requires deliberate action	Permanently without external action	Supply the electromagnet on the lock control board with power. Once the locking contactor is energized, switch off the brake coil power supply and then that of the control board
Return to engaged position	**Automatic** once traction is eliminated	**Automatic** when the power is restored or via manual action	**Automatic** when the power is restored
Areas of use	Safety option: - practical for frequent releases - a safety measure because **the brake cannot be left released by mistake.**	Safety option: - quick release - saves time when returning to engaged position - a safety measure because **it is a way of avoiding leaving the brake in released position**	Safety option: - **release and maintaining release remotely** - setting a crane movement to weathervane mode

Equipment and Options
Mechanical Options

RELEASE SYSTEMS

Dimensions in millimeters



Fr. size	DLRA			DLM - DMD					
	LC	Ø LD	LH	LC	Ø LD	LH	LE	Ø JD	JH
71	78	6	151	78	6	151	42	6	< LH
80 L	82	6	151	82	6	151	16	6	< LH
80 LG, 90 SL	131	6	151	131	6	151	96	6	< LH
90 L	122	8	176	122	8	176	80	8	< LH
90 LU	95	8	176	95	8	176	52	8	< LH
100 LR, 112 MR	109	8	176	109	8	176	66	8	< LH
100 LG	92	8	176	92	8	176	50	8	< LH
112 MG	116	8	176	116	8	176	75	8	< LH
100 L, 112 M	122	8	176	122	8	176	80	8	< LH
112 MU	94	8	176	94	8	176	52	8	< LH
132 S	116	8	176	116	8	176	75	8	< LH
132 SU	94	8	176	94	8	176	52	8	< LH
132 MR	132	13	307	132	13	307	74	13	< LH
132 MU	157	13	307	157	13	307	99	13	< LH
132 SM, M	180.5	13	307	180.5	13	307	122.5	13	< LH
160 LR, MR	144	13	307	144	13	307	86	13	< LH
160 MP	175	13	307	175	13	307	117	13	< LH
160 M, L, LUR	160	13	307	160	13	307	103	13	< LH

Equipment and Options
Mechanical Options

OPTIONAL BRAKING TORQUE

If the application does not need the braking torque offered as standard on the brake motor (Characteristics Tables section), as an option, the brake has different torques as shown in the table below.

Braking torques (N.m) given for information only; for standards-related restrictions, please consult Leroy-Somer.

No. of springs	FFB1		FFB2		FFB3		FFB4		FFB5	
	Color	M_f (N.m)	Color	M_f (N.m)	Color	M_f (N.m)	Color	M_f (N.m)	Color	M_f (N.m)
3		4.5		11	-	-		41	-	-
4		6		15	-	-		55	-	-
5	Purple (RAL 4008)	7.5	White (RAL 1013)	19		37	Brown (RAL 8017)	69	-	-
6		9		23		45		83		120
7		10.5		26	Orange (RAL 2000)	52		96		140
8		12		30		59		110	Black (RAL 9005)	160
9	-	-	-	-		67	-	-		180
10	-	-	-	-		74	-	-		200

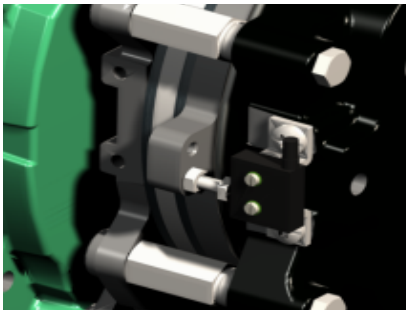
INDICATOR MICROCONTACT (RELEASE/APPLICATION, WEAR)

As an option, the whole range of FFB brake motors can be equipped with a system to monitor the brake condition (release or application) and/or how worn the lining is. They are mounted and adjusted in the factory.
The microcontact wiring is connected in the terminal box on dominos (details in the table).

Indicators	Release indicator (Open/Close)	Wear indicator
Current	6 A	6 A
Voltage	250 V	250 V
Mounting	on dominos (3 wires - blue/black/gray) Black/Blue = NO Black/Gray = NC	on dominos (3 wires - blue/black/gray) Black/Blue = NO Black/Gray = NC

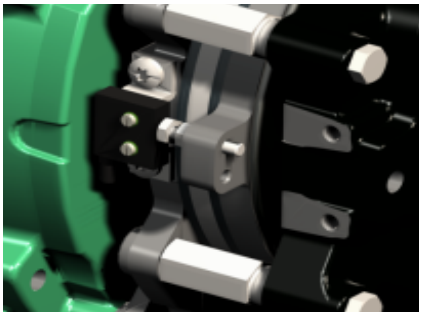
NO: normally open; NC: normally closed

RELEASE/APPLICATION INDICATOR



For brakes fitted with a release indicator, while the brake is supplied with power the armature actuates a microswitch (discrete) fixed on the yoke indicating brake release. When the power is switched off, the microswitch changes state in order to confirm that the brake is engaged.

WEAR INDICATOR

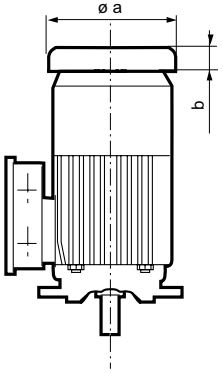


For brakes fitted with a wear indicator, if the brake lining is worn (+ 0.6 mm) the armature actuates the microswitch (discrete) fixed on the backplate and informs the user of the need to adjust the air gap or change the brake lining if it is less than the required minimum.

DRIP COVER
for brake motors operating outdoors, with the drive shaft downwards (IM1011 V5, IM3001 V1, IM3611 V18), an optional drip cover is recommended. This is an option and should be specified on the order if required.

Type	Drip cover	
	a	b
71 L, M	138	25
80 L, LG	184	25
90 L, LU, SL	220	25
100 L, LG, LR	220	25
112 M	220	25
112 MG, MU	264	25
132 S, SU	264	25
132 M, MU, SM	310	25
160 LR, MP, MR	310	25

Dimensions in millimeters



Equipment and Options
Electrical Options

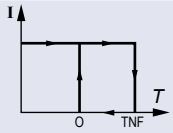
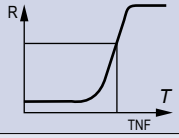
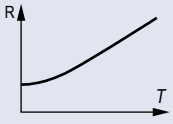
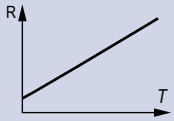
SENSORS

Motors are protected by a manual or automatic overcurrent relay, placed between the isolating switch and the motor. This relay can in turn be protected by fuses. These protection devices provide total protection of the motor against non-transient overloads.

If a shorter reaction time is required, if you want to detect transient overloads, or if you wish to monitor temperature rises at “hot spots” in the motor or at strategic points in the installation for maintenance purposes, it is advisable to install heat sensors at sensitive points. The various types are shown in the table below, with a description of each.

We offer PTO, PTC, KTY and PT100 heat sensors. It must be emphasized that under no circumstances can these sensors be used to carry out direct regulation of the brake motor operating cycles.

Built-in indirect thermal protection

Type	Operating principle	Operating curve	Breaking capacity (A)	Protection provided	Mounting Number of devices*
Normally closed thermal protection **PTO**	Bimetallic strip, indirectly heated, with normally closed (NC) contact		2.5 A at 250 V with cos φ 0.4	general surveillance for non-transient overloads	Mounted in control circuit 3 in series
Positive temperature coefficient thermistor **PTC**	Non-linear variable resistor, indirectly heated		0	general surveillance for transient overloads	Mounted with associated relay in control circuit 3 in series
Temperature sensor **KT** Y	Resistance depends on the winding temperature		0	high accuracy continuous surveillance of key hot spots	Mounted in control boards with associated reading equipment (or recorder) 1 per hot spot
Platinum resistance thermometer **PT 100**	Linear variable resistor, indirectly heated		0	high accuracy continuous surveillance of key hot spots	Mounted in control boards with associated reading equipment (or recorder) 1 per hot spot

- NRT: nominal running temperature
- The NRTs are chosen according to the position of the sensor in the motor and the temperature rise class.
- PTC: as standard on frame size ≥160
- **KT** Y 84/130 as standard

** The number of devices relates to the winding protection.*

Fitting thermal protection

- PTO or PTF, in the control circuits
- PTC, with relay, in the control circuits
- PT 100 or thermocouples, with reading equipment or recorder, in the installation control panel for continuous surveillance

Alarm and early warning

All protective equipment can be backed up by another type of protection (with different NRTs). The first device will then act as an early warning (light or sound signals given without shutting down the power circuits), and the second device will be an alarm (which shuts down the power circuits).

Built-in direct thermal protection

For low rated currents, bimetallic strip-type protection can be used. The line current passes through the strip, which shuts down or restores the supply circuit as necessary. The design of this type of protection allows for manual or automatic reset.

Equipment and Options
Electrical Options

FORCED AXIAL VENTILATION

The forced ventilation option is used to:
- operate at zero speed continuously with a torque the same as the motor rated torque at 50 Hz
- operate in overspeed mode:
  - n > 2600 rpm with 4 and 6 poles
  - n > 4500 rpm with 2 poles
- to limit the machine temperature rise for operation with a drive

Characteristics

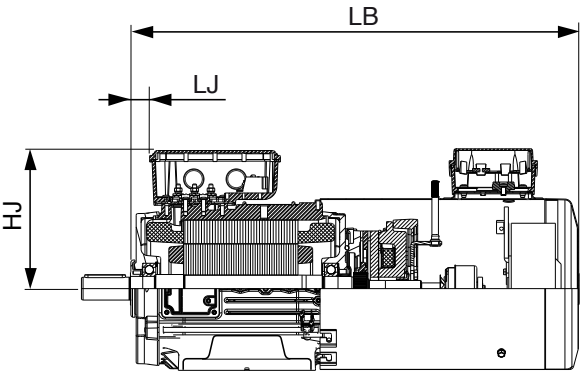
Motor fr. size	Supply voltage[1]	Consumption		Ingress protection[2]
		P (W)	I (A)	
71	Single-phase 230 V	22	0.13	IP54
80	Single-phase 230/400 V 50 Hz	98	0.43/0.25	IP55
90 to 132	Single-phase 230/400 V 50 Hz	91	0.40/0.23	IP55
160	Three-phase 230/400 V 50 Hz	150	0.94/0.55	IP55

1. ± 10% for voltage, ± 2% for frequency
2. Ingress protection of the forced ventilation unit installed on the motor.

Dimensions

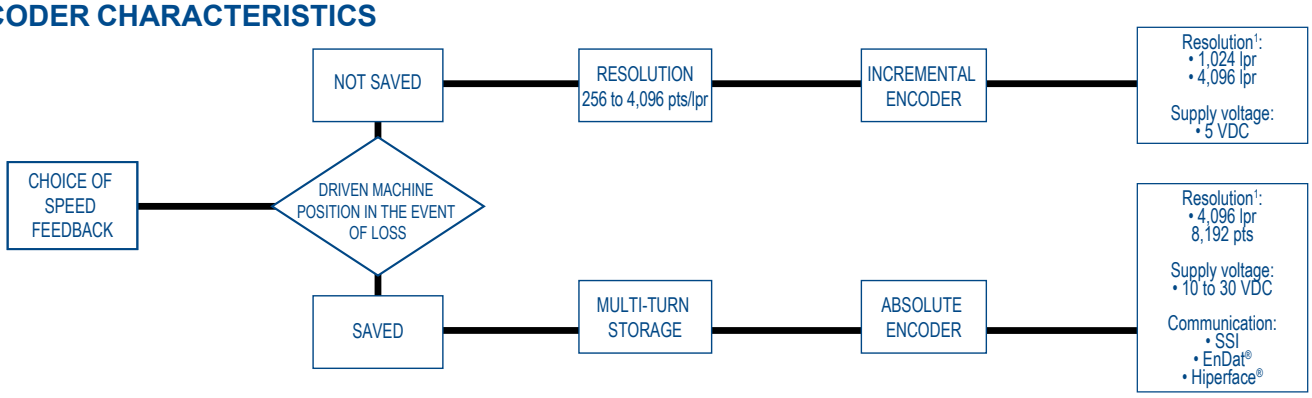
Dimensions in millimeters

Fr. size	Forced ventilation unit on FFB brake motor			
	HJ-LJ	LB		
		B3	B5	B14
71 M	Same as std FFB	386	386	386
71 L		396	396	396
80 L		427	427	427
80 LG		481	501	481
90 L, LU, SL		481	501	481
100 L, LR		529	529	529
100 LG		574	574	574
112 M, MR		529	529	529
112 MG, MU		574	574	574
132 S, SU		615	615	615
132 SM, M, MU, MR		711	711	711
160 LR, MP, MR		786	786	786
160 M, L, LUR		786	786	786



Equipment and Options
Choice of Speed Feedback

ENCODER CHARACTERISTICS



[1]. Other resolutions on request and with manufacturing lead time

- Incremental encoder:
This generator supplies a number of pulses on channels A, A/, B, B/, 0 marker, 0/ marker proportional to the speed.
A 1,024 lpr or 4,096 lpr encoder is sufficient for most applications. However, where stability at very low speed (< 10 rpm) is required, use of a higher resolution encoder is recommended.
Our std CE-approved encoder is the 5 VDC - 1,024 lpr or 4,096 lpr - TTL output - 150 mA - 10,000 rpm - IP64 - Temp. -40°C to +85°C.

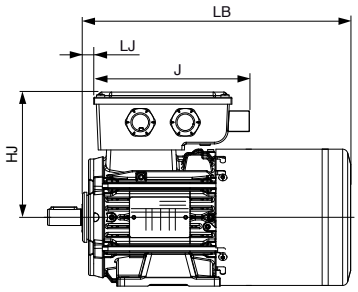
- Multi-turn absolute encoder:
This saves the position in the revolution and also over several revolutions (max. 4,096), if the power source is disconnected. A reference point is no longer necessary.
Data is transmitted via different communication protocols (EnDat2.1®, Hiperface®, SSI, etc.); some protocols are owned by a particular supplier.
In certain cases, SinCos or incremental data is also available.

Our std CE, cURus, UL/CSA-approved encoder is the 10/30 VDC - 8,192-pt - 4,096 lpr - 1 V output - 55 mA - 12,000 rpm - IP64 - Temp. -40°C to +85°C.

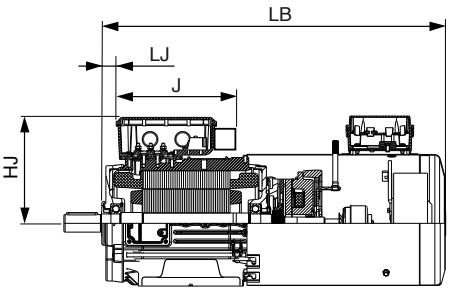
ENCODER DIMENSIONS

Dimensions in millimeters

Fr. size	FFB brake + Encoder				
	HJ	J	LB		LJ
			B3, B14	B5	
71 M	Same as std FFB	197	329	329	Same as std FFB
71 L		197	339	339	
80 L		197	355	355	
80 LG		197	436	456	
90 L, LU, SL		197	435	455	
100 L, LR		197	483	483	
100 LG		197	468	468	
112 M		197	483	483	
112 MG, MU		197	493	493	
132 S, SU		197	534	534	
132 SM, M, MU		197	596	596	
160 MP		197	671	671	
160 LR, MR		197	699	699	
160 M, L, LUR		197	699	699	



Fr. size	FFB brake + Encoder + Forced ventilation unit				
	HJ	J	LB		LJ
			B3, B14	B5	
71 M	Same as std FFB	197	386	386	Same as std FFB
71 L		197	396	396	
80 L		197	427	427	
80 LG		197	481	501	
90 L, LU, SL		197	481	501	
100 L, LR		197	529	529	
100 LG		197	574	574	
112 M, MR		197	529	529	
112 MG, MU		197	574	574	
132 S, SU		197	615	615	
132 SM, M, MU, MR		197	711	711	
160 MP, LR, MR		197	786	786	
160 M, L, LUR		197	786	786	

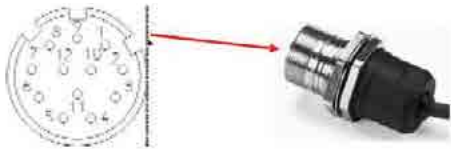


Equipment and Options
Choice of Speed Feedback

CONNECTION

- Incremental encoder:

Terminal No.	
1	0V
2	+VDC
3	A
4	B
5	0
6	A
7	B
8	0
9	NC
10	NC
11	NC
12	NC

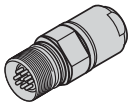


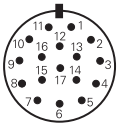
View of male connector base at the encoder end

NC: Not Connected (free)

- Absolute encoder:

17-pin
HEIDENHAIN coupling





	Power supply					Incremental signals				Other signals	
	7	**1**	**10**	**4**	**11**	**15**	**16**	**12**	**13**	**3**	**2**
	U_P	**Sensor** U_P	**0 V**	**Sensor** 0 V	**Internal shield**	**A+**	**A–**	**B+**	**B–**	**Vacant**	**Vacant**
	Brown/ Green	Blue	White/ Green	White	/	Green/ Black	Yellow/ Black	Blue/ Black	Red/ Black	Red	Black

	Absolute position values					
	14	**17**	**8**	**9**	**5**	**6**
	DATA	**$\overline{DATA}$**	**CLOCK**	**$\overline{CLOCK}$**	**Vacant**	**Vacant**
	Gray	Pink	Violet	Yellow	Green	Brown

Shield on housing; **U_P** = power supply voltage
Sensor: The sensor line is connected internally with the corresponding power line.
Vacant pins or wires must not be used!

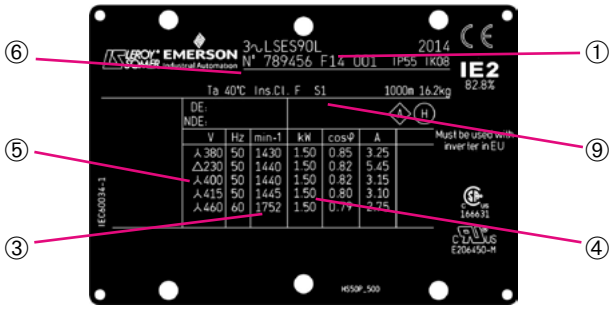
Identification - Installation
Identification

Check that the equipment conforms to the order: mounting arrangement, information on the nameplate.

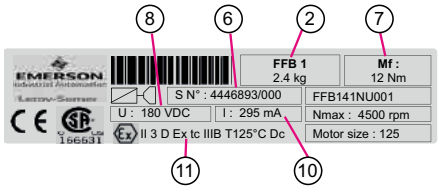
Information ① to ⑪ should be quoted when ordering spare parts.

Other logos can optionally be provided: agreement prior to ordering is essential.

MOTOR NAMEPLATE



BRAKE NAMEPLATE



Definition of symbols used on nameplates:

Legal mark of conformity of product to the requirements of European Directives

Essential information included on the nameplates:

①	Motor series, frame size
②	FFB brake type
③	Speed of rotation (rpm)
④	Rated power (kW)
⑤	Motor voltage (V)
⑥	Motor and brake manufacturing no.
⑦	Mf: Braking torque (N.m)
⑧	U: Brake coil voltage (VDC)
⑨	Duty - Operating factor
⑩	I: Coil current (mA)
⑪	Special marking (ATEX)

Please quote when ordering spare parts

Definition of symbols

T : Impregnation class
IE2 : Efficiency class
IP-- IK-- : Ingress protection*
Cl. F : Insulation class
(Ta) 40°C : Ambient operating temperature
cos P or φ : Power factor
A : Rated current
Δ : Delta connection
人: Star connection
A : Vibration level
H : Balancing mode

Bearings

DE: Drive end bearing
NDE: Non-drive end bearing

Marking

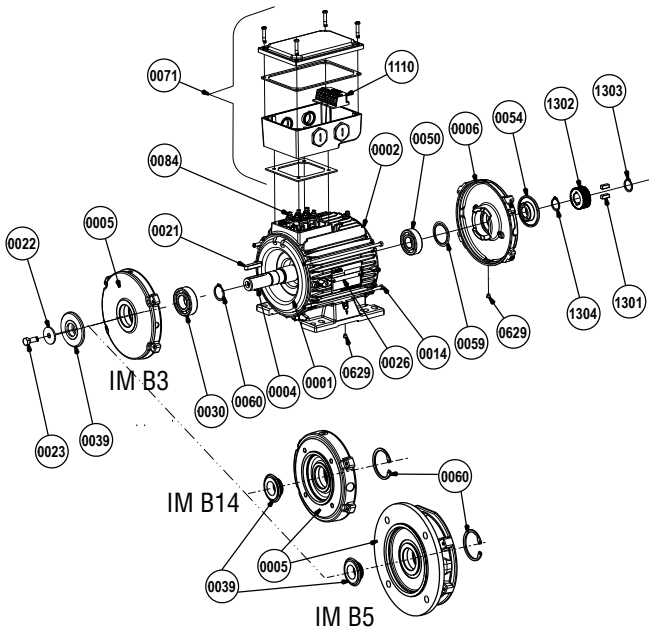
CE : Legal mark of conformity of product to the requirements of European Directives
: Product certified CSA, conforming to UL 166631

***IK: Shock resistance**

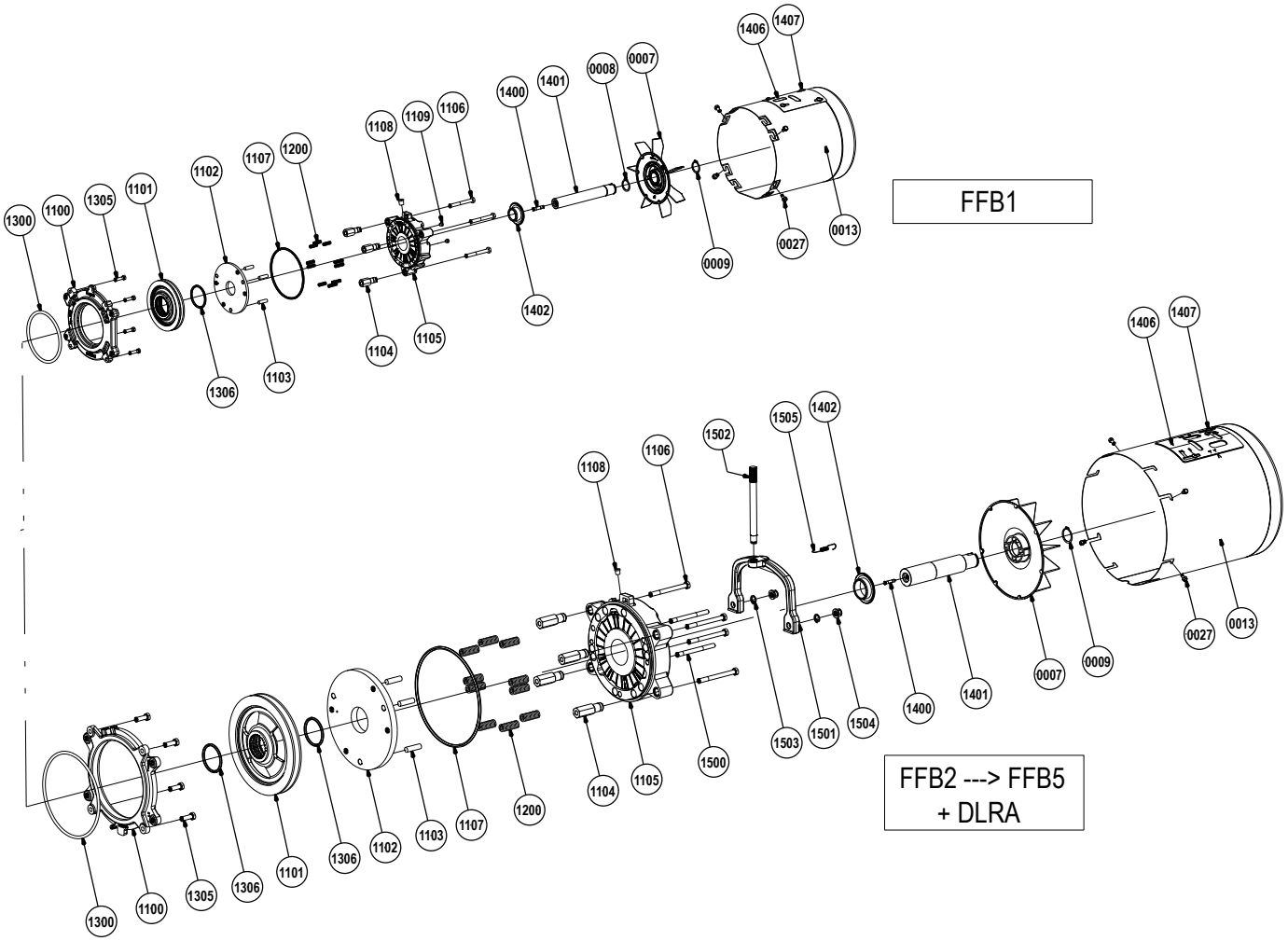
The motor can withstand a weak mechanical shock (IK 08 according to EN 50102). **The user must provide additional protection if there is a risk of significant mechanical shock.**

Identification - Installation
Exploded Views

- Motor



- Brake



Identification - Installation
Parts List

No.	Name	Qty
1	Wound stator	1
2	Housing (frame)	1
4	Rotor	1
5	DE shield	1
6	Motor NDE shield	2
7	Fan	1
8	Fan washer (no. 7)	0 or 1
9	Locking circlips (no. 7)	1 or 2
13	Fan cover	1
14	Tie rods	3 or 4
21	Shaft end key (DE)	1
22	Shaft end washer	1
23	Locking screw (no. 22)	1
25	Lifting ring (frame size ≥ 100)	2
26a	Motor nameplate	1
26b	Brake nameplate	1
27	Fan cover screws (no.13)	4
30	Drive end bearing (DE)	
39	Drive end weatherproof seal (DE)	1
50	Bearing on brake side (NDE)	1
54	Weatherproof seal on brake side (NDE)	1
59	Preloading (wavy) washer	1
60	Internal circlip (DE no. 30)	1
71	Terminal box	1
84	Terminal plate	1
629	Drain hole plug	1 or 2
1100	Friction backplate	1
1101	Brake disk	1
1102	Armature	1
1103	Pins	3 or 4
1104	Spacer	3 or 4
1105	Yoke	1
1106	Fixing screws (no. 1105/1100)	3 or 4
1107	O ring seal	1
1108	Cable entry (no. 1105)	1
1109	Pin hole blanking plug	2
1110	Brake power supply unit	1
1200	Compression spring	3 to 10
1300	O ring seal (between no. 6 and no.1100)	1
1301	Splined ring key (no. 1302)	2
1302	Splined ring	1
1303	Retaining ring (no. 1302)	1
1304	Washer	0 or 1
1305	Backplate fixing screws (no. 1100)	3 or 4
1306	O ring seal (no. 1101)	2
1400	Extension/shaft linking setscrew (no. 1401/4)	1
1401	Extension shaft	1
1402	VLS seal (no. 1105)	1
1406	Cover closing hatch	1
1407	Fixing screws (no. 1406)	4
1500 to 1505: DLRA option (see section 6.1 of maintenance manual reference 5287)		
xx	*Primary maintenance part*	

Identification - Installation
Installation

The following information is given for guidance only, and should never be used as a substitute for the current standards, nor does it relieve the installation company of its responsibility.

Depending on the installation, more optional elements can be added to the installation:

RECEIPT

Check the state of the brake motor; if there is any damage to the motor or even its packaging, contact the carrier.

Check that the brake motor conforms to the order (mounting arrangement, information on the nameplates).

STORAGE

Store the equipment in a clean, dry location, protected from shocks, vibrations, variations in temperature and in an environment with relative humidity of less than 90%.

Storage for longer than 6 months leads to special conditions, we will be happy to discuss these with you.

After storage for a period of more than 6 months, disconnect the brake power supply unit and check the winding insulation resistance (phase/earth resistance higher than 10 MΩ).

Drain any condensation water.

COMMISSIONING

The brake motor is designed to operate at the speeds indicated on the nameplate (do not exceed the maximum speed stated on the brake nameplate: Nmax).

Comply with the voltages and frequencies indicated on the nameplate.

(Do not deviate by more than 5% from the voltage extremes on the nameplate and by more than 1% from the frequencies).

For hoisting applications, do not use a motor that is not rated S3 (except for variable speed). Do not use a motor with a different duty type from that on the nameplate no. ⑨ (see Motor Nameplate section on page 39).

MECHANICAL INSTALLATION

See manuals ref. 5286 (FFB brake motor installation manual) and ref. 1889 (Recommendations for storing and commissioning AC motors manual).

If the brake motor has been stored at a temperature lower than -10°C, heat it and turn the shaft manually before starting up the machine.

If the brake motor is to be used at a temperature lower than -25°C, it must not be fitted with a sensor. It can be fitted with thermocouples.

Ensure there is minimum clearance (corresponding to the length of the cover) at the non-drive end of the brake motor so it can be put down (inspections and brake adjustment).

Install the brake motor in conditions conforming to those on the order (temperature, relative humidity, altitude).

When the brake motor is fitted with lifting rings, these are for lifting the brake motor on its own.

Mount the brake motor in the position specified on the order, on a flat, rigid base in order to prevent distortion and vibration.

Ensure the fixing screws are tightened to the correct tightening torque (class 8.8 minimum according to ISO 898-1), the screw diameter must be the right size for the fixing holes.

Ensure the mechanical shafts are aligned and the coupling and pulley are mounted in accordance with good practice.

Do not knock the motor (terminal box, cover), the shaft or the coupling during mounting, do not crush the seal, do not project beyond the shoulder of the shaft.

Ensure correct brake motor cooling, the air intakes and outlets must be kept clear.

Check that the loads applied to the motor shaft (especially the belt tension) are compatible with the values stated in our technical catalogues.

WIRING

Drive power supply cables

These cables do not necessarily need shielding. Their cross-section is recommended in the drive documentation, however, it can be adapted according to the type of cable, installation method, the cable length (voltage drop), etc. See the Sizing power cables section below.

Motor power supply cables

These cables must be shielded to ensure EMC conformance of the installation. The cable shielding must be connected over 360° at both ends. At the motor end, special EMC cable glands are available as an option. The cable cross-section is recommended in the motor documentation, however, it can be adapted according to the type of cable, installation method, the cable length (voltage drop), etc. See the Sizing power cables section below.

Encoder cables

Shielding the sensor cables is important due to the high voltages and currents present at the drive output. This cable must be laid at least 30 cm away from any power cables. See the Encoders section.

Identification - Installation
Installation

Sizing power cables

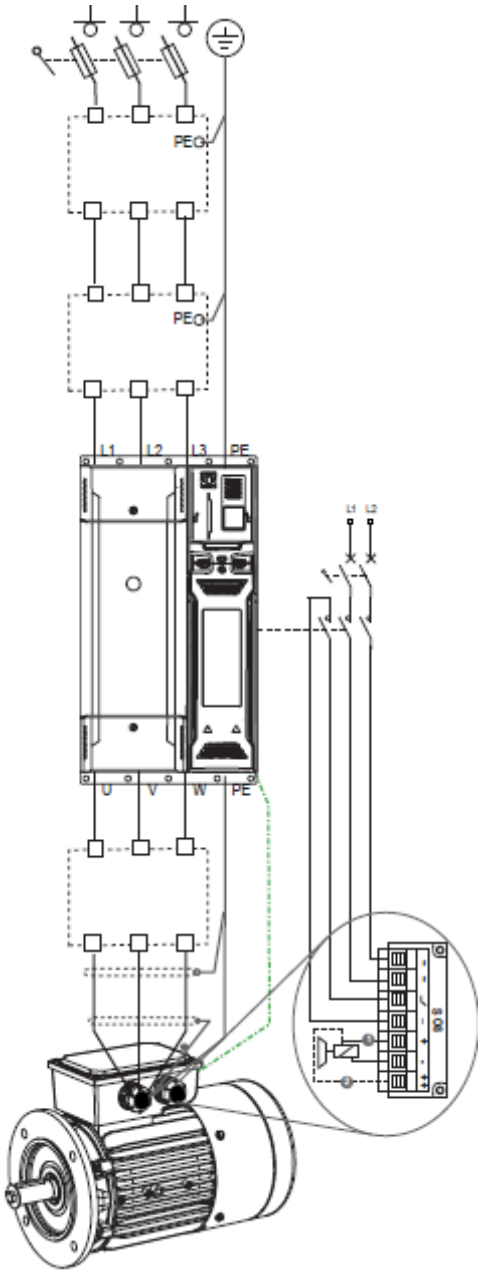
The drive and motor power supply cables must be sized according to the applicable standard, and according to the design current, stated in the drive documentation.

The different factors to be taken into account are:

- The installation method: in a conduit, a cable tray, suspended, etc.
- The type of conductor: copper or aluminum

Once the cable cross-section has been determined, check the voltage drop at the motor terminals. A significant voltage drop results in increased current and additional losses in the motor (temperature rise).

A variable speed drive and transformer system that have been grounded in accordance with good practice will contribute significantly to reducing the voltage on the shaft and the motor casing, resulting in fewer high-frequency leakage currents. Premature breakage of bearings and auxiliary equipment such as encoders should also be avoided wherever possible.



Identification - Installation
Packaging Weights and Dimensions

ROAD TRANSPORT (code 30) or AIR TRANSPORT (code 40)

Cardboard boxes[1]		
Ref.	Tare	Dimensions (L x W x H)[2]
	kg	mm
P0 000	0.25	245 x 190 x 150
P0 100	0.35	256 x 222 x 165
P0 200	0.40	330 x 288 x 172
R1	0.25	330 x 145 x 200
R2	0.50	420 x 200 x 240
R3	0.65	520 x 220 x 280
R4	1.05	550 x 320 x 360
R5	0.85	580 x 260 x 280
R6	1.30	780 x 300 x 430
R7	0.75	420 x 300 x 260
R8	0.90	500 x 330 x 290
R5 Marine	0.85	580 x 260 x 280

Open pallet box or open-slat crate[1]		
Tare	Outer dimensions (L x W x H)[2]	Inner dimensions (L x W x H)[2]
kg	mm	mm
10	720 x 420 x 550	650 x 350 x 400
26	830 x 520 x 660	760 x 450 x 500
30	990 x 570 x 620	920 x 500 x 550
47	920 x 870 x 700	850 x 800 x 550
48	990 x 870 x 880	920 x 800 x 720
45	1,270 x 870 x 700	1,200 x 800 x 550
47	1,270 x 870 x 880	1,200 x 800 x 720
61	1,270 x 1,070 x 730	1,200 x 1,000 x 550
62	1,270 x 1,070 x 900	1,200 x 1,000 x 720
64	1,270 x 1,070 x 1,050	1,200 x 1,000 x 870

PACKAGING FOR SEA TRANSPORT (code 10)

Plywood crates[1]		
Tare	Outer dimensions (L x W x H)[2]	Inner dimensions (L x W x H)[2]
kg	mm	mm
20	740 x 480 x 730	680 x 420 x 600
26	840 x 520 x 710	760 x 440 x 530
30	980 x 560 x 720	920 x 500 x 550
58	1,120 x 750 x 850	1,040 x 680 x 670
60	1,100 x 950 x 680	1,020 x 870 x 500
80	1,100 x 950 x 1,180	1,020 x 870 x 1,000

1. Maximum permissible weight: 50 kg

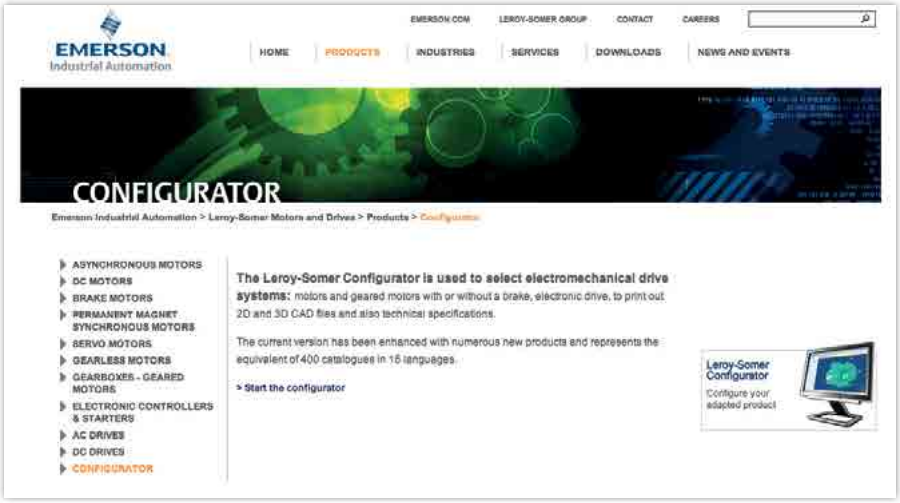
2. Theses approximate values are given for individual packages. Packages grouped in open slat crates for quantity of machines supplied > 5, in the majority of cases.

Appendix
Configurator

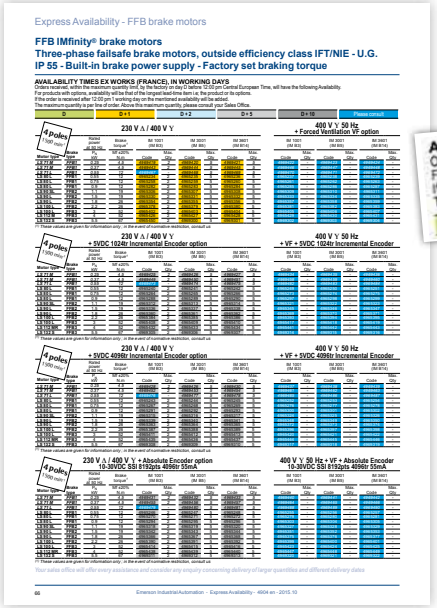
The Leroy-Somer configurator can be used to choose the most suitable motor and provides the technical specifications and corresponding drawings.

To register online:
http://www.emersonindustrial.com/fr-FR/leroy-somer-motors-drives/Products/Configurator/

- Help with product selection
- Print-outs of technical specifications
- Print-outs of 2D and 3D CAD files
- The equivalent of 300 catalogs in 11 languages



Product Availability


Express Availability - FFB brake motors

FFB IMfinity® brake motors
Three-phase failsafe brake motors, outside efficiency class IFT/NIE - U.G.
IP 55 - Built-in brake power supply - Factory set braking torque

AVAILABILITY TIMES EX WORKS (FRANCE), IN WORKING DAYS

Being able both to respond to urgent requests and adhere to promised customer lead times calls for a powerful logistics system.

The availability of motors is ensured by the network of approved partners and Leroy-Somer central services all working together.

The selection data in the "*Express* Availability" catalog specify the product lead time for each family in the form of a color code and according to the quantities per order.

Please consult Leroy-Somer.

Notes

Notes

Leroy-Somer™

www.emersonindustrial.com/automation

EMERSON™
Industrial Automation

Control Techniques Limited. Registered office: The Gro, Newtown, Powys SY16 3BE. Company registered in England and Wales. Company registration no: 01236886.

Moteurs Leroy-Somer SAS. Registered office: Bd Marcellin Leroy, CS 10015, 16915 Angoulême Cedex 9, France. Registered capital: €65,800,512, RCS Angoulême 338 567 258.

5329 en - 2015.10 / b