

MV IEC Electric Motors TEFC & TEAAC

LF & LT Series



www.hyosungpni.com

Global Top Energy, Machinery & Plant Solution Provider

 **HYOSUNG CORPORATION**
Power & Industrial Systems Performance Group

HEAD OFFICE

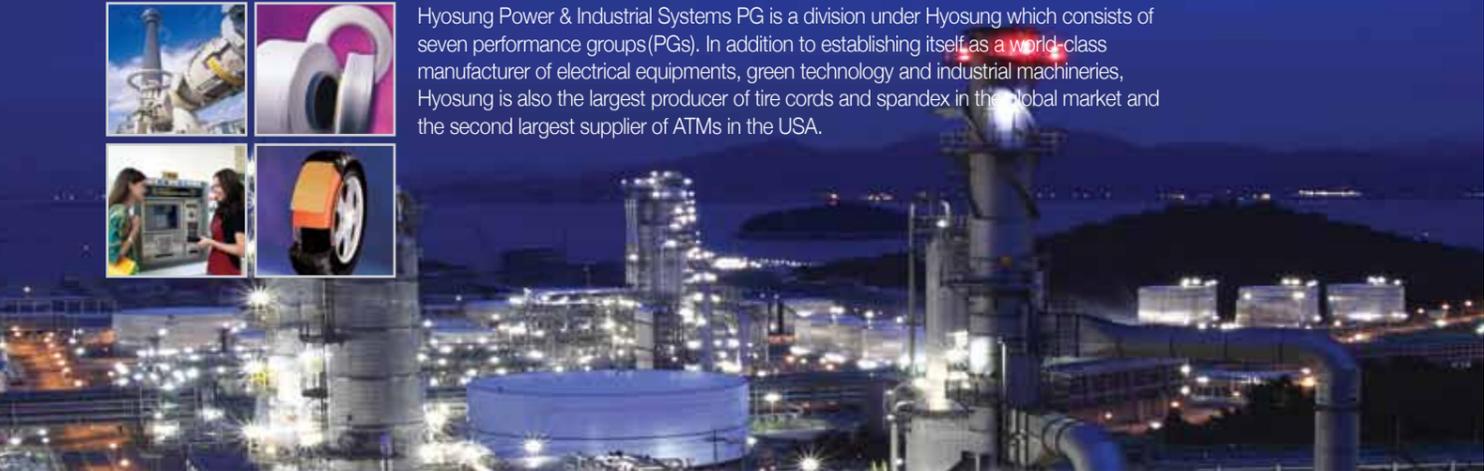
119, Mapo-daero, Mapo-gu, Seoul, Korea 121-720
TEL : 82-2-707-7000 FAX : 82-2-707-6039



About HYOSUNG



Hyosung Power & Industrial Systems PG is a division under Hyosung which consists of seven performance groups (PGs). In addition to establishing itself as a world-class manufacturer of electrical equipments, green technology and industrial machineries, Hyosung is also the largest producer of tire cords and spandex in the global market and the second largest supplier of ATMs in the USA.



01 Our Business

Brief introduction of Hyosung Power & Industrial Systems

Hyosung Power & Industrial Systems Performance Group

Hyosung Power & Industrial Systems Performance Group, a comprehensive energy solution provider, boasts world-leading technology in the global power industry and has secured a competitive capability on par with that of top competitors in transformers, switchgears, electric motors, generators, gear units, and chemical process equipment.

With globalization as one of our top priorities, we have achieved outstanding increase in sales over the past few years thanks to the enhancement in Hyosung's quality, technology, and brand recognition among overseas clients, which include North America, Europe, the Middle East, and Asia. We expect such robust performance, marked by an increasing number of orders from the overseas market, to continue in the future.

At the heart of our capability to grow as a comprehensive energy solution provider is our global organization structure. Hyosung Power & Industrial Systems Performance Group is divided into Power Systems Performance Unit and Industrial Machinery Performance Unit.



Industrial Machinery Performance Unit

The Industrial Machinery Performance Unit plays an important role in the infrastructure industry around the globe and is specialized in manufacturing all types of electric motors, generators, gear units, and chemical process equipment.

With the ability to produce motors with up to 25,000kW, we possess an automated production line capable of manufacturing more than 40,000 motors every month.

In addition, we anticipate that our efforts in innovation among rotary machinery will make significant contributions towards creating energy profitability as well as greater efficiency. With the goal to serve as a world-leading provider of industrial machinery and plant engineering, we will continue to focus on innovative energy conservation technology, enhanced reliability of new products, and development of new technologies.



MV Electric Motors - TEFC & TEAAC

CONTENTS

02 Our Business 03 Sustainability / R&D 04 TEFC & TEAAC Motors / LF & LT Series 05 Why Hyosung Motors? 08 LF Series / General 09 LT Series / General 10 LF Series / Performance Data 20 LF Series / Dimension 22 LT Series / Performance Data 32 LT Series / Dimension 34 Tolerance & Derating Factor 35 On-line Technical Support System 36 Optional Design & Test 37 Manufacturing Facilities 38 Global Network

02 Sustainability

Our sustainability principles are the backbone of the way we design and manufacture products



Quality Assurance

Hyosung strives for excellence. We believe excellence can only be achieved through absolute quality and value for customers. In order to create quality products, we believe that all of the actions of every single employee must be focused in the highest level of quality. In order to achieve such levels, we have implemented a quality assurance policy and programs that make our philosophy into a reality. Our Quality Assurance Policy was founded based on the management policy of the president and meets the demands of ISO 9001. As a globally active company, we are committed to comprehensive and quality management through three quality strategies: quality management system, customer-focused management system, and concentration on core competencies. The comprehensive quality management system ensures that we completely comply with all compliances and applicable legislation, codes, and standards in addition to implementing efficient operation of our management resources to eliminate unnecessary waste. Our customer-focused management system clarifies and simplifies our first priority which is customer satisfaction. All of our work is aimed to exceed customer needs and provide exceptional value through quality standards, flexibility, and innovation. Finally, we concentrate on our core competencies for strict quality control and continual improvement which provides quality products and cost-saving to our clients via advancement in technical capacity and technological innovation. We implement our policy via a Quality Management Team manages research laboratories, including the Measurement Standard Laboratory, the Chemical Analysis Laboratory and the Material Analysis Laboratory to maintain a strict control over quality.

Environment Protection Policy

Hyosung understands the impact of Hyosung's activities in the environment and works to protect the environment from pollution, manages the environmental impacts of Hyosung's products and technologies, and prevents future pollution and harmful effects in the environment by investing in environmentally-friendly products and solutions. Based on this eco-philosophy of shared responsibility, Hyosung has implemented a comprehensive environmental protection program that aims to minimize our impact on the environment and conserve resources. Our environmental policy fulfils all requirements of the ISO 14001.



03 R&D

Inspiring innovation, creation and expertise

Hyosung R&D Center identifies innovation, creation, and expertise as core value, and concentrates on world class R&D activities in the 21st century with a philosophy aspiring after customer satisfaction, quality priority, and performance orientation. Hyosung pursues to be the world's best company in the field of heavy electrical machinery, industrial & electrical electronics engineering, and energy system. Ever since establishment in 1978, R&D Center had led the development of domestic technology. Along with the Anyang and Changwon labs, the group has endeavored to produce core technology and world-class products in the areas of heavy electrical machinery, energy system, electrical electronics engineering, and industrial automation system.

Research Areas

Hyosung R&D Center engages in the activities in the field of energy system, solution & service, applied electrical and electronic technology, basic core technology, technology of improved reliability, core components, and new materials.

Energy System

- Renewable energy (wind system, wind turbine, wind PCS, solar system, PV PCS, fuel cell, co-generation)
- Electric Vehicle (EV charger, EV motor)

Solution & Service

- Power facility diagnosis algorithm and system
- Power facility lifecycle evaluation system
- Service solution for remote diagnosis for prevention

Applied Electrical & Electronic Technology

- Power conversion system
- Flexible AC transmission system and high voltage direct current
- Power quality solution

Basic Core Technology

- Fortified technology in structural dynamics, electromagnetics, heat transfer analysis, etc.
- Skills for system simulation, analysis and evaluation
- Business support technology

Technology with Improved Reliability

- Test data analysis and testing facility
- Analysis of lifecycle and cause of error
- Reliability assessment (environment-friendliness, durability, long-term degradation, and more)

Core Components and New Materials

- Organic and inorganic insulation materials
- Silicon forming technology
- Intelligent sensor (facility diagnosis, CT, PT, VT, LA, and more)

General Information

Hyosung's LF and LT Series MV motors are designed for high efficiency and low temperature rise.

Frame No.	280	315	355	400	450	500	560	630	710	
Standard	IEC									
Type	AC 3 phase squirrel cage induction motor									
Voltage & Frequency	3.0kV, 6.0kV / 50Hz									
	3.3kV, 4.16kV, 6.6kV / 60Hz									
Max. Rated power	LF Series	~ 2350kW								
	LT Series		~ 10200kW							
Ambient temperature	-20 ~ 40°C									
Insulation class & Temperature rise	F / B									
Altitude	1000m a.s.l									
Degree of protection	IP55									
Type of construction	IM 1001 (B3)									
Frame material	LF Series	Cast iron								
	LT Series		Fabricated steel							
Enclosure & method of cooling	LF Series	Totally enclosed fan cooled type - IC411								
	LT Series		Totally enclosed air-to-air cooled type - IC611							
Rotor bar type	LF Series	Copper bar								
	LT Series		Copper bar							
Starting method	Direct on line									
Bearings	LF Series	Anti-friction type (grease) or sleeve type (oil bath)								
	LT Series	Anti-friction type (grease) or sleeve type (oil bath)			Anti-friction type (grease) or sleeve type (forced feed oil)					
Direction of rotation	Clockwise or Counter-clockwise									
Vibration	≤2.3mm/s rms (acc. to IEC 60034-14)									
Protection of windings	R.T.D (PT 100 Ω)									
Protection of bearings	R.T.D (PT 100 Ω)									
Anti-condensate heater	Included (Wired to an auxiliary terminal box as basic design)									

LF and LT Series are for general use. They are suitable for constant speed operation and standard inertia such as pumps, fans, compressors and blowers, etc.

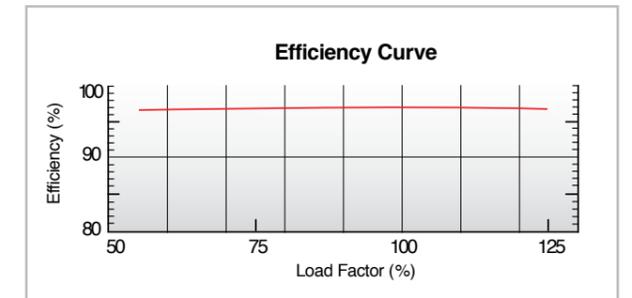
Hyosung Motors can meet technical specifications including vibration, noise, accessories according to customers' requirements.

Protection degree of IP55 motors can operate in dusty environment.

Higher Efficiency is Our Promise to Customers

The importance of motor efficiency cannot be overstated, since electric motors use approximately 70% of all energy consumed. Using higher efficiency motors means a lower cost to operate.

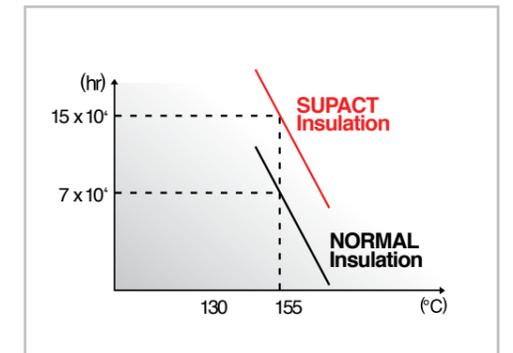
LF & LT series minimized internal losses by optimizing design of electromagnetic field and flow with unique design software we've developed, achieving world class level of efficiency. Even in the range from 75% to 100% of load, where most of applications are in operation, our LF & LT series motors keep almost flat but still high efficiency as you can find in the curve.



Excellent Insulation System is the Basis of Long Life Span

Insulation design and materials are the most important factors in the life span of large motors. Ability of an insulation to resist temperature and environmental attacks yields long life. Hyosung's design approach minimizes degradation of the di-electric strength of the insulation system contributing to increased lifespan.

On the LF & LT series machines, our Class F Insulation system has thermal performance rating that approaches full class H(180°C) systems due to our unique SUPACT insulation system. The process of vacuum pressurized impregnation with heat-resisting MICA tape and non-solvent based epoxy resins allows us to endure continuous operation at high temperatures without degradation. Our standard for VFD operation is to design for one voltage class higher and includes corona treatment.

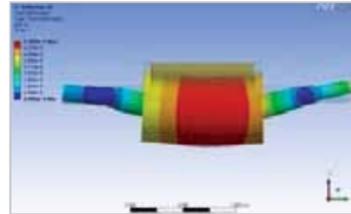


Be at the First to Reduce the Noise and to Improve Your Working Environment

We care about operators' working environment. Our LF & LT series motors comply with international health & safety regulation especially in noise levels. Thanks to the ideal slot combination and power analysis design software, we can minimize electromagnetic power losses and therefore lower our operating noise.

We combine fractional harmonic wave noise reduction at non-drive end of LF & LT series and use sound-absorbing materials inside of the motor frame to complete the noise reduction system.

Optimized Shaft Design for Stable Operation

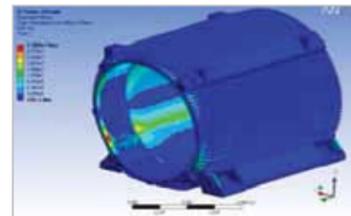


<Static Deflection Analysis>

LF & LT series limit the static deflection under 10%, increasing the shaft stiffness by using heat treatment materials, so that it can be suitably used for the driven machines requiring high starting torques.

Insulated bearings are provided to prevent the bearing pitting due to the shaft currents. LF & LT series motors?
Of course, YES!

Enhanced Durability with Cast Iron Frame



<Frame stiffness analysis for the maximum torque>

Fundamental function of frame is to protect windings from external impact and foreign substances. As stiffness is very important, LF series applies cast iron frame up to 560 frame. Especially gray cast iron(ISO 250, DIN No. 0.6025, COPANT FG250) which is sturdy and anticorrosive increase mechanical safety and reliability.

Reliable Bearings

LF series motors are equipped with anti-friction bearings with grease lubrication which are of SKF, NSK, FAG or equivalent.

For LT series, 2-pole & 4-pole motors up to 500 frame are available with self-lubricated sleeve bearings, whereas others are available with both anti-friction type and sleeve type with forced oil lubrication. Sleeve bearings are supplied by Renk or equivalent.

[Bearing No.]

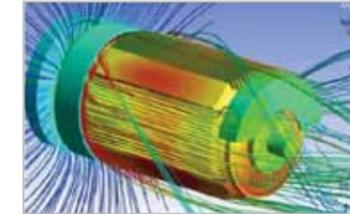
LF Series

Frame	2P		4P~8P	
	DE Bearing	NDE Bearing	DE Bearing	NDE Bearing
280	6216	6216	6218	6216
315	6218	6218	6220	6218
355	6218	6218	6224	6220
400	Sleeve	Sleeve	6226	6224
450	Sleeve	Sleeve	NU1028+6028	NU1028
500	Sleeve	Sleeve	NU1030+6030	NU1030
560	-	-	NU1034+6034	NU1034

LT Series

Frame	2P		4P		6P		8P	
	DE Bearing	NDE Bearing	DE Bearing	NDE Bearing	DE Bearing	NDE Bearing	DE Bearing	NDE Bearing
450	Sleeve	Sleeve	NU1028+6028	NU1028	NU1030+6030	NU1030	NU1030+6030	NU1030
500	Sleeve	Sleeve	NU1032+6032	NU1032	NU1034+6034	NU1034	NU1034+6034	NU1034
560	Sleeve	Sleeve	Sleeve	Sleeve	NU1038+6038	NU1038	NU1038+6038	NU1038
630	Sleeve	Sleeve	Sleeve	Sleeve	NU1044+6044	NU1044	NU1044+6044	NU1044
710	Sleeve	Sleeve	Sleeve	Sleeve	Sleeve	Sleeve	Sleeve	Sleeve

Improved Cooling Structure



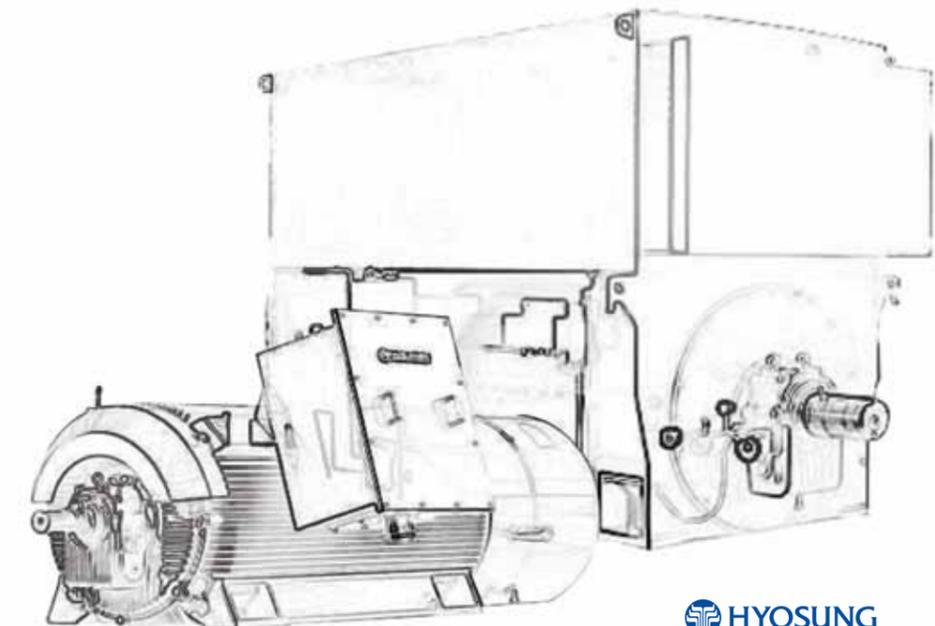
LF series' extended fin height on the frame and the longer fin design at the bracket improve cooling by promoting effective air flow between fins.

LF series incorporates a special cover at the drive end for more efficient cooling structure. The cover guides the air flow to assist bearing cooling at the drive end resulting in lower bearing temperature rise. This also helps keep hot air from driven machinery from heating the bearing.

Internal structure is designed to promote improved cooling and reduce noise levels. LF series' ventilation structure is formed as streamlined shape which increases the cooling efficiency while also decreasing noise level.

Other Advantages

- Broad product range satisfies customers' needs
- Various options can be applied
- Compact size
- Various terminal boxes are ready to meet global customers' diverse needs
- Optimum fan housing design minimizes vibration but maximizes cooling effect
- Better construction for easier cable connection
- Easy installation
- Anti-corrosion design
- Reliable painting system
- Anti-corona shield applied to the motors above 4000V
- Easy and simple maintenance
- Substantial and reliable lifting lug



Totally Enclosed Fan Cooled, Squirrel Cage

Specifications

- **Enclosure** : Totally Enclosed
- **Rotor Type** : Squirrel Cage
- **Number of Poles** : 2 ~ 8 Poles
- **Voltage** : 2 ~ 7.2 kV
- **Output Range** : 120 ~ 2,350 kW
- **Frame Size** : 280 ~ 560 Frame
- **Degree of Protection** : IP55 (IEC60034-5)
- **Method of Cooling** : IC411 (IEC60034-6)
- **Insulation / Temp. Rise** : F / B
- **Type of Construction** : IM B3



Frame Assignment (Unit : kW)

50Hz, 3.0kV

Frame No.	Poles			
	2P	4P	6P	8P
280	190	190	150	100
315	355	365	270	210
355	500	560	425	300
400	750	750	630	465
450	1030	1000	800	670
500	1420	1450	1250	940
560	-	2200	1850	1400

50Hz, 6.0kV

Frame No.	Poles			
	2P	4P	6P	8P
280	190	190	150	100
315	355	365	270	210
355	500	560	425	300
400	750	750	630	465
450	1030	1000	800	670
500	1420	1450	1250	940
560	-	2200	1850	1400

60Hz, 3.3kV

Frame No.	Poles			
	2P	4P	6P	8P
280	220	220	170	110
315	410	440	325	250
355	560	640	510	360
400	830	830	690	540
450	1140	1100	900	770
500	1560	1600	1360	1000
560	-	2350	2000	1500

60Hz, 4.16kV

Frame No.	Poles			
	2P	4P	6P	8P
280	220	220	170	110
315	410	440	325	250
355	560	640	510	360
400	830	830	690	540
450	1140	1100	900	770
500	1560	1600	1360	1000
560	-	2350	2000	1500

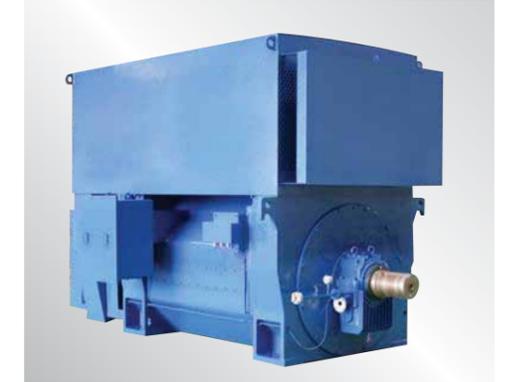
60Hz, 6.6kV

Frame No.	Poles			
	2P	4P	6P	8P
280	220	220	170	110
315	410	440	325	250
355	560	640	510	360
400	830	830	690	540
450	1140	1100	900	770
500	1560	1600	1360	1000
560	-	2350	2000	1500

Totally Enclosed Air to Air Cooled, Squirrel Cage

Specifications

- **Enclosure** : Totally Enclosed
- **Rotor Type** : Squirrel Cage
- **Number of Poles** : 2 ~ 8 Poles
- **Voltage** : 2 ~ 7.2 kV
- **Output Range** : 500 ~ 10,200 kW
- **Frame Size** : 450 ~ 710 Frame
- **Degree of Protection** : IP55 (IEC60034-5)
- **Method of Cooling** : IC611 (IEC60034-6)
- **Insulation / Temp. Rise** : F / B
- **Type of Construction** : IM B3



Frame Assignment (Unit : kW)

50Hz, 3.0kV

Frame No.	Poles			
	2P	4P	6P	8P
450-118	1200	1000	800	-
450-140	1550	1540	1200	880
500-132	1900	1800	1400	1000
500-150	2500	2450	1950	1400
560-140	3000	3000	2250	1500
560-160	3800	4000	3000	2200
630-160	4500	4500	3500	2250
630-180	6000	5800	4400	3200
710-200	-	6400	4500	3750
710-224	-	7000	6400	4900

50Hz, 6.0kV

Frame No.	Poles			
	2P	4P	6P	8P
450-118	1200	1000	800	-
450-140	1550	1540	1200	880
500-132	1900	1800	1400	1000
500-150	2500	2450	1950	1400
560-140	3000	3000	2250	1500
560-160	3800	4000	3000	2200
630-160	4500	4500	3500	2250
630-180	6000	5800	4400	3200
710-200	-	6400	4500	3750
710-224	-	8700	6400	4900

60Hz, 3.3kV

Frame No.	Poles			
	2P	4P	6P	8P
450-118	1400	1400	1000	800
450-140	1820	1850	1430	1030
500-132	2250	2300	1800	1200
500-150	3000	2900	2300	1700
560-140	3500	3500	2750	2000
560-160	4200	4500	3600	2650
630-160	4500	5500	4200	3000
630-180	6300	6700	5200	3800
710-200	-	8000	6000	4500
710-224	-	-	7500	6000

60Hz, 4.16kV

Frame No.	Poles			
	2P	4P	6P	8P
450-118	1400	1400	1000	800
450-140	1820	1850	1430	1030
500-132	2250	2300	1800	1200
500-150	3000	2900	2300	1700
560-140	3500	3500	2750	2000
560-160	4200	4500	3600	2650
630-160	4500	5500	4200	3000
630-180	6300	6700	5200	3800
710-200	-	8000	6000	4500
710-224	-	10200	7500	6000

60Hz, 6.6kV

Frame No.	Poles			
	2P	4P	6P	8P
450-118	1400	1400	1000	800
450-140	1820	1850	1430	1030
500-132	2250	2300	1800	1200
500-150	3000	2900	2300	1700
560-140	3500	3500	2750	2000
560-160	4200	4500	3600	2650
630-160	4500	5500	4200	3000
630-180	6300	6700	5200	3800
710-200	-	8000	6000	4500
710-224	-	10200	7500	6000

LF Series / Performance Data

Leading the World best

LF Series : 50Hz, 3.0kV

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

3.0kV, 50Hz

2-Pole										
130	280	2961	31.4	93.4	85.4	419	210	60	550	13
150	280	2961	35.9	93.6	85.8	484	210	70	550	15
190	280	2961	44.9	94.1	86.5	612	220	80	550	18
200	315	2961	47.4	93.9	86.4	645	210	90	590	19
250	315	2961	58.6	94.4	86.9	806	220	100	590	23
300	315	2961	69.8	94.8	87.3	967	220	110	590	27
355	315	2961	82.0	95.2	87.5	1144	220	110	580	31
400	355	2961	92.4	95.2	87.5	1289	220	110	610	35
450	355	2961	103.5	95.5	87.6	1451	210	110	600	38
500	355	2961	114.7	95.7	87.7	1612	210	110	600	42
550	400	2961	126.2	95.6	87.7	1773	200	100	630	45
600	400	2961	137.3	95.8	87.8	1934	200	100	630	48
650	400	2961	148.4	95.9	87.9	2095	200	100	620	52
700	400	2961	159.4	95.9	88.1	2257	200	90	620	55
750	400	2961	170.5	96.0	88.2	2418	200	90	620	58
800	450	2961	181.8	95.9	88.3	2579	210	90	640	61
850	450	2961	192.5	96.0	88.5	2740	210	80	640	63
900	450	2961	203.4	96.0	88.7	2901	210	80	630	66
950	450	2961	214.0	96.1	88.9	3062	200	80	630	69
1030	450	2961	230.7	96.2	89.3	3320	200	70	620	73
1100	500	2961	246.4	96.1	89.4	3546	200	70	630	77
1200	500	2961	267.1	96.3	89.8	3868	200	70	620	81
1300	500	2961	288.4	96.4	90.0	4191	200	70	600	86
1420	500	2961	313.6	96.5	90.3	4578	200	60	580	91

4-Pole

130	280	1481	34.8	92.2	77.9	838	200	100	640	81
150	280	1481	39.4	92.7	79.0	967	200	100	630	93
190	280	1481	48.4	93.4	80.9	1225	200	110	620	115
200	315	1481	50.9	93.3	81.1	1289	210	90	640	120
250	315	1481	62.0	93.9	82.7	1612	210	100	640	147
300	315	1481	73.1	94.3	83.8	1934	220	100	630	173
365	315	1481	87.6	94.8	84.6	2353	230	100	620	206
400	355	1481	96.0	94.7	84.7	2579	220	110	650	223
450	355	1481	107.5	94.9	84.9	2901	220	110	650	248
500	355	1481	119.0	95.1	85.0	3224	220	110	640	271
560	355	1481	133.2	95.2	85.0	3610	230	110	630	299
600	400	1481	141.7	95.2	85.6	3868	220	100	660	317
650	400	1481	153.7	95.2	85.5	4191	220	100	650	340
700	400	1481	165.5	95.3	85.4	4513	220	90	640	362
750	400	1481	177.2	95.4	85.4	4835	220	90	640	384
800	450	1481	188.3	95.4	85.7	5158	210	80	660	405
850	450	1481	199.9	95.5	85.7	5480	210	80	650	426
900	450	1481	211.2	95.6	85.8	5803	210	80	640	447
950	450	1481	222.7	95.7	85.8	6125	210	80	640	467
1000	450	1481	233.9	95.8	85.9	6447	210	70	630	488
1100	500	1481	256.4	95.9	86.1	7092	210	100	650	527
1200	500	1481	278.1	96.1	86.4	7737	210	90	640	565
1300	500	1481	300.0	96.2	86.7	8381	210	90	630	603
1450	500	1481	332.0	96.4	87.2	9349	220	80	620	657
1500	560	1481	349.3	96.2	85.9	9671	190	70	650	674
1600	560	1481	370.9	96.3	86.2	10316	200	70	650	709
1700	560	1481	393.2	96.3	86.4	10960	200	60	650	743
1800	560	1481	414.5	96.4	86.7	11605	210	60	640	775
1900	560	1481	436.5	96.4	86.9	12250	210	60	640	807
2000	560	1481	456.9	96.5	87.3	12895	210	60	640	839
2100	560	1481	477.1	96.7	87.6	13539	200	60	630	869
2200	560	1481	497.6	96.8	87.9	14184	200	60	630	899

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

3.0kV, 50Hz

6-Pole										
120	280	987	33.2	91.6	75.9	1161	220	130	630	203
150	280	987	40.3	92.3	77.7	1451	200	100	620	249
180	315	987	50.6	92.7	73.8	1741	230	90	640	295
200	315	987	55.6	93.0	74.5	1934	220	90	640	324
270	315	987	72.8	93.9	76.0	2611	200	80	630	426
300	355	987	78.5	94.1	78.2	2901	210	100	660	469
350	355	987	91.0	94.4	78.4	3385	210	100	650	539
425	355	987	109.8	94.8	78.6	4110	210	100	640	641
450	400	987	111.1	94.8	82.2	4352	200	90	650	675
500	400	987	123.1	95.0	82.3	4835	200	90	640	741
550	400	987	134.9	95.1	82.5	5319	210	90	640	806
630	400	987	151.8	95.3	83.8	6093	210	90	630	909
650	450	987	156.3	95.3	84.0	6286	200	80	660	934
700	450	987	167.3	95.4	84.4	6770	200	80	650	997
750	450	987	178.0	95.5	84.9	7253	200	70	650	1058
800	450	987	187.5	95.6	85.9	7737	190	70	640	1119
850	500	987	198.4	95.0	86.8	8220	190	70	660	1180
900	500	987	208.4	95.1	87.4	8704	190	70	660	1239
950	500	987	218.5	95.2	87.9	9187	190	70	660	1298
1000	500	987	228.7	95.3	88.3	9671	180	60	650	1356
1100	500	987	249.3	95.5	88.9	10638	180	60	650	1470
1250	500	987	281.5	95.8	89.2	12089	190	60	640	1638
1300	560	987	302.2	95.7	86.5	12572	180	70	670	1692
1400	560	987	326.3	95.8	86.2	13539	180	70	660	1800
1500	560	987	350.0	95.9	86.0	14506	190	70	660	1905
1600	560	987	374.2	95.9	85.8	15473	190	70	650	2009
1700	560	987	396.7	96.0	85.9	16441	190	70	650	2111
1850	560	987	428.3	96.0	86.6	17891	190	60	640	2260

8-Pole

100	280	740	32.0	91.8	65.5	1289	220	100	550	344
140	315	740	41.1	92.3	71.1	1805	210	90	640	470
180	315	740	51.7	92.8	72.2	2321	210	100	640	593
210	315	740	59.8	93.1	72.6	2708	220	100	630	684
250	355	740	65.3	93.4	78.9	3224	210	90	650	802
300	355	740	77.5	93.8	79.4	3868	220	90	650	948
350	400	740	90.0	94.1	79.5	4513	220	70	620	1090
400	400	740	102.7	94.4	79.4	5158	220	70	610	1231
465	400	740	119.5	94.7	79.1	5996	230	70	610	1410
500	450	740	123.9	94.8	81.9	6447	190	90	610	1505
550	450	740	136.5	94.9	81.7	7092	190	90	610	1639
600	450	740	148.8	95.1	81.6	7737	190	90	610	1772
670	450	740	166.0	95.3	81.5	8639	190	90	600	1955
700	500	740	173.2	95.3	81.6	9026	190	70	640	2032
750	500	740	185.2	95.4	81.7	9671	190	70	630	2160
800	500	740	196.8	95.5	81.9	10316	190	70	630	2287
850	500	740	208.4	95.6	82.1	10960	190	70	630	2412
940	500	740	228.9	95.7	82.6	12121	190	70	620	2634
950	560	740	232.1	95.6	82.4	12250	190	60	650	2659
1000	560	740	243.2	95.7	82.7	12895	190	60	640	2780
1100	560	740	265.3	95.9	83.2	14184	180	60	640	3020
1200	560	740	287.8	96.0	83.6	15473	190	60	630	3256
1300	560	740	310.3	96.1	83.9	16763	190	60	620	3487
1400	560	740	333.0	96.2	84.1	18052	180	50	620	3715

* Note - F/B, Ambient temperature 40°C
 - Above technical data are only design values and shall be guaranteed with tolerance of applicable standard. (IEC tolerance is applied.)

LF Series / Performance Data

Leading the World best

LF Series : 50Hz, 6.0kV

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	Wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

6.0kV, 50Hz

2-Pole										
130	280	2961	15.7	93.4	85.4	419	210	60	550	13
150	280	2961	18.0	93.6	85.8	484	210	70	550	15
190	280	2961	22.5	94.1	86.5	612	220	80	550	18
200	315	2961	23.7	93.9	86.4	645	210	90	590	19
250	315	2961	29.3	94.4	86.9	806	220	100	590	23
300	315	2961	34.9	94.8	87.3	967	220	110	590	27
355	315	2961	41.0	95.2	87.5	1144	220	110	580	31
400	355	2961	46.2	95.2	87.5	1289	220	110	610	35
450	355	2961	51.8	95.5	87.6	1451	210	110	600	38
500	355	2961	57.3	95.7	87.7	1612	210	110	600	42
550	400	2961	63.1	95.6	87.7	1773	200	100	630	45
600	400	2961	68.6	95.8	87.8	1934	200	100	630	48
650	400	2961	74.2	95.9	87.9	2095	200	100	620	52
700	400	2961	79.7	95.9	88.1	2257	200	90	620	55
750	400	2961	85.2	96.0	88.2	2418	200	90	620	58
800	450	2961	90.9	95.9	88.3	2579	210	90	640	61
850	450	2961	96.3	96.0	88.5	2740	210	80	640	63
900	450	2961	101.7	96.0	88.7	2901	210	80	630	66
950	450	2961	107.0	96.1	88.9	3062	200	80	630	69
1030	450	2961	115.4	96.2	89.3	3320	200	70	620	73
1100	500	2961	123.2	96.1	89.4	3546	200	70	630	77
1200	500	2961	133.5	96.3	89.8	3868	200	70	620	81
1300	500	2961	144.2	96.4	90.0	4191	200	70	600	86
1420	500	2961	156.8	96.5	90.3	4578	200	60	580	91
4-Pole										
130	280	1481	17.4	92.2	77.9	838	200	100	640	81
150	280	1481	19.7	92.7	79.0	967	200	100	630	93
190	280	1481	24.2	93.4	80.9	1225	200	110	620	115
200	315	1481	25.4	93.3	81.1	1289	210	90	640	120
250	315	1481	31.0	93.9	82.7	1612	210	100	640	147
300	315	1481	36.5	94.3	83.8	1934	220	100	630	173
365	315	1481	43.8	94.8	84.6	2353	230	100	620	206
400	355	1481	48.0	94.7	84.7	2579	220	110	650	223
450	355	1481	53.7	94.9	84.9	2901	220	110	650	248
500	355	1481	59.5	95.1	85.0	3224	220	110	640	271
560	355	1481	66.6	95.2	85.0	3610	230	110	630	299
600	400	1481	70.8	95.2	85.6	3868	220	100	660	317
650	400	1481	76.8	95.2	85.5	4191	220	100	650	340
700	400	1481	82.8	95.3	85.4	4513	220	90	640	362
750	400	1481	88.6	95.4	85.4	4835	220	90	640	384
800	450	1481	94.2	95.4	85.7	5158	210	80	660	405
850	450	1481	99.9	95.5	85.7	5480	210	80	650	426
900	450	1481	105.6	95.6	85.8	5803	210	80	640	447
950	450	1481	111.3	95.7	85.8	6125	210	80	640	467
1000	450	1481	116.9	95.8	85.9	6447	210	70	630	488
1100	500	1481	128.2	95.9	86.1	7092	210	100	650	527
1200	500	1481	139.1	96.1	86.4	7737	210	90	640	565
1300	500	1481	150.0	96.2	86.7	8381	210	90	630	603
1450	500	1481	166.0	96.4	87.2	9349	220	80	620	657
1500	560	1481	174.7	96.2	85.9	9671	190	70	650	674
1600	560	1481	185.5	96.3	86.2	10316	200	70	650	709
1700	560	1481	196.6	96.3	86.4	10960	200	60	650	743
1800	560	1481	207.2	96.4	86.7	11605	210	60	640	775
1900	560	1481	218.2	96.4	86.9	12250	210	60	640	807
2000	560	1481	228.4	96.5	87.3	12895	210	60	640	839
2100	560	1481	238.5	96.7	87.6	13539	200	60	630	869
2200	560	1481	248.8	96.8	87.9	14184	200	60	630	899

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	Wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

6.0kV, 50Hz

6-Pole										
120	280	987	16.6	91.6	75.9	1161	220	130	630	203
150	280	987	20.1	92.3	77.7	1451	200	100	620	249
180	315	987	25.3	92.7	73.8	1741	230	90	640	295
200	315	987	27.8	93.0	74.5	1934	220	90	640	324
270	315	987	36.4	93.9	76.0	2611	200	80	630	426
300	355	987	39.2	94.1	78.2	2901	210	100	660	469
350	355	987	45.5	94.4	78.4	3385	210	100	650	539
425	355	987	54.9	94.8	78.6	4110	210	100	640	641
450	400	987	55.6	94.8	82.2	4352	200	90	650	675
500	400	987	61.5	95.0	82.3	4835	200	90	640	741
550	400	987	67.5	95.1	82.5	5319	210	90	640	806
630	400	987	75.9	95.3	83.8	6093	210	90	630	909
650	450	987	78.1	95.3	84.0	6286	200	80	660	934
700	450	987	83.7	95.4	84.4	6770	200	80	650	997
750	450	987	89.0	95.5	84.9	7253	200	70	650	1058
800	450	987	93.7	95.6	85.9	7737	190	70	640	1119
850	500	987	99.2	95.0	86.8	8220	190	70	660	1180
900	500	987	104.2	95.1	87.4	8704	190	70	660	1239
950	500	987	109.2	95.2	87.9	9187	190	70	660	1298
1000	500	987	114.3	95.3	88.3	9671	180	60	650	1356
1100	500	987	124.7	95.5	88.9	10638	180	60	650	1470
1250	500	987	140.8	95.8	89.2	12089	190	60	640	1638
1300	560	987	151.1	95.7	86.5	12572	180	70	670	1692
1400	560	987	163.1	95.8	86.2	13539	180	70	660	1800
1500	560	987	175.0	95.9	86.0	14506	190	70	660	1905
1600	560	987	187.1	95.9	85.8	15473	190	70	650	2009
1700	560	987	198.4	96.0	85.9	16441	190	70	650	2111
1850	560	987	214.1	96.0	86.6	17891	190	60	640	2260
8-Pole										
100	280	740	16.0	91.8	65.5	1289	220	100	550	344
140	315	740	20.5	92.3	71.1	1805	210	90	640	470
180	315	740	25.9	92.8	72.2	2321	210	100	640	593
210	315	740	29.9	93.1	72.6	2708	220	100	630	684
250	355	740	32.6	93.4	78.9	3224	210	90	650	802
300	355	740	38.8	93.8	79.4	3868	220	90	650	948
350	400	740	45.0	94.1	79.5	4513	220	70	620	1090
400	400	740	51.4	94.4	79.4	5158	220	70	610	1231
465	400	740	59.7	94.7	79.1	5996	230	70	610	1410
500	450	740	62.0	94.8	81.9	6447	190	90	610	1505
550	450	740	68.3	94.9	81.7	7092	190	90	610	1639
600	450	740	74.4	95.1	81.6	7737	190	90	610	1772
670	450	740	83.0	95.3	81.5	8639	190	90	600	1955
700	500	740	86.6	95.3	81.6	9026	190	70	640	2032
750	500	740	92.6	95.4	81.7	9671	190	70	630	2160
800	500	740	98.4	95.5	81.9	10316	190	70	630	2287
850	500	740	104.2	95.6	82.1	10960	190	70	630	2412
940	500	740	114.4	95.7	82.6	12121	190	70	620	2634
950	560	740	116.0	95.6	82.4	12250	190	60	650	2659
1000	560	740	121.6	95.7	82.7	12895	190	60	640	2780
1100	560	740	132.7	95.9	83.2	14184	180	60	640	3020
1200	560	740	143.9	96.0	83.6	15473	190	60	630	3256
1300	560	740	155.1	96.1	83.9	16763	190	60	620	3487
1400	560	740	166.5	96.2	84.1	18052	180	50	620	3715

* Note - F/B, Ambient temperature 40°C
 - Above technical data are only design values and shall be guaranteed with tolerance of applicable standard. (IEC tolerance is applied.)

LF Series / Performance Data

Leading the World best

LF Series : 60Hz, 3.3kV

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	Wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

3.3kV, 60Hz

2-Pole										
150	280	3553	33.1	93.2	85.1	403	200	50	650	11
180	280	3553	39.3	93.6	85.6	484	210	60	650	13
220	280	3553	47.5	94.1	86.2	591	230	70	630	15
250	315	3553	53.8	94.2	86.3	672	210	90	640	17
300	315	3553	63.9	94.6	86.8	806	220	100	650	20
350	315	3553	74.1	94.9	87.1	940	230	100	650	23
410	315	3553	86.1	95.3	87.4	1101	220	100	650	26
450	355	3553	94.4	95.3	87.5	1209	220	110	670	28
500	355	3553	104.6	95.5	87.6	1343	210	110	660	30
560	355	3553	116.7	95.6	87.8	1504	200	110	650	33
600	400	3553	125.1	95.6	87.8	1612	190	70	630	35
650	400	3553	135.2	95.7	87.9	1746	190	70	620	38
700	400	3553	145.1	95.8	88.1	1880	190	70	620	40
750	400	3553	155.3	95.8	88.2	2015	190	70	610	42
830	400	3553	170.9	96.0	88.5	2230	190	80	610	45
850	450	3553	175.4	95.8	88.5	2283	190	80	640	46
900	450	3553	185.1	95.9	88.7	2418	190	80	640	48
950	450	3553	194.7	96.0	88.9	2552	190	70	640	50
1000	450	3553	204.5	96.0	89.1	2686	190	70	640	52
1140	450	3553	231.4	96.1	89.7	3062	190	70	630	57
1200	500	3553	243.8	96.0	89.7	3224	210	70	650	59
1300	500	3553	263.2	96.0	90.0	3492	210	70	630	63
1400	500	3553	282.6	96.1	90.2	3761	200	70	610	66
1560	500	3553	312.2	96.4	90.7	4191	210	70	610	71
4-Pole										
150	280	1777	35.2	93.0	80.2	806	240	120	650	59
180	280	1777	41.6	93.6	80.8	967	230	120	620	70
220	280	1777	50.4	94.2	81.0	1182	210	130	600	84
250	315	1777	58.0	93.5	80.6	1343	220	80	650	94
300	315	1777	68.3	94.0	81.8	1612	210	90	640	110
350	315	1777	78.7	94.4	82.4	1880	210	90	630	126
440	315	1777	98.1	95.0	82.6	2364	220	90	630	154
450	355	1777	97.4	94.8	85.3	2418	200	100	640	157
500	355	1777	107.4	95.0	85.7	2686	210	100	640	172
550	355	1777	117.7	95.1	86.0	2955	210	100	630	187
640	355	1777	136.5	95.3	86.1	3439	220	90	630	212
650	400	1777	137.0	95.6	86.8	3492	210	80	640	215
700	400	1777	147.6	95.7	86.7	3761	210	80	650	229
750	400	1777	158.2	95.8	86.6	4030	210	80	660	242
830	400	1777	175.3	95.9	86.4	4459	210	80	670	263
850	450	1777	179.0	95.7	86.8	4567	210	90	650	268
900	450	1777	189.6	95.8	86.7	4835	210	90	640	281
950	450	1777	200.1	95.8	86.7	5104	210	80	640	294
1000	450	1777	210.4	95.9	86.7	5373	210	80	630	306
1100	450	1777	231.2	96.0	86.7	5910	210	80	610	330
1200	500	1777	252.5	96.0	86.6	6447	210	70	630	354
1300	500	1777	272.7	96.1	86.8	6985	210	70	620	376
1400	500	1777	292.4	96.3	87.0	7522	210	70	610	398
1500	500	1777	312.2	96.4	87.2	8059	210	70	600	420
1600	500	1777	331.9	96.5	87.4	8596	200	70	600	440
1700	560	1777	358.6	96.1	86.3	9134	220	50	650	460
1800	560	1777	378.8	96.1	86.5	9671	220	50	660	480
1900	560	1777	399.0	96.2	86.6	10208	230	50	670	499
2000	560	1777	418.6	96.3	86.8	10745	230	50	680	517
2100	560	1777	438.0	96.3	87.1	11283	230	50	680	535
2200	560	1777	456.8	96.4	87.4	11820	230	50	690	552
2350	560	1777	484.7	96.5	87.9	12626	230	50	690	577

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	Wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

3.3kV, 60Hz

6-Pole										
150	280	1184	36.0	92.6	78.7	1209	210	140	570	160
170	280	1184	40.4	93.1	79.0	1370	200	130	580	179
200	315	1184	52.4	92.7	72.1	1612	220	100	630	208
250	315	1184	64.6	93.5	72.4	2015	230	90	620	254
325	315	1184	83.3	94.3	72.4	2619	220	90	620	322
350	355	1184	79.8	94.4	81.3	2821	200	80	650	344
400	355	1184	91.0	94.7	81.2	3224	200	80	650	388
450	355	1184	102.2	94.9	81.2	3627	200	80	640	430
510	355	1184	115.5	95.1	81.2	4110	200	80	630	480
550	400	1184	121.6	95.1	83.2	4433	200	80	650	513
600	400	1184	132.1	95.2	83.5	4835	200	80	640	554
690	400	1184	150.5	95.4	84.1	5561	200	80	630	625
700	450	1184	150.8	95.3	85.2	5641	200	70	650	633
750	450	1184	160.8	95.3	85.6	6044	200	70	640	672
800	450	1184	170.4	95.4	86.1	6447	200	70	640	710
850	450	1184	179.6	95.5	86.7	6850	190	60	630	748
900	450	1184	188.9	95.6	87.2	7253	190	60	630	785
950	500	1184	200.2	94.9	87.5	7656	190	60	650	821
1000	500	1184	209.3	95.0	88.0	8059	190	60	650	858
1100	500	1184	227.7	95.2	88.8	8865	180	60	640	929
1200	500	1184	246.4	95.4	89.3	9671	180	60	640	998
1360	500	1184	277.5	95.7	89.6	10960	190	60	630	1106
1400	560	1184	294.8	95.6	86.9	11283	170	70	660	1132
1500	560	1184	315.9	95.7	86.8	12089	170	70	650	1197
1600	560	1184	337.8	95.7	86.6	12895	170	60	650	1261
1700	560	1184	359.3	95.8	86.4	13700	180	60	640	1323
1800	560	1184	380.5	95.8	86.4	14506	180	60	640	1384
1900	560	1184	400.2	95.8	86.7	15312	180	60	630	1444
2000	560	1184	419.3	95.8	87.1	16118	180	60	630	1503
8-Pole										
110	280	888	27.9	92.0	75.1	1182	190	70	610	242
150	315	888	37.3	92.4	76.2	1612	210	70	620	322
200	315	888	48.9	93.1	76.9	2149	190	70	610	419
250	315	888	60.8	93.6	76.9	2686	180	70	600	514
300	355	888	70.0	93.9	79.9	3224	210	80	620	607
360	355	888	83.1	94.3	80.4	3868	210	80	620	716
400	400	888	94.4	94.4	78.5	4298	210	80	630	787
450	400	888	106.0	94.6	78.5	4835	210	80	630	875
540	400	888	127.0	95.0	78.3	5803	220	80	620	1029
550	450	888	123.4	94.9	82.2	5910	200	90	640	1046
600	450	888	134.6	95.0	82.1	6447	200	90	640	1130
650	450	888	146.0	95.1	81.9	6985	200	90	630	1213
700	450	888	157.3	95.2	81.8	7522	200	80	630	1294
770	450	888	172.6	95.4	81.8	8274	200	80	620	1407
800	500	888	177.8	95.3	82.6	8596	200	60	640	1455
850	500	888	188.5	95.4	82.7	9134	200	60	640	1534
900	500	888	199.1	95.5	82.8	9671	190	60	640	1612
950	500	888	209.7	95.6	82.9	10208	190	60	630	1689
1000	500	888	220.0	95.7	83.1	10745	190	60	630	1765
1100	560	888	244.1	95.7	82.4	11820	180	60	640	1915
1200	560	888	264.4	95.9	82.8	12895	180	60	640	2063
1300	560	888	284.4	96.0	83.3	13969	180	60	640	2207
1400	560	888	304.1	96.1	83.8	15044	180	60	630	2349
1500	560	888	324.7	96.1	84.1	16118	180	60	630	2488

* Note - F/B, Ambient temperature 40°C
 - Above technical data are only design values and shall be guaranteed with tolerance of applicable standard. (IEC tolerance is applied.)

LF Series / Performance Data

Leading the World best

LF Series : 60Hz, 4.16kV

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	Wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

4.16kV, 60Hz

2-Pole										
150	280	3553	26.2	93.2	85.1	403	200	50	650	11
180	280	3553	31.2	93.6	85.6	484	210	60	650	13
220	280	3553	37.6	94.1	86.2	591	230	70	630	15
250	315	3553	42.7	94.2	86.3	672	210	90	640	17
300	315	3553	50.7	94.6	86.8	806	220	100	650	20
350	315	3553	58.8	94.9	87.1	940	230	100	650	23
410	315	3553	68.3	95.3	87.4	1101	220	100	650	26
450	355	3553	74.9	95.3	87.5	1209	220	110	670	28
500	355	3553	82.9	95.5	87.6	1343	210	110	660	30
560	355	3553	92.6	95.6	87.8	1504	200	110	650	33
600	400	3553	99.2	95.6	87.8	1612	190	70	630	35
650	400	3553	107.2	95.7	87.9	1746	190	70	620	38
700	400	3553	115.1	95.8	88.1	1880	190	70	620	40
750	400	3553	123.2	95.8	88.2	2015	190	70	610	42
830	400	3553	135.6	96.0	88.5	2230	190	80	610	45
850	450	3553	139.1	95.8	88.5	2283	190	80	640	46
900	450	3553	146.8	95.9	88.7	2418	190	80	640	48
950	450	3553	154.5	96.0	88.9	2552	190	70	640	50
1000	450	3553	162.3	96.0	89.1	2686	190	70	640	52
1140	450	3553	183.5	96.1	89.7	3062	190	70	630	57
1200	500	3553	193.4	96.0	89.7	3224	210	70	650	59
1300	500	3553	208.8	96.0	90.0	3492	210	70	630	63
1400	500	3553	224.2	96.1	90.2	3761	200	70	610	66
1560	500	3553	247.6	96.4	90.7	4191	210	70	610	71
4-Pole										
150	280	1777	27.9	93.0	80.2	806	240	120	650	59
180	280	1777	33.0	93.6	80.8	967	230	120	620	70
220	280	1777	40.0	94.2	81.0	1182	210	130	600	84
250	315	1777	46.0	93.5	80.6	1343	220	80	650	94
300	315	1777	54.1	94.0	81.8	1612	210	90	640	110
350	315	1777	62.4	94.4	82.4	1880	210	90	630	126
440	315	1777	77.8	95.0	82.6	2364	220	90	630	154
450	355	1777	77.2	94.8	85.3	2418	200	100	640	157
500	355	1777	85.2	95.0	85.7	2686	210	100	640	172
550	355	1777	93.3	95.1	86.0	2955	210	100	630	187
640	355	1777	108.3	95.3	86.1	3439	220	90	630	212
650	400	1777	108.7	95.6	86.8	3492	210	80	640	215
700	400	1777	117.1	95.7	86.7	3761	210	80	650	229
750	400	1777	125.5	95.8	86.6	4030	210	80	660	242
830	400	1777	139.0	95.9	86.4	4459	210	80	670	263
850	450	1777	142.0	95.7	86.8	4567	210	90	650	268
900	450	1777	150.4	95.8	86.7	4835	210	90	640	281
950	450	1777	158.7	95.8	86.7	5104	210	80	640	294
1000	450	1777	166.9	95.9	86.7	5373	210	80	630	306
1100	450	1777	183.4	96.0	86.7	5910	210	80	610	330
1200	500	1777	200.3	96.0	86.6	6447	210	70	630	354
1300	500	1777	216.3	96.1	86.8	6985	210	70	620	376
1400	500	1777	231.9	96.3	87.0	7522	210	70	610	398
1500	500	1777	247.7	96.4	87.2	8059	210	70	600	420
1600	500	1777	263.3	96.5	87.4	8596	200	70	600	440
1700	560	1777	284.5	96.1	86.3	9134	220	50	650	460
1800	560	1777	300.5	96.1	86.5	9671	220	50	660	480
1900	560	1777	316.5	96.2	86.6	10208	230	50	670	499
2000	560	1777	332.1	96.3	86.8	10745	230	50	680	517
2100	560	1777	347.5	96.3	87.1	11283	230	50	680	535
2200	560	1777	362.4	96.4	87.4	11820	230	50	690	552
2350	560	1777	384.5	96.5	87.9	12626	230	50	690	577

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	Wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

4.16kV, 60Hz

6-Pole										
150	280	1184	28.6	92.6	78.7	1209	210	140	570	160
170	280	1184	32.1	93.1	79.0	1370	200	130	580	179
200	315	1184	41.5	92.7	72.1	1612	220	100	630	208
250	315	1184	51.3	93.5	72.4	2015	230	90	620	254
325	315	1184	66.1	94.3	72.4	2619	220	90	620	322
350	355	1184	63.3	94.4	81.3	2821	200	80	650	344
400	355	1184	72.2	94.7	81.2	3224	200	80	650	388
450	355	1184	81.0	94.9	81.2	3627	200	80	640	430
510	355	1184	91.7	95.1	81.2	4110	200	80	630	480
550	400	1184	96.5	95.1	83.2	4433	200	80	650	513
600	400	1184	104.8	95.2	83.5	4835	200	80	640	554
690	400	1184	119.4	95.4	84.1	5561	200	80	630	625
700	450	1184	119.6	95.3	85.2	5641	200	70	650	633
750	450	1184	127.6	95.3	85.6	6044	200	70	640	672
800	450	1184	135.2	95.4	86.1	6447	200	70	640	710
850	450	1184	142.5	95.5	86.7	6850	190	60	630	748
900	450	1184	149.8	95.6	87.2	7253	190	60	630	785
950	500	1184	158.8	94.9	87.5	7656	190	60	650	821
1000	500	1184	166.0	95.0	88.0	8059	190	60	650	858
1100	500	1184	180.6	95.2	88.8	8865	180	60	640	929
1200	500	1184	195.5	95.4	89.3	9671	180	60	640	998
1360	500	1184	220.1	95.7	89.6	10960	190	60	630	1106
1400	560	1184	233.9	95.6	86.9	11283	170	70	660	1132
1500	560	1184	250.6	95.7	86.8	12089	170	70	650	1197
1600	560	1184	267.9	95.7	86.6	12895	170	60	650	1261
1700	560	1184	285.0	95.8	86.4	13700	180	60	640	1323
1800	560	1184	301.8	95.8	86.4	14506	180	60	640	1384
1900	560	1184	317.5	95.8	86.7	15312	180	60	630	1444
2000	560	1184	332.7	95.8	87.1	16118	180	60	630	1503
8-Pole										
110	280	888	22.1	92.0	75.1	1182	190	70	610	242
150	315	888	29.6	92.4	76.2	1612	210	70	620	322
200	315	888	38.8	93.1	76.9	2149	190	70	610	419
250	315	888	48.2	93.6	76.9	2686	180	70	600	514
300	355	888	55.5	93.9	79.9	3224	210	80	620	607
360	355	888	65.9	94.3	80.4	3868	210	80	620	716
400	400	888	74.9	94.4	78.5	4298	210	80	630	787
450	400	888	84.1	94.6	78.5	4835	210	80	630	875
540	400	888	100.8	95.0	78.3	5803	220	80	620	1029
550	450	888	97.9	94.9	82.2	5910	200	90	640	1046
600	450	888	106.8	95.0	82.1	6447	200	90	640	1130
650	450	888	115.8	95.1	81.9	6985	200	90	630	1213
700	450	888	124.8	95.2	81.8	7522	200	80	630	1294
770	450	888	136.9	95.4	81.8	8274	200	80	620	1407
800	500	888	141.0	95.3	82.6	8596	200	60	640	1455
850	500	888	149.5	95.4	82.7	9134	200	60	640	1534
900	500	888	158.0	95.5	82.8	9671	190	60	640	1612
950	500	888	166.4	95.6	82.9	10208	190	60	630	1689
1000	500	888	174.5	95.7	83.1	10745	190	60	630	1765
1100	560	888	193.6	95.7	82.4	11820	180	60	640	1915
1200	560	888	209.7	95.9	82.8	12895	180	60	640	2063
1300	560	888	225.6	96.0	83.3	13969	180	60	640	2207
1400	560	888	241.3	96.1	83.8	15044	180	60	630	2349
1500	560	888	257.6	96.1	84.1	16118	180	60	630	2488

* Note - F/B, Ambient temperature 40°C
 - Above technical data are only design values and shall be guaranteed with tolerance of applicable standard. (IEC tolerance is applied.)

LF Series / Performance Data

Leading the World best

LF Series : 60Hz, 6.6kV

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	Wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

6.6kV, 60Hz

2-Pole										
150	280	3553	16.5	93.2	85.1	403	200	50	650	11
180	280	3553	19.7	93.6	85.6	484	210	60	650	13
220	280	3553	23.7	94.1	86.2	591	230	70	630	15
250	315	3553	26.9	94.2	86.3	672	210	90	640	17
300	315	3553	32.0	94.6	86.8	806	220	100	650	20
350	315	3553	37.0	94.9	87.1	940	230	100	650	23
410	315	3553	43.1	95.3	87.4	1101	220	100	650	26
450	355	3553	47.2	95.3	87.5	1209	220	110	670	28
500	355	3553	52.3	95.5	87.6	1343	210	110	660	30
560	355	3553	58.4	95.6	87.8	1504	200	110	650	33
600	400	3553	62.5	95.6	87.8	1612	190	70	630	35
650	400	3553	67.6	95.7	87.9	1746	190	70	620	38
700	400	3553	72.6	95.8	88.1	1880	190	70	620	40
750	400	3553	77.6	95.8	88.2	2015	190	70	610	42
830	400	3553	85.5	96.0	88.5	2230	190	80	610	45
850	450	3553	87.7	95.8	88.5	2283	190	80	640	46
900	450	3553	92.6	95.9	88.7	2418	190	80	640	48
950	450	3553	97.4	96.0	88.9	2552	190	70	640	50
1000	450	3553	102.3	96.0	89.1	2686	190	70	640	52
1140	450	3553	115.7	96.1	89.7	3062	190	70	630	57
1200	500	3553	121.9	96.0	89.7	3224	210	70	650	59
1300	500	3553	131.6	96.0	90.0	3492	210	70	630	63
1400	500	3553	141.3	96.1	90.2	3761	200	70	610	66
1560	500	3553	156.1	96.4	90.7	4191	210	70	610	71
4-Pole										
150	280	1777	17.6	93.0	80.2	806	240	120	650	59
180	280	1777	20.8	93.6	80.8	967	230	120	620	70
220	280	1777	25.2	94.2	81.0	1182	210	130	600	84
250	315	1777	29.0	93.5	80.6	1343	220	80	650	94
300	315	1777	34.1	94.0	81.8	1612	210	90	640	110
350	315	1777	39.4	94.4	82.4	1880	210	90	630	126
440	315	1777	49.1	95.0	82.6	2364	220	90	630	154
450	355	1777	48.7	94.8	85.3	2418	200	100	640	157
500	355	1777	53.7	95.0	85.7	2686	210	100	640	172
550	355	1777	58.8	95.1	86.0	2955	210	100	630	187
640	355	1777	68.2	95.3	86.1	3439	220	90	630	212
650	400	1777	68.5	95.6	86.8	3492	210	80	640	215
700	400	1777	73.8	95.7	86.7	3761	210	80	650	229
750	400	1777	79.1	95.8	86.6	4030	210	80	660	242
830	400	1777	87.6	95.9	86.4	4459	210	80	670	263
850	450	1777	89.5	95.7	86.8	4567	210	90	650	268
900	450	1777	94.8	95.8	86.7	4835	210	90	640	281
950	450	1777	100.1	95.8	86.7	5104	210	80	640	294
1000	450	1777	105.2	95.9	86.7	5373	210	80	630	306
1100	450	1777	115.6	96.0	86.7	5910	210	80	610	330
1200	500	1777	126.3	96.0	86.6	6447	210	70	630	354
1300	500	1777	136.3	96.1	86.8	6985	210	70	620	376
1400	500	1777	146.2	96.3	87.0	7522	210	70	610	398
1500	500	1777	156.1	96.4	87.2	8059	210	70	600	420
1600	500	1777	165.9	96.5	87.4	8596	200	70	600	440
1700	560	1777	179.3	96.1	86.3	9134	220	50	650	460
1800	560	1777	189.4	96.1	86.5	9671	220	50	660	480
1900	560	1777	199.5	96.2	86.6	10208	230	50	670	499
2000	560	1777	209.3	96.3	86.8	10745	230	50	680	517
2100	560	1777	219.0	96.3	87.1	11283	230	50	680	535
2200	560	1777	228.4	96.4	87.4	11820	230	50	690	552
2350	560	1777	242.4	96.5	87.9	12626	230	50	690	577

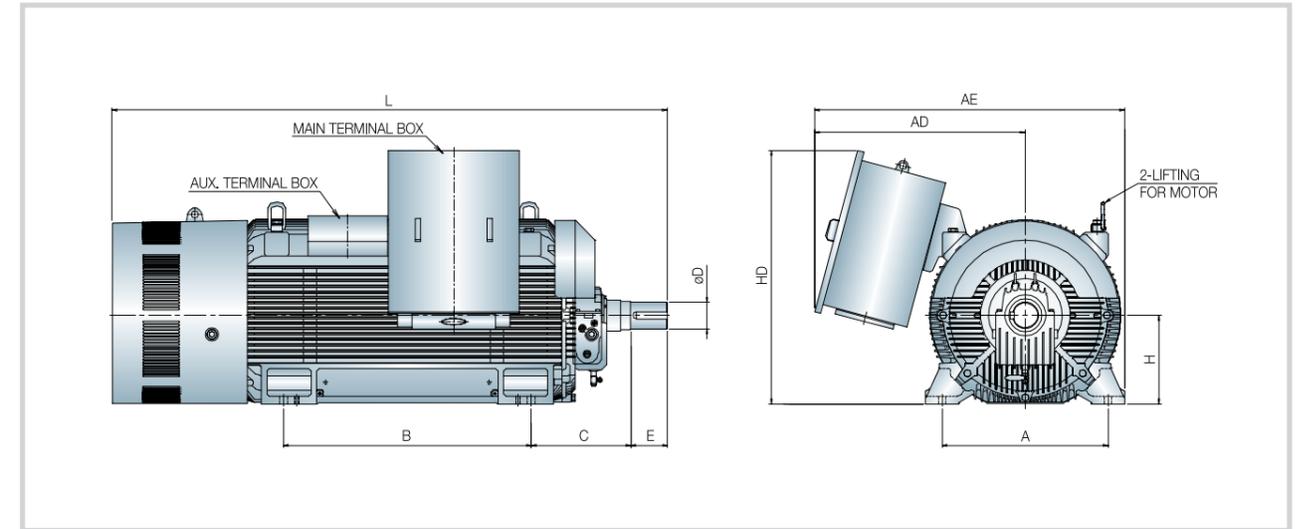
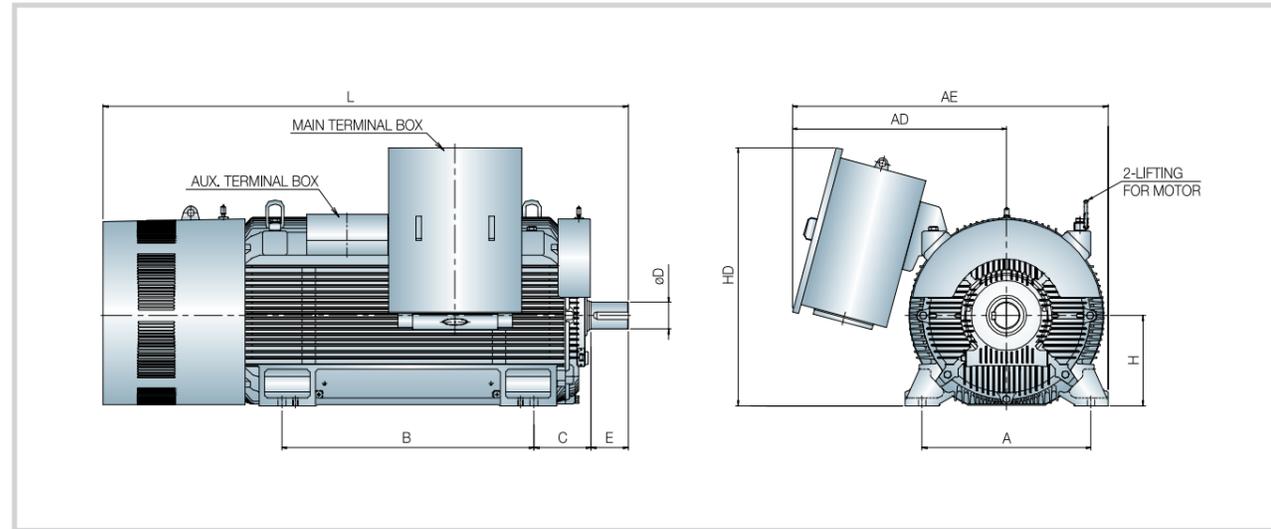
Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	Wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

6.6kV, 60Hz

6-Pole										
150	280	1184	18.0	92.6	78.7	1209	210	140	570	160
170	280	1184	20.2	93.1	79.0	1370	200	130	580	179
200	315	1184	26.2	92.7	72.1	1612	220	100	630	208
250	315	1184	32.3	93.5	72.4	2015	230	90	620	254
325	315	1184	41.6	94.3	72.4	2619	220	90	620	322
350	355	1184	39.9	94.4	81.3	2821	200	80	650	344
400	355	1184	45.5	94.7	81.2	3224	200	80	650	388
450	355	1184	51.1	94.9	81.2	3627	200	80	640	430
510	355	1184	57.8	95.1	81.2	4110	200	80	630	480
550	400	1184	60.8	95.1	83.2	4433	200	80	650	513
600	400	1184	66.0	95.2	83.5	4835	200	80	640	554
690	400	1184	75.2	95.4	84.1	5561	200	80	630	625
700	450	1184	75.4	95.3	85.2	5641	200	70	650	633
750	450	1184	80.4	95.3	85.6	6044	200	70	640	672
800	450	1184	85.2	95.4	86.1	6447	200	70	640	710
850	450	1184	89.8	95.5	86.7	6850	190	60	630	748
900	450	1184	94.4	95.6	87.2	7253	190	60	630	785
950	500	1184	100.1	94.9	87.5	7656	190	60	650	821
1000	500	1184	104.6	95.0	88.0	8059	190	60	650	858
1100	500	1184	113.8	95.2	88.8	8865	180	60	640	929
1200	500	1184	123.2	95.4	89.3	9671	180	60	640	998
1360	500	1184	138.7	95.7	89.6	10960	190	60	630	1106
1400	560	1184	147.4	95.6	86.9	11283	170	70	660	1132
1500	560	1184	158.0	95.7	86.8	12089	170	70	650	1197
1600	560	1184	168.9	95.7	86.6	12895	170	60	650	1261
1700	560	1184	179.7	95.8	86.4	13700	180	60	640	1323
1800	560	1184	190.2	95.8	86.4	14506	180	60	640	1384
1900	560	1184	200.1	95.8	86.7	15312	180	60	630	1444
2000	560	1184	209.7	95.8	87.1	16118	180	60	630	1503
8-Pole										
110	280	888	13.9	92.0	75.1	1182	190	70	610	242
150	315	888	18.6	92.4	76.2	1612	210	70	620	322
200	315	888	24.4	93.1	76.9	2149	190	70	610	419
250	315	888	30.4	93.6	76.9	2686	180	70	600	514
300	355	888	35.0	93.9	79.9	3224	210	80	620	607
360	355	888	41.5	94.3	80.4	3868	210	80	620	716
400	400	888	47.2	94.4	78.5	4298	210	80	630	787
450	400	888	53.0	94.6	78.5	4835	210	80	630	875
540	400	888	63.5	95.0	78.3	5803	220	80	620	1029
550	450	888	61.7	94.9	82.2	5910	200	90	640	1046
600	450	888	67.3	95.0	82.1	6447	200	90	640	1130
650	450	888	73.0	95.1	81.9	6985	200	90	630	1213
700	450	888	78.6	95.2	81.8	7522	200	80	630	1294
770	450	888	86.3	95.4	81.8	8274	200	80	620	1407
800	500	888	88.9	95.3	82.6	8596	200	60	640	1455
850	500	888	94.2	95.4	82.7	9134	200	60	640	1534
900	500	888	99.6	95.5	82.8	9671	190	60	640	1612
950	500	888	104.9	95.6	82.9	10208	190	60	630	1689
1000	500	888	110.0	95.7	83.1	10745	190	60	630	1765
1100	560	888	122.0	95.7	82.4	11820	180	60	640	1915
1200	560	888	132.2	95.9	82.8	12895	180	60	640	2063
1300	560	888	142.2	96.0	83.3	13969	180	60	640	2207
1400	560	888	152.1	96.1	83.8	15044	180	60	630	2349
1500	560	888	162.4	96.1	84.1	16118	180	60	630	2488

* Note - F/B, Ambient temperature 40°C
 - Above technical data are only design values and shall be guaranteed with tolerance of applicable standard. (IEC tolerance is applied.)

Outline Dimension Drawing



Bearing type : Anti-friction bearing

Frame No.	Weight kg	Dimensions									
		A mm	AD mm	AE mm	B mm	C mm	D mm	E mm	H mm	HD mm	L mm
2P											
280	1450	560	905	1275	840	190	70	105	280	1000	1850
315	2250	610	900	1265	900	200	70	105	315	1010	2100
355	2800	686	945	1360	1000	224	75	105	355	1100	2250
4P											
280	1500	560	905	1275	840	190	85	130	280	1000	1700
315	2300	610	900	1265	900	200	90	130	315	1010	2000
355	3000	686	945	1350	1000	224	100	165	355	1100	2250
400	4050	750	960	1410	1120	254	120	165	400	1150	2460
450	5550	850	1005	1520	1250	280	130	200	450	1250	2710
500	7050	950	1085	1650	1320	315	140	200	500	1350	3000
560	9950	1060	1110	1745	1400	335	160	240	560	1450	3250
6P											
280	1500	560	905	1275	840	190	85	130	280	1000	1700
315	2300	610	900	1265	900	200	90	130	315	1010	2000
355	3000	686	945	1350	1000	224	100	165	355	1100	2250
400	4050	750	960	1410	1120	254	120	165	400	1150	2460
450	5550	850	1005	1520	1250	280	130	200	450	1250	2710
500	7050	950	1085	1650	1320	315	140	200	500	1350	3000
560	9950	1060	1110	1745	1400	335	160	240	560	1450	3250
8P											
280	1500	560	905	1275	840	190	85	130	280	1000	1700
315	2300	610	900	1265	900	200	90	130	315	1010	2000
355	3000	686	945	1350	1000	224	100	165	355	1100	2250
400	4050	750	960	1410	1120	254	120	165	400	1150	2460
450	5550	850	1005	1520	1250	280	130	200	450	1250	2710
500	7050	950	1085	1650	1320	315	140	200	500	1350	3000
560	9950	1060	1110	1745	1400	335	160	240	560	1450	3250

Bearing type : Sleeve bearing

Frame No.	Weight kg	Dimensions									
		A mm	AD mm	AE. mm	B mm	C mm	D mm	E mm	H mm	HD mm	L mm
2P											
315	2350	610	900	1265	900	375	70	105	315	1010	2300
355	2900	686	945	1360	1000	400	75	105	355	1100	2500
400	3850	750	960	1410	1120	425	85	130	400	1150	2800
450	5450	850	1005	1520	1250	475	95	130	450	1250	3200
500	6950	950	1085	1650	1320	500	110	165	500	1350	3280
560											
4P											
315	2400	610	900	1265	900	375	90	130	315	1010	2200
355	3100	686	945	1360	1000	400	100	165	355	1100	2500
400	4150	750	960	1410	1120	450	120	165	400	1150	2650
450	5650	850	1005	1520	1250	475	130	200	450	1250	2900
500	7250	950	1085	1650	1320	500	140	200	500	1350	3290
560	10300	1060	1110	1745	1400	560	160	240	560	1450	3400
6P											
315	2400	610	900	1265	900	375	90	130	315	1010	2200
355	3100	686	945	1360	1000	400	100	165	355	1100	2500
400	4150	750	960	1410	1120	450	120	165	400	1150	2650
450	5650	850	1005	1520	1250	475	130	200	450	1250	2900
500	7250	950	1085	1650	1320	500	140	200	500	1350	3290
560	10300	1060	1110	1745	1400	560	160	240	560	1450	3400
8P											
315	2400	610	900	1265	900	375	90	130	315	1010	2200
355	3100	686	945	1360	1000	400	100	165	355	1100	2500
400	4150	750	960	1410	1120	450	120	165	400	1150	2650
450	5650	850	1005	1520	1250	475	130	200	450	1250	2900
500	7250	950	1085	1650	1320	500	140	200	500	1350	3290
560	10300	1060	1110	1745	1400	560	160	240	560	1450	3400

LT Series / Performance Data

Leading the World best

LT Series : 50Hz, 3.0kV

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

3.0kV, 50Hz

2-Pole										
1000	LT450-118	2961	230.5	94.1	88.7	3224	220	110	680	72
1200	LT450-118	2961	282.6	94.4	86.6	3868	230	110	680	81
1400	LT450-140	2961	317.2	94.7	89.7	4513	230	110	680	90
1550	LT450-140	2961	354.4	94.9	88.7	4997	230	110	670	96
1800	LT500-132	2961	405.0	95.1	90.0	5803	250	110	650	106
1900	LT500-132	2961	426.3	95.2	90.1	6125	250	110	640	109
2000	LT500-150	2961	444.5	95.2	91.0	6447	250	110	640	112
2250	LT500-150	2961	497.1	95.4	91.3	7253	250	110	620	119
2500	LT500-150	2961	548.2	95.5	91.9	8059	250	110	600	125
2750	LT560-140	2961	605.7	95.8	91.2	8865	240	90	670	130
3000	LT560-140	2961	657.1	95.9	91.6	9671	240	90	660	135
3200	LT560-160	2961	698.9	95.9	91.9	10316	240	90	650	137
3500	LT560-160	2961	764.8	96.0	91.7	11283	240	80	640	140
3800	LT560-160	2961	843.1	96.2	90.2	12250	250	80	630	142
4000	LT630-160	2961	874.2	96.0	91.7	12895	210	80	650	143
4250	LT630-160	2961	924.5	96.1	92.1	13700	210	80	650	143
4500	LT630-160	2961	975.3	96.2	92.3	14506	210	80	660	142
4750	LT630-180	2961	1022.7	96.3	92.8	15312	220	80	660	141
4900	LT630-180	2961	1053.9	96.4	92.8	15796	220	80	660	140
5500	LT630-180	2961	1181.9	96.6	92.7	17730	220	80	670	133
6000	LT630-180	2961	1287.5	96.6	92.8	19342	200	80	650	124
4-Pole										
1000	LT450-118	1481	237.0	94.7	85.7	6447	200	100	620	488
1200	LT450-140	1481	286.0	94.9	85.1	7737	200	100	610	565
1400	LT450-140	1481	328.9	95.1	86.1	9026	200	100	600	639
1540	LT450-140	1481	350.5	95.3	88.7	9929	200	100	590	688
1800	LT500-132	1481	408.5	95.5	88.8	11605	200	100	600	775
1900	LT500-150	1481	427.6	95.6	89.4	12250	200	100	600	807
2000	LT500-150	1481	459.8	95.6	87.6	12895	200	100	590	839
2250	LT500-150	1481	510.6	95.8	88.5	14506	200	100	580	914
2450	LT500-150	1481	560.1	95.9	87.8	15796	200	100	570	970
2750	LT560-140	1481	626.5	95.6	88.4	17730	200	70	590	1051
3000	LT560-140	1481	680.8	95.7	88.6	19342	200	70	580	1113
3200	LT560-160	1481	725.2	95.8	88.6	20631	200	70	580	1161
3500	LT560-160	1481	793.6	95.9	88.5	22565	200	70	570	1227
3750	LT560-160	1481	858.1	96.0	87.6	24177	200	70	560	1279
4000	LT560-160	1481	913.6	96.1	87.7	25789	200	70	560	1328
4250	LT630-160	1481	965.7	95.7	88.5	27401	200	70	590	1374
4500	LT630-160	1481	1025.3	95.8	88.2	29013	200	70	590	1417
4750	LT630-180	1481	1062.8	95.8	89.8	30625	200	70	590	1456
5000	LT630-180	1481	1110.9	95.9	90.3	32236	200	70	580	1493
5800	LT630-180	1481	1286.3	96.1	90.3	37394	200	70	570	1593
6000	LT710-200	1481	1299.0	96.4	92.2	38684	200	70	590	1614
6400	LT710-200	1481	1374.5	96.5	92.9	41263	190	70	590	1651
7000	LT710-224	1481	1511.4	96.6	92.3	45131	190	70	590	1695

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

3.0kV, 50Hz

6-Pole										
750	LT450-118	987	178.6	94.7	85.3	7253	180	70	560	1058
800	LT450-118	987	188.8	94.8	86.0	7737	180	70	570	1119
900	LT450-140	987	209.4	95.0	87.1	8704	180	70	560	1239
1000	LT450-140	987	232.4	95.2	87.0	9671	190	70	560	1356
1200	LT450-140	987	280.3	95.5	86.3	11605	190	70	550	1582
1400	LT500-132	987	355.9	95.3	79.4	13539	190	80	560	1800
1500	LT500-150	987	366.3	95.4	82.6	14506	190	80	560	1905
1800	LT500-150	987	465.3	95.7	77.8	17408	190	80	540	2211
1950	LT500-150	987	497.2	95.8	78.8	18858	180	80	530	2357
2000	LT560-140	987	471.6	95.7	85.3	19342	170	70	580	2405
2250	LT560-140	987	525.6	95.9	85.9	21760	170	70	560	2640
2450	LT560-160	987	566.2	96.0	86.8	23694	170	60	550	2820
2750	LT560-160	987	635.2	96.2	86.6	26595	170	60	540	3080
3000	LT560-160	987	689.4	96.3	87.0	29013	170	60	530	3288
3200	LT630-160	987	742.6	96.2	86.2	30947	200	80	640	3448
3500	LT630-160	987	807.5	96.4	86.5	33848	200	80	640	3679
3750	LT630-180	987	859.8	96.5	87.0	36266	210	90	640	3864
4000	LT630-180	987	909.3	96.5	87.7	38684	210	90	650	4041
4400	LT630-180	987	1013.9	96.7	86.4	42552	220	100	660	4312
4500	LT710-200	987	1042.7	96.6	86.0	43519	210	90	640	4377
4750	LT710-200	987	1086.1	96.6	87.1	45937	210	90	650	4535
4900	LT710-224	987	1088.6	96.7	89.6	47388	220	100	650	4627
5500	LT710-224	987	1223.9	96.8	89.3	53190	240	110	680	4974
6000	LT710-224	987	1344.2	96.9	88.7	58026	250	120	680	5238
6400	LT710-224	987	1502.3	96.9	84.6	61894	250	120	650	5435
8-Pole										
750	LT450-140	740	191.5	94.8	79.5	9671	210	100	620	2160
880	LT450-140	740	218.5	95.1	81.5	11347	200	100	610	2486
900	LT500-132	740	213.0	95.1	85.5	11605	200	110	640	2536
1000	LT500-132	740	251.7	95.3	80.2	12895	200	110	630	2780
1200	LT500-150	740	293.4	95.5	82.4	15473	200	100	620	3256
1400	LT500-150	740	334.9	95.8	84.0	18052	200	100	600	3715
1500	LT560-140	740	377.1	95.3	80.3	19342	200	120	620	3939
1800	LT560-160	740	499.3	95.5	72.7	23210	200	110	600	4592
1900	LT560-160	740	518.7	95.6	73.7	24500	200	110	600	4803
2200	LT560-160	740	579.1	95.8	76.3	28368	200	110	580	5420
2250	LT630-160	740	553.4	95.4	82.0	29013	200	100	620	5520
2450	LT630-180	740	580.4	95.5	85.1	31592	200	100	610	5915
2750	LT630-180	740	707.9	95.7	78.1	35460	200	100	600	6488
3000	LT630-180	740	759.6	95.8	79.3	38684	200	100	600	6950
3200	LT630-180	740	801.6	95.9	80.1	41263	210	100	600	7309
3500	LT710-200	740	798.1	96.2	87.7	45131	220	110	640	7833
3750	LT710-200	740	851.0	96.3	88.1	48355	230	110	640	8255
4000	LT710-224	740	914.0	96.4	87.4	51578	240	110	640	8665
4250	LT710-224	740	966.7	96.5	87.7	54802	240	110	640	9063
4500	LT710-224	740	1087.9	96.5	82.5	58026	240	110	630	9451
4750	LT710-224	740	1139.5	96.5	83.1	61249	220	100	610	9827
4900	LT710-224	740	1170.7	96.5	83.5	63183	190	100	600	10048

* Note - F/B, Ambient temperature 40°C
 - Above technical data are only design values and shall be guaranteed with tolerance of applicable standard. (IEC tolerance is applied.)

LT Series / Performance Data

Leading the World best

LT Series : 50Hz, 6.0kV

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

6.0kV, 50Hz

2-Pole										
1000	LT450-118	2961	115.2	94.1	88.7	3224	220	110	680	72
1200	LT450-118	2961	141.3	94.4	86.6	3868	230	110	680	81
1400	LT450-140	2961	158.6	94.7	89.7	4513	230	110	680	90
1550	LT450-140	2961	177.2	94.9	88.7	4997	230	110	670	96
1800	LT500-132	2961	202.5	95.1	90.0	5803	250	110	650	106
1900	LT500-132	2961	213.1	95.2	90.1	6125	250	110	640	109
2000	LT500-150	2961	222.3	95.2	91.0	6447	250	110	640	112
2250	LT500-150	2961	248.5	95.4	91.3	7253	250	110	620	119
2500	LT500-150	2961	274.1	95.5	91.9	8059	250	110	600	125
2750	LT560-140	2961	302.8	95.8	91.2	8865	240	90	670	130
3000	LT560-140	2961	328.5	95.9	91.6	9671	240	90	660	135
3200	LT560-160	2961	349.5	95.9	91.9	10316	240	90	650	137
3500	LT560-160	2961	382.4	96.0	91.7	11283	240	80	640	140
3800	LT560-160	2961	421.5	96.2	90.2	12250	250	80	630	142
4000	LT630-160	2961	437.1	96.0	91.7	12895	210	80	650	143
4250	LT630-160	2961	462.3	96.1	92.1	13700	210	80	650	143
4500	LT630-160	2961	487.7	96.2	92.3	14506	210	80	660	142
4750	LT630-180	2961	511.3	96.3	92.8	15312	220	80	660	141
4900	LT630-180	2961	526.9	96.4	92.8	15796	220	80	660	140
5500	LT630-180	2961	590.9	96.6	92.7	17730	220	80	670	133
6000	LT630-180	2961	643.8	96.6	92.8	19342	200	80	650	124
4-Pole										
1000	LT450-118	1481	118.5	94.7	85.7	6447	200	100	620	488
1200	LT450-140	1481	143.0	94.9	85.1	7737	200	100	610	565
1400	LT450-140	1481	164.5	95.1	86.1	9026	200	100	600	639
1540	LT450-140	1481	175.3	95.3	88.7	9929	200	100	590	688
1800	LT500-132	1481	204.3	95.5	88.8	11605	200	100	600	775
1900	LT500-150	1481	213.8	95.6	89.4	12250	200	100	600	807
2000	LT500-150	1481	229.9	95.6	87.6	12895	200	100	590	839
2250	LT500-150	1481	255.3	95.8	88.5	14506	200	100	580	914
2450	LT500-150	1481	280.1	95.9	87.8	15796	200	100	570	970
2750	LT560-140	1481	313.2	95.6	88.4	17730	200	70	590	1051
3000	LT560-140	1481	340.4	95.7	88.6	19342	200	70	580	1113
3200	LT560-160	1481	362.6	95.8	88.6	20631	200	70	580	1161
3500	LT560-160	1481	396.8	95.9	88.5	22565	200	70	570	1227
3750	LT560-160	1481	429.0	96.0	87.6	24177	200	70	560	1279
4000	LT560-160	1481	456.8	96.1	87.7	25789	200	70	560	1328
4250	LT630-160	1481	482.9	95.7	88.5	27401	200	70	590	1374
4500	LT630-160	1481	512.6	95.8	88.2	29013	200	70	590	1417
4750	LT630-180	1481	531.4	95.8	89.8	30625	200	70	590	1456
5000	LT630-180	1481	555.5	95.9	90.3	32236	200	70	580	1493
5800	LT630-180	1481	643.1	96.1	90.3	37394	200	70	570	1593
6000	LT710-200	1481	649.5	96.4	92.2	38684	200	70	590	1614
6400	LT710-200	1481	687.2	96.5	92.9	41263	190	70	590	1651
7000	LT710-224	1481	755.7	96.6	92.3	45131	190	70	590	1695
7500	LT710-224	1481	808.2	96.7	92.3	48355	190	70	580	1722
8000	LT710-224	1481	863.5	96.7	92.2	51578	190	70	570	1740
8700	LT710-224	1481	939.9	96.6	92.2	56091	180	60	550	1751

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

6.0kV, 50Hz

6-Pole										
750	LT450-118	987	89.3	94.7	85.3	7253	180	70	560	1058
800	LT450-118	987	94.4	94.8	86.0	7737	180	70	570	1119
900	LT450-140	987	104.7	95.0	87.1	8704	180	70	560	1239
1000	LT450-140	987	116.2	95.2	87.0	9671	190	70	560	1356
1200	LT450-140	987	140.1	95.5	86.3	11605	190	70	550	1582
1400	LT500-132	987	178.0	95.3	79.4	13539	190	80	560	1800
1500	LT500-150	987	183.2	95.4	82.6	14506	190	80	560	1905
1800	LT500-150	987	232.6	95.7	77.8	17408	190	80	540	2211
1950	LT500-150	987	248.6	95.8	78.8	18858	180	80	530	2357
2000	LT560-140	987	235.8	95.7	85.3	19342	170	70	580	2405
2250	LT560-140	987	262.8	95.9	85.9	21760	170	70	560	2640
2450	LT560-160	987	283.1	96.0	86.8	23694	170	60	550	2820
2750	LT560-160	987	317.6	96.2	86.6	26595	170	60	540	3080
3000	LT560-160	987	344.7	96.3	87.0	29013	170	60	530	3288
3200	LT630-160	987	371.3	96.2	86.2	30947	200	80	640	3448
3500	LT630-160	987	403.7	96.4	86.5	33848	200	80	640	3679
3750	LT630-180	987	429.9	96.5	87.0	36266	210	90	640	3864
4000	LT630-180	987	454.6	96.5	87.7	38684	210	90	650	4041
4400	LT630-180	987	506.9	96.7	86.4	42552	220	100	660	4312
4500	LT710-200	987	521.3	96.6	86.0	43519	210	90	640	4377
4750	LT710-200	987	543.0	96.6	87.1	45937	210	90	650	4535
4900	LT710-224	987	544.3	96.7	89.6	47388	220	100	650	4627
5500	LT710-224	987	612.0	96.8	89.3	53190	240	110	680	4974
6000	LT710-224	987	672.1	96.9	88.7	58026	250	120	680	5238
6400	LT710-224	987	751.1	96.9	84.6	61894	250	120	650	5435
8-Pole										
750	LT450-140	740	95.8	94.8	79.5	9671	210	100	620	2160
880	LT450-140	740	109.3	95.1	81.5	11347	200	100	610	2486
900	LT500-132	740	106.5	95.1	85.5	11605	200	110	640	2536
1000	LT500-132	740	125.8	95.3	80.2	12895	200	110	630	2780
1200	LT500-150	740	146.7	95.5	82.4	15473	200	100	620	3256
1400	LT500-150	740	167.4	95.8	84.0	18052	200	100	600	3715
1500	LT560-140	740	188.6	95.3	80.3	19342	200	120	620	3939
1800	LT560-160	740	249.6	95.5	72.7	23210	200	110	600	4592
1900	LT560-160	740	259.3	95.6	73.7	24500	200	110	600	4803
2200	LT560-160	740	289.5	95.8	76.3	28368	200	110	580	5420
2250	LT630-160	740	276.7	95.4	82.0	29013	200	100	620	5520
2450	LT630-180	740	290.2	95.5	85.1	31592	200	100	610	5915
2750	LT630-180	740	354.0	95.7	78.1	35460	200	100	600	6488
3000	LT630-180	740	379.8	95.8	79.3	38684	200	100	600	6950
3200	LT630-180	740	400.8	95.9	80.1	41263	210	100	600	7309
3500	LT710-200	740	399.1	96.2	87.7	45131	220	110	640	7833
3750	LT710-200	740	425.5	96.3	88.1	48355	230	110	640	8255
4000	LT710-224	740	457.0	96.4	87.4	51578	240	110	640	8665
4250	LT710-224	740	483.3	96.5	87.7	54802	240	110	640	9063
4500	LT710-224	740	544.0	96.5	82.5	58026	240	110	630	9451
4750	LT710-224	740	569.8	96.5	83.1	61249	220	100	610	9827
4900	LT710-224	740	585.4	96.5	83.5	63183	190	100	600	10048

* Note - F/B, Ambient temperature 40°C
 - Above technical data are only design values and shall be guaranteed with tolerance of applicable standard. (IEC tolerance is applied.)

LT Series : 60Hz, 3.3kV

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	Wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

3.3kV, 60Hz

2-Pole										
1200	LT450-118	3553	251.3	94.0	88.9	3224	220	100	690	59
1400	LT450-118	3553	291.7	94.4	88.9	3761	230	100	680	66
1600	LT450-140	3553	330.6	94.7	89.4	4298	230	100	670	72
1820	LT450-140	3553	373.6	94.9	89.8	4889	230	100	660	78
2000	LT500-132	3553	406.5	95.4	90.2	5373	220	90	640	82
2250	LT500-132	3553	455.4	95.5	90.5	6044	230	90	640	87
2500	LT500-150	3553	500.7	95.6	91.4	6716	230	90	640	92
2750	LT500-150	3553	544.0	95.7	92.4	7388	230	80	640	95
3000	LT500-150	3553	599.5	95.8	91.4	8059	230	80	630	99
3250	LT560-140	3553	658.9	95.8	90.1	8731	230	80	680	101
3500	LT560-140	3553	707.7	95.9	90.2	9402	230	80	670	103
3750	LT630-160	3553	747.8	95.9	91.5	10074	230	80	660	104
4200	LT630-160	3553	837.3	96.0	91.4	11283	240	80	640	105
4250	LT630-160	3553	835.8	96.1	92.6	11417	210	80	670	105
4500	LT630-160	3553	892.7	96.2	91.7	12089	220	80	670	105
4750	LT630-160	3553	935.5	96.3	92.3	12760	220	80	660	104
5000	LT630-180	3553	983.5	96.3	92.4	13432	230	70	660	103
5500	LT630-180	3553	1070.0	96.5	93.2	14775	230	70	660	99
6300	LT630-180	3553	1224.0	96.7	93.1	16924	240	80	670	88
4-Pole										
1400	LT450-118	1777	299.7	95.3	85.8	7522	210	90	630	398
1600	LT450-140	1777	347.0	95.5	84.5	8596	210	90	630	440
1850	LT450-140	1777	397.8	95.7	85.0	9940	210	90	630	489
2000	LT500-132	1777	411.6	95.7	88.8	10745	210	100	590	517
2300	LT500-132	1777	475.7	95.9	88.2	12357	210	100	590	569
2600	LT500-150	1777	539.9	96.0	87.8	13969	210	100	590	617
2900	LT500-150	1777	601.5	96.2	87.7	15581	210	100	580	660
3000	LT560-140	1777	624.6	96.0	87.5	16118	200	60	580	674
3250	LT560-140	1777	673.6	96.1	87.8	17461	200	60	570	706
3500	LT560-140	1777	722.8	96.2	88.1	18805	200	60	570	736
3750	LT630-160	1777	770.1	96.3	88.5	20148	200	60	560	764
4000	LT630-160	1777	823.4	96.4	88.2	21491	200	60	560	789
4250	LT630-160	1777	866.3	96.5	88.9	22834	200	60	550	812
4500	LT630-160	1777	919.7	96.5	88.7	24177	210	60	540	833
4750	LT630-160	1777	964.4	96.3	89.5	25520	200	70	580	851
5000	LT630-160	1777	1026.3	96.3	88.5	26864	200	70	570	868
5500	LT630-160	1777	1130.2	96.5	88.2	29550	200	70	560	896
6000	LT630-180	1777	1203.7	96.6	90.3	32236	200	70	550	916
6700	LT630-180	1777	1338.9	96.8	90.4	35997	190	70	530	932
7000	LT710-200	1777	1377.1	96.8	91.9	37609	190	60	570	935
7500	LT710-200	1777	1467.4	96.9	92.3	40296	180	60	560	935
8000	LT710-200	1777	1563.0	97.0	92.3	42982	170	70	540	929

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	Wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

3.3kV, 60Hz

6-Pole										
1000	LT450-118	1184	213.7	95.2	86.0	8059	190	70	530	858
1200	LT450-140	1184	256.7	95.4	85.7	9671	190	70	520	998
1430	LT450-140	1184	302.4	95.7	86.5	11525	190	70	500	1152
1600	LT500-132	1184	385.9	95.7	75.8	12895	180	70	530	1261
1800	LT500-132	1184	411.4	95.8	79.9	14506	180	70	520	1384
2000	LT500-150	1184	440.9	96.0	82.7	16118	180	70	510	1503
2300	LT500-150	1184	484.6	96.2	86.3	18536	180	70	500	1671
2500	LT560-140	1184	534.0	96.1	85.2	20148	180	60	530	1779
2750	LT560-140	1184	588.7	96.3	84.9	22163	180	60	520	1907
3000	LT560-160	1184	633.3	96.4	86.0	24177	180	60	510	2030
3250	LT560-160	1184	691.2	96.5	85.3	26192	180	60	500	2147
3600	LT560-160	1184	768.9	96.6	84.8	29013	180	60	490	2302
3750	LT630-160	1184	797.9	96.5	85.2	30222	200	90	630	2365
4000	LT630-160	1184	839.4	96.6	86.3	32236	200	90	640	2466
4250	LT630-160	1184	897.1	96.7	85.7	34251	210	90	640	2563
4500	LT630-180	1184	933.6	96.8	87.1	36266	210	90	650	2655
4750	LT630-180	1184	987.7	96.9	86.8	38281	210	90	650	2743
5200	LT630-180	1184	1087.3	97.1	86.2	41907	220	100	670	2890
5500	LT710-200	1184	1150.8	96.8	86.4	44325	220	90	630	2981
6000	LT710-200	1184	1236.5	97.0	87.5	48355	220	90	630	3120
6500	LT710-224	1184	1333.6	97.2	87.7	52384	230	90	630	3244
7000	LT710-224	1184	1418.4	97.3	88.7	56414	230	90	630	3353
7500	LT710-224	1184	1521.7	97.3	88.6	60443	210	90	620	3448
8-Pole										
750	LT450-118	888	173.9	94.7	79.7	8059	200	90	620	1375
800	LT450-118	888	183.0	94.9	80.6	8596	200	90	610	1455
900	LT450-140	888	200.9	95.1	82.4	9671	200	90	600	1612
1030	LT450-140	888	225.9	95.4	83.6	11068	200	90	590	1810
1200	LT500-132	888	268.9	95.3	81.9	12895	210	100	630	2063
1400	LT500-150	888	312.1	95.6	82.1	15044	210	100	620	2349
1700	LT500-150	888	369.6	95.9	83.9	18267	210	100	600	2760
1800	LT560-140	888	409.7	95.7	80.3	19342	210	100	620	2892
2000	LT560-140	888	447.1	95.9	81.6	21491	200	100	620	3151
2300	LT560-160	888	515.0	96.0	81.4	24715	200	100	610	3524
2650	LT560-160	888	589.0	96.2	81.8	28475	200	100	590	3938
2750	LT630-160	888	623.4	95.9	80.5	29550	200	90	640	4052
3000	LT630-160	888	670.3	96.0	81.6	32236	200	90	630	4331
3250	LT630-180	888	735.7	96.2	80.3	34923	200	90	620	4601
3500	LT630-180	888	783.1	96.3	81.2	37609	200	90	620	4861
3800	LT630-180	888	840.3	96.5	82.0	40833	200	90	610	5161
4000	LT710-200	888	816.1	96.4	89.0	42982	200	90	620	5355
4250	LT710-200	888	890.8	96.5	86.5	45668	200	90	620	5589
4500	LT710-200	888	938.5	96.5	86.9	48355	200	90	610	5816
4750	LT710-224	888	969.1	96.6	88.8	51041	200	90	610	6035
5000	LT710-224	888	1067.9	96.6	84.8	53727	200	90	600	6246
5500	LT710-224	888	1161.9	96.7	85.6	59100	200	90	590	6648
6000	LT710-224	888	1257.7	96.8	86.2	64473	200	90	580	7022

* Note - F/B, Ambient temperature 40°C
 - Above technical data are only design values and shall be guaranteed with tolerance of applicable standard. (IEC tolerance is applied.)

LT Series : 60Hz, 4.16kV

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

4.16kV, 60Hz

2-Pole										
1200	LT450-118	3553	199.4	94.0	88.9	3224	220	100	690	59
1400	LT450-118	3553	231.4	94.4	88.9	3761	230	100	680	66
1600	LT450-140	3553	262.3	94.7	89.4	4298	230	100	670	72
1820	LT450-140	3553	296.4	94.9	89.8	4889	230	100	660	78
2000	LT500-132	3553	322.5	95.4	90.2	5373	220	90	640	82
2250	LT500-132	3553	361.2	95.5	90.5	6044	230	90	640	87
2500	LT500-150	3553	397.2	95.6	91.4	6716	230	90	640	92
2750	LT500-150	3553	431.5	95.7	92.4	7388	230	80	640	95
3000	LT500-150	3553	475.6	95.8	91.4	8059	230	80	630	99
3250	LT560-140	3553	522.7	95.8	90.1	8731	230	80	680	101
3500	LT560-140	3553	561.4	95.9	90.2	9402	230	80	670	103
3750	LT560-160	3553	593.2	95.9	91.5	10074	230	80	660	104
4200	LT560-160	3553	664.2	96.0	91.4	11283	240	80	640	105
4250	LT630-160	3553	663.0	96.1	92.6	11417	210	80	670	105
4500	LT630-160	3553	708.1	96.2	91.7	12089	220	80	670	105
4750	LT630-160	3553	742.1	96.3	92.3	12760	220	80	660	104
5000	LT630-180	3553	780.2	96.3	92.4	13432	230	70	660	103
5500	LT630-180	3553	848.8	96.5	93.2	14775	230	70	660	99
6300	LT630-180	3553	971.0	96.7	93.1	16924	240	80	670	88
4-Pole										
1400	LT450-118	1777	237.7	95.3	85.8	7522	210	90	630	398
1600	LT450-140	1777	275.2	95.5	84.5	8596	210	90	630	440
1850	LT450-140	1777	315.5	95.7	85.0	9940	210	90	630	489
2000	LT500-132	1777	326.5	95.7	88.8	10745	210	100	590	517
2300	LT500-132	1777	377.3	95.9	88.2	12357	210	100	590	569
2600	LT500-150	1777	428.3	96.0	87.8	13969	210	100	590	617
2900	LT500-150	1777	477.2	96.2	87.7	15581	210	100	580	660
3000	LT560-140	1777	495.5	96.0	87.5	16118	200	60	580	674
3250	LT560-140	1777	534.3	96.1	87.8	17461	200	60	570	706
3500	LT560-140	1777	573.4	96.2	88.1	18805	200	60	570	736
3750	LT560-160	1777	610.9	96.3	88.5	20148	200	60	560	764
4000	LT560-160	1777	653.1	96.4	88.2	21491	200	60	560	789
4250	LT560-160	1777	687.2	96.5	88.9	22834	200	60	550	812
4500	LT560-160	1777	729.6	96.5	88.7	24177	210	60	540	833
4750	LT630-160	1777	765.0	96.3	89.5	25520	200	70	580	851
5000	LT630-160	1777	814.1	96.3	88.5	26864	200	70	570	868
5500	LT630-160	1777	896.5	96.5	88.2	29550	200	70	560	896
6000	LT630-180	1777	954.8	96.6	90.3	32236	200	70	550	916
6700	LT630-180	1777	1062.1	96.8	90.4	35997	190	70	530	932
7000	LT710-200	1777	1092.4	96.8	91.9	37609	190	60	570	935
7500	LT710-200	1777	1164.1	96.9	92.3	40296	180	60	560	935
8000	LT710-200	1777	1239.8	97.0	92.3	42982	170	70	540	929
8500	LT710-224	1777	1315.3	97.1	92.4	45668	170	70	540	917
9000	LT710-224	1777	1385.4	97.2	92.8	48355	170	70	530	899
9500	LT710-224	1777	1463.5	97.3	92.6	51041	170	70	530	875
10200	LT710-224	1777	1572.5	97.3	92.5	54802	170	70	530	832

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

4.16kV, 60Hz

6-Pole										
1000	LT450-118	1184	169.5	95.2	86.0	8059	190	70	530	858
1200	LT450-140	1184	203.6	95.4	85.7	9671	190	70	520	998
1430	LT450-140	1184	239.9	95.7	86.5	11525	190	70	500	1152
1600	LT500-132	1184	306.1	95.7	75.8	12895	180	70	530	1261
1800	LT500-132	1184	326.3	95.8	79.9	14506	180	70	520	1384
2000	LT500-150	1184	349.8	96.0	82.7	16118	180	70	510	1503
2300	LT500-150	1184	384.4	96.2	86.3	18536	180	70	500	1671
2500	LT560-140	1184	423.6	96.1	85.2	20148	180	60	530	1779
2750	LT560-140	1184	467.0	96.3	84.9	22163	180	60	520	1907
3000	LT560-160	1184	502.4	96.4	86.0	24177	180	60	510	2030
3250	LT560-160	1184	548.3	96.5	85.3	26192	180	60	500	2147
3600	LT560-160	1184	609.9	96.6	84.8	29013	180	60	490	2302
3750	LT630-160	1184	632.9	96.5	85.2	30222	200	90	630	2365
4000	LT630-160	1184	665.8	96.6	86.3	32236	200	90	640	2466
4250	LT630-160	1184	711.7	96.7	85.7	34251	210	90	640	2563
4500	LT630-180	1184	740.6	96.8	87.1	36266	210	90	650	2655
4750	LT630-180	1184	783.5	96.9	86.8	38281	210	90	650	2743
5200	LT630-180	1184	862.5	97.1	86.2	41907	220	100	670	2890
5500	LT710-200	1184	912.9	96.8	86.4	44325	220	90	630	2981
6000	LT710-200	1184	980.9	97.0	87.5	48355	220	90	630	3120
6500	LT710-224	1184	1057.9	97.2	87.7	52384	230	90	630	3244
7000	LT710-224	1184	1125.2	97.3	88.7	56414	230	90	630	3353
7500	LT710-224	1184	1207.2	97.3	88.6	60443	210	90	620	3448
8-Pole										
750	LT450-118	888	137.9	94.7	79.7	8059	200	90	620	1375
800	LT450-118	888	145.2	94.9	80.6	8596	200	90	610	1455
900	LT450-140	888	159.4	95.1	82.4	9671	200	90	600	1612
1030	LT450-140	888	179.2	95.4	83.6	11068	200	90	590	1810
1200	LT500-132	888	213.3	95.3	81.9	12895	210	100	630	2063
1400	LT500-150	888	247.6	95.6	82.1	15044	210	100	620	2349
1700	LT500-150	888	293.2	95.9	83.9	18267	210	100	600	2760
1800	LT560-140	888	325.0	95.7	80.3	19342	210	100	620	2892
2000	LT560-140	888	354.7	95.9	81.6	21491	200	100	620	3151
2300	LT560-160	888	408.5	96.0	81.4	24715	200	100	610	3524
2650	LT560-160	888	467.2	96.2	81.8	28475	200	100	590	3938
2750	LT630-160	888	494.5	95.9	80.5	29550	200	90	640	4052
3000	LT630-160	888	531.7	96.0	81.6	32236	200	90	630	4331
3250	LT630-180	888	583.6	96.2	80.3	34923	200	90	620	4601
3500	LT630-180	888	621.2	96.3	81.2	37609	200	90	620	4861
3800	LT630-180	888	666.6	96.5	82.0	40833	200	90	610	5161
4000	LT710-200	888	647.4	96.4	89.0	42982	200	90	620	5355
4250	LT710-200	888	706.6	96.5	86.5	45668	200	90	620	5589
4500	LT710-200	888	744.5	96.5	86.9	48355	200	90	610	5816
4750	LT710-224	888	768.8	96.6	88.8	51041	200	90	610	6035
5000	LT710-224	888	847.1	96.6	84.8	53727	200	90	600	6246
5500	LT710-224	888	921.7	96.7	85.6	59100	200	90	590	6648
6000	LT710-224	888	997.7	96.8	86.2	64473	200	90	580	7022

* Note - F/B, Ambient temperature 40°C
 - Above technical data are only design values and shall be guaranteed with tolerance of applicable standard. (IEC tolerance is applied.)

LT Series : 60Hz, 6.6kV

Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

6.6kV, 60Hz

2-Pole										
1200	LT450-118	3553	125.7	94.0	88.9	3224	220	100	690	59
1400	LT450-118	3553	145.9	94.4	88.9	3761	230	100	680	66
1600	LT450-140	3553	165.3	94.7	89.4	4298	230	100	670	72
1820	LT450-140	3553	186.8	94.9	89.8	4889	230	100	660	78
2000	LT500-132	3553	203.2	95.4	90.2	5373	220	90	640	82
2250	LT500-132	3553	227.7	95.5	90.5	6044	230	90	640	87
2500	LT500-150	3553	250.4	95.6	91.4	6716	230	90	640	92
2750	LT500-150	3553	272.0	95.7	92.4	7388	230	80	640	95
3000	LT500-150	3553	299.7	95.8	91.4	8059	230	80	630	99
3250	LT560-140	3553	329.4	95.8	90.1	8731	230	80	680	101
3500	LT560-140	3553	353.9	95.9	90.2	9402	230	80	670	103
3750	LT560-160	3553	373.9	95.9	91.5	10074	230	80	660	104
4200	LT560-160	3553	418.6	96.0	91.4	11283	240	80	640	105
4250	LT630-160	3553	417.9	96.1	92.6	11417	210	80	670	105
4500	LT630-160	3553	446.3	96.2	91.7	12089	220	80	670	105
4750	LT630-160	3553	467.7	96.3	92.3	12760	220	80	660	104
5000	LT630-180	3553	491.8	96.3	92.4	13432	230	70	660	103
5500	LT630-180	3553	535.0	96.5	93.2	14775	230	70	660	99
6300	LT630-180	3553	612.0	96.7	93.1	16924	240	80	670	88
4-Pole										
1400	LT450-118	1777	149.8	95.3	85.8	7522	210	90	630	398
1600	LT450-140	1777	173.5	95.5	84.5	8596	210	90	630	440
1850	LT450-140	1777	198.9	95.7	85.0	9940	210	90	630	489
2000	LT500-132	1777	205.8	95.7	88.8	10745	210	100	590	517
2300	LT500-132	1777	237.8	95.9	88.2	12357	210	100	590	569
2600	LT500-150	1777	270.0	96.0	87.8	13969	210	100	590	617
2900	LT500-150	1777	300.8	96.2	87.7	15581	210	100	580	660
3000	LT560-140	1777	312.3	96.0	87.5	16118	200	60	580	674
3250	LT560-140	1777	336.8	96.1	87.8	17461	200	60	570	706
3500	LT560-140	1777	361.4	96.2	88.1	18805	200	60	570	736
3750	LT560-160	1777	385.0	96.3	88.5	20148	200	60	560	764
4000	LT560-160	1777	411.7	96.4	88.2	21491	200	60	560	789
4250	LT560-160	1777	433.2	96.5	88.9	22834	200	60	550	812
4500	LT560-160	1777	459.8	96.5	88.7	24177	210	60	540	833
4750	LT630-160	1777	482.2	96.3	89.5	25520	200	70	580	851
5000	LT630-160	1777	513.2	96.3	88.5	26864	200	70	570	868
5500	LT630-160	1777	565.1	96.5	88.2	29550	200	70	560	896
6000	LT630-180	1777	601.8	96.6	90.3	32236	200	70	550	916
6700	LT630-180	1777	669.5	96.8	90.4	35997	190	70	530	932
7000	LT710-200	1777	688.6	96.8	91.9	37609	190	60	570	935
7500	LT710-200	1777	733.7	96.9	92.3	40296	180	60	560	935
8000	LT710-200	1777	781.5	97.0	92.3	42982	170	70	540	929
8500	LT710-224	1777	829.0	97.1	92.4	45668	170	70	540	917
9000	LT710-224	1777	873.2	97.2	92.8	48355	170	70	530	899
9500	LT710-224	1777	922.4	97.3	92.6	51041	170	70	530	875
10200	LT710-224	1777	991.2	97.3	92.5	54802	170	70	530	832

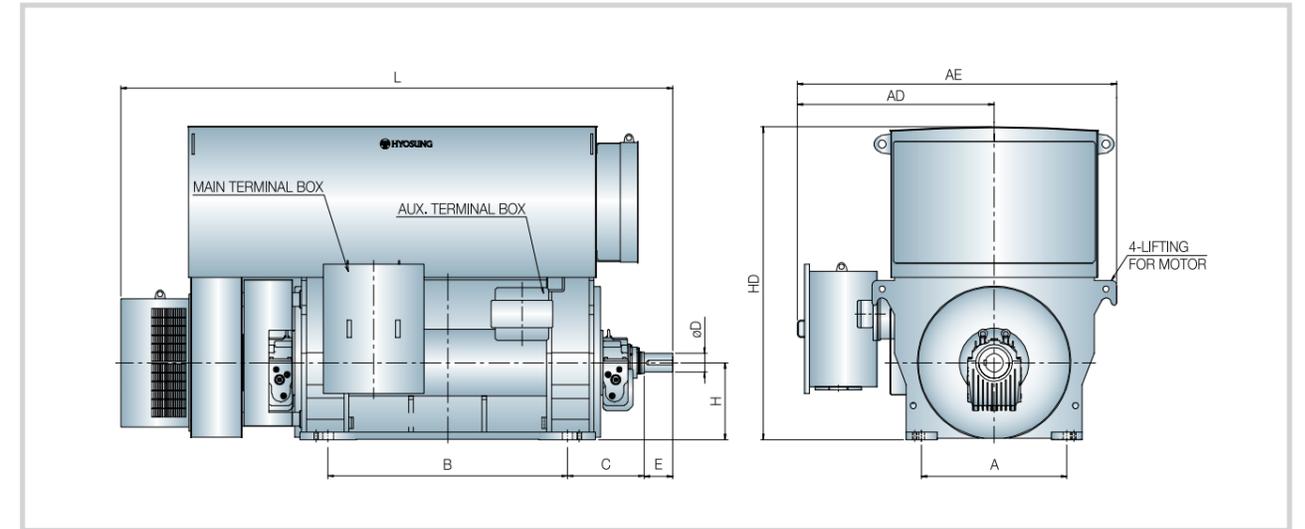
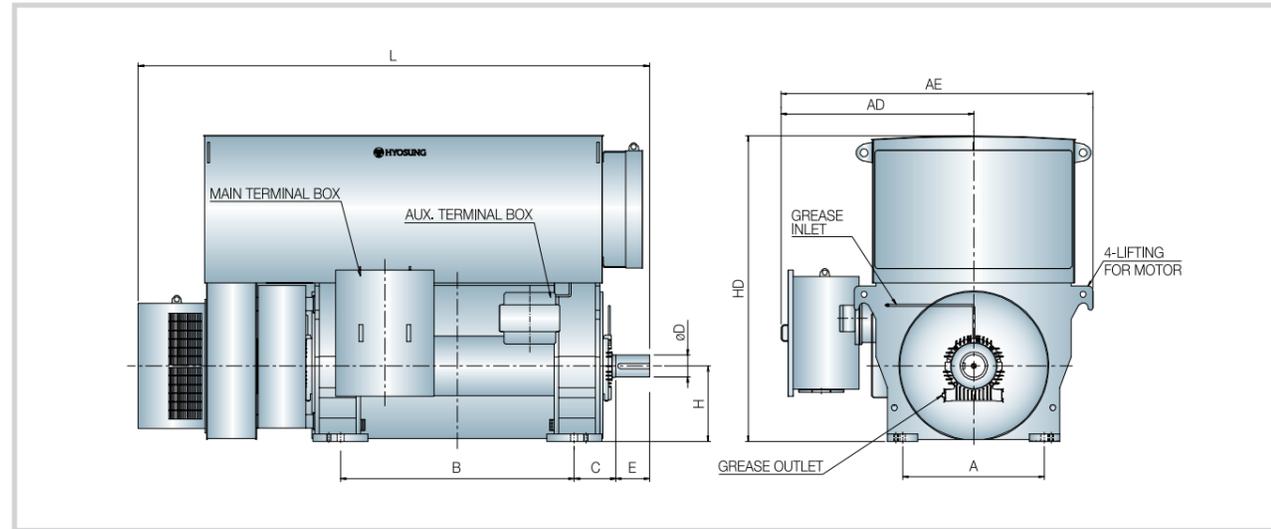
Rated power	Frame No.	Speed	Rated current	Efficiency	Power factor	Torque	Break down torque	Locked-rotor torque	Locked-rotor current	Max. load inertia
P _N		n _N	I _N	100% load	100% load	T _N	T _{max} / T _N	T _s / T _N	I _s / I _N	wk ²
kW		rpm	A	%	cos φ [%]	Nm	[%]	[%]	[%]	kgm ²

6.6kV, 60Hz

6-Pole										
1000	LT450-118	1184	106.9	95.2	86.0	8059	190	70	530	858
1200	LT450-140	1184	128.3	95.4	85.7	9671	190	70	520	998
1430	LT450-140	1184	151.2	95.7	86.5	11525	190	70	500	1152
1600	LT500-132	1184	192.9	95.7	75.8	12895	180	70	530	1261
1800	LT500-132	1184	205.7	95.8	79.9	14506	180	70	520	1384
2000	LT500-150	1184	220.5	96.0	82.7	16118	180	70	510	1503
2300	LT500-150	1184	242.3	96.2	86.3	18536	180	70	500	1671
2500	LT560-140	1184	267.0	96.1	85.2	20148	180	60	530	1779
2750	LT560-140	1184	294.3	96.3	84.9	22163	180	60	520	1907
3000	LT560-160	1184	316.7	96.4	86.0	24177	180	60	510	2030
3250	LT560-160	1184	345.6	96.5	85.3	26192	180	60	500	2147
3600	LT560-160	1184	384.4	96.6	84.8	29013	180	60	490	2302
3750	LT630-160	1184	398.9	96.5	85.2	30222	200	90	630	2365
4000	LT630-160	1184	419.7	96.6	86.3	32236	200	90	640	2466
4250	LT630-160	1184	448.6	96.7	85.7	34251	210	90	640	2563
4500	LT630-180	1184	466.8	96.8	87.1	36266	210	90	650	2655
4750	LT630-180	1184	493.9	96.9	86.8	38281	210	90	650	2743
5200	LT630-180	1184	543.7	97.1	86.2	41907	220	100	670	2890
5500	LT710-200	1184	575.4	96.8	86.4	44325	220	90	630	2981
6000	LT710-200	1184	618.3	97.0	87.5	48355	220	90	630	3120
6500	LT710-224	1184	666.8	97.2	87.7	52384	230	90	630	3244
7000	LT710-224	1184	709.2	97.3	88.7	56414	230	90	630	3353
7500	LT710-224	1184	760.9	97.3	88.6	60443	210	90	620	3448
8-Pole										
750	LT450-118	888	86.9	94.7	79.7	8059	200	90	620	1375
800	LT450-118	888	91.5	94.9	80.6	8596	200	90	610	1455
900	LT450-140	888	100.5	95.1	82.4	9671	200	90	600	1612
1030	LT450-140	888	113.0	95.4	83.6	11068	200	90	590	1810
1200	LT500-132	888	134.4	95.3	81.9	12895	210	100	630	2063
1400	LT500-150	888	156.1	95.6	82.1	15044	210	100	620	2349
1700	LT500-150	888	184.8	95.9	83.9	18267	210	100	600	2760
1800	LT560-140	888	204.8	95.7	80.3	19342	210	100	620	2892
2000	LT560-140	888	223.6	95.9	81.6	21491	200	100	620	3151
2300	LT560-160	888	257.5	96.0	81.4	24715	200	100	610	3524
2650	LT560-160	888	294.5	96.2	81.8	28475	200	100	590	3938
2750	LT630-160	888	311.7	95.9	80.5	29550	200	90	640	4052
3000	LT630-160	888	335.2	96.0	81.6	32236	200	90	630	4331
3250	LT630-180	888	367.9	96.2	80.3	34923	200	90	620	4601
3500	LT630-180	888	391.5	96.3	81.2	37609	200	90	620	4861
3800	LT630-180	888	420.1	96.5	82.0	40833	200	90	610	5161
4000	LT710-200	888	408.1	96.4	89.0	42982	200	90	620	5355
4250	LT710-200	888	445.4	96.5	86.5	45668	200	90	620	5589
4500	LT710-200	888	469.3	96.5	86.9	48355	200	90	610	5816
4750	LT710-224	888	484.6	96.6	88.8	51041	200	90	610	6035
5000	LT710-224	888	533.9	96.6	84.8	53727	200	90	600	6246
5500	LT710-224	888	581.0	96.7	85.6	59100	200	90	590	6648
6000	LT710-224	888	628.9	96.8	86.2	64473	200	90	580	7022

* Note - F/B, Ambient temperature 40°C
 - Above technical data are only design values and shall be guaranteed with tolerance of applicable standard. (IEC tolerance is applied.)

Outline Dimension Drawing



Bearing type : Anti-friction bearing

Frame No.	Weight kg	Dimensions									
		A mm	AD mm	AE mm	B mm	C mm	D mm	E mm	H mm	HD mm	L mm
4P											
450-118	4990	850	1152	1867	1180	250	120	165	450	1828	2813
450-140	5800	850	1152	1867	1400	250	130	200	450	1828	3063
500-132	6460	950	1218	2003	1320	280	140	200	500	1990	3046
500-150	7510	950	1218	2003	1500	280	150	200	500	1990	3221
6P											
450-118	4840	850	1152	1867	1180	250	130	200	450	1828	2455
450-140	5620	850	1152	1867	1400	250	140	200	450	1828	2670
500-132	6640	950	1218	2003	1320	280	150	200	500	1990	2579
500-150	7720	950	1218	2003	1500	280	160	240	500	1990	2794
560-140	8950	1060	1291	2186	1400	315	170	240	560	2275	2885.5
560-160	10400	1060	1291	2186	1600	315	180	240	560	2275	3100.5
630-160	13470	1320	1390	2375	1600	355	200	280	630	2610	3280
630-180	15300	1320	1390	2375	1800	355	200	280	630	2610	3480
8P											
450-118	4840	850	1152	1867	1180	250	130	200	450	1828	2455
450-140	5620	850	1152	1867	1400	250	140	200	450	1828	2670
500-132	6640	950	1218	2003	1320	280	150	200	500	1990	2579
500-150	7720	950	1218	2003	1500	280	160	240	500	1990	2794
560-140	8950	1060	1291	2186	1400	315	170	240	560	2275	2885.5
560-160	10400	1060	1291	2186	1600	315	180	240	560	2275	3100.5
630-160	13470	1320	1390	2375	1600	355	200	280	630	2610	3280
630-180	15300	1320	1390	2375	1800	355	200	280	630	2610	3480

Bearing type : Sleeve bearing

Frame No.	Weight kg	Dimensions									
		A mm	AD mm	AE mm	B mm	C mm	D mm	E mm	H mm	HD mm	L mm
2P											
450-118	4570	850	1152	1867	1180	450	100	165	450	1828	3013
450-140	5250	850	1152	1867	1400	450	110	165	450	1828	3228
500-132	5700	950	1218	2003	1320	475	110	165	500	1990	3046
500-150	6750	950	1218	2003	1500	475	120	165	500	1990	3381
560-140	8600	1060	1291	2186	1400	560	130	200	560	2275	3602
560-160	11000	1060	1291	2186	1600	560	140	200	560	2275	3817
630-160	11560	1320	1390	2375	1600	560	140	200	630	2610	3976
630-180	15500	1320	1390	2375	1800	560	150	200	630	2610	4186
710-224	23520	1500	1740	2860	2240	600	180	240	710	3075	5017
4P											
560-140	9940	1060	1291	2186	1400	530	170	240	560	2275	3612
560-160	10550	1060	1291	2186	1600	530	180	240	560	2275	3827
630-160	13640	1320	1390	2375	1600	600	190	280	630	2610	4106
630-180	15500	1320	1390	2375	1800	600	200	280	630	2610	4306
710-200	24840	1500	1525	2645	2000	670	220	280	710	2880	4661
710-224	27600	1500	1525	2645	2240	670	220	280	710	2880	4901
6P											
710-224	27300	1500	1525	2645	2240	670	220	280	710	2880	4321
8P											
710-224	27300	1500	1525	2645	2240	670	220	280	710	2880	4321

Tolerance for Performance Data (IEC60034-1)

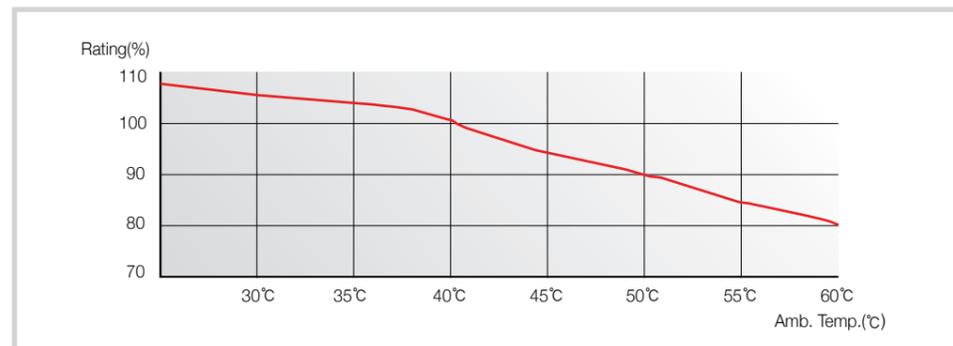
Factor	Range
Efficiency	-10% (1-eff.)
Power Factor (cos ϕ)	-1/6 (1-cos ϕ)
Locked Rotor Torque (kg-m)	Min 0.02 ~ max 0.07
Max Torque (kg-m)	-15%, +25%
Locked Rotor Current (A)	+20%
Moment of Inertia (kg-m ²)	$\pm 10\%$
Slip	$\pm 20\%$

* No Load Current (A) : +30% acc. to Hyosung Standard
 * Noise : +3dB(A) acc. to Hyosung Standard

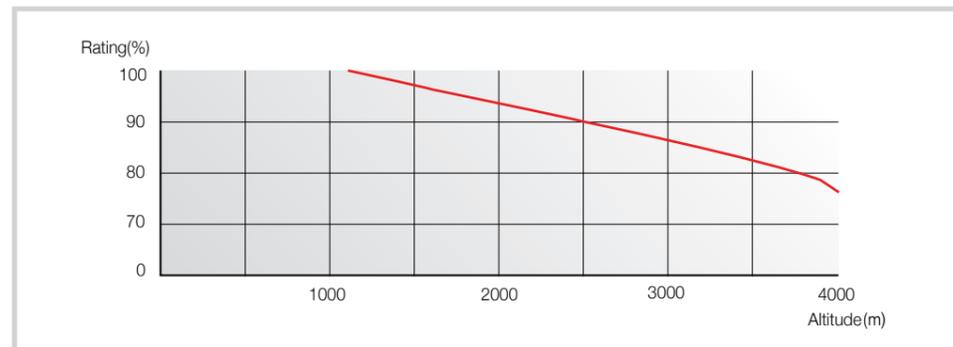
Tolerance for Dimensions (IEC60034-1)

Factor	Range
Center Height	~ 560Fr. ~ 630Fr. ~
Shaft Diameter (Above 55 ϕ)	0 ~ -1.0
Shaft End Play (Sleeve Type)	0 ~ -1.5
Width of Key	m6
Width of Key Way (DE)	$\pm 4.5\text{mm}$
	h9
	h9

Modification of Output



Derating Factor by Cooling Ambient Air Inlet Temperature Impregnation of Core and Assemblies



Derating Factor by Site Altitude

At our website (www.hyosungpni.com), you can check and download technical datasheets, dimensional drawings and terminal box drawings. Simply input basic technical information of the motor that you need and download them for your quick reference.

- 1 Visit 'www.hyosungpni.com'.
- 2 Select your language.
- 3 Go to 'Products & Solution > Industrial Machinery'.
- 4 Go to 'High Voltage Motors'.
- 5 On the left side you will find 'Technical Support'.
- 6 Fill in the blanks with your motor specification.
- 7 Click 'Search'.
- 8 Click 'Datasheet' or drawing numbers right in the table.
- 9 Drawings can also be found by clicking drawing number in the datasheet.

1 Visit 'www.hyosungpni.com'.
2 Select your language.
3 Go to 'Products & Solution > Industrial Machinery'.
4 Go to 'High Voltage Motors'.
5 On the left side you will find 'Technical Support'.
6 Fill in the blanks with your motor specification.
7 Click 'Search'.
8 Click 'Datasheet' or drawing numbers right in the table.
9 Drawings can also be found by clicking drawing number in the datasheet.

9 <Outline Dimension / Main Terminal Box / Aux. Terminal Box >

Custom Designs are Available

Customized designs can be applied upon request.

- Change of ambient temperature
- Inverter duty
- Direction of rotation (clockwise, counter-clockwise or bi-direction)
- DE bearing insulation (NDE bearing is insulated as basic design.)
- Change of bearing type (from anti-friction to sleeve, if applicable)
- Special terminal box (phase segregated type, elastimold type etc.)
- Change of location of the terminal box
- Special painting system
- Instrumentation & auxiliary terminal box
 - RTD's for bearings & windings, Transmitters
 - Vibration sensors, Current transformers
 - Surge arrestors & capacitors
 - Separate terminal boxes for space heater & RTD's
- Special packing
- Specified performance requirements such as current, torque etc.



Test Description

Each motor receives standard routine commercial tests as required by IEC. An unwitnessed routine test will be performed at no charge to all motors ordered.

1. Routine test

- Measurement of resistance of stator winding with DC, referred to 20°C (IEC 60034, IEEE 112)
- No-load test (IEC 60034) (measurement of no-load current and no-load losses at rated voltage and rated frequency)
- Insulation resistance test of stator/rotor winding (IEEE 43)
- Verification that phase sequence agrees with terminal markings
- Measurement and evaluation of vibrations (IEC 60034)
- Mechanical balance
- High voltage test (IEC 60034)

2. Complete test

- Routine test
- Determination of efficiency at full, 3/4, and 1/2 load (IEEE 112 F method)
- Determination of power factor at full, 3/4, and 1/2 loads (IEEE 112 F method)
- Temperature run by dual frequency method (IEC 61986, IEEE 112)
- Locked rotor current (Logarithmic proportion method)
- Determination of locked rotor and breakdown torques
- Sound pressure test

Optional Tests

- Sample coil test
- Bearing temperature rise test
- Others upon customer's request



Manufacturing Plant



- **Location** Changwon City, Korea
- **Land** 741,340 m²
- **Floor space** 343,252m²

Manufacturing Facilities



VPI Tank



Winding Machine



Test Facility

Certificate



ISO 9001
Quality Management System



ISO 14001
Environment Management System



OHSAS 18001
Occupational Health & Safety
Assessment Series



Asia

--- Bangkok Office

Tel. +66 2 653 2031
Room No. 1404, 14th Floor One Pacific
Place 142 Sukhumvit Road, Bangkok
10110, Thailand

--- Beijing Office

Tel. +86 10 6512 9692
Room No. 501 5/F., Scitech Tower #22 Jian
Guo Men Wai Street, Beijing, China

--- Jakarta Office

Tel. +62 21 526 6475
Citi Bank Tower 24/F., Plaza Bapindo Jl,
Jendral Sudirman Kav, 54-55 Jakarta
12920, Indonesia

--- Kuala Lumpur Office

Tel. +60 3 2031 2416
Suite 24-04, Level 24 Wisma Goldhill, No.
67, Jalan Raja Chulan, 50200 Kuala
Lumpur, Malaysia

--- Manila Office

Tel. +632 848 6204
12F Unit 1203, Ayala Tower 1, Ayala
Triangle, Ayala Avenue, Makti City,
Philippines

--- New Delhi Office

Tel. +91 11 4166 2255
D-4 Commercial Complex Paschimi Marg
2nd Floor, Vasant Vihar, New Delhi, India

--- Osaka Office

Tel. +81 6 6264 0778
Kokusai Bldg., 13F., 3-13, 2-Chome
Azuchi-Machi, Chuo-ku, Osaka, Japan

--- Seoul - Headquarters

Tel. +82 2 707 7000
450 Gongdeok-dong, Mapo-gu, Seoul,
Korea

--- Shanghai Office

Tel. +86 21 6209 0123
Room No. 1115, Shanghai International
Trading Center No. 2200 Yan An Xi Road,
Shanghai, China

--- Singapore - Hyosung Singapore Pte, Ltd.

Tel. +656 337 2079
250, North Bridge Road # 16-03, Raffles
City Tower, Singapore 179101

--- Taipei Office

Tel. +886 2 2758 4636
1714, 17F, International Trade Building No.
333 Sec1, Keelung Road, Taipei 110,
Taiwan R.O.C

--- Tokyo - Hyosung Japan

Tel. +81 3 3432 1005
Svax TT Bldg 6F, 11-15, 3-Chome,
Toranomon Minato-ku, Tokyo, Japan

Americas

--- Los Angeles Office – HICO America Inc. L.A Branch

Tel. +1 714 989 8900
910 Columbia Street, Brea, CA 92821,
USA

--- Pittsburgh – HICO America Inc.

Tel. +1 412 787 1170
One Penn Center West, Suite 212
Pittsburgh, PA 15276, USA

--- Mexico Office

Tel. +52 55 5250 2790
Paseo de Tamarindos 90, Torre 1, Piso 10,
Col. Bosques de las Lomas, C.P. 05120,
Mexico D.F., Mexico

--- Panama Office

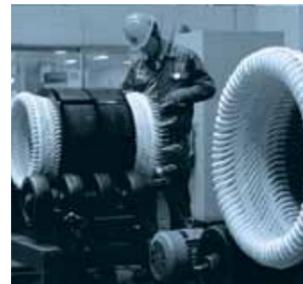
Tel. +507 214 8968
International Business Center Piso 8, Ave.
Manuel Espinosa Bantista Bella Vista,
Apdo. 0819-06390, Panama City, Republic
of Panama

--- Sao Paulo – Hyosung Do Brazil

Tel. +55 11 3284 6436
Av. Eng. Luis Carlos Berrini, 1297 Conj 142,
Brooklin, Edificio Sudameris, Sao Paulo,
Brazil



*We are always
by your side.*



Europe

--- Barcelona Office

Tel. +34 93 430 7735
Calle Valencia 243-245, 6-3 08007
Barcelona, Spain

--- Frankfurt Office

Tel. +49 6102 74120
Martin-Behaim Str. 12, 63263 Neu-
Isenburg, Germany

--- Istanbul Office

Tel. +90 212 284 1601
Harman Caddesi, Ali Kaya Sk. Polat Plaza
B Block, Kat 3, No. 76, Levent, Istanbul,
Turkey

--- Milan – Hyosung Europe S.r.l.

Tel. +39 02 9886 251
Via del Tecchione 34, 20098 San Giuliano
Milanese (MI), Italy

--- Moscow Office

Tel. +7 495 956 5172
Park Place D 105. 113/1, Lninsky Prospect
117198, Moscow, Russia

Middle East

--- Dubai Office

Tel. +971 4 221 8483
P.O. Box 15287, Office 804 Green Tower Al
Regga Street Deira, Dubai, UAE

