

Overview

The SIMOTICS FD 1L.16 crane motors have been specially designed for the application-specific requirements encountered during hoisting duty in crane installations. The focus is on cranes located in seaports that are often exposed to adverse weather conditions, which means that special measures must be taken here to protect the motors against corrosion and the ingress of dust and water. The squirrel-cage motors with the IVIC-C premium insulation system are suitable for operation with a SINAMICS S120 converter. Since the crane motors in particular operate over a large speed range during converter operation, you must check – alongside the usual design criteria such as thermal load (effective torque) and maximum acceleration torque – whether the motor can still generate the required maximum torque in the field weakening range.

The three-phase induction motors are either force-ventilated in IP55 degree of protection (1LQ16) or IP23 (1LIP16) or self-ventilated in IP55 degree of protection (1LM16).

Detailed configuring information for crane motors can be found in Catalog CR 1 "Drive and Control Components for Cranes".

The innovations in the field of modern crane installations place ever higher demands on compact induction motors. The compact 1L.16 induction motor covers the increased performance requirements, e.g. for intermittent duty S3 – 25% with up to 2.1 MW. This motor series is a converter solution which has been specially developed for use in conjunction with the SINAMICS S120 drive system.

The 1L.16 induction motors have the following distinguishing features:

- Force-ventilated and self-ventilated induction motors with squirrel-cage rotor in IP55 degree of protection
- Force-ventilated induction motors with squirrel-cage rotor in IP23 degree of protection
- The motors are force-ventilated as standard by a radially mounted separately driven fan unit
- A second shaft extension is possible as an option
- The 1LM16 crane motors comprise as standard a bidirectional fan impeller (for frame sizes 400 and 450 it is not necessary here to select order code **K99**).
- The degree of protection of the 1LQ16 and 1LM16 motors can optionally be increased to IP56 (non-heavy-sea) (order code **K52**). The additional information "non-heavy-sea" means that the machine must not be flooded or submerged by a wave.

Externally mounted encoder systems are available as an option. For the optional version of the motor with a second shaft extension, the bearing-free incremental encoder MHGE 200 (order code **H65**) is available.

The crane motors must be protected by placing them under a roof or enclosing them. If they are enclosed, an adequate supply of air must be ensured. For installation in salt-laden or humid ambient air, the motor must be ordered with improved corrosion protection (order codes **E83**, **E82**, **E81** or **C19**, **C26**).

Benefits

The crane motors are distinguished by the following design criteria:

- High overload torque at rated speed
- Large field-weakening range as well as high torque also at max. mechanical speed
- Low moment of inertia
- Optimized for line voltage 480 V and operation with SINAMICS S120 with controlled infeed (ALM)

The following features of the SIMOTICS FD motor platform also apply to the SIMOTICS FD crane motors:

- Low-voltage motor series optimized for converter operation
- High level of flexibility due to modular design principle
- Host of possible uses thanks to various design variants
- Rugged cast-iron housing
- Wide range of options
- Generously dimensioned terminal boxes
- Wide speed setting ranges
- Compact unit with high power density
- High rotational accuracy, even at very low speeds
- Fitted as standard with regreasing system and insulated NDE bearing – optionally with spent grease removal and automatic regreasing system

Application

The Siemens crane motors are particularly suitable for harsh hoisting duty. These rugged motors have:

- High degree of protection in conjunction with ordering options for increased corrosion protection and are thus especially suitable for adverse conditions of use
- Torque reserves that allow high short-time overloads
- High torque and low intrinsic moment of inertia for optimum acceleration
- The particularly rugged IVIC-C premium insulation system that permanently withstands the increased voltage loads encountered during hoisting duty

For other crane applications, such as trolley, the SIMOTICS FD platform offers further motor series. The selection and ordering data can be found in chapters 4 to 9.

Technical specifications

Duty types

Motor type	Overload factors for short-time duty – duty type S2			for intermittent, periodic duty – duty type S3				
	10 min	30 min	60 min	15 %	25 %	40 %	60 %	80 %
1.M.....	1.80	1.20	1.10	2.10	1.65	1.40	1.16	1.02
1.P.....	1.70	1.15	1.05	2.20	1.75	1.47	1.22	1.07
1.Q.....	1.80	1.20	1.10					

With 1LQ1 and 1LP1 it is not permitted for the cooling to be interrupted.

Application-specific motors

Crane motors for hoisting gear

Technical specifications (continued)

General technical specifications

Type of motor	IEC low-voltage motors SIMOTICS FD Cranes
Frame sizes	315, 355, 400, 450
Rated power	140 ... 1200 kW
Rated speed	750, 900, 1000 rpm
Rated torque	1783 ... 11459 Nm
Versions	Air-cooled, enclosed version • with self-ventilation (IC411) • with forced ventilation (IC416) Air-cooled, open version • with forced ventilation (IC06)
Version in accordance with standards and specifications	• UL (order code D31) • CSA (order code D40) • Import to the Eurasian customs union (order code D47)
Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)	Temperature class 180 (H) DURIGNIT IR 2000, IVIC-C premium insulation system
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	As standard: IP55: Air-cooled, enclosed version IP23: Air-cooled, open version
Cooling in accordance with EN 60034-6 (IEC 60034-6)	• Self-ventilated motors 1LM16 (IC411) • Force-ventilated motors 1LQ16 (IC416, radially mounted separately driven fan) • Force-ventilated, open-circuit ventilated motors 1LP16 (IC06, radially mounted separately driven fan)
Permissible coolant temperature and installation altitude	As standard: Air-cooled motors: Coolant temperature -20 ... +40 °C, installation altitude up to 1000 m above sea level
Standard voltages in accordance with EN 60038 (IEC 60038)	• 480 V • Separately driven fan motor: 400 V, 50 Hz – order code Y81 for separately driven fan with special voltage
Type of construction according to EN 60034-7 (IEC 60034-7)	IM B3 (foot-mounted design without flange)
Paint finish Suitability of paint finish for climate group according to IEC 60721, Part 2-1	As standard: color RAL 7030 stone gray
Vibration severity level according to EN 60034-14 (IEC 60034-14)	Level A (normal) Optionally: level B (with special vibration requirements)
Shaft extension according to DIN 748 (IEC 60072)	Balance type: half-key balancing as standard
Sound pressure level according to EN ISO 1680 (tolerance +3 dB)	85 dB(A) for boundary conditions see "Technical information" on page 2/7
Weights	The relevant weight is listed in the selection and ordering data for the required motor.
Modular mounting concept	• Prepared for mounting of rotary pulse encoder or brake. • Incremental encoder HTL 1024 POG 10 (Baumer-Hübner) • Incremental encoder HOG 10, HOG 11 (Baumer-Hübner) • Bearing-free incremental encoder MHGE 200 (Baumer-Hübner) – with continuous hollow shaft
Options	See "Article No. supplements and special versions"

Note:

The rated motor data is specified in the selection and ordering data for a rated pulse frequency of 1.25 kHz and optimized pulse patterns.

Maximum torque for the second shaft extension (order code K16)

Motor	1LM16					1LQ16 and 1LP16			
Cooling method	IC411					IC416 and IC06			
Shaft height		315	355	400	450	315	355	400	450
Diameter DE shaft extension	mm	85	95	110	120	85	95	110	120
Mechanical torque limit shaft extension (DE) ¹⁾	Nm	7500	10200	16400	20700	7500	10200	16400	20700
Diameter Second shaft extension (NDE)	mm	75	80	100	110	85	95	110	120
Mechanical torque limit for second shaft extension (NDE) ¹⁾	Nm	5300	5800	12300	16100	7500	10200	16400	20700

¹⁾ The mechanical torque limit is equivalent to the max. permissible breakdown torque (permanently designed with safety factor 1.5) and applies to rising converter operation.