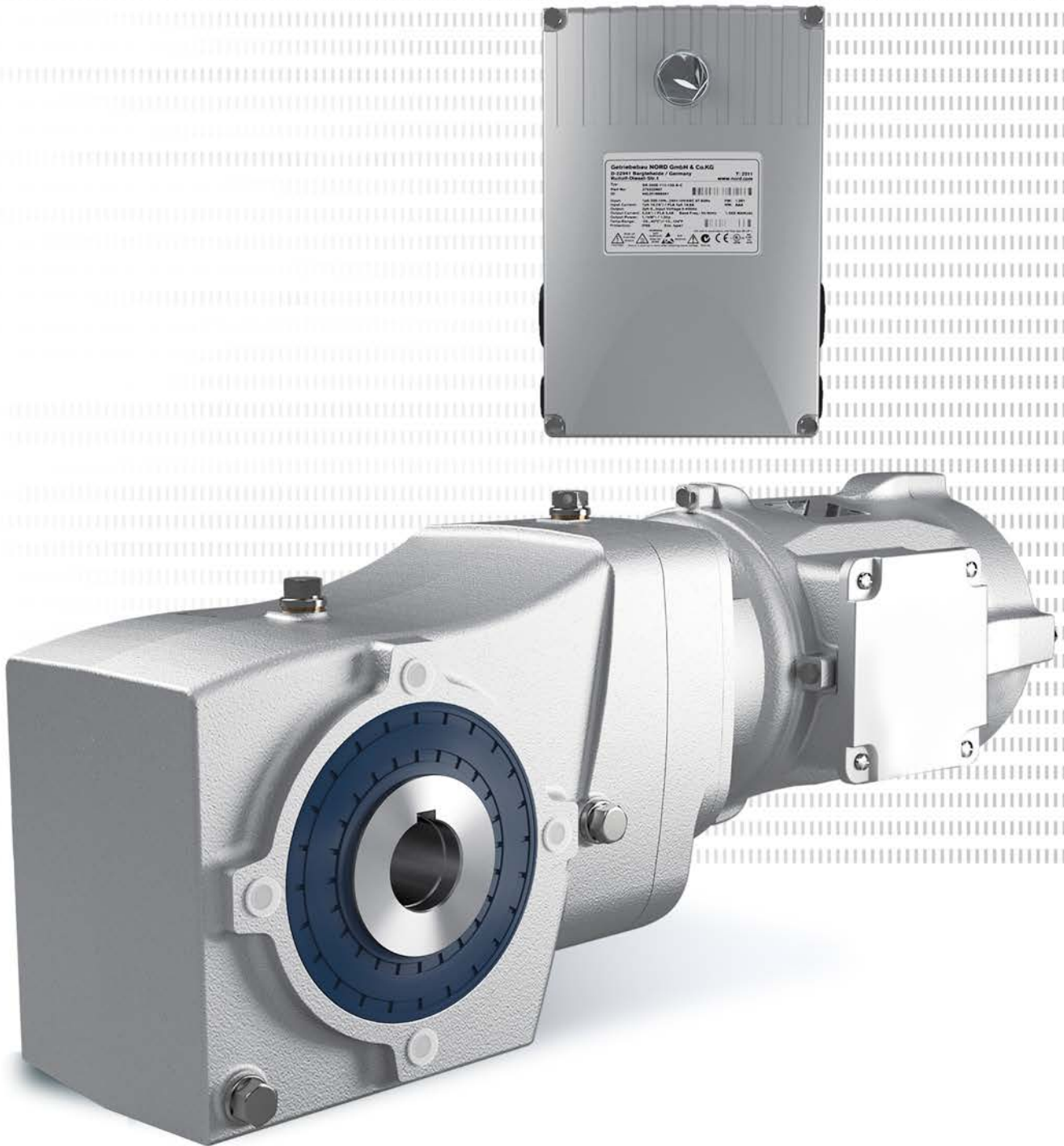


ATEX



B 1091-1 – en

Motors in FI operation for Category 2D/3D

Planning guideline for B 1091



Intended use of three-phase asynchronous motors in frequency inverter operation

Compliance with the planning guide B1091-1 for the operating and installation instructions B1091, as well as with the operating instructions for the frequency inverter and the product overview G4014-1 is **essential for correct operation** and the fulfilment of any warranty claims. **Read the operating and installation instructions** before starting work with the motors and frequency inverters.

The operating instruction contains **important information about servicing**. It must therefore be kept in **close proximity to the motor**.

The three-phase asynchronous motors and frequency inverters are suitable for industrial and commercial systems for moving a wide variety of drive components and applications.

All details regarding technical data and permissible conditions at the installation site must be complied with.

Commissioning (implementation of the intended use) is not permitted until it has been ensured that the machine complies with the EMC directive 2014/30/EU and that the conformity of the end product meets the machine directive 2006/42/EEC (note EN 60204).

Documentation

Designation:	B 1091-1	Planning guideline
Part no.:	6052102	
Series:	Three-phase asynchronous motors in frequency inverter operation	
Motor series:	IE1, IE2, IE3	
Type of ignition protection:	Ex tb, Ex tc, Ex tD A21	
Motor types:	Size 63 ... 180 4-pole	

Version list

Name of previous editions	Comment
B1091-1 en , February 2013 Part no. 6052102 / 0613	First edition, based on B1091-1 DE / January 2013
B1091-1 en , August 2013 Part no. 6052102 / 3213	Layout revision and error correction
B1091-1 en , February 2017 Part no. 6052102 / 0517	Supplementation of 2D FI motors
B1091-1, October 2017 Part no. 6052102 / 4317	Change of document reference From G4014 to G4014-1
B1091-1, March 2021 Part no. 6052102 / 1221	Supplementation of IE3 motors

Table 1: Version list

Validity

This Planning Guideline for the operation and instructions B 1091 describes the planning requirements for NORD three-phase asynchronous motors supplied by frequency inverters for Zone 22 (Ex tc) and for Zone 21 (Ex tb).

Publisher

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Table of Contents

1	Technical explanations	7
1.1	General	7
1.2	Overview	7
1.2.1	Necessary frequency inverter characteristics:	7
1.2.2	Category 3D motors according to EU Directive 2014/34/EU	8
1.3	Wiring	8
1.4	Commissioning	9
1.5	Frequency inverter assignment and operating mode selection	10
1.6	Examples	11
1.6.1	1. Example: motor 100L/4 3D TF	11
1.6.2	2. Example: motor 100L/4 3D TF	14
1.7	Motor data for frequency inverter parameterisation	15
1.7.1	Frequency inverter parameterisation data for IE1 motors	15
1.7.1.1	50 Hz characteristic curve	15
1.7.1.2	87 Hz characteristic curve	16
1.7.1.3	100 Hz characteristic curve	16
1.7.2	Frequency inverter parameterisation data for IE2 motors	17
1.7.2.1	50 Hz characteristic curve	17
1.7.2.2	87 Hz characteristic curve	17
1.7.2.3	100 Hz characteristic curve	18
1.7.3	Frequency inverter parameterisation data for IE3 motors	18
1.7.3.1	50 Hz characteristic curve	18
1.7.3.2	87 Hz characteristic curve	19
1.7.3.3	100 Hz characteristic curve	20
2	Technical data (characteristic curve data)	21
2.1	Self-cooled motors	21
2.1.1	IE1 motors	22
2.1.1.1	IE1 motors, 50 Hz nominal point, Size 63S/4 to 71L/4 for category 2D and 3D	22
2.1.1.2	IE1 motors, 50 Hz nominal point, Size 80S/4 to 132M/4 for category 3D	23
2.1.1.3	IE1 motors, 87 Hz nominal point, Size 63S/4 to 71L/4 for category 2D and 3D	24
2.1.1.4	IE1 motors, 87 Hz nominal point, Size 80S/4 to 132M/4 for category 3D	25
2.1.1.5	IE1 motors, 100 Hz nominal point, Size 63S/4 to 71L/4 for category 2D and 3D	26
2.1.1.6	IE1 motors, 100 Hz nominal point, Size 80S/4 to 132M/4 for category 3D	27
2.1.2	IE2 motors	28
2.1.2.1	IE2 motors, 50 Hz nominal point, Size 80SH/4 to 180LH/4 for category 2D and 3D	28
2.1.2.2	IE2 motors, 87 Hz nominal point, Size 80SH/4 to 180LH/4 for category 2D and 3D	30
2.1.2.3	IE2 motors, 100 Hz nominal point, Size 80SH/4 to 180LH/4 for category 2D and 3D	32
2.1.3	IE3 Motors	34
2.1.3.1	IE3 motors, 50 Hz nominal point, Size 63SP/4 to 180LP/4 for category 2D and 3D	34
2.1.3.2	IE3 motors, 87 Hz nominal point, Size 63SP/4 to 180LP/4 for category 2D and 3D	37
2.1.3.3	IE3 motors, 100 Hz nominal point, Size 63SP/4 to 180LP/4 for category 2D and 3D	40
2.2	Motors with external fan	43
2.2.1	IE1 and IE2 motors with external fan, 50 Hz-nominal point, category 3D	44
2.2.2	IE1 and IE2 motors with external fan, 87 Hz-nominal point, category 3D	45
2.2.3	IE1 and IE2 motors with external fan, 100 Hz-nominal point, category 3D	46
3	Appendix	47

List of illustrations

Figure 1: Selection of V/f characteristic curves.....	10
Figure 2: Motor 100L/4, 50 Hz characteristic curve	11
Figure 3: Motor 100L/4, 100 Hz characteristic curve	12
Figure 4: Motor 100L/4, 87 Hz characteristic curve	13

1 Technical explanations

1.1 General

Category 2D and 3D motors supplied by NORD DRIVESYSTEMS comply with the standards EN 60079-0 and EN 60079-31. The insulation of the windings is designed for operation with frequency inverters. For operation with frequency inverters, the motors are always equipped with triple thermistors as per DIN 44082.

For variable speed drives, the thermistor is the most important protective element to ensure compliance with the maximum surface temperature, which is stated in the type plate of the motor.

As the thermistor only provides indirect temperature monitoring of some components of the motor, e.g. the motor shaft, it is necessary to observe all the specifications which are stated in this planning guideline.

The operating ranges stated in the Appendix have been checked in the course of extensive test runs and only these ranges are approved. Compliance with the stated procedures is therefore a prerequisite for the planning and commissioning of Device Group II regulated drive units in Zone 22 (non-conducting dust), as well as in Zone 21.

1.2 Overview

1.2.1 Necessary frequency inverter characteristics:

- Only frequency inverters with a vector regulation method which provides load-dependent terminal voltage adjustment in the low speed range may be used.
- The maximum output voltage of the frequency inverter must not be less than 91 % of the mains voltage.
- The frequency inverter must provide $i^2 \cdot t$ monitoring which is adjustable to the nominal motor current.
- The pulse frequency of the output stage must be adjustable to 4 kHz or higher.
- If the inverter does not have an input for evaluation of the thermistor, evaluation must be carried out by a separate triggering device which switches off the inverter. Operation without evaluation of the thermistor is not permitted.
- Evaluation of the thermistor for motors with ignition protection type tb as well as tD A21 must be carried out with an external certified thermistor triggering device with an EU type test certificate. Evaluation of the thermistor via the thermistor evaluation input on the frequency inverter is not permitted. In case of a fault (excessive temperature) the motor and frequency inverter combination must be safely switched off via the external thermistor triggering device.
- The values stated in the tables refer to frequency inverters that are not directly mounted on the motor. For frequency inverters that are directly mounted on the motor reduced torques are to be used. These can be found in the G4014-1 documentation.

1.2.2 Category 3D motors according to EU Directive 2014/34/EU

For Category 3D motors as per EU Directive 2014/34/EU with the frequency inverter mounted on the motor, the following steps must be observed for the determination of the maximum permissible torque:

1. Determination of the maximum permissible torque on the basis of B1091-1
2. Determination of the maximum permissible torque for the required operating point according to G4014-1 on the basis of a NORD standard motor (not ATEX) of the same size and power rating.
3. The maximum permissible value must be obtained via the following comparison.
 - a) If the value of the torque from document G4014-1 is larger than the torque value in the Planning Guideline B1091-1, the torque value from the Planning Guideline B1091-1 must be used.
 - b) If the value of the torque from the Planning Guideline B1091-1 is larger than the value of the torque in document G4014-1, the value from document G4014-1 must be used.

1.3 Wiring

- No filters which come into the resonance range may be wired between the inverter and the motor. Overvoltages resulting from that scenario may damage the insulation of the wires or the motor.
- Only filters which are prescribed or approved by the supplier of the frequency inverter may be used.
- The wires used must have an insulation strength of at least 2,000 VDC.
- Additional mains or motor chokes reduce the output voltage of the frequency inverter and are not considered in this planning guideline. With chokes, the field weakening threshold shifts downwards and the field weakening increases.
- The maximum permissible length of the cable between motor and frequency inverter can be limited by the frequency inverter's manufacturer. For NORD frequency inverters, please enquire for permissibility from a cable length of 30 m.

1.4 Commissioning

- Set the pulse frequency of the output stage to 4 - 6 kHz.
- Parameterise the vector control on the motor in use.
- $i^2 \cdot t$ monitoring is to be set to the nominal current of the motor.
- For NORD frequency inverters, please set parameter P535 in switch-off class 5 to the value 1 (100%).
- The maximum output frequency must be set depending on the application and must not be above 100 Hz.
- Activate evaluation of the thermistor. An external, certified thermistor triggering device must be used for 2D motors (Ex tb, Ex tD A21).
- Check the thermistor monitoring by disconnecting the cable connected to the frequency inverter or to the connection of the external thermistor triggering device.

The type plate of the motor which is suitable for the application must be observed. An explanation of the details on the type plate can be found in the NORD Operating and Installation Instructions B1091.

The values for current, speed and torque which are stated in the tables are maximum values and must not be exceeded.

If the minimum voltage values which are stated on the motor type plate are not achieved, the motor must not be operated at the corresponding operating point.

NOTICE

Damage to the gear unit – high speed

The maximum permissible input speed of the gear unit must be complied with.

Exceeding the permissible speed may lead to overheating and damage of gear unit parts or even complete destruction of the gear unit.

For frequency inverter operation, the motor speed is to be limited according to the planning specifications.

1.5 Frequency inverter assignment and operating mode selection

The rated current of the frequency inverter must match the nominal motor current in order to achieve a sufficient measurement precision of the current sensing. The rated frequency inverter current should not be higher than 2 times the nominal motor current.

According to this planning guideline, multi-motor operation is not permitted as selective i^{2*t} monitoring of a motor is no longer possible.

Please note the technical data in chapter 2 "Technical data (characteristic curve data)".

Depending on the application, the operating mode of the motor can be selected from one of the following three characteristic curves:

- 50 Hz characteristic curve: Nominal point 400 V / 50 Hz, 0 – 50 Hz no field weakening and 50 – 100 Hz field weakening.
- 87 Hz characteristic curve: Nominal point 400 V / 87 Hz, 0 – 87 Hz no field weakening and 87 – 100 Hz field weakening.
- 100 Hz characteristic curve: Nominal point 400 V / 100 Hz, 0 – 100 Hz reduced, constant torque with slight field weakening.

U/f characteristic curves

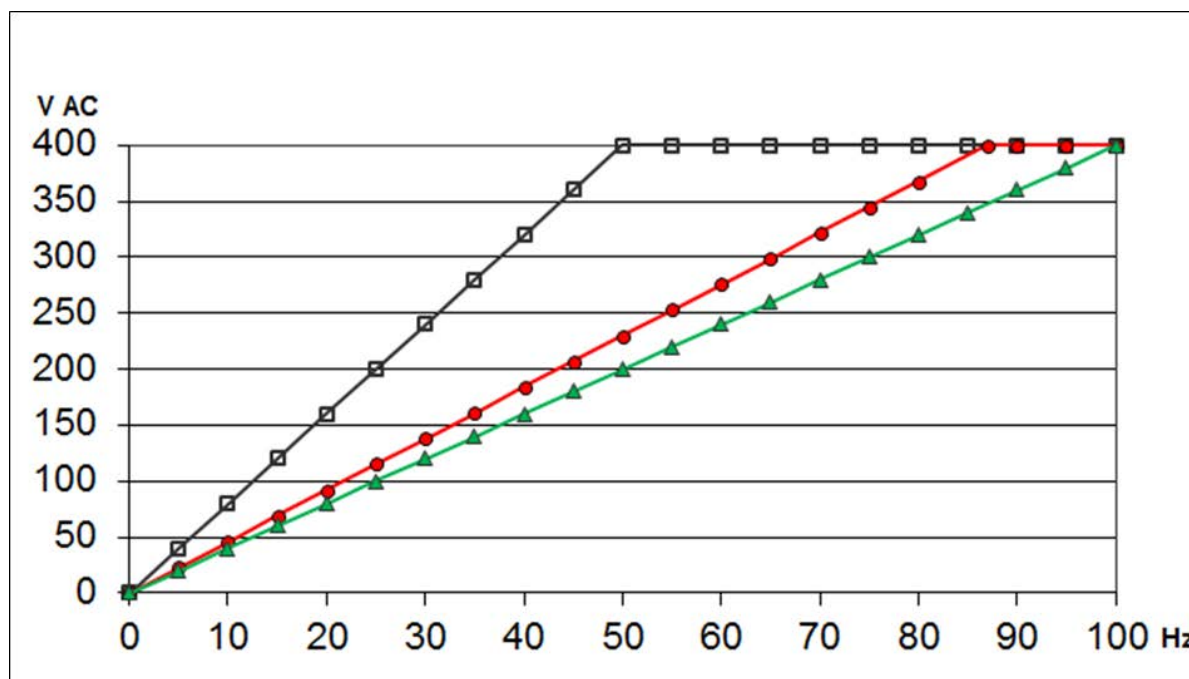


Figure 1: Selection of V/f characteristic curves

Legend	
	50 Hz characteristic curve
	87 Hz characteristic curve
	100 Hz characteristic curve

1.6 Examples

1.6.1 1. Example: motor 100L/4 3D TF

Motor type plate information:

Nominal voltage 230 / 400 V Δ/Y
 Nominal frequency: 50 Hz
 Nominal power: 2.2 kW

50 Hz characteristic curve

Motor in star circuit (400 V / 50 Hz), frequency inverter 2.2 kW

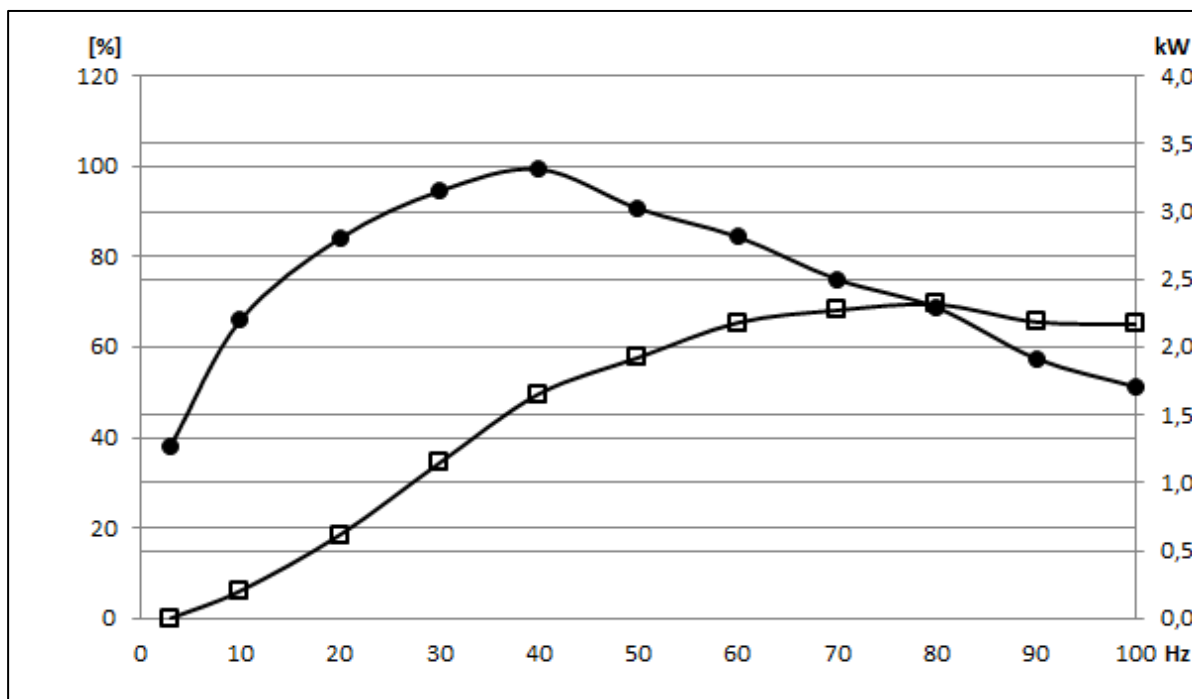




Figure 2: Motor 100L/4, 50 Hz characteristic curve

Legend

-  Motor output power [kW]
-  Torque [%]

100 Hz characteristic curve

Motor in delta circuit (230 V / 50 Hz), frequency inverter 3.0 kW

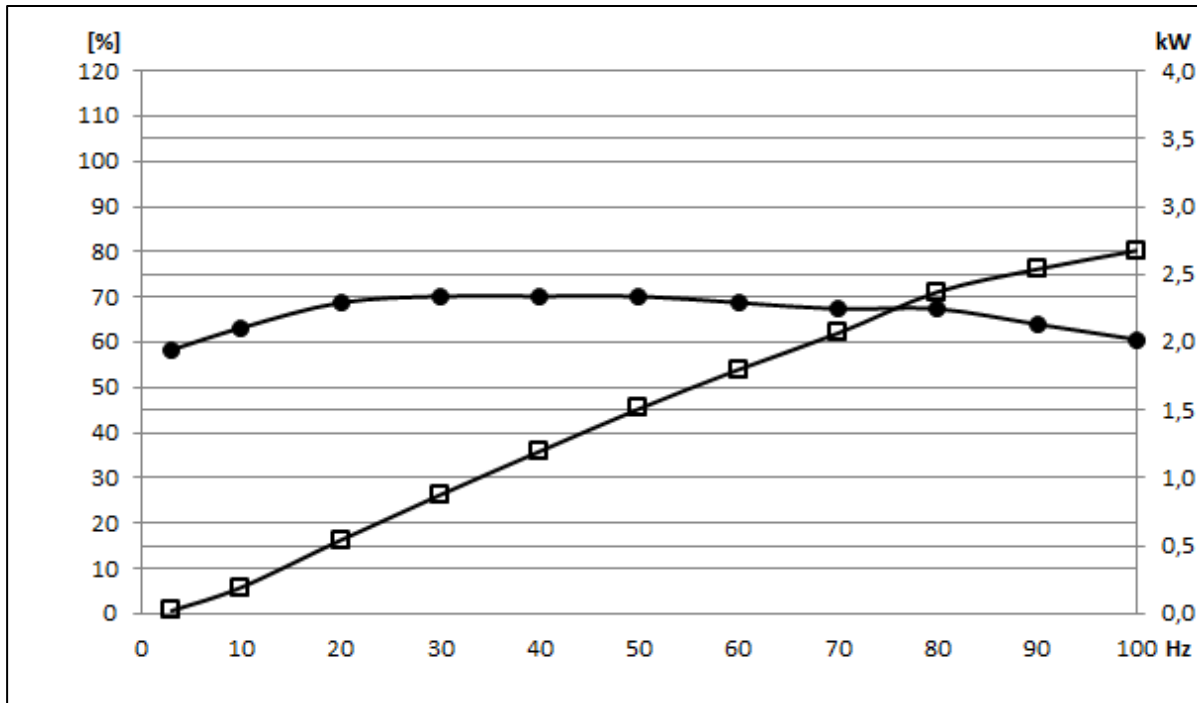


Figure 3: Motor 100L/4, 100 Hz characteristic curve

Legend	
	Motor output power [kW]
	Torque [%]

87 Hz characteristic curve

Motor in delta circuit (230 V / 50 Hz), frequency inverter 4.0 kW

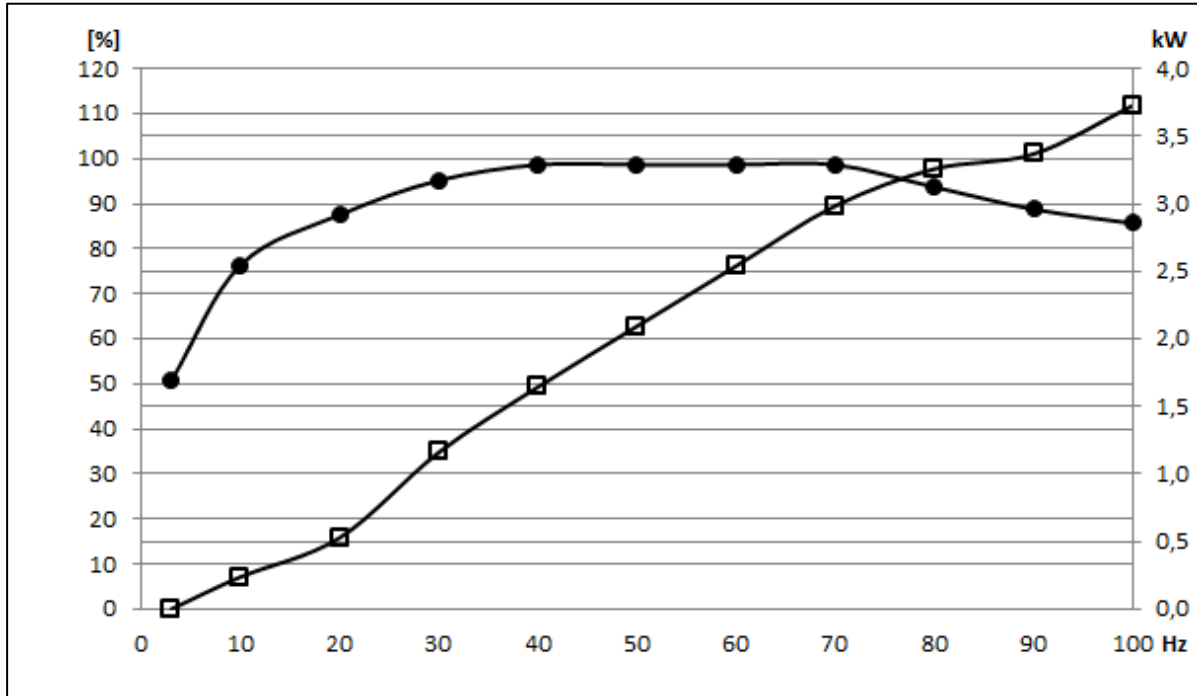


Figure 4: Motor 100L/4, 87 Hz characteristic curve

Legend	
	Motor output power [kW]
	Torque [%]

1.6.2 2. Example: motor 100L/4 3D TF

Motor type plate details:

Nominal voltage	400 / 690 V Δ/Y
Nominal frequency:	50 Hz
Nominal power:	2.2 kW

Due to the 400 / 690 V Δ/Y winding design, only the 50 Hz characteristic curve can be used on the frequency inverter in this case.

1.7 Motor data for frequency inverter parameterisation

Motor types: **IE1, IE2 and IE3 motors**

The legend below applies to all following tables in this chapter.

Legend							
f_N	Nominal frequency	I_N	Nominal current	P_N	Nominal power	Circuit	Δ/Y circuit
n_N	Nominal speed	U_N	Nominal voltage	$\cos \varphi$	Power factor	R_{St}	Line resistance

1.7.1 Frequency inverter parameterisation data for IE1 motors

1.7.1.1 50 Hz characteristic curve

Motor type	Category	f_N [Hz]	n_N [min ⁻¹]	I_N [A]	U_N [V]	P_N [kW]	$\cos \varphi$	Circuit	R_{St} [Ω]
63S/4	2D/3D	50	1385	0,51	400	0,12	0,62	Y	68,35
63L/4	2D/3D	50	1368	0,65	400	0,18	0,66	Y	58,19
71S/4	2D/3D	50	1365	0,74	400	0,25	0,80	Y	39,76
71L/4	2D/3D	50	1385	1,05	400	0,37	0,76	Y	22,24
80S/4	3D	50	1385	1,51	400	0,55	0,75	Y	15,79
80L/4	3D	50	1395	2,03	400	0,75	0,75	Y	10,49
90S/4	3D	50	1410	2,76	400	1,1	0,76	Y	6,41
90L/4	3D	50	1390	3,53	400	1,5	0,78	Y	3,99
100L/4	3D	50	1415	5,0	400	2,2	0,78	Δ^*	2,78
100LA/4	3D	50	1415	6,8	400	3,0	0,78	Δ^*	5,12
112M/4	3D	50	1430	8,24	400	4,0	0,83	Δ^*	3,47
132S/4	3D	50	1450	11,6	400	5,5	0,8	Δ^*	2,14
132M/4	3D	50	1450	15,5	400	7,5	0,79	Δ^*	1,42
132MA/4	3D	50	1445	18,8	400	9,2	0,82	Δ^*	1,16

*) at 400/690V (at 230/400 V circuit type Y); $R_{StY}=R_{St\Delta}/3$

1.7.1.2 87 Hz characteristic curve

Motor type	Category	f _N [Hz]	n _N [min ⁻¹]	I _N [A]	U _N [V]	P _N [kW]	cos φ	Circuit (230/400V)	R _{St} [Ω]
63S/4	2D/3D	50	1385	0,88	230	0,12	0,62	Δ	68,35
63L/4	2D/3D	50	1368	1,12	230	0,18	0,66	Δ	58,19
71S/4	2D/3D	50	1365	1,28	230	0,25	0,80	Δ	39,76
71L/4	2D/3D	50	1385	1,82	230	0,37	0,76	Δ	22,24
80S/4	3D	50	1385	2,62	230	0,55	0,75	Δ	15,79
80L/4	3D	50	1395	3,52	230	0,75	0,75	Δ	10,49
90S/4	3D	50	1410	4,78	230	1,1	0,76	Δ	6,41
90L/4	3D	50	1390	6,11	230	1,5	0,78	Δ	3,99
100L/4	3D	50	1415	8,65	230	2,2	0,78	Δ	2,78
100LA/4	3D	50	1415	11,76	230	3,0	0,78	Δ	1,71
112M/4	3D	50	1430	14,2	230	4,0	0,83	Δ	1,11
132S/4	3D	50	1450	20,0	230	5,5	0,8	Δ	0,72
132M/4 3D	3D	50	1450	26,8	230	7,5	0,79	Δ	0,46
132MA/4	3D	50	1455	32,6	230	9,2	0,829	Δ	0,39

1.7.1.3 100 Hz characteristic curve

Motor type	Category	f _N [Hz]	n _N [min ⁻¹]	I _N [A]	U _N [V]	P _N [kW]	cos φ	Circuit (230/400V)	R _{St} [Ω]
63S/4	2D/3D	100	2878	0,77	400	0,18	0,63	Δ	68,35
63L/4	2D/3D	100	2880	0,93	400	0,25	0,64	Δ	58,19
71S/4	2D/3D	100	2895	1,07	400	0,37	0,71	Δ	39,76
71L/4	2D/3D	100	2905	1,5	400	0,55	0,74	Δ	22,24
80S/4	3D	100	2910	2,0	400	0,75	0,72	Δ	15,79
80L/4	3D	100	2910	2,8	400	1,1	0,74	Δ	10,49
90S/4	3D	100	2925	3,75	400	1,5	0,76	Δ	6,41
90L/4	3D	100	2920	4,96	400	2,2	0,82	Δ	3,99
100L/4	3D	100	2930	6,95	400	3,0	0,78	Δ	2,78
100LA/4	3D	100	2950	7,46	400	4,0	0,76	Δ	1,71
112M/4	3D	100	2945	11,3	400	5,5	0,82	Δ	1,11
132S/4	3D	100	2955	16,0	400	7,5	0,82	Δ	0,72
132M/4 3D	3D	100	2965	19,6	400	9,2	0,79	Δ	0,46
132MA/4	3D	100	2960	23,0	400	11,0	0,8	Δ	0,39

1.7.2 Frequency inverter parameterisation data for IE2 motors

1.7.2.1 50 Hz characteristic curve

Motor type	Category	f _N [Hz]	n _N [min ⁻¹]	I _N [A]	U _N [V]	P _N [kW]	cos φ	Circuit	R _{St} [Ω]
80SH/4	2D/3D	50	1415	1,38	400	0,55	0,7	Y	9,34
80LH/4	2D/3D	50	1410	1,8	400	0,75	0,75	Y	6,70
90SH/4	2D/3D	50	1430	2,46	400	1,1	0,8	Y	4,96
90LH/4	2D/3D	50	1420	3,38	400	1,5	0,79	Y	3,27
100LH/4	2D/3D	50	1445	4,76	400	2,2	0,79	Δ*	1,73
100AH/4	2D/3D	50	1420	6,4	400	3,0	0,77	Δ*	4,39
112MH/4	2D/3D	50	1440	8,12	400	4,0	0,83	Δ*	2,96
132SH/4	2D/3D	50	1455	10,82	400	5,5	0,83	Δ*	1,84
132MH/4	2D/3D	50	1455	15,08	400	7,5	0,8	Δ*	1,29
160MH/4	2D/3D	50	1465	20,5	400	11,0	0,85	Δ*	0,78
160LH/4	2D/3D	50	1465	27,5	400	15,0	0,87	Δ*	0,53
180MH/4	2D/3D	50	1475	34,9	400	18,5	0,84	Δ*	0,36
180LH/4	2D/3D	50	1475	40,8	400	22,0	0,86	Δ*	0,31

*) at 400/690V (at 230/400 V circuit type Y); R_{St}Y=R_{St}Δ/3

1.7.2.2 87 Hz characteristic curve

Motor type	Category	f _N [Hz]	n _N [min ⁻¹]	I _N [A]	U _N [V]	P _N [kW]	cos φ	Circuit (230/400V)	R _{St} [Ω]
80SH/4	2D/3D	50	1415	2,39	230	0,55	0,7	Δ	9,34
80LH/4	2D/3D	50	1410	3,12	230	0,75	0,75	Δ	6,70
90SH/4	2D/3D	50	1430	4,26	230	1,1	0,8	Δ	4,96
90LH/4	2D/3D	50	1420	5,85	230	1,5	0,79	Δ	3,27
100LH/4	2D/3D	50	1445	8,25	230	2,2	0,79	Δ	1,73
100AH/4	2D/3D	50	1420	11,1	230	3,0	0,77	Δ	1,48
112MH/4	2D/3D	50	1440	14,1	230	4,0	0,83	Δ	1,00
132SH/4	2D/3D	50	1455	18,8	230	5,5	0,83	Δ	0,60
132MH/4	2D/3D	50	1455	26,2	230	7,5	0,8	Δ	0,42
160MH/4	2D/3D	50	1465	35,5	230	11,0	0,85	Δ	0,26
160LH/4	2D/3D	50	1465	48,0	230	15,0	0,87	Δ	0,17
180MH/4	2D/3D	50	1475	60,8	230	18,5	0,84	Δ	0,12
180LH/4	2D/3D	50	1475	71,0	230	22,0	0,86	Δ	0,10

1.7.2.3 100 Hz characteristic curve

Motor type	Category	f _N [Hz]	n _N [min ⁻¹]	I _N [A]	U _N [V]	P _N [kW]	cos φ	Circuit (230/400V)	R _{St} [Ω]
80SH/4	2D/3D	100	2930	1,9	400	0,75	0,7	Δ	9,34
80LH/4	2D/3D	100	2920	2,56	400	1,1	0,73	Δ	6,7
90SH/4	2D/3D	100	2930	3,53	400	1,5	0,79	Δ	4,96
90LH/4	2D/3D	100	2925	4,98	400	2,2	0,79	Δ	3,27
100LH/4	2D/3D	100	2955	6,47	400	3,0	0,78	Δ	1,73
100AH/4	2D/3D	100	2940	8,24	400	4,0	0,79	Δ	1,48
112MH/4	2D/3D	100	2950	11,13	400	5,5	0,82	Δ	1,0
132SH/4	2D/3D	100	2960	15,3	400	7,5	0,83	Δ	0,6
132MH/4	2D/3D	100	2965	19,5	400	9,2	0,79	Δ	0,42
160MH/4	2D/3D	100	2967	29,0	400	15,0	0,87	Δ	0,256
160LH/4	2D/3D	100	2975	35,7	400	18,5	0,86	Δ	0,168
180MH/4	2D/3D	100	2980	43,2	400	22	0,85	Δ	0,115
180LH/4	2D/3D	100	2980	55,5	400	30	0,88	Δ	0,306

1.7.3 Frequency inverter parameterisation data for IE3 motors

1.7.3.1 50 Hz characteristic curve

Motor type	Category	f _N [Hz]	n _N [min ⁻¹]	I _N [A]	U _N [V]	P _N [kW]	cos φ	Circuit	R _{St} [Ω]
63SP	2D/3D	50	1342	0,41	400	0,12	0,70	Y	66,61
63LP	2D/3D	50	1373	0,58	400	0,18	0,66	Y	38,28
71SP	2D/3D	50	1408	0,7	400	0,25	0,73	Y	24,15
71LP	2D/3D	50	1397	0,93	400	0,37	0,78	Y	18,13
80SP	2D/3D	50	1402	1,42	400	0,55	0,75	Y	10,65
80LP	2D/3D	50	1414	1,78	400	0,75	0,75	Y	6,30
90SP	2D/3D	50	1429	2,45	400	1,1	0,79	Y	4,22
90LP	2D/3D	50	1414	3,24	400	1,5	0,81	Y	3,08
100LP	2D/3D	50	1460	4,5	400	2,2	0,81	Y	1,97
100AP	2D/3D	50	1454	6,25	400	3	0,81	Y	1,60
112MP	2D/3D	50	1440	7,94	400	4	0,84	Δ*	2,7*
132SP	2D/3D	50	1465	11,24	400	5,5	0,79	Δ*	1,49*
132MP	2D/3D	50	1458	15,49	400	7,5	0,79	Δ*	1,102*
160SP	2D/3D	50	1474	16,95	400	9,2	0,86	Δ*	0,92*
160MP	2D/3D	50	1467	20,39	400	11	0,85	Δ*	0,8*
160LP	2D/3D	50	1467	27,5	400	15	0,87	Δ*	0,535*
180MP	2D/3D	50	1480	34,8	400	18,5	0,83	Δ*	0,31*
180LP	2D/3D	50	1475	40,83	400	22	0,85	Δ*	0,302*

*) at 400/690V (at 230/400 V circuit type Y); R_{St}Y=R_{St}Δ/3

1.7.3.2 87 Hz characteristic curve

Motor type	Category	f _N [Hz]	n _N [min ⁻¹]	I _N [A]	U _N [V]	P _N [kW]	cos φ	Circuit (230/400V)	R _{St} [Ω]
63SP	2D/3D	50	1342	0,71	230	0,12	0,70	Δ	66,61
63LP	2D/3D	50	1373	1	230	0,18	0,66	Δ	38,28
71SP	2D/3D	50	1408	1,21	230	0,25	0,73	Δ	24,15
71LP	2D/3D	50	1397	1,61	230	0,37	0,78	Δ	18,13
80SP	2D/3D	50	1402	2,46	230	0,55	0,75	Δ	10,65
80LP	2D/3D	50	1414	3,08	230	0,75	0,75	Δ	6,30
90SP	2D/3D	50	1429	4,24	230	1,1	0,79	Δ	4,22
90LP	2D/3D	50	1414	5,61	230	1,5	0,81	Δ	3,08
100LP	2D/3D	50	1460	7,79	230	2,2	0,81	Δ	1,97
100AP	2D/3D	50	1454	10,83	230	3	0,81	Δ	1,60
112MP	2D/3D	50	1440	13,75	230	4	0,84	Δ	0,91
132SP	2D/3D	50	1465	19,47	230	5,5	0,79	Δ	0,487
132MP	2D/3D	50	1458	26,83	230	7,5	0,79	Δ	0,371
160SP	2D/3D	50	1474	29,36	230	9,2	0,86	Δ	0,30
160MP	2D/3D	50	1467	35,32	230	11	0,85	Δ	0,261
160LP	2D/3D	50	1467	47,63	230	15	0,87	Δ	0,167
180MP	2D/3D	50	1480	60,28	230	18,5	0,83	Δ	0,103
180LP	2D/3D	50	1475	70,72	230	22	0,85	Δ	0,097

1.7.3.3 100 Hz characteristic curve

Motor type	Category	f_N [Hz]	n_N [min ⁻¹]	I_N [A]	U_N [V]	P_N [kW]	$\cos \varphi$	Circuit (230/400V)	R_{St} [Ω]
63SP	2D/3D	100	2885	0,55	400	0,18	0,65	Δ	66,61
63LP	2D/3D	100	2905	0,84	400	0,25	0,56	Δ	38,28
71SP	2D/3D	100	2923	1,01	400	0,37	0,69	Δ	24,15
71LP	2D/3D	100	2900	1,33	400	0,55	0,74	Δ	18,13
80SP	2D/3D	100	2935	1,77	400	0,75	0,73	Δ	10,65
80LP	2D/3D	100	2930	2,13	400	1,1	0,84	Δ	6,30
90SP	2D/3D	100	2945	3,1	400	1,5	0,79	Δ	4,22
90LP	2D/3D	100	2930	4,33	400	2,2	0,83	Δ	3,08
100LP	2D/3D	100	2970	5,6	400	3	0,85	Δ	1,97
100AP	2D/3D	100	2970	7,42	400	4	0,85	Δ	1,60
112MP	2D/3D	100	2950	10,3	400	5,5	0,85	Δ	0,91
132SP	2D/3D	100	2970	14,3	400	7,5	0,83	Δ	0,487
132MP	2D/3D	100	2970	18	400	9,2	0,82	Δ	0,371
160SP	2D/3D	100	2975	21	400	11	0,85	Δ	0,30
160MP	2D/3D	100	-	-	-	-	-	-	-
160LP	2D/3D	100	2975	34,4	400	18,5	0,85	Δ	0,167
180MP	2D/3D	100	2985	40,6	400	22	0,85	Δ	0,103
180LP	2D/3D	100	2980	55	400	30	0,88	Δ	0,097

2 Technical data (characteristic curve data)

Data:

Motor type:	IE1, IE2 and IE3	Circuit:	see tables
Mains voltage:	400 V	Ambient temperature Tu:	-20 °C to +40 °C
Surface temperature:	T125°C / T140°C		

2.1 Self-cooled motors

Information

Increased ambient temperature for category 3D motors IE1 and IE2

Operation is possible up to an ambient temperature of 60°C. The stated torques must then be reduced to 72%.

Information

Interpolation

Linear interpolation of data between adjacent frequencies is permissible.

The legend below applies to all following tables in this chapter.

Legend			
fs Stator frequency [Hz] in hertz	M Torque [Nm] In Newton metres	M Torque [%] in % of nominal torque	n Speed [rpm] Speed in rpm
P Motor power [kW] in kilowatts	Us Motor voltage [V] in volts	Is Motor current [A] in amps	

2.1.1 IE1 motors

2.1.1.1 IE1 motors, 50 Hz nominal point, Size 63S/4 to 71L/4 for category 2D and 3D

Motor type Voltage Circuit type (Y/Δ)	3	20	40	60	100	f _s [Hz]
63S/4 230/400V, 50 Hz Y	0,65	0,86	0,86	0,86	0,54	M [Nm]
	0	450	1073	1484	1805	n [min ⁻¹]
	0	0,04	0,1	0,13	0,1	P [kW]
	80	187	347	363	361	U _s [V]
	0,45	0,48	0,52	0,48	0,65	I _s [A]
63L/4 230/400V, 50 Hz Y	0,71	1,26	1,26	1,26	0,74	M [Nm]
	0	438	1060	1428	1886	n [min ⁻¹]
	0	0,06	0,14	0,19	0,15	P [kW]
	65	185	352	361	360	U _s [V]
	0,5	0,61	0,66	0,71	0,8	I _s [A]
71S/4 230/400V, 50 Hz Y	1,15	1,76	1,76	1,56	0,72	M [Nm]
	0	441	1059	1448	2469	n [min ⁻¹]
	0	0,08	0,2	0,24	0,19	P [kW]
	62	187	342	356	357	U _s [V]
	0,54	0,72	0,72	0,88	0,79	I _s [A]
71L/4 230/400V, 50 Hz Y	1,81	2,55	2,57	2,38	1,22	M [Nm]
	0	461	1069	1481	2312	n [min ⁻¹]
	0	0,12	0,29	0,37	0,3	P [kW]
	57	181	329	344	343	U _s [V]
	0,83	1,02	1,04	1,24	1,3	I _s [A]

2.1.1.2 IE1 motors, 50 Hz nominal point, Size 80S/4 to 132M/4 for category 3D

Motor type		For the circuit, please refer to 1.7												
		Frequency inverter power and nominal current												
↓	↓	Motor power in [kW] at 50 Hz (upper value) and 100 Hz (lower value)												f _s [Hz]
		3	10	20	30	40	50	60	70	80	90	100		
80S/4	0,55 kW	0,48	1,6	2,0	2,9	3,4	3,8	3,5	3,2	2,7	2,3	2,0	1,6	M [Nm]
	1,6 A		42	52	76	89	99	91	82	71	59	52	42	M [%]
		0,43	30	150	463	765	1.061	1.314	1.604	1.837	2.073	2.296	2.529	n [min ⁻¹]
80L/4	0,75 kW	0,67	2,1	3,1	4,0	4,7	5,2	4,7	4,4	3,8	3,2	2,8	2,3	M [Nm]
	2,2 A		40	60	77	90	100	90	85	73	62	54	45	M [%]
		0,63	26	166	471	769	1.091	1.377	1.614	1.864	2.108	2.348	2.564	n [min ⁻¹]
90S/4	1,1 kW	1,01	3,5	5,4	6,6	7,3	7,6	7,0	6,4	5,6	5,1	4,3	3,9	M [Nm]
	3,0 A		46	71	87	96	100	92	84	73	68	57	51	M [%]
		1,06	10	207	503	800	1.032	1.379	1.626	1.875	2.096	2.372	2.606	n [min ⁻¹]
90L/4	1,5 kW	1,31	4,3	5,8	7,8	9,0	9,5	9,0	8,3	7,2	6,5	5,6	4,9	M [Nm]
	3,7 A		42	56	76	87	92	87	80	70	63	54	47	M [%]
		1,37	0	196	495	790	1.091	1.388	1.654	1.909	2.173	2.437	2.695	n [min ⁻¹]
100L/4	2,2 kW	1,92	5,5	9,5	12,1	13,6	14,3	13,1	12,2	10,8	9,9	8,3	7,4	M [Nm]
	5,5 A		38	66	84	95	99	91	84	75	69	58	51	M [%]
		2,17	0	207	488	805	1.106	1.408	1.715	2.010	2.234	2.523	2.807	n [min ⁻¹]
100LA/4 T140°C	3 kW	2,61	10,7	13,6	16,4	18,0	18,9	17,7	15,6	13,2	11,4	10,0	8,3	M [Nm]
	7,0 A		53	67	81	89	93	87	77	65	56	49	41	M [%]
		2,39	12	256	541	833	1.140	1.410	1.681	1.940	2.233	2.490	2.760	n [min ⁻¹]
112M/4	4 kW	3,52	13,2	18,1	21,9	24,0	25,5	23,8	21,1	18,0	15,9	14,0	12,1	M [Nm]
	9,5 A		50	69	83	91	97	90	80	68	60	53	46	M [%]
		3,51	17	237	529	824	1.120	1.414	1.689	1.963	2.236	2.506	2.775	n [min ⁻¹]
132S/4	5,5 kW	5,04	22,0	25,8	30,0	34,0	36,2	33,7	29,6	25,5	21,9	18,4	16,1	M [Nm]
	12,5 A		61	71	83	94	100	93	82	71	60	51	45	M [%]
		4,78	44	240	536	832	1.130	1.428	1.714	1.995	2.276	2.556	2.834	n [min ⁻¹]
132M/4	7,5 kW	6,66	30,0	35,0	41,0	47,1	49,5	44,5	39,3	32,2	27,7	23,8	20,5	M [Nm]
	16,0 A		60	70	82	94	99	89	79	64	55	48	41	M [%]
		6,06	62	241	538	837	1.133	1.431	1.713	1.967	2.268	2.551	2.828	n [min ⁻¹]

2.1.1.3 IE1 motors, 87 Hz nominal point, Size 63S/4 to 71L/4 for category 2D and 3D

Motor type Voltage Circuit type (Y/Δ)	3	20	40	100	f _s [Hz]
63S/4 230/400V, 50 Hz Δ	0,65	0,86	0,86	0,86	M [Nm]
	0	450	1073	2741	n [min ⁻¹]
	0	0,04	0,1	0,25	P [kW]
	46	108	200	358	U _s [V]
	0,78	0,82	0,89	0,81	I _s [A]
63L/4 230/400V, 50 Hz Δ	0,71	1,26	1,26	1,26	M [Nm]
	0	438	1060	2719	n [min ⁻¹]
	0	0,06	0,14	0,36	P [kW]
	38	107	203	361	U _s [V]
	0,87	1,06	1,15	1,1	I _s [A]
71S/4 230/400V, 50 Hz Δ	1,15	1,76	1,76	1,88	M [Nm]
	0	441	1059	2661	n [min ⁻¹]
	0	0,08	0,2	0,52	P [kW]
	36	108	198	356	U _s [V]
	0,94	1,25	1,25	1,63	I _s [A]
71L/4 230/400V, 50 Hz Δ	1,81	2,55	2,57	2,56	M [Nm]
	0	461	1069	2770	n [min ⁻¹]
	0	0,12	0,29	0,74	P [kW]
	33	104	190	342	U _s [V]
	1,43	1,77	1,8	2,12	I _s [A]

2.1.1.4 IE1 motors, 87 Hz nominal point, Size 80S/4 to 132M/4 for category 3D

Motor type		For the circuit, please refer to 1.7													
		Frequency inverter power and nominal current													
		Motor power in [kW] at 50 Hz (upper value) and 100 Hz (lower value)													
			3	10	20	30	40	50	60	70	80	90	100	f _s [Hz]	
80S/4	1,1 kW	0,55	1,9	2,3	3,0	3,4	3,7	3,9	3,9	3,9	3,8	3,6	3,5	M [Nm]	
	3,0 A	0,93	50	60	79	89	97	102	102	102	99	94	92	M [%]	
		1,03	0	164	440	757	1.052	1.351	1.638	1.947	2.237	2.457	2.814	n [min ⁻¹]	
80L/4	1,5 kW	0,78	2,9	3,3	4,2	4,7	5,0	5,4	5,6	5,7	5,5	5,3	5,0	M [Nm]	
	3,7 A	1,36	56	63	81	90	96	104	108	110	106	102	95	M [%]	
		1,46	0	207	493	792	1.086	1.377	1.668	1.970	2.256	2.439	2.813	n [min ⁻¹]	
90S/4	2,2 kW	1,10	4,3	5,0	6,3	7,0	7,6	7,7	7,6	7,6	7,4	7,0	6,8	M [Nm]	
	5,5 A	1,83	57	66	83	92	100	101	100	100	98	92	90	M [%]	
		2,03	0	192	482	778	1.070	1.370	1.675	1.978	2.270	2.489	2.833	n [min ⁻¹]	
90L/4	3 kW	1,39	4,1	5,4	7,3	8,5	9,3	9,6	9,9	9,9	9,8	9,1	8,6	M [Nm]	
	7,0 A	2,38	40	52	71	83	90	93	96	96	95	88	83	M [%]	
		2,56	73	179	487	789	1.085	1.387	1.684	1.988	2.284	2.497	2.863	n [min ⁻¹]	
100L/4	4 kW	2,10	7,3	11,0	12,6	13,7	14,2	14,2	14,2	14,2	13,5	12,8	12,3	M [Nm]	
	9,5 A	3,37	51	76	88	95	99	99	99	99	94	89	86	M [%]	
		3,73	0	207	520	809	1.106	1.409	1.709	2.008	2.307	2.518	2.887	n [min ⁻¹]	
100LA/4 T140°C	5,5 kW	2,98	11,3	14,1	17,2	18,6	19,6	19,8	20,2	20,0	18,8	18,0	17,6	M [Nm]	
	12,5 A	4,72	56	69	85	92	96	97	99	98	93	89	86	M [%]	
		5,27	7	229	524	819	1.116	1.413	1.713	2.014	2.304	2.505	2.869	n [min ⁻¹]	
112M/4	7,5 kW	4,01	12,4	18,6	22,6	24,7	26,2	26,9	26,9	26,0	25,1	23,8	22,4	M [Nm]	
	16,0 A	6,50	47	71	86	94	99	102	102	98	95	90	85	M [%]	
		6,79	34	244	535	830	1.126	1.425	1.725	2.024	2.325	2.609	2.890	n [min ⁻¹]	
132S/4	11 kW	5,75	20,7	25,9	31,0	34,9	36,7	38,2	38,5	38,3	36,8	34,3	29,7	M [Nm]	
	24,0 A	9,14	57	71	86	96	101	105	106	106	102	95	82	M [%]	
		9,06	49	241	541	839	1.139	1.437	1.737	2.037	2.335	2.544	2.918	n [min ⁻¹]	
132M/4	15 kW	7,55	20,0	31,0	40,0	45,0	47,7	50,3	50,5	50,0	48,9	45,5	39,0	M [Nm]	
	31,0 A	12,1	40	62	80	90	95	101	101	100	98	91	78	M [%]	
		11,91	18	244	541	837	1.137	1.434	1.734	2.034	2.332	2.540	2.916	n [min ⁻¹]	

2.1.1.5 IE1 motors, 100 Hz nominal point, Size 63S/4 to 71L/4 for category 2D and 3D

Motor type Voltage Circuit type (Y/Δ)	3	20	40	100	f _s [Hz]
63S/4 230/400V, 50 Hz Δ	0,55	0,61	0,61	0,6	M [Nm]
	0	500	1097	2835	n [min ⁻¹]
	0	0,03	0,07	0,18	P [kW]
	42	100	178	349	U _s [V]
	0,7	0,74	0,76	0,68	I _s [A]
63L/4 230/400V, 50 Hz Δ	0,56	0,83	0,83	0,83	M [Nm]
	0	488	1088	2844	n [min ⁻¹]
	0	0,04	0,09	0,25	P [kW]
	32	94	170	349	U _s [V]
	0,73	0,89	0,91	0,88	I _s [A]
71S/4 230/400V, 50 Hz Δ	0,92	1,22	1,22	1,22	M [Nm]
	0	474	1081	2832	n [min ⁻¹]
	0	0,06	0,14	0,36	P [kW]
	32	94	172	357	U _s [V]
	0,83	0,97	1,01	1,1	I _s [A]
71L/4 230/400V, 50 Hz Δ	1,53	1,82	1,81	1,81	M [Nm]
	0	479	1087	2830	n [min ⁻¹]
	0	0,09	0,21	0,54	P [kW]
	30	91	168	342	U _s [V]
	1,3	1,44	1,46	1,51	I _s [A]

2.1.1.6 IE1 motors, 100 Hz nominal point, Size 80S/4 to 132M/4 for category 3D

Motor type		For the circuit, please refer to 1.7													
		Frequency inverter power and nominal current													
		Motor power in [kW] at 50 Hz (upper value) and 100 Hz (lower value)													
↓	↓	↓	3	10	20	30	40	50	60	70	80	90	100	f _s [Hz]	
80S/4	0,75 kW	0,39	1,8	2,3	2,5	2,6	2,6	2,6	2,6	2,5	2,5	2,4	2,2	M [Nm]	
	2,2 A		48	61	64	68	68	68	67	66	66	62	57	M [%]	
		0,67	0	163	410	810	1.108	1.416	1.712	2.028	2.344	2.627	2.910	n [min ⁻¹]	
80L/4	1,1 kW	0,53	3,0	3,3	3,6	3,6	3,6	3,6	3,6	3,6	3,5	3,4	3,2	M [Nm]	
	3,0 A		58	63	69	69	69	69	69	69	67	66	62	M [%]	
		0,99	0	196	505	812	1.116	1.414	1.715	2.015	2.313	2.611	2.908	n [min ⁻¹]	
90S/4	1,5 kW	0,75	4,2	4,9	4,9	4,9	5,0	5,0	5,0	5,0	5,0	4,9	4,6	M [Nm]	
	3,7 A		55	64	64	64	66	66	66	66	66	65	60	M [%]	
		1,40	0	183	516	822	1.120	1.425	1.725	2.025	2.321	2.620	2.911	n [min ⁻¹]	
90L/4	2,2 kW	1,06	4,0	5,6	7,2	7,2	7,2	7,2	7,2	7,2	7,1	6,9	6,6	M [Nm]	
	5,5 A		39	54	70	70	70	70	70	70	69	67	64	M [%]	
		2,00	20	192	484	799	1.098	1.406	1.707	2.008	2.309	2.606	2.905	n [min ⁻¹]	
100L/4	3 kW	1,51	8,4	9,1	9,9	10,1	10,1	10,1	9,9	9,7	9,7	9,2	8,7	M [Nm]	
	7,0 A		58	63	69	70	70	70	69	67	67	64	61	M [%]	
		2,68	25	205	524	829	1.132	1.429	1.736	2.036	2.335	2.631	2.927	n [min ⁻¹]	
100LA/4 T140°C	4 kW	1,99	6,6	11,3	13,1	13,2	13,2	13,2	13,2	13,3	13,3	12,6	12,0	M [Nm]	
	9,5 A		32	56	64	65	65	65	65	65	66	62	59	M [%]	
		3,69	20	200	530	834	1.130	1.442	1.734	2.028	2.332	2.639	2.944	n [min ⁻¹]	
112M/4	5,5 kW	2,72	14,4	17,0	18,0	18,0	18,0	18,0	18,0	18,0	18,0	17,3	16,3	M [Nm]	
	12,5 A		54	64	68	68	68	68	68	68	68	65	62	M [%]	
		5,02	36	233	539	840	1.142	1.442	1.742	2.042	2.341	2.640	2.933	n [min ⁻¹]	
132S/4	7,5 kW	3,63	20,6	22,0	24,3	24,3	24,3	24,3	24,3	24,3	24,3	24,3	24,3	M [Nm]	
	16,0 A		57	61	67	67	67	67	67	67	67	67	67	M [%]	
		7,42	36	227	530	828	1.124	1.425	1.724	2.023	2.324	2.623	2.918	n [min ⁻¹]	
132M/4	11 kW	5,32	17,2	28,9	35,7	35,7	35,7	35,7	35,7	35,7	35,7	35,7	35,7	M [Nm]	
	24,0 A		34	58	71	71	71	71	71	71	71	71	71	M [%]	
		10,9	16	233	530	826	1.125	1.423	1.723	2.022	2.321	2.625	2.916	n [min ⁻¹]	

2.1.2 IE2 motors

2.1.2.1 IE2 motors, 50 Hz nominal point, Size 80SH/4 to 180LH/4 for category 2D and 3D

Motor type Voltage Circuit type (Y/Δ)	3	20	40	60	100	f _s [Hz]
80SH/4 230/400V, 50 Hz Y	2,64	3,74	3,73	3,71	1,83	M [Nm]
	14,8	516	1118	1628	2551	n [min ⁻¹]
	0	0,2	0,44	0,63	0,49	P [kW]
	38	174	328	368	352	U _s [V]
	1,11	1,4	1,41	1,61	1,75	I _s [A]
80LH/4 230/400V, 50 Hz Y	3,33	4,92	5,08	4,84	2,51	M [Nm]
	10	508	1105	1596	2549	n [min ⁻¹]
	0	0,26	0,59	0,81	0,67	P [kW]
	36	172	333	363	363	U _s [V]
	1,38	1,77	1,81	2,13	2,22	I _s [A]
90SH/4 230/400V, 50 Hz Y	0,97	5,52	6,83	5,72	3,11	M [Nm]
	76	540	1127	1676	2763	n [min ⁻¹]
	0,01	0,31	0,81	1	0,9	P [kW]
	29	168	332	361	362	U _s [V]
	1,29	2,06	2,36	2,43	2,49	I _s [A]
90LH/4 230/400V, 50 Hz Y	5,99	9,75	10,22	10,07	5,43	M [Nm]
	33	521	1115	1605	2603	n [min ⁻¹]
	0,02	0,53	1,19	1,69	1,48	P [kW]
	35	173	338	361	361	U _s [V]
	2,38	3,28	3,33	4,19	4,31	I _s [A]
100LH/4 230/400V, 50 Hz Y	2,38	14,6	14,79	12,08	6,96	M [Nm]
	80	545	1143	1704	2818	n [min ⁻¹]
	0,02	0,83	1,77	2,16	2,05	P [kW]
	27	171	334	360	361	U _s [V]
	2,8	4,84	4,82	4,89	4,9	I _s [A]
100AH/4 230/400V, 50 Hz Y	9,8	19,31	20,19	18,21	10,14	M [Nm]
	49	528	1122	1646	2690	n [min ⁻¹]
	0,05	1,07	2,37	3,14	2,86	P [kW]
	32	172	336	363	363	U _s [V]
	4,17	6,15	6,41	7,08	7,36	I _s [A]
112MH/4 230/400V, 50 Hz Y	16,56	24,27	26,49	21,76	11,92	M [Nm]
	47,4	543	1139	1683	2774	n [min ⁻¹]
	0,08	1,38	3,16	3,83	3,46	P [kW]
	33	170	338	349	349	U _s [V]
	5,78	7,63	8,31	9	9,2	I _s [A]

2 Technical data (characteristic curve data)

Motor type Voltage Circuit type (Y/Δ)	3	20	40	60	100	f _s [Hz]
132SH/4 230/400V, 50 Hz Y	26,8	36	36	30,9	15,86	M [Nm]
	57	558	1158	1712	2827	n [min ⁻¹]
	0,16	2,11	4,37	5,53	4,7	P [kW]
	33	172	338	345	344	U _s [V]
	8,63	10,76	10,73	12,97	13,12	I _s [A]
132MH/4 230/400V, 50 Hz Y	30,6	48,54	49,17	41,8	21,15	M [Nm]
	62	559	1158	1720	2845	n [min ⁻¹]
	0,2	2,84	5,96	7,53	6,3	P [kW]
	31	169	337	350	341	U _s [V]
	10,94	15	15,6	16,9	16,9	I _s [A]
132LH/4 230/400V, 50 Hz Y	28,8	56,57	60,9	53,3	27,5	M [Nm]
	68	556	1151	1704	2830	n [min ⁻¹]
	0,21	3,29	7,34	9,5	8,15	P [kW]
	29	168	333	354	355	U _s [V]
	11,95	18,2	19,7	21	20,2	I _s [A]
160MH/4 230/400V, 50 Hz Y	48,8	64,3	72	58,4	32,8	M [Nm]
	67	564	1159	1739	2885	n [min ⁻¹]
	0,34	3,8	8,75	10,6	9,9	P [kW]
	30	155	308	351	352	U _s [V]
	15,2	19,5	21,9	22,7	23,4	I _s [A]
160LH/4 2D TF 230/400V, 50 Hz Y	66,9	97,3	97,3	85,3	48	M [Nm]
	65	566	1167	1735	2875	n [min ⁻¹]
	0,46	5,78	11,9	15,5	14,5	P [kW]
	28	167	336	350	350	U _s [V]
	21,1	27,8	27,8	32,2	33,2	I _s [A]
180MH/4 230/400V, 50 Hz Y	79,9	121	120	102	51,7	M [Nm]
	64	575	1176	1752	2908	n [min ⁻¹]
	0,54	7,3	14,7	18,8	15,7	P [kW]
	25	164	334	347	349	U _s [V]
	28,7	37,5	36,2	41,6	41,1	I _s [A]
180LH/4 230/400V, 50 Hz Y	102	142	142	117	54,6	M [Nm]
	68	573	1173	1749	2926	n [min ⁻¹]
	0,73	8,54	17,5	21,6	16,7	P [kW]
	28	166	325	341	342	U _s [V]
	32,3	40,6	40,8	47	41	I _s [A]

2.1.2.2 IE2 motors, 87 Hz nominal point, Size 80SH/4 to 180LH/4 for category 2D and 3D

Motor type Voltage Circuit type (Y/Δ)	3	20	40	100	f _s [Hz]
80SH/4 230/400V, 50 Hz Δ	2,64	3,74	3,73	3,74	M [Nm]
	15	516	1118	2840	n [min ⁻¹]
	0	0,2	0,44	1,11	P [kW]
	22	100	190	355	U _s [V]
	1,92	2,42	2,44	2,77	I _s [A]
80LH/4 230/400V, 50 Hz Δ	3,33	4,92	5,08	5,1	M [Nm]
	10	508	1105	2803	n [min ⁻¹]
	0	0,26	0,59	1,5	P [kW]
	21	99	192	357	U _s [V]
	2,38	3,06	3,14	3,69	I _s [A]
90SH/4 230/400V, 50 Hz Δ	0,97	5,52	6,83	5,96	M [Nm]
	76	540	1127	2882	n [min ⁻¹]
	0,01	0,31	0,81	1,8	P [kW]
	17	97	192	358	U _s [V]
	2,24	3,57	4,08	4,25	I _s [A]
90LH/4 230/400V, 50 Hz Δ	6	9,75	10,2	10,1	M [Nm]
	33	521	1115	2822	n [min ⁻¹]
	0,02	0,53	1,19	2,98	P [kW]
	20	100	195	357	U _s [V]
	4,13	5,68	5,77	7,08	I _s [A]
100LH/4 230/400V, 50 Hz Δ	2,38	14,6	14,8	12,56	M [Nm]
	80	545	1143	2905	n [min ⁻¹]
	0,02	0,83	1,77	3,82	P [kW]
	16	99	193	359	U _s [V]
	4,85	8,39	8,35	8,5	I _s [A]
100AH/4 230/400V, 50 Hz Δ	9,8	19,3	20,2	20,2	M [Nm]
	49	528	1122	2840	n [min ⁻¹]
	0,05	1,07	2,37	6	P [kW]
	18	99	194	357	U _s [V]
	7,22	10,6	11,1	13	I _s [A]
112MH/4 230/400V, 50 Hz Δ	16,5	24,3	26,5	22,5	M [Nm]
	47	543	1139	2884	n [min ⁻¹]
	0,08	1,38	3,16	6,8	P [kW]
	19	98	195	341	U _s [V]
	10	13,2	14,4	15,8	I _s [A]

2 Technical data (characteristic curve data)

Motor type Voltage Circuit type (Y/Δ)	3	20	40	100	f _s [Hz]
132SH/4 230/400V, 50 Hz Δ	26,8	36,1	36,1	31	M [Nm]
	57	558	1158	2915	n [min ⁻¹]
	0,16	2,11	4,37	9,46	P [kW]
	19	99	195	338	U _s [V]
	14,9	18,65	18,6	22,15	I _s [A]
132MH/4 230/400V, 50 Hz Δ	30,6	48,5	49,17	39,5	M [Nm]
	62	559	1158	2921	n [min ⁻¹]
	0,2	2,84	5,96	12,1	P [kW]
	18	98	195	332	U _s [V]
	18,95	26	27	28,4	I _s [A]
132LH/4 230/400V, 50 Hz Δ	28,8	56,6	60,9	48	M [Nm]
	68	556	1151	2927	n [min ⁻¹]
	0,21	3,29	7,34	14,7	P [kW]
	17	97	192	353	U _s [V]
	20,7	31,5	34,1	31,5	I _s [A]
160MH/4 230/400V, 50 Hz Δ	48,8	64,3	72,1	56,9	M [Nm]
	67	564	1159	2944	n [min ⁻¹]
	0,34	3,8	8,75	17,5	P [kW]
	17	89	178	348	U _s [V]
	26,4	33,9	37,9	37,2	I _s [A]
160LH/4 230/400V, 50 Hz Δ	66,9	97,4	97,4	82,4	M [Nm]
	65	566	1167	2939	n [min ⁻¹]
	0,46	5,78	11,9	25,4	P [kW]
	16	96	194	344	U _s [V]
	36,5	48,1	48,2	53,4	I _s [A]
180MH/4 230/400V, 50 Hz Δ	79,9	121	120	93,6	M [Nm]
	64	575	1176	2957	n [min ⁻¹]
	0,54	7,3	14,8	29	P [kW]
	14	95	193	343	U _s [V]
	49,8	65,1	62,7	65,8	I _s [A]
180LH/4 230/400V, 50 Hz Δ	102	142	142,8	96,8	M [Nm]
	68	573	1173	2963	n [min ⁻¹]
	0,73	8,54	17,5	30	P [kW]
	16	96	188	335	U _s [V]
	56	70,4	70,7	65,4	I _s [A]

2.1.2.3 IE2 motors, 100 Hz nominal point, Size 80SH/4 to 180LH/4 for category 2D and 3D

Motor type Voltage Circuit type (Y/Δ)	3	20	40	100	f _s [Hz]
80SH/4 230/400V, 50 Hz Δ	1,99	2,45	2,45	2,46	M [Nm]
	29	534	1134	2913	n [min ⁻¹]
	0,01	0,14	0,29	0,75	P [kW]
	19	87	167	362	U _s [V]
	1,63	1,89	1,91	1,95	I _s [A]
80LH/4 230/400V, 50 Hz Δ	2,17	3,59	3,6	3,6	M [Nm]
	0	511	1115	2886	n [min ⁻¹]
	0	0,19	0,42	1,09	P [kW]
	16	84	163	350	U _s [V]
	1,91	2,54	2,55	2,73	I _s [A]
90SH/4 230/400V, 50 Hz Δ	0,97	4,92	4,89	4,9	M [Nm]
	76	529	1131	2902	n [min ⁻¹]
	0,01	0,27	0,58	1,49	P [kW]
	17	85	164	343	U _s [V]
	2,24	3,39	3,39	3,78	I _s [A]
90LH/4 230/400V, 50 Hz Δ	4,3	7,21	7,17	7,14	M [Nm]
	0	518	1120	2913	n [min ⁻¹]
	0	0,39	0,84	2,18	P [kW]
	16	84	164	347	U _s [V]
	3,7	4,74	4,94	5,25	I _s [A]
100LH/4 230/400V, 50 Hz Δ	2,38	9,71	9,65	9,67	M [Nm]
	80	551	1152	2934	n [min ⁻¹]
	0,02	0,56	1,16	2,97	P [kW]
	16	83	164	348	U _s [V]
	4,85	6,46	6,62	6,98	I _s [A]
100AH/4 230/400V, 50 Hz Δ	9,29	12,96	13,11	13	M [Nm]
	0	535	1136	2932	n [min ⁻¹]
	0	0,73	1,56	4	P [kW]
	20	84	164	347	U _s [V]
	7,54	8,47	8,7	9,37	I _s [A]
112MH/4 230/400V, 50 Hz Δ	16,56	17,85	17,85	17,8	M [Nm]
	47	548	1147	2915	n [min ⁻¹]
	0,08	1,02	2,14	5,44	P [kW]
	19	89	173	345	U _s [V]
	10,01	9,53	9,46	12,35	I _s [A]

2 Technical data (characteristic curve data)

Motor type Voltage Circuit type (Y/Δ)	3	20	40	100	f _s [Hz]
132SH/4 230/400V, 50 Hz Δ	24,3	24,2	24,2	24,2	M [Nm]
	51	563	1163	2939	n [min ⁻¹]
	0,13	1,43	2,95	7,45	P [kW]
	18	88	167	342	U _s [V]
	13,8	14,6	14,6	17,2	I _s [A]
132MH/4 230/400V, 50 Hz Δ	29,7	29,6	29,6	29,7	M [Nm]
	50	568	1167	2946	n [min ⁻¹]
	0,16	1,76	3,62	9,15	P [kW]
	16	84	166	335	U _s [V]
	18,2	17,4	16,95	20,1	I _s [A]
132LH/4 230/400V, 50 Hz Δ	28,81	35,4	35,5	35,3	M [Nm]
	68	564	1163	2947	n [min ⁻¹]
	0,21	2,09	4,32	10,9	P [kW]
	17	84	164	340	U _s [V]
	20,7	22,1	21,6	21,4	I _s [A]
160MH/4 230/400V, 50 Hz Δ	48,4	48,4	48,3	48,2	M [Nm]
	58	564	1164	2954	n [min ⁻¹]
	0,29	2,86	5,88	14,9	P [kW]
	15	77	151	347	U _s [V]
	27,1	29,2	25,1	32,1	I _s [A]
160LH/4 230/400V, 50 Hz Δ	59,5	59,7	59,4	59	M [Nm]
	55	574	1173	2959	n [min ⁻¹]
	0,34	3,59	7,3	18,3	P [kW]
	14	82	163	346	U _s [V]
	35,5	32,9	31,9	37,3	I _s [A]
180MH/4 230/400V, 50 Hz Δ	70,7	70,5	69,8	70,8	M [Nm]
	69	582	1181	2969	n [min ⁻¹]
	0,51	4,29	8,63	22	P [kW]
	14	85	163	344	U _s [V]
	42,2	41,2	38,6	36	I _s [A]
180LH/4 230/400V, 50 Hz Δ	95,9	94,5	96,3	96,4	M [Nm]
	54	576	1176	2965	n [min ⁻¹]
	0,54	5,7	11,9	29,9	P [kW]
	15	82	162	337	U _s [V]
	65,5	53,6	54,6	65,7	I _s [A]

2.1.3 IE3 Motors

2.1.3.1 IE3 motors, 50 Hz nominal point, Size 63SP/4 to 180LP/4 for category 2D and 3D

Motor type Voltage Circuit type (Y/Δ)	3	20	50	70	100	f _s [Hz]
63SP/4 2D TF 230/400V, 50 Hz Y	0,38	0,83	0,84	0,79	0,49	M [Nm]
	0	445	1290	1555	2035	n [min ⁻¹]
	0,00	0,038	0,11	0,13	0,11	P [kW]
	48	181	350	350	348	U _s [V]
	0,27	0,39	0,39	0,48	0,50	I _s [A]
63LP/4 230/400V, 50 Hz Y	0,81	1,10	1,24	1,16	0,79	M [Nm]
	0	484	1321	1682	2270	n [min ⁻¹]
	0,00	0,056	0,17	0,21	0,19	P [kW]
	50	174	350	349	349	U _s [V]
	0,46	0,54	0,56	0,66	0,69	I _s [A]
71SP/4 230/400V, 50 Hz Y	0,73	1,69	1,70	1,54	1,00	M [Nm]
	41	506	1368	1808	2521	n [min ⁻¹]
	0,00	0,089	0,24	0,29	0,26	P [kW]
	37	174	348	349	349	U _s [V]
	0,47	0,69	0,71	0,86	0,89	I _s [A]
71LP/4 230/400V, 50 Hz Y	1,26	2,39	2,52	2,08	1,39	M [Nm]
	10	496	1351	1810	2516	n [min ⁻¹]
	0,00	0,12	0,36	0,39	0,37	P [kW]
	38	174	354	352	351	U _s [V]
	0,61	0,89	0,97	1,11	1,16	I _s [A]
80SP/4 230/400V, 50 Hz Y	0,94	3,30	3,83	2,71	1,60	M [Nm]
	60	514	1351	1852	2557	n [min ⁻¹]
	0,01	0,18	0,54	0,53	0,43	P [kW]
	31	171	349	349	350	U _s [V]
	0,77	1,28	1,53	1,56	1,60	I _s [A]
80LP/4 230/400V, 50 Hz Y	3,04	4,51	5,06	3,57	2,20	M [Nm]
	20	519,7	1371,1	1880	2616,8	n [min ⁻¹]
	0,006	0,25	0,73	0,70	0,60	P [kW]
	34	168	350	346	349	U _s [V]
	1,29	1,65	1,92	1,96	2,01	I _s [A]

2 Technical data (characteristic curve data)

Motor type Voltage Circuit type (Y/Δ)	3	20	50	70	100	f _s [Hz]
90SP/4 230/400V, 50 Hz Y	2,51	7,34	7,37	6,12	4,03	M [Nm]
	61	530	1400	1908	2689	n [min-1]
	0,02	0,41	1,08	1,22	1,13	P [kW]
	29	170	347	347	347	U _s [V]
	1,38	2,41	2,60	3,02	3,13	I _s [A]
90LP/4 230/400V, 50 Hz Y	5,68	10,2	10,1	8,19	5,02	M [Nm]
	34	514	1370	1861	2614	n [min-1]
	0,02	0,55	1,45	1,60	1,37	P [kW]
	33	172	348	351	351	U _s [V]
	2,19	3,12	3,53	4,01	4,07	I _s [A]
100LP/4 230/400V, 50 Hz Y	5,81	14,1	14,4	10,9	6,97	M [Nm]
	40	559	1441	2003	2844	n [min-1]
	0,02	0,83	2,17	2,29	2,07	P [kW]
	28	167	343	344	344	U _s [V]
	2,54	4,40	4,92	5,24	5,34	I _s [A]
100AP/4 230/400V, 50 Hz Y	7,44	19,9	19,6	15,4	9,66	M [Nm]
	50	549	1435	1985	2818	n [min-1]
	0,04	1,14	2,95	3,21	2,85	P [kW]
	25	164	349	349	350	U _s [V]
	3,46	6,19	6,63	7,34	7,31	I _s [A]
112MP/4 230/400V, 50 Hz Y	11,5	25,2	25,7	18,7	11,9	M [Nm]
	59	542	1412	1963	2783	n [min-1]
	0,07	1,43	3,80	3,84	3,46	P [kW]
	28	167	342	344	343	U _s [V]
	4,46	7,51	8,54	8,74	8,82	I _s [A]
132SP/4 230/400V, 50 Hz Y	17,6	34,5	35,4	25,5	16,5	M [Nm]
	69	565	1448	2020	2874	n [min-1]
	0,13	2,04	5,37	5,38	4,95	P [kW]
	27	166	343	343	342	U _s [V]
	6,98	10,9	12,0	12,1	12,1	I _s [A]

Motor type Voltage Circuit type (Y/Δ)	3	20	50	70	100	f _s [Hz]
132MP/4 230/400V, 50 Hz Y	27,7	47,0	49,1	35,8	22,9	M [Nm]
	61	559	1435	1997	2838	n [min-1]
	0,18	2,75	7,37	7,50	6,80	P [kW]
	28	165	341	340	340	Us [V]
	10,1	14,8	16,5	16,9	16,9	Is [A]
160SP/4 230/400V, 50 Hz Y	25,8	54,5	55,7	40,2	25,2	M [Nm]
	66	570	1460	2044	2920	n [min-1]
	0,18	3,25	8,52	8,61	7,71	P [kW]
	24	161	343	345	344	Us [V]
	10,1	16,0	18,1	18,6	18,5	Is [A]
160MP/4 230/400V, 50 Hz Y	40,3	68,8	67,8	49,5	-	M [Nm]
	69	568	1453	2030	-	n [min-1]
	0,29	4,09	10,3	10,5	-	P [kW]
	28	165	337	339	-	Us [V]
	13,4	19,6	21,9	22,1	-	Is [A]
160LP/4 230/400V, 50 Hz Y	52,7	88,1	88,4	64,3	42,2	M [Nm]
	70	571	1455	2033	2896	n [min-1]
	0,39	5,26	13,5	13,7	12,8	P [kW]
	27	163	337	339	338	Us [V]
	17,4	25,1	28,6	29,1	29,3	Is [A]
180MP/4 230/400V, 50 Hz Y	79,5	120	114	80,5	49,3	M [Nm]
	76	580	1471	2056	2935	n [min-1]
	0,63	7,26	17,5	17,3	15,2	P [kW]
	27	164	335	335	336	Us [V]
	25,7	35,3	38,0	38,2	36,5	Is [A]
180LP/4 230/400V, 50 Hz Y	82,8	141	133	93,0	56,6	M [Nm]
	68	577	1471	2055	2927	n [min-1]
	0,59	8,51	20,5	20,0	17,3	P [kW]
	24	162	343	344	343	Us [V]
	29,4	40,5	43,0	43,6	43,0	Is [A]

2.1.3.2 IE3 motors, 87 Hz nominal point, Size 63SP/4 to 180LP/4 for category 2D and 3D

Motor type Voltage Circuit type (Y/Δ)	3	20	87	100	f _s [Hz]
63SP/4 230/400V, 50 Hz Δ	0,38	0,83	0,84	0,84	M [Nm]
	0	445	2428	2740	n [min-1]
	0,000	0,038	0,21	0,24	P [kW]
	28	105	351	351	U _s [V]
	0,47	0,67	0,67	0,70	I _s [A]
63LP/4 230/400V, 50 Hz Δ	0,81	1,10	1,24	1,24	M [Nm]
	0	484	2446	2769	n [min-1]
	0,000	0,056	0,32	0,36	P [kW]
	29	101	351	351	U _s [V]
	0,80	0,94	0,98	1,01	I _s [A]
71SP/4 230/400V, 50 Hz Δ	0,73	1,69	1,69	1,70	M [Nm]
	41	506	2483	2816	n [min-1]
	0,003	0,089	0,44	0,50	P [kW]
	21	101	348	346	U _s [V]
	0,81	1,19	1,24	1,34	I _s [A]
71LP/4 230/400V, 50 Hz Δ	1,26	2,39	2,53	2,51	M [Nm]
	10	496	2470	2793	n [min-1]
	0,001	0,12	0,65	0,73	P [kW]
	22	101	350	349	U _s [V]
	1,06	1,54	1,67	1,84	I _s [A]
80SP/4 230/400V, 50 Hz Δ	0,94	3,30	3,69	3,64	M [Nm]
	60	514	2475	2805	n [min-1]
	0,006	0,18	0,96	1,07	P [kW]
	18	99	348	348	U _s [V]
	1,34	2,21	2,55	2,82	I _s [A]
80LP/4 230/400V, 50 Hz Δ	3,04	4,51	5,08	4,66	M [Nm]
	20	520	2478	2830	n [min-1]
	0,006	0,25	1,32	1,38	P [kW]
	19	97	347	347	U _s [V]
	2,23	2,86	3,39	3,50	I _s [A]

Motor type Voltage Circuit type (Y/Δ)	3	20	87	100	f _s [Hz]
90SP/4 230/400V, 50 Hz Δ	2,51	7,34	7,35	7,35	M [Nm]
	61	530	2512	2859	n [min-1]
	0,016	0,41	1,93	2,20	P [kW]
	17	98	346	345	U _s [V]
	2,38	4,17	4,50	5,12	I _s [A]
90LP/4 230/400V, 50 Hz Δ	5,68	10,2	10,1	10,1	M [Nm]
	34	514	2483	2816	n [min-1]
	0,02	0,55	2,63	2,99	P [kW]
	19	99	346	348	U _s [V]
	3,79	5,40	6,05	6,87	I _s [A]
100LP/4 230/400V, 50 Hz Δ	5,81	14,1	14,4	13,4	M [Nm]
	40	559	2550	2923	n [min-1]
	0,024	0,83	3,84	4,11	P [kW]
	16	97	341	342	U _s [V]
	4,39	7,62	8,57	9,08	I _s [A]
100AP/4 230/400V, 50 Hz Δ	7,44	19,9	19,6	19,3	M [Nm]
	50	549	2547	2909	n [min-1]
	0,039	1,14	5,24	5,88	P [kW]
	15	95	345	346	U _s [V]
	6,00	10,7	11,4	12,7	I _s [A]
112MP/4 230/400V, 50 Hz Δ	11,5	25,2	25,8	22,5	M [Nm]
	59	542	2520	2893	n [min-1]
	0,071	1,43	6,81	6,83	P [kW]
	16	97	339	341	U _s [V]
	7,73	13,0	15,0	15,0	I _s [A]
132SP/4 230/400V, 50 Hz Δ	17,6	34,5	33,0	29,3	M [Nm]
	69	565	2560	2940	n [min-1]
	0,13	2,04	8,84	9,01	P [kW]
	16	96	339	340	U _s [V]
	12,1	18,9	19,9	20,0	I _s [A]

2 Technical data (characteristic curve data)

Motor type Voltage Circuit type (Y/Δ)	3	20	87	100	f _s [Hz]
132MP/4 230/400V, 50 Hz Δ	27,7	47,0	45,2	40,5	M [Nm]
	61	559	2550	2926	n [min-1]
	0,18	2,75	12,1	12,4	P [kW]
	16	95	336	335	U _s [V]
	17,5	25,6	26,8	27,2	I _s [A]
160SP/4 230/400V, 50 Hz Δ	25,8	54,5	51,9	45,0	M [Nm]
	66	570	2582	2962	n [min-1]
	0,18	3,25	14,0	14,0	P [kW]
	14	93	339	340	U _s [V]
	17,5	27,7	30,1	30,2	I _s [A]
160MP/4 230/400V, 50 Hz Δ	40,3	68,8	61,0	-	M [Nm]
	69	568	2567	-	n [min-1]
	0,29	4,09	16,4	-	P [kW]
	16	95	332	-	U _s [V]
	23,1	34,0	34,7	-	I _s [A]
160LP/4 230/400V, 50 Hz Δ	52,7	88,1	82,2	71,4	M [Nm]
	70	571	2566	2949	n [min-1]
	0,39	5,26	22,1	22,1	P [kW]
	16	94	331	332	U _s [V]
	30,1	43,6	46,9	46,7	I _s [A]
180MP/4 230/400V, 50 Hz Δ	79,5	120	98,0	84,4	M [Nm]
	76	580	2584	2969	n [min-1]
	0,63	7,26	26,5	26,3	P [kW]
	16	95	328	329	U _s [V]
	44,6	61,1	58,1	57,4	I _s [A]
180LP/4 230/400V, 50 Hz Δ	82,8	141	116	95,3	M [Nm]
	68	577	2585	2972	n [min-1]
	0,59	8,51	31,4	29,7	P [kW]
	14	93	333	334	U _s [V]
	50,9	70,1	67,8	64,0	I _s [A]

2.1.3.3 IE3 motors, 100 Hz nominal point, Size 63SP/4 to 180LP/4 for category 2D and 3D

Motor type Voltage Circuit type (Y/Δ)	3	20	50	100	f _s [Hz]
63SP/4 230/400V, 50 Hz Δ	0,49	0,60	0,60	0,60	M [Nm]
	0	464	1376	2802	n [min ⁻¹]
	0,000	0,029	0,086	0,18	P [kW]
	31	94	212	347	U _s [V]
	0,54	0,58	0,58	0,57	I _s [A]
63LP/4 230/400V, 50 Hz Δ	0,59	0,82	0,82	0,82	M [Nm]
	0	496	1397	2850	n [min ⁻¹]
	0,000	0,043	0,12	0,25	P [kW]
	23	90	210	352	U _s [V]
	0,65	0,81	0,82	0,79	I _s [A]
71SP/4 230/400V, 50 Hz Δ	0,88	1,21	1,22	1,21	M [Nm]
	0	513	1416	2874	n [min ⁻¹]
	0,000	0,065	0,18	0,36	P [kW]
	21	88	207	349	U _s [V]
	0,80	0,99	1,01	1,03	I _s [A]
71LP/4 230/400V, 50 Hz Δ	1,12	1,81	1,82	1,81	M [Nm]
	0	498	1402	2864	n [min ⁻¹]
	0,000	0,094	0,27	0,54	P [kW]
	18	88	207	351	U _s [V]
	0,90	1,32	1,32	1,38	I _s [A]
80SP/4 230/400V, 50 Hz Δ	1,58	2,45	2,44	2,45	M [Nm]
	0	520	1422	2881	n [min ⁻¹]
	0,000	0,13	0,36	0,74	P [kW]
	19	88	212	349	U _s [V]
	1,09	1,86	1,89	2,01	I _s [A]
80LP/4 230/400V, 50 Hz Δ	3,59	3,58	3,59	3,61	M [Nm]
	0	518	1417	2876	n [min ⁻¹]
	0,00	0,19	0,53	1,09	P [kW]
	20	85	204	347	U _s [V]
	2,44	2,55	2,54	2,80	I _s [A]

2 Technical data (characteristic curve data)

Motor type Voltage Circuit type (Y/Δ)	3	20	50	100	f _s [Hz]
90SP/4 230/400V, 50 Hz Δ	4,01	4,87	4,87	4,87	M [Nm]
	0	539	1439	2910	n [min-1]
	0	0,27	0,73	1,48	P [kW]
	17	85	205	347	U _s [V]
	3,17	3,29	3,29	3,55	I _s [A]
90LP/4 230/400V, 50 Hz Δ	5,68	10,2	10,1	10,1	M [Nm]
	34	514	2483	2816	n [min-1]
	0,02	0,55	2,63	2,99	P [kW]
	19	99	346	348	U _s [V]
	3,79	5,40	6,05	6,87	I _s [A]
100LP/4 230/400V, 50 Hz Δ	9,46	9,65	9,66	9,67	M [Nm]
	2	564	1465	2949	n [min-1]
	0,002	0,57	1,48	2,98	P [kW]
	18	83	201	341	U _s [V]
	8,31	6,11	6,12	6,69	I _s [A]
100AP/4 230/400V, 50 Hz Δ	12,9	13,0	12,8	12,9	M [Nm]
	15	561	1462	2947	n [min-1]
	0,020	0,76	1,97	3,97	P [kW]
	19	85	204	346	U _s [V]
	9,67	7,95	7,94	8,69	I _s [A]
112MP/4 230/400V, 50 Hz Δ	17,8	17,8	17,9	17,8	M [Nm]
	5	548	1445	2919	n [min-1]
	0,010	1,02	2,71	5,45	P [kW]
	17	84	203	340	U _s [V]
	12,6	10,6	10,6	12,0	I _s [A]
132SP/4 230/400V, 50 Hz Δ	24,1	24,1	24,2	24,1	M [Nm]
	46	568	1467	2853	n [min-1]
	0,12	1,43	3,72	7,20	P [kW]
	15	83	202	340	U _s [V]
	16,1	15,0	15,1	16,8	I _s [A]

Motor type Voltage Circuit type (Y/Δ)	3	20	50	100	f _s [Hz]
132MP/4 230/400V, 50 Hz Δ	29,6	29,6	29,6	29,6	M [Nm]
	51	566	1466	2949	n [min-1]
	0,16	1,76	4,54	9,15	P [kW]
	15	83	203	338	Us [V]
	19,3	18,4	18,6	20,3	Is [A]
160SP/4 230/400V, 50 Hz Δ	35,5	35,4	35,3	35,3	M [Nm]
	58	581	1483	2980	n [min-1]
	0,22	2,15	5,49	11,0	P [kW]
	15	82	201	340	Us [V]
	23,0	21,2	20,8	24,5	Is [A]
160MP/4 230/400V, 50 Hz Δ	48,4	48,3	48,3	-	M [Nm]
	42	572	1470,2	-	n [min-1]
	0,21	2,89	7,43	-	P [kW]
	15	83	201	-	Us [V]
	32,3	27,4	27,2	-	Is [A]
160LP/4 230/400V, 50 Hz Δ	59,5	59,4	59,5	59,5	M [Nm]
	53	574	1473	2959	n [min-1]
	0,33	3,57	9,18	18,4	P [kW]
	14	82	201	334	Us [V]
	39,1	34,2	34,1	39,1	Is [A]
180MP/4 230/400V, 50 Hz Δ	70,7	70,5	70,6	70,6	M [Nm]
	71	585	1484	2976	n [min-1]
	0,53	4,32	11,0	22,0	P [kW]
	14	81	201	332	Us [V]
	44,4	42,0	41,9	48,2	Is [A]
180LP/4 230/400V, 50 Hz Δ	96,2	96,1	96,1	96,2	M [Nm]
	52	580	1484	2978	n [min-1]
	0,53	5,84	14,9	30,0	P [kW]
	14	81	201	338	Us [V]
	66,1	55,0	54,6	64,7	Is [A]

2.2 Motors with external fan

Information

Interpolation

Linear interpolation of data between adjacent frequencies is permissible.

The legend below applies to all following tables in this chapter.

Legend			
fs [Hz]	Stator frequency in hertz	M [Nm]	Torque In Newton metres
P [kW]	Motor power in kilowatts	Us [V]	Motor voltage in volts
		M [%]	Torque in % of nominal torque
		Is [A]	Motor current in amps
		n [rpm]	Speed Speed in rpm

2.2.1 IE1 and IE2 motors with external fan, 50 Hz-nominal point, category 3D

Motor type		For the circuit, please refer to 1.7													
		Frequency inverter power and nominal current													
		Motor power in [kW] at 50 Hz (upper value) and 100 Hz (lower value)													
			3	10	20	30	40	50	60	70	80	90	100	f _s [Hz]	
63S/4	0,55 kW	0,11	0,8	0,8	0,8	0,8	0,8	0,8	0,8	0,8	0,7	0,6	0,4	M [Nm]	
	1,6 A		94	94	94	94	94	94	92	90	82	66	50	M [%]	
		0,09	10	150	375	690	1.010	1.320	1.381	1.441	1.641	1.840	1.932	n [min ⁻¹]	
63L/4	0,55 kW	0,17	1,3	1,3	1,3	1,3	1,3	1,3	1,2	1,2	1,1	0,9	0,8	M [Nm]	
	1,6 A		96	96	96	96	96	96	93	91	83	73	61	M [%]	
		0,18	0	142	419	696	990	1.282	1.458	1.633	1.787	1.941	2.151	n [min ⁻¹]	
71S/4	0,55 kW	0,23	1,7	1,7	1,7	1,7	1,7	1,6	1,5	1,4	1,2	1,1	0,9	M [Nm]	
	1,6 A		100	100	100	100	100	92	87	81	72	61	53	M [%]	
		0,23	10	150	437	733	1.032	1.364	1.537	1.710	1.939	2.168	2.388	n [min ⁻¹]	
71L/4	0,55 kW	0,33	2,4	2,4	2,4	2,4	2,4	2,4	2,2	1,9	1,6	1,4	1,3	M [Nm]	
	1,6 A		92	92	92	92	92	92	83	73	62	55	48	M [%]	
		0,33	0	128	427	734	1.042	1.339	1.594	1.843	2.092	2.326	2.490	n [min ⁻¹]	
80S/4	0,55 kW	0,48	3,5	3,5	3,5	3,5	3,5	3,5	3,2	2,7	2,3	2,0	1,6	M [Nm]	
	1,6 A		91	91	91	91	91	91	82	71	59	52	42	M [%]	
		0,43	30	150	463	765	1.061	1.314	1.604	1.837	2.073	2.296	2.529	n [min ⁻¹]	
80L/4	0,75 kW	0,67	4,7	4,7	4,7	4,7	4,7	4,7	4,4	3,8	3,2	2,8	2,3	M [Nm]	
	2,2 A		90	90	90	90	90	90	85	73	62	54	45	M [%]	
		0,63	26	166	471	769	1.091	1.377	1.614	1.864	2.108	2.348	2.564	n [min ⁻¹]	
90S/4	1,1 kW	1,01	7,0	7,0	7,0	7,0	7,0	7,0	6,4	5,6	5,1	4,3	3,9	M [Nm]	
	3,0 A		92	92	92	92	92	92	84	73	68	57	51	M [%]	
		1,06	10	207	503	800	1.032	1.379	1.626	1.875	2.096	2.372	2.606	n [min ⁻¹]	
90L/4	1,5 kW	1,31	9,0	9,0	9,0	9,0	9,0	9,0	8,3	7,2	6,5	5,6	4,9	M [Nm]	
	3,7 A		87	87	87	87	87	87	80	70	63	54	47	M [%]	
		1,37	0	196	495	790	1.091	1.388	1.654	1.909	2.173	2.437	2.695	n [min ⁻¹]	
100L/4	2,2 kW	1,92	13,1	13,1	13,1	13,1	13,1	13,1	12,2	10,8	9,9	8,3	7,4	M [Nm]	
	5,5 A		91	91	91	91	91	91	84	75	69	58	51	M [%]	
		2,17	0	207	488	805	1.106	1.408	1.715	2.010	2.234	2.523	2.807	n [min ⁻¹]	
100LA/4 T140°C	3 kW	2,68	20,3	20,3	20,3	20,3	20,3	18,2	16,1	13,9	12,1	10,1	9,0	M [Nm]	
	7,0 A		100	100	100	100	100	90	79	69	59	50	44	M [%]	
		2,59	11	172	488	804	1.105	1.406	1.673	1.940	2.214	2.488	2.753	n [min ⁻¹]	
112M/4	4 kW	3,57	26,4	26,4	26,4	26,4	26,4	24,0	21,2	18,6	16,0	13,8	12,1	M [Nm]	
	9,5 A		100	100	100	100	100	91	80	70	61	52	46	M [%]	
		3,53	2	224	402	827	1.123	1.418	1.691	1.967	2.242	2.519	2.793	n [min ⁻¹]	
132S/4	5,5 kW	4,88	35,2	36,4	36,4	36,4	35,8	32,3	28,3	23,4	19,5	17,3	14,2	M [Nm]	
	12,5 A		97	100	100	100	98	89	78	64	54	47	39	M [%]	
		4,28	26	250	551	851	1.153	1.444	1.725	2.010	2.299	2.585	2.876	n [min ⁻¹]	
132M/4	7,5 kW	6,83	47,0	49,6	49,6	49,6	49,6	45,2	38,6	31,3	27,1	23,1	20,0	M [Nm]	
	16,0 A		95	100	100	100	100	91	78	63	55	47	40	M [%]	
		6,03	27	249	551	851	1.151	1.442	1.727	2.011	2.302	2.585	2.875	n [min ⁻¹]	
132MA/4 T140°C	11 kW	8,19	57,2	60,8	60,8	60,8	60,8	54,5	46,8	38,8	32,9	28,9	25,1	M [Nm]	
	24,0 A		94	100	100	100	100	90	77	64	54	48	41	M [%]	
		7,52	18	238	539	840	1.140	1.435	1.720	2.008	2.298	2.580	2.866	n [min ⁻¹]	

2.2.2 IE1 and IE2 motors with external fan, 87 Hz-nominal point, category 3D

Motor type		For the circuit, please refer to 1.7													
		Frequency inverter power and nominal current													
		Motor power in [kW] at 50 Hz (upper value) and 100 Hz (lower value)													
			3	10	20	30	40	50	60	70	80	90	100	f _s [Hz]	
63S/4	0,55 kW	0,12	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,8	0,8	0,8	M [Nm]
	1,6 A	0,20	100	100	100	100	100	100	100	100	100	96	92	90	M [%]
		0,22	20	152	369	688	1.007	1.310	1.612	1.914	2.213	2.419	2.763		n [min ⁻¹]
63L/4	0,55 kW	0,18	1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,3	1,2	1,2	M [Nm]
	1,6 A	0,30	100	100	100	100	100	100	100	100	100	96	92	90	M [%]
		0,33	20	175	407	715	1.002	1.306	1.610	1.909	2.207	2.415	2.713		n [min ⁻¹]
71S/4	0,55 kW	0,25	1,7	1,7	1,7	1,7	1,7	1,7	1,7	1,7	1,7	1,7	1,6	1,6	M [Nm]
	1,6 A	0,41	100	100	100	100	100	100	100	100	100	97	92	92	M [%]
		0,47	100	146	442	734	1.031	1.364	1.663	1.962	2.260	2.460	2.818		n [min ⁻¹]
71L/4	0,75 kW	0,35	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,4	2,3	M [Nm]
	2,2 A	0,61	95	95	95	95	95	95	95	95	95	95	92	90	M [%]
		0,69	0	188	488	782	1.077	1.350	1.633	1.941	2.245	2.457	2.797		n [min ⁻¹]
80S/4	1,1 kW	0,54	3,8	3,8	3,8	3,8	3,8	3,8	3,8	3,8	3,8	3,8	3,6	3,5	M [Nm]
	3,0 A	0,93	99	99	99	99	99	99	99	99	99	99	94	92	M [%]
		1,03	0	164	440	757	1.052	1.351	1.638	1.947	2.237	2.457	2.814		n [min ⁻¹]
80L/4	1,5 kW	0,79	5,5	5,5	5,5	5,5	5,5	5,5	5,5	5,5	5,5	5,5	5,3	5,0	M [Nm]
	3,7 A	1,36	106	106	106	106	106	106	106	106	106	106	102	95	M [%]
		1,46	0	207	493	792	1.086	1.377	1.668	1.970	2.256	2.439	2.813		n [min ⁻¹]
90S/4	2,2 kW	1,07	7,4	7,4	7,4	7,4	7,4	7,4	7,4	7,4	7,4	7,4	7,0	6,8	M [Nm]
	5,5 A	1,83	98	98	98	98	98	98	98	98	98	98	92	90	M [%]
		2,03	0	192	482	778	1.070	1.370	1.675	1.978	2.270	2.489	2.833		n [min ⁻¹]
90L/4	3 kW	1,42	9,8	9,8	9,8	9,8	9,8	9,8	9,8	9,8	9,8	9,8	9,1	8,6	M [Nm]
	7,0 A	2,38	95	95	95	95	95	95	95	95	95	95	88	83	M [%]
		2,56	73	179	487	789	1.085	1.387	1.684	1.988	2.284	2.497	2.863		n [min ⁻¹]
100L/4	4 kW	1,99	13,5	13,5	13,5	13,5	13,5	13,5	13,5	13,5	13,5	13,5	12,8	12,3	M [Nm]
	9,5 A	3,37	94	94	94	94	94	94	94	94	94	94	89	86	M [%]
		3,73	0	207	520	809	1.106	1.409	1.709	2.008	2.307	2.518	2.887		n [min ⁻¹]
100LA/4 T140°C	5,5 kW	3,02	20,3	20,3	20,3	20,3	20,3	20,3	20,3	20,3	20,3	19,3	18,5	17,3	M [Nm]
	12,5 A	4,87	100	100	100	100	100	100	100	100	100	95	91	85	M [%]
		5,21	51	211	516	820	1.120	1.419	1.718	2.016	2.263	2.510	2.877		n [min ⁻¹]
112M/4	7,5 kW	3,92	21,1	26,4	26,4	26,4	26,4	26,4	26,4	26,4	26,4	26,3	26,1	21,6	M [Nm]
	16,0 A	6,87	80	100	100	100	100	100	100	100	100	100	99	82	M [%]
		6,54	15	213	518	820	1.119	1.419	1.719	2.016	2.312	2.517	2.896		n [min ⁻¹]
132S/4	11 kW	5,52	33,5	36,4	36,4	36,4	36,4	36,4	33,8	31,7	28,7	25,3	20,5		M [Nm]
	24,0 A	6,79	92	100	100	100	100	100	93	87	79	70	56		M [%]
		6,27	15	240	545	848	1.150	1.450	1.755	2.057	2.357	2.566	2.921		n [min ⁻¹]
132M/4	15 kW	7,40	46,9	49,6	49,6	49,6	49,6	48,7	47,0	45,3	41,6	39,0	33,8		M [Nm]
	31,0 A	10,47	95	100	100	100	100	98	95	91	84	79	68		M [%]
		10,43	19	244	547	849	1.151	1.452	1.757	2.054	2.356	2.562	2.944		n [min ⁻¹]
132MA/4 T140°C	18 kW	9,01	51,9	60,8	60,8	60,8	59,7	59,6	56,4	53,9	50,4	45,6	42,6		M [Nm]
	38,0 A	12,20	85	100	100	100	98	98	93	89	83	75	70		M [%]
		13,09	17	234	540	840	1.143	1.443	1.746	2.049	2.349	2.556	2.934		n [min ⁻¹]

2.2.3 IE1 and IE2 motors with external fan, 100 Hz-nominal point, category 3D

Motor type		For the circuit, please refer to 1.7													
		Frequency inverter power and nominal current													
		Motor power in [kW] at 50 Hz (upper value) and 100 Hz (lower value)													
			3	10	20	30	40	50	60	70	80	90	100	f _s [Hz]	
63S/4	0,55 kW	0,09	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	M [Nm]	
	1,6 A		71	71	71	71	71	71	71	71	71	71	70	M [%]	
		0,18	6	134	401	731	1.033	1.346	1.652	1.947	2.253	2.542	2.827	n [min ⁻¹]	
63L/4	0,55 kW	0,13	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,8	M [Nm]	
	1,6 A		68	68	68	68	68	68	68	68	68	67	64	M [%]	
		0,25	30	185	422	750	1.057	1.351	1.648	1.944	2.256	2.548	2.851	n [min ⁻¹]	
71S/4	0,55 kW	0,18	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,1	M [Nm]	
	1,6 A		71	71	71	71	71	71	71	71	71	69	65	M [%]	
		0,34	30	181	462	774	1.076	1.389	1.687	1.985	2.284	2.583	2.884	n [min ⁻¹]	
71L/4	0,55 kW	0,24	1,6	1,6	1,6	1,6	1,6	1,6	1,6	1,6	1,6	1,5	1,4	M [Nm]	
	1,6 A		63	63	63	63	63	63	63	63	63	58	54	M [%]	
		0,42	0	152	475	788	1.090	1.398	1.700	1.992	2.283	2.587	2.891	n [min ⁻¹]	
80S/4	0,75 kW	0,38	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,4	2,2	M [Nm]	
	2,2 A		66	66	66	66	66	66	66	66	66	62	57	M [%]	
		0,67	0	163	410	810	1.108	1.416	1.712	2.028	2.344	2.627	2.910	n [min ⁻¹]	
80L/4	1,1 kW	0,52	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,4	3,2	M [Nm]	
	3,0 A		67	67	67	67	67	67	67	67	67	66	62	M [%]	
		0,99	0	196	505	812	1.116	1.414	1.715	2.015	2.313	2.611	2.908	n [min ⁻¹]	
90S/4	1,5 kW	0,75	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	4,9	4,6	M [Nm]	
	3,7 A		66	66	66	66	66	66	66	66	66	65	60	M [%]	
		1,40	0	183	516	822	1.120	1.425	1.725	2.025	2.321	2.620	2.911	n [min ⁻¹]	
90L/4	2,2 kW	1,05	7,1	7,1	7,1	7,1	7,1	7,1	7,1	7,1	7,1	6,9	6,6	M [Nm]	
	5,5 A		69	69	69	69	69	69	69	69	69	67	64	M [%]	
		2,00	20	192	484	799	1.098	1.406	1.707	2.008	2.309	2.606	2.905	n [min ⁻¹]	
100L/4	3 kW	1,45	9,7	9,7	9,7	9,7	9,7	9,7	9,7	9,7	9,7	9,2	8,7	M [Nm]	
	7,0 A		67	67	67	67	67	67	67	67	67	64	61	M [%]	
		2,68	25	205	524	829	1.132	1.429	1.736	2.036	2.335	2.631	2.927	n [min ⁻¹]	
100LA/4 T140°C	4 kW	1,96	13,1	13,1	13,1	13,1	13,1	13,1	13,1	13,1	13,1	12,4	11,8	M [Nm]	
	9,5 A		65	65	65	65	65	65	65	65	65	61	58	M [%]	
		3,61	20	210	520	830	1.131	1.431	1.731	2.031	2.330	2.629	2.924	n [min ⁻¹]	
112M/4	5,5 kW	2,67	18,0	18,0	18,0	18,0	18,0	18,0	18,0	18,0	18,0	18,0	18,0	M [Nm]	
	12,5 A		68	68	68	68	68	68	68	68	68	68	68	M [%]	
		5,46	5	220	520	820	1.120	1.420	1.720	2.020	2.320	2.599	2.898	n [min ⁻¹]	
132S/4	7,5 kW	3,68	24,2	24,2	24,2	24,2	24,2	24,2	24,2	24,2	24,2	24,2	23,8	M [Nm]	
	16,0 A		67	67	67	67	67	67	67	67	67	67	66	M [%]	
		7,36	15	240	550	850	1.150	1.450	1.750	2.050	2.350	2.650	2.950	n [min ⁻¹]	
132M/4	11 kW	5,42	35,7	35,7	35,7	35,7	35,7	35,7	35,7	35,7	35,7	35,7	33,9	M [Nm]	
	24,0 A		72	72	72	72	72	72	72	72	72	72	68	M [%]	
		10,46	15	240	550	850	1.150	1.450	1.750	2.050	2.350	2.650	2.950	n [min ⁻¹]	
132MA/4 T140°C	15 kW	6,58	43,7	43,7	43,7	43,7	43,7	43,7	43,7	43,7	43,7	43,7	41,5	M [Nm]	
	31,0 A		72	72	72	72	72	72	72	72	72	72	68	M [%]	
		12,73	15	238	536	837	1.138	1.439	1.731	2.029	2.329	2.633	2.930	n [min ⁻¹]	

3 Appendix

Abbreviations

2D Category 2D

3D Category 3D
(non-conducting dust)

ATEX: **AT**mosphères **EX**plosible

DIN Deutsche Industrie Norm

EN European standard

FI Frequency inverter

IE1 Efficiency as per IE1

IE2 Efficiency as per IE2

IE3 Efficiency as per IE3

U/f Voltage/frequency characteristic curve

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