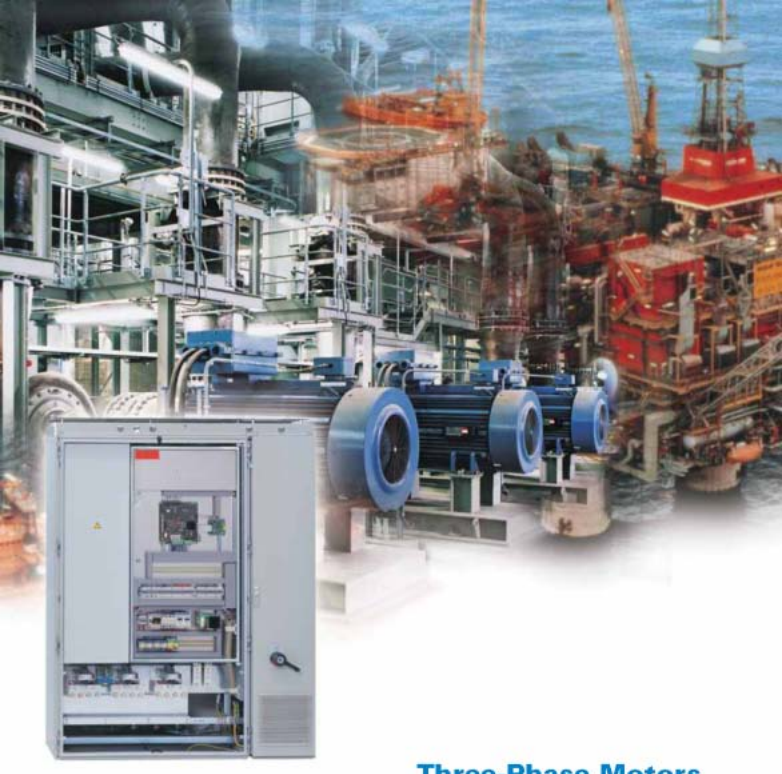


Three-Phase Motors for Variable-Speed Drive Systems

Technical List UN 04 en

We are your Ex-PERT

FLENDER
LOHER

WE MOVE THE WORLD

Technical List
Variable–Speed Drive Systems
UN 04 en

FLENDER
LOHER

1 Basic concepts

1.1 Quality assurance

From quotation to delivery, our complete order handling for electrical machines is done on the basis of an approved quality assurance system complying with the following quality standards:

DIN ISO 9001 / EN 29 001

Loher is certified in accordance with the Directive 94/9/EC:
PTB 99 ATEX Q 003

1.2 Standards and specifications

The motors comply with the relevant standards and specifications, especially with:

Type series	Title	DIN / EN	IEC
all types	Rotating electrical machines – Rated data and operational behaviour	DIN EN 60 034-1	IEC 60034-1 IEC 60085
	Determination of losses and of the efficiency	DIN EN 60034-2	IEC 60034-2
	IP-enclosures	DIN EN 60034-5	IEC 60034-5
	Cooling systems	DIN EN 60034-6	IEC 60034-6
	Mounting arrangements	DIN EN 60034-7	IEC 60034-7
	Terminal designations and direction of rotations	DIN EN 60034-8	IEC 60034-8
	Limit values for noises	DIN EN 60034-9	IEC 60034-9
	Acoustics: Procedure for measurement of airborne noise emitted of rotating electrical machines	DIN EN ISO 1680	–
	Installed thermal protection	–	IEC 60034-11
	Starting characteristics of motors with squirrel cage up to and including 660V, 50 Hz	DIN EN 60034-12	IEC 60034-12
	Mechanical vibrations	DIN EN 60034-14	IEC 60034-14
	IEC–standard voltages	DIN EN 60038	IEC 60038
	Three–phase motors for general use with standardized dimensions and outputs	DIN EN 50347	IEC 60072 [1]
	Output assignment for Increased Safety ”e”	DIN 42677-2	
	Centerholes with threads	DIN 332	–
	Keys, slots, high shape	DIN 6885-1	–
Motors for hazardous areas	Mounting of electrical equipment in hazardous areas	DIN EN 60079–14	IEC 60079–14
	Electrical apparatus for hazardous areas general regulations	DIN EN 50014	–
	Non–sparking ”n”	DIN EN 50021	–
	Increased Safety ”e”	DIN EN 50019	–
	Flameproof Enclosure ”d”	DIN EN 50018	–
	Electrical apparatus for the application in areas with combustible dust	DIN EN 50281–1–1	–

1 Only dimensions are determined in IEC 60072; an output assignment is not yet available.

1.3 General

Three–phase motors with squirrel cage are suitable for mains operation at constant voltage and frequency as well as for frequency inverter operation at variable voltage and frequency. Depending on the connection the operational behaviour of the motor is subject to changes. Mains–operated motors are working with sinusoidal voltages and currents at an almost constant speed. With frequency inverters between power supply and motor an infinitely variable speed control is achieved. In this case, however, the motor voltages and motor currents are no longer sinusoidal.

For the motor assignment the changed behaviour in contrast to mains operation have to be considered.

This catalogue serves to assign Loher Motors for an application with frequency inverters. The detailed assignment tables include suitable motors and its operation data for the most important applications. The essential features of an inverter operation are also mentioned.

1.4 Frequency inverters

For speed control of three–phase motors within the output range of this catalogue, the following inverter types are used:

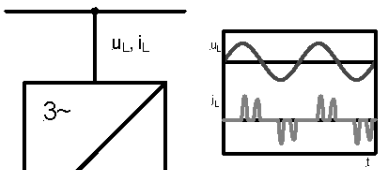
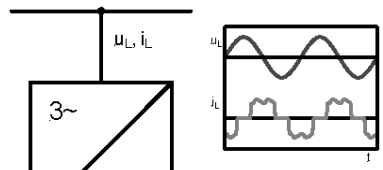
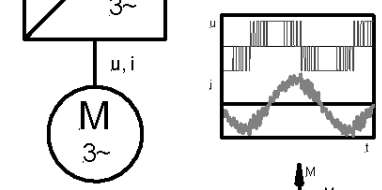
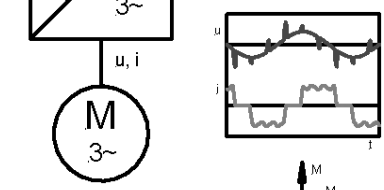
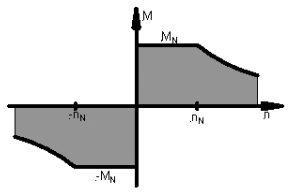
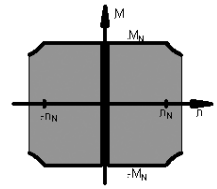
- voltage–source inverters (pulse–controlled inverters or PWM–Inverters)
- current–source inverters (I–Inverters)

Figure 1 shows a comparison of the both inverter types as well as the typical voltages and currents occurring in the motor and power supply system.

The motor voltage– and motor current behaviour for a PWM–Inverter operation depends on the pulse frequency and on the manufacturer–specific pulse pattern. These characteristics have an influence on the operation and the suitability of a motor for the inverter operation.

For connection of an I–Inverter the voltages and currents occurring in the motor are not influenced by the inverter manufacturer.

Frequency inverters, comparison

Inverter system	PWM–Inverter	I–Inverter
Mains voltage u_L Mains current i_L		
Mains converter	non–controlled bridge	controlled bridge
Intermediate circuit	Intermediate circuit capacitor	Intermediate circuit choke
Machine converter	self–commutated converter	self–commutated converter
Motor voltage u Motor current i		
Speed–torque range		
typ. frequency range	f = 0 ...100...500 Hz	f = (0) ...5...50...(100) Hz[1]
typ. speed range	n = 0 ...4 · n_N	n = (0) ...0.1...1...(2) · n_N[1]
typ. power range	0 – 2000 kVA (low–voltage inverters) 700–10000 kVA (medium–voltage inverters)	50 – 5000 kVA (low–voltage inverters) 2000–10000 kVA (medium–voltage inverters)
typ. applications	Fans, pumps, machine tools, conveyor belts, assembly lines, winder drives, metering drives, air–conditioning drives, hoisting drives, mixers, extruders, wind power plants	High–power pumps and fans, mills, centrifuges, decanters, agitators, rolling mills, extruders, mixers, compressors
Essential features	2–quadrant operation (4–quadrant operation with additional expenditure) Mains current harmonics manufacturer–dependent Mains–cos φ ≈ 1 High speed control range	4–quadrant operation Low mains current harmonics Mains–cos φ ≤ 0.95 Limited speed control range

[1] Values in parenthesis with additional measures

Fig. 1: Comparison of PWM–Inverter and I–Inverter

1.5 Three–phase motors for inverter operation and mains operation

Motors being suitable for both inverter operation and mains operation are indicated in the assignment tables. Apart from some exceptions these motors comply with the motors in the **current Technical Lists**. This is above all applicable to the type series

AN..
Three–phase motors for low voltage with squirrel cage, totally enclosed fan–cooled

DN..
Explosion–proof three–phase motors with squirrel cage for low voltage, protection type ”Flameproof Enclosure”

In an exceptional case the motors are optimized for inverter operation, e.g. by special rotors. In the tables these motors are especially marked.

The available catalogue also contains information on frequency inverter operation of EEx e– and Ex n–motors.

1.6 Scope of assignment tables

The assignment tables were issued for motors operated at the inverters

LOHER DYNAVERT® T

(PWM–Inverter)

and for 6∼motors at the inverters

LOHER DYNAVERT® I

(I–Inverter)

The admissible powers for 3 ∼ motors at the **LOHER DYNAVERT®** I (I–Inverter) are obtained from the tables for operation at the PWM–Inverter less 10%

The scope of the assignment tables also covers inverters of other manufacturers with an equivalent pulse pattern.

A nearly equivalent pulse pattern is achievable with a regulation to sinusoidal motor current and the following pulse frequencies:

$$\begin{aligned} P \leq 30\ kW &: f_P \geq 4\ kHz \\ 30\ kW < P \leq 130\ kW &: f_P \geq 3\ kHz \\ P > 130\ kW &: f_P \geq 2\ kHz \end{aligned}$$

1.7 Motor rating

The motors of this catalogue are designed in a way that for a rated operation according to EN 60034–1 or VDE 0530 Part 1 they are in compliance with the temperature limits of Insulation Class B or in single cases Insulation Class F.

Rated operation means above all

- mains operation practically with sinusoidal rated voltage and constant frequency of 50 Hz (motors for 60 Hz: see 4.2)
- continuous duty (Duty type: S1) of the motor with its rated power P_N, corresponding with the rated torque M_N and the rated speed n_N
- constant speed
- coolant temperature: ≤ 40 °C
- altitude of installation ≤1000m above sea level

Inverter operation differs from the rated conditions:

- non–sinusoidal variable voltages and currents
- variable frequency and variable speed
- optional utilization of the motors to Insulation Class B or Insulation Class F

Table 1 indicates the special features which have to be considered for inverter–operated motors (see DIN IEC/TS 60034–17 or VDE 0530 Part 17 and our Technical Publication No. 4: Speed control of asynchronous machines).

Table 1: Inverter operation effects

To be observed for inverter operation	Explanations see Chapter
Reduction of the admissible torque due to additional losses of non–sinusoidal voltages and currents	2.1 4.3.3
Reduction of the admissible torque due to decreased cooling of self–ventilated motors at low speed	2.3.1 2.4.2.2
Reduction of the achievable torque with field weakening	2.4.1
Reduction of the admissible torque due to increased iron losses for operation at constant flux and frequencies exceeding the rated frequency (e.g. 87Hz)	2.4.2
Higher insulation stress	5.1
Higher noise due to self–ventilation at frequencies exceeding the rated frequency	5.2
Partially increased noise due to harmonics or operation at a certain speed (e.g. frame oscillation exciting)	5.2
Compliance with rules for the use of explosion–proof motors	5.4
Occurrence of bearing currents and shaft voltages	5.5
Compliance with mechanical speed limits for operation at speeds exceeding the rated speed (bearing speeds, centrifugal forces, critical speed of rotor shaft, maximum speed of plastic fans for the use of motors in the hazardous area of Zone 2)	5.6
Shorter grease life and relubrication times at speeds exceeding the rated speed	5.7

2 Inverter–operated three–phase motors

The torque–speed–behaviour of the motor and the working machine is important for the designing of electric drives. Whereas the **torque–speed–characteristic** is important for mains–fed asynchronous motors, an inverter operation requires above all the consideration of the **limit curve of the torque.**

2.1 Limit curve of the torque

Figure 2 shows the typical behaviour of the motor torque for mains operation with the characteristic features starting torque, pull–up torque and breakdown torque.

From the overall torque–speed–characteristic line (M–n–characteristic) only the steep range marked by a broken line is normally used for inverter operation. With the frequency– and voltage control of the inverter operation a parallel displacement of this range to lower speeds is possible by a frequency reduction. Higher frequencies displace this range at a constant flux parallel and at field weakening with decreasing steepness to the right resulting in higher speeds. The continuously achievable torque is drawn as limit curve in Figure 2.

The limit curve indicates for constant flux the thermally admissible torque for continuous duty.

With the limit torque the motor in continuous duty is not heating more than specified by its insulation class.

On principle an operation at speed ”Zero” is also possible.
(Limit torque upon request)
In the field weakening range the limit curve indicates up to limit frequency f_L the torque which is achievable at an approximately constant motor current and thus constant inverter current. Beyond the limit frequency the achievable torque is limited by the strongly decreasing breakdown torque.

The following principle has to be considered for the designing of inverter drives:

- The torque of the working machine (load torque) at continuous duty must always be less than the limit torque of the motor.

Higher motor torques are generally possible, but at continuous duty they cause a higher temperature rise and require more current from the inverter *(as to overload capability see chapter 5.3).*

The motor power can be determined from the M–n–curves. The power output of the motor is calculated at every point of the M–n–curve from the torque and the relating speed.

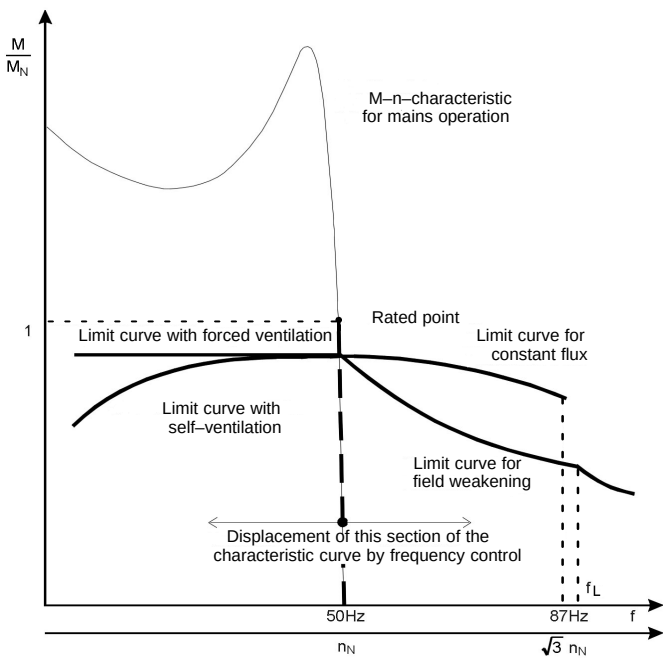


Fig. 2: Torque–speed–characteristic of the asynchronous motor and limit torque for inverter operation

$$P = 2\pi n M$$

or

$$\frac{P}{kW} = \frac{1}{9550} \cdot \frac{n}{min^{-1}} \cdot \frac{M}{Nm}$$

It has to be distinguished between the possible power at inverter operation and the rated power (applicable for mains operation).

In the M–n–curves and in the assignment tables the rated power P_N (to be calculated from the rated torque M_N and the rated speed n_N) is marked by a point. The power at inverter operation (e.g. P_1) is marked by a cross.

For inverter operation the maximum possible torque is often less than the rated torque. It results from the physical connections (laws of growth) that for larger motors a higher reduction of the torque is required than for smaller motors. The extent of the torque reduction also depends on the working machine (constant or quadratic load torque), the cooling type, the speed range and the utilization (Insulation Class B or F).

In case of smaller motors and for utilization to Insulation Class F the power at inverter operation can also be a little higher than the rated power.

2.2 Drives with quadratic load torque

The load torque of centrifugal pumps and fans (ventilators) is increasing quadratically with the speed. **Figure 3** shows that a motor with self–ventilation is always suitable. The load torque is always less than the motor torque.

2.3 Drives with constant load torque

For drives with constant load torque like e.g. stirrers or hoisting gears it has to be distinguished whether the used motor will be cooled with a self–ventilation on the motor shaft or by forced ventilation.

2.3.1 Motors with self–ventilation

For self–ventilated motors the cooling effect is reduced with the decreasing speed. In order to avoid an overheating of the motor in continuous duty at low speed, the motor torque and consequently the current and the heat–generating losses have to be reduced.

As shown in **Figure 4**, the achievable torque depends on the speed control range. For a control range of e.g. 1:10 the motor can be operated at a constant load torque M_{L4}. This load torque and the rated speed n_N (corresponding to the rated frequency 50 Hz) are used to calculate the reduced power P_4 whitch is less than the rated power P_N.

Note:
The torque and motor power reduction e.g. to M_{L4} or P_4 is only required when the motor is operated at low speed continuously or for a longer time. If the operation at low speed only takes a short time (some minutes) a reduction is not necessary (also see chapter 5.4).
This is important e.g. for drives with an increased breakaway torque. Since the start normally is of a short duration, it is not necessary to consider the increased breakaway torque for thermal reasons. However, it should not be forgotten that higher torque (for the usual control to constant stator flux) requires higher current from the inverter.

2.3.2 Motors with forced ventilation

The reduction of motor torque and power at constant load torque and large control range can be avoided by using motors with forced ventilation. The cooling effect is then independent from the motor speed (**Figure 5**).

There is a special feature for larger motors as from Type ANSA–355LN (Vario). These motors have two fans, one inside and one outside the frame. The internal fan cannot be driven separately, hence the cooling effect is speed–dependent. Also when an external separately driven fan is used, the limit torque decreases at lower speed.

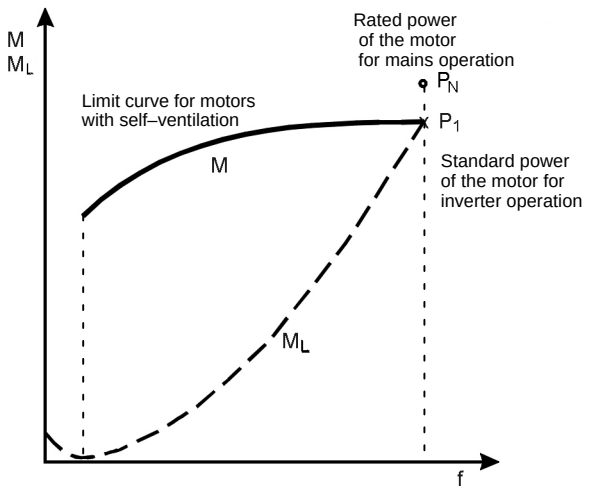


Fig. 3 Motors with self–ventilation for pump– and fan drive ($M_L \sim n^2$)

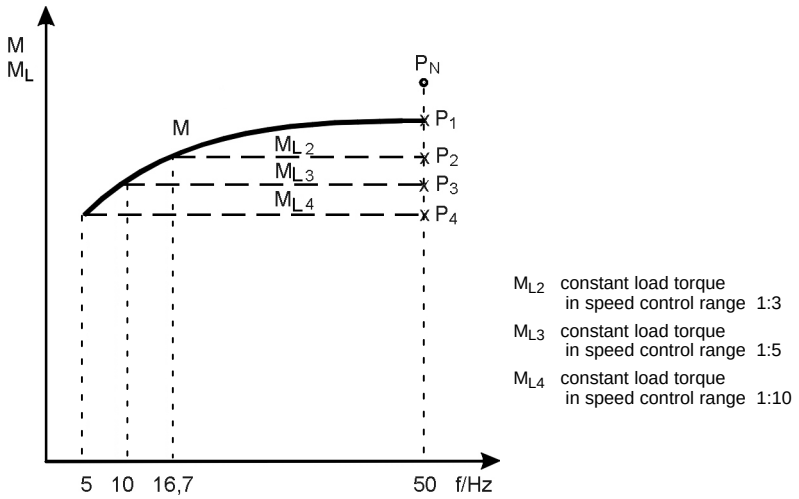


Fig 4: Torque reduction due to decreased cooling effect for motors with self–ventilation (M_L = const.)

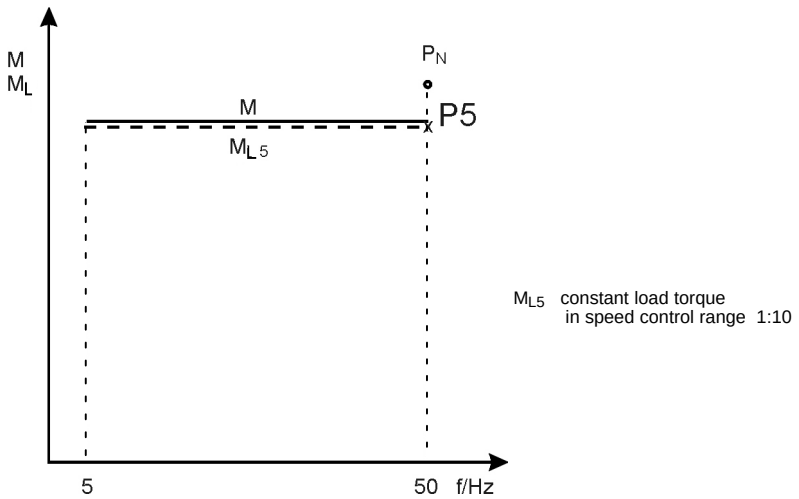


Fig. 5: Torque at constant load torque for forced ventilation

2.4 Motors with higher frequency range

Above its rated frequency the inverter–fed motors can be operated differently. All motors can be operated with field weakening (2.4.1), for certain motors an operation at constant flux is also possible (2.4.2) (**Figure 6**).

2.4.1 Operation with field weakening

At this operation a frequency increase beyond the rated frequency occurs with constant voltage. This reduces the magnetic flux and the available torque decreases until the limit frequency f_L with $M \sim 1/f$. The power output of the motor remains constant.

In the field weakening range the breakdown torque M_B of the motor is strongly decreasing ($M_B \sim 1/f^2$). From the limit frequency f_L a stronger reduction of the torque is required, as otherwise the necessary distance between the breakdown torque M_B and the torque M becomes too small.

In practice the breakdown torque should be at least 40% over the stationary required torque. For dynamic processes (accelerating, braking) an distance of 20% is sufficient.

2.4.2 Operation at constant flux up to $f = \sqrt{3} f_N$

This operation requires motors which are designed for mains operation in Y–connection. For inverter operation the windings are connected in delta. Due to this an operation at constant flux is possible up to the $\sqrt{3}$–fold rated frequency. Hence, motors for a rated frequency of 50 Hz can also be operated at constant speed with $\sqrt{3} \cdot 50\,\text{Hz} = 87$ Hz.

However due to the iron losses $P_{Fe,}$ increasing with the frequency, a torque reduction is required. In spite of this a power increase of up to 60% compared to rated power is achievable with this method. With increasing frame sizes this power increase becomes less.

For larger frame sizes a motor of a special design different from the standard motor is recommendable (upon request).

For motors with forced ventilation the cooling remains constant over the whole speed range. At high speeds the cooling effect for motors with self–ventilation improves insignificantly. The higher utilization achieved in this way is of such an insignificance that in the assignment tables no difference was made between motors with self– and forced cooling.

Attention:
For self–ventilated motors the fan noise strongly increases with the speed. Therefore is e.g. the sound pressure level of a 2–pole motor at 87 Hz on the average by approx. 13 dB(A) higher than at 50 Hz (see chapter 5.2). The mechanically or magnetically caused noises are also increasing with the frequency but less than the fan noise .
In case of forced ventilation the noise increases at 87 Hz by only approx. 4 dB(A) on the average.

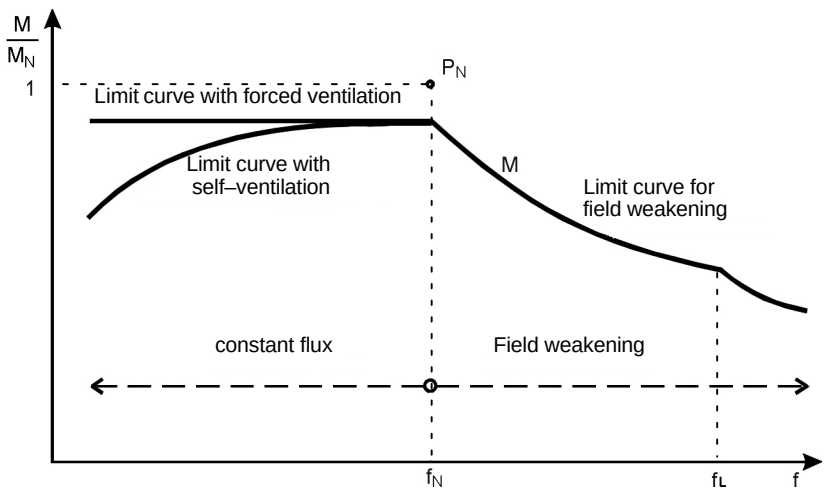


Fig. 6: Constant flux and field weakening range

2.4.2.1 Drives with quadratic load torque

Figure 7 shows that with a quadratic load torque the torque reduction at maximum frequency is decisive. The reducing limit torque of self–ventilated motors at low frequencies is no hindrance, since the load torque strongly decreases.

2.4.2.2 Drives with constant load torque

At constant load torque the necessary reduction of the torque to keep the temperature limit depends on the cooling type and the speed range.
Figure 8 shows the influences on motors with self–ventilation. Over 50 Hz (high speeds) the torque reduction is necessary due to the increasing iron losses, whereas low speeds require the torque reduction due to the poor cooling.

For selection of a self–ventilated motor the torques of two columns must therefore be compared in the assignment tables:

1. For the high speed range the torque M_{L6}
2. For the low speed range the corresponding torques M_{L2}, M_{L3}, M_{L4} (also see Figure 4)

The lower torque of both columns can continuously be applied in the overall speed range.

The maximum motor power has to be recalculated, if the torque in the low speed range is less than in the high speed range, e.g. $M_{L3} < M_{L6}$.

Example:
For motor type ANGA–200LG–04,
P_N = 30 kW, Utilization B this means
P_6 = 41 kW, M_{L6}, = 154 Nm as well as
M_{L3} = 145 Nm. Due to $M_{L3} < M_{L6}$ the maximum motor power (at maximum speed) will be recalculated:

$$P_{6new} = P_6 \frac{M_{L\ \text{low sped range}}}{M_{L6}} =$$

$$= 41\ \text{kW} \frac{145\ \text{Nm}}{154\text{kW}} = 38.6\ \text{kW}$$

With forced ventilation the speed range has no influence on the necessary torque reduction (**Figure 9**). Another advantage of the forced ventilation is the low noise emission (see chapter 5.2).

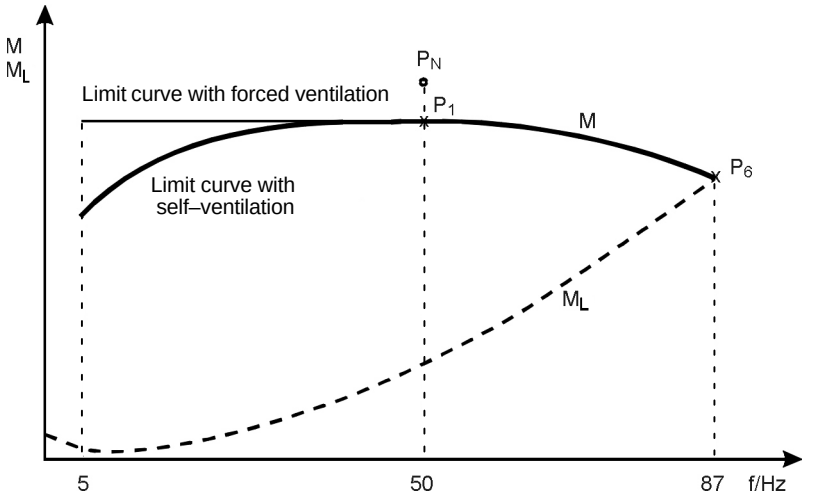


Fig. 7: Operation in the higher frequency range with constant flux

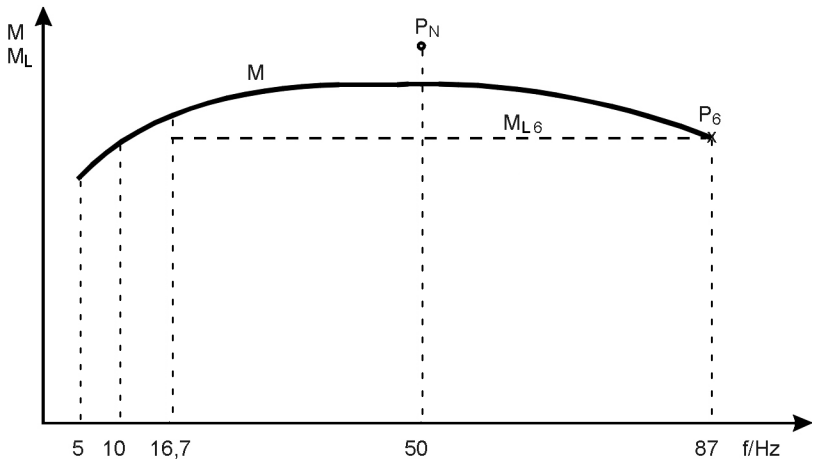


Fig. 8: Torque of self–ventilated motors at constant flux and constant load torque

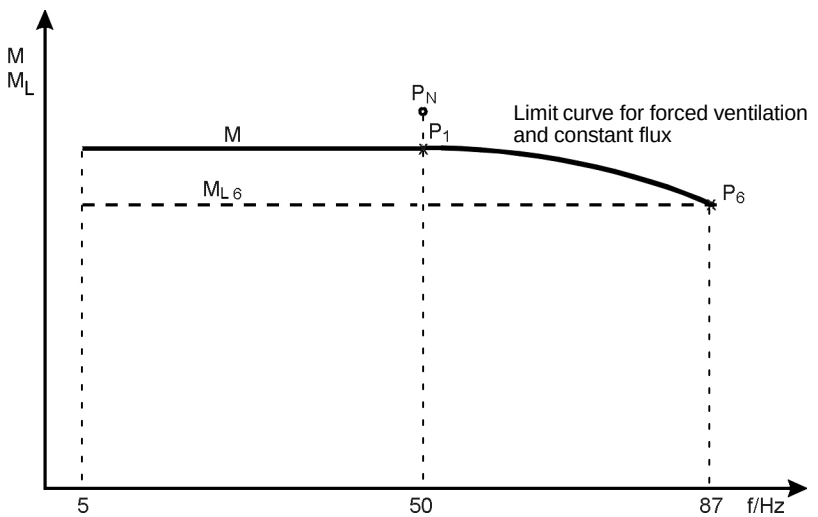


Fig. 9: Torque of forced–ventilated motors at constant flux and constant load torque

3 Assignment tables

3.1 Tolerances

In addition to the rated power and the rated voltage the assignment tables include the possible power at inverter operation, the corresponding torque and current I_1 as well as the displacement factor $\cos\varphi$ and efficiency η.

Current, displacement factor and efficiency are applicable to presumed **sinusoidal** voltages and currents at maximum frequency and consequently maximum power. In the M–n–characteristic this working point is marked by a cross (x)
(see Figures 3 – 5 and 7 – 9).

For inverter operation with non–sinusoidal voltages and currents insignificantly changed values occur depending on the inverter type. Moreover these variables change depending on the working point, i.e. according to torque and frequency or speed. The conversion of these variables is explained in chapter 4.

3.1 Tolerances

For displacement factor and efficiency the tolerances according to EN 60034–1 are applicable:

Tolerance $\Delta\eta$ for the efficiency:
$P \leq 50$ kW: $\Delta\eta = -0.15\ (1-\eta)$.
$P > 50$ kW: $\Delta\eta = -0.10\ (1-\eta)$.

Tolerance $\Delta\cos\varphi$ for the displacement factor to:

$$\Delta\cos\varphi = -\frac{1-\cos\varphi}{6}$$

The tolerance calculated to this formula is limited:
minimum: $\Delta\cos\varphi = 0.02$
maximum: $\Delta\cos\varphi = 0.07$

Explanation of table particulars:

P_N	Rated power (for mains operation at sinusoidal voltages and currents)		
P_1	Power at $M_L \sim n^2$	Control range 1:10	Self–ventilation
P_2	Power at $M_L = \text{const}$	Control range 1:3	Self–ventilation
P_3	Power at $M_L = \text{const}$	Control range 1:5	Self–ventilation
P_4	Power at $M_L = \text{const}$	Control range 1:10	Self–ventilation
P_5	Power at $M_L = \text{const}$	Control range 1:10	Forced ventilation
P_6	Power at $M_L = \text{const}$ / $M_L \sim n^2$	Control range 10:17	Self–ventilation / Forced ventilation
M_{L1}	Maximum load torque at $M_L \sim n^2$	Control range 1:10	Self–ventilation
M_{L2}	Constant load torque at	Control range 1:3	Self–ventilation
M_{L3}	Constant load torque at	Control range 1:5	Self–ventilation
M_{L4}	Constant load torque at	Control range 1:10	Self–ventilation
M_{L5}	Constant load torque at	Control range 1:10	Forced ventilation
M_{L6}	Constant load torque at	Control range 10:17	Self–ventilation / Forced ventilation
U	Rated voltage		
I_1	Current (fundamental oscillation) for inverter power P_1 to P_6		
$\cos\varphi$	Displacement factor for inverter power P_1 to P_6		
η	Efficiency for inverter power P_1 to P_6 (without inverter–dependent additional losses)		

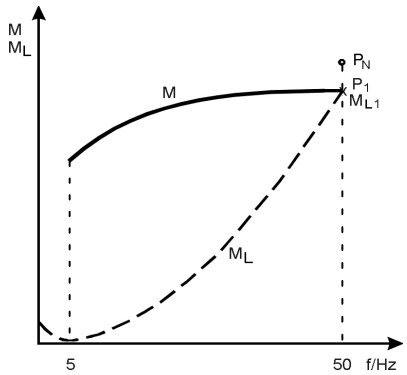
3.2 Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at PWM–Inverter

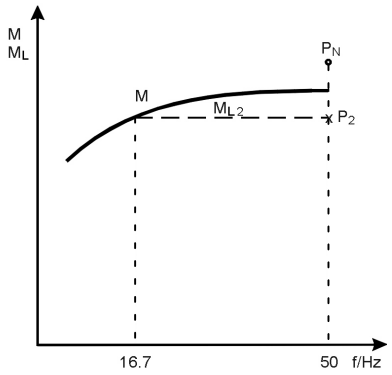
(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 3000 min^{-1}



Speed range: 300 – 3000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$



Speed range: 1000 – 3000 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–02	1.5	1.50	5.1	400	3.30	0.87	77.9	1.20	4.1	400	2.80	0.82	78.2
ANGA–090LB–02	2.2	2.20	7.4	400	4.65	0.86	81.7	1.75	5.9	400	3.90	0.82	81.9
ANGA–100LB–02	3	3.15	10.4	400	6.20	0.89	84.1	2.55	8.4	400	5.20	0.86	84.4
ANGA–112MB–02	4	4.20	13.9	400	8.00	0.93	84.1	3.90	12.9	400	7.40	0.92	84.3
ANGA–132SB–02	5.5	5.80	19.0	400	11.4	0.88	85.2	4.95	16.3	400	10.0	0.86	85.1
ANGA–132SD–02	7.5	7.80	25.5	400	14.7	0.88	88.4	6.30	20.5	400	12.4	0.85	88.5
ANGA–160MB–02	11	11.6	38	400	22	0.88	88.3	10.3	33.5	400	19.7	0.87	88.4
ANGA–160MD–02	15	15.0	49	400	28	0.88	89.7	12.1	39.5	400	23.5	0.85	89.8
ANGA–160LB–02	18.5	19.4	64	400	35	0.90	91.0	15.8	52	400	29	0.88	91.4
ANGA–180MB–02	22	23.0	75	400	43	0.87	90.7	21.0	68	400	40	0.86	90.6
ANGA–200LG–02	30	31.5	102	400	55	0.92	92.2	25.0	81	400	44	0.90	92.0
ANGA–200LJ–02	37	35	113	400	62	0.89	92.6	27.5	89	400	51	0.87	92.2
ANGA–225ME–02	45	47	152	400	82	0.90	93.4	38	123	400	68	0.88	93.2
ANGA–250ME–02	55	58	186	400	103	0.88	93.8	51	163	400	93	0.86	93.6
ANGA–280SG–02 [1]	75	77	245	400	128	0.93	94.7	61	196	400	102	0.92	94.6
ANGA–280MG–02 [1]	90	86	275	400	144	0.92	94.6	69	220	400	118	0.91	94.4
ANGA–315SL–02	110	105	335	400	180	0.90	94.8	89	285	400	156	0.89	94.5
ANGA–315ML–02	132	125	400	400	215	0.90	95.3	108	345	400	189	0.88	95.0
ANGA–315MN–02	160	152	485	400	255	0.91	96.0	130	415	400	220	0.89	95.8
ANGA–315LL–02	200	182	580	400	310	0.90	95.6	160	510	400	275	0.89	95.4
ANGA–315LN–02 [2]	250	215	690	400	355	0.93	96.1	179	570	400	300	0.92	95.9
ANGA–315LN–02 [3]	250	240	760	400	385	0.94	96.4	205	650	400	330	0.94	96.4
ANGA–355LB–02 [2]	315	275	890	400	460	0.90	96.6	230	740	400	390	0.88	96.5
ANGA–355LB–02 [3]	315	300	960	400	495	0.90	96.9	260	840	400	435	0.89	96.8
ANSA–355LC–02	355	335	1080	690	315	0.92	96.8	280	900	690	265	0.92	96.7
ANSA–355LD–02	400	380	1220	690	360	0.91	97.0	330	1060	690	320	0.90	96.9
ANSA–355LX–02	450	430	1370	690	410	0.91	96.5	350	1130	690	340	0.90	96.5
ANSA–400LN–02	500	475	1520	690	450	0.91	96.8	415	1330	690	395	0.91	96.7
ANSA–400LN–02	560	530	1700	690	500	0.91	96.9	450	1440	690	430	0.91	96.8
ANSA–400LX–02	630	600	1920	690	570	0.91	97.0	500	1610	690	475	0.91	96.9
ANSA–450LL–02	710	670	2150	690	630	0.91	96.9	570	1840	690	540	0.91	96.8
ANSA–450LN–02	800	760	2450	690	720	0.91	97.0	650	2050	690	620	0.90	96.9
ANSA–450LN–02	900	860	2750	690	810	0.91	97.2	740	2350	690	710	0.90	97.1

1 Special motor, inverter–optimized (different from Technical List IM)
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

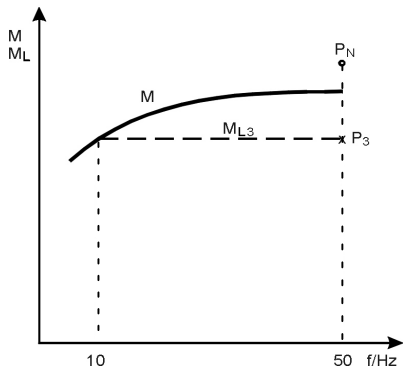
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at PWM–Inverter

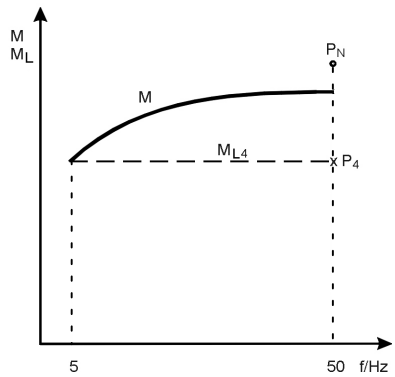
(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 3000 min^{-1}



Speed range: 600 – 3000 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.



Speed range: 300 – 3000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

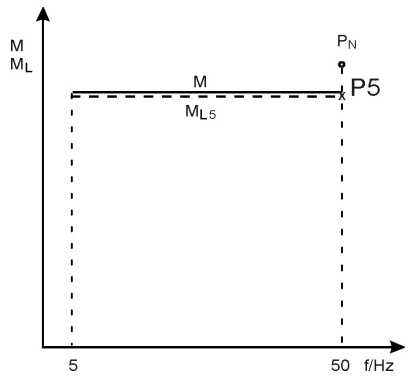
Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–02	1.5	1.01	3.4	400	2.50	0.78	77.7	0.87	2.9	400	2.35	0.74	76.7
ANGA–090LB–02	2.2	1.49	5.0	400	3.55	0.78	81.5	1.28	4.3	400	3.25	0.74	80.7
ANGA–100LB–02	3	2.20	7.2	400	4.7	0.83	84.2	1.92	6.4	400	4.3	0.80	83.8
ANGA–112MB–02	4	3.45	11.5	400	6.7	0.91	84.3	3.1	10.2	400	6.1	0.90	84.1
ANGA–132SB–02	5.5	4.3	14.1	400	9.1	0.84	84.8	3.8	12.4	400	8.3	0.81	84.2
ANGA–132SD–02	7.5	5.4	17.9	400	11.1	0.82	88.2	4.8	15.7	400	10.3	0.79	87.8
ANGA–160MB–02	11	8.9	29.0	400	17.5	0.85	88.3	7.9	26	400	16.0	0.83	88.0
ANGA–160MD–02	15	10.5	34.5	400	21.0	0.83	89.6	9.3	30.5	400	19.3	0.80	89.3
ANGA–160LB–02	18.5	13.7	45	400	25.5	0.86	91.4	12.1	39.5	400	23.0	0.85	91.2
ANGA–180MB–02	22	18.3	59	400	35.5	0.84	90.2	16.4	53	400	33.0	0.82	89.8
ANGA–200LG–02	30	22.0	72	400	39.5	0.89	91.7	20.5	66	400	37.5	0.89	91.4
ANGA–200LJ–02	37	24.5	79	400	46.5	0.85	91.8	22.5	72	400	43.5	0.84	91.5
ANGA–225ME–02	45	36.0	116	400	65	0.88	93.1	33	107	400	60	0.87	92.9
ANGA–250ME–02	55	47.5	153	400	87	0.85	93.5	44	142	400	82	0.84	93.3
ANGA–280SG–02 [1]	75	58	185	400	98	0.92	94.5	54	173	400	92	0.91	94.3
ANGA–280MG–02 [1]	90	65	210	400	111	0.91	94.2	61	197	400	105	0.90	94.1
ANGA–315SL–02	110	85	275	400	150	0.88	94.4	80	255	400	143	0.87	94.2
ANGA–315ML–02	132	104	330	400	184	0.87	94.9	98	310	400	175	0.87	94.8
ANGA–315MN–02	160	124	400	400	215	0.89	95.7	117	375	400	205	0.88	95.6
ANGA–315LL–02	200	155	495	400	270	0.88	95.4	147	470	400	260	0.88	95.3
ANGA–315LN–02 [2]	250	172	550	400	285	0.91	95.8	163	520	400	275	0.91	95.7
ANGA–315LN–02 [3]	250	195	620	400	315	0.93	96.3	183	590	400	300	0.93	96.2
ANGA–355LB–02 [2]	315	220	710	400	375	0.88	96.4	205	660	400	355	0.87	96.3
ANGA–355LB–02 [3]	315	250	810	400	420	0.89	96.8	235	760	400	400	0.88	96.7
ANSA–355LC–02	355	265	850	690	250	0.91	96.6	250	800	690	240	0.91	96.6
ANSA–355LD–02	400	325	1040	690	315	0.90	96.9	305	970	690	295	0.89	96.8
ANSA–355LX–02	450	330	1070	690	320	0.90	96.4	310	990	690	305	0.89	96.4
ANSA–400LN–02	500	395	1270	690	380	0.90	96.7	370	1180	690	355	0.90	96.6
ANSA–400LN–02	560	430	1370	690	410	0.90	96.8	400	1290	690	385	0.90	96.7
ANSA–400LX–02	630	480	1540	690	460	0.91	96.8	450	1450	690	430	0.90	96.7
ANSA–450LL–02	710	550	1760	690	530	0.90	96.7	520	1660	690	500	0.90	96.7
ANSA–450LN–02	800	620	1990	690	600	0.90	96.9	590	1870	690	570	0.89	96.8
ANSA–450LN–02	900	710	2300	690	680	0.90	97.1	670	2150	690	650	0.89	97.0

1 Special motor, inverter–optimized (different from Technical List IM)
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 3000 min^{-1}

Speed range: 300 – 3000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
ANLA–090LX–02	1.5	1.51	5.1	400	3.35	0.87	77.9
ANLA–090LB–02	2.2	2.20	7.4	400	4.65	0.86	81.7
ANLA–100LB–02	3	3.15	10.4	400	6.2	0.89	84.1
ANLA–112MB–02	4	4.2	13.9	400	8.0	0.93	84.1
ANLA–132SB–02	5.5	5.8	19.0	400	11.4	0.88	85.2
ANLA–132SD–02	7.5	7.8	25.5	400	14.7	0.88	88.4
ANLA–160MB–02	11	11.6	38	400	22	0.88	88.3
ANLA–160MD–02	15	15.0	49	400	28	0.88	89.7
ANLA–160LB–02	18.5	19.4	64	400	35	0.90	91.0
ANLA–180MB–02	22	23.0	75	400	43	0.87	90.7
ANLA–200LG–02	30	31.5	102	400	55	0.92	92.2
ANLA–200LJ–02	37	35	113	400	62	0.89	92.6
ANLA–225ME–02	45	47	152	400	82	0.90	93.4
ANLA–250ME–02	55	58	186	400	103	0.88	93.8
ANLA–280SG–02 [1]	75	76	245	400	127	0.93	94.7
ANLA–280MG–02 [1]	90	86	275	400	144	0.92	94.6
ANLA–315SL–02	110	104	335	400	178	0.90	94.8
ANLA–315ML–02	132	125	400	400	215	0.90	95.3
ANLA–315MN–02	160	151	485	400	255	0.91	95.9
ANLA–315LL–02	200	181	580	400	305	0.90	95.6
ANLA–315LN–02 [2]	250	215	690	400	355	0.93	96.1
ANLA–315LN–02 [3]	250	240	760	400	385	0.94	96.4
ANLA–355LB–02 [2]	315	280	890	400	465	0.90	96.6
ANLA–355LB–02 [3]	315	300	960	400	495	0.90	96.9
ANUA–355LC–02	355	335	1080	690	315	0.92	96.8
ANUA–355LD–02	400	380	1220	690	360	0.91	97.0
ANUA–355LX–02	450	415	1330	690	395	0.91	96.5
ANUA–400LN–02	500	460	1470	690	440	0.91	96.8
ANUA–400LN–02	560	520	1650	690	495	0.91	96.9
ANUA–400LX–02	630	580	1860	690	550	0.91	96.9
ANUA–450LL–02	710	650	2100	690	620	0.91	96.9
ANUA–450LN–02	800	740	2350	690	710	0.91	97.0
ANUA–450LN–02	900	830	2650	690	790	0.91	97.2

1 Special motor, inverter–optimized (different from Technical List IM)
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

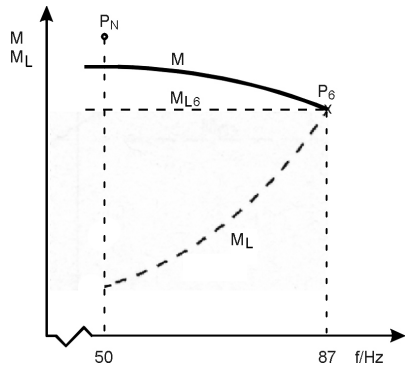
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 3000 min^{-1}



Speed range:	3000 – 5200 min^{-1}
Control range:	10 : 17
Frequency:	50 – 87 Hz
Fan:	Self–ventilation, Forced ventilation
Load torque:	M_L = const./ $M_L \sim n^2$

Type	P_N kW	P_6 kW	M_{L6} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–02	1.5	2.15	4.2	400	5.1	0.82	77.2
ANGA–090LB–02	2.2	3.1	6.0	400	7.0	0.81	82.0
ANGA–100LB–02	3	4.4	8.5	400	9.4	0.86	81.9
ANGA–112MB–02	4	5.9	11.3	400	12.1	0.91	79.6
ANGA–132SB–02	5.5	8.1	15.4	400	17.7	0.86	79.9
ANGA–132SD–02	7.5	11.0	21.0	400	22.0	0.85	86.7
ANGA–160MB–02	11	15.8	30.0	400	32.5	0.86	83.8
ANGA–160MD–02	15	21.5	40.5	400	43	0.86	86.7
ANGA–160LB–02	18.5	26.5	50	400	50	0.88	88.9
ANGA–180MB–02	22	31.5	59	400	65	0.85	85.5
ANGA–200LG–02	30	38	71	400	72	0.90	87.4
ANGA–200LJ–02	37	39	73	400	79	0.85	86.7
ANGA–225ME–02	45	58	108	400	110	0.87	89.3

For mains operation the motor windings have to be Y–connected.

For inverter operation Δ–connection of the windings is required.

For the control range below 50 Hz the limit torques M_{L2}, M_{L3}, M_{L4} have to be observed (see Chapter 2.4.2.2)

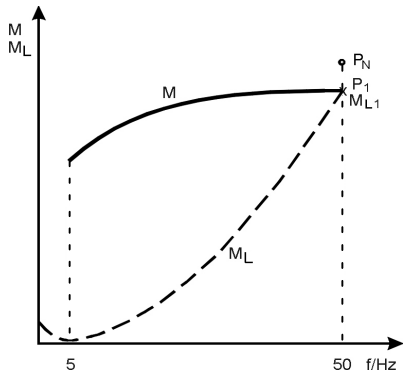
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at PWM–Inverter

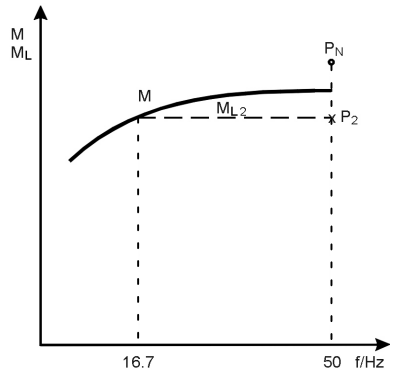
(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 1500 min^{-1}



Speed range: 150 – 1500 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$



Speed range: 500 – 1500 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–04	1.1	1.15	7.8	400	2.55	0.87	77.8	0.96	6.5	400	2.20	0.84	78.6
ANGA–090LB–04	1.5	1.57	10.7	400	3.55	0.87	76.6	1.30	8.9	400	3.05	0.83	77.4
ANGA–100LB–04	2.2	2.3	15.7	400	5.1	0.86	78.2	1.83	12.5	400	4.25	0.82	79.0
ANGA–100LD–04	3	3.0	20.5	400	6.9	0.81	80.6	2.30	15.7	400	5.8	0.74	80.8
ANGA–112MB–04	4	4.0	27.0	400	8.3	0.87	83.3	3.20	21.5	400	6.8	0.83	84.0
ANGA–132SB–04	5.5	5.8	38.5	400	11.4	0.88	86.3	4.85	32.5	400	9.7	0.85	86.8
ANGA–132MB–04	7.5	7.8	52	400	15.2	0.86	87.9	6.3	41.5	400	12.7	0.83	88.4
ANGA–160MB–04	11	11.5	75	400	22.5	0.86	89.3	9.3	61	400	18.5	0.83	89.7
ANGA–160LB–04	15	15.0	98	400	29.0	0.85	90.5	12.0	79	400	24.0	0.82	91.0
ANGA–180MB–04	18.5	19.1	125	400	35.5	0.87	91.1	15.7	103	400	30.0	0.85	91.3
ANGA–180LB–04	22	23.0	151	400	42.5	0.87	91.5	19.5	127	400	36.5	0.86	91.8
ANGA–200LG–04	30	30.0	197	400	54	0.88	92.3	24.0	155	400	44	0.87	92.6
ANGA–225SE–04	37	35.5	230	400	64	0.88	93.3	29.0	189	400	53	0.86	93.5
ANGA–225ME–04	45	43.5	280	400	81	0.85	93.4	35.5	230	400	68	0.82	93.5
ANGA–250ME–04	55	54	350	400	95	0.88	94.0	46.5	300	400	84	0.87	93.9
ANGA–280SG–04	75	75	485	400	132	0.88	94.7	62	400	400	111	0.87	94.7
ANGA–280MG–04	90	86	550	400	150	0.88	94.9	73	470	400	129	0.87	94.8
ANGA–315SL–04	110	104	670	400	190	0.85	95.2	94	600	400	174	0.83	95.2
ANGA–315ML–04	132	125	810	400	225	0.86	95.4	108	690	400	196	0.85	95.4
ANGA–315MN–04	160	152	980	400	270	0.86	95.7	129	830	400	235	0.84	95.7
ANGA–315LL–04 [2]	200	175	1130	400	320	0.84	95.7	148	950	400	280	0.82	95.6
ANGA–315LL–04 [3]	200	190	1220	400	340	0.86	95.8	167	1070	400	305	0.85	95.7
ANGA–315LM–04 [2]	250	220	1400	400	405	0.83	96.3	181	1160	400	345	0.80	96.2
ANGA–315LM–04 [3]	250	235	1520	400	420	0.85	96.0	210	1340	400	385	0.84	96.0
ANGA–355LB–04	270	250	1610	400	445	0.84	96.5	220	1400	400	400	0.83	96.4
ANGA–355LB–04 [3]	315	300	1920	400	520	0.86	96.4	265	1700	400	470	0.85	96.3
ANSA–355LC–04	355	335	2150	690	340	0.86	96.8	300	1910	690	305	0.85	96.7
ANSA–355LD–04	400	380	2450	690	380	0.86	96.9	335	2150	690	340	0.85	96.8
ANSA–355LN–04	450	430	2750	690	440	0.85	96.7	380	2400	690	390	0.84	96.7
ANSA–355LX–04	500	475	3050	690	480	0.85	96.9	420	2700	690	430	0.84	96.9
ANSA–400LN–04	560	530	3400	690	520	0.88	96.9	470	3000	690	470	0.87	96.8
ANSA–400LN–04	630	600	3850	690	590	0.88	96.8	530	3400	690	530	0.87	96.8
ANSA–400LX–04	710	670	4300	690	660	0.88	97.0	590	3800	690	590	0.87	97.0
ANSA–450LL–04	800	760	4850	690	750	0.88	97.1	670	4300	690	670	0.87	97.0
ANSA–450LN–04	900	860	5500	690	840	0.88	97.2	760	4850	690	750	0.87	97.1
ANSA–450LN–04	950	900	5800	690	880	0.88	97.3	800	5100	690	790	0.87	97.2
ANSA–500LL–04	1000	950	6100	690	930	0.88	97.0	840	5400	690	830	0.87	96.9
ANSA–500LL–04	1120	1060	6800	690	1040	0.88	97.2	940	6000	690	920	0.88	97.1

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

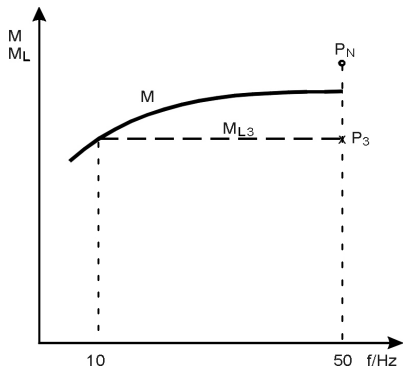
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at PWM–Inverter

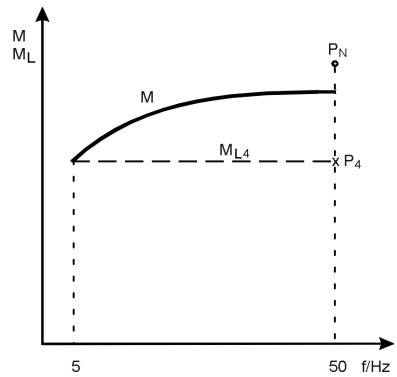
(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 1500 min^{-1}



Speed range: 300 – 1500 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.



Speed range: 150 – 1500 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–04	1.1	0.84	5.7	400	1.99	0.81	78.6	0.77	5.2	400	1.88	0.79	78.4
ANGA–090LB–04	1.5	1.14	7.8	400	2.8	0.80	77.3	1.05	7.1	400	2.65	0.78	77.1
ANGA–100LB–04	2.2	1.67	11.4	400	4.0	0.80	78.9	1.54	10.5	400	3.8	0.78	78.7
ANGA–100LD–04	3	2.1	14.1	400	5.5	0.72	80.5	1.90	12.9	400	5.3	0.69	80.1
ANGA–112MB–04	4	2.9	19.8	400	6.3	0.81	84.0	2.70	18.4	400	6.0	0.80	83.9
ANGA–132SB–04	5.5	4.2	28	400	8.6	0.83	86.9	3.85	25.5	400	8.1	0.82	86.8
ANGA–132MB–04	7.5	5.7	38	400	11.8	0.81	88.4	5.2	35.0	400	11.1	0.79	88.3
ANGA–160MB–04	11	8.4	55	400	17.1	0.82	89.7	7.4	48.5	400	15.5	0.79	89.6
ANGA–160LB–04	15	11.1	73	400	22.5	0.81	91.0	10.0	66	400	21.0	0.79	91.0
ANGA–180MB–04	18.5	14.1	92	400	27.5	0.83	91.3	12.4	81	400	25.0	0.81	91.1
ANGA–180LB–04	22	16.7	109	400	32.0	0.84	91.9	14.7	96	400	29.0	0.82	91.8
ANGA–200LG–04	30	22.0	145	400	40.5	0.86	92.6	20.0	131	400	37.5	0.85	92.5
ANGA–225SE–04	37	29.0	187	400	53	0.86	93.5	26.5	171	400	49	0.85	93.5
ANGA–225ME–04	45	35.0	230	400	68	0.82	93.5	32.0	210	400	63	0.81	93.4
ANGA–250ME–04	55	46.5	300	400	84	0.87	93.9	42.5	275	400	78	0.86	93.8
ANGA–280SG–04	75	62	400	400	111	0.87	94.7	57	370	400	103	0.86	94.6
ANGA–280MG–04	90	73	470	400	129	0.87	94.8	68	435	400	122	0.87	94.7
ANGA–315SL–04	110	93	600	400	173	0.83	95.2	86	550	400	162	0.82	95.1
ANGA–315ML–04	132	107	690	400	195	0.85	95.3	101	650	400	186	0.84	95.3
ANGA–315MN–04	160	129	830	400	235	0.84	95.7	119	770	400	220	0.83	95.6
ANGA–315LL–04 [2]	200	148	950	400	280	0.82	95.6	137	880	400	260	0.81	95.5
ANGA–315LL–04 [3]	200	167	1070	400	305	0.85	95.7	155	1000	400	285	0.84	95.7
ANGA–315LM–04 [2]	250	180	1160	400	345	0.80	96.2	168	1080	400	330	0.79	96.2
ANGA–315LM–04 [3]	250	210	1340	400	385	0.84	96.0	195	1250	400	360	0.83	95.9
ANGA–355LB–04	270	220	1400	400	400	0.83	96.4	205	1320	400	375	0.82	96.4
ANGA–355LB–04 [3]	315	260	1650	400	460	0.85	96.3	245	1550	400	440	0.84	96.2
ANSA–355LC–04	355	290	1860	690	300	0.84	96.7	275	1750	690	285	0.84	96.7
ANSA–355LD–04	400	330	2100	690	335	0.85	96.8	310	1970	690	320	0.84	96.8
ANSA–355LN–04	450	370	2350	690	385	0.84	96.7	345	2200	690	360	0.83	96.6
ANSA–355LX–04	500	410	2650	690	425	0.84	96.8	385	2450	690	400	0.83	96.8
ANSA–400LN–04	560	460	2950	690	460	0.87	96.8	430	2750	690	435	0.86	96.8
ANSA–400LN–04	630	520	3300	690	520	0.87	96.7	485	3100	690	490	0.86	96.7
ANSA–400LX–04	710	580	3750	690	580	0.87	97.0	550	3500	690	550	0.86	97.0
ANSA–450LL–04	800	660	4200	690	660	0.87	97.0	620	3950	690	620	0.86	96.9
ANSA–450LN–04	900	740	4700	690	740	0.87	97.1	690	4450	690	690	0.86	97.0
ANSA–450LN–04	950	780	5000	690	770	0.87	97.2	730	4700	690	730	0.87	97.1
ANSA–500LL–04	1000	820	5200	690	810	0.87	96.9	770	4900	690	770	0.87	96.8
ANSA–500LL–04	1120	920	5900	690	910	0.88	97.1	860	5500	690	850	0.87	97.0

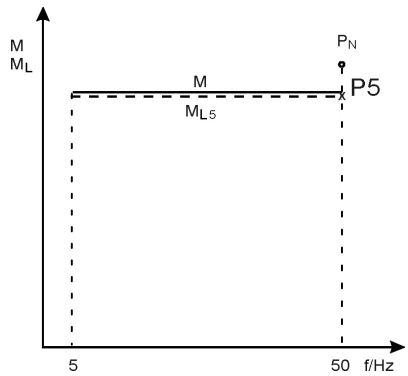
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~



Speed 1500 min^{-1}

Speed range: 150 – 1500 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

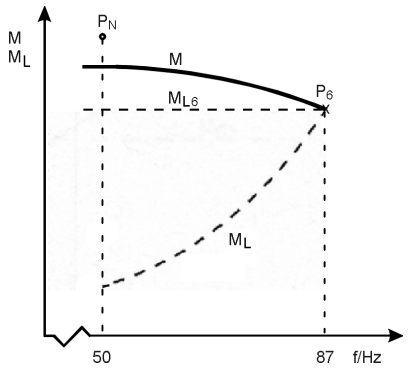
Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
ANLA–090LX–04	1.1	1.15	7.8	400	2.55	0.87	77.8
ANLA–090LB–04	1.5	1.57	10.7	400	3.55	0.87	76.6
ANLA–100LB–04	2.2	2.3	15.7	400	5.1	0.86	78.2
ANLA–100LD–04	3	3.0	20.5	400	6.9	0.81	80.6
ANLA–112MB–04	4	4.0	27.0	400	8.3	0.87	83.3
ANLA–132SB–04	5.5	5.8	38.5	400	11.4	0.88	86.3
ANLA–132MB–04	7.5	7.8	52	400	15.2	0.86	87.9
ANLA–160MB–04	11	11.4	75	400	22.0	0.86	89.3
ANLA–160LB–04	15	14.9	98	400	29.0	0.85	90.5
NLA–180MB–04	18.5	19.2	125	400	36.0	0.87	91.1
ANLA–180LB–04	22	23.0	151	400	42.5	0.87	91.5
ANLA–200LG–04	30	30.0	197	400	54	0.88	92.3
ANLA–225SE–04	37	35.5	230	400	64	0.88	93.3
ANLA–225ME–04	45	43	280	400	80	0.85	93.4
ANLA–250ME–04	55	54	350	400	95	0.88	94.0
ANLA–280SG–04	75	75	485	400	132	0.88	94.7
ANLA–280MG–04	90	85	550	400	149	0.88	94.9
ANLA–315SL–04	110	104	670	400	190	0.85	95.2
ANLA–315ML–04	132	125	810	400	225	0.86	95.4
ANLA–315MN–04	160	152	980	400	270	0.86	95.7
ANLA–315LL–04 [2]	200	176	1130	400	320	0.84	95.7
ANLA–315LL–04	200	190	1220	400	340	0.86	95.8
ANLA–315LM–04 [2]	250	220	1400	400	405	0.83	96.3
ANLA–315LM–04	250	235	1520	400	420	0.85	96.0
ANLA–355LB–04	270	250	1610	400	445	0.84	96.5
ANLA–355LB–04 [3]	315	300	1920	400	520	0.86	96.4
ANUA–355LC–04	355	335	2150	690	340	0.86	96.8
ANUA–355LD–04	400	380	2450	690	380	0.86	96.9
ANUA–355LN–04	450	415	2650	690	425	0.85	96.7
ANUA–355LX–04	500	460	2950	690	470	0.85	96.9
ANUA–400LN–04	560	520	3300	690	510	0.88	96.9
ANUA–400LN–04	630	580	3700	690	570	0.87	96.8
ANUA–400LX–04	710	650	4200	690	640	0.88	97.0
ANUA–450LL–04	800	740	4700	690	730	0.88	97.0
ANUA–450LN–04	900	830	5300	690	820	0.88	97.1
ANUA–450LN–04	950	870	5600	690	850	0.88	97.3
ANUA–500LL–04	1000	920	5900	690	900	0.88	97.0
ANUA–500LL–04	1120	1030	6600	690	1010	0.88	97.2

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 1500 min^{-1}

Speed range: 1500 – 2600 min^{-1}
Control range: 10 : 17
Frequency: 50 – 87 Hz
Fan: Self–ventilation, Forced ventilation
Load torque: M_L = const./ $M_L \sim n^2$

For mains operation the motor windings have to be Y–connected.

For inverter operation Δ–connection of the windings is required.

For the control range below 50 Hz the limit torques M_{L2}, M_{L3}, M_{L4} have to be observed (see Chapter 2.4.2.2)

Type	P_N kW	P_6 kW	M_{L6} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–04	1.1	1.60	6.3	400	3.75	0.81	79.3
ANGA–090LB–04	1.5	2.20	8.6	400	5.2	0.80	79.9
ANGA–100LB–04	2.2	3.20	12.6	400	7.4	0.80	81.1
ANGA–100LD–04	3	4.25	16.7	400	10.5	0.74	83.1
ANGA–112MB–04	4	5.8	23.0	400	12.3	0.83	84.4
ANGA–132SB–04	5.5	8.0	30.5	400	16.2	0.84	87.0
ANGA–132MB–04	7.5	10.9	42	400	22.0	0.82	89.4
ANGA–160MB–04	11	15.6	59	400	31.5	0.82	88.8
ANGA–160LB–04	15	21.5	81	400	42.5	0.82	91.8
ANGA–180MB–04	18.5	26.5	99	400	52	0.84	90.6
ANGA–180LB–04	22	31.0	118	400	60	0.84	91.4
ANGA–200LG–04	30	41.0	154	400	76	0.87	91.7
ANGA–225SE–04	37	46.5	175	400	87	0.85	92.3
ANGA–225ME–04	45	55	205	400	110	0.80	92.2
ANGA–250ME–04	55	63	235	400	121	0.84	91.9
ANGA–280SG–04	75	90	335	400	168	0.85	92.9
ANGA–280MG–04	90	99	365	400	186	0.85	92.7
ANGA–315SL–04	110	124	460	400	250	0.79	92.8
ANGA–315ML–04	132	138	510	400	270	0.81	93.2
ANGA–315MN–04	160	179	670	400	345	0.81	94.3
ANGA–315LL–04 [2]	200	196	730	400	400	0.78	93.4
ANGA–315LL–04 [3]	200	215	800	400	425	0.80	93.6
ANGA–315LM–04 [2]	250	245	910	400	510	0.75	95.1
ANGA–315LL–04 [3]	250	265	990	400	530	0.79	94.2

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

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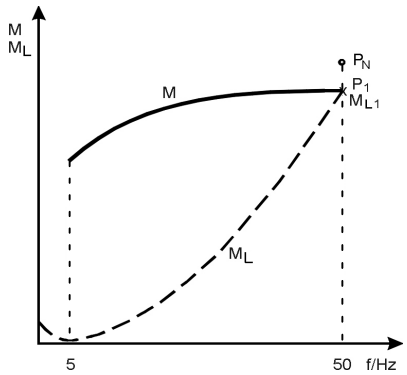
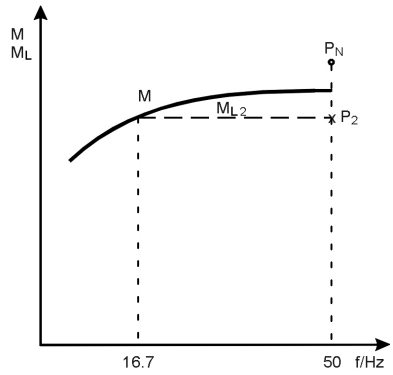
Speed 1000 min^{-1}



Speed range: 100 – 1000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$



Speed range: 330 – 1000 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–06	0.75	0.78	8.3	400	2.1	0.79	71.4	0.58	6.2	400	1.74	0.70	73.0
ANGA–090LB–06	1.1	1.10	11.5	400	3.3	0.73	70.9	0.73	7.6	400	2.8	0.59	70.1
ANGA–100LB–06	1.5	1.57	16.0	400	4.4	0.74	74.2	1.26	12.8	400	3.9	0.68	73.7
ANGA–112MB–06	2.2	2.30	23.5	400	5.5	0.81	77.9	1.83	18.6	400	4.6	0.77	78.6
ANGA–132SB–06	3	3.15	31.5	400	6.7	0.83	84.6	2.9	29	400	6.3	0.81	84.8
ANGA–132MB–06	4	4.2	42	400	9.2	0.82	83.5	3.7	37	400	8.3	0.80	83.8
ANGA–132MD–06	5.5	5.8	58	400	12.3	0.83	85.1	5.1	51	400	11.1	0.80	85.5
ANGA–160MB–06	7.5	7.9	78	400	16.0	0.84	87.2	7.3	72	400	15.0	0.83	87.3
ANGA–160LB–06	11	11.5	113	400	23.0	0.83	88.9	10.2	100	400	21.0	0.81	89.1
ANGA–180LB–06	15	15.7	156	400	31.5	0.82	89.7	13.4	133	400	27.5	0.80	90.1
ANGA–200LG–06	18.5	19.4	193	400	38	0.85	89.5	16.6	165	400	32.5	0.84	90.2
ANGA–200LJ–06	22	22.5	220	400	45	0.82	90.2	17.3	171	400	35.5	0.80	90.7
ANGA–225ME–06	30	30.5	300	400	59	0.83	92.0	25.0	245	400	49.5	0.81	92.1
ANGA–250ME–06	37	39.0	375	400	77	0.82	92.1	33.5	325	400	67	0.81	92.0
ANGA–280SG–06	45	44.5	430	400	80	0.88	93.3	37	360	400	68	0.86	93.4
ANGA–280MG–06	55	53	510	400	97	0.87	93.0	44	430	400	82	0.85	92.9
ANGA–315SL–06	75	71	690	400	131	0.85	94.3	64	620	400	120	0.84	94.3
ANGA–315ML–06	90	85	830	400	151	0.87	95.3	77	750	400	138	0.86	95.3
ANGA–315MM–06	110	104	1010	400	185	0.87	95.1	95	910	400	170	0.86	95.1
ANGA–315MN–06 [2]	132	118	1140	400	205	0.88	95.5	102	980	400	179	0.87	95.5
ANGA–315LL–06	160	152	1470	400	265	0.88	95.6	131	1270	400	230	0.87	95.6
ANGA–315LM–06 [2]	200	177	1700	400	325	0.84	95.9	152	1470	400	285	0.82	95.8
ANGA–315LM–06 [3]	200	190	1830	400	330	0.88	95.9	164	1580	400	290	0.87	95.9
ANGA–355LB–06 [3]	250	235	2300	400	420	0.84	96.3	210	2000	400	385	0.82	96.2
ANSA–355LC–06	280	265	2550	690	270	0.85	96.3	235	2250	690	245	0.84	96.3
ANSA–355LD–06	315	300	2900	690	310	0.84	96.4	265	2550	690	280	0.82	96.3
ANSA–355LN–06	355	335	3250	690	340	0.85	96.4	295	2850	690	305	0.84	96.4
ANSA–355LN–06	400	380	3650	690	395	0.83	96.5	325	3150	690	345	0.82	96.5
ANSA–400LN–06	450	425	4100	690	440	0.84	96.6	380	3650	690	400	0.83	96.6
ANSA–400LN–06	500	475	4550	690	490	0.84	96.7	415	4000	690	435	0.83	96.6
ANSA–450LL–06	560	530	5100	690	540	0.85	96.9	470	4500	690	485	0.84	96.8
ANSA–450LL–06	630	600	5700	690	610	0.85	97.0	530	5100	690	550	0.84	96.9
ANSA–450LN–06	710	670	6500	690	680	0.85	97.0	600	5700	690	620	0.84	97.0
ANSA–450LN–06	800	740	7100	690	760	0.84	97.1	650	6300	690	680	0.83	97.1
ANSA–500LL–06	900	860	8200	690	880	0.85	97.0	760	7300	690	780	0.84	96.9
ANSA–500LN–06	1000	950	9100	690	970	0.85	97.1	840	8100	690	860	0.84	97.0
ANSA–500LN–06	1120	1060	10200	690	1060	0.86	97.2	940	9000	690	940	0.86	97.1
ANSA–560LL–06	1250	1190	11400	690	1170	0.88	97.2	1050	10100	690	1040	0.87	97.2
ANSA–560LL–06	1400	1330	12800	690	1330	0.86	97.2	1180	11300	690	1200	0.85	97.1
ANSA–560LN–06	1600	1520	14600	690	1490	0.88	97.4	1340	12900	690	1320	0.87	97.3

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

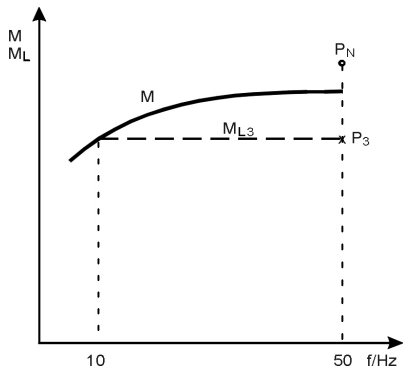
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at PWM–Inverter

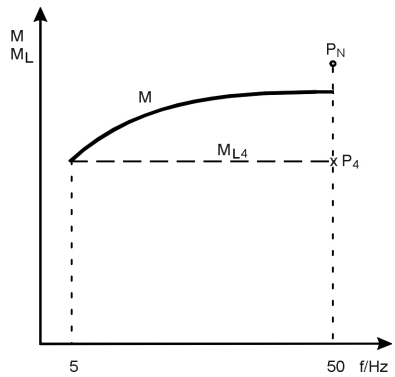
(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 1000 min^{-1}



Speed range: 200 – 1000 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.



Speed range: 100 – 1000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

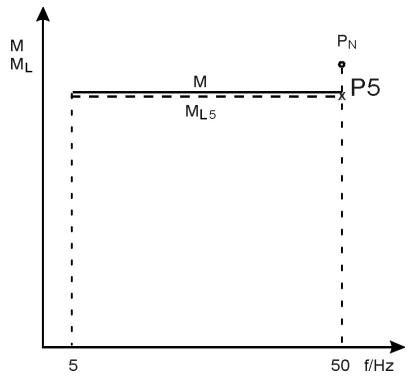
Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–06	0.75	0.51	5.4	400	1.65	0.66	72.8	0.42	4.6	400	1.55	0.61	71.6
ANGA–090LB–06	1.1	0.66	6.6	400	2.7	0.57	69.3	0.62	6.1	400	2.65	0.54	68.0
ANGA–100LB–06	1.5	1.09	11.1	400	3.7	0.64	72.8	0.88	8.9	400	3.45	0.57	70.6
ANGA–112MB–06	2.2	1.66	16.8	400	4.3	0.75	78.5	1.53	15.5	400	4.1	0.73	78.2
ANGA–132SB–06	3	2.30	23.0	400	5.3	0.77	84.8	2.10	21.0	400	5.1	0.74	84.6
ANGA–132MB–06	4	3.05	30.5	400	7.3	0.75	83.8	2.80	28.0	400	6.9	0.73	83.6
ANGA–132MD–06	5.5	4.2	42	400	9.7	0.76	85.5	3.85	38.5	400	9.2	0.74	85.3
ANGA–160MB–06	7.5	5.7	56	400	12.5	0.78	87.2	5.0	49.5	400	11.5	0.75	86.9
ANGA–160LB–06	11	8.4	82	400	18.4	0.77	89.0	7.4	72	400	17.0	0.74	88.8
ANGA–180LB–06	15	11.4	113	400	24.5	0.77	90.3	10.1	99	400	23.0	0.74	90.2
ANGA–200LG–06	18.5	14.1	140	400	28.0	0.83	90.5	12.4	123	400	25.0	0.81	90.5
ANGA–200LJ–06	22	16.1	159	400	34.0	0.78	90.7	14.7	146	400	31.5	0.77	90.6
ANGA–225ME–06	30	25.0	245	400	49.5	0.81	92.1	22.5	220	400	46	0.79	92.1
ANGA–250ME–06	37	31.5	305	400	64	0.80	91.9	28.5	275	400	59	0.78	91.7
ANGA–280SG–06	45	37.0	355	400	68	0.86	93.4	34	330	400	63	0.85	93.3
ANGA–280MG–06	55	44.5	430	400	83	0.85	92.9	41	395	400	78	0.84	92.8
ANGA–315SL–06	75	64	620	400	120	0.84	94.3	58	560	400	110	0.82	94.2
ANGA–315ML–06	90	76	740	400	137	0.86	95.3	70	680	400	127	0.85	95.3
ANGA–315MM–06	110	93	900	400	167	0.86	95.1	86	830	400	156	0.85	95.1
ANGA–315MN–06 [2]	132	101	980	400	178	0.87	95.5	94	910	400	167	0.87	95.5
ANGA–315LL–06	160	131	1260	400	230	0.87	95.6	120	1160	400	215	0.86	95.6
ANGA–315LM–06 [2]	200	152	1470	400	285	0.82	95.8	141	1360	400	270	0.81	95.8
ANGA–315LM–06 [3]	200	164	1580	400	290	0.87	95.9	151	1460	400	270	0.86	95.9
ANGA–355LB–06 [3]	250	205	1970	400	375	0.82	96.2	192	1850	400	355	0.81	96.1
ANSA–355LC–06	280	230	2200	690	240	0.83	96.3	215	2050	690	225	0.83	96.2
ANSA–355LD–06	315	260	2500	690	275	0.82	96.3	245	2350	690	265	0.81	96.3
ANSA–355LN–06	355	290	2800	690	300	0.84	96.4	275	2650	690	285	0.84	96.4
ANSA–355LN–06	400	325	3150	690	345	0.82	96.5	300	2900	690	325	0.81	96.4
ANSA–400LN–06	450	370	3550	690	390	0.82	96.6	345	3350	690	370	0.81	96.5
ANSA–400LN–06	500	410	3950	690	430	0.82	96.6	385	3700	690	410	0.82	96.6
ANSA–450LL–06	560	460	4400	690	475	0.83	96.8	430	4150	690	450	0.83	96.7
ANSA–450LL–06	630	520	4950	690	540	0.84	96.9	485	4650	690	510	0.83	96.8
ANSA–450LN–06	710	580	5600	690	600	0.84	97.0	550	5300	690	570	0.83	96.9
ANSA–450LN–06	800	660	6300	690	690	0.83	97.1	620	5900	690	650	0.82	97.0
ANSA–500LL–06	900	740	7100	690	760	0.84	96.9	690	6700	690	710	0.84	96.8
ANSA–500LN–06	1000	820	7900	690	840	0.84	96.9	770	7400	690	800	0.84	96.9
ANSA–500LN–06	1120	920	8800	690	920	0.86	97.1	860	8300	690	870	0.86	97.1
ANSA–560LL–06	1250	1030	9800	690	1020	0.87	97.1	960	9200	690	950	0.87	97.1
ANSA–560LL–06	1400	1150	11000	690	1170	0.85	97.1	1080	10300	690	1110	0.84	97.0
ANSA–560LN–06	1600	1310	12600	690	1290	0.87	97.3	1230	11800	690	1220	0.87	97.2

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 1000 min^{-1}

Speed range: 100 – 1000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

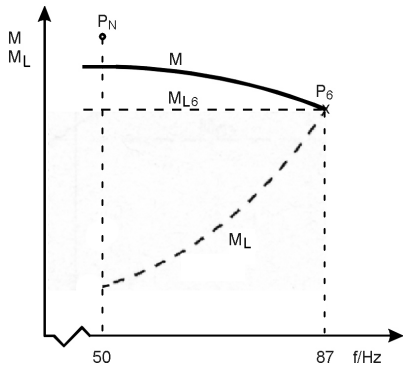
Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
ANLA–090LX–06	0.75	0.78	8.3	400	2.1	0.79	71.4
ANLA–090LB–06	1.1	1.10	11.5	400	3.3	0.73	70.9
ANLA–100LB–06	1.5	1.57	16.0	400	4.4	0.74	74.2
ANLA–112MB–06	2.2	2.30	23.5	400	5.5	0.81	77.9
ANLA–132SB–06	3	3.15	31.5	400	6.7	0.83	84.6
ANLA–132MB–06	4	4.2	42	400	9.2	0.82	83.5
ANLA–132MD–06	5.5	5.8	58	400	12.3	0.83	85.1
ANLA–160MB–06	7.5	7.9	78	400	16.0	0.84	87.2
ANLA–160LB–06	11	11.5	113	400	23.0	0.83	88.9
ANLA–180LB–06	15	15.7	156	400	31.5	0.82	89.7
ANLA–200LG–06	18.5	19.4	193	400	38	0.85	89.5
ANLA–200LJ–06	22	22.5	220	400	45	0.82	90.2
ANLA–225ME–06	30	30.5	300	400	59	0.83	92.0
ANLA–250ME–06	37	38.5	375	400	76	0.82	92.1
ANLA–280SG–06	45	44.5	430	400	80	0.88	93.3
ANLA–280MG–06	55	53	510	400	97	0.87	93.0
ANLA–315SL–06	75	71	690	400	131	0.85	94.3
ANLA–315ML–06	90	85	830	400	151	0.87	95.3
ANLA–315MM–06	110	104	1010	400	185	0.87	95.1
ANLA–315MN–06 [2]	132	118	1140	400	205	0.88	95.5
ANLA–315LL–06	160	152	1470	400	265	0.88	95.6
ANLA–315LM–06 [2]	200	176	1700	400	320	0.84	95.9
ANLA–315LM–06 [3]	200	190	1830	400	330	0.88	95.9
ANLA–355LB–06 [3]	250	235	2300	400	420	0.84	96.3
ANUA–355LC–06	280	265	2550	690	270	0.85	96.3
ANUA–355LD–06	315	300	2900	690	310	0.84	96.4
ANUA–355LN–06	355	325	3150	690	330	0.85	96.4
ANUA–355LN–06	400	370	3550	690	385	0.83	96.5
ANUA–400LN–06	450	415	4000	690	430	0.83	96.6
ANUA–400LN–06	500	460	4400	690	475	0.84	96.7
ANUA–450LL–06	560	520	4950	690	530	0.85	96.9
ANUA–450LL–06	630	580	5600	690	590	0.85	96.9
ANUA–450LN–06	710	650	6300	690	660	0.85	97.0
ANUA–450LN–06	800	740	7100	690	760	0.84	97.1
ANUA–500LL–06	900	830	7900	690	850	0.85	97.0
ANUA–500LN–06	1000	920	8800	690	940	0.85	97.0
ANUA–500LN–06	1120	1030	9900	690	1030	0.86	97.2
ANUA–560LL–06	1250	1150	11000	690	1130	0.88	97.2
ANUA–560LL–06	1400	1290	12400	690	1300	0.86	97.2
ANUA–560LN–06	1600	1470	14100	690	1440	0.88	97.4

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 1000 min^{-1}

Speed range: 1000 – 1730 min^{-1}
Control range: 10 : 17
Frequency: 50 – 87 Hz
Fan: Self–ventilation, Forced ventilation
Load torque: M_L = const./ $M_L \sim n^2$

For mains operation the motor windings have to be Y–connected.

For inverter operation Δ–connection of the windings is required.

For the control range below 50 Hz the limit torques M_{L2}, M_{L3}, M_{L4} have to be observed (see Chapter 2.4.2.2)

Type	P_N kW	P_6 kW	M_{L6} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–06	0.75	1.09	6.7	400	3.15	0.69	77.6
ANGA–090LB–06	1.1	1.60	9.6	400	5.2	0.62	77.0
ANGA–100LB–06	1.5	2.20	12.8	400	6.8	0.65	77.1
ANGA–112MB–06	2.2	3.20	18.8	400	8.2	0.75	79.0
ANGA–132SB–06	3	4.35	25	400	9.9	0.78	84.9
ANGA–132MB–06	4	5.8	33.5	400	13.4	0.76	85.5
ANGA–132MD–06	5.5	8.0	46	400	17.9	0.77	86.9
ANGA–160MB–06	7.5	10.7	61	400	23.0	0.79	87.8
ANGA–160LB–06	11	15.6	88	400	33.5	0.78	89.4
ANGA–180LB–06	15	21.5	122	400	45	0.78	91.4
ANGA–200LG–06	18.5	26.5	151	400	52	0.83	90.6
ANGA–200LJ–06	22	30.0	170	400	62	0.79	91.0
ANGA–225ME–06	30	39.0	220	400	80	0.79	91.4
ANGA–250ME–06	37	45.5	255	400	99	0.77	89.1
ANGA–280SG–06	45	55	305	400	104	0.84	92.7
ANGA–280MG–06	55	61	340	400	122	0.81	90.8
ANGA–315SL–06	75	94	520	400	184	0.81	92.8
ANGA–315ML–06	90	112	630	400	210	0.84	94.7
ANGA–315MM–06	110	137	760	400	255	0.84	94.4
ANGA–315MN–06 [2]	132	143	800	400	260	0.85	94.9
ANGA–315LL–06	160	195	1090	400	350	0.86	95.3
ANGA–315LM–06 [2]	200	196	1090	400	400	0.77	94.9
ANGA–315LM–06 [3]	200	240	1320	400	435	0.85	95.1

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

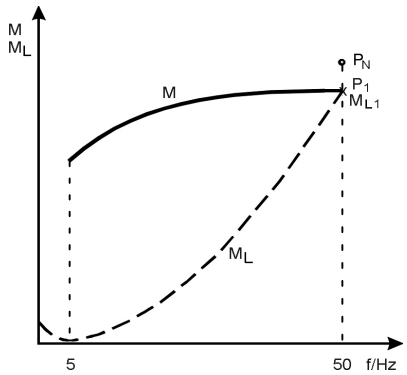
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at PWM–Inverter

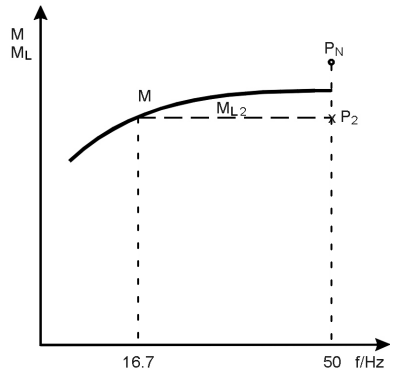
(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 750 min^{-1}



Speed range: 75 – 750 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$



Speed range: 250 – 750 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–08	0.37	0.39	5.5	400	1.43	0.68	63.1	0.36	5.0	400	1.37	0.66	63.1
ANGA–090LB–08	0.55	0.58	8.2	400	1.94	0.70	67.0	0.53	7.5	400	1.83	0.68	67.3
ANGA–100LB–08	0.75	0.79	10.7	400	2.40	0.72	70.4	0.73	9.9	400	2.30	0.70	70.4
ANGA–100LD–08	1.1	1.10	15.1	400	3.20	0.74	72.0	0.80	11.0	400	2.70	0.65	71.3
ANGA–112MB–08	1.5	1.57	21.5	400	4.35	0.74	74.5	1.31	17.9	400	3.85	0.70	75.0
ANGA–132SB–08	2.2	2.30	31	400	5.8	0.74	81.9	2.15	28.5	400	5.5	0.72	82.0
ANGA–132MB–08	3	3.15	42	400	7.8	0.74	83.6	2.9	39	400	7.3	0.72	83.8
ANGA–160MB–08	4	4.2	56	400	9.6	0.77	85.0	3.9	52	400	9.0	0.76	85.4
ANGA–160MD–08	5.5	5.8	76	400	13.5	0.75	86.2	5.3	70	400	12.7	0.73	86.4
ANGA–160LB–08	7.5	7.9	104	400	17.9	0.77	85.9	7.3	96	400	16.9	0.76	86.1
ANGA–180LB–08	11	11.6	153	400	24.0	0.82	88.1	10.4	138	400	22.0	0.80	88.5
ANGA–200LG–08	15	15.7	210	400	33.5	0.79	87.7	13.6	183	400	29.5	0.78	88.6
ANGA–225SE–08	18.5	19.4	255	400	40.5	0.80	89.0	16.4	215	400	35.0	0.78	89.6
ANGA–225ME–08	22	23.0	305	400	49	0.78	89.9	21.5	280	400	46.5	0.77	90.0
ANGA–250ME–08	30	31.5	410	400	62	0.82	91.1	28.5	375	400	57	0.81	91.2
ANGA–280SG–08	37	37.5	490	400	74	0.81	92.3	31.0	400	400	63	0.79	92.4
ANGA–280MG–08	45	47.5	610	400	93	0.82	92.7	38.5	500	400	77	0.80	93.0
ANGA–315SL–08	55	52	670	400	103	0.79	94.2	47.5	610	400	96	0.78	94.2
ANGA–315ML–08	75	71	920	400	139	0.80	94.1	64	830	400	128	0.79	94.1
ANGA–315MM–08	90	85	1100	400	164	0.81	94.7	77	1000	400	151	0.80	94.8
ANGA–315MN–08 [2]	110	101	1300	400	200	0.79	94.2	84	1090	400	172	0.77	94.3
ANGA–315LL–08	132	124	1600	400	240	0.80	94.6	103	1330	400	205	0.78	94.6
ANGA–315LM–08 [2]	160	132	1710	400	260	0.79	95.1	108	1400	400	225	0.75	95.2
ANGA–315LM–08 [3]	160	152	1960	400	290	0.81	95.6	128	1650	400	255	0.77	95.6
ANGA–355LB–08 [3]	200	190	2450	400	360	0.80	95.7	165	2100	400	320	0.77	95.7
ANSA–355LC–08	225	215	2750	690	235	0.81	95.5	184	2350	690	205	0.79	95.5
ANSA–355LD–08	250	240	3050	690	260	0.81	95.6	205	2650	690	230	0.78	95.6
ANSA–355LN–08	280	265	3400	690	285	0.81	96.0	225	2900	690	250	0.79	96.0
ANSA–355LX–08	315	300	3850	690	320	0.82	95.9	250	3250	690	275	0.80	95.9
ANSA–400LL–08	355	335	4350	690	360	0.81	96.2	290	3700	690	320	0.79	96.2
ANSA–400LN–08	400	380	4900	690	405	0.82	96.2	320	4150	690	350	0.79	96.3
ANSA–400LX–08	450	430	5500	690	460	0.81	96.3	360	4650	690	395	0.79	96.3
ANSA–450LL–08	500	475	6100	690	495	0.83	96.6	410	5300	690	435	0.82	96.6
ANSA–450LN–08	560	530	6800	690	550	0.83	96.6	465	6000	690	490	0.82	96.6
ANSA–450LN–08	630	600	7700	690	630	0.83	96.7	520	6700	690	550	0.82	96.7
ANSA–450LX–08	670	640	8200	690	670	0.82	96.8	560	7200	690	600	0.81	96.8
ANSA–500LL–08	710	670	8600	690	680	0.85	96.9	600	7600	690	620	0.84	96.9
ANSA–500LL–08	800	760	9700	690	770	0.85	97.0	670	8600	690	690	0.84	96.9
ANSA–500LN–08	900	860	11000	690	890	0.84	96.7	750	9600	690	780	0.83	96.7
ANSA–500LX–08	950	900	11600	690	940	0.83	96.9	800	10200	690	850	0.82	96.9
ANSA–560LL–08	1000	950	12200	690	970	0.84	97.0	840	10800	690	870	0.84	96.9
ANSA–560LL–08	1100	1020	13000	690	1050	0.84	97.5	920	11800	690	950	0.83	97.4
ANSA–560LN–08	1200	1140	14600	690	1170	0.84	97.0	1010	12900	690	1040	0.84	96.9
ANSA–560LN–08	1350	1280	16400	690	1320	0.84	97.1	1130	14500	690	1170	0.83	97.0

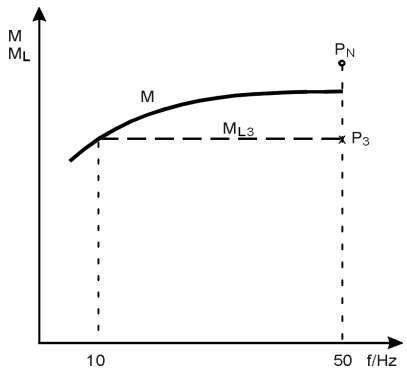
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

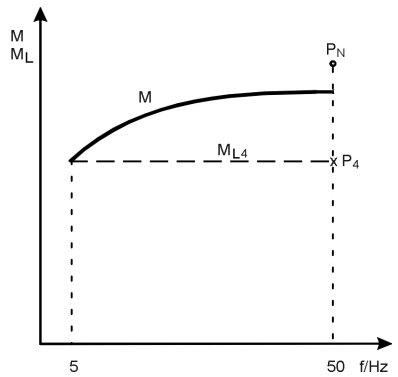
Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 750 min^{-1}



Speed range: 150 – 750 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.



Speed range: 75 – 750 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–08	0.37	0.28	4.0	400	1.24	0.59	61.5	0.26	3.7	400	1.22	0.57	60.7
ANGA–090LB–08	0.55	0.42	5.9	400	1.64	0.61	66.7	0.38	5.4	400	1.60	0.59	66.0
ANGA–100LB–08	0.75	0.57	7.8	400	2.10	0.63	69.0	0.52	7.2	400	2.05	0.60	68.1
ANGA–100LD–08	1.1	0.69	9.4	400	2.60	0.61	70.0	0.73	9.7	400	2.63	0.61	69.5
ANGA–112MB–08	1.5	1.14	15.6	400	3.60	0.66	74.7	1.02	13.9	400	3.45	0.63	74.1
ANGA–132SB–08	2.2	1.67	22.5	400	4.75	0.66	81.7	1.54	20.5	400	4.6	0.64	81.3
ANGA–132MB–08	3	2.30	30.5	400	6.4	0.66	83.6	2.1	28.0	400	6.1	0.64	83.3
ANGA–160MB–08	4	3.05	40.5	400	7.6	0.71	86.0	2.7	36.0	400	7.1	0.68	85.9
ANGA–160MD–08	5.5	4.2	55	400	11.1	0.67	86.2	3.7	48.5	400	10.4	0.64	85.8
ANGA–160LB–08	7.5	5.7	76	400	14.4	0.70	86.0	5.0	67	400	13.4	0.67	85.6
ANGA–180LB–08	11	8.4	111	400	18.9	0.75	88.8	7.4	98	400	17.5	0.72	88.8
ANGA–200LG–08	15	11.4	153	400	26	0.75	89.1	10.1	135	400	23.5	0.72	89.3
ANGA–225SE–08	18.5	15.7	210	400	34	0.77	89.6	14.2	189	400	31.5	0.75	89.7
ANGA–225ME–08	22	18.7	245	400	42	0.74	90.1	16.9	225	400	39.5	0.72	90.0
ANGA–250ME–08	30	25.5	330	400	52	0.80	91.1	23.0	300	400	48.5	0.78	91.0
ANGA–280SG–08	37	31.0	400	400	63	0.79	92.4	28.0	365	400	58	0.77	92.3
ANGA–280MG–08	45	38.5	495	400	77	0.80	93.0	34.5	450	400	71	0.78	93.0
ANGA–315SL–08	55	46.5	600	400	94	0.78	94.2	43	550	400	89	0.76	94.2
ANGA–315ML–08	75	64	820	400	128	0.79	94.1	58	750	400	119	0.77	94.1
ANGA–315MM–08	90	76	990	400	150	0.79	94.8	70	910	400	141	0.78	94.8
ANGA–315MN–08 [2]	110	84	1080	400	172	0.77	94.3	76	980	400	160	0.75	94.2
ANGA–315LL–08	132	102	1320	400	205	0.78	94.6	93	1200	400	192	0.76	94.6
ANGA–315LM–08 [2]	160	107	1390	400	225	0.75	95.2	97	1260	400	210	0.73	95.2
ANGA–315LM–08 [3]	160	128	1640	400	255	0.77	95.6	116	1490	400	240	0.75	95.6
ANGA–355LB–08 [3]	200	164	2100	400	320	0.77	95.7	153	1960	400	305	0.76	95.6
ANSA–355LC–08	225	183	2350	690	205	0.78	95.5	168	2150	690	192	0.77	95.4
ANSA–355LD–08	250	205	2650	690	230	0.78	95.6	188	2400	690	215	0.76	95.6
ANSA–355LN–08	280	225	2900	690	250	0.79	96.0	205	2650	690	235	0.77	95.9
ANSA–355LX–08	315	250	3250	690	275	0.80	95.9	230	2950	690	255	0.78	95.9
ANSA–400LL–08	355	290	3700	690	320	0.79	96.2	265	3400	690	300	0.77	96.1
ANSA–400LN–08	400	320	4150	690	350	0.79	96.3	295	3800	690	330	0.78	96.2
ANSA–400LX–08	450	360	4650	690	395	0.79	96.3	330	4250	690	370	0.78	96.2
ANSA–450LL–08	500	410	5300	690	435	0.82	96.6	385	4900	690	415	0.81	96.5
ANSA–450LN–08	560	460	5900	690	485	0.82	96.6	430	5500	690	460	0.81	96.6
ANSA–450LN–08	630	520	6600	690	550	0.82	96.7	485	6200	690	520	0.81	96.6
ANSA–450LX–08	670	550	7000	690	590	0.81	96.8	520	6600	690	560	0.80	96.8
ANSA–500LL–08	710	580	7500	690	600	0.83	96.9	550	7000	690	580	0.82	96.8
ANSA–500LL–08	800	660	8400	690	680	0.84	96.9	620	7900	690	650	0.83	96.9
ANSA–500LN–08	900	740	9500	690	770	0.83	96.7	690	8900	690	720	0.83	96.7
ANSA–500LX–08	950	780	10000	690	830	0.81	96.9	730	9400	690	780	0.81	96.8
ANSA–560LL–08	1000	820	10500	690	850	0.84	96.9	770	9900	690	800	0.83	96.8
ANSA–560LL–08	1100	900	11500	690	930	0.83	97.4	850	10800	690	880	0.83	97.3
ANSA–560LN–08	1200	980	12600	690	1010	0.84	96.9	920	11800	690	950	0.83	96.9
ANSA–560LN–08	1350	1110	14200	690	1150	0.83	97.0	1040	13300	690	1090	0.82	97.0

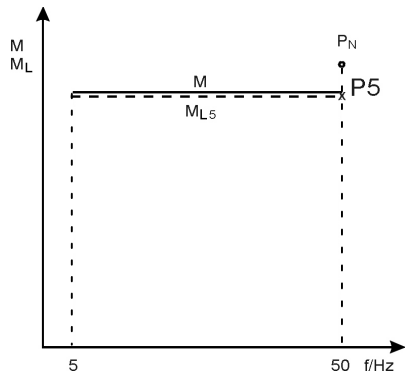
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M 3~



Speed 750 min^{-1}

Speed range: 75 – 750 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
ANLA–090LX–08	0.37	0.39	5.5	400	1.43	0.68	63.1
ANLA–090LB–08	0.55	0.58	8.2	400	1.94	0.70	67.0
ANLA–100LB–08	0.75	0.78	10.7	400	2.40	0.71	70.4
ANLA–100LD–08	1.1	1.10	15.1	400	3.20	0.74	72.0
ANLA–112MB–08	1.5	1.57	21.5	400	4.35	0.74	74.5
ANLA–132SB–08	2.2	2.30	31	400	5.8	0.74	81.9
ANLA–132MB–08	3	3.15	42	400	7.8	0.74	83.6
ANLA–160MB–08	4	4.2	56	400	9.6	0.77	85.0
ANLA–160MD–08	5.5	5.8	76	400	13.5	0.75	86.2
ANLA–160LB–08	7.5	7.8	104	400	17.7	0.77	86.0
ANLA–180LB–08	11	11.5	153	400	24.0	0.81	88.1
ANLA–200LG–08	15	15.7	210	400	33.5	0.79	87.7
ANLA–225SE–08	18.5	19.3	255	400	40.5	0.80	89.0
ANLA–225ME–08	22	23.0	305	400	49	0.78	89.9
ANLA–250ME–08	30	31.5	410	400	62	0.82	91.1
ANLA–280SG–08	37	38	490	400	75	0.82	92.3
ANLA–280MG–08	45	47	610	400	92	0.82	92.8
ANLA–315SL–08	55	52	670	400	103	0.79	94.2
ANLA–315ML–08	75	71	920	400	139	0.80	94.1
ANLA–315MM–08	90	85	1100	400	164	0.81	94.7
ANLA–315MN–08 [2]	110	101	1300	400	200	0.79	94.2
ANLA–315LL–08	132	124	1600	400	240	0.80	94.6
ANLA–315LM–08 [2]	160	132	1710	400	260	0.79	95.1
ANLA–315LM–08 [3]	160	152	1960	400	290	0.81	95.6
ANLA–355LB–08 [3]	200	190	2450	400	360	0.80	95.7
ANUA–355LC–08	225	215	2750	690	235	0.81	95.5
ANUA–355LD–08	250	240	3050	690	260	0.81	95.6
ANUA–355LN–08	280	260	3300	690	280	0.81	96.0
ANUA–355LX–08	315	290	3750	690	310	0.82	95.9
ANUA–400LL–08	355	325	4200	690	350	0.81	96.2
ANUA–400LN–08	400	370	4750	690	395	0.81	96.2
ANUA–400LX–08	450	415	5300	690	445	0.81	96.3
ANUA–450LL–08	500	460	5900	690	480	0.83	96.6
ANUA–450LN–08	560	520	6600	690	540	0.83	96.6
ANUA–450LN–08	630	580	7400	690	610	0.83	96.7
ANUA–450LX–08	670	620	7900	690	650	0.82	96.8
ANUA–500LL–08	710	650	8400	690	670	0.84	96.9
ANUA–500LL–08	800	740	9400	690	750	0.85	97.0
ANUA–500LN–08	900	830	10600	690	860	0.84	96.7
ANUA–500LX–08	950	870	11200	690	910	0.82	96.9
ANUA–560LL–08	1000	920	11800	690	950	0.84	97.0
ANUA–560LL–08	1100	1010	13000	690	1040	0.84	97.5
ANUA–560LN–08	1200	1100	14100	690	1130	0.84	97.0
ANUA–560LN–08	1350	1240	15900	690	1280	0.84	97.1

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

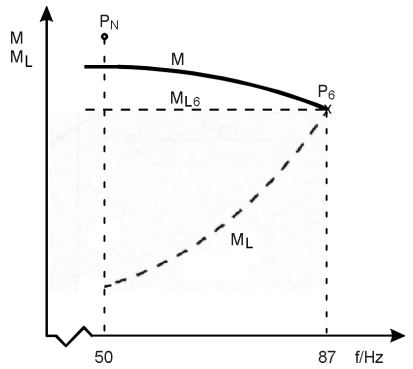
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 750 min^{-1}



Speed range: 750 – 1300 min^{-1}
Control range: 10 : 17
Frequency: 50 – 87 Hz
Fan: Self–ventilation, Forced ventilation
Load torque: M_L = const./ $M_L \sim n^2$

For mains operation the motor windings have to be Y–connected.

For inverter operation Δ–connection of the windings is required.

For the control range below 50 Hz the limit torques M_{L2}, M_{L3}, M_{L4} have to be observed (see Chapter 2.4.2.2)

Type	P_N kW	P_6 kW	M_{L6} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–08	0.37	0.54	4.3	400	2.3	0.59	64.4
ANGA–090LB–08	0.55	0.80	6.5	400	3.0	0.61	69.8
ANGA–100LB–08	0.75	1.09	8.6	400	3.8	0.62	72.2
ANGA–100LD–08	1.1	1.55	12.3	400	5.0	0.65	75.1
ANGA–112MB–08	1.5	2.20	17.2	400	6.6	0.66	78.6
ANGA–132SB–08	2.2	3.20	24.5	400	8.8	0.67	83.4
ANGA–132MB–08	3	4.35	33.5	400	11.6	0.67	85.6
ANGA–160MB–08	4	5.7	44	400	13.8	0.71	87.8
ANGA–160MD–08	5.5	7.8	59	400	20.0	0.68	87.9
ANGA–160LB–08	7.5	10.7	82	400	26.0	0.71	86.9
ANGA–180LB–08	11	15.6	120	400	34.5	0.76	89.4
ANGA–200LG–08	15	21.5	165	400	47	0.75	90.8
ANGA–225SE–08	18.5	24.5	189	400	55	0.75	90.1
ANGA–225ME–08	22	29.5	225	400	69	0.72	90.4
ANGA–250ME–08	30	40.0	300	400	86	0.78	89.5
ANGA–280SG–08	37	47.5	355	400	100	0.77	92.5
ANGA–280MG–08	45	60	450	400	124	0.77	93.4
ANGA–315SL–08	55	69	510	400	147	0.75	94.0
ANGA–315ML–08	75	94	700	400	198	0.76	93.4
ANGA–315MM–08	90	112	840	400	230	0.76	94.6
ANGA–315MN–08 [2]	110	127	950	400	270	0.74	94.2
ANGA–315LL–08	132	159	1190	400	330	0.76	94.4
ANGA–315LM–08 [2]	160	169	1260	400	365	0.73	95.1
ANGA–315LM–08 [3]	160	190	1410	400	405	0.74	95.5

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

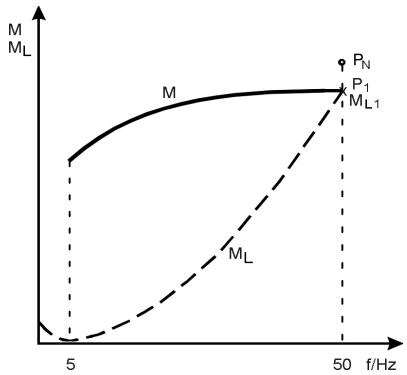
3.3 Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization F, operated at PWM–Inverter

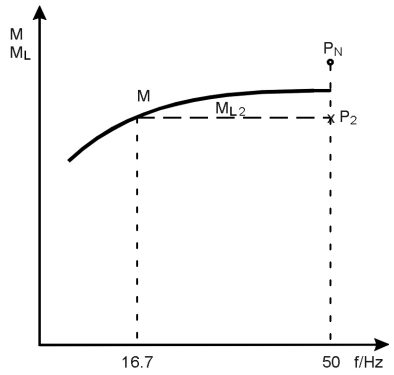
(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 3000 min^{-1}



Speed range: 300 – 3000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$



Speed range: 1000 – 3000 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–02	1.5	1.72	5.8	400	3.75	0.89	77.0	1.41	4.8	400	3.15	0.86	78.1
ANGA–090LB–02	2.2	2.55	8.5	400	5.3	0.88	81.0	2.05	6.9	400	4.4	0.85	81.9
ANGA–100LB–02	3	3.45	11.5	400	6.8	0.90	83.7	2.95	9.7	400	5.9	0.88	84.3
ANGA–112MB–02	4	4.6	15.3	400	8.7	0.94	83.8	4.25	14.2	400	8.0	0.93	84.1
ANGA–132SB–02	5.5	6.4	21.0	400	12.5	0.90	85.0	5.7	18.9	400	11.3	0.88	85.2
ANGA–132SD–02	7.5	8.7	28.5	400	16.2	0.90	88.1	7.3	24.0	400	13.9	0.88	88.5
ANGA–160MB–02	11	12.7	41.5	400	24.0	0.89	88.2	11.7	38.5	400	22.0	0.89	88.3
ANGA–160MD–02	15	17.1	56	400	31.5	0.89	89.4	14.0	45.5	400	26.5	0.87	89.8
ANGA–160LB–02	18.5	21.5	70	400	38.5	0.91	90.7	18.0	59	400	32.5	0.90	91.2
ANGA–180MB–02	22	25.5	82	400	47	0.88	90.8	23.5	76	400	43.5	0.87	90.7
ANGA–200LG–02	30	34.5	112	400	60	0.92	92.1	28.5	92	400	50	0.91	92.1
ANGA–200LJ–02	37	41	132	400	72	0.90	92.6	31.5	102	400	57	0.88	92.5
ANGA–225ME–02	45	52	168	400	90	0.90	93.4	44	141	400	77	0.90	93.4
ANGA–250ME–02	55	64	205	400	113	0.88	93.8	58	187	400	103	0.88	93.8
ANGA–280SG–02 [1]	75	87	280	400	145	0.93	94.7	69	225	400	115	0.93	94.7
ANGA–280MG–02 [1]	90	99	320	400	166	0.92	94.7	79	255	400	133	0.92	94.6
ANGA–315SL–02	110	115	370	400	195	0.91	94.9	103	330	400	177	0.90	94.8
ANGA–315ML–02	132	138	440	400	235	0.90	95.4	125	400	400	215	0.90	95.3
ANGA–315MN–02	160	167	540	400	280	0.92	96.0	150	480	400	250	0.91	95.9
ANGA–315LL–02	200	210	670	400	350	0.91	95.8	187	600	400	315	0.90	95.7
ANGA–315LN–02 [2]	250	255	820	400	420	0.93	96.1	205	660	400	340	0.92	96.0
ANGA–315LN–02 [3]	250	260	840	400	420	0.94	96.5	235	750	400	380	0.94	96.4
ANGA–355LB–02 [2]	315	330	1050	400	540	0.91	96.6	265	850	400	445	0.90	96.6
ANGA–355LB–02 [3]	315	330	1050	400	540	0.91	96.9	290	920	400	480	0.90	96.9
ANSA–355LC–02	355	370	1190	690	345	0.92	96.8	320	1030	690	300	0.92	96.8
ANSA–355LD–02	400	420	1340	690	400	0.91	97.0	365	1170	690	350	0.90	96.9
ANSA–355LX–02	450	470	1510	690	450	0.91	96.5	400	1290	690	385	0.91	96.5
ANSA–400LN–02	500	520	1670	690	495	0.91	96.8	455	1460	690	435	0.91	96.7
ANSA–400LN–02	560	590	1870	690	560	0.91	96.9	510	1640	690	485	0.91	96.9
ANSA–400LX–02	630	660	2100	690	620	0.92	97.0	580	1840	690	550	0.91	96.9
ANSA–450LL–02	710	740	2350	690	700	0.92	97.0	650	2050	690	620	0.91	96.9
ANSA–450LN–02	800	840	2650	690	800	0.91	97.1	730	2350	690	700	0.91	97.0
ANSA–450LN–02	900	940	3000	690	890	0.91	97.3	820	2650	690	780	0.91	97.2

1 Special motor, inverter–optimized (different from Technical List IM)
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

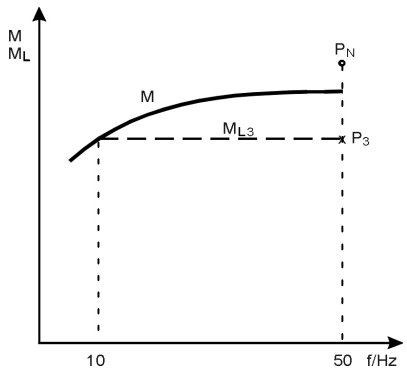
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization F, operated at PWM–Inverter

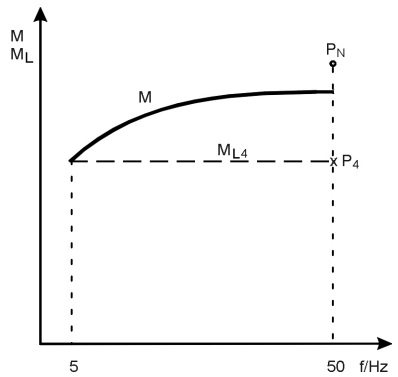
(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 3000 min^{-1}



Speed range: 600 – 3000 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.



Speed range: 300 – 3000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

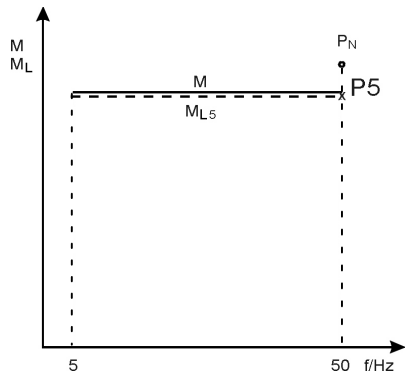
Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–02	1.5	1.20	4.1	400	2.80	0.82	78.2	1.05	3.5	400	2.60	0.79	77.8
ANGA–090LB–02	2.2	1.76	5.9	400	3.95	0.82	81.9	1.54	5.2	400	3.60	0.79	81.6
ANGA–100LB–02	3	2.55	8.4	400	5.2	0.86	84.4	2.25	7.4	400	4.75	0.84	84.3
ANGA–112MB–02	4	3.9	13.0	400	7.4	0.92	84.3	3.5	11.7	400	6.7	0.91	84.3
ANGA–132SB–02	5.5	5.0	16.4	400	10.1	0.86	85.1	4.4	14.5	400	9.2	0.84	84.8
ANGA–132SD–02	7.5	6.3	21.0	400	12.4	0.85	88.5	5.6	18.4	400	11.4	0.83	88.3
ANGA–160MB–02	11	10.3	33.5	400	19.7	0.87	88.4	9.1	30.0	400	17.8	0.86	88.3
ANGA–160MD–02	15	12.1	39.5	400	23.5	0.85	89.8	10.7	35.0	400	21.5	0.83	89.7
ANGA–160LB–02	18.5	15.6	51	400	28.5	0.88	91.4	13.9	45.5	400	26.0	0.87	91.4
ANGA–180MB–02	22	21.0	69	400	40	0.86	90.6	18.9	61	400	36.5	0.85	90.3
ANGA–200LG–02	30	25.5	82	400	45	0.91	92.0	23.0	75	400	41	0.90	91.8
ANGA–200LJ–02	37	28	91	400	51	0.87	92.2	25.5	83	400	48	0.86	92.0
ANGA–225ME–02	45	41	132	400	72	0.89	93.3	38.0	122	400	68	0.88	93.2
ANGA–250ME–02	55	54	173	400	97	0.87	93.7	49.5	159	400	90	0.86	93.6
ANGA–280SG–02 [1]	75	65	210	400	109	0.92	94.6	61	196	400	102	0.92	94.6
ANGA–280MG–02 [1]	90	74	240	400	125	0.92	94.5	69	225	400	118	0.91	94.4
ANGA–315SL–02	110	98	315	400	169	0.90	94.7	91	295	400	159	0.89	94.5
ANGA–315ML–02	132	120	385	400	205	0.89	95.2	112	360	400	195	0.88	95.1
ANGA–315MN–02	160	143	455	400	240	0.90	95.9	133	425	400	225	0.90	95.8
ANGA–315LL–02	200	179	570	400	305	0.90	95.6	169	540	400	290	0.89	95.5
ANGA–315LN–02 [2]	250	197	630	400	325	0.92	96.0	186	600	400	310	0.92	95.9
ANGA–315LN–02 [3]	250	220	710	400	355	0.94	96.4	210	670	400	340	0.94	96.4
ANGA–355LB–02 [2]	315	255	810	400	430	0.89	96.6	235	760	400	400	0.89	96.5
ANGA–355LB–02 [3]	315	280	900	400	465	0.90	96.9	265	840	400	445	0.89	96.8
ANSA–355LC–02	355	305	970	690	290	0.92	96.7	285	910	690	270	0.92	96.7
ANSA–355LD–02	400	355	1140	690	340	0.90	96.9	335	1070	690	325	0.90	96.9
ANSA–355LX–02	450	380	1210	690	365	0.90	96.5	350	1120	690	340	0.90	96.5
ANSA–400LN–02	500	445	1430	690	425	0.91	96.7	420	1340	690	400	0.91	96.7
ANSA–400LN–02	560	485	1560	690	460	0.91	96.9	455	1460	690	435	0.91	96.8
ANSA–400LX–02	630	550	1750	690	520	0.91	96.9	510	1640	690	485	0.91	96.9
ANSA–450LL–02	710	630	2000	690	600	0.91	96.9	590	1890	690	560	0.91	96.8
ANSA–450LN–02	800	710	2250	690	680	0.90	97.0	660	2150	690	630	0.90	96.9
ANSA–450LN–02	900	800	2550	690	760	0.91	97.2	750	2400	690	720	0.90	97.1

1 Special motor, inverter–optimized (different from Technical List IM)
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 3000 min^{-1}

Speed range: 300 – 3000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
ANLA–090LX–02	1.5	1.72	5.8	400	3.75	0.89	77.0
ANLA–090LB–02	2.2	2.55	8.5	400	5.3	0.88	81.0
ANLA–100LB–02	3	3.45	11.5	400	6.8	0.90	83.7
ANLA–112MB–02	4	4.6	15.3	400	8.7	0.94	83.8
ANLA–132SB–02	5.5	6.4	21.0	400	12.5	0.90	85.0
ANLA–132SD–02	7.5	8.7	28.5	400	16.2	0.90	88.1
ANLA–160MB–02	11	12.7	41.5	400	24.0	0.89	88.2
ANLA–160MD–02	15	17.1	56	400	31.5	0.89	89.4
ANLA–160LB–02	18.5	21.5	70	400	38.5	0.91	90.7
ANLA–180MB–02	22	25.5	82	400	47	0.88	90.8
ANLA–200LG–02	30	34.5	112	400	60	0.92	92.1
ANLA–200LJ–02	37	41	132	400	72	0.90	92.6
ANLA–225ME–02	45	52	168	400	90	0.90	93.4
ANLA–250ME–02	55	64	205	400	113	0.88	93.8
ANLA–280SG–02 [1]	75	87	280	400	145	0.93	94.7
ANLA–280MG–02 [1]	90	100	320	400	167	0.92	94.7
ANLA–315SL–02	110	115	370	400	195	0.91	94.9
ANLA–315ML–02	132	137	440	400	235	0.90	95.4
ANLA–315MN–02	160	167	540	400	280	0.92	96.0
ANLA–315LL–02	200	210	670	400	350	0.91	95.8
ANLA–315LN–02 [2]	250	255	820	400	420	0.93	96.1
ANLA–315LN–02 [3]	250	260	840	400	420	0.94	96.5
ANLA–355LB–02 [2]	315	325	1050	400	540	0.91	96.6
ANLA–355LB–02 [3]	315	330	1050	400	540	0.91	96.9
ANUA–355LC–02	355	370	1190	690	345	0.92	96.8
ANUA–355LD–02	400	420	1340	690	400	0.91	97.0
ANUA–355LX–02	450	455	1460	690	435	0.91	96.5
ANUA–400LN–02	500	510	1620	690	485	0.91	96.8
ANUA–400LN–02	560	570	1810	690	540	0.91	96.9
ANUA–400LX–02	630	640	2050	690	600	0.92	97.0
ANUA–450LL–02	710	720	2300	690	680	0.92	97.0
ANUA–450LN–02	800	810	2600	690	770	0.91	97.1
ANUA–450LN–02	900	910	2900	690	860	0.91	97.3

1 Special motor, inverter–optimized (different from Technical List IM)
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

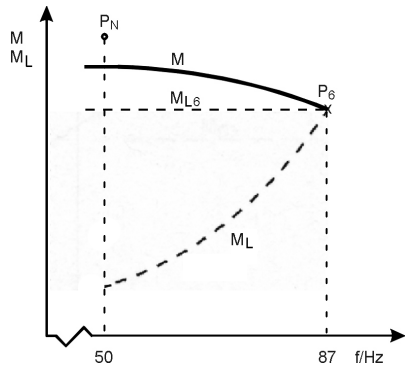
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 3000 min^{-1}



Speed range:	3000 – 5200 min^{-1}
Control range:	10 : 17
Frequency:	50 – 87 Hz
Fan:	Self–ventilation, Forced ventilation
Load torque:	M_L = const./ $M_L \sim n^2$

Type	P_N kW	P_6 kW	M_{L6} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–02	1.5	2.45	4.7	400	5.6	0.84	78.2
ANGA–090LB–02	2.2	3.55	6.9	400	7.7	0.84	82.8
ANGA–100LB–02	3	4.85	9.3	400	10.1	0.87	82.6
ANGA–112MB–02	4	6.5	12.4	400	13.1	0.92	80.5
ANGA–132SB–02	5.5	8.9	16.9	400	18.9	0.87	80.8
ANGA–132SD–02	7.5	12.1	23	400	23.5	0.87	87.2
ANGA–160MB–02	11	17.4	33	400	35	0.87	84.6
ANGA–160MD–02	15	23.5	45	400	46	0.87	87.3
ANGA–160LB–02	18.5	29.5	55	400	55	0.89	89.4
ANGA–180MB–02	22	35.0	65	400	70	0.86	86.4
ANGA–200LG–02	30	47.0	88	400	86	0.91	88.9
ANGA–200LJ–02	37	49.5	93	400	94	0.87	88.7
ANGA–225ME–02	45	67	125	400	123	0.89	90.3

For mains operation the motor windings have to be Y–connected.

For inverter operation Δ–connection of the windings is required.

For the control range below 50 Hz the limit torques M_{L2}, M_{L3}, M_{L4} have to be observed (see Chapter 2.4.2.2)

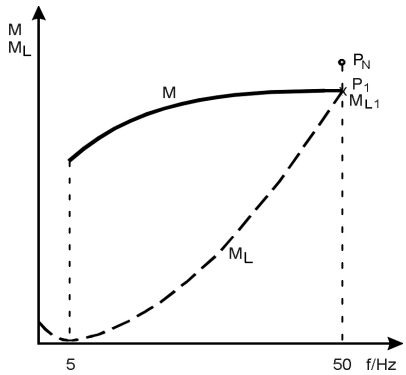
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization F, operated at PWM–Inverter

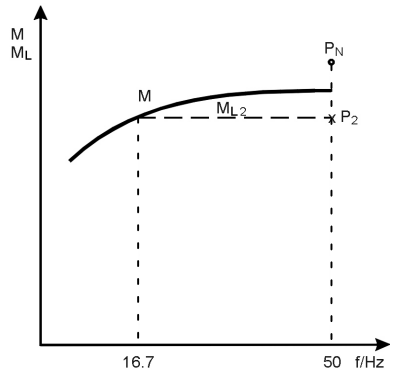
(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 1500 min^{-1}



Speed range: 150 – 1500 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$



Speed range: 500 – 1500 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–04	1.1	1.27	8.6	400	2.8	0.88	76.9	1.12	7.6	400	2.50	0.86	78.0
ANGA–090LB–04	1.5	1.73	11.8	400	3.9	0.88	75.7	1.53	10.4	400	3.50	0.86	76.7
ANGA–100LB–04	2.2	2.55	17.4	400	5.7	0.87	77.4	2.15	14.7	400	4.85	0.85	78.6
ANGA–100LD–04	3	3.45	23.5	400	7.8	0.83	79.8	2.75	18.7	400	6.5	0.79	80.8
ANGA–112MB–04	4	4.55	31.0	400	9.4	0.88	82.3	3.7	25.0	400	7.7	0.86	83.6
ANGA–132SB–04	5.5	6.4	42.5	400	12.5	0.88	85.7	5.6	37.0	400	11.0	0.87	86.4
ANGA–132MB–04	7.5	8.7	57	400	16.9	0.87	87.4	7.3	48.5	400	14.4	0.85	88.1
ANGA–160MB–04	11	12.7	83	400	24.5	0.86	88.9	10.7	70	400	21.0	0.85	89.5
ANGA–160LB–04	15	17.1	112	400	33	0.86	89.9	13.9	91	400	27.0	0.84	90.7
ANGA–180MB–04	18.5	21.5	139	400	40	0.87	90.8	18.1	118	400	34.0	0.86	91.2
ANGA–180LB–04	22	25.5	166	400	47	0.88	91.2	22.5	146	400	41.5	0.87	91.6
ANGA–200LG–04	30	34.5	225	400	63	0.88	91.8	27.0	177	400	49	0.88	92.5
ANGA–225SE–04	37	40.5	265	400	73	0.88	93.0	33.0	215	400	60	0.87	93.4
ANGA–225ME–04	45	50	325	400	92	0.86	93.2	40.5	265	400	76	0.84	93.5
ANGA–250ME–04	55	64	410	400	112	0.89	93.9	54	345	400	95	0.88	94.0
ANGA–280SG–04	75	86	560	400	151	0.88	94.6	71	455	400	125	0.88	94.7
ANGA–280MG–04	90	100	640	400	174	0.89	94.8	83	540	400	145	0.88	94.9
ANGA–315SL–04	110	115	740	400	210	0.85	95.2	104	670	400	190	0.85	95.2
ANGA–315ML–04	132	138	890	400	245	0.87	95.4	124	800	400	220	0.86	95.4
ANGA–315MN–04	160	167	1080	400	295	0.86	95.6	148	950	400	265	0.86	95.7
ANGA–315LL–04 [2]	200	205	1330	400	370	0.86	95.6	171	1100	400	315	0.84	95.7
ANGA–315LL–04 [3]	200	210	1340	400	370	0.87	95.8	189	1210	400	340	0.86	95.8
ANGA–315LM–04 [2]	250	255	1650	400	460	0.85	96.2	210	1350	400	390	0.83	96.3
ANGA–315LM–04 [3]	250	260	1680	400	460	0.86	96.0	235	1520	400	420	0.85	96.0
ANGA–355LB–04	270	280	1810	400	495	0.85	96.5	250	1600	400	455	0.84	96.5
ANGA–355LB–04 [2]	315	290	1850	400	530	0.82	96.1	260	1680	400	485	0.81	96.0
ANGA–355LB–04 [3]	315	330	2100	400	570	0.86	96.5	290	1860	400	510	0.86	96.4
ANSA–355LC–04	355	370	2400	690	370	0.86	96.8	330	2100	690	335	0.86	96.8
ANSA–355LD–04	400	420	2700	690	420	0.87	96.9	370	2350	690	370	0.86	96.8
ANSA–355LN–04	450	470	3000	690	475	0.86	96.7	415	2650	690	425	0.85	96.7
ANSA–355LX–04	500	520	3350	690	520	0.86	96.9	460	2950	690	470	0.85	96.9
ANSA–400LN–04	560	590	3750	690	580	0.88	96.9	520	3300	690	510	0.88	96.9
ANSA–400LN–04	630	660	4200	690	650	0.88	96.8	580	3750	690	570	0.87	96.8
ANSA–400LX–04	710	740	4750	690	720	0.88	97.0	660	4200	690	650	0.88	97.0
ANSA–450LL–04	800	840	5300	690	820	0.88	97.1	740	4750	690	730	0.88	97.0
ANSA–450LN–04	900	940	6000	690	920	0.88	97.2	830	5300	690	820	0.88	97.1
ANSA–450LN–04	950	990	6400	690	970	0.88	97.3	880	5600	690	860	0.88	97.3
ANSA–500LL–04	1000	1040	6700	690	1020	0.88	97.1	920	5900	690	900	0.88	97.0
ANSA–500LL–04	1120	1170	7500	690	1140	0.88	97.2	1030	6600	690	1010	0.88	97.2

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

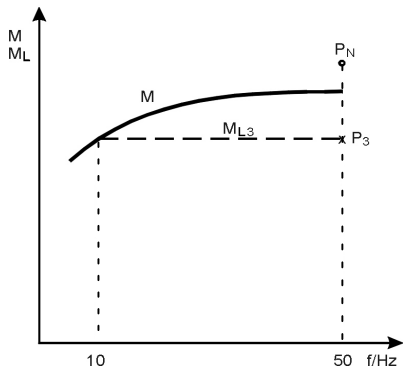
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization F, operated at PWM–Inverter

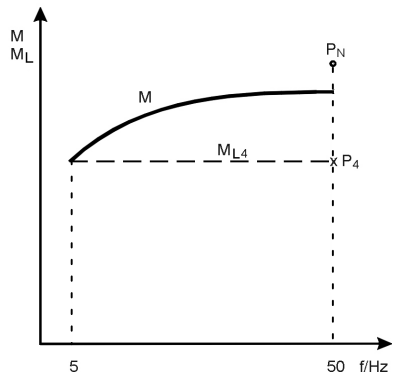
(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 1500 min^{-1}



Speed range: 300 – 1500 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.



Speed range: 150 – 1500 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

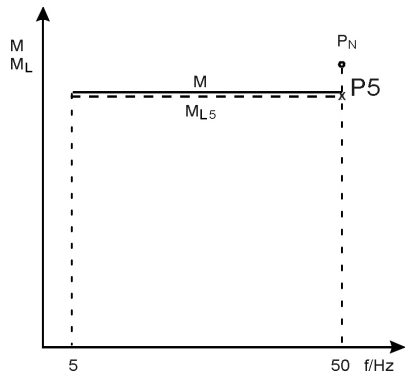
Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–04	1.1	0.92	6.2	400	2.10	0.83	78.6	0.85	5.7	400	2.00	0.81	78.6
ANGA–090LB–04	1.5	1.25	8.5	400	2.95	0.82	77.4	1.15	7.9	400	2.80	0.80	77.3
ANGA–100LB–04	2.2	1.84	12.6	400	4.3	0.82	79.0	1.69	11.6	400	4.05	0.80	78.9
ANGA–100LD–04	3	2.50	16.9	400	6.1	0.76	80.9	2.30	15.5	400	5.8	0.74	80.8
ANGA–112MB–04	4	3.35	22.5	400	7.1	0.84	83.9	3.10	21.0	400	6.7	0.83	84.0
ANGA–132SB–04	5.5	4.6	30.5	400	9.3	0.85	86.9	4.25	28.0	400	8.7	0.83	86.9
ANGA–132MB–04	7.5	6.3	41.5	400	12.7	0.83	88.4	5.8	38.5	400	12.0	0.82	88.4
ANGA–160MB–04	11	9.2	60	400	18.3	0.83	89.7	8.1	53	400	16.6	0.81	89.7
ANGA–160LB–04	15	12.5	82	400	24.5	0.83	90.9	11.1	73	400	22.5	0.81	91.0
ANGA–180MB–04	18.5	15.5	101	400	30.0	0.84	91.3	13.6	89	400	27.0	0.82	91.2
ANGA–180LB–04	22	18.4	120	400	35.0	0.85	91.9	16.2	106	400	31.5	0.83	91.9
ANGA–200LG–04	30	25.0	163	400	45.5	0.87	92.5	22.0	144	400	40.5	0.86	92.6
ANGA–225SE–04	37	32.5	210	400	59	0.87	93.4	30.0	194	400	55	0.87	93.5
ANGA–225ME–04	45	40	260	400	75	0.84	93.5	36.5	240	400	70	0.83	93.5
ANGA–250ME–04	55	51	330	400	91	0.88	94.0	46.5	300	400	84	0.87	93.9
ANGA–280SG–04	75	70	450	400	124	0.88	94.7	64	410	400	114	0.87	94.7
ANGA–280MG–04	90	83	540	400	145	0.88	94.9	76	490	400	134	0.88	94.8
ANGA–315SL–04	110	103	660	400	188	0.85	95.2	94	610	400	174	0.83	95.2
ANGA–315ML–04	132	123	790	400	220	0.86	95.4	113	730	400	205	0.85	95.4
ANGA–315MN–04	160	148	950	400	265	0.86	95.7	136	870	400	245	0.85	95.7
ANGA–315LL–04 [2]	200	170	1100	400	310	0.84	95.7	157	1010	400	290	0.83	95.6
ANGA–315LL–04 [3]	200	187	1200	400	335	0.86	95.8	172	1100	400	310	0.85	95.8
ANGA–315LM–04 [2]	250	210	1340	400	390	0.83	96.3	192	1240	400	365	0.81	96.2
ANGA–315LM–04 [3]	250	235	1500	400	420	0.85	96.0	215	1380	400	390	0.84	96.0
ANGA–355LB–04	270	245	1560	400	435	0.84	96.5	230	1470	400	415	0.83	96.5
ANGA–355LB–04 [2]	315	260	1680	400	485	0.81	96.0	250	1600	400	470	0.80	96.0
ANGA–355LB–04 [3]	315	285	1820	400	500	0.85	96.4	265	1710	400	470	0.85	96.3
ANSA–355LC–04	355	320	2050	690	325	0.85	96.8	300	1930	690	305	0.85	96.7
ANSA–355LD–04	400	360	2300	690	365	0.86	96.8	340	2150	690	345	0.85	96.8
ANSA–355LN–04	450	405	2600	690	415	0.85	96.7	380	2450	690	390	0.84	96.7
ANSA–355LX–04	500	450	2900	690	460	0.85	96.9	425	2700	690	435	0.84	96.9
ANSA–400LN–04	560	510	3250	690	500	0.88	96.9	475	3050	690	470	0.87	96.8
ANSA–400LN–04	630	570	3650	690	570	0.87	96.8	530	3400	690	530	0.87	96.8
ANSA–400LX–04	710	640	4100	690	630	0.88	97.0	600	3850	690	590	0.87	97.0
ANSA–450LL–04	800	720	4600	690	710	0.87	97.0	680	4350	690	680	0.87	97.0
ANSA–450LN–04	900	810	5200	690	800	0.88	97.1	760	4900	690	750	0.87	97.1
ANSA–450LN–04	950	860	5500	690	840	0.88	97.2	800	5100	690	790	0.87	97.2
ANSA–500LL–04	1000	900	5800	690	890	0.88	97.0	850	5400	690	840	0.88	96.9
ANSA–500LL–04	1120	1010	6500	690	990	0.88	97.2	950	6100	690	930	0.88	97.1

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 1500 min^{-1}

Speed range: 150 – 1500 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
ANLA–090LX–04	1.1	1.27	8.6	400	2.8	0.88	76.9
ANLA–090LB–04	1.5	1.73	11.8	400	3.9	0.88	75.7
ANLA–100LB–04	2.2	2.55	17.4	400	5.7	0.87	77.4
ANLA–100LD–04	3	3.45	23.5	400	7.8	0.83	79.8
ANLA–112MB–04	4	4.6	31.0	400	9.5	0.88	82.2
ANLA–132SB–04	5.5	6.4	42.5	400	12.5	0.88	85.7
ANLA–132MB–04	7.5	8.6	57	400	16.7	0.87	87.4
ANLA–160MB–04	11	12.7	83	400	24.5	0.86	88.9
ANLA–160LB–04	15	17.1	112	400	33	0.86	89.9
ANLA–180MB–04	18.5	21.5	139	400	40	0.87	90.8
ANLA–180LB–04	22	25.5	166	400	47	0.88	91.2
ANLA–200LG–04	30	34.5	225	400	63	0.88	91.8
ANLA–225SE–04	37	41	265	400	74	0.88	92.9
ANLA–225ME–04	45	50	325	400	92	0.86	93.2
ANLA–250ME–04	55	64	410	400	112	0.89	93.9
ANLA–280SG–04	75	87	560	400	153	0.88	94.5
ANLA–280MG–04	90	99	640	400	172	0.89	94.8
ANLA–315SL–04	110	115	740	400	210	0.85	95.2
ANLA–315ML–04	132	138	890	400	245	0.87	95.4
ANLA–315MN–04	160	167	1080	400	295	0.86	95.6
ANLA–315LL–04 [2]	200	205	1330	400	370	0.86	95.6
ANLA–315LL–04 [3]	200	210	1340	400	370	0.87	95.8
ANLA–315LM–04 [2]	250	255	1650	400	460	0.85	96.2
ANLA–315LM–04 [3]	250	260	1680	400	460	0.86	96.0
ANLA–355LB–04	270	280	1810	400	495	0.85	96.5
ANLA–355LB–04 [3]	315	290	1850	400	530	0.82	96.1
ANLA–355LB–04 [3]	315	330	2100	400	570	0.86	96.5
ANUA–355LC–04	355	370	2400	690	370	0.86	96.8
ANUA–355LD–04	400	420	2700	690	420	0.87	96.9
ANUA–355LN–04	450	455	2900	690	460	0.85	96.7
ANUA–355LX–04	500	510	3250	690	510	0.86	96.9
ANUA–400LN–04	560	570	3650	690	560	0.88	96.9
ANUA–400LN–04	630	640	4100	690	630	0.88	96.8
ANUA–400LX–04	710	720	4600	690	700	0.88	97.0
ANUA–450LL–04	800	810	5200	690	790	0.88	97.1
ANUA–450LN–04	900	910	5800	690	890	0.88	97.2
ANUA–450LN–04	950	960	6200	690	940	0.88	97.3
ANUA–500LL–04	1000	1010	6500	690	990	0.88	97.0
ANUA–500LL–04	1120	1130	7300	690	1100	0.88	97.2

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

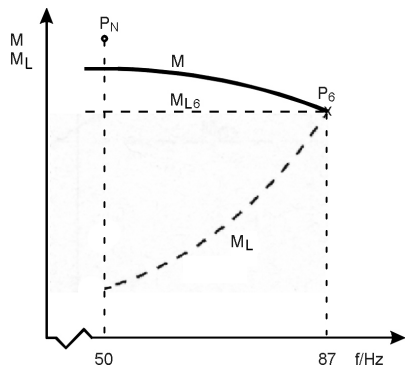
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 1500 min^{-1}



Speed range: 1500 – 2600 min^{-1}
Control range: 10 : 17
Frequency: 50 – 87 Hz
Fan: Self–ventilation, Forced ventilation
Load torque: M_L = const./ $M_L \sim n^2$

For mains operation the motor windings have to be Y–connected.

For inverter operation Δ–connection of the windings is required.

For the control range below 50 Hz the limit torques M_{L2}, M_{L3}, M_{L4} have to be observed (see Chapter 2.4.2.2)

Type	P_N kW	P_6 kW	M_{L6} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–04	1.1	1.76	6.9	400	4.0	0.83	79.9
ANGA–090LB–04	1.5	2.4	9.4	400	5.5	0.82	80.3
ANGA–100LB–04	2.2	3.5	13.9	400	7.9	0.82	81.6
ANGA–100LD–04	3	4.8	18.8	400	11.2	0.77	83.7
ANGA–112MB–04	4	6.4	25	400	13.3	0.85	84.8
ANGA–132SB–04	5.5	8.8	34	400	17.5	0.85	87.4
ANGA–132MB–04	7.5	12.0	46	400	23.5	0.84	89.6
ANGA–160MB–04	11	17.2	65	400	34.0	0.84	89.2
ANGA–160LB–04	15	23.5	89	400	45.5	0.83	92.0
ANGA–180MB–04	18.5	29.0	109	400	55	0.85	90.9
ANGA–180LB–04	22	34.5	130	400	65	0.85	91.7
ANGA–200LG–04	30	47	176	400	86	0.88	92.1
ANGA–225SE–04	37	54	205	400	99	0.87	92.8
ANGA–225ME–04	45	66	245	400	127	0.83	92.9
ANGA–250ME–04	55	81	300	400	147	0.87	93.0
ANGA–280SG–04	75	110	410	400	198	0.87	93.6
ANGA–280MG–04	90	126	470	400	225	0.87	93.7
ANGA–315SL–04	110	151	560	400	290	0.83	93.7
ANGA–315ML–04	132	181	670	400	335	0.85	94.3
ANGA–315MN–04	160	220	820	400	405	0.84	94.9
ANGA–315LL–04 [2]	200	255	950	400	485	0.82	94.4
ANGA–315LL–04 [3]	200	275	1020	400	510	0.84	94.5
ANGA–315LM–04 [2]	250	315	1180	400	610	0.80	95.7
ANGA–315LM–04 [3]	250	345	1270	400	640	0.83	95.1

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

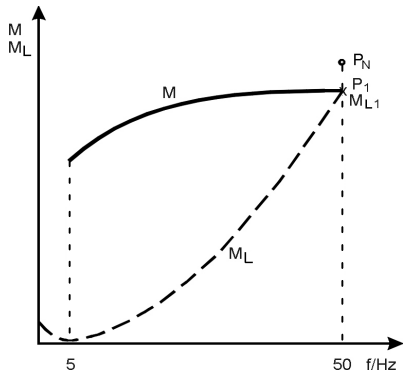
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization F, operated at PWM–Inverter

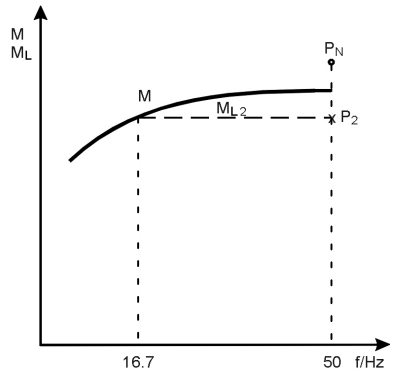
(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 1000 min^{-1}



Speed range: 100 – 1000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$



Speed range: 330 – 1000 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–06	0.75	0.87	9.2	400	2.35	0.82	69.6	0.70	7.4	400	1.95	0.76	72.4
ANGA–090LB–06	1.1	1.27	13.3	400	3.65	0.77	69.6	0.95	9.9	400	3.05	0.68	71.3
ANGA–100LB–06	1.5	1.73	17.6	400	4.7	0.76	73.9	1.55	15.8	400	4.35	0.74	74.2
ANGA–112MB–06	2.2	2.55	26.0	400	6.1	0.82	77.0	2.15	22.0	400	5.2	0.80	78.2
ANGA–132SB–06	3.	3.45	34.5	400	7.3	0.84	84.1	3.20	32.0	400	6.8	0.83	84.5
ANGA–132MB–06	4	4.6	46	400	9.9	0.83	83.0	4.25	42.5	400	9.3	0.82	83.4
ANGA–132MD–06	5.5	6.4	64	400	13.4	0.84	84.6	5.9	59	400	12.5	0.83	85.0
ANGA–160MB–06	7.5	8.7	85	400	17.4	0.86	86.8	8.0	79	400	16.1	0.85	87.1
ANGA–160LB–06	11	12.7	124	400	25.0	0.84	88.6	11.7	115	400	23.5	0.83	88.8
ANGA–180LB–06	15	17.3	171	400	34.5	0.83	89.3	15.5	153	400	31.5	0.82	89.8
ANGA–200LG–06	18.5	21.5	210	400	42.5	0.84	88.8	18.8	186	400	36.5	0.85	89.7
ANGA–200LJ–06	22	25.5	250	400	51	0.83	89.6	19.9	197	400	40	0.81	90.5
ANGA–225ME–06	30	34.5	340	400	66	0.84	91.6	29.0	285	400	56	0.83	92.0
ANGA–250ME–06	37	42.5	415	400	83	0.83	92.0	38.5	375	400	76	0.82	92.1
ANGA–280SG–06	45	51	500	400	91	0.88	93.1	42.5	410	400	77	0.87	93.4
ANGA–280MG–06	55	62	600	400	112	0.88	92.9	51	495	400	93	0.86	93.0
ANGA–315SL–06	75	78	760	400	143	0.85	94.3	71	690	400	131	0.85	94.3
ANGA–315ML–06	90	94	910	400	166	0.87	95.2	85	820	400	151	0.87	95.3
ANGA–315MM–06	110	115	1110	400	205	0.87	95.0	104	1000	400	185	0.87	95.1
ANGA–315MN–06 [2]	132	138	1330	400	240	0.89	95.3	117	1130	400	205	0.88	95.5
ANGA–315LL–06	160	167	1610	400	290	0.88	95.5	150	1450	400	260	0.88	95.6
ANGA–315LM–06 [2]	200	210	2000	400	375	0.86	95.8	176	1700	400	320	0.84	95.9
ANGA–315LM–06 [3]	200	210	2000	400	365	0.88	95.9	188	1810	400	325	0.88	95.9
ANGA–355LB–06 [3]	250	260	2500	400	460	0.85	96.3	230	2200	400	415	0.84	96.3
ANSA–355LC–06	280	295	2800	690	300	0.86	96.3	260	2500	690	265	0.85	96.3
ANSA–355LD–06	315	330	3150	690	340	0.85	96.4	290	2800	690	300	0.83	96.4
ANSA–355LN–06	355	370	3550	690	375	0.86	96.4	330	3150	690	335	0.85	96.4
ANSA–355LN–06	400	420	4000	690	435	0.84	96.4	370	3550	690	385	0.83	96.5
ANSA–400LN–06	450	470	4500	690	485	0.84	96.6	415	4000	690	430	0.83	96.6
ANSA–400LN–06	500	520	5000	690	530	0.84	96.7	460	4450	690	475	0.84	96.7
ANSA–450LL–06	560	590	5600	690	600	0.85	96.9	520	4950	690	530	0.85	96.9
ANSA–450LL–06	630	660	6300	690	670	0.85	97.0	580	5600	690	590	0.85	96.9
ANSA–450LN–06	710	740	7100	690	750	0.85	97.0	660	6300	690	670	0.85	97.0
ANSA–450LN–06	800	840	8000	690	850	0.85	97.1	740	7100	690	760	0.84	97.1
ANSA–500LL–06	900	940	9000	690	960	0.85	97.0	830	8000	690	850	0.85	97.0
ANSA–500LN–06	1000	1040	10000	690	1050	0.85	97.1	920	8900	690	940	0.85	97.0
ANSA–500LN–06	1120	1170	11200	690	1170	0.86	97.2	1030	9900	690	1030	0.86	97.2
ANSA–560LL–06	1250	1310	12500	690	1290	0.88	97.2	1160	11100	690	1140	0.88	97.2
ANSA–560LL–06	1400	1460	14000	690	1460	0.86	97.2	1290	12400	690	1300	0.86	97.2
ANSA–560LN–06	1600	1670	16000	690	1640	0.88	97.4	1480	14200	690	1450	0.88	97.4

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

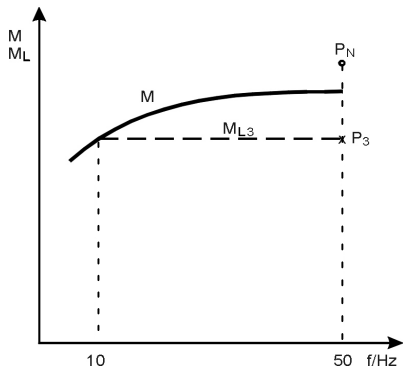
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization F, operated at PWM–Inverter

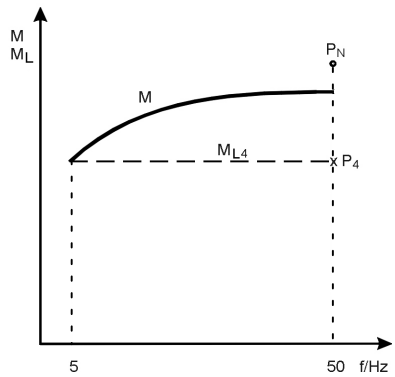
(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 1000 min^{-1}



Speed range: 200 – 1000 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.



Speed range: 100 – 1000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–06	0.75	0.62	6.6	400	1.81	0.72	73.0	0.55	5.9	400	1.70	0.69	73.0
ANGA–090LB–06	1.1	0.84	8.7	400	2.70	0.67	72.8	0.75	7.8	400	2.60	0.63	72.3
ANGA–100LB–06	1.5	1.25	12.7	400	3.9	0.68	73.7	1.15	11.7	400	3.75	0.65	73.2
ANGA–112MB–06	2.2	1.84	18.7	400	4.6	0.77	78.6	1.69	17.2	400	4.35	0.75	78.5
ANGA–132SB–06	3.	2.50	25.0	400	5.6	0.78	84.9	2.30	23.0	400	5.3	0.77	84.8
ANGA–132MB–06	4	3.35	33.5	400	7.8	0.78	83.9	3.10	31.0	400	7.4	0.76	83.8
ANGA–132MD–06	5.5	4.6	46	400	10.3	0.78	85.6	4.25	42.5	400	9.8	0.77	85.5
ANGA–160MB–06	7.5	6.3	62	400	13.4	0.80	87.4	5.5	54	400	12.2	0.77	87.2
ANGA–160LB–06	11	9.2	90	400	19.5	0.79	89.1	8.1	79	400	18	0.76	89.0
ANGA–180LB–06	15	12.5	124	400	26.5	0.79	90.2	11.1	109	400	24	0.76	90.2
ANGA–200LG–06	18.5	15.5	153	400	30.5	0.84	90.3	13.6	135	400	27	0.82	90.5
ANGA–200LJ–06	22	18.4	182	400	37.5	0.80	90.6	16.2	160	400	34	0.79	90.7
ANGA–225ME–06	30	28.0	275	400	55	0.83	92.1	25.5	250	400	50	0.81	92.1
ANGA–250ME–06	37	34.5	335	400	69	0.81	92.1	31.5	305	400	64	0.80	91.9
ANGA–280SG–06	45	42	405	400	76	0.87	93.4	38.0	370	400	69	0.86	93.4
ANGA–280MG–06	55	51	490	400	93	0.86	93.0	46.5	450	400	86	0.85	93.0
ANGA–315SL–06	75	70	680	400	129	0.84	94.3	64	620	400	120	0.84	94.3
ANGA–315ML–06	90	84	810	400	150	0.86	95.3	77	750	400	138	0.86	95.3
ANGA–315MM–06	110	103	990	400	183	0.87	95.1	94	910	400	169	0.86	95.1
ANGA–315MN–06 [2]	132	116	1120	400	200	0.88	95.5	107	1030	400	187	0.88	95.5
ANGA–315LL–06	160	149	1430	400	260	0.88	95.6	136	1320	400	240	0.87	95.6
ANGA–315LM–06 [2]	200	176	1700	400	320	0.84	95.9	162	1560	400	300	0.83	95.9
ANGA–315LM–06 [3]	200	186	1800	400	325	0.88	95.9	172	1650	400	300	0.87	95.9
ANGA–355LB–06 [3]	250	225	2150	400	405	0.83	96.3	210	2050	400	385	0.82	96.2
ANSA–355LC–06	280	255	2450	690	265	0.85	96.3	235	2300	690	245	0.84	96.3
ANSA–355LD–06	315	285	2750	690	300	0.83	96.4	265	2550	690	280	0.82	96.3
ANSA–355LN–06	355	320	3100	690	325	0.85	96.4	300	2900	690	310	0.84	96.4
ANSA–355LN–06	400	360	3450	690	375	0.83	96.5	340	3250	690	360	0.82	96.5
ANSA–400LN–06	450	405	3900	690	425	0.83	96.6	380	3650	690	400	0.83	96.6
ANSA–400LN–06	500	450	4350	690	470	0.83	96.7	425	4050	690	445	0.83	96.7
ANSA–450LL–06	560	510	4850	690	520	0.84	96.9	475	4550	690	490	0.84	96.8
ANSA–450LL–06	630	570	5500	690	580	0.84	96.9	530	5100	690	550	0.84	96.9
ANSA–450LN–06	710	640	6200	690	650	0.85	97.0	600	5800	690	620	0.84	97.0
ANSA–450LN–06	800	720	6900	690	740	0.84	97.1	680	6500	690	700	0.83	97.1
ANSA–500LL–06	900	810	7800	690	830	0.85	97.0	760	7300	690	780	0.84	96.9
ANSA–500LN–06	1000	900	8700	690	920	0.85	97.0	850	8100	690	870	0.84	97.0
ANSA–500LN–06	1120	1010	9700	690	1010	0.86	97.2	950	9100	690	950	0.86	97.1
ANSA–560LL–06	1250	1130	10800	690	1110	0.87	97.2	1060	10200	690	1050	0.87	97.2
ANSA–560LL–06	1400	1260	12100	690	1270	0.86	97.2	1190	11400	690	1210	0.85	97.1
ANSA–560LN–06	1600	1440	13800	690	1420	0.88	97.3	1360	13000	690	1340	0.87	97.3

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
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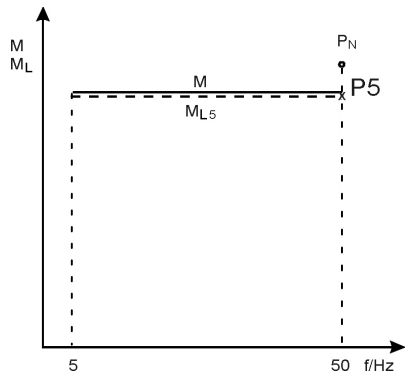


Speed 1000 min^{-1}

Speed range: 100 – 1000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
ANLA–090LX–06	0.75	.87	9.2	400	2.35	0.82	69.6
ANLA–090LB–06	1.1	1.27	13.3	400	3.65	0.77	69.6
ANLA–100LB–06	1.5	1.73	17.6	400	4.70	0.76	73.9
ANLA–112MB–06	2.2	2.55	26.0	400	6.1	0.82	77.0
ANLA–132SB–06	3.	3.45	34.5	400	7.3	0.84	84.1
ANLA–132MB–06	4	4.6	46	400	9.9	0.83	83.0
ANLA–132MD–06	5.5	6.4	64	400	13.4	0.84	84.6
ANLA–160MB–06	7.5	8.6	85	400	17.2	0.86	86.9
ANLA–160LB–06	11	12.7	124	400	25.0	0.84	88.6
ANLA–180LB–06	15	17.3	171	400	34.5	0.83	89.3
ANLA–200LG–06	18.5	21.0	210	400	41.5	0.85	89.0
ANLA–200LJ–06	22	25.5	250	400	51	0.83	89.6
ANLA–225ME–06	30	34.5	340	400	66	0.84	91.6
ANLA–250ME–06	37	42.5	415	400	83	0.83	92.0
ANLA–280SG–06	45	52	500	400	93	0.88	93.0
ANLA–280MG–06	55	62	600	400	112	0.88	92.9
ANLA–315SL–06	75	78	760	400	143	0.85	94.3
ANLA–315ML–06	90	94	910	400	166	0.87	95.2
ANLA–315MM–06	110	115	1110	400	205	0.87	95.0
ANLA–315MN–06 [2]	132	138	1330	400	240	0.89	95.3
ANLA–315LL–06	160	167	1610	400	290	0.88	95.5
ANLA–315LM–06 [2]	200	205	2000	400	370	0.85	95.8
ANLA–315LM–06 [3]	200	210	2000	400	365	0.88	95.9
ANLA–355LB–06 [3]	250	260	2500	400	460	0.85	96.3
ANUA–355LC–06	280	290	2800	690	295	0.85	96.3
ANUA–355LD–06	315	330	3150	690	340	0.85	96.4
ANUA–355LN–06	355	360	3450	690	365	0.86	96.4
ANUA–355LN–06	400	405	3900	690	420	0.84	96.4
ANUA–400LN–06	450	455	4400	690	470	0.84	96.6
ANUA–400LN–06	500	510	4850	690	520	0.84	96.7
ANUA–450LL–06	560	570	5400	690	580	0.85	96.9
ANUA–450LL–06	630	640	6100	690	650	0.85	97.0
ANUA–450LN–06	710	720	6900	690	730	0.85	97.0
ANUA–450LN–06	800	810	7800	690	820	0.85	97.1
ANUA–500LL–06	900	910	8700	690	920	0.85	97.0
ANUA–500LN–06	1000	1010	9700	690	1020	0.85	97.1
ANUA–500LN–06	1120	1130	10900	690	1130	0.86	97.2
ANUA–560LL–06	1250	1270	12100	690	1250	0.88	97.2
ANUA–560LL–06	1400	1420	13600	690	1420	0.86	97.2
ANUA–560LN–06	1600	1620	15500	690	1590	0.88	97.4

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

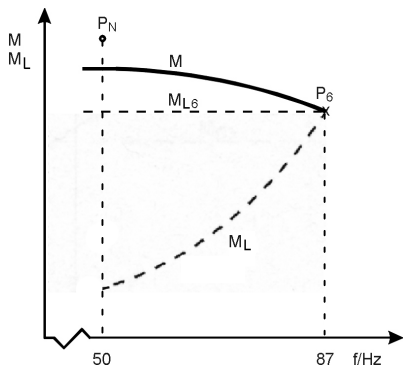
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M 3~

Speed 1000 min^{-1}



Speed range: 1000 – 1730 min^{-1}
Control range: 10 : 17
Frequency: 50 – 87 Hz
Fan: Self–ventilation, Forced ventilation
Load torque: M_L = const./ $M_L \sim n^2$

For mains operation the motor windings have to be Y–connected.

For inverter operation Δ–connection of the windings is required.

For the control range below 50 Hz the limit torques M_{L2}, M_{L3}, M_{L4} have to be observed (see Chapter 2.4.2.2)

Type	P_N kW	P_6 kW	M_{L6} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–06	0.75	1.20	7.4	400	3.3	0.71	78.0
ANGA–090LB–06	1.1	1.76	10.6	400	5.4	0.65	77.5
ANGA–100LB–06	1.5	2.4	14.1	400	7.1	0.67	77.8
ANGA–112MB–06	2.2	3.5	20.5	400	8.6	0.77	79.6
ANGA–132SB–06	3.	4.8	27.5	400	10.6	0.80	85.4
ANGA–132MB–06	4	6.4	37	400	14.3	0.78	85.9
ANGA–132MD–06	5.5	8.8	51	400	19.1	0.79	87.2
ANGA–160MB–06	7.5	11.7	67	400	24.5	0.81	88.2
ANGA–160LB–06	11	17.2	97	400	36	0.80	89.8
ANGA–180LB–06	15	23.5	134	400	48	0.79	91.5
ANGA–200LG–06	18.5	29.0	166	400	56	0.84	90.8
ANGA–200LJ–06	22	34.5	196	400	69	0.81	91.3
ANGA–225ME–06	30	44	250	400	88	0.81	91.8
ANGA–250ME–06	37	54	305	400	112	0.80	90.2
ANGA–280SG–06	45	66	370	400	121	0.86	93.3
ANGA–280MG–06	55	78	440	400	147	0.85	92.0
ANGA–315SL–06	75	103	570	400	198	0.83	93.2
ANGA–315ML–06	90	123	690	400	225	0.85	94.9
ANGA–315MM–06	110	151	840	400	275	0.85	94.7
ANGA–315MN–06 [2]	132	181	1010	400	320	0.87	95.4
ANGA–315LL–06	160	220	1220	400	390	0.87	95.5
ANGA–315LM–06 [2]	200	260	1450	400	490	0.82	95.6
ANGA–315LM–06 [3]	200	275	1520	400	490	0.87	95.4

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

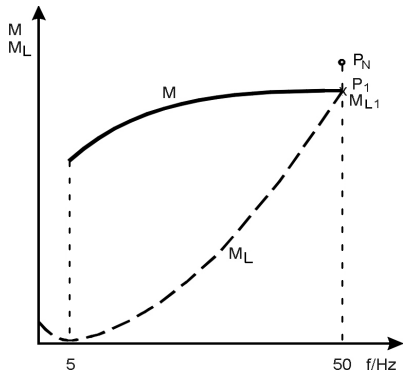
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization F, operated at PWM–Inverter

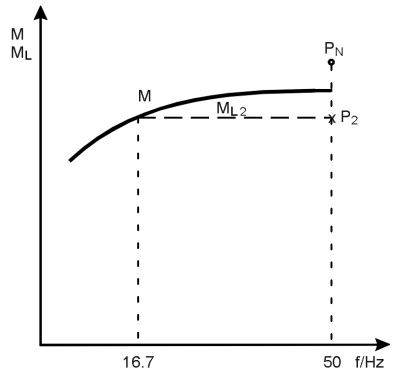
(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 750 min^{-1}



Speed range: 75 – 750 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$



Speed range: 250 – 750 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–08	0.37	0.43	6.0	400	1.51	0.71	62.7	0.40	5.5	400	1.44	0.69	63.1
ANGA–090LB–08	0.55	0.64	9.0	400	2.10	0.72	66.0	0.59	8.3	400	1.96	0.70	66.9
ANGA–100LB–08	0.75	0.87	11.8	400	2.55	0.74	70.2	0.80	10.9	400	2.45	0.72	70.4
ANGA–100LD–08	1.1	1.27	17.5	400	3.55	0.77	71.2	1.00	13.8	400	3.0	0.71	72.1
ANGA–112MB–08	1.5	1.73	23.5	400	4.7	0.77	73.7	1.56	21.5	400	4.3	0.74	74.5
ANGA–132SB–08	2.2	2.55	34.0	400	6.3	0.76	81.4	2.35	31.5	400	5.9	0.74	81.8
ANGA–132MB–08	3	3.45	46.5	400	8.3	0.75	83.2	3.20	43	400	7.9	0.74	83.5
ANGA–160MB–08	4	4.6	62	400	10.4	0.79	84.3	4.25	57	400	9.7	0.78	84.9
ANGA–160MD–08	5.5	6.4	84	400	14.6	0.77	85.9	5.9	77	400	13.7	0.75	86.2
ANGA–160LB–08	7.5	8.7	115	400	19.4	0.79	85.5	8.0	106	400	18.1	0.77	85.9
ANGA–180LB–08	11	12.7	169	400	26	0.83	87.6	11.7	156	400	24.0	0.82	88.1
ANGA–200LG–08	15	17.3	230	400	37	0.80	86.8	15.5	205	400	33.5	0.79	87.8
ANGA–225SE–08	18.5	21.5	285	400	45	0.81	88.4	18.8	250	400	39.5	0.80	89.1
ANGA–225ME–08	22	25.5	335	400	54	0.79	89.5	23.5	310	400	50	0.78	89.8
ANGA–250ME–08	30	34.5	450	400	68	0.83	90.9	32.0	415	400	63	0.82	91.0
ANGA–280SG–08	37	42.5	550	400	83	0.82	92.0	36.0	465	400	71	0.81	92.3
ANGA–280MG–08	45	52	670	400	101	0.82	92.5	44.5	580	400	87	0.81	92.9
ANGA–315SL–08	55	57	740	400	112	0.80	94.1	52	670	400	103	0.79	94.2
ANGA–315ML–08	75	78	1010	400	152	0.81	94.0	71	910	400	139	0.80	94.1
ANGA–315MM–08	90	94	1210	400	180	0.82	94.6	85	1100	400	164	0.81	94.7
ANGA–315MN–08 [2]	110	115	1480	400	225	0.81	94.0	98	1260	400	195	0.79	94.2
ANGA–315LL–08	132	138	1780	400	265	0.81	94.4	120	1540	400	235	0.80	94.6
ANGA–315LM–08 [2]	160	155	2000	400	300	0.81	94.9	126	1630	400	250	0.78	95.2
ANGA–315LM–08 [3]	160	167	2150	400	315	0.82	95.5	150	1920	400	290	0.80	95.6
ANGA–355LB–08 [3]	200	210	2700	400	390	0.81	95.7	185	2350	400	350	0.79	95.7
ANSA–355LC–08	225	235	3000	690	250	0.82	95.4	210	2650	690	230	0.81	95.5
ANSA–355LD–08	250	260	3350	690	280	0.82	95.6	230	2950	690	250	0.80	95.6
ANSA–355LN–08	280	295	3750	690	315	0.82	95.9	260	3350	690	280	0.81	96.0
ANSA–355LX–08	315	330	4250	690	350	0.83	95.8	290	3700	690	310	0.82	95.9
ANSA–400LL–08	355	370	4750	690	395	0.82	96.1	330	4200	690	355	0.81	96.2
ANSA–400LN–08	400	420	5400	690	445	0.82	96.2	370	4750	690	395	0.81	96.2
ANSA–400LX–08	450	470	6000	690	500	0.82	96.2	415	5300	690	445	0.81	96.3
ANSA–450LL–08	500	520	6700	690	540	0.84	96.5	460	5900	690	480	0.83	96.6
ANSA–450LN–08	560	590	7500	690	610	0.84	96.6	520	6600	690	540	0.83	96.6
ANSA–450LN–08	630	660	8400	690	680	0.84	96.7	580	7500	690	610	0.83	96.7
ANSA–450LX–08	670	700	9000	690	730	0.83	96.8	620	7900	690	650	0.82	96.8
ANSA–500LL–08	710	740	9500	690	750	0.86	96.9	660	8400	690	670	0.85	96.9
ANSA–500LL–08	800	840	10700	690	850	0.86	96.9	740	9500	690	750	0.85	97.0
ANSA–500LN–08	900	940	12100	690	970	0.84	96.7	830	10700	690	860	0.84	96.7
ANSA–500LX–08	950	990	12700	690	1030	0.83	96.9	880	11200	690	920	0.83	96.9
ANSA–560LL–08	1000	1040	13400	690	1070	0.84	97.0	920	11800	690	950	0.84	97.0
ANSA–560LL–08	1100	1150	14700	690	1180	0.84	97.6	1020	13000	690	1050	0.84	97.5
ANSA–560LN–08	1200	1250	16100	690	1280	0.84	97.0	1110	14200	690	1140	0.84	97.0
ANSA–560LN–08	1350	1410	18100	690	1450	0.84	97.1	1250	16000	690	1290	0.84	97.1

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

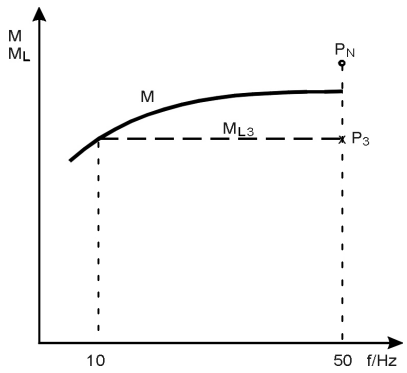
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization F, operated at PWM–Inverter

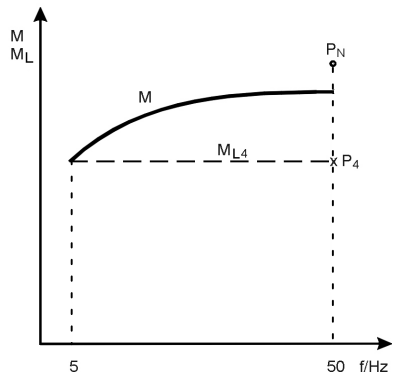
(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 750 min^{-1}



Speed range: 150 – 750 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.



Speed range: 75 – 750 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–08	0.37	0.31	4.3	400	1.29	0.62	62.4	0.28	4.0	400	1.25	0.60	61.7
ANGA–090LB–08	0.55	0.46	6.5	400	1.70	0.64	67.2	0.42	6.0	400	1.65	0.61	66.8
ANGA–100LB–08	0.75	0.63	8.6	400	2.15	0.66	69.7	0.58	7.9	400	2.1	0.63	69.1
ANGA–100LD–08	1.1	0.88	12.1	400	2.85	0.68	71.8	0.77	10.6	400	2.7	0.64	71.0
ANGA–112MB–08	1.5	1.25	17.1	400	3.75	0.69	75.0	1.15	15.8	400	3.6	0.66	74.8
ANGA–132SB–08	2.2	1.84	24.5	400	5.0	0.69	82.0	1.69	22.5	400	4.8	0.66	81.7
ANGA–132MB–08	3	2.50	33.5	400	6.7	0.68	83.8	2.30	31.0	400	6.4	0.66	83.6
ANGA–160MB–08	4	3.35	44.5	400	8.1	0.73	85.9	2.95	39.5	400	7.5	0.70	86.0
ANGA–160MD–08	5.5	4.6	61	400	11.6	0.70	86.4	4.05	53	400	10.9	0.66	86.1
ANGA–160LB–08	7.5	6.3	83	400	15.2	0.73	86.2	5.5	73	400	14.1	0.69	85.9
ANGA–180LB–08	11	9.2	122	400	20.0	0.77	88.8	8.1	108	400	18.5	0.74	88.8
ANGA–200LG–08	15	12.5	168	400	27.5	0.76	88.9	11.1	148	400	25.5	0.74	89.2
ANGA–225SE–08	18.5	17.3	230	400	36.5	0.79	89.4	15.7	205	400	34	0.77	89.6
ANGA–225ME–08	22	20.5	270	400	45	0.76	90.1	18.6	245	400	42	0.74	90.1
ANGA–250ME–08	30	28.0	365	400	56	0.81	91.2	25.5	330	400	52	0.80	91.1
ANGA–280SG–08	37	34.5	450	400	69	0.81	92.4	31.5	405	400	64	0.79	92.4
ANGA–280MG–08	45	42	540	400	83	0.81	92.9	38	495	400	77	0.79	93.0
ANGA–315SL–08	55	51	660	400	102	0.79	94.2	47	610	400	95	0.78	94.2
ANGA–315ML–08	75	70	900	400	138	0.80	94.1	64	830	400	128	0.79	94.1
ANGA–315MM–08	90	84	1080	400	163	0.81	94.7	77	1000	400	151	0.80	94.8
ANGA–315MN–08 [2]	110	96	1240	400	192	0.79	94.3	88	1130	400	179	0.78	94.3
ANGA–315LL–08	132	118	1520	400	230	0.80	94.6	107	1380	400	215	0.79	94.6
ANGA–315LM–08 [2]	160	124	1600	400	250	0.78	95.2	113	1460	400	230	0.76	95.2
ANGA–315LM–08 [3]	160	148	1900	400	285	0.80	95.6	134	1730	400	265	0.78	95.6
ANGA–355LB–08 [3]	200	180	2300	400	345	0.79	95.7	169	2150	400	330	0.78	95.7
ANSA–355LC–08	225	205	2600	690	225	0.80	95.5	191	2450	690	210	0.79	95.5
ANSA–355LD–08	250	225	2900	690	245	0.80	95.6	210	2700	690	235	0.79	95.6
ANSA–355LN–08	280	255	3250	690	275	0.81	96.0	235	3050	690	260	0.79	96.0
ANSA–355LX–08	315	285	3650	690	305	0.81	95.9	260	3400	690	285	0.80	95.9
ANSA–400LL–08	355	320	4100	690	345	0.80	96.2	300	3850	690	330	0.79	96.2
ANSA–400LN–08	400	360	4650	690	385	0.81	96.3	335	4350	690	365	0.80	96.3
ANSA–400LX–08	450	405	5200	690	440	0.81	96.3	380	4900	690	415	0.80	96.3
ANSA–450LL–08	500	450	5800	690	475	0.83	96.6	425	5400	690	450	0.82	96.6
ANSA–450LN–08	560	510	6500	690	530	0.83	96.6	475	6100	690	500	0.82	96.6
ANSA–450LN–08	630	570	7300	690	600	0.83	96.7	530	6800	690	560	0.82	96.7
ANSA–450LX–08	670	600	7700	690	640	0.82	96.8	570	7300	690	610	0.81	96.8
ANSA–500LL–08	710	640	8200	690	660	0.84	96.9	600	7700	690	620	0.84	96.9
ANSA–500LL–08	800	720	9200	690	740	0.85	96.9	680	8700	690	700	0.84	96.9
ANSA–500LN–08	900	810	10400	690	840	0.84	96.7	760	9800	690	790	0.83	96.7
ANSA–500LX–08	950	860	11000	690	900	0.82	96.9	800	10300	690	850	0.82	96.9
ANSA–560LL–08	1000	900	11500	690	930	0.84	96.9	850	10800	690	880	0.84	96.9
ANSA–560LL–08	1100	990	12700	690	1020	0.84	97.5	930	11900	690	960	0.83	97.4
ANSA–560LN–08	1200	1080	13900	690	1110	0.84	97.0	1020	13000	690	1050	0.84	96.9
ANSA–560LN–08	1350	1220	15600	690	1260	0.84	97.1	1140	14600	690	1180	0.83	97.0

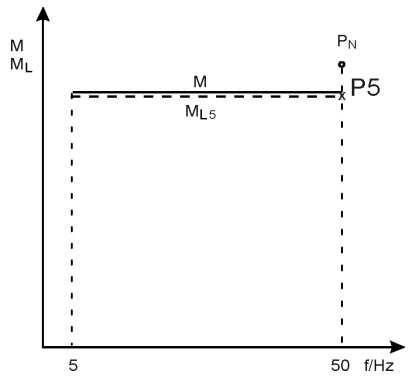
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~



Speed 750 min^{-1}

Speed range: 75 – 750 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
ANLA–090LX–08	0.37	0.43	6.0	400	1.51	0.71	62.7
ANLA–090LB–08	0.55	0.64	9.0	400	2.10	0.72	66.0
ANLA–100LB–08	0.75	0.86	11.8	400	2.55	0.74	70.2
ANLA–100LD–08	1.1	1.27	17.5	400	3.55	0.77	71.2
ANLA–112MB–08	1.5	1.72	23.5	400	4.65	0.76	73.7
ANLA–132SB–08	2.2	2.55	34.0	400	6.3	0.76	81.4
ANLA–132MB–08	3	3.45	46.5	400	8.3	0.75	83.2
ANLA–160MB–08	4	4.6	62	400	10.4	0.79	84.3
ANLA–160MD–08	5.5	6.4	84	400	14.6	0.77	85.9
ANLA–160LB–08	7.5	8.7	115	400	19.4	0.79	85.5
ANLA–180LB–08	11	12.7	169	400	26	0.83	87.6
ANLA–200LG–08	15	17.2	230	400	37	0.80	86.8
ANLA–225SE–08	18.5	21.5	285	400	45	0.81	88.4
ANLA–225ME–08	22	25.5	335	400	54	0.79	89.5
ANLA–250ME–08	30	34.5	450	400	68	0.83	90.9
ANLA–280SG–08	37	42.5	550	400	83	0.82	92.0
ANLA–280MG–08	45	52	670	400	101	0.82	92.5
ANLA–315SL–08	55	57	740	400	112	0.80	94.1
ANLA–315ML–08	75	78	1010	400	152	0.81	94.0
ANLA–315MM–08	90	94	1210	400	180	0.82	94.6
ANLA–315MN–08 [2]	110	115	1480	400	225	0.81	94.0
ANLA–315LL–08	132	138	1780	400	265	0.81	94.4
ANLA–315LM–08 [2]	160	155	2000	400	300	0.81	94.9
ANLA–315LM–08 [3]	160	167	2150	400	315	0.82	95.5
ANLA–355LB–08 [3]	200	210	2700	400	390	0.81	95.7
ANUA–355LC–08	225	235	3000	690	250	0.82	95.4
ANUA–355LD–08	250	260	3350	690	280	0.82	95.6
ANUA–355LN–08	280	285	3650	690	305	0.82	95.9
ANUA–355LX–08	315	320	4100	690	340	0.82	95.8
ANUA–400LL–08	355	360	4600	690	385	0.82	96.1
ANUA–400LN–08	400	405	5200	690	430	0.82	96.2
ANUA–400LX–08	450	455	5900	690	485	0.82	96.2
ANUA–450LL–08	500	510	6500	690	530	0.84	96.5
ANUA–450LN–08	560	570	7300	690	590	0.84	96.6
ANUA–450LN–08	630	640	8200	690	660	0.84	96.7
ANUA–450LX–08	670	680	8700	690	710	0.83	96.8
ANUA–500LL–08	710	720	9200	690	730	0.85	97.0
ANUA–500LL–08	800	810	10400	690	820	0.85	96.9
ANUA–500LN–08	900	910	11700	690	940	0.84	96.7
ANUA–500LX–08	950	960	12300	690	1000	0.83	96.9
ANUA–560LL–08	1000	1010	13000	690	1040	0.84	97.0
ANUA–560LL–08	1100	1110	14300	690	1140	0.84	97.6
ANUA–560LN–08	1200	1210	15500	690	1240	0.84	97.0
ANUA–560LN–08	1350	1370	17500	690	1400	0.84	97.1

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

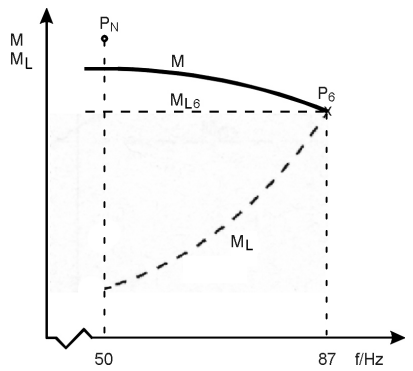
Three–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

M
3~

Speed 750 min^{-1}



Speed range:	750 – 1300 min^{-1}
Control range:	10 : 17
Frequency:	50 – 87 Hz
Fan:	Self–ventilation, Forced ventilation
Load torque:	M_L = const./ $M_L \sim n^2$

For mains operation the motor windings have to be Y–connected.

For inverter operation Δ–connection of the windings is required.

For the control range below 50 Hz the limit torques M_{L2}, M_{L3}, M_{L4} have to be observed (see Chapter 2.4.2.2)

Type	P_N kW	P_6 kW	M_{L6} Nm	U V	I_1 A	cosφ	η %
ANGA–090LX–08	0.37	0.59	4.8	400	2.35	0.61	65.5
ANGA–090LB–08	0.55	0.88	7.2	400	3.10	0.63	70.7
ANGA–100LB–08	0.75	1.20	9.5	400	3.95	0.65	73.2
ANGA–100LD–08	1.1	1.76	14.0	400	5.3	0.68	76.1
ANGA–112MB–08	1.5	2.4	18.9	400	6.9	0.68	79.1
ANGA–132SB–08	2.2	3.5	27	400	9.2	0.69	83.9
ANGA–132MB–08	3	4.8	37	400	12.3	0.69	86.0
ANGA–160MB–08	4	6.2	48	400	14.6	0.73	88.0
ANGA–160MD–08	5.5	8.6	65	400	21.0	0.70	88.3
ANGA–160LB–08	7.5	11.7	90	400	27.5	0.73	87.3
ANGA–180LB–08	11	17.2	132	400	37	0.78	89.6
ANGA–200LG–08	15	23.5	181	400	50	0.77	90.9
ANGA–225SE–08	18.5	27.0	205	400	58	0.76	90.4
ANGA–225ME–08	22	32.5	245	400	73	0.74	90.7
ANGA–250ME–08	30	44	330	400	92	0.79	90.0
ANGA–280SG–08	37	54	405	400	110	0.79	92.9
ANGA–280MG–08	45	66	495	400	133	0.79	93.6
ANGA–315SL–08	55	75	560	400	156	0.76	94.2
ANGA–315ML–08	75	103	770	400	210	0.77	93.7
ANGA–315MM–08	90	123	920	400	245	0.78	94.8
ANGA–315MN–08 [2]	110	151	1120	400	305	0.77	94.6
ANGA–315LL–08	132	181	1350	400	365	0.78	94.7
ANGA–315LM–08 [2]	160	210	1570	400	425	0.77	95.5
ANGA–315LM–08 [3]	160	220	1630	400	445	0.77	95.8

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

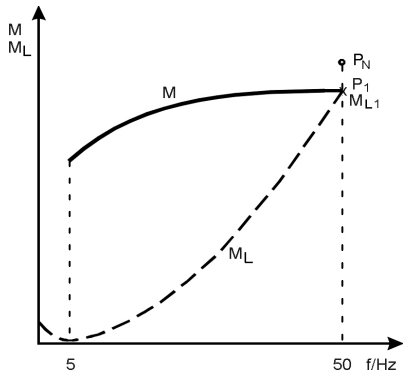
3.4 Explosion–proof three–phase motors for low voltage with squirrel cage,

Protection type ”Flameproof Enclosure” acc. to EN 50 018

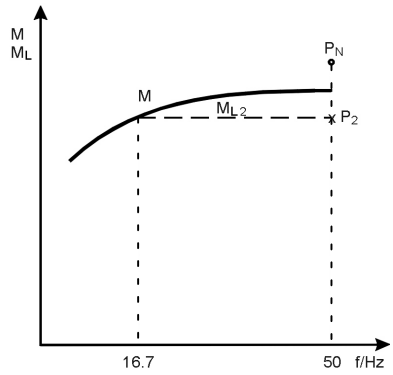
Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 3000 min^{-1}



Speed range: 300 – 3000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$



Speed range: 1000 – 3000 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
DNGW–071BG–02	0.37	0.39	1.3	400	1.06	0.83	68.2	0.36	1.2	400	1.00	0.81	68.3
DNGW–071BH–02	0.55	0.58	2.0	400	1.41	0.88	70.4	0.53	1.8	400	1.31	0.87	70.8
DNGW–080BG–02	0.75	0.79	2.7	400	1.81	0.85	76.9	0.73	2.5	400	1.71	0.84	77.1
DNGW–080BH–02	1.1	1.15	4.0	400	2.60	0.85	78.0	1.01	3.5	400	2.35	0.83	78.4
DNGW–090LX–02	1.5	1.50	5.1	400	3.30	0.87	77.9	1.20	4.1	400	2.8	0.82	78.2
DNGW–090LD–02	2.2	2.20	7.4	400	4.65	0.86	81.7	1.75	5.9	400	3.9	0.82	81.9
DNGW–100LB–02	3	3.15	10.4	400	6.2	0.89	84.1	2.55	8.4	400	5.2	0.86	84.4
DNGW–112MB–02	4	4.2	13.9	400	8.0	0.93	84.1	3.9	12.9	400	7.4	0.92	84.3
DNGW–132SL–02	5.5	5.8	19.0	400	11.4	0.88	85.2	4.95	16.3	400	10.0	0.86	85.1
DNGW–132SN–02	7.5	7.8	25.5	400	14.7	0.88	88.4	6.3	20.5	400	12.4	0.85	88.5
DNGW–160ML–02	11	11.6	38	400	22.0	0.88	88.3	10.3	33.5	400	19.7	0.87	88.4
DNGW–160MN–02	15	14.6	48	400	27.5	0.88	89.7	11.8	38.5	400	23	0.85	89.8
DNGW–160LL–02	18.5	19.4	64	400	35	0.90	91.0	15.8	52	400	29	0.88	91.4
DNGW–180MB–02	22	23.0	75	400	43	0.87	90.7	21.0	68	400	40	0.86	90.6
DNGW–200LB–02	30	31.5	102	400	55	0.92	92.2	25.0	81	400	44	0.90	92.0
DNGW–200LD–02	37	35	113	400	62	0.89	92.6	27.5	89	400	51	0.87	92.2
DNGW–225MB–02	45	47	152	400	82	0.90	93.4	38	123	400	68	0.88	93.2
DNGW–250MB–02	55	58	186	400	103	0.88	93.8	51	163	400	93	0.86	93.6
DNGW–280SG–02 [1]	75	74	240	400	123	0.93	94.7	59	189	400	99	0.92	94.5
DNGW–280MG–02 [1]	90	86	275	400	144	0.92	94.6	69	220	400	118	0.91	94.4
DNGW–315SL–02	110	105	335	400	180	0.90	94.8	89	285	400	156	0.89	94.5
DNGW–315ML–02	132	125	400	400	215	0.90	95.3	108	345	400	189	0.88	95.0
DNGW–315MN–02	160	152	485	400	255	0.91	96.0	130	415	400	220	0.89	95.8
DNGW–315LL–02	200	182	580	400	310	0.90	95.6	160	510	400	275	0.89	95.4
DNGW–315LN–02 [2]	250	215	690	400	355	0.93	96.1	179	570	400	300	0.92	95.9
DNGW–315LN–02 [3]	250	240	760	400	385	0.94	96.4	205	650	400	330	0.94	96.4
DNSL–355LB–02	315	300	960	400	495	0.90	96.9	260	840	400	435	0.89	96.8
DNSL–355LC–02	355	335	1080	690	315	0.92	96.8	280	900	690	265	0.92	96.7
DNSL–355LD–02	400	380	1220	690	360	0.91	97.0	330	1060	690	320	0.90	96.9
DNSL–355LX–02	450	430	1370	690	410	0.91	96.5	350	1130	690	340	0.90	96.5
DNSL–400LN–02	500	475	1520	690	450	0.91	96.8	415	1330	690	395	0.91	96.7
DNSL–400LN–02	560	530	1700	690	500	0.91	96.9	450	1440	690	430	0.91	96.8
DNSL–400LX–02	630	600	1920	690	570	0.91	97.0	500	1610	690	475	0.91	96.9
DNSL–450LL–02	710	670	2150	690	630	0.91	96.9	570	1840	690	540	0.91	96.8
DNSL–450LN–02	800	760	2450	690	720	0.91	97.0	650	2050	690	620	0.90	96.9
DNSL–450LN–02	900	860	2750	690	810	0.91	97.2	740	2350	690	710	0.90	97.1

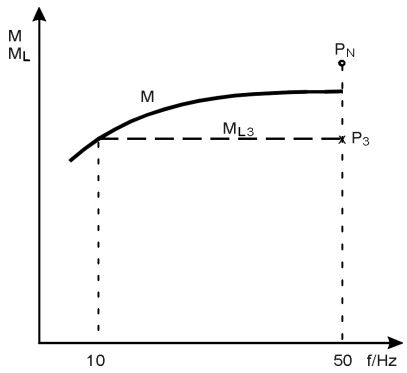
1 Special motor, inverter–optimized (different from Technical List IM)
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

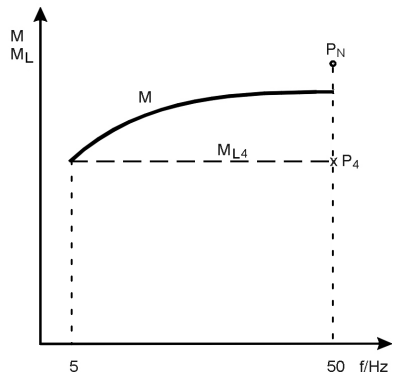
Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 3000 min^{-1}



Speed range: 600 – 3000 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.



Speed range: 300 – 3000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

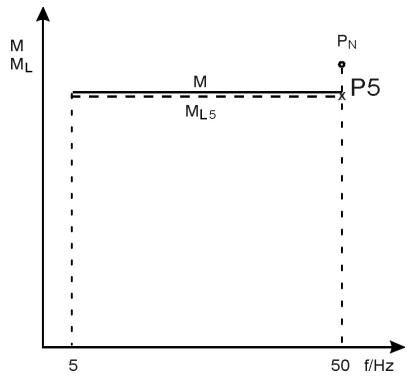
Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
DNGW–071BG–02	0.37	0.3	1	400	0.91	0.75	67.6	0.23	0.8	400	0.82	0.68	65.1
DNGW–071BH–02	0.55	0.46	1.6	400	1.19	0.84	70.8	0.39	1.4	400	1.08	0.80	70.2
DNGW–080BG–02	0.75	0.63	2.2	400	1.55	0.80	76.9	0.54	1.8	400	1.42	0.76	76.2
DNGW–080BH–02	1.1	0.85	2.9	400	2.1	0.78	78.2	0.73	2.5	400	1.93	0.74	77.6
DNGW–090LX–02	1.5	1.01	3.4	400	2.5	0.78	77.7	0.87	2.9	400	2.35	0.74	76.7
DNGW–090LD–02	2.2	1.49	5	400	3.55	0.78	81.5	1.28	4.3	400	3.25	0.74	80.7
DNGW–100LB–02	3	2.2	7.2	400	4.7	0.83	84.2	1.92	6.4	400	4.3	0.80	83.8
DNGW–112MB–02	4	3.45	11.5	400	6.7	0.91	84.3	3.1	10.2	400	6.1	0.90	84.1
DNGW–132SL–02	5.5	4.3	14.1	400	9.1	0.84	84.8	3.8	12.4	400	8.3	0.81	84.2
DNGW–132SN–02	7.5	5.4	17.9	400	11.1	0.82	88.2	4.8	15.7	400	10.3	0.79	87.8
DNGW–160ML–02	11	8.9	29	400	17.5	0.85	88.3	7.9	26	400	16	0.83	88.0
DNGW–160MN–02	15	10.2	33.5	400	20.5	0.82	89.6	9	29.5	400	18.9	0.80	89.2
DNGW–160LL–02	18.5	13.7	45	400	25.5	0.86	91.4	12.1	39.5	400	23	0.85	91.2
DNGW–180MB–02	22	18.3	59	400	35.5	0.84	90.2	16.4	53	400	33	0.82	89.8
DNGW–200LB–02	30	22	72	400	39.5	0.89	91.7	20.5	66	400	37.5	0.89	91.4
DNGW–200LD–02	37	24.5	79	400	46.5	0.85	91.8	22.5	72	400	43.5	0.84	91.5
DNGW–225MB–02	45	36	116	400	65	0.88	93.1	33	107	400	60	0.87	92.9
DNGW–250MB–02	55	47.5	153	400	87	0.85	93.5	44	142	400	82	0.84	93.3
DNGW–280SG–02 [1]	75	56	180	400	95	0.92	94.4	52	168	400	89	0.91	94.3
DNGW–280MG–02 [1]	90	65	210	400	111	0.91	94.2	61	197	400	105	0.90	94.1
DNGW–315SL–02	110	85	275	400	150	0.88	94.4	80	255	400	143	0.87	94.2
DNGW–315ML–02	132	104	330	400	184	0.87	94.9	98	310	400	175	0.87	94.8
DNGW–315MN–02	160	124	400	400	215	0.89	95.7	117	375	400	205	0.88	95.6
DNGW–315LL–02	200	155	495	400	270	0.88	95.4	147	470	400	260	0.88	95.3
DNGW–315LN–02 [2]	250	172	550	400	285	0.91	95.8	163	520	400	275	0.91	95.7
DNGW–315LN–02 [3]	250	195	620	400	315	0.93	96.3	183	590	400	300	0.93	96.2
DNSL–355LB–02	315	250	810	400	420	0.89	96.8	235	760	400	400	0.88	96.7
DNSL–355LC–02	355	265	850	690	250	0.91	96.6	250	800	690	240	0.91	96.6
DNSL–355LD–02	400	325	1040	690	315	0.90	96.9	305	970	690	295	0.89	96.8
DNSL–355LX–02	450	330	1070	690	320	0.90	96.4	310	990	690	305	0.89	96.4
DNSL–400LN–02	500	395	1270	690	380	0.90	96.7	370	1180	690	355	0.90	96.6
DNSL–400LN–02	560	430	1370	690	410	0.90	96.8	400	1290	690	385	0.90	96.7
DNSL–400LX–02	630	480	1540	690	460	0.91	96.8	450	1450	690	430	0.90	96.7
DNSL–450LL–02	710	550	1760	690	530	0.90	96.7	520	1660	690	500	0.90	96.7
DNSL–450LN–02	800	620	1990	690	600	0.90	96.9	590	1870	690	570	0.89	96.8
DNSL–450LN–02	900	710	2300	690	680	0.90	97.1	670	2150	690	650	0.89	97.0

1 Special motor, inverter–optimized (different from Technical List IM)
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 3000 min^{-1}

Speed range:	300 – 3000 min^{-1}
Control range:	1 : 10
Frequency:	5 – 50 Hz
Fan:	Forced ventilation
Load torque:	M_L = const.

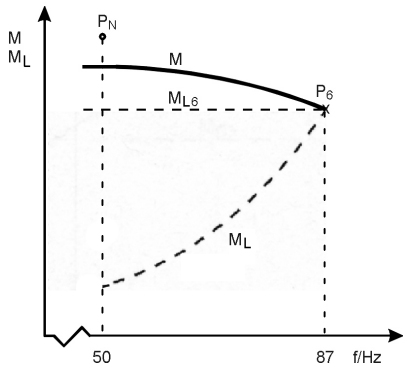
Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
DNLW–112MB–02	4	4.2	13.9	400	8	0.93	84.1
DNLW–132SL–02	5.5	5.8	19	400	11.4	0.88	85.2
DNLW–132SN–02	7.5	7.8	25.5	400	14.7	0.88	88.4
DNLW–160ML–02	11	11.6	38	400	22	0.88	88.3
DNLW–160MN–02	15	14.7	48	400	27.5	0.88	89.7
DNLW–160LL–02	18.5	19.4	64	400	35	0.90	91.0
DNLW–180MB–02	22	23	75	400	43	0.87	90.7
DNLW–200LB–02	30	31.5	102	400	55	0.92	92.2
DNLW–200LD–02	37	35	113	400	62	0.89	92.6
DNLW–225MB–02	45	47	152	400	82	0.90	93.4
DNLW–250MB–02	55	58	186	400	103	0.88	93.8
DNLW–280SG–02 [1]	75	75	240	400	125	0.93	94.7
DNLW–280MG–02 [1]	90	86	275	400	144	0.92	94.6
DNLW–315SL–02	110	104	335	400	178	0.90	94.8
DNLW–315ML–02	132	125	400	400	215	0.90	95.3
DNLW–315MN–02	160	151	485	400	255	0.91	95.9
DNLW–315LL–02	200	181	580	400	305	0.90	95.6
DNLW–315LN–02 [2]	250	215	690	400	355	0.93	96.1
DNLW–315LN–02 [3]	250	240	760	400	385	0.94	96.4
DNUL–355LB–02	315	300	960	400	495	0.90	96.9
DNUL–355LC–02	355	335	1080	690	315	0.92	96.8
DNUL–355LD–02	400	380	1220	690	360	0.91	97.0
DNUL–355LX–02	450	415	1330	690	395	0.91	96.5
DNUL–400LN–02	500	460	1470	690	440	0.91	96.8
DNUL–400LN–02	560	520	1650	690	495	0.91	96.9
DNUL–400LX–02	630	580	1860	690	550	0.91	96.9
DNUL–450LL–02	710	650	2100	690	620	0.91	96.9
DNUL–450LN–02	800	740	2350	690	710	0.91	97.0
DNUL–450LN–02	900	830	2650	690	790	0.91	97.2

1 Special motor, inverter–optimized (different from Technical List IM)
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 3000 min^{-1}

Speed range: 3000 – 5200 min^{-1}
Control range: 10 : 17
Frequency: 50 – 87 Hz
Fan: Self–ventilation, Forced ventilation
Load torque: M_L = const./ $M_L \sim n^2$

Type	P_N kW	P_6 kW	M_{L6} Nm	U V	I_1 A	cosφ	η %
DNGW–071BG–02	0.37	0.54	1.1	400	1.68	0.75	66.3
DNGW–071BH–02	0.55	0.81	1.6	400	2.15	0.82	70.3
DNGW–080BG–02	0.75	1.1	2.2	400	2.75	0.79	76.7
DNGW–080BH–02	1.1	1.62	3.2	400	3.9	0.79	79.5
DNGW–090LX–02	1.5	2.15	4.2	400	5.1	0.82	77.2
DNGW–090LD–02	2.2	3.1	6	400	7	0.81	82.0
DNGW–100LB–02	3	4.4	8.5	400	9.4	0.86	81.9
DNGW–112MB–02	4	5.9	11.3	400	12.1	0.91	79.6
DNGW–132SL–02	5.5	8.1	15.4	400	17.7	0.86	79.9
DNGW–132SN–02	7.5	11	21	400	22	0.85	86.7
DNGW–160ML–02	11	15.8	30	400	32.5	0.86	83.8
DNGW–160MN–02	15	21.5	40	400	43	0.86	86.7
DNGW–160LL–02	18.5	26.5	50	400	50	0.88	88.9
DNGW–180MB–02	22	31.5	59	400	65	0.85	85.5
DNGW–200LB–02	30	38	71	400	72	0.90	87.4
DNGW–200LD–02	37	39	73	400	79	0.85	86.7

For mains operation the motor windings have to be Y–connected.

For inverter operation Δ–connection of the windings is required.

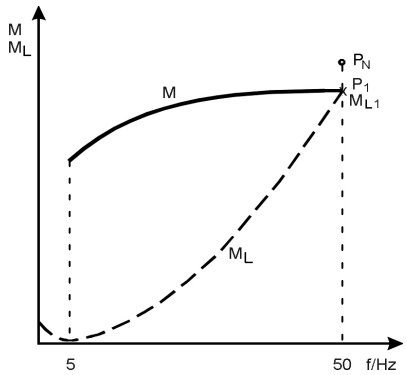
For the control range below 50 Hz the limit torques M_{L2}, M_{L3}, M_{L4} have to be observed (see Chapter 2.4.2.2)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

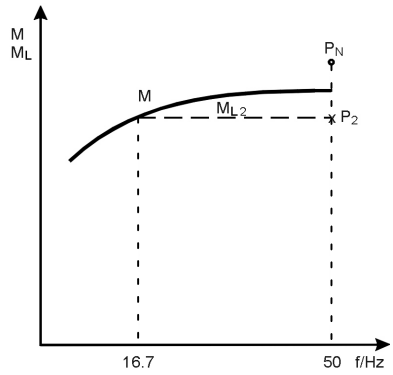
Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 1500 min^{-1}



Speed range: 150 – 1500 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$



Speed range: 500 – 1500 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
DNGW–071BG–04	0.25	0.26	1.8	400	0.79	0.80	64.1	0.24	1.7	400	0.76	0.78	64.2
DNGW–071BH–04	0.37	0.39	2.8	400	1.16	0.80	65.0	0.34	2.5	400	1.07	0.76	65.3
DNGW–080BG–04	0.55	0.58	4.0	400	1.59	0.80	69.8	0.46	3.2	400	1.39	0.74	70.0
DNGW–080BH–04	0.75	0.75	5.2	400	1.92	0.81	72.9	0.57	4.0	400	1.60	0.75	73.4
DNGW–090LX–04	1.1	1.15	7.8	400	2.55	0.87	77.8	0.96	6.5	400	2.20	0.84	78.6
DNGW–090LD–04	1.5	1.57	10.7	400	3.55	0.87	76.6	1.30	8.9	400	3.05	0.83	77.4
DNGW–100LB–04	2.2	2.3	15.7	400	5.1	0.86	78.2	1.83	12.5	400	4.25	0.82	79.0
DNGW–100LD–04	3	3.0	20.5	400	6.9	0.81	80.6	2.30	15.7	400	5.8	0.74	80.8
DNGW–112MB–04	4	4.0	27.0	400	8.3	0.87	83.3	3.20	21.5	400	6.8	0.83	84.0
DNGW–132SL–04	5.5	5.8	38.5	400	11.4	0.88	86.3	4.85	32.5	400	9.7	0.85	86.8
DNGW–132ML–04	7.5	7.8	52	400	15.2	0.86	87.9	6.3	41.5	400	12.7	0.83	88.4
DNGW–160ML–04	11	11.5	75	400	22.5	0.86	89.3	9.3	61	400	18.5	0.83	89.7
DNGW–160LL–04	15	15.0	98	400	29.0	0.85	90.5	12.0	79	400	24.0	0.82	91.0
DNGW–180MB–04	18.5	19.1	125	400	35.5	0.87	91.1	15.7	103	400	30.0	0.85	91.3
DNGW–180LB–04	22	23.0	151	400	42.5	0.87	91.5	19.5	127	400	36.5	0.86	91.8
DNGW–200LB–04	30	30.0	197	400	54	0.88	92.3	24.0	155	400	44	0.87	92.6
DNGW–225SB–04	37	35.5	230	400	64	0.88	93.3	29.0	189	400	53	0.86	93.5
DNGW–225MB–04	45	43.5	280	400	81	0.85	93.4	35.5	230	400	68	0.82	93.5
DNGW–250MB–04	55	54	350	400	95	0.88	94.0	46.5	300	400	84	0.87	93.9
DNGW–280SG–04	75	75	485	400	132	0.88	94.7	62	400	400	111	0.87	94.7
DNGW–280MG–04	90	86	550	400	150	0.88	94.9	73	470	400	129	0.87	94.8
DNGW–315SL–04	110	104	670	400	190	0.85	95.2	94	600	400	174	0.83	95.2
DNGW–315ML–04	132	125	810	400	225	0.86	95.4	108	690	400	196	0.85	95.4
DNGW–315MN–04	160	152	980	400	270	0.86	95.7	129	830	400	235	0.84	95.7
DNGW–315LL–04 [2]	200	175	1130	400	320	0.84	95.7	148	950	400	280	0.82	95.6
DNGW–315LL–04 [3]	200	190	1220	400	340	0.86	95.8	167	1070	400	305	0.85	95.7
DNGW–315LM–04 [2]	250	220	1400	400	405	0.83	96.3	181	1160	400	345	0.80	96.2
DNGW–315LM–04 [3]	250	235	1520	400	420	0.85	96.0	210	1340	400	385	0.84	96.0
DNSL–355LB–04	280	265	1710	400	465	0.86	96.2	235	1510	400	420	0.85	96.2
DNSL–355LB–04	315	300	1920	400	520	0.86	96.4	265	1700	400	470	0.85	96.3
DNSL–355LC–04	355	335	2150	690	340	0.86	96.8	300	1910	690	305	0.85	96.7
DNSL–355LD–04	400	380	2450	690	380	0.86	96.9	335	2150	690	340	0.85	96.8
DNSL–355LN–04	450	430	2750	690	440	0.85	96.7	380	2400	690	390	0.84	96.7
DNSL–355LX–04	500	475	3050	690	480	0.85	96.9	420	2700	690	430	0.84	96.9
DNSL–400LN–04	560	530	3400	690	520	0.88	96.9	470	3000	690	470	0.87	96.8
DNSL–400LN–04	630	600	3850	690	590	0.88	96.8	530	3400	690	530	0.87	96.8
DNSL–400LX–04	710	670	4300	690	660	0.88	97.0	590	3800	690	590	0.87	97.0
DNSL–450LL–04	800	760	4850	690	750	0.88	97.1	670	4300	690	670	0.87	97.0
DNSL–450LN–04	900	860	5500	690	840	0.88	97.2	760	4850	690	750	0.87	97.1
DNSL–450LN–04	950	900	5800	690	880	0.88	97.3	800	5100	690	790	0.87	97.2
DNSL–500LL–04	1000	950	6100	690	930	0.88	97.0	840	5400	690	830	0.87	96.9
DNSL–500LL–04	1120	1060	6800	690	1040	0.88	97.2	940	6000	690	920	0.88	97.1

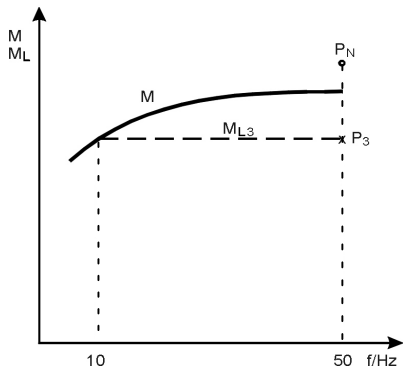
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

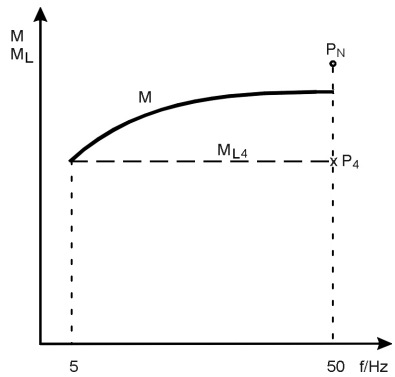
Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 1500 min^{-1}



Speed range: 300 – 1500 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.



Speed range: 150 – 1500 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

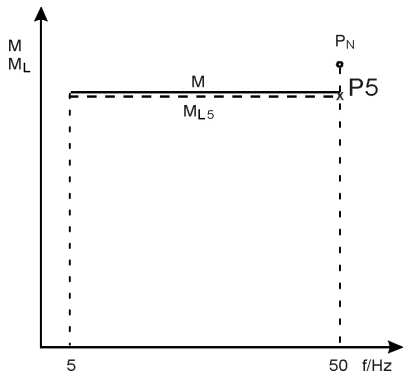
Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
DNGW–071BG–04	0.25	0.19	1.3	400	0.68	0.70	63.1	0.17	1.2	400	0.66	0.68	62.3
DNGW–071BH–04	0.37	0.28	2.0	400	0.97	0.70	64.5	0.24	1.7	400	0.93	0.66	63.3
DNGW–080BG–04	0.55	0.40	2.8	400	1.30	0.70	69.3	0.31	2.1	400	1.19	0.62	66.7
DNGW–080BH–04	0.75	0.51	3.5	400	1.51	0.71	73.0	0.45	3.2	400	1.44	0.68	72.3
DNGW–090LX–04	1.1	0.84	5.7	400	1.99	0.81	78.6	0.77	5.2	400	1.88	0.79	78.4
DNGW–090LD–04	1.5	1.14	7.8	400	2.8	0.80	77.3	1.05	7.1	400	2.65	0.78	77.1
DNGW–100LB–04	2.2	1.67	11.4	400	4.0	0.80	78.9	1.54	10.5	400	3.8	0.78	78.7
DNGW–100LD–04	3	2.1	14.1	400	5.5	0.72	80.5	1.90	12.9	400	5.3	0.69	80.1
DNGW–112MB–04	4	2.9	19.8	400	6.3	0.81	84.0	2.70	18.4	400	6.0	0.80	83.9
DNGW–132SL–04	5.5	4.2	28	400	8.6	0.83	86.9	3.85	25.5	400	8.1	0.82	86.8
DNGW–132ML–04	7.5	5.7	38	400	11.8	0.81	88.4	5.2	35	400	11.1	0.79	88.3
DNGW–160ML–04	11	8.4	55	400	17.1	0.82	89.7	7.4	48.5	400	15.5	0.79	89.6
DNGW–160LL–04	15	11.1	73	400	22.5	0.81	91.0	10.0	66	400	21.0	0.79	91.0
DNGW–180MB–04	18.5	14.1	92	400	27.5	0.83	91.3	12.4	81	400	25.0	0.81	91.1
DNGW–180LB–04	22	16.7	109	400	32.0	0.84	91.9	14.7	96	400	29.0	0.82	91.8
DNGW–200LB–04	30	22	145	400	40.5	0.86	92.6	20.0	131	400	37.5	0.85	92.5
DNGW–225SB–04	37	29	187	400	53	0.86	93.5	26.5	171	400	49	0.85	93.5
DNGW–225MB–04	45	35	230	400	68	0.82	93.5	32.0	210	400	63	0.81	93.4
DNGW–250MB–04	55	46.5	300	400	84	0.87	93.9	42.5	275	400	78	0.86	93.8
DNGW–280SG–04	75	62	400	400	111	0.87	94.7	57	370	400	103	0.86	94.6
DNGW–280MG–04	90	73	470	400	129	0.87	94.8	68	435	400	122	0.87	94.7
DNGW–315SL–04	110	93	600	400	173	0.83	95.2	86	550	400	162	0.82	95.1
DNGW–315ML–04	132	107	690	400	195	0.85	95.3	101	650	400	186	0.84	95.3
DNGW–315MN–04	160	129	830	400	235	0.84	95.7	119	770	400	220	0.83	95.6
DNGW–315LL–04 [2]	200	148	950	400	280	0.82	95.6	137	880	400	260	0.81	95.5
DNGW–315LL–04 [3]	200	167	1070	400	305	0.85	95.7	155	1000	400	285	0.84	95.7
DNGW–315LM–04 [2]	250	180	1160	400	345	0.80	96.2	168	1080	400	330	0.79	96.2
DNGW–315LM–04 [3]	250	210	1340	400	385	0.84	96.0	195	1250	400	360	0.83	95.9
DNSL–355LB–04	280	230	1470	400	410	0.84	96.1	215	1380	400	385	0.84	96.1
DNSL–355LB–04	315	260	1650	400	460	0.85	96.3	245	1550	400	440	0.84	96.2
DNSL–355LC–04	355	290	1860	690	300	0.84	96.7	275	1750	690	285	0.84	96.7
DNSL–355LD–04	400	330	2100	690	335	0.85	96.8	310	1970	690	320	0.84	96.8
DNSL–355LN–04	450	370	2350	690	385	0.84	96.7	345	2200	690	360	0.83	96.6
DNSL–355LX–04	500	410	2650	690	425	0.84	96.8	385	2450	690	400	0.83	96.8
DNSL–400LN–04	560	460	2950	690	460	0.87	96.8	430	2750	690	435	0.86	96.8
DNSL–400LN–04	630	520	3300	690	520	0.87	96.7	485	3100	690	490	0.86	96.7
DNSL–400LX–04	710	580	3750	690	580	0.87	97.0	550	3500	690	550	0.86	97.0
DNSL–450LL–04	800	660	4200	690	660	0.87	97.0	620	3950	690	620	0.86	96.9
DNSL–450LN–04	900	740	4700	690	740	0.87	97.1	690	4450	690	690	0.86	97.0
DNSL–450LN–04	950	780	5000	690	770	0.87	97.2	730	4700	690	730	0.87	97.1
DNSL–500LL–04	1000	820	5200	690	810	0.87	96.9	770	4900	690	770	0.87	96.8
DNSL–500LL–04	1120	920	5900	690	910	0.88	97.1	860	5500	690	850	0.87	97.0

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 1500 min^{-1}

Speed range: 150 – 1500 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

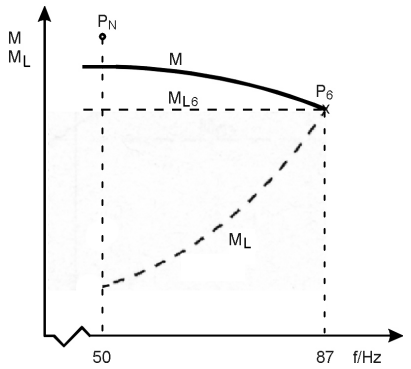
Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
DNLW–112MB–04	4	4.0	27.0	400	8 .3	0.87	83.3
DNLW–132SL–04	5.5	5.8	38 .5	400	11 .4	0.88	86.3
DNLW–132ML–04	7.5	7.8	52	400	15 .2	0.86	87.9
DNLW–160ML–04	11	11.4	75	400	22.0	0.86	89.3
DNLW–160LL–04	15	14.9	98	400	29.0	0.85	90.5
DNLW–180MB–04	18.5	19.2	125	400	36.0	0.87	91.1
DNLW–180LB–04	22	23.0	151	400	42 .5	0.87	91.5
DNLW–200LB–04	30	30.0	197	400	54	0.88	92.3
DNLW–225SB–04	37	35.5	230	400	64	0.88	93.3
DNLW–225MB–04	45	43	280	400	80	0.85	93.4
DNLW–250MB–04	55	54	350	400	95	0.88	94.0
DNLW–280SG–04	75	75	485	400	132	0.88	94.7
DNLW–280MG–04	90	85	550	400	149	0.88	94.9
DNLW–315SL–04	110	104	670	400	190	0.85	95.2
DNLW–315ML–04	132	125	810	400	225	0.86	95.4
DNLW–315MN–04	160	152	980	400	270	0.86	95.7
DNLW–315LL–04 [2]	200	176	1130	400	320	0.84	95.7
DNLW–315LL–04 [3]	200	190	1220	400	340	0.86	95.8
DNLW–315LM–04 [2]	250	220	1400	400	405	0.83	96.3
DNLW–315LM–04 [3]	250	235	1520	400	420	0.85	96.0
DNUL–355LB–04	280	265	1710	400	465	0.86	96.2
DNUL–355LB–04	315	300	1920	400	520	0.86	96.4
DNUL–355LC–04	355	335	2150	690	340	0.85	96.8
DNUL–355LD–04	400	380	2450	690	380	0.86	96.9
DNUL–355LN–04	450	415	2650	690	425	0.85	96.7
DNUL–355LX–04	500	460	2950	690	470	0.85	96.9
DNUL–400LN–04	560	520	3300	690	510	0.88	96.9
DNUL–400LN–04	630	580	3700	690	570	0.87	96.8
DNUL–400LX–04	710	650	4200	690	640	0.88	97.0
DNUL–450LL–04	800	740	4700	690	730	0.88	97.0
DNUL–450LN–04	900	830	5300	690	820	0.88	97.1
DNUL–450LN–04	950	870	5600	690	850	0.88	97.3
DNUL–500LL–04	1000	920	5900	690	900	0.88	97.0
DNUL–500LL–04	1120	1030	6600	690	1010	0.88	97.2

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 1500 min^{-1}

Speed range: 1500 – 2600 min^{-1}
Control range: 10 : 17
Frequency: 50 – 87 Hz
Fan: Self–ventilation, Forced ventilation
Load torque: M_L = const./ $M_L \sim n^2$

For mains operation the motor windings have to be Y–connected.

For inverter operation Δ–connection of the windings is required.

For the control range below 50 Hz the limit torques M_{L2}, M_{L3}, M_{L4} have to be observed (see Chapter 2.4.2.2)

Type	P_N kW	P_6 kW	M_{L6} Nm	U V	I_1 A	cosφ	η %
DNGW–071BG–04	0.25	0.37	1.5	400	1.23	0.68	68.4
DNGW–071BH–04	0.37	0.54	2.2	400	1.77	0.68	69.6
DNGW–080BG–04	0.55	0.80	3.2	400	2.40	0.69	74.4
DNGW–080BH–04	0.75	1.09	4.3	400	2.90	0.74	77.5
DNGW–090LX–04	1.1	1.60	6.3	400	3.75	0.81	79.3
DNGW–090LD–04	1.5	2.20	8.6	400	5.2	0.80	79.9
DNGW–100LB–04	2.2	3.20	12.6	400	7.4	0.80	81.1
DNGW–100LD–04	3	4.25	16.7	400	10.5	0.74	83.1
DNGW–112MB–04	4	5.8	23.0	400	12.3	0.83	84.4
DNGW–132SL–04	5.5	8.0	30.5	400	16.2	0.84	87.0
DNGW–132ML–04	7.5	10.9	42	400	22.0	0.82	89.4
DNGW–160ML–04	11	15.6	59	400	31.5	0.82	88.8
DNGW–160LL–04	15	21.5	81	400	42.5	0.82	91.8
DNGW–180MB–04	18.5	26.5	99	400	52	0.84	90.6
DNGW–180LB–04	22	31.0	118	400	60	0.84	91.4
DNGW–200LB–04	30	41.0	154	400	76	0.87	91.7
DNGW–225SB–04	37	46.5	175	400	87	0.85	92.3
DNGW–225MB–04	45	55	205	400	110	0.80	92.2
DNGW–250MB–04	55	63	235	400	121	0.84	91.9
DNGW–280SG–04	75	90	335	400	168	0.85	92.9
DNGW–280MG–04	90	99	365	400	186	0.85	92.7
DNGW–315SL–04	110	124	460	400	250	0.79	92.8
DNGW–315ML–04	132	138	510	400	270	0.81	93.2
DNGW–315MN–04	160	179	670	400	345	0.81	94.3
DNGW–315LL–04 [2]	200	196	730	400	400	0.78	93.4
DNGW–315LL–04 [3]	200	215	800	400	425	0.80	93.6
DNGW–315LM–04 [2]	250	245	910	400	510	0.75	95.1
DNGW–315LM–04 [3]	250	265	990	400	530	0.79	94.2

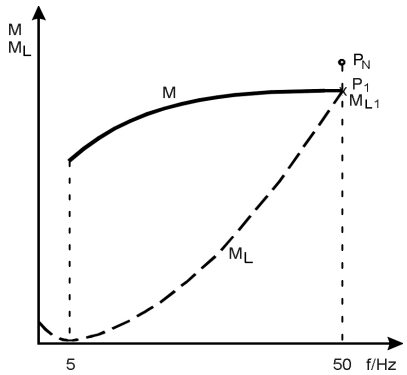
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

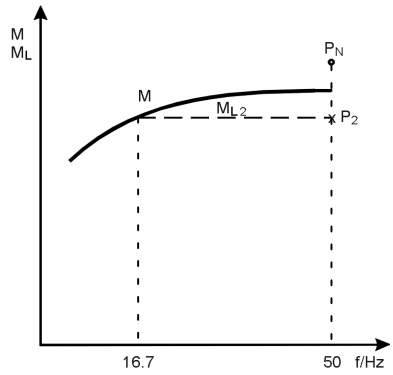
Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 1000 min^{-1}



Speed range: 100 – 1000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$



Speed range: 330 – 1000 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
DNGW–071BH–06	0.25	0.26	2.8	400	0.90	0.77	58.9	0.20	2.2	400	0.79	0.68	58.9
DNGW–080BG–06	0.37	0.39	4.2	400	1.29	0.76	62.6	0.29	3.2	400	1.11	0.67	63.1
DNGW–080BH–06	0.55	0.52	5.6	400	1.64	0.74	66.8	0.36	3.9	400	1.39	0.63	65.8
DNGW–090LX–06	0.75	0.78	8.3	400	2.1	0.79	71.4	0.58	6.2	400	1.74	0.70	73.0
DNGW–090LD–06	1.1	1.10	11.5	400	3.3	0.73	70.9	0.73	7.6	400	2.8	0.59	70.1
DNGW–100LB–06	1.5	1.57	16.0	400	4.4	0.74	74.2	1.26	12.8	400	3.9	0.68	73.7
DNGW–112MB–06	2.2	2.30	23.5	400	5.5	0.81	77.9	1.83	18.6	400	4.6	0.77	78.6
DNGW–132SL–06	3	3.15	31.5	400	6.7	0.83	84.6	2.9	29	400	6.3	0.81	84.8
DNGW–132ML–06	4	4.2	42	400	9.2	0.82	83.5	3.7	37	400	8.3	0.80	83.8
DNGW–132MN–06	5.5	5.8	58	400	12.3	0.83	85.1	5.1	51	400	11.1	0.80	85.5
DNGW–160ML–06	7.5	7.9	78	400	16.0	0.84	87.2	7.3	72	400	15.0	0.83	87.3
DNGW–160LL–06	11	11.5	113	400	23.0	0.83	88.9	10.2	100	400	21.0	0.81	89.1
DNGW–180LB–06	15	15.7	156	400	31.5	0.82	89.7	13.4	133	400	27.5	0.80	90.1
DNGW–200LB–06	18.5	19.4	193	400	38	0.85	89.5	16.6	165	400	32.5	0.84	90.2
DNGW–200LD–06	22	22.5	220	400	45	0.82	90.2	17.3	171	400	35.5	0.80	90.7
DNGW–225MB–06	30	30.5	300	400	59	0.83	92.0	25.0	245	400	49.5	0.81	92.1
DNGW–250MB–06	37	39.0	375	400	77	0.82	92.1	33.5	325	400	67	0.81	92.0
DNGW–280SG–06	45	44.5	430	400	80	0.88	93.3	37	360	400	68	0.86	93.4
DNGW–280MG–06	55	53	510	400	97	0.87	93.0	44	430	400	82	0.85	92.9
DNGW–315SL–06	75	71	690	400	131	0.85	94.3	64	620	400	120	0.84	94.3
DNGW–315ML–06	90	85	830	400	151	0.87	95.3	77	750	400	138	0.86	95.3
DNGW–315MM–06	110	104	1010	400	185	0.87	95.1	95	910	400	170	0.86	95.1
DNGW–315MN–06 [2]	132	118	1140	400	205	0.88	95.5	102	980	400	179	0.87	95.5
DNGW–315LL–06	160	152	1470	400	265	0.88	95.6	131	1270	400	230	0.87	95.6
DNGW–315LM–06 [2]	200	177	1700	400	325	0.84	95.9	152	1470	400	285	0.82	95.8
DNGW–315LM–06 [3]	200	190	1830	400	330	0.88	95.9	164	1580	400	290	0.87	95.9
DNSL–355MD–06	225	215	2050	400	385	0.84	96.0	189	1820	400	345	0.82	95.9
DNSL–355LB–06	250	235	2300	400	420	0.84	96.3	210	2000	400	385	0.82	96.2
DNSL–355LC–06	280	265	2550	690	270	0.85	96.3	235	2250	690	245	0.84	96.3
DNSL–355LD–06	315	300	2900	690	310	0.84	96.4	265	2550	690	280	0.82	96.3
DNSL–355LN–06	355	335	3250	690	340	0.85	96.4	295	2850	690	305	0.84	96.4
DNSL–355LN–06	400	380	3650	690	395	0.83	96.5	325	3150	690	345	0.82	96.5
DNSL–400LL–06	400	380	3650	690	395	0.83	96.5	335	3200	690	355	0.82	96.5
DNSL–400LN–06	450	425	4100	690	440	0.84	96.6	380	3650	690	400	0.83	96.6
DNSL–400LN–06	500	475	4550	690	490	0.84	96.7	415	4000	690	435	0.83	96.6
DNSL–450LL–06	560	530	5100	690	540	0.85	96.9	470	4500	690	485	0.84	96.8
DNSL–450LL–06	630	600	5700	690	610	0.85	97.0	530	5100	690	550	0.84	96.9
DNSL–450LN–06	710	670	6500	690	680	0.85	97.0	600	5700	690	620	0.84	97.0
DNSL–450LN–06	800	740	7100	690	760	0.84	97.1	650	6300	690	680	0.83	97.1
DNSL–500LL–06	900	860	8200	690	880	0.85	97.0	760	7300	690	780	0.84	96.9
DNSL–500LN–06	1000	950	9100	690	970	0.85	97.1	840	8100	690	860	0.84	97.0
DNSL–500LN–06	1120	1060	10200	690	1060	0.86	97.2	940	9000	690	940	0.86	97.1
DNSL–560LL–06	1250	1190	11400	690	1170	0.88	97.2	1050	10100	690	1040	0.87	97.2
DNSL–560LL–06	1400	1330	12800	690	1330	0.86	97.2	1180	11300	690	1200	0.85	97.1
DNSL–560LN–06	1600	1520	14600	690	1490	0.88	97.4	1340	12900	690	1320	0.87	97.3

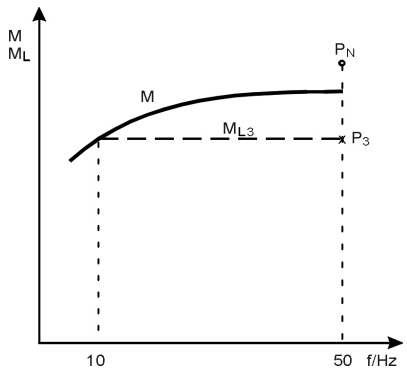
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

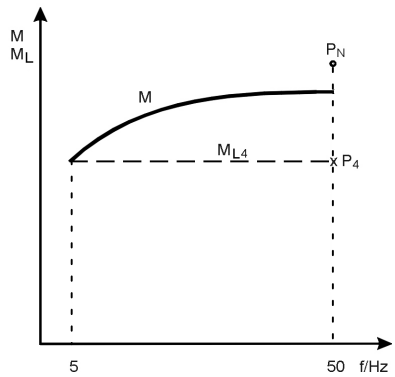
Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 1000 min^{-1}



Speed range: 200 – 1000 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.



Speed range: 100 – 1000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

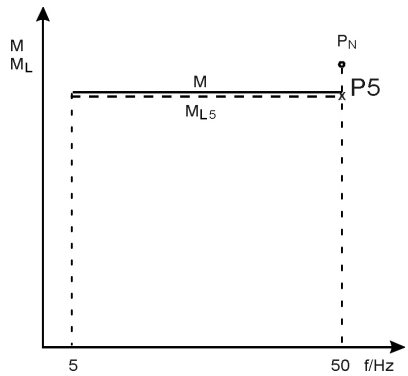
Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
DNGW–071BH–06	0.25	0.16	1.7	400	0.74	0.61	56.6	0.14	1.4	400	0.72	0.60	55.0
DNGW–080BG–06	0.37	0.23	2.5	400	1.03	0.60	61.2	0.21	2.1	400	1.01	0.59	60.0
DNGW–080BH–06	0.55	0.29	3.2	400	1.32	0.57	63.6	0.28	2.8	400	1.20	0.56	63.5
DNGW–090LX–06	0.75	0.51	5.4	400	1.65	0.66	72.8	0.44	4.4	400	1.56	0.62	71.0
DNGW–090LD–06	1.1	0.66	6.6	400	2.7	0.57	69.3	0.62	6.1	400	2.65	0.54	68.0
DNGW–100LB–06	1.5	1.09	11.1	400	3.7	0.64	72.8	0.88	8.9	400	3.45	0.57	70.6
DNGW–112MB–06	2.2	1.67	17	400	4.35	0.75	78.5	1.53	15.5	400	4.1	0.73	78.2
DNGW–132SL–06	3	2.3	23	400	5.3	0.77	84.8	2.1	21.0	400	5.1	0.73	84.6
DNGW–132ML–06	4	3.05	30.5	400	7.3	0.75	83.8	2.8	28.0	400	6.9	0.74	83.6
DNGW–132MN–06	5.5	4.2	42	400	9.7	0.76	85.5	3.85	38.5	400	9.2	0.74	85.3
DNGW–160ML–06	7.5	5.7	56	400	12.5	0.78	87.2	5	49.5	400	11.5	0.75	86.9
DNGW–160LL–06	11	8.4	82	400	18.4	0.77	89.0	7.4	72	400	17	0.74	88.8
DNGW–180LB–06	15	11.4	113	400	24.5	0.77	90.3	10.1	99	400	23	0.74	90.2
DNGW–200LB–06	18.5	14.1	140	400	28	0.83	90.5	12.4	123	400	25	0.81	90.5
DNGW–200LD–06	22	16.1	159	400	34	0.78	90.7	14.7	146	400	31.5	0.77	90.6
DNGW–225MB–06	30	25	245	400	49.5	0.81	92.1	22.5	220	400	46	0.79	92.1
DNGW–250MB–06	37	31.5	305	400	64	0.80	91.9	28.5	275	400	59	0.78	91.7
DNGW–280SG–06	45	37	355	400	68	0.86	93.4	34	330	400	63	0.85	93.3
DNGW–280MG–06	55	44.5	430	400	83	0.85	92.9	41	395	400	78	0.84	92.8
DNGW–315SL–06	75	64	620	400	120	0.84	94.3	58	560	400	110	0.82	94.2
DNGW–315ML–06	90	76	740	400	137	0.86	95.3	70	680	400	127	0.85	95.3
DNGW–315MM–06	110	93	900	400	167	0.86	95.1	86	830	400	156	0.85	95.1
DNGW–315MN–06 [2]	132	101	980	400	178	0.87	95.5	94	910	400	167	0.87	95.5
DNGW–315LL–06	160	131	1260	400	230	0.87	95.6	120	1160	400	215	0.86	95.6
DNGW–315LM–06 [2]	200	152	1470	400	285	0.82	95.8	141	1360	400	270	0.81	95.8
DNGW–315LM–06 [3]	200	164	1580	400	290	0.87	95.9	151	1460	400	270	0.86	95.9
DNSL–355MD–06	225	184	1770	400	340	0.82	95.9	173	1670	400	325	0.81	95.8
DNSL–355LB–06	250	205	1970	400	375	0.82	96.2	192	1850	400	355	0.81	96.1
DNSL–355LC–06	280	230	2200	690	240	0.83	96.3	215	2050	690	225	0.83	96.2
DNSL–355LD–06	315	260	2500	690	275	0.82	96.3	240	2300	690	265	0.81	96.3
DNSL–355LN–06	355	290	2800	690	300	0.84	96.4	275	2650	690	285	0.84	96.4
DNSL–355LN–06	400	325	3150	690	345	0.82	96.5	300	2900	690	325	0.81	96.4
DNSL–400LL–06	400	330	3150	690	350	0.82	96.4	310	2950	690	330	0.81	96.4
DNSL–400LN–06	450	370	3550	690	390	0.82	96.6	345	3350	690	370	0.81	96.5
DNSL–400LN–06	500	410	3950	690	430	0.82	96.6	385	3700	690	410	0.82	96.6
DNSL–450LL–06	560	460	4400	690	475	0.83	96.8	430	4150	690	450	0.83	96.7
DNSL–450LL–06	630	520	4950	690	540	0.84	96.9	485	4650	690	510	0.83	96.8
DNSL–450LN–06	710	580	5600	690	600	0.84	97.0	550	5300	690	570	0.83	96.9
DNSL–450LN–06	800	660	6300	690	690	0.83	97.1	620	5900	690	650	0.82	97.0
DNSL–500LL–06	900	740	7100	690	760	0.84	96.9	690	6700	690	710	0.84	96.8
DNSL–500LN–06	1000	820	7900	690	840	0.84	96.9	770	7400	690	800	0.84	96.9
DNSL–500LN–06	1120	920	8800	690	920	0.86	97.1	860	8300	690	870	0.86	97.1
DNSL–560LL–06	1250	1030	9800	690	1020	0.87	97.1	960	9200	690	950	0.87	97.1
DNSL–560LL–06	1400	1150	11000	690	1170	0.85	97.1	1080	10300	690	1110	0.84	97.0
DNSL–560LN–06	1600	1310	12600	690	1290	0.87	97.3	1230	11800	690	1220	0.87	97.2

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 1000 min^{-1}

Speed range: 100 – 1000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

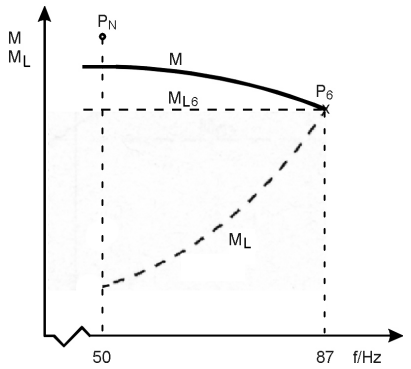
Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
DNLW–112MB–06	2.2	2.3	23.5	400	5.5	0.81	77.9
DNLW–132SL–06	3	3.15	31.5	400	6.7	0.83	84.6
DNLW–132ML–06	4	4.2	42	400	9.2	0.82	83.5
DNLW–132MN–06	5.5	5.8	58	400	12.3	0.83	85.1
DNLW–160ML–06	7.5	7.9	78	400	16	0.84	87.2
DNLW–160LL–06	11	11.5	113	400	23	0.83	88.9
DNLW–180LB–06	15	15.7	156	400	31.5	0.82	89.7
DNLW–200LB–06	18.5	19.4	193	400	38	0.85	89.5
DNLW–200LD–06	22	22.5	220	400	45	0.82	90.2
DNLW–225MB–06	30	30.5	300	400	59	0.83	92.0
DNLW–250MB–06	37	38.5	375	400	76	0.82	92.1
DNLW–280SG–06	45	44.5	430	400	80	0.88	93.3
DNLW–280MG–06	55	53	510	400	97	0.87	93.0
DNLW–315SL–06	75	71	690	400	131	0.85	94.3
DNLW–315ML–06	90	85	830	400	151	0.87	95.3
DNLW–315MM–06	110	104	1010	400	185	0.87	95.1
DNLW–315MN–06 [2]	132	118	1140	400	205	0.88	95.5
DNLW–315LL–06	160	152	1470	400	265	0.88	95.6
DNLW–315LM–06 [2]	200	176	1700	400	320	0.84	95.9
DNLW–315LM–06 [3]	200	190	1830	400	330	0.88	95.9
DNUL–355MD–06	225	215	2050	400	385	0.84	96.0
DNUL–355LB–06	250	235	2300	400	420	0.84	96.3
DNUL–355LC–06	280	265	2550	690	270	0.85	96.3
DNUL–355LD–06	315	300	2900	690	310	0.84	96.4
DNUL–355LN–06	355	325	3150	690	330	0.85	96.4
DNUL–355LN–06	400	370	3550	690	385	0.83	96.5
DNUL–400LL–06	400	370	3550	690	385	0.83	96.5
DNUL–400LN–06	450	415	4000	690	430	0.83	96.6
DNUL–400LN–06	500	460	4400	690	475	0.84	96.7
DNUL–450LL–06	560	520	4950	690	530	0.85	96.9
DNUL–450LL–06	630	580	5600	690	590	0.85	96.9
DNUL–450LN–06	710	650	6300	690	660	0.85	97.0
DNUL–450LN–06	800	740	7100	690	760	0.84	97.1
DNUL–500LL–06	900	830	7900	690	850	0.85	97.0
DNUL–500LN–06	1000	920	8800	690	940	0.85	97.0
DNUL–500LN–06	1120	1030	9900	690	1030	0.86	97.2
DNUL–560LL–06	1250	1150	11000	690	1130	0.88	97.2
DNUL–560LL–06	1400	1290	12400	690	1300	0.86	97.2
DNUL–560LN–06	1600	1470	14100	690	1440	0.88	97.4

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 1000 min^{-1}

Speed range: 1000 – 1730 min^{-1}
Control range: 10 : 17
Frequency: 50 – 87 Hz
Fan: Self–ventilation, Forced ventilation
Load torque: M_L = const./ $M_L \sim n^2$

Type	P_N kW	P_6 kW	M_{L6} Nm	U V	I_1 A	cosφ	η %
DNGW–071BH–06	0.25	0.37	2.3	400	1.41	0.64	64.3
DNGW–080BG–06	0.37	0.54	3.4	400	1.97	0.63	69.4
DNGW–080BH–06	0.55	0.76	4.8	400	2.6	0.64	72.1
DNGW–090LX–06	0.75	1.09	6.7	400	3.15	0.69	77.6
DNGW–090LD–06	1.1	1.6	9.6	400	5.2	0.62	77.0
DNGW–100LB–06	1.5	2.2	12.8	400	6.8	0.65	77.1
DNGW–112MB–06	2.2	3.2	18.8	400	8.2	0.75	79.0
DNGW–132SL–06	3	4.35	25	400	9.9	0.78	84.9
DNGW–132ML–06	4	5.8	33.5	400	13.4	0.76	85.5
DNGW–132MN–06	5.5	8	46	400	17.9	0.77	86.9
DNGW–160ML–06	7.5	10.7	61	400	23	0.79	87.8
DNGW–160LL–06	11	15.6	88	400	33.5	0.78	89.4
DNGW–180LB–06	15	21.5	122	400	45	0.78	91.4
DNGW–200LB–06	18.5	26.5	151	400	52	0.83	90.6
DNGW–200LD–06	22	30	170	400	62	0.79	91.0
DNGW–225MB–06	30	39	220	400	80	0.79	91.4
DNGW–250MB–06	37	45.5	255	400	99	0.77	89.1
DNGW–280SG–06	45	55	305	400	104	0.84	92.7
DNGW–280MG–06	55	61	340	400	122	0.81	90.8
DNGW–315SL–06	75	94	520	400	184	0.81	92.8
DNGW–315ML–06	90	112	630	400	210	0.84	94.7
DNGW–315MM–06	110	137	760	400	255	0.84	94.4
DNGW–315MN–06 [2]	132	143	800	400	260	0.85	94.9
DNGW–315LL–06	160	195	1090	400	350	0.86	95.3
DNGW–315LM–06 [2]	200	196	1090	400	400	0.77	94.9
DNGW–315LM–06 [3]	200	240	1320	400	435	0.85	95.1

For mains operation the motor windings have to be Y–connected.

For inverter operation Δ–connection of the windings is required.

For the control range below 50 Hz the limit torques M_{L2}, M_{L3}, M_{L4} have to be observed (see Chapter 2.4.2.2)

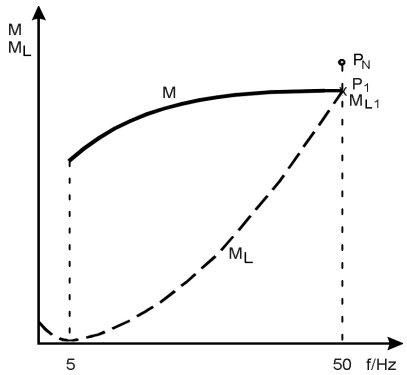
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

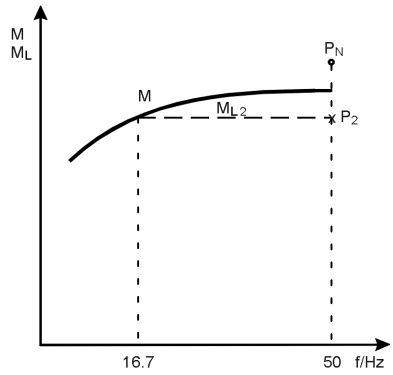
Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 750 min^{-1}



Speed range: 75 – 750 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$



Speed range: 250 – 750 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
DNGW–071BH–08	0.12	0.13	1.9	400	0.60	0.70	49.8	0.12	1.8	400	0.57	0.67	50.0
DNGW–080BH–08	0.25	0.26	3.8	400	1.07	0.68	57.4	0.22	3.3	400	1.01	0.63	57.3
DNGW–090LX–08	0.37	0.39	5.5	400	1.43	0.68	63.1	0.36	5.0	400	1.37	0.66	63.1
DNGW–090LD–08	0.55	0.58	8.2	400	1.94	0.70	67.0	0.53	7.5	400	1.83	0.68	67.3
DNGW–100LB–08	0.75	0.79	10.7	400	2.40	0.72	70.4	0.73	9.9	400	2.30	0.70	70.4
DNGW–100LD–08	1.1	1.10	15.1	400	3.20	0.74	72.0	0.80	11.0	400	2.70	0.65	71.3
DNGW–112MB–08	1.5	1.57	21.5	400	4.35	0.74	74.5	1.31	17.9	400	3.85	0.70	75.0
DNGW–132SL–08	2.2	2.30	31	400	5.8	0.74	81.9	2.15	28.5	400	5.5	0.72	82.0
DNGW–132ML–08	3	3.15	42	400	7.8	0.74	83.6	2.9	39	400	7.3	0.72	83.8
DNGW–160ML–08	4	4.2	56	400	9.6	0.77	85.0	3.9	52	400	9.0	0.76	85.4
DNGW–160MN–08	5.5	5.8	76	400	13.5	0.75	86.2	5.3	70	400	12.7	0.73	86.4
DNGW–160LL–08	7.5	7.9	104	400	17.9	0.77	85.9	7.3	96	400	16.9	0.76	86.1
DNGW–180LB–08	11	11.6	153	400	24.0	0.82	88.1	10.4	138	400	22.0	0.80	88.5
DNGW–200LB–08	15	15.7	210	400	33.5	0.79	87.7	13.6	183	400	29.5	0.78	88.6
DNGW–225SB–08	18.5	19.4	255	400	40.5	0.80	89.0	16.4	215	400	35.0	0.78	89.6
DNGW–225MB–08	22	23.0	305	400	49	0.78	89.9	21.5	280	400	46.5	0.77	90.0
DNGW–250MB–08	30	31.5	410	400	62	0.82	91.1	28.5	375	400	57	0.81	91.2
DNGW–280SG–08	37	37.5	490	400	74	0.81	92.3	31.0	400	400	63	0.79	92.4
DNGW–280MG–08	45	47.5	610	400	93	0.82	92.7	38.5	500	400	77	0.80	93.0
DNGW–315SL–08	55	52	670	400	103	0.79	94.2	47.5	610	400	96	0.78	94.2
DNGW–315ML–08	75	71	920	400	139	0.80	94.1	64	830	400	128	0.79	94.1
DNGW–315MM–08	90	85	1100	400	164	0.81	94.7	77	1000	400	151	0.80	94.8
DNGW–315MN–08 [2]	110	101	1300	400	200	0.79	94.2	84	1090	400	172	0.77	94.3
DNGW–315LL–08	132	124	1600	400	240	0.80	94.6	103	1330	400	205	0.78	94.6
DNGW–315LM–08 [2]	160	132	1710	400	260	0.79	95.1	108	1400	400	225	0.75	95.2
DNGW–315LM–08 [3]	160	152	1960	400	290	0.81	95.6	128	1650	400	255	0.77	95.6
DNSL–355LB–08	200	190	2450	400	360	0.80	95.7	165	2100	400	320	0.77	95.7
DNSL–355LC–08	225	215	2750	690	235	0.81	95.5	184	2350	690	205	0.79	95.5
DNSL–355LD–08	250	240	3050	690	260	0.81	95.6	205	2650	690	230	0.78	95.6
DNSL–355LN–08	280	265	3400	690	285	0.81	96.0	225	2900	690	250	0.79	96.0
DNSL–355LX–08	315	300	3850	690	320	0.82	95.9	250	3250	690	275	0.80	95.9
DNSL–400LL–08	355	335	4350	690	360	0.81	96.2	290	3700	690	320	0.79	96.2
DNSL–400LN–08	400	380	4900	690	405	0.82	96.2	320	4150	690	350	0.79	96.3
DNSL–400LX–08	450	430	5500	690	460	0.81	96.3	360	4650	690	395	0.79	96.3
DNSL–450LL–08	500	475	6100	690	495	0.83	96.6	410	5300	690	435	0.82	96.6
DNSL–450LN–08	560	530	6800	690	550	0.83	96.6	465	6000	690	490	0.82	96.6
DNSL–450LN–08	630	600	7700	690	630	0.83	96.7	520	6700	690	550	0.82	96.7
DNSL–450LX–08	670	640	8200	690	670	0.82	96.8	560	7200	690	600	0.81	96.8
DNSL–500LL–08	710	670	8600	690	680	0.85	96.9	600	7600	690	620	0.84	96.9
DNSL–500LL–08	800	760	9700	690	770	0.85	97.0	670	8600	690	690	0.84	96.9
DNSL–500LN–08	900	860	11000	690	890	0.84	96.7	750	9600	690	780	0.83	96.7
DNSL–500LX–08	950	900	11600	690	940	0.83	96.9	800	10200	690	850	0.82	96.9
DNSL–560LL–08	1000	950	12200	690	970	0.84	97.0	840	10800	690	870	0.84	96.9
DNSL–560LL–08	1100	1020	13000	690	1050	0.84	97.5	920	11800	690	950	0.83	97.4
DNSL–560LN–08	1200	1140	14600	690	1170	0.84	97.0	1010	12900	690	1040	0.84	96.9
DNSL–560LN–08	1350	1280	16400	690	1320	0.84	97.1	1130	14500	690	1170	0.83	97.0

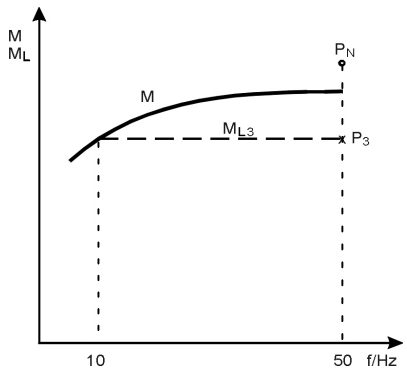
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

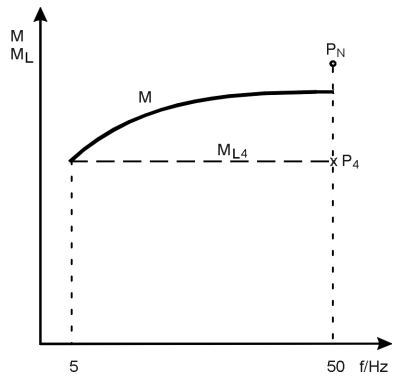
Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 750 min^{-1}



Speed range: 250 – 750 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.



Speed range: 75 – 750 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

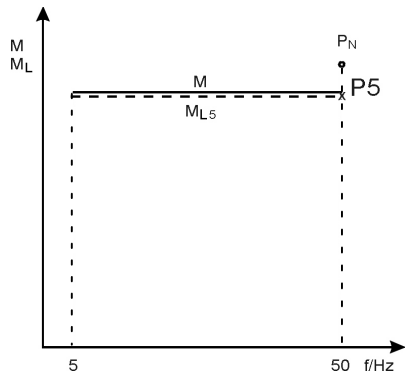
Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
DNGW–071BH–08	0.12	0.09	1.4	400	0.53	0.60	48.4	0.08	1.1	400	0.52	0.57	46.8
DNGW–080BH–08	0.25	0.15	2.2	400	0.92	0.51	52.5	0.18	2.5	400	0.92	0.58	55.6
DNGW–090LX–08	0.37	0.28	4	400	1.24	0.59	61.5	0.26	3.7	400	1.22	0.57	60.7
DNGW–090LD–08	0.55	0.42	5.9	400	1.64	0.61	66.7	0.38	5.4	400	1.6	0.59	66.0
DNGW–100LB–08	0.75	0.57	7.8	400	2.1	0.63	69.0	0.52	7.2	400	2.05	0.60	68.1
DNGW–100LD–08	1.1	0.69	9.4	400	2.6	0.61	70.0	0.73	9.7	400	2.63	0.61	69.5
DNGW–112MB–08	1.5	1.14	15.6	400	3.6	0.66	74.7	1.02	13.9	400	3.45	0.63	74.1
DNGW–132SL–08	2.2	1.67	22.5	400	4.75	0.66	81.7	1.54	20.5	400	4.6	0.64	81.3
DNGW–132ML–08	3	2.3	30.5	400	6.4	0.66	83.6	2.1	28	400	6.1	0.64	83.3
DNGW–160ML–08	4	3.05	40.5	400	7.6	0.71	86.0	2.7	36	400	7.1	0.68	85.9
DNGW–160MN–08	5.5	4.2	55	400	11.1	0.67	86.2	3.7	48.5	400	10.4	0.64	85.8
DNGW–160LL–08	7.5	5.7	76	400	14.4	0.70	86.0	5	67	400	13.4	0.67	85.6
DNGW–180LB–08	11	8.4	111	400	18.9	0.75	88.8	7.4	98	400	17.5	0.72	88.8
DNGW–200LB–08	15	11.4	153	400	26	0.75	89.1	10.1	135	400	23.5	0.72	89.3
DNGW–225SB–08	18.5	15.7	210	400	34	0.77	89.6	14.2	189	400	31.5	0.75	89.7
DNGW–225MB–08	22	18.7	245	400	42	0.74	90.1	16.9	225	400	39.5	0.72	90.0
DNGW–250MB–08	30	25.5	330	400	52	0.80	91.1	23	300	400	48.5	0.78	91.0
DNGW–280SG–08	37	31	400	400	63	0.79	92.4	28	365	400	58	0.77	92.3
DNGW–280MG–08	45	38.5	495	400	77	0.80	93.0	34.5	450	400	71	0.78	93.0
DNGW–315SL–08	55	46.5	600	400	94	0.78	94.2	43	550	400	89	0.76	94.2
DNGW–315ML–08	75	64	820	400	128	0.79	94.1	58	750	400	119	0.77	94.1
DNGW–315MM–08	90	76	990	400	150	0.79	94.8	70	910	400	141	0.78	94.8
DNGW–315MN–08 [2]	110	84	1080	400	172	0.77	94.3	76	980	400	160	0.75	94.2
DNGW–315LL–08	132	102	1320	400	205	0.78	94.6	93	1200	400	192	0.76	94.6
DNGW–315LM–08 [2]	160	107	1390	400	225	0.75	95.2	97	1260	400	210	0.73	95.2
DNGW–315LM–08 [3]	160	128	1640	400	255	0.77	95.6	116	1490	400	240	0.75	95.6
DNSL–355LB–08	200	164	2100	400	320	0.77	95.7	153	1960	400	305	0.76	95.6
DNSL–355LC–08	225	183	2350	690	205	0.78	95.5	168	2150	690	192	0.77	95.4
DNSL–355LD–08	250	205	2650	690	230	0.78	95.6	188	2400	690	215	0.76	95.6
DNSL–355LN–08	280	225	2900	690	250	0.79	96.0	205	2650	690	235	0.77	95.9
DNSL–355LX–08	315	250	3250	690	275	0.80	95.9	230	2950	690	255	0.78	95.9
DNSL–400LL–08	355	290	3700	690	320	0.79	96.2	265	3400	690	300	0.77	96.1
DNSL–400LN–08	400	320	4150	690	350	0.79	96.3	295	3800	690	330	0.78	96.2
DNSL–400LX–08	450	360	4650	690	395	0.79	96.3	330	4250	690	370	0.78	96.2
DNSL–450LL–08	500	410	5300	690	435	0.82	96.6	385	4900	690	415	0.81	96.5
DNSL–450LN–08	560	460	5900	690	485	0.82	96.6	430	5500	690	460	0.81	96.6
DNSL–450LN–08	630	520	6600	690	550	0.82	96.7	485	6200	690	520	0.81	96.6
DNSL–450LX–08	670	550	7000	690	590	0.81	96.8	520	6600	690	560	0.80	96.8
DNSL–500LL–08	710	580	7500	690	600	0.83	96.9	550	7000	690	580	0.82	96.8
DNSL–500LL–08	800	660	8400	690	680	0.84	96.9	620	7900	690	650	0.83	96.9
DNSL–500LN–08	900	740	9500	690	770	0.83	96.7	690	8900	690	720	0.83	96.7
DNSL–500LX–08	950	780	10000	690	830	0.81	96.9	730	9400	690	780	0.81	96.8
DNSL–560LL–08	1000	820	10500	690	850	0.84	96.9	770	9900	690	800	0.83	96.8
DNSL–560LL–08	1100	900	11500	690	930	0.83	97.4	850	10800	690	880	0.83	97.3
DNSL–560LN–08	1200	980	12600	690	1010	0.84	96.9	920	11800	690	950	0.83	96.9
DNSL–560LN–08	1350	1110	14200	690	1150	0.83	97.0	1040	13300	690	1090	0.82	97.0

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 750 min^{-1}

Speed range: 75 – 750 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
DNLW–112MB–08	1.5	1.57	21.5	400	4.35	0.74	74.5
DNLW–132SL–08	2.2	2.3	31	400	5.8	0.74	81.9
DNLW–132ML–08	3	3.15	42	400	7.8	0.74	83.6
DNLW–160ML–08	4	4.2	56	400	9.6	0.77	85.0
DNLW–160MN–08	5.5	5.8	76	400	13.5	0.75	86.2
DNLW–160LL–08	7.5	7.8	104	400	17.7	0.77	86.0
DNLW–180LB–08	11	11.5	153	400	24	0.81	88.1
DNLW–200LB–08	15	15.7	210	400	33.5	0.79	87.7
DNLW–225SB–08	18.5	19.3	255	400	40.5	0.80	89.0
DNLW–225MB–08	22	23	305	400	49	0.78	89.9
DNLW–250MB–08	30	31.5	410	400	62	0.82	91.1
DNLW–280SG–08	37	38	490	400	75	0.82	92.3
DNLW–280MG–08	45	47	610	400	92	0.82	92.8
DNLW–315SL–08	55	52	670	400	103	0.79	94.2
DNLW–315ML–08	75	71	920	400	139	0.80	94.1
DNLW–315MM–08	90	85	1100	400	164	0.81	94.7
DNLW–315MN–08 [2]	110	101	1300	400	200	0.79	94.2
DNLW–315LL–08	132	124	1600	400	240	0.80	94.6
DNLW–315LM–08 [2]	160	132	1710	400	260	0.79	95.1
DNLW–315LM–08 [3]	160	152	1960	400	290	0.81	95.6
DNUL–355LB–08	200	190	2450	400	360	0.80	95.7
DNUL–355LC–08	225	215	2750	690	235	0.81	95.5
DNUL–355LD–08	250	240	3050	690	260	0.81	95.6
DNUL–355LN–08	280	260	3300	690	280	0.81	96.0
DNUL–355LX–08	315	290	3750	690	310	0.82	95.9
DNUL–400LL–08	355	325	4200	690	350	0.81	96.2
DNUL–400LN–08	400	370	4750	690	395	0.81	96.2
DNUL–400LX–08	450	415	5300	690	445	0.81	96.3
DNUL–450LL–08	500	460	5900	690	480	0.83	96.6
DNUL–450LN–08	560	520	6600	690	540	0.83	96.6
DNUL–450LN–08	630	580	7400	690	610	0.83	96.7
DNUL–450LX–08	670	620	7900	690	650	0.82	96.8
DNUL–500LL–08	710	650	8400	690	670	0.84	96.9
DNUL–500LL–08	800	740	9400	690	750	0.85	97.0
DNUL–500LN–08	900	830	10600	690	860	0.84	96.7
DNUL–500LX–08	950	870	11200	690	910	0.82	96.9
DNUL–560LL–08	1000	920	11800	690	950	0.84	97.0
DNUL–560LL–08	1100	1010	13000	690	1040	0.84	97.5
DNUL–560LN–08	1200	1100	14100	690	1130	0.84	97.0
DNUL–560LN–08	1350	1240	15900	690	1280	0.84	97.1

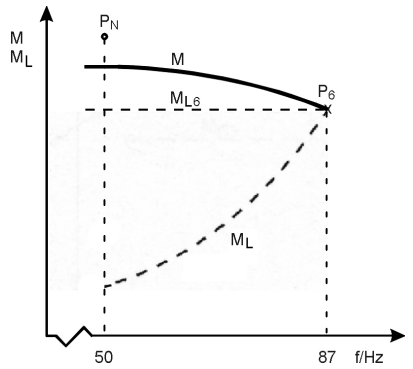
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization B, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 750 min^{-1}



Speed range: 750 – 1300 min^{-1}
Control range: 10 : 17
Frequency: 50 – 87 Hz
Fan: Self–ventilation, Forced ventilation
Load torque: M_L = const./ M_L ~ n^2

For mains operation the motor windings have to be Y–connected.

For inverter operation Δ–connection of the windings is required.

For the control range below 50 Hz the limit torques M_{L2}, M_{L3}, M_{L4} have to be observed (see Chapter 2.4.2.2)

Type	P_N kW	P_6 kW	M_{L6} Nm	U V	I_1 A	cosφ	η %
DNGW–071BH–08	0.12	0.17	1.5	400	1.01	0.60	48.4
DNGW–080BH–08	0.25	0.37	3.1	400	1.73	0.54	63.1
DNGW–090LX–08	0.37	0.54	4.3	400	2.3	0.59	64.4
DNGW–090LD–08	0.55	0.8	6.5	400	3	0.61	69.8
DNGW–100LB–08	0.75	1.09	8.6	400	3.8	0.62	72.2
DNGW–100LD–08	1.1	1.55	12.3	400	5	0.65	75.1
DNGW–112MB–08	1.5	2.2	17.2	400	6.6	0.66	78.6
DNGW–132SL–08	2.2	3.2	24.5	400	8.8	0.67	83.4
DNGW–132ML–08	3	4.35	33.5	400	11.6	0.67	85.6
DNGW–160ML–08	4	5.7	44	400	13.8	0.71	87.8
DNGW–160MN–08	5.5	7.8	59	400	20	0.68	87.9
DNGW–160LL–08	7.5	10.7	82	400	26	0.71	86.9
DNGW–180LB–08	11	15.6	120	400	34.5	0.76	89.4
DNGW–200LB–08	15	21.5	165	400	47	0.75	90.8
DNGW–225SB–08	18.5	24.5	189	400	55	0.75	90.1
DNGW–225MB–08	22	29.5	225	400	69	0.72	90.4
DNGW–250MB–08	30	40	300	400	86	0.78	89.5
DNGW–280SG–08	37	47.5	355	400	100	0.77	92.5
DNGW–280MG–08	45	60	450	400	124	0.77	93.4
DNGW–315SL–08	55	69	510	400	147	0.75	94.0
DNGW–315ML–08	75	94	700	400	198	0.76	93.4
DNGW–315MM–08	90	112	840	400	230	0.76	94.6
DNGW–315MN–08 [2]	110	127	950	400	270	0.74	94.2
DNGW–315LL–08	132	159	1190	400	330	0.76	94.4
DNGW–315LM–08 [2]	160	169	1260	400	365	0.73	95.1
DNGW–315LM–08 [3]	160	190	1410	400	405	0.74	95.5

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

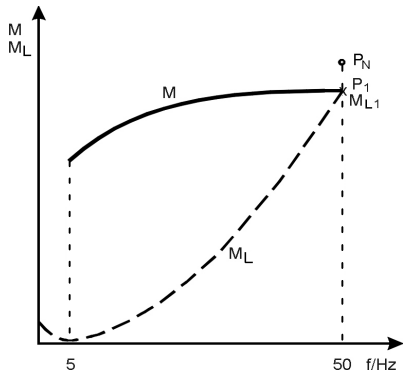
3.5 Explosion–proof three–phase motors for low voltage with squirrel cage,

Protection type ”Flameproof Enclosure” acc. to EN 50 018

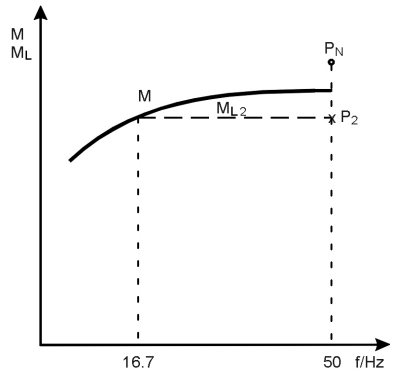
Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 3000 min^{-1}



Speed range: 300 – 3000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$



Speed range: 1000 – 3000 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
DNGW–071BG–02	0.37	0.43	1.5	400	1.12	0.85	67.9	0.40	1.4	400	1.07	0.83	68.2
DNGW–071BH–02	0.55	0.64	2.2	400	1.55	0.90	69.6	0.59	2.0	400	1.43	0.89	70.3
DNGW–080BG–02	0.75	0.87	2.9	400	1.96	0.87	76.6	0.80	2.7	400	1.83	0.86	76.9
DNGW–080BH–02	1.1	1.27	4.3	400	2.80	0.87	77.4	1.17	4.0	400	2.65	0.86	77.9
DNGW–090LX–02	1.5	1.72	5.8	400	3.75	0.89	77.0	1.41	4.8	400	3.15	0.86	78.1
DNGW–090LD–02	2.2	2.55	8.5	400	5.3	0.88	81.0	2.05	6.9	400	4.4	0.85	81.9
DNGW–100LB–02	3	3.45	11.5	400	6.8	0.90	83.7	2.95	9.7	400	5.9	0.88	84.3
DNGW–112MB–02	4	4.6	15.3	400	8.7	0.94	83.8	4.25	14.2	400	8.0	0.93	84.1
DNGW–132SL–02	5.5	6.4	21.0	400	12.5	0.90	85.0	5.7	18.9	400	11.3	0.88	85.2
DNGW–132SN–02	7.5	8.7	28.5	400	16.2	0.90	88.1	7.3	24.0	400	13.9	0.88	88.5
DNGW–160ML–02	11	12.7	41.5	400	24.0	0.89	88.2	11.7	38.5	400	22	0.89	88.3
DNGW–160MN–02	15	16.8	55	400	31.0	0.89	89.4	13.7	44.5	400	26	0.87	89.8
DNGW–160LL–02	18.5	21.5	70	400	38.5	0.91	90.7	18.0	59	400	32.5	0.90	91.2
DNGW–180MB–02	22	25.5	82	400	47	0.88	90.8	23.5	76	400	43.5	0.87	90.7
DNGW–200LB–02	30	34.5	112	400	60	0.92	92.1	28.5	92	400	50	0.91	92.1
DNGW–200LD–02	37	41	132	400	72	0.90	92.6	31.5	102	400	57	0.88	92.5
DNGW–225MB–02	45	52	168	400	90	0.90	93.4	44	141	400	77	0.90	93.4
DNGW–250MB–02	55	64	205	400	113	0.88	93.8	58	187	400	103	0.88	93.8
DNGW–280SG–02 [1]	75	85	275	400	142	0.93	94.7	67	215	400	112	0.92	94.7
DNGW–280MG–02 [1]	90	99	320	400	166	0.92	94.7	79	255	400	133	0.92	94.6
DNGW–315SL–02	110	115	370	400	195	0.91	94.9	103	330	400	177	0.90	94.8
DNGW–315ML–02	132	138	440	400	235	0.90	95.4	125	400	400	215	0.90	95.3
DNGW–315MN–02	160	167	540	400	280	0.92	96.0	150	480	400	250	0.91	95.9
DNGW–315LL–02	200	210	670	400	350	0.91	95.8	187	600	400	315	0.90	95.7
DNGW–315LN–02 [2]	250	255	820	400	420	0.93	96.1	205	660	400	340	0.92	96.0
DNGW–315LN–02 [3]	250	260	840	400	420	0.94	96.5	235	750	400	380	0.94	96.4
DNSL–355LB–02	315	330	1050	400	540	0.91	96.9	290	920	400	480	0.90	96.9
DNSL–355LC–02	355	370	1190	690	345	0.92	96.8	320	1030	690	300	0.92	96.8
DNSL–355LD–02	400	420	1340	690	400	0.91	97.0	365	1170	690	350	0.90	96.9
DNSL–355LX–02	450	470	1510	690	450	0.91	96.5	400	1290	690	385	0.91	96.5
DNSL–400LN–02	500	520	1670	690	495	0.91	96.8	455	1460	690	435	0.91	96.7
DNSL–400LN–02	560	590	1870	690	560	0.91	96.9	510	1640	690	485	0.91	96.9
DNSL–400LX–02	630	660	2100	690	620	0.92	97.0	580	1840	690	550	0.91	96.9
DNSL–450LL–02	710	740	2350	690	700	0.92	97.0	650	2050	690	620	0.91	96.9
DNSL–450LN–02	800	840	2650	690	800	0.91	97.1	730	2350	690	700	0.91	97.0
DNSL–450LN–02	900	940	3000	690	890	0.91	97.3	820	2650	690	780	0.91	97.2

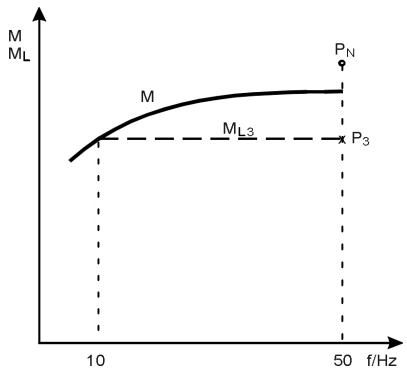
1 Special motor, inverter–optimized (different from Technical List IM)
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

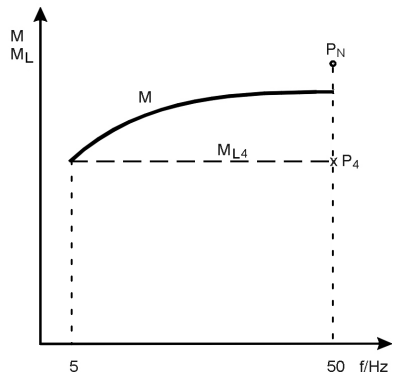
Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 3000 min^{-1}



Speed range: 600 – 3000 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.



Speed range: 300 – 3000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

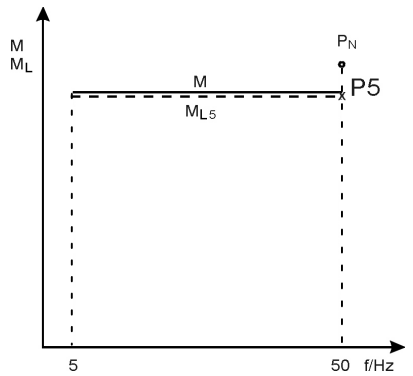
Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
DNGW–071BG–02	0.37	0.36	1.3	400	1	0.81	68.3	0.3	1.1	400	0.92	0.76	67.7
DNGW–071BH–02	0.55	0.54	1.9	400	1.33	0.87	70.7	0.46	1.6	400	1.19	0.84	70.8
DNGW–080BG–02	0.75	0.73	2.5	400	1.71	0.84	77.1	0.65	2.2	400	1.58	0.81	76.9
DNGW–080BH–02	1.1	1.01	3.5	400	2.35	0.83	78.4	0.87	2.9	400	2.15	0.79	78.3
DNGW–090LX–02	1.5	1.2	4.1	400	2.8	0.82	78.2	1.05	3.5	400	2.6	0.79	77.8
DNGW–090LD–02	2.2	1.76	5.9	400	3.95	0.82	81.9	1.54	5.2	400	3.6	0.79	81.6
DNGW–100LB–02	3	2.55	8.4	400	5.2	0.86	84.4	2.25	7.4	400	4.75	0.84	84.3
DNGW–112MB–02	4	3.9	13	400	7.4	0.92	84.3	3.5	11.7	400	6.7	0.91	84.3
DNGW–132SL–02	5.5	5	16.4	400	10.1	0.86	85.1	4.4	14.5	400	9.2	0.84	84.8
DNGW–132SN–02	7.5	6.3	21	400	12.4	0.85	88.5	5.6	18.4	400	11.4	0.83	88.3
DNGW–160ML–02	11	10.3	33.5	400	19.7	0.87	88.4	9.1	30	400	17.8	0.86	88.3
DNGW–160MN–02	15	11.8	38.5	400	23	0.85	89.8	10.5	34.5	400	21	0.83	89.6
DNGW–160LL–02	18.5	15.6	51	400	28.5	0.88	91.4	13.9	45.5	400	26	0.87	91.4
DNGW–180MB–02	22	21	69	400	40	0.86	90.6	18.9	61	400	36.5	0.85	90.3
DNGW–200LB–02	30	25.5	82	400	45	0.91	92.0	23	75	400	41	0.90	91.8
DNGW–200LD–02	37	28	91	400	51	0.87	92.2	25.5	83	400	48	0.86	92.0
DNGW–225MB–02	45	41	132	400	72	0.89	93.3	38	122	400	68	0.88	93.2
DNGW–250MB–02	55	54	173	400	97	0.87	93.7	49.5	159	400	90	0.86	93.6
DNGW–280SG–02 [1]	75	63	205	400	106	0.92	94.6	59	190	400	99	0.92	94.5
DNGW–280MG–02 [1]	90	74	240	400	125	0.92	94.5	69	225	400	118	0.91	94.4
DNGW–315SL–02	110	98	315	400	169	0.90	94.7	91	295	400	159	0.89	94.5
DNGW–315ML–02	132	120	385	400	205	0.89	95.2	112	360	400	195	0.88	95.1
DNGW–315MN–02	160	143	455	400	240	0.90	95.9	133	425	400	225	0.90	95.8
DNGW–315LL–02	200	179	570	400	305	0.90	95.6	169	540	400	290	0.89	95.5
DNGW–315LN–02 [2]	250	197	630	400	325	0.92	96.0	186	600	400	310	0.92	95.9
DNGW–315LN–02 [3]	250	220	710	400	355	0.94	96.4	210	670	400	340	0.94	96.4
DNSL–355LB–02	315	280	900	400	465	0.90	96.9	265	840	400	445	0.89	96.8
DNSL–355LC–02	355	305	970	690	290	0.92	96.7	285	910	690	270	0.92	96.7
DNSL–355LD–02	400	355	1140	690	340	0.90	96.9	335	1070	690	325	0.90	96.9
DNSL–355LX–02	450	380	1210	690	365	0.90	96.5	350	1120	690	340	0.90	96.5
DNSL–400LN–02	500	445	1430	690	425	0.91	96.7	420	1340	690	400	0.91	96.7
DNSL–400LN–02	560	485	1560	690	460	0.91	96.9	455	1460	690	435	0.91	96.8
DNSL–400LX–02	630	550	1750	690	520	0.91	96.9	510	1640	690	485	0.91	96.9
DNSL–450LL–02	710	630	2000	690	600	0.91	96.9	590	1890	690	560	0.91	96.8
DNSL–450LN–02	800	710	2250	690	680	0.90	97.0	660	2150	690	630	0.90	96.9
DNSL–450LN–02	900	800	2550	690	760	0.91	97.2	750	2400	690	720	0.90	97.1

1 Special motor, inverter–optimized (different from Technical List IM)
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 3000 min^{-1}

Speed range: 300 – 3000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

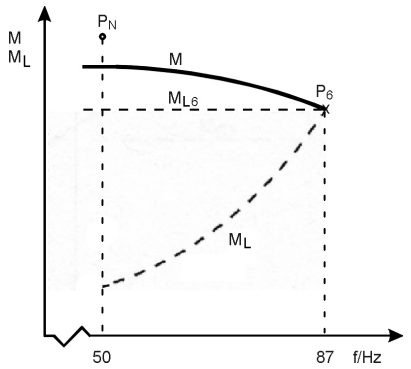
Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
DNLW–112MB–02	4	4.6	15.3	400	8.7	0.94	83.8
DNLW–132SL–02	5.5	6.4	21	400	12.5	0.90	85.0
DNLW–132SN–02	7.5	8.7	28.5	400	16.2	0.90	88.1
DNLW–160ML–02	11	12.7	41.5	400	24	0.89	88.2
DNLW–160MN–02	15	16.8	55	400	31	0.89	89.4
DNLW–160LL–02	18.5	21.5	70	400	38.5	0.91	90.7
DNLW–180MB–02	22	25.5	82	400	47	0.88	90.8
DNLW–200LB–02	30	34.5	112	400	60	0.92	92.1
DNLW–200LD–02	37	41	132	400	72	0.90	92.6
DNLW–225MB–02	45	52	168	400	90	0.90	93.4
DNLW–250MB–02	55	64	205	400	113	0.88	93.8
DNLW–280SG–02 [1]	75	85	275	400	142	0.93	94.7
DNLW–280MG–02 [1]	90	100	320	400	167	0.92	94.7
DNLW–315SL–02	110	115	370	400	195	0.91	94.9
DNLW–315ML–02	132	137	440	400	235	0.90	95.4
DNLW–315MN–02	160	167	540	400	280	0.92	96.0
DNLW–315LL–02	200	210	670	400	350	0.91	95.8
DNLW–315LN–02 [2]	250	255	820	400	420	0.93	96.1
DNLW–315LN–02 [3]	250	260	840	400	420	0.94	96.5
DNSL–355LB–02	315	330	1050	400	540	0.91	96.9
DNUL–355LC–02	355	370	1190	690	345	0.92	96.8
DNUL–355LD–02	400	420	1340	690	400	0.91	97.0
DNUL–355LX–02	450	455	1460	690	435	0.91	96.5
DNUL–400LN–02	500	510	1620	690	485	0.91	96.8
DNUL–400LN–02	560	570	1810	690	540	0.91	96.9
DNUL–400LX–02	630	640	2050	690	600	0.92	97.0
DNUL–450LL–02	710	720	2300	690	680	0.92	97.0
DNUL–450LN–02	800	810	2600	690	770	0.91	97.1
DNUL–450LN–02	900	910	2900	690	860	0.91	97.3

1 Special motor, inverter–optimized (different from Technical List IM)
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 3000 min^{-1}

Speed range:	3000 – 5200 min^{-1}
Control range:	10 : 17
Frequency:	50 – 87 Hz
Fan:	Self–ventilation, Forced ventilation
Load torque:	M_L = const./ M_L ~ n^2

Type	P_N kW	P_6 kW	M_{L6} Nm	U V	I_1 A	cosφ	η %
DNGW–071BG–02	0.37	0.6	1.2	400	1.76	0.78	67.6
DNGW–071BH–02	0.55	0.89	1.8	400	2.25	0.84	71.2
DNGW–080BG–02	0.75	1.21	2.3	400	2.9	0.81	77.5
DNGW–080BH–02	1.1	1.78	3.5	400	4.1	0.81	80.1
DNGW–090LX–02	1.5	2.45	4.7	400	5.6	0.84	78.2
DNGW–090LD–02	2.2	3.55	6.9	400	7.7	0.84	82.8
DNGW–100LB–02	3	4.85	9.3	400	10.1	0.87	82.6
DNGW–112MB–02	4	6.5	12.4	400	13.1	0.92	80.5
DNGW–132SL–02	5.5	8.9	16.9	400	18.9	0.87	80.8
DNGW–132SN–02	7.5	12.1	23	400	23.5	0.87	87.2
DNGW–160ML–02	11	17.4	33	400	35	0.87	84.6
DNGW–160MN–02	15	23.5	45	400	46	0.87	87.3
DNGW–160LL–02	18.5	29.5	55	400	55	0.89	89.4
DNGW–180MB–02	22	35	65	400	70	0.86	86.4
DNGW–200LB–02	30	47	88	400	86	0.91	88.9
DNGW–200LD–02	37	49.5	93	400	94	0.87	88.7

For mains operation the motor windings have to be Y–connected.

For inverter operation Δ–connection of the windings is required.

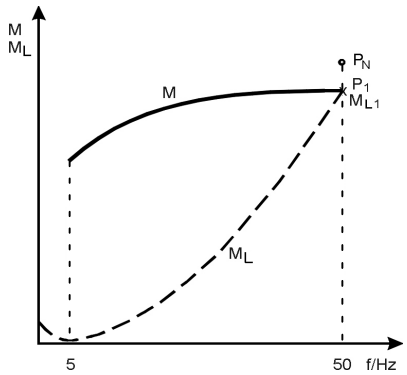
For the control range below 50 Hz the limit torques M_{L2}, M_{L3}, M_{L4} have to be observed (see Chapter 2.4.2.2)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

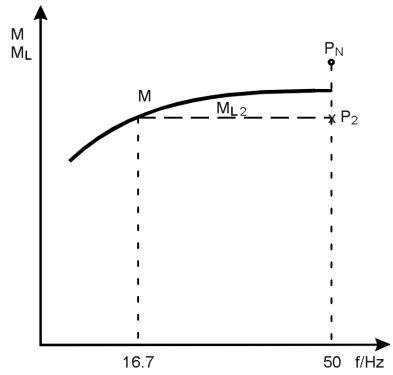
Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 1500 min^{-1}



Speed range: 150 – 1500 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$



Speed range: 500 – 1500 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
DNGW–071BG–04	0.25	0.29	2.0	400	0.85	0.83	63.5	0.27	1.9	400	0.80	0.80	64.1
DNGW–071BH–04	0.37	0.43	3.0	400	1.24	0.82	64.2	0.40	2.8	400	1.17	0.80	64.9
DNGW–080BG–04	0.55	0.64	4.3	400	1.72	0.82	69.1	0.56	3.8	400	1.55	0.79	70.0
DNGW–080BH–04	0.75	0.86	5.9	400	2.15	0.84	71.5	0.69	4.8	400	1.80	0.80	73.3
DNGW–090LX–04	1.1	1.27	8.6	400	2.8	0.88	76.9	1.12	7.6	400	2.50	0.86	78.0
DNGW–090LD–04	1.5	1.73	11.8	400	3.9	0.88	75.7	1.53	10.4	400	3.50	0.86	76.7
DNGW–100LB–04	2.2	2.55	17.4	400	5.7	0.87	77.4	2.15	14.7	400	4.85	0.85	78.6
DNGW–100LD–04	3	3.45	23.5	400	7.8	0.83	79.8	2.75	18.7	400	6.5	0.79	80.8
DNGW–112MB–04	4	4.55	31.0	400	9.4	0.88	82.3	3.7	25.0	400	7.7	0.86	83.6
DNGW–132SL–04	5.5	6.4	42.5	400	12.5	0.88	85.7	5.6	37.0	400	11.0	0.87	86.4
DNGW–132ML–04	7.5	8.7	57	400	16.9	0.87	87.4	7.3	48.5	400	14.4	0.85	88.1
DNGW–160ML–04	11	12.7	83	400	24.5	0.86	88.9	10.7	70	400	21.0	0.85	89.5
DNGW–160LL–04	15	17.1	112	400	33	0.86	89.9	13.9	91	400	27.0	0.84	90.7
DNGW–180MB–04	18.5	21.5	139	400	40	0.87	90.8	18.1	118	400	34.0	0.86	91.2
DNGW–180LB–04	22	25.5	166	400	47	0.88	91.2	22.5	146	400	41.5	0.87	91.6
DNGW–200LB–04	30	34.5	225	400	63	0.88	91.8	27.0	177	400	49	0.88	92.5
DNGW–225SB–04	37	40.5	265	400	73	0.88	93.0	33.0	215	400	60	0.87	93.4
DNGW–225MB–04	45	50	325	400	92	0.86	93.2	40.5	265	400	76	0.84	93.5
DNGW–250MB–04	55	64	410	400	112	0.89	93.9	54	345	400	95	0.88	94.0
DNGW–280SG–04	75	86	560	400	151	0.88	94.6	71	455	400	125	0.88	94.7
DNGW–280MG–04	90	100	640	400	174	0.89	94.8	83	540	400	145	0.88	94.9
DNGW–315SL–04	110	115	740	400	210	0.85	95.2	104	670	400	190	0.85	95.2
DNGW–315ML–04	132	138	890	400	245	0.87	95.4	124	800	400	220	0.86	95.4
DNGW–315MN–04	160	167	1080	400	295	0.86	95.6	148	950	400	265	0.86	95.7
DNGW–315LL–04 [2]	200	205	1330	400	370	0.86	95.6	171	1100	400	315	0.84	95.7
DNGW–315LL–04 [3]	200	210	1340	400	370	0.87	95.8	189	1210	400	340	0.86	95.8
DNGW–315LM–04 [2]	250	255	1650	400	460	0.85	96.2	210	1350	400	390	0.83	96.3
DNGW–315LM–04 [3]	250	260	1680	400	460	0.86	96.0	235	1520	400	420	0.85	96.0
DNSL–355LB–04	280	295	1880	400	510	0.86	96.2	260	1660	400	460	0.85	96.2
DNSL–355LB–04	315	330	2100	400	570	0.86	96.5	290	1860	400	510	0.86	96.4
DNSL–355LC–04	355	370	2400	690	370	0.86	96.8	330	2100	690	335	0.86	96.8
DNSL–355LD–04	400	420	2700	690	420	0.87	96.9	370	2350	690	370	0.86	96.8
DNSL–355LN–04	450	470	3000	690	475	0.86	96.7	415	2650	690	425	0.85	96.7
DNSL–355LX–04	500	520	3350	690	520	0.86	96.9	460	2950	690	470	0.85	96.9
DNSL–400LN–04	560	590	3750	690	580	0.88	96.9	520	3300	690	510	0.88	96.9
DNSL–400LN–04	630	660	4200	690	650	0.88	96.8	580	3750	690	570	0.87	96.8
DNSL–400LX–04	710	740	4750	690	720	0.88	97.0	660	4200	690	650	0.88	97.0
DNSL–450LL–04	800	840	5300	690	820	0.88	97.1	740	4750	690	730	0.88	97.0
DNSL–450LN–04	900	940	6000	690	920	0.88	97.2	830	5300	690	820	0.88	97.1
DNSL–450LN–04	950	990	6400	690	970	0.88	97.3	880	5600	690	860	0.88	97.3
DNSL–500LL–04	1000	1040	6700	690	1020	0.88	97.1	920	5900	690	900	0.88	97.0
DNSL–500LL–04	1120	1170	7500	690	1140	0.88	97.2	1030	6600	690	1010	0.88	97.2

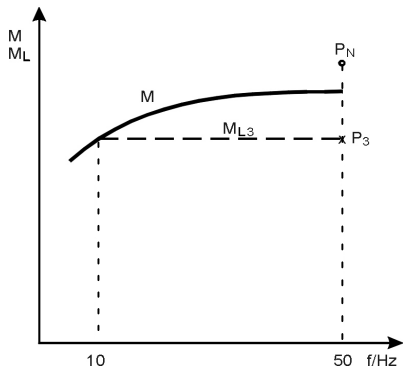
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

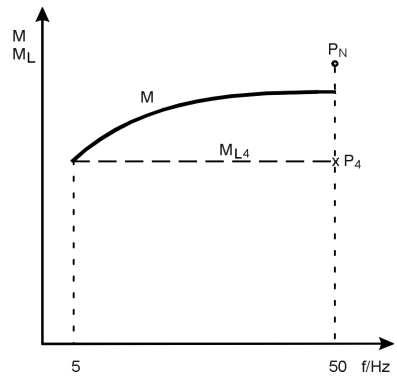
Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 1500 min^{-1}



Speed range: 300 – 1500 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.



Speed range: 150 – 1500 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

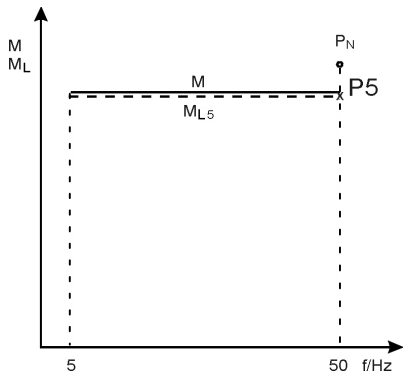
Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
DNGW–071BG–04	0.25	0.21	1.4	400	0.7	0.73	63.8	0.19	1.3	400	0.68	0.71	63.2
DNGW–071BH–04	0.37	0.31	2.2	400	1.02	0.73	65.1	0.28	2	400	0.98	0.71	64.6
DNGW–080BG–04	0.55	0.46	3.2	400	1.38	0.74	69.9	0.42	2.9	400	1.33	0.71	69.6
DNGW–080BH–04	0.75	0.62	4.3	400	1.68	0.77	73.5	0.56	3.8	400	1.58	0.74	73.4
DNGW–090LX–04	1.1	0.92	6.2	400	2.1	0.83	78.6	0.85	5.7	400	2	0.81	78.6
DNGW–090LD–04	1.5	1.25	8.5	400	2.95	0.82	77.4	1.15	7.9	400	2.8	0.80	77.3
DNGW–100LB–04	2.2	1.84	12.6	400	4.3	0.82	79.0	1.69	11.6	400	4.05	0.80	78.9
DNGW–100LD–04	3	2.5	16.9	400	6.1	0.76	80.9	2.3	15.5	400	5.8	0.74	80.8
DNGW–112MB–04	4	3.35	22.5	400	7.1	0.84	83.9	3.1	21	400	6.7	0.83	84.0
DNGW–132SL–04	5.5	4.6	30.5	400	9.3	0.85	86.9	4.25	28	400	8.7	0.83	86.9
DNGW–132ML–04	7.5	6.3	41.5	400	12.7	0.83	88.4	5.8	38.5	400	12	0.82	88.4
DNGW–160ML–04	11	9.2	60	400	18.3	0.83	89.7	8.1	53	400	16.6	0.81	89.7
DNGW–160LL–04	15	12.5	82	400	24.5	0.83	90.9	11.1	73	400	22.5	0.81	91.0
DNGW–180MB–04	18.5	15.5	101	400	30	0.84	91.3	13.6	89	400	27	0.82	91.2
DNGW–180LB–04	22	18.4	120	400	35	0.85	91.9	16.2	106	400	31.5	0.83	91.9
DNGW–200LB–04	30	25	163	400	45.5	0.87	92.5	22	144	400	40.5	0.86	92.6
DNGW–225SB–04	37	32.5	210	400	59	0.87	93.4	30	194	400	55	0.87	93.5
DNGW–225MB–04	45	40	260	400	75	0.84	93.5	36.5	240	400	70	0.83	93.5
DNGW–250MB–04	55	51	330	400	91	0.88	94.0	46.5	300	400	84	0.87	93.9
DNGW–280SG–04	75	70	450	400	124	0.88	94.7	64	410	400	114	0.87	94.7
DNGW–280MG–04	90	83	540	400	145	0.88	94.9	76	490	400	134	0.88	94.8
DNGW–315SL–04	110	103	660	400	188	0.85	95.2	94	610	400	174	0.83	95.2
DNGW–315ML–04	132	123	790	400	220	0.86	95.4	113	730	400	205	0.85	95.4
DNGW–315MN–04	160	148	950	400	265	0.86	95.7	136	870	400	245	0.85	95.7
DNGW–315LL–04 [2]	200	170	1100	400	310	0.84	95.7	157	1010	400	290	0.83	95.6
DNGW–315LL–04 [3]	200	187	1200	400	335	0.86	95.8	172	1100	400	310	0.85	95.8
DNGW–315LM–04 [2]	250	210	1340	400	390	0.83	96.3	192	1240	400	365	0.81	96.2
DNGW–315LM–04 [3]	250	235	1500	400	420	0.85	96.0	215	1380	400	390	0.84	96.0
DNSL–355LB–04	280	255	1620	400	450	0.85	96.2	235	1520	400	420	0.85	96.2
DNSL–355LB–04	315	285	1820	400	500	0.85	96.4	265	1710	400	470	0.85	96.3
DNSL–355LC–04	355	320	2050	690	325	0.85	96.6	300	1930	690	305	0.85	96.7
DNSL–355LD–04	400	360	2300	690	365	0.86	96.8	340	2150	690	345	0.85	96.8
DNSL–355LN–04	450	405	2600	690	415	0.85	96.7	380	2450	690	390	0.84	96.7
DNSL–355LX–04	500	450	2900	690	460	0.85	96.9	425	2700	690	435	0.84	96.9
DNSL–400LN–04	560	510	3250	690	500	0.88	96.9	475	3050	690	470	0.87	96.8
DNSL–400LN–04	630	570	3650	690	570	0.87	96.8	530	3400	690	530	0.87	96.8
DNSL–400LX–04	710	640	4100	690	630	0.88	97.0	600	3850	690	590	0.87	97.0
DNSL–450LL–04	800	720	4600	690	710	0.87	97.0	680	4350	690	680	0.87	97.0
DNSL–450LN–04	900	810	5200	690	800	0.88	97.1	760	4900	690	750	0.87	97.1
DNSL–450LN–04	950	860	5500	690	840	0.88	97.2	800	5100	690	790	0.87	97.2
DNSL–500LL–04	1000	900	5800	690	890	0.88	97.0	850	5400	690	840	0.88	96.9
DNSL–500LL–04	1120	1010	6500	690	990	0.88	97.2	950	6100	690	930	0.88	97.1

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 1500 min^{-1}

Speed range: 150 – 1500 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

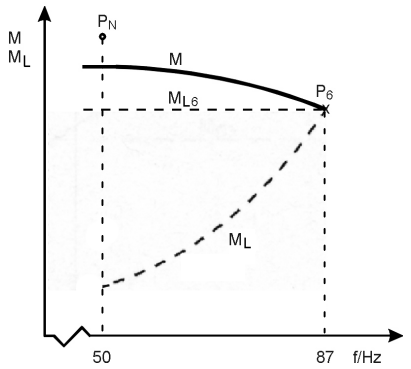
Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
DNLW–112MB–04	4	4.6	31	400	9.5	0.88	82.2
DNLW–132SL–04	5.5	6.4	42.5	400	12.5	0.88	85.7
DNLW–132ML–04	7.5	8.6	57	400	16.7	0.87	87.4
DNLW–160ML–04	11	12.7	83	400	24.5	0.86	88.9
DNLW–160LL–04	15	17.1	112	400	33	0.86	89.9
DNLW–180MB–04	18.5	21.5	139	400	40	0.87	90.8
DNLW–180LB–04	22	25.5	166	400	47	0.88	91.2
DNLW–200LB–04	30	34.5	225	400	63	0.88	91.8
DNLW–225SB–04	37	41	265	400	74	0.88	92.9
DNLW–225MB–04	45	50	325	400	92	0.86	93.2
DNLW–250MB–04	55	64	410	400	112	0.89	93.9
DNLW–280SG–04	75	87	560	400	153	0.88	94.5
DNLW–280MG–04	90	99	640	400	172	0.89	94.8
DNLW–315SL–04	110	115	740	400	210	0.85	95.2
DNLW–315ML–04	132	138	890	400	245	0.87	95.4
DNLW–315MN–04	160	167	1080	400	295	0.86	95.6
DNLW–315LL–04 [2]	200	205	1330	400	370	0.86	95.6
DNLW–315LL–04 [3]	200	210	1340	400	370	0.87	95.8
DNLW–315LM–04 [2]	250	255	1650	400	460	0.85	96.2
DNLW–315LM–04 [3]	250	260	1680	400	460	0.86	96.0
DNUL–355LB–04	280	295	1880	400	510	0.86	96.2
DNUL–355LB–04	315	330	2100	400	570	0.86	96.5
DNUL–355LC–04	355	370	2400	690	370	0.86	96.8
DNUL–355LD–04	400	420	2700	690	420	0.87	96.9
DNUL–355LN–04	450	455	2900	690	460	0.85	96.7
DNUL–355LX–04	500	510	3250	690	510	0.86	96.9
DNUL–400LN–04	560	570	3650	690	560	0.88	96.9
DNUL–400LN–04	630	640	4100	690	630	0.88	96.8
DNUL–400LX–04	710	720	4600	690	700	0.88	97.0
DNUL–450LL–04	800	810	5200	690	790	0.88	97.1
DNUL–450LN–04	900	910	5800	690	890	0.88	97.2
DNUL–450LN–04	950	960	6200	690	940	0.88	97.3
DNUL–500LL–04	1000	1010	6500	690	990	0.88	97.0
DNUL–500LL–04	1120	1130	7300	690	1100	0.88	97.2

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 1500 min^{-1}

Speed range: 1500 – 2600 min^{-1}
Control range: 10 : 17
Frequency: 50 – 87 Hz
Fan: Self–ventilation, Forced ventilation
Load torque: M_L = const./ $M_L \sim n^2$

For mains operation the motor windings have to be Y–connected.

For inverter operation Δ–connection of the windings is required.

For the control range below 50 Hz the limit torques M_{L2}, M_{L3}, M_{L4} have to be observed (see Chapter 2.4.2.2)

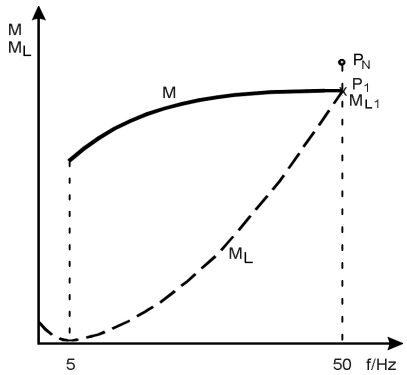
Type	P_N kW	P_6 kW	M_{L6} Nm	U V	I_1 A	cosφ	η %
DNGW–071BG–04	0.25	0.4	1.6	400	1.27	0.70	69.3
DNGW–071BH–04	0.37	0.59	2.4	400	1.84	0.71	70.4
DNGW–080BG–04	0.55	0.88	3.5	400	2.5	0.72	75.1
DNGW–080BH–04	0.75	1.2	4.8	400	3.1	0.76	78.1
DNGW–090LX–04	1.1	1.76	6.9	400	4	0.83	79.9
DNGW–090LD–04	1.5	2.4	9.4	400	5.5	0.82	80.3
DNGW–100LB–04	2.2	3.5	13.9	400	7.9	0.82	81.6
DNGW–100LD–04	3	4.8	18.8	400	11.2	0.77	83.7
DNGW–112MB–04	4	6.4	25	400	13.3	0.85	84.8
DNGW–132SL–04	5.5	8.8	34	400	17.5	0.85	87.4
DNGW–132ML–04	7.5	12	46	400	23.5	0.84	89.6
DNGW–160ML–04	11	17.2	65	400	34	0.84	89.2
DNGW–160LL–04	15	23.5	89	400	45.5	0.83	92.0
DNGW–180MB–04	18.5	29	109	400	55	0.85	90.9
DNGW–180LB–04	22	34.5	130	400	65	0.85	91.7
DNGW–200LB–04	30	47	176	400	86	0.88	92.1
DNGW–225SB–04	37	54	205	400	99	0.87	92.8
DNGW–225MB–04	45	66	245	400	127	0.83	92.9
DNGW–250MB–04	55	81	300	400	147	0.87	93.0
DNGW–280SG–04	75	110	410	400	198	0.87	93.6
DNGW–280MG–04	90	126	470	400	225	0.87	93.7
DNGW–315SL–04	110	151	560	400	290	0.83	93.7
DNGW–315ML–04	132	181	670	400	335	0.85	94.3
DNGW–315MN–04	160	220	820	400	405	0.84	94.9
DNGW–315LL–04 [2]	200	255	950	400	485	0.82	94.4
DNGW–315LL–04 [3]	200	275	1020	400	510	0.84	94.5
DNGW–315LM–04 [2]	250	315	1180	400	610	0.80	95.7
DNGW–315LM–04 [3]	250	345	1270	400	640	0.83	95.1

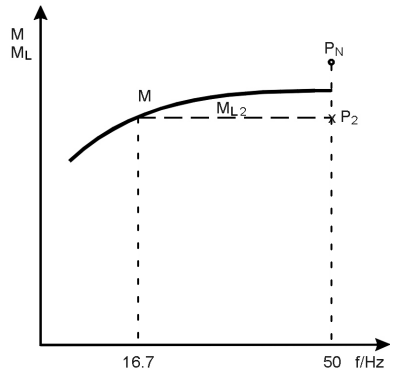
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)





Speed 1000 min^{-1}

Speed range: 100 – 1000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$

Speed range: 330 – 1000 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
DNGW–071BH–06	0.25	0.29	3.2	400	0.99	0.80	57.4	0.25	2.8	400	0.88	0.76	59.2
DNGW–080BG–06	0.37	0.43	4.6	400	1.38	0.78	61.4	0.36	4.0	400	1.23	0.74	63.1
DNGW–080BH–06	0.55	0.61	6.6	400	1.84	0.78	65.4	0.46	4.9	400	1.53	0.70	67.0
DNGW–090LX–06	0.75	0.87	9.2	400	2.35	0.82	69.6	0.70	7.4	400	1.95	0.76	72.4
DNGW–090LD–06	1.1	1.27	13.3	400	3.65	0.77	69.6	0.95	9.9	400	3.05	0.68	71.3
DNGW–100LB–06	1.5	1.73	17.6	400	4.7	0.76	73.9	1.55	15.8	400	4.35	0.74	74.2
DNGW–112MB–06	2.2	2.55	26.0	400	6.1	0.82	77.0	2.15	22.0	400	5.2	0.80	78.2
DNGW–132SL–06	3	3.45	34.5	400	7.3	0.84	84.1	3.20	32.0	400	6.8	0.83	84.5
DNGW–132ML–06	4	4.6	46	400	9.9	0.83	83.0	4.25	42.5	400	9.3	0.82	83.4
DNGW–132MN–06	5.5	6.4	64	400	13.4	0.84	84.6	5.9	59	400	12.5	0.83	85.0
DNGW–160ML–06	7.5	8.7	85	400	17.4	0.86	86.8	8.0	79	400	16.1	0.85	87.1
DNGW–160LL–06	11	12.7	124	400	25.0	0.84	88.6	11.7	115	400	23.5	0.83	88.8
DNGW–180LB–06	15	17.3	171	400	34.5	0.83	89.3	15.5	153	400	31.5	0.82	89.8
DNGW–200LB–06	18.5	21.5	210	400	42.5	0.84	88.8	18.8	186	400	36.5	0.85	89.7
DNGW–200LD–06	22	25.5	250	400	51	0.83	89.6	19.9	197	400	40	0.81	90.5
DNGW–225MB–06	30	34.5	340	400	66	0.84	91.6	29.0	285	400	56	0.83	92.0
DNGW–250MB–06	37	42.5	415	400	83	0.83	92.0	38.5	375	400	76	0.82	92.1
DNGW–280SG–06	45	51	500	400	91	0.88	93.1	42.5	410	400	77	0.87	93.4
DNGW–280MG–06	55	62	600	400	112	0.88	92.9	51	495	400	93	0.86	93.0
DNGW–315SL–06	75	78	760	400	143	0.85	94.3	71	690	400	131	0.85	94.3
DNGW–315ML–06	90	94	910	400	166	0.87	95.2	85	820	400	151	0.87	95.3
DNGW–315MM–06	110	115	1110	400	205	0.87	95.0	104	1000	400	185	0.87	95.1
DNGW–315MN–06 [2]	132	138	1330	400	240	0.89	95.3	117	1130	400	205	0.88	95.5
DNGW–315LL–06	160	167	1610	400	290	0.88	95.5	150	1450	400	260	0.88	95.6
DNGW–315LM–06 [2]	200	210	2000	400	375	0.86	95.8	176	1700	400	320	0.84	95.9
DNGW–315LM–06 [3]	200	210	2000	400	365	0.88	95.9	188	1810	400	325	0.88	95.9
DNSL–355MD–06	225	235	2250	400	420	0.84	96.0	210	2000	400	380	0.83	96.0
DNSL–355LB–06	250	260	2500	400	460	0.85	96.3	230	2200	400	415	0.84	96.3
DNSL–355LC–06	280	295	2800	690	300	0.86	96.3	260	2500	690	265	0.85	96.3
DNSL–355LD–06	315	330	3150	690	340	0.85	96.4	290	2800	690	300	0.83	96.4
DNSL–355LN–06	355	370	3550	690	375	0.86	96.4	330	3150	690	335	0.85	96.4
DNSL–355LN–06	400	420	4000	690	435	0.84	96.4	370	3550	690	385	0.83	96.5
DNSL–400LL–06	400	420	4000	690	435	0.84	96.5	370	3550	690	385	0.83	96.5
DNSL–400LN–06	450	470	4500	690	485	0.84	96.6	415	4000	690	430	0.83	96.6
DNSL–400LN–06	500	520	5000	690	530	0.84	96.7	460	4450	690	475	0.84	96.7
DNSL–450LL–06	560	590	5600	690	600	0.85	96.9	520	4950	690	530	0.85	96.9
DNSL–450LL–06	630	660	6300	690	670	0.85	97.0	580	5600	690	590	0.85	96.9
DNSL–450LN–06	710	740	7100	690	750	0.85	97.0	660	6300	690	670	0.85	97.0
DNSL–450LN–06	800	840	8000	690	850	0.85	97.1	740	7100	690	760	0.84	97.1
DNSL–500LL–06	900	940	9000	690	960	0.85	97.0	830	8000	690	850	0.85	97.0
DNSL–500LN–06	1000	1040	10000	690	1050	0.85	97.1	920	8900	690	940	0.85	97.0
DNSL–500LN–06	1120	1170	11200	690	1170	0.86	97.2	1030	9900	690	1030	0.86	97.2
DNSL–560LL–06	1250	1310	12500	690	1290	0.88	97.2	1160	11100	690	1140	0.88	97.2
DNSL–560LL–06	1400	1460	14000	690	1460	0.86	97.2	1290	12400	690	1300	0.86	97.2
DNSL–560LN–06	1600	1670	16000	690	1640	0.88	97.4	1480	14200	690	1450	0.88	97.4

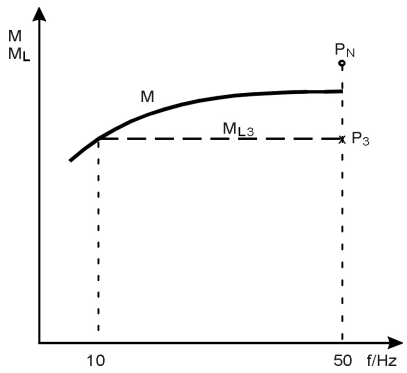
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

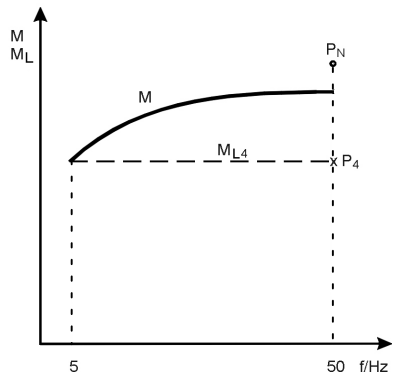
Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 1000 min^{-1}



Speed range: 200 – 1000 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.



Speed range: 100 – 1000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

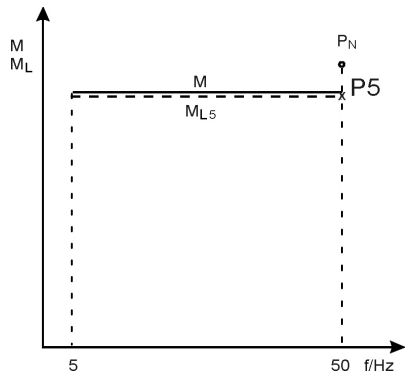
Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
DNGW–071BH–06	0.25	0.21	2.3	400	0.81	0.70	59.2	0.17	1.8	400	0.75	0.65	57.4
DNGW–080BG–06	0.37	0.31	3.3	400	1.13	0.69	63.3	0.25	2.6	400	1.05	0.63	61.7
DNGW–080BH–06	0.55	0.39	4.3	400	1.44	0.65	66.5	0.38	3.9	400	1.42	0.65	66.1
DNGW–090LX–06	0.75	0.62	6.6	400	1.81	0.72	73.0	0.62	6.6	400	1.81	0.72	73.0
DNGW–090LD–06	1.1	0.84	8.7	400	2.7	0.67	72.8	0.75	7.8	400	2.60	0.63	72.3
DNGW–100LB–06	1.5	1.25	12.7	400	3.9	0.68	73.7	1.15	11.7	400	3.75	0.65	73.2
DNGW–112MB–06	2.2	1.84	18.7	400	4.6	0.77	78.6	1.69	17.2	400	4.35	0.75	78.5
DNGW–132SL–06	3	2.5	25	400	5.6	0.78	84.9	2.3	23	400	5.3	0.77	84.8
DNGW–132ML–06	4	3.35	33.5	400	7.8	0.78	83.9	3.1	31	400	7.4	0.76	83.8
DNGW–132MN–06	5.5	4.6	46	400	10.3	0.78	85.6	4.25	42.5	400	9.8	0.77	85.5
DNGW–160ML–06	7.5	6.3	62	400	13.4	0.80	87.4	5.5	54	400	12.2	0.77	87.2
DNGW–160LL–06	11	9.2	90	400	19.5	0.79	89.1	8.1	79	400	18	0.76	89.0
DNGW–180LB–06	15	12.5	124	400	26.5	0.79	90.2	11.1	109	400	24	0.76	90.2
DNGW–200LB–06	18.5	15.5	153	400	30.5	0.84	90.3	13.6	135	400	27	0.82	90.5
DNGW–200LD–06	22	18.4	182	400	37.5	0.80	90.6	16.2	160	400	34	0.79	90.7
DNGW–225MB–06	30	28	275	400	55	0.83	92.1	25.5	250	400	50	0.81	92.1
DNGW–250MB–06	37	34.5	335	400	69	0.81	92.1	31.5	305	400	64	0.80	91.9
DNGW–280SG–06	45	42	405	400	76	0.87	93.4	38	370	400	69	0.86	93.4
DNGW–280MG–06	55	51	490	400	93	0.86	93.0	46.5	450	400	86	0.85	93.0
DNGW–315SL–06	75	70	680	400	129	0.84	94.3	64	620	400	120	0.84	94.3
DNGW–315ML–06	90	84	810	400	150	0.86	95.3	77	750	400	138	0.86	95.3
DNGW–315MM–06	110	103	990	400	183	0.87	95.1	94	910	400	169	0.86	95.1
DNGW–315MN–06 [2]	132	116	1120	400	200	0.88	95.5	107	1030	400	187	0.88	95.5
DNGW–315LL–06	160	149	1430	400	260	0.88	95.6	136	1320	400	240	0.87	95.6
DNGW–315LM–06 [2]	200	176	1700	400	320	0.84	95.9	162	1560	400	300	0.83	95.9
DNGW–315LM–06 [3]	200	186	1800	400	325	0.88	95.9	172	1650	400	300	0.87	95.9
DNSL–355MD–06	225	205	1950	400	370	0.83	96.0	191	1830	400	350	0.82	95.9
DNSL–355LB–06	250	225	2150	400	405	0.83	96.3	210	2050	400	385	0.82	96.2
DNSL–355LC–06	280	255	2450	690	265	0.85	96.3	235	2300	690	245	0.84	96.3
DNSL–355LD–06	315	285	2750	690	300	0.83	96.4	265	2550	690	280	0.82	96.3
DNSL–355LN–06	355	320	3100	690	325	0.85	96.4	300	2900	690	310	0.84	96.4
DNSL–355LN–06	400	360	3450	690	375	0.83	96.5	340	3250	690	360	0.82	96.5
DNSL–400LL–06	400	360	3450	690	375	0.83	96.5	340	3250	690	360	0.82	96.5
DNSL–400LN–06	450	405	3900	690	425	0.83	96.6	380	3650	690	400	0.83	96.6
DNSL–400LN–06	500	450	4350	690	470	0.83	96.7	425	4050	690	445	0.83	96.7
DNSL–450LL–06	560	510	4850	690	520	0.84	96.9	475	4550	690	490	0.84	96.8
DNSL–450LL–06	630	570	5500	690	580	0.84	96.9	530	5100	690	550	0.84	96.9
DNSL–450LN–06	710	640	6200	690	650	0.85	97.0	600	5800	690	620	0.84	97.0
DNSL–450LN–06	800	720	6900	690	740	0.84	97.1	680	6500	690	700	0.83	97.1
DNSL–500LL–06	900	810	7800	690	830	0.85	97.0	760	7300	690	780	0.84	96.9
DNSL–500LN–06	1000	900	8700	690	920	0.85	97.0	850	8100	690	870	0.84	97.0
DNSL–500LN–06	1120	1010	9700	690	1010	0.86	97.2	950	9100	690	950	0.86	97.1
DNSL–560LL–06	1250	1130	10800	690	1110	0.87	97.2	1060	10200	690	1050	0.87	97.2
DNSL–560LL–06	1400	1260	12100	690	1270	0.86	97.2	1190	11400	690	1210	0.85	97.1
DNSL–560LN–06	1600	1440	13800	690	1420	0.88	97.3	1360	13000	690	1340	0.87	97.3

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 1000 min^{-1}

Speed range: 100 – 1000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

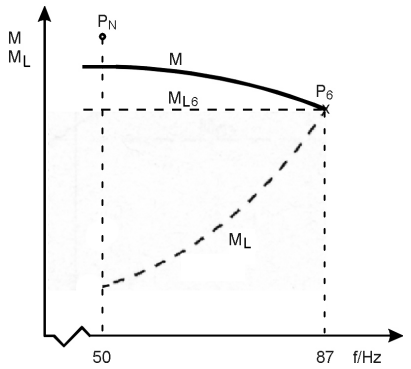
Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
DNLW–112MB–06	2.2	2.55	26	400	6.1	0.82	77.0
DNLW–132SL–06	3	3.45	34.5	400	7.3	0.84	84.1
DNLW–132ML–06	4	4.6	46	400	9.9	0.83	83.0
DNLW–132MN–06	5.5	6.4	64	400	13.4	0.84	84.6
DNLW–160ML–06	7.5	8.6	85	400	17.2	0.86	86.9
DNLW–160LL–06	11	12.7	124	400	25	0.84	88.6
DNLW–180LB–06	15	17.3	171	400	34.5	0.83	89.3
DNLW–200LB–06	18.5	21	210	400	41.5	0.85	89.0
DNLW–200LD–06	22	25.5	250	400	51	0.83	89.6
DNLW–225MB–06	30	34.5	340	400	66	0.84	91.6
DNLW–250MB–06	37	42.5	415	400	83	0.83	92.0
DNLW–280SG–06	45	52	500	400	93	0.88	93.0
DNLW–280MG–06	55	62	600	400	112	0.88	92.9
DNLW–315SL–06	75	78	760	400	143	0.85	94.3
DNLW–315ML–06	90	94	910	400	166	0.87	95.2
DNLW–315MM–06	110	115	1110	400	205	0.87	95.0
DNLW–315MN–06 [2]	132	138	1330	400	240	0.89	95.3
DNLW–315LL–06	160	167	1610	400	290	0.88	95.5
DNLW–315LM–06 [2]	200	205	2000	400	370	0.85	95.8
DNLW–315LM–06 [3]	200	210	2000	400	365	0.88	95.9
DNUL–355MD–06	225	235	2250	400	420	0.84	96.0
DNUL–355LB–06	250	260	2500	400	460	0.85	96.3
DNUL–355LC–06	280	290	2800	690	295	0.85	96.3
DNUL–355LD–06	315	330	3150	690	340	0.85	96.4
DNUL–355LN–06	355	360	3450	690	365	0.86	96.4
DNUL–355LN–06	400	405	3900	690	420	0.84	96.4
DNUL–400LL–06	400	405	3900	690	420	0.84	96.5
DNUL–400LN–06	450	455	4400	690	470	0.84	96.6
DNUL–400LN–06	500	510	4850	690	520	0.84	96.7
DNUL–450LL–06	560	570	5400	690	580	0.85	96.9
DNUL–450LL–06	630	640	6100	690	650	0.85	97.0
DNUL–450LN–06	710	720	6900	690	730	0.85	97.0
DNUL–450LN–06	800	810	7800	690	820	0.85	97.1
DNUL–500LL–06	900	910	8700	690	920	0.85	97.0
DNUL–500LN–06	1000	1010	9700	690	1020	0.85	97.1
DNUL–500LN–06	1120	1130	10900	690	1130	0.86	97.2
DNUL–560LL–06	1250	1270	12100	690	1250	0.88	97.2
DNUL–560LL–06	1400	1420	13600	690	1420	0.86	97.2
DNUL–560LN–06	1600	1620	15500	690	1590	0.88	97.4

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 1000 min^{-1}

Speed range: 1000 – 1730 min^{-1}
Control range: 10 : 17
Frequency: 50 – 87 Hz
Fan: Self–ventilation, Forced ventilation
Load torque: M_L = const./ $M_L \sim n^2$

For mains operation the motor windings have to be Y–connected.

For inverter operation Δ–connection of the windings is required.

For the control range below 50 Hz the limit torques M_{L2}, M_{L3}, M_{L4} have to be observed (see Chapter 2.4.2.2)

Type	P_N kW	P_6 kW	M_{L6} Nm	U V	I_1 A	cosφ	η %
DNGW–071BH–06	0.25	0.4	2.5	400	1.46	0.66	65.3
DNGW–080BG–06	0.37	0.59	3.7	400	2.05	0.65	70.2
DNGW–080BH–06	0.55	0.88	5.5	400	2.75	0.68	73.2
DNGW–090LX–06	0.75	1.2	7.4	400	3.3	0.71	78.0
DNGW–090LD–06	1.1	1.76	10.6	400	5.4	0.65	77.5
DNGW–100LB–06	1.5	2.4	14.1	400	7.1	0.67	77.8
DNGW–112MB–06	2.2	3.5	20.5	400	8.6	0.77	79.6
DNGW–132SL–06	3	4.8	27.5	400	10.6	0.80	85.4
DNGW–132ML–06	4	6.4	37	400	14.3	0.78	85.9
DNGW–132MN–06	5.5	8.8	51	400	19.1	0.79	87.2
DNGW–160ML–06	7.5	11.7	67	400	24.5	0.81	88.2
DNGW–160LL–06	11	17.2	97	400	36	0.80	89.8
DNGW–180LB–06	15	23.5	134	400	48	0.79	91.5
DNGW–200LB–06	18.5	29	166	400	56	0.84	90.8
DNGW–200LD–06	22	34.5	196	400	69	0.81	91.3
DNGW–225MB–06	30	44	250	400	88	0.81	91.8
DNGW–250MB–06	37	54	305	400	112	0.80	90.2
DNGW–280SG–06	45	66	370	400	121	0.86	93.3
DNGW–280MG–06	55	78	440	400	147	0.85	92.0
DNGW–315SL–06	75	103	570	400	198	0.83	93.2
DNGW–315ML–06	90	123	690	400	225	0.85	94.9
DNGW–315MM–06	110	151	840	400	275	0.85	94.7
DNGW–315MN–06 [2]	132	181	1010	400	320	0.87	95.4
DNGW–315LL–06	160	220	1220	400	390	0.87	95.5
DNGW–315LM–06 [2]	200	260	1450	400	490	0.82	95.6
DNGW–315LM–06 [3]	200	275	1520	400	490	0.87	95.4

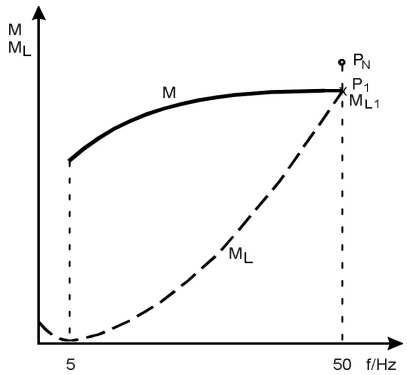
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

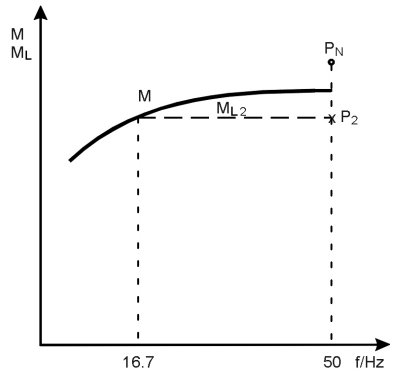
Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 750 min^{-1}



Speed range: 75 – 750 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$



Speed range: 250 – 750 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
DNGW–071BH–08	0.12	0.10	1.6	400	0.55	0.64	49.6	0.10	1.6	400	0.55	0.64	49.6
DNGW–080BH–08	0.25	0.29	4.2	400	1.15	0.72	56.4	0.27	3.8	400	1.08	0.69	57.3
DNGW–090LX–08	0.37	0.43	6.0	400	1.51	0.71	62.7	0.40	5.5	400	1.44	0.69	63.1
DNGW–090LD–08	0.55	0.64	9.0	400	2.10	0.72	66.0	0.59	8.3	400	1.96	0.70	66.9
DNGW–100LB–08	0.75	0.87	11.8	400	2.55	0.74	70.2	0.80	10.9	400	2.45	0.72	70.4
DNGW–100LD–08	1.1	1.27	17.5	400	3.55	0.77	71.2	1.00	13.8	400	3.0	0.71	72.1
DNGW–112MB–08	1.5	1.73	23.5	400	4.7	0.77	73.7	1.56	21.5	400	4.3	0.74	74.5
DNGW–132SL–08	2.2	2.55	34.0	400	6.3	0.76	81.4	2.35	31.5	400	5.9	0.74	81.8
DNGW–132ML–08	3	3.45	46.5	400	8.3	0.75	83.2	3.20	43	400	7.9	0.74	83.5
DNGW–160ML–08	4	4.6	62	400	10.4	0.79	84.3	4.25	57	400	9.7	0.78	84.9
DNGW–160MN–08	5.5	6.4	84	400	14.6	0.77	85.9	5.9	77	400	13.7	0.75	86.2
DNGW–160LL–08	7.5	8.7	115	400	19.4	0.79	85.5	8.0	106	400	18.1	0.77	85.9
DNGW–180LB–08	11	12.7	169	400	26	0.83	87.6	11.7	156	400	24.0	0.82	88.1
DNGW–200LB–08	15	17.3	230	400	37	0.80	86.8	15.5	205	400	33.5	0.79	87.8
DNGW–225SB–08	18.5	21.5	285	400	45	0.81	88.4	18.8	250	400	39.5	0.80	89.1
DNGW–225MB–08	22	25.5	335	400	54	0.79	89.5	23.5	310	400	50	0.78	89.8
DNGW–250MB–08	30	34.5	450	400	68	0.83	90.9	32.0	415	400	63	0.82	91.0
DNGW–280SG–08	37	42.5	550	400	83	0.82	92.0	36.0	465	400	71	0.81	92.3
DNGW–280MG–08	45	52	670	400	101	0.82	92.5	44.5	580	400	87	0.81	92.9
DNGW–315SL–08	55	57	740	400	112	0.80	94.1	52	670	400	103	0.79	94.2
DNGW–315ML–08	75	78	1010	400	152	0.81	94.0	71	910	400	139	0.80	94.1
DNGW–315MM–08	90	94	1210	400	180	0.82	94.6	85	1100	400	164	0.81	94.7
DNGW–315MN–08 [2]	110	115	1480	400	225	0.81	94.0	98	1260	400	195	0.79	94.2
DNGW–315LL–08	132	138	1780	400	265	0.81	94.4	120	1540	400	235	0.80	94.6
DNGW–315LM–08 [2]	160	155	2000	400	300	0.81	94.9	126	1630	400	250	0.78	95.2
DNGW–315LM–08 [3]	160	167	2150	400	315	0.82	95.5	150	1920	400	290	0.80	95.6
DNSL–355LB–08	200	210	2700	400	390	0.81	95.7	185	2350	400	350	0.79	95.7
DNSL–355LC–08	225	235	3000	690	250	0.82	95.4	210	2650	690	230	0.81	95.5
DNSL–355LD–08	250	260	3350	690	280	0.82	95.6	230	2950	690	250	0.80	95.6
DNSL–355LN–08	280	295	3750	690	315	0.82	95.9	260	3350	690	280	0.81	96.0
DNSL–355LX–08	315	330	4250	690	350	0.83	95.8	290	3700	690	310	0.82	95.9
DNSL–400LL–08	355	370	4750	690	395	0.82	96.1	330	4200	690	355	0.81	96.2
DNSL–400LN–08	400	420	5400	690	445	0.82	96.2	370	4750	690	395	0.81	96.2
DNSL–400LX–08	450	470	6000	690	500	0.82	96.2	415	5300	690	445	0.81	96.3
DNSL–450LL–08	500	520	6700	690	540	0.84	96.5	460	5900	690	480	0.83	96.6
DNSL–450LN–08	560	590	7500	690	610	0.84	96.6	520	6600	690	540	0.83	96.6
DNSL–450LN–08	630	660	8400	690	680	0.84	96.7	580	7500	690	610	0.83	96.7
DNSL–450LX–08	670	700	9000	690	730	0.83	96.8	620	7900	690	650	0.82	96.8
DNSL–500LL–08	710	740	9500	690	750	0.86	96.9	660	8400	690	670	0.85	96.9
DNSL–500LL–08	800	840	10700	690	850	0.86	96.9	740	9500	690	750	0.85	97.0
DNSL–500LN–08	900	940	12100	690	970	0.84	96.7	830	10700	690	860	0.84	96.7
DNSL–500LX–08	950	990	12700	690	1030	0.83	96.9	880	11200	690	920	0.83	96.9
DNSL–560LL–08	1000	1040	13400	690	1070	0.84	97.0	920	11800	690	950	0.84	97.0
DNSL–560LL–08	1100	1150	14700	690	1180	0.84	97.6	1020	13000	690	1050	0.84	97.5
DNSL–560LN–08	1200	1250	16100	690	1280	0.84	97.0	1110	14200	690	1140	0.84	97.0
DNSL–560LN–08	1350	1410	18100	690	1450	0.84	97.1	1250	16000	690	1290	0.84	97.1

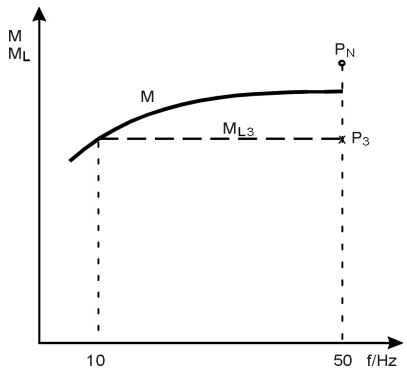
2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

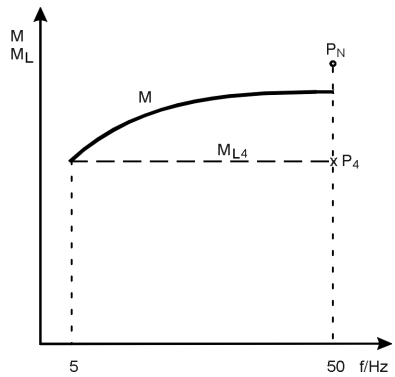
Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)

Speed 750 min^{-1}



Speed range: 250 – 750 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.



Speed range: 75 – 750 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

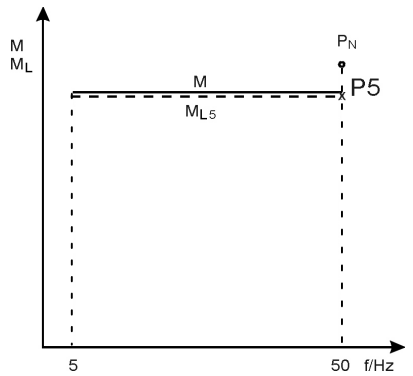
Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
DNGW–071BH–08	0.12	0.1	1.5	400	0.54	0.62	49.3	0.09	1.3	400	0.53	0.60	48.5
DNGW–080BH–08	0.25	0.21	3	400	0.98	0.61	56.9	0.18	2.6	400	0.96	0.60	56.2
DNGW–090LX–08	0.37	0.31	4.3	400	1.29	0.62	62.4	0.28	4	400	1.25	0.60	61.7
DNGW–090LD–08	0.55	0.46	6.5	400	1.7	0.64	67.2	0.42	6	400	1.65	0.61	66.8
DNGW–100LB–08	0.75	0.63	8.6	400	2.15	0.66	69.7	0.58	7.9	400	2.1	0.63	69.1
DNGW–100LD–08	1.1	0.88	12.1	400	2.85	0.68	71.8	0.77	10.6	400	2.7	0.64	71.0
DNGW–112MB–08	1.5	1.25	17.1	400	3.75	0.69	75.0	1.15	15.8	400	3.6	0.66	74.8
DNGW–132SL–08	2.2	1.84	24.5	400	5	0.69	82.0	1.69	22.5	400	4.8	0.66	81.7
DNGW–132ML–08	3	2.5	33.5	400	6.7	0.68	83.8	2.3	31	400	6.4	0.66	83.6
DNGW–160ML–08	4	3.35	44.5	400	8.1	0.73	85.9	2.95	39.5	400	7.5	0.70	86.0
DNGW–160MN–08	5.5	4.6	61	400	11.6	0.70	86.4	4.05	53	400	10.9	0.66	86.1
DNGW–160LL–08	7.5	6.3	83	400	15.2	0.73	86.2	5.5	73	400	14.1	0.69	85.9
DNGW–180LB–08	11	9.2	122	400	20	0.77	88.8	8.1	108	400	18.5	0.74	88.8
DNGW–200LB–08	15	12.5	168	400	27.5	0.76	88.9	11.1	148	400	25.5	0.74	89.2
DNGW–225SB–08	18.5	17.3	230	400	36.5	0.79	89.4	15.7	205	400	34	0.77	89.6
DNGW–225MB–08	22	20.5	270	400	45	0.76	90.1	18.6	245	400	42	0.74	90.1
DNGW–250MB–08	30	28	365	400	56	0.81	91.2	25.5	330	400	52	0.80	91.1
DNGW–280SG–08	37	34.5	450	400	69	0.81	92.4	31.5	405	400	64	0.79	92.4
DNGW–280MG–08	45	42	540	400	83	0.81	92.9	38	495	400	77	0.79	93.0
DNGW–315SL–08	55	51	660	400	102	0.79	94.2	47	610	400	95	0.78	94.2
DNGW–315ML–08	75	70	900	400	138	0.80	94.1	64	830	400	128	0.79	94.1
DNGW–315MM–08	90	84	1080	400	163	0.81	94.7	77	1000	400	151	0.80	94.8
DNGW–315MN–08 [2]	110	96	1240	400	192	0.79	94.3	88	1130	400	179	0.78	94.3
DNGW–315LL–08	132	118	1520	400	230	0.80	94.6	107	1380	400	215	0.79	94.6
DNGW–315LM–08 [2]	160	124	1600	400	250	0.78	95.2	113	1460	400	230	0.76	95.2
DNGW–315LM–08 [3]	160	148	1900	400	285	0.80	95.6	134	1730	400	265	0.78	95.6
DNSL–355LB–08	200	180	2300	400	345	0.79	95.7	169	2150	400	330	0.78	95.7
DNSL–355LC–08	225	205	2600	690	225	0.80	95.5	191	2450	690	210	0.79	95.5
DNSL–355LD–08	250	225	2900	690	245	0.80	95.6	210	2700	690	235	0.79	95.6
DNSL–355LN–08	280	255	3250	690	275	0.81	96.0	235	3050	690	260	0.79	96.0
DNSL–355LX–08	315	285	3650	690	305	0.81	95.9	260	3400	690	285	0.80	95.9
DNSL–400LL–08	355	320	4100	690	345	0.80	96.2	300	3850	690	330	0.79	96.2
DNSL–400LN–08	400	360	4650	690	385	0.81	96.3	335	4350	690	365	0.80	96.3
DNSL–400LX–08	450	405	5200	690	440	0.81	96.3	380	4900	690	415	0.80	96.3
DNSL–450LL–08	500	450	5800	690	475	0.83	96.6	425	5400	690	450	0.82	96.6
DNSL–450LN–08	560	510	6500	690	530	0.83	96.6	475	6100	690	500	0.82	96.6
DNSL–450LN–08	630	570	7300	690	600	0.83	96.7	530	6800	690	560	0.82	96.7
DNSL–450LX–08	670	600	7700	690	640	0.82	96.8	570	7300	690	610	0.81	96.8
DNSL–500LL–08	710	640	8200	690	660	0.84	96.9	600	7700	690	620	0.84	96.9
DNSL–500LL–08	800	720	9200	690	740	0.85	96.9	680	8700	690	700	0.84	96.9
DNSL–500LN–08	900	810	10400	690	840	0.84	96.7	760	9800	690	790	0.83	96.7
DNSL–500LX–08	950	860	11000	690	900	0.82	96.9	800	10300	690	850	0.82	96.9
DNSL–560LL–08	1000	900	11500	690	930	0.84	96.9	850	10800	690	880	0.84	96.9
DNSL–560LL–08	1100	990	12700	690	1020	0.84	97.5	930	11900	690	960	0.83	97.4
DNSL–560LN–08	1200	1080	13900	690	1110	0.84	97.0	1020	13000	690	1050	0.84	96.9
DNSL–560LN–08	1350	1220	15600	690	1260	0.84	97.1	1140	14600	690	1180	0.83	97.0

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 750 min^{-1}

Speed range: 75 – 750 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

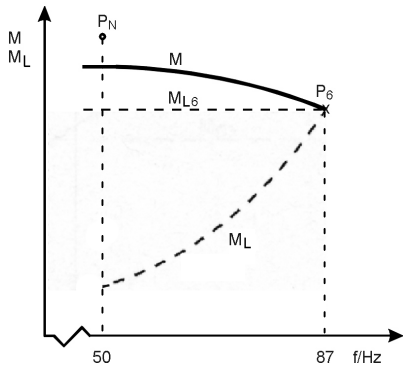
Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
DNLW–112MB–08	1.5	1.72	23.5	400	4.65	0.76	73.7
DNLW–132SL–08	2.2	2.55	34	400	6.3	0.76	81.4
DNLW–132ML–08	3	3.45	46.5	400	8.3	0.75	83.2
DNLW–160ML–08	4	4.6	62	400	10.4	0.79	84.3
DNLW–160MN–08	5.5	6.4	84	400	14.6	0.77	85.9
DNLW–160LL–08	7.5	8.7	115	400	19.4	0.79	85.5
DNLW–180LB–08	11	12.7	169	400	26	0.83	87.6
DNLW–200LB–08	15	17.2	230	400	37	0.80	86.8
DNLW–225SB–08	18.5	21.5	285	400	45	0.81	88.4
DNLW–225MB–08	22	25.5	335	400	54	0.79	89.5
DNLW–250MB–08	30	34.5	450	400	68	0.83	90.9
DNLW–280SG–08	37	42.5	550	400	83	0.82	92.0
DNLW–280MG–08	45	52	670	400	101	0.82	92.5
DNLW–315SL–08	55	57	740	400	112	0.80	94.1
DNLW–315ML–08	75	78	1010	400	152	0.81	94.0
DNLW–315MM–08	90	94	1210	400	180	0.82	94.6
DNLW–315MN–08 [2]	110	115	1480	400	225	0.81	94.0
DNLW–315LL–08	132	138	1780	400	265	0.81	94.4
DNLW–315LM–08 [2]	160	155	2000	400	300	0.81	94.9
DNLW–315LM–08 [3]	160	167	2150	400	315	0.82	95.5
DNUL–355LB–08	200	210	2700	400	390	0.81	95.7
DNUL–355LC–08	225	235	3000	690	250	0.82	95.4
DNUL–355LD–08	250	260	3350	690	280	0.82	95.6
DNUL–355LN–08	280	285	3650	690	305	0.82	95.9
DNUL–355LX–08	315	320	4100	690	340	0.82	95.8
DNUL–400LL–08	355	360	4600	690	385	0.82	96.1
DNUL–400LN–08	400	405	5200	690	430	0.82	96.2
DNUL–400LX–08	450	455	5900	690	485	0.82	96.2
DNUL–450LL–08	500	510	6500	690	530	0.84	96.5
DNUL–450LN–08	560	570	7300	690	590	0.84	96.6
DNUL–450LN–08	630	640	8200	690	660	0.84	96.7
DNUL–450LX–08	670	680	8700	690	710	0.83	96.8
DNUL–500LL–08	710	720	9200	690	730	0.85	97.0
DNUL–500LL–08	800	810	10400	690	820	0.85	96.9
DNUL–500LN–08	900	910	11700	690	940	0.84	96.7
DNUL–500LX–08	950	960	12300	690	1000	0.83	96.9
DNUL–560LL–08	1000	1010	13000	690	1040	0.84	97.0
DNUL–560LL–08	1100	1110	14300	690	1140	0.84	97.6
DNUL–560LN–08	1200	1210	15500	690	1240	0.84	97.0
DNUL–560LN–08	1350	1370	17500	690	1400	0.84	97.1

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

Explosion–proof three–phase motors for low voltage with squirrel cage,
Protection type ”Flameproof Enclosure” acc. to EN 50 018

Class F insulation – Utilization F, operated at PWM–Inverter

(operated at I–Inverter: Power P_1, P_2, ... P_6 less 10%)



Speed 750 min^{-1}

Speed range: 750 – 1300 min^{-1}
Control range: 10 : 17
Frequency: 50 – 87 Hz
Fan: Self–ventilation, Forced ventilation
Load torque: M_L = const./ $M_L \sim n^2$

For mains operation the motor windings have to be Y–connected.

For inverter operation Δ–connection of the windings is required.

For the control range below 50 Hz the limit torques M_{L2}, M_{L3}, M_{L4} have to be observed (see Chapter 2.4.2.2)

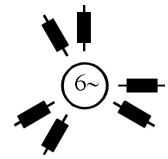
Type	P_N kW	P_6 kW	M_{L6} Nm	U V	I_1 A	cosφ	η %
DNGW–071BH–08	0.12	0.19	1.7	400	1.04	0.62	49.7
DNGW–080BH–08	0.25	0.4	3.4	400	1.77	0.57	64.2
DNGW–090LX–08	0.37	0.59	4.8	400	2.35	0.61	65.5
DNGW–090LD–08	0.55	0.88	7.2	400	3.1	0.63	70.7
DNGW–100LB–08	0.75	1.2	9.5	400	3.95	0.65	73.2
DNGW–100LD–08	1.1	1.76	14	400	5.3	0.68	76.1
DNGW–112MB–08	1.5	2.4	18.9	400	6.9	0.68	79.1
DNGW–132SL–08	2.2	3.5	27	400	9.2	0.69	83.9
DNGW–132ML–08	3	4.8	37	400	12.3	0.69	86.0
DNGW–160ML–08	4	6.2	48	400	14.6	0.73	88.0
DNGW–160MN–08	5.5	8.6	65	400	21	0.70	88.3
DNGW–160LL–08	7.5	11.7	90	400	27.5	0.73	87.3
DNGW–180LB–08	11	17.2	132	400	37	0.78	89.6
DNGW–200LB–08	15	23.5	181	400	50	0.77	90.9
DNGW–225SB–08	18.5	27	205	400	58	0.76	90.4
DNGW–225MB–08	22	32.5	245	400	73	0.74	90.7
DNGW–250MB–08	30	44	330	400	92	0.79	90.0
DNGW–280SG–08	37	54	405	400	110	0.79	92.9
DNGW–280MG–08	45	66	495	400	133	0.79	93.6
DNGW–315SL–08	55	75	560	400	156	0.76	94.2
DNGW–315ML–08	75	103	770	400	210	0.77	93.7
DNGW–315MM–08	90	123	920	400	245	0.78	94.8
DNGW–315MN–08 [2]	110	151	1120	400	305	0.77	94.6
DNGW–315LL–08	132	181	1350	400	365	0.78	94.7
DNGW–315LM–08 [2]	160	210	1570	400	425	0.77	95.5
DNGW–315LM–08 [3]	160	220	1630	400	445	0.77	95.8

2 Rated power P_N for utilization F
3 Motor with special rotor (Cu)

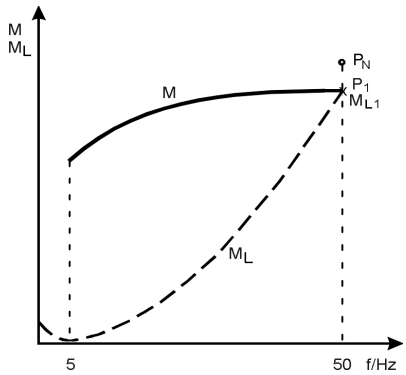
3.6 Six–phase motors for low voltage with squirrel cage,

Totally enclosed fan–cooled

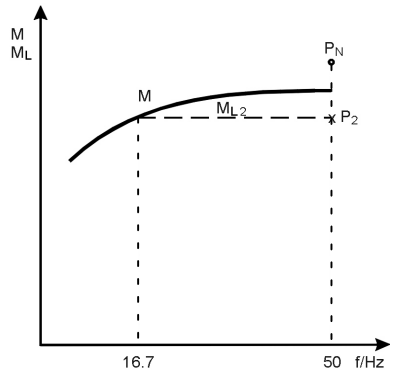
Class F insulation – Utilization B, operated at I–Inverter



Speed 3000 min^{-1}



Speed range: 300 – 3000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$

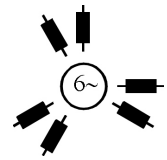


Speed range: 1000 – 3000 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

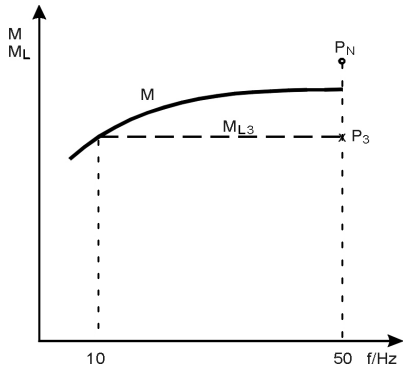
Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
ANSA–355LC–02	355	325	1050	690	2 x 153	0.93	96.8	290	920	690	2 x 137	0.92	96.7
ANSA–355LD–02	400	385	1240	690	2 x 183	0.91	97.0	335	1070	690	2 x 161	0.90	96.9
ANSA–355LX–02	450	415	1330	690	2 x 199	0.91	96.5	360	1160	690	2 x 174	0.91	96.5
ANSA–400LN–02	500	485	1550	690	2 x 230	0.92	96.8	420	1340	690	2 x 200	0.91	96.7
ANSA–400LN–02	560	520	1660	690	2 x 245	0.92	96.9	460	1470	690	2 x 220	0.91	96.8
ANSA–400LX–02	630	580	1860	690	2 x 275	0.92	96.9	520	1660	690	2 x 245	0.92	96.9
ANSA–450LL–02	710	650	2100	690	2 x 310	0.92	96.9	590	1890	690	2 x 280	0.91	96.8
ANSA–450LN–02	800	740	2350	690	2 x 355	0.91	97.0	670	2150	690	2 x 320	0.91	96.9
ANSA–450LN–02	900	830	2650	690	2 x 395	0.91	97.2	760	2400	690	2 x 365	0.91	97.1

Six–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

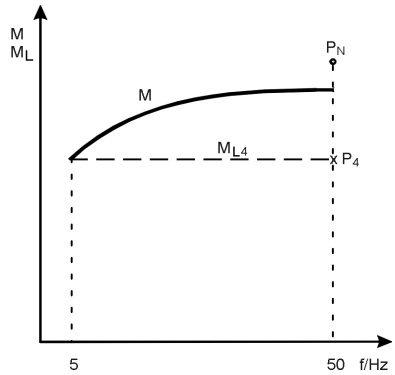
Class F insulation – Utilization B, operated at I–Inverter



Speed 3000 min^{-1}



Speed range: 600 – 3000 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

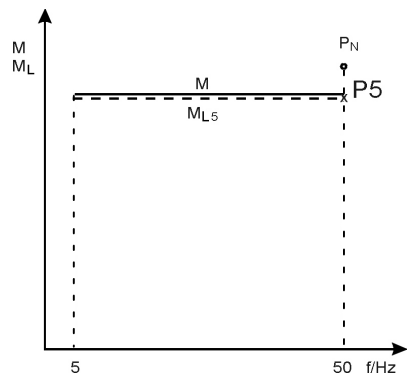


Speed range: 300 – 3000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
ANSA–355LC–02	355	275	880	690	2 x 130	0.92	96.7	255	820	690	2 x 122	0.91	96.6
ANSA–355LD–02	400	330	1060	690	2 x 159	0.90	96.9	310	1000	690	2 x 151	0.90	96.8
ANSA–355LX–02	450	340	1090	690	2 x 165	0.90	96.4	315	1010	690	2 x 154	0.90	96.4
ANSA–400LN–02	500	405	1300	690	2 x 194	0.91	96.7	375	1210	690	2 x 181	0.91	96.6
ANSA–400LN–02	560	440	1400	690	2 x 210	0.91	96.8	410	1310	690	2 x 197	0.91	96.7
ANSA–400LX–02	630	495	1580	690	2 x 235	0.91	96.8	460	1480	690	2 x 220	0.91	96.8
ANSA–450LL–02	710	570	1810	690	2 x 270	0.91	96.8	530	1700	690	2 x 255	0.91	96.7
ANSA–450LN–02	800	640	2050	690	2 x 310	0.90	96.9	600	1910	690	2 x 290	0.90	96.8
ANSA–450LN–02	900	730	2350	690	2 x 350	0.91	97.1	690	2200	690	2 x 335	0.90	97.0

Six–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at I–Inverter



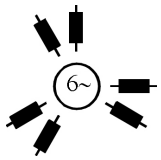
Speed 3000 min^{-1}

Speed range: 300 – 3000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

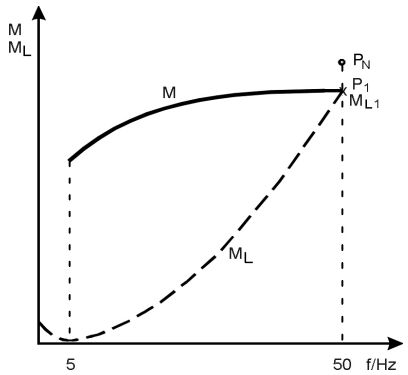
Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
ANUA–355LC–02	355	325	1050	690	2 x 153	0.93	96.8
ANUA–355LD–02	400	380	1220	690	2 x 181	0.91	97.0
ANUA–355LX–02	450	410	1310	690	2 x 196	0.91	96.5
ANUA–400LN–02	500	455	1460	690	2 x 215	0.91	96.7
ANUA–400LN–02	560	510	1630	690	2 x 240	0.92	96.9
ANUA–400LX–02	630	570	1840	690	2 x 270	0.92	96.9
ANUA–450LL–02	710	650	2050	690	2 x 310	0.92	96.9
ANUA–450LN–02	800	730	2350	690	2 x 350	0.91	97.0
ANUA–450LN–02	900	820	2600	690	2 x 390	0.91	97.2

Six–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

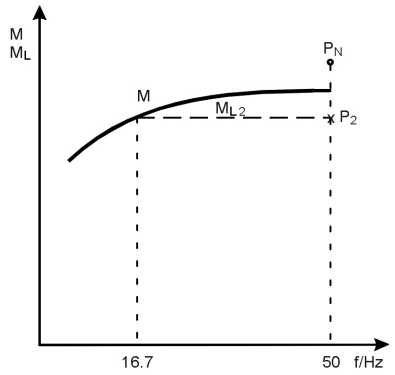
Class F insulation – Utilization B, operated at I–Inverter



Speed 1500 min^{-1}



Speed range: 150 – 1500 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$

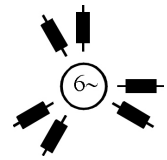


Speed range: 500 – 1500 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

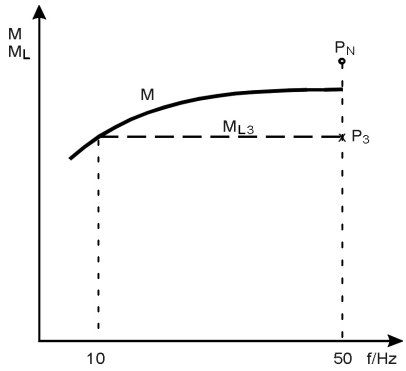
Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
ANSA–355LC–04	355	325	2100	690	2 x 165	0.86	96.8	300	1910	690	2 x 153	0.85	96.7
ANSA–355LD–04	400	365	2350	690	2 x 184	0.87	96.8	335	2150	690	2 x 170	0.86	96.8
ANSA–355LN–04	450	410	2650	690	2 x 210	0.85	96.7	380	2400	690	2 x 196	0.85	96.7
ANSA–355LX–04	500	460	2950	690	2 x 235	0.86	96.9	420	2700	690	2 x 215	0.85	96.9
ANSA–400LN–04	560	510	3300	690	2 x 250	0.88	96.9	470	3000	690	2 x 235	0.87	96.8
ANSA–400LN–04	630	580	3700	690	2 x 285	0.88	96.8	530	3400	690	2 x 265	0.87	96.8
ANSA–400LX–04	710	650	4150	690	2 x 320	0.88	97.0	600	3800	690	2 x 295	0.88	97.0
ANSA–450LL–04	800	730	4700	690	2 x 360	0.88	97.0	670	4300	690	2 x 335	0.87	97.0
ANSA–450LN–04	900	820	5300	690	2 x 405	0.88	97.1	760	4850	690	2 x 375	0.88	97.1
ANSA–450LN–04	950	860	5500	690	2 x 420	0.88	97.2	800	5100	690	2 x 395	0.88	97.2
ANSA–500LL–04	1000	910	5800	690	2 x 450	0.88	97.0	840	5400	690	2 x 415	0.88	96.9
ANSA–500LL–04	1120	1020	6500	690	2 x 500	0.89	97.2	940	6000	690	2 x 460	0.88	97.1

Six–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

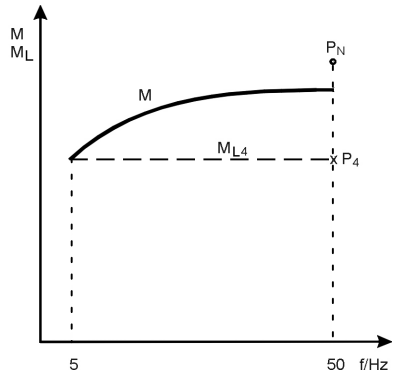
Class F insulation – Utilization B, operated at I–Inverter



Speed 1500 min^{-1}



Speed range: 300 – 1500 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

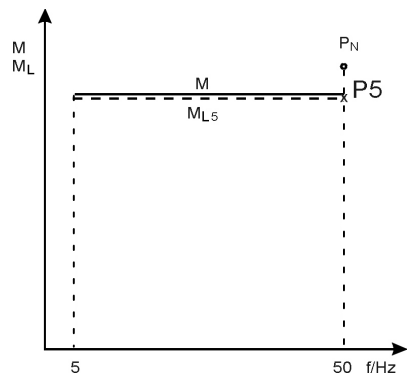


Speed range: 150 – 1500 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
ANSA–355LC–04	355	295	1890	690	2 x 151	0.85	96.7	275	1770	690	2 x 142	0.84	96.7
ANSA–355LD–04	400	330	2150	690	2 x 168	0.86	96.8	310	2000	690	2 x 159	0.85	96.8
ANSA–355LN–04	450	375	2400	690	2 x 194	0.84	96.7	350	2250	690	2 x 183	0.84	96.6
ANSA–355LX–04	500	415	2650	690	2 x 215	0.85	96.9	390	2500	690	2 x 205	0.84	96.8
ANSA–400LN–04	560	465	3000	690	2 x 230	0.87	96.8	435	2800	690	2 x 220	0.87	96.8
ANSA–400LN–04	630	520	3350	690	2 x 260	0.87	96.7	490	3150	690	2 x 245	0.87	96.7
ANSA–400LX–04	710	590	3750	690	2 x 295	0.88	97.0	550	3550	690	2 x 275	0.87	97.0
ANSA–450LL–04	800	660	4250	690	2 x 330	0.87	97.0	620	4000	690	2 x 310	0.87	96.9
ANSA–450LN–04	900	750	4800	690	2 x 370	0.88	97.1	700	4500	690	2 x 350	0.87	97.0
ANSA–450LN–04	950	790	5000	690	2 x 390	0.88	97.2	740	4750	690	2 x 370	0.87	97.1
ANSA–500LL–04	1000	830	5300	690	2 x 410	0.88	96.9	780	5000	690	2 x 390	0.87	96.8
ANSA–500LL–04	1120	930	5900	690	2 x 460	0.88	97.1	870	5600	690	2 x 430	0.88	97.0

Six–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at I–Inverter



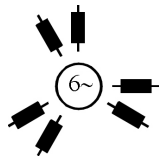
Speed 1500 min^{-1}

Speed range: 150 – 1500 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

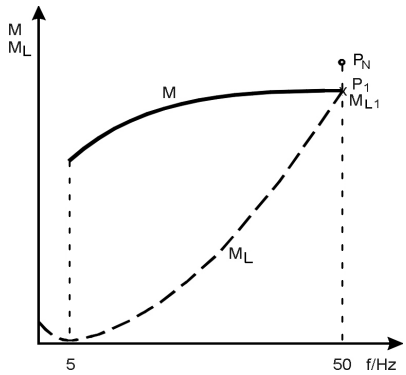
Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
ANUA–355LC–04	355	325	2100	690	2 x 165	0.86	96.8
ANUA–355LD–04	400	365	2350	690	2 x 184	0.87	96.8
ANUA–355LN–04	450	410	2600	690	2 x 210	0.85	96.7
ANUA–355LX–04	500	455	2900	690	2 x 230	0.86	96.9
ANUA–400LN–04	560	510	3250	690	2 x 250	0.88	96.9
ANUA–400LN–04	630	570	3650	690	2 x 285	0.88	96.8
ANUA–400LX–04	710	650	4150	690	2 x 320	0.88	97.0
ANUA–450LL–04	800	730	4650	690	2 x 360	0.88	97.0
ANUA–450LN–04	900	820	5200	690	2 x 405	0.88	97.1
ANUA–450LN–04	950	860	5500	690	2 x 420	0.88	97.2
ANUA–500LL–04	1000	910	5800	690	2 x 450	0.88	97.0
ANUA–500LL–04	1120	1020	6500	690	2 x 500	0.89	97.2

Six–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

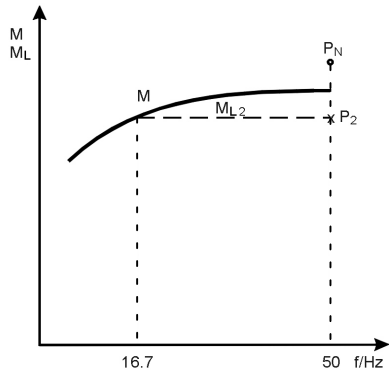
Class F insulation – Utilization B, operated at I–Inverter



Speed 1000 min^{-1}



Speed range: 100 – 1000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$

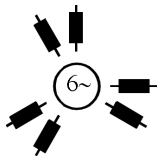


Speed range: 330 – 1000 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

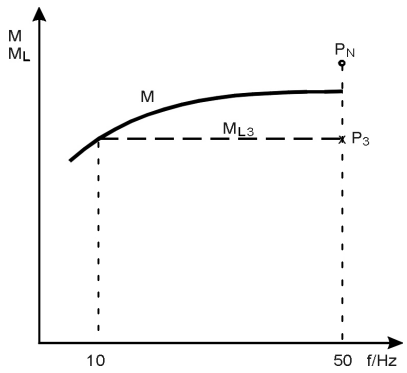
Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
ANSA–355LC–06	280	260	2500	690	2 x 134	0.85	96.3	235	2250	690	2 x 122	0.84	96.3
ANSA–355LD–06	315	290	2800	690	2 x 151	0.84	96.4	265	2550	690	2 x 140	0.83	96.3
ANSA–355LN–06	355	325	3150	690	2 x 166	0.86	96.4	300	2850	690	2 x 154	0.85	96.4
ANSA–355LN–06	400	365	3500	690	2 x 191	0.84	96.5	335	3250	690	2 x 177	0.83	96.5
ANSA–400LN–06	450	435	4150	690	2 x 225	0.84	96.6	380	3650	690	2 x 200	0.83	96.6
ANSA–400LN–06	500	455	4400	690	2 x 235	0.84	96.7	420	4050	690	2 x 220	0.83	96.7
ANSA–450LL–06	560	510	4900	690	2 x 260	0.85	96.9	470	4500	690	2 x 245	0.84	96.8
ANSA–450LL–06	630	580	5500	690	2 x 295	0.85	96.9	530	5100	690	2 x 275	0.84	96.9
ANSA–450LN–06	710	650	6200	690	2 x 330	0.85	97.0	600	5700	690	2 x 310	0.85	97.0
ANSA–450LN–06	800	710	6800	690	2 x 365	0.84	97.1	670	6500	690	2 x 350	0.84	97.1
ANSA–500LL–06	900	820	7900	690	2 x 420	0.85	97.0	760	7300	690	2 x 390	0.85	96.9
ANSA–500LN–06	1000	910	8700	690	2 x 465	0.85	97.0	840	8100	690	2 x 430	0.85	97.0
ANSA–500LN–06	1120	1020	9800	690	2 x 510	0.87	97.2	940	9000	690	2 x 470	0.87	97.1
ANSA–560LL–06	1250	1140	11000	690	2 x 560	0.88	97.2	1050	10100	690	2 x 520	0.88	97.2
ANSA–560LL–06	1400	1270	12200	690	2 x 640	0.86	97.2	1180	11300	690	2 x 600	0.86	97.1
ANSA–560LN–06	1600	1460	14000	690	2 x 720	0.88	97.4	1340	12900	690	2 x 660	0.88	97.3

Six–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

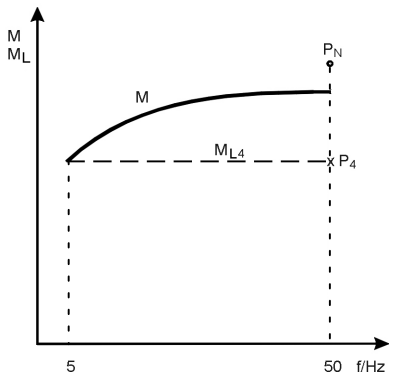
Class F insulation – Utilization B, operated at I–Inverter



Speed 1000 min^{-1}



Speed range: 200 – 1000 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

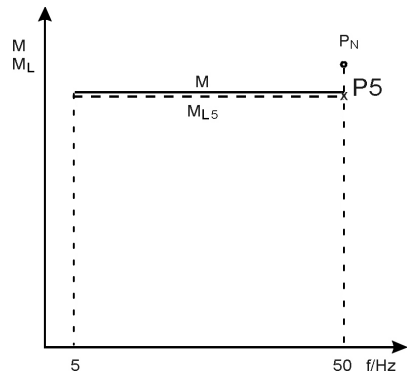


Speed range: 100 – 1000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
ANSA–355LC–06	280	230	2250	690	2 x 120	0.84	96.3	220	2100	690	2 x 116	0.84	96.2
ANSA–355LD–06	315	260	2500	690	2 x 138	0.83	96.3	245	2350	690	2 x 131	0.82	96.3
ANSA–355LN–06	355	295	2850	690	2 x 152	0.85	96.4	275	2650	690	2 x 143	0.84	96.4
ANSA–355LN–06	400	330	3200	690	2 x 175	0.83	96.5	310	2950	690	2 x 166	0.82	96.4
ANSA–400LN–06	450	375	3600	690	2 x 198	0.83	96.6	350	3400	690	2 x 186	0.82	96.5
ANSA–400LN–06	500	415	4000	690	2 x 220	0.83	96.6	390	3750	690	2 x 205	0.82	96.6
ANSA–450LL–06	560	465	4450	690	2 x 240	0.84	96.8	435	4200	690	2 x 230	0.84	96.8
ANSA–450LL–06	630	520	5000	690	2 x 270	0.84	96.9	490	4700	690	2 x 255	0.84	96.8
ANSA–450LN–06	710	590	5700	690	2 x 305	0.84	97.0	550	5300	690	2 x 285	0.84	96.9
ANSA–450LN–06	800	660	6400	690	2 x 345	0.84	97.1	620	6000	690	2 x 325	0.83	97.0
ANSA–500LL–06	900	750	7200	690	2 x 385	0.85	96.9	700	6700	690	2 x 360	0.84	96.9
ANSA–500LN–06	1000	830	8000	690	2 x 425	0.85	97.0	780	7500	690	2 x 405	0.84	96.9
ANSA–500LN–06	1120	930	8900	690	2 x 465	0.87	97.1	870	8400	690	2 x 440	0.86	97.1
ANSA–560LL–06	1250	1040	10000	690	2 x 510	0.88	97.1	980	9400	690	2 x 485	0.87	97.1
ANSA–560LL–06	1400	1160	11100	690	2 x 590	0.86	97.1	1090	10500	690	2 x 560	0.85	97.0
ANSA–560LN–06	1600	1330	12700	690	2 x 660	0.88	97.3	1250	12000	690	2 x 620	0.87	97.3

Six–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at I–Inverter



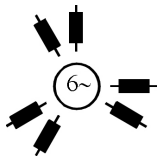
Speed 1000 min^{-1}

Speed range: 100 – 1000 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

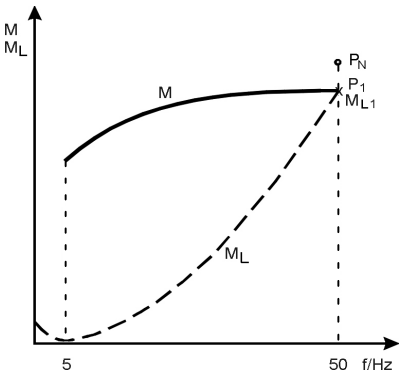
Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
ANUA–355LC–06	280	260	2500	690	2 x 134	0.85	96.3
ANUA–355LD–06	315	290	2800	690	2 x 151	0.84	96.4
ANUA–355LN–06	355	325	3100	690	2 x 166	0.86	96.4
ANUA–355LN–06	400	365	3500	690	2 x 191	0.84	96.5
ANUA–400LN–06	450	410	3950	690	2 x 215	0.84	96.6
ANUA–400LN–06	500	455	4400	690	2 x 235	0.84	96.7
ANUA–450LL–06	560	510	4900	690	2 x 260	0.85	96.9
ANUA–450LL–06	630	570	5500	690	2 x 290	0.85	96.9
ANUA–450LN–06	710	650	6200	690	2 x 330	0.85	97.0
ANUA–450LN–06	800	710	6800	690	2 x 365	0.84	97.1
ANUA–500LL–06	900	820	7900	690	2 x 420	0.85	97.0
ANUA–500LN–06	1000	910	8700	690	2 x 465	0.85	97.0
ANUA–500LN–06	1120	1020	9800	690	2 x 510	0.87	97.2
ANUA–560LL–06	1250	1140	10900	690	2 x 560	0.88	97.2
ANUA–560LL–06	1400	1270	12200	690	2 x 640	0.86	97.2
ANUA–560LN–06	1600	1460	14000	690	2 x 720	0.88	97.4

Six–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

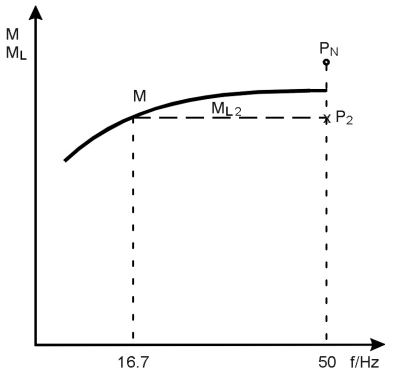
Class F insulation – Utilization B, operated at I–Inverter



Speed 750 min^{-1}



Speed range: 75 – 750 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: $M_L \sim n^2$

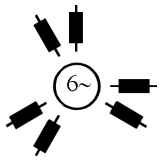


Speed range: 250 – 750 min^{-1}
Control range: 1 : 3
Frequency: 16.7 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

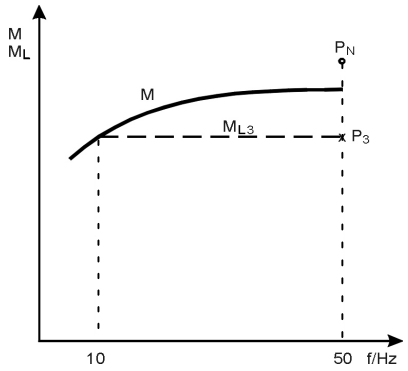
Type	P_N kW	P_1 kW	M_{L1} Nm	U V	I_1 A	cosφ	η %	P_2 kW	M_{L2} Nm	U V	I_1 A	cosφ	η %
ANSA–355LC–08	225	205	2650	690	2 x 112	0.81	95.5	187	2400	690	2 x 104	0.80	95.5
ANSA–355LD–08	250	230	2950	690	2 x 126	0.81	95.6	210	2700	690	2 x 117	0.79	95.6
ANSA–355LN–08	280	255	3300	690	2 x 138	0.81	96.0	230	2950	690	2 x 127	0.80	96.0
ANSA–355LX–08	315	290	3700	690	2 x 155	0.82	95.9	260	3350	690	2 x 141	0.81	95.9
ANSA–400LL–08	355	325	4150	690	2 x 176	0.81	96.2	295	3800	690	2 x 162	0.80	96.2
ANSA–400LN–08	400	365	4700	690	2 x 196	0.82	96.3	330	4250	690	2 x 180	0.81	96.3
ANSA–400LX–08	450	410	5300	690	2 x 220	0.82	96.3	375	4800	690	2 x 205	0.80	96.3
ANSA–450LL–08	500	455	5900	690	2 x 240	0.83	96.6	420	5400	690	2 x 225	0.83	96.6
ANSA–450LN–08	560	510	6600	690	2 x 265	0.84	96.6	470	6000	690	2 x 250	0.83	96.6
ANSA–450LN–08	630	580	7400	690	2 x 305	0.83	96.7	530	6800	690	2 x 280	0.83	96.7
ANSA–450LX–08	670	610	7900	690	2 x 320	0.83	96.8	560	7200	690	2 x 300	0.82	96.8
ANSA–500LL–08	710	650	8300	690	2 x 335	0.85	96.9	600	7600	690	2 x 310	0.84	96.9
ANSA–500LL–08	800	730	9400	690	2 x 375	0.85	97.0	670	8600	690	2 x 345	0.84	96.9
ANSA–500LN–08	900	820	10500	690	2 x 425	0.84	96.7	760	9700	690	2 x 395	0.84	96.7
ANSA–500LX–08	950	870	11200	690	2 x 455	0.83	96.9	800	10200	690	2 x 425	0.82	96.9
ANSA–560LL–08	1000	910	11700	690	2 x 470	0.85	96.9	840	10800	690	2 x 435	0.84	96.9
ANSA–560LL–08	1100	970	12500	690	2 x 500	0.84	97.5	920	11800	690	2 x 475	0.84	97.4
ANSA–560LN–08	1200	1100	14000	690	2 x 560	0.85	97.0	1010	12900	690	2 x 520	0.85	96.9
ANSA–560LN–08	1350	1230	15800	690	2 x 630	0.84	97.1	1130	14500	690	2 x 590	0.84	97.0

Six–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

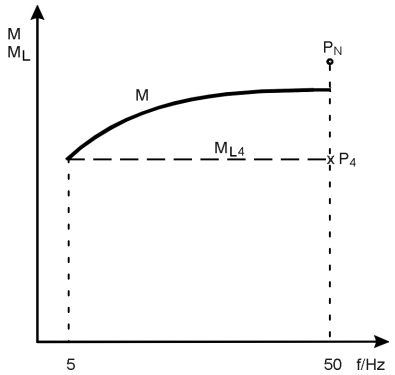
Class F insulation – Utilization B, operated at I–Inverter



Speed 750 min^{-1}



Speed range: 250 – 750 min^{-1}
Control range: 1 : 5
Frequency: 10 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

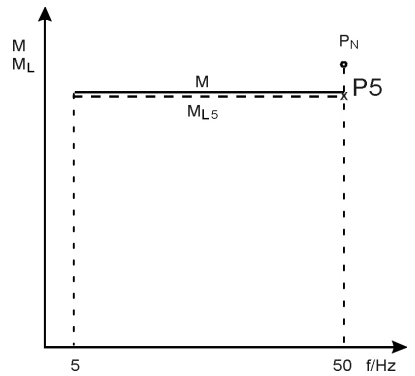


Speed range: 75 – 750 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Self–ventilation
Load torque: M_L = const.

Type	P_N kW	P_3 kW	M_{L3} Nm	U V	I_1 A	cosφ	η %	P_4 kW	M_{L4} Nm	U V	I_1 A	cosφ	η %
ANSA–355LC–08	225	186	2400	690	2 x 104	0.80	95.5	170	2200	690	2 x 97	0.78	95.5
ANSA–355LD–08	250	210	2650	690	2 x 117	0.79	95.6	190	2450	690	2 x 109	0.78	95.6
ANSA–355LN–08	280	230	2950	690	2 x 127	0.80	96.0	210	2700	690	2 x 119	0.78	96.0
ANSA–355LX–08	315	255	3300	690	2 x 139	0.81	95.9	235	3000	690	2 x 130	0.80	95.9
ANSA–400LL–08	355	295	3800	690	2 x 162	0.80	96.2	270	3500	690	2 x 151	0.79	96.1
ANSA–400LN–08	400	330	4250	690	2 x 180	0.81	96.3	300	3900	690	2 x 167	0.79	96.2
ANSA–400LX–08	450	370	4800	690	2 x 205	0.80	96.3	340	4400	690	2 x 190	0.79	96.2
ANSA–450LL–08	500	415	5300	690	2 x 220	0.83	96.6	390	5000	690	2 x 210	0.82	96.5
ANSA–450LN–08	560	465	6000	690	2 x 245	0.83	96.6	435	5600	690	2 x 230	0.82	96.6
ANSA–450LN–08	630	520	6700	690	2 x 275	0.82	96.7	490	6300	690	2 x 265	0.82	96.7
ANSA–450LX–08	670	560	7100	690	2 x 300	0.82	96.8	520	6700	690	2 x 280	0.81	96.8
ANSA–500LL–08	710	590	7500	690	2 x 305	0.84	96.9	550	7100	690	2 x 290	0.83	96.8
ANSA–500LL–08	800	660	8500	690	2 x 340	0.84	96.9	620	8000	690	2 x 325	0.84	96.9
ANSA–500LN–08	900	750	9600	690	2 x 390	0.84	96.7	700	9000	690	2 x 365	0.84	96.7
ANSA–500LX–08	950	790	10100	690	2 x 420	0.82	96.9	740	9500	690	2 x 395	0.82	96.9
ANSA–560LL–08	1000	830	10600	690	2 x 430	0.84	96.9	780	10000	690	2 x 405	0.84	96.8
ANSA–560LL–08	1100	910	11700	690	2 x 470	0.84	97.4	860	11000	690	2 x 445	0.84	97.3
ANSA–560LN–08	1200	1000	12800	690	2 x 520	0.85	96.9	940	12000	690	2 x 485	0.84	96.9
ANSA–560LN–08	1350	1120	14300	690	2 x 580	0.84	97.0	1050	13500	690	2 x 550	0.83	97.0

Six–phase motors for low voltage with squirrel cage,
Totally enclosed fan–cooled

Class F insulation – Utilization B, operated at I–Inverter



Speed 750 min^{-1}

Speed range: 75 – 750 min^{-1}
Control range: 1 : 10
Frequency: 5 – 50 Hz
Fan: Forced ventilation
Load torque: M_L = const.

Type	P_N kW	P_5 kW	M_{L5} Nm	U V	I_1 A	cosφ	η %
ANUA–355LC–08	225	205	2650	690	2 x 112	0.81	95.5
ANUA–355LD–08	250	230	2950	690	2 x 126	0.81	95.6
ANUA–355LN–08	280	255	3300	690	2 x 138	0.81	96.0
ANUA–355LX–08	315	285	3700	690	2 x 153	0.82	95.9
ANUA–400LL–08	355	325	4150	690	2 x 176	0.81	96.2
ANUA–400LN–08	400	365	4700	690	2 x 196	0.82	96.3
ANUA–400LX–08	450	410	5300	690	2 x 220	0.82	96.3
ANUA–450LL–08	500	455	5800	690	2 x 240	0.83	96.6
ANUA–450LN–08	560	510	6500	690	2 x 265	0.84	96.6
ANUA–450LN–08	630	570	7400	690	2 x 300	0.83	96.7
ANUA–450LX–08	670	610	7800	690	2 x 320	0.83	96.8
ANUA–500LL–08	710	650	8300	690	2 x 335	0.85	96.9
ANUA–500LL–08	800	730	9300	690	2 x 375	0.85	97.0
ANUA–500LN–08	900	820	10500	690	2 x 425	0.84	96.7
ANUA–500LX–08	950	860	11100	690	2 x 450	0.83	96.9
ANUA–560LL–08	1000	910	11600	690	2 x 470	0.85	96.9
ANUA–560LL–08	1100	970	12500	690	2 x 500	0.84	97.5
ANUA–560LN–08	1200	1090	14000	690	2 x 560	0.85	97.0
ANUA–560LN–08	1350	1230	15700	690	2 x 630	0.84	97.1

4 Information to assignment tables

4.1 Motor data for other rated voltages

The currents indicated in the assignment tables of this catalogue are applicable for a rated voltage of 400 V or 690 V. Most of the motors are also available with a modified winding for other rated voltages, especially for 500 V. Due to physical reasons, larger motors (from approx. frame size 355) are not always feasible for all rated voltages (upon request, cf. Technical List IM).

For motors up to including frame size 315 the motor current indicated in the assignment table can be converted to another motor voltage as follows:

$$I_{1new} = \frac{U}{U_{new}} \cdot I_1$$

- U Rated voltage of assignment table
- I_1 Current of assignment table
- U_{new} requested rated voltage
- I_{1new} Current at the requested voltage U_{new}

Example:
For motor ANGA–250ME–04 the power P_3 = 51 kW, the rated voltage U = 400 V and the current I_1 = 91 A are taken from the assignment table for utilization F.
For a requested rated voltage of U_{new} = 500 V a motor current of

$$I_{1new} = \frac{400\ V}{500\ V} \cdot 91\ A = 73\ A$$

is calculated for 51 kW.

Efficiency and cos φ will not change for this conversion.

4.2 Motor data for a different rated frequency

The motors indicated in the assignment tables are designed for a rated frequency of 50 Hz. Basically other rated frequencies, e.g. 60 Hz, 75 Hz or 100 Hz, are also possible at a modified winding design. These motors can be operated at higher rated powers than the 50 Hz–motors.

A detailed description of the 60 Hz–motor is given in the following.

4.2.1 Power increase of the 60 Hz–motor compared to the 50 Hz–motor

For the rated frequency of 60 Hz and with *adequate* winding a power increase of 12% to 20% in comparison with the power data is achievable (see Table 2) of the assignment tables for the 50 Hz–motors. The power increase refers both to the rated power P_N and to the powers P_1 to P_6 on the inverter. The power P_6 is then applicable at a frequency of
$\sqrt{3} \cdot 60\ Hz = 104\ Hz$ (limit speeds of Chapter 5.6 have to be observed!).

4.2.2 Motor data of the 60 Hz–motor

Motor data of the Types A... and D... (but not E...) for 60 Hz up to including frame size 315 can be converted approximately from the data indicated in the assignment table as follows (larger frame sizes upon request):

Power $P_{60} = Factor \cdot P$

- P Power of assignment table (P_1 to P_6)
- P_{60} Power at 60 Hz (factor acc. to Table 2)

Motor current: $I_{1\,60} = Factor \cdot I_1 \cdot \frac{U}{U_{60}}$

- I_1 Motor current of assignment table (page 12 – 87)
- $I_{1\,60}$ Motor current at 60 Hz and power P_{60}
- U_1 Motor voltage of assignment table (page 12– 87)
- U_{60} requested motor voltage at 60 Hz (factor acc. to Table 2)

Speed: $n_{60} = 1.2 \cdot n$

- n Speed of the assignment table
- n_{60} Speed at 60 Hz

Torque: $M_{60} = \frac{Factor}{1.2} \cdot M$

- M Torque of assignment table
- M_{60} Torque at 60 Hz

Displacement factor cosφ and *efficiency* remain approximately the same.

4.3 Motor data for inverter operation

The values indicated in the assignment tables are applicable for voltages and currents supposed to be **sinusoidal**. In the following the motor data conversion to the values applicable for inverter operation is described.

4.3.1 Conversion of the motor current

The determination of the inverter requires among others the effective value of the motor current (= inverter–output current). For inverter operation the effective value I of the current is due to the harmonic oscillations higher than its fundamental oscillation I_1. The relative fundamental content g_i depending on the inverter type is used for the conversion of both values:

$$I = \frac{I_1}{g_i}$$

- I_1 Effective value of the fundamental current
- I Effective value of the current
- g_i Relative fundamental content

Table 2: Power increase factor for a 60 Hz–winding for motor types A..A, A..K, D... (but not E...)

2–pole		4–pole		6–pole		8–pole	
Frame size	Factor	Frame size	Factor	Frame size	Factor	Frame size	Factor
63 – 180	1.2	63 – 250	1.2	71 – 315	1.2	71 – 315	1.2
200 – 250	1.15						
280 – 315	1.12	280 – 315	1.15				
355 – 400	1.125	355 – 450	1.125	355 – 500	1.125	355 – 500	1.125
450	on request	500	1.125	560	1.125	560	1.125

For **PWM–Inverters** the relative fundamental content depends on the pulse pattern, the pulse frequency, the power on the motor used as well as on the working point.
For the Loher DYNAVERT® T with the Loher–motors recommended in the assignment tables results at a maximum power approx.

$g_i = 0.99$ with Loher DYNAVERT® T

For **I–Inverters** the relative fundamental content of the motor current is almost independent of the inverter manufacturer and also independent of the working point. In practice applies

$g_i = 0.96$ with 6–pulse inverter output

$g_i = 0.99$ with 12–pulse inverter output

4.3.2 Conversion of the motor power factor

For inverter operation the power factor λ is less by the relative fundamental content g_i of the current than the displacement factor $\cos\varphi$:

$\lambda = g_i \cdot \cos\varphi$

The displacement factor depends on the working point. **Figure 10** shows the typical behaviour (motor side) of the displacement factor. As it can be seen at constant load the displacement factor practically remains the same, whereas it decreases at a quadratically load torque.

4.3.3 Motor efficiency for inverter operation

Due to the non–sinusoidal voltages and currents additional losses occur in the motor. At maximum power, however, there is only an insignificant decrease of the motor efficiency compared to the operation with sinusoidal voltages and currents.

The inverter–specific losses and consequently the decrease of the motor efficiency depend on the inverter type.

4.3.3.1 Efficiency on the PWM–Inverter

For the operation of motors on PWM–Inverters a generally applicable statement on the efficiency decrease is not possible due to the considerable influence on the pulse frequency and the manufacturer–specific pulse pattern.

For an operation with the PWM–Inverters Loher DYNAVERT® T applies:
Up to a power of approx. 30 kW the efficiency decrease is insignificant. With an increasing power there will be a higher efficiency decrease. For a 200 kW–motor it is for example 0.2%–points approximately.

4.3.3.2 Efficiency on the I–Inverter

On an I–Inverter the efficiency decrease is reduced with an increasing motor power.
For 4–pole six–phase motors it is for instance 0.5%–points for a power of 355 kW and only 0.3%–points for 1000 kW.

4.3.4 System efficiency

For the energy costs the system efficiency, i.e. the overall efficiency of the drive, consisting of motor– and inverter efficiency is decisive.

The efficiencies for the PWM–Inverters Loher DYNAVERT® T and I–Inverters Loher DYNAVERT® I are hardly different. Already at a low power of 4 kW the Loher DYNAVERT® T reaches an efficiency of 94%. An increasing power results in higher efficiencies, e.g. up to 97% at 500 kW (exact data upon request).

The system efficiency η_S is calculated as a product from motor efficiency η_M and inverter efficiency η_I:

$\eta_S = \eta_M \cdot \eta_I$

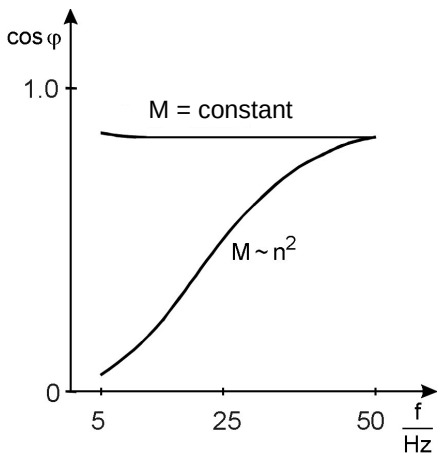


Fig. 10: Displacement factor (motor side) for $M \sim n^2$ and M=constant

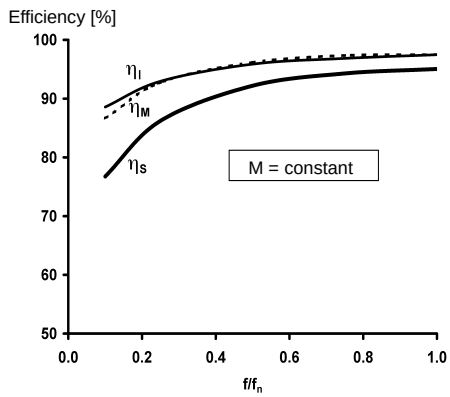


Fig. 11: General behaviour of motor efficiency η_M inverter efficiency η_I and system efficiency η_S for M=constant

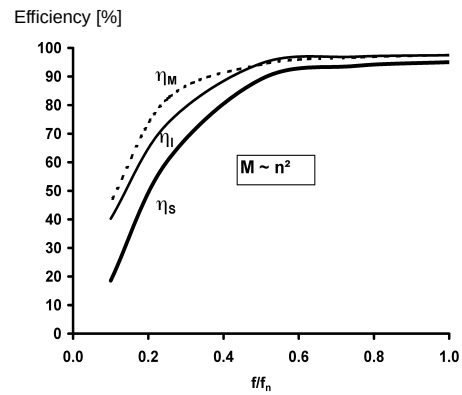


Fig. 12: General behaviour of motor efficiency η_M inverter efficiency η_I and system efficiency η_S for $M \sim n^2$

4.4 Six–phase motors and three–phase motors for 12/24–pulse inverters

From powers of approx. 250 kW six–phase motors and 12/24–pulse I–Inverters are also used for variable–speed drive systems. **Figure 13** shows a comparison of the different drive solutions. The figure shows that the number of pulses can refer to both the mains current and the motor. The mains–pulse number (pulse number of the inverter input) is decisive for the mains current and also for the circuit feedback.

The motor–pulse number identifies the oscillating torques occurring for inverter operation. Fig. 13 shows that e.g. with a six–phase motor the oscillating torques are essentially lower (approx. the half) than with a three–phase motor (see our Technical Publication No. 4: ”Speed control of asynchronous machines”).

For drives with a six–phase motor less inverter–specific losses occur inside the motor. Therefore a higher utilization of the motors for such drives is possible.

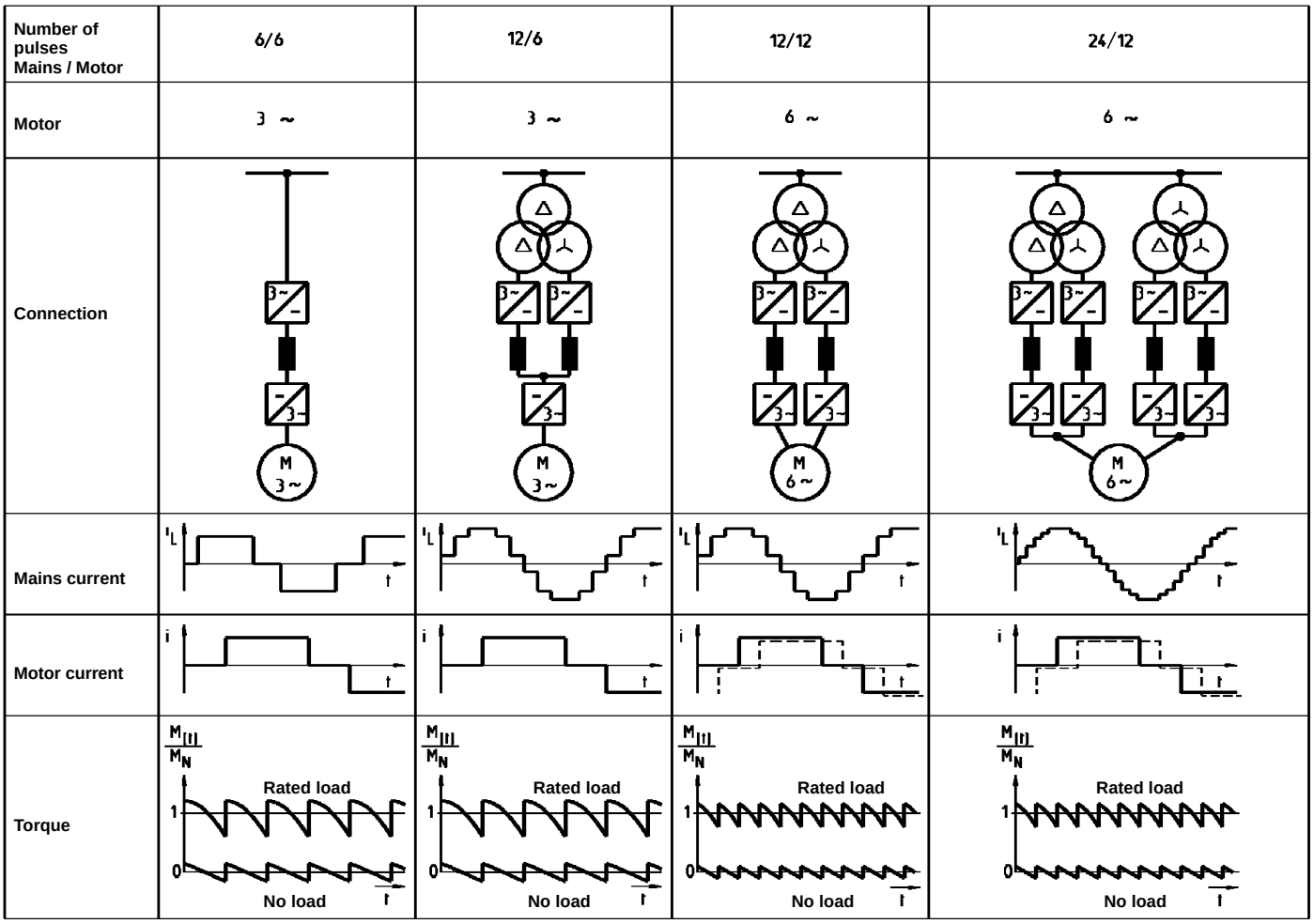


Fig. 13: I–inverter drives with different numbers of pulses

5 Considerations for rating and design

5.1 Admissible voltage stress

For inverter operation the motor winding is subject to higher stress than for mains operation. The voltage stress depends among others on the type of the used inverter.

5.1.1 Voltage stress by PWM–Inverter

The PWM–Inverter stresses the motor winding above all by the rapid switching of the voltage pulses. Each switching of the inverter voltage causes a voltage surge in the motor supply line, which due to reflections can lead to high motor voltages (**Figure 14**).

The height of the maximum voltage is influenced by the rise time of the pulses and the cable length between motor and inverter.

Inadmissibly high voltage peaks can occur without du/dt–output filters already when using a relatively short motor cable (approx. 10 m).

By means of a du/dt–output filter on the inverter the maximum motor voltage can be lowered to non critical values. A high–quality du/dt–output filter belongs to the standard equipment of the Loher DYNAVERT® T–Inverters.

Thus, depending on the supply voltage, cable lengths are possible from 150 m (at 690 V) up to 300 m (at 400 V – 500 V).

The admissible voltage stress of the motor depends on the rise time t_A of the inverter output voltage.
Figure 15 shows the admissible voltage stress for Loher–Motors with standard insulation. For higher voltage stress a special insulation is necessary (request, surcharge).

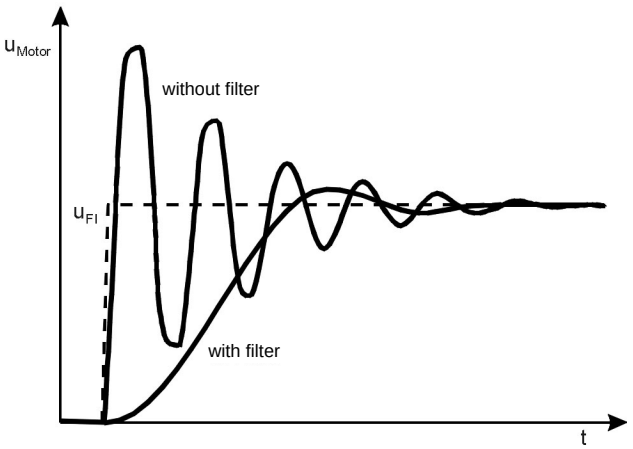


Fig. 14: Typical behaviour of inverter voltage U_{FI} and motor voltage U_{Motor} on the PWM–inverter (inverter without and with output filter, length of motor cable = 100 m)

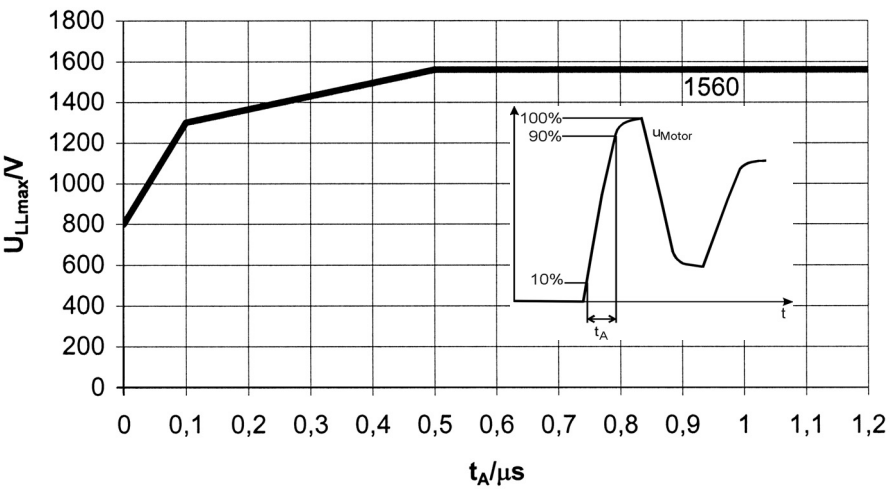


Fig. 15: Admissible voltage load for Loher–Motors with standard insulation ($\hat{U}_{LL}$ = Maximum value of phase –to–phase–voltage)

5.1.1.1 Inverter–operated motor with sine filter

For special applications, e.g. in case of very long motor cables so–called sine filters are used, smoothening the inverter voltage even better than du/dt–filters (see 5.5). But sine filters have the disadvantage that a considerable voltage drop occurs due to which the motor voltage can decrease up to 15%. In order to avoid an inadmissible heating of the motor during this application the motor power has to be reduced.

For an operation with sine filters and thus a motor voltage reduced by 10% up to 15%, the admissible powers P_1 up to P_6 of the assignment tables (to Chapter 3) have to be reduced by 10% up to 15% as well.

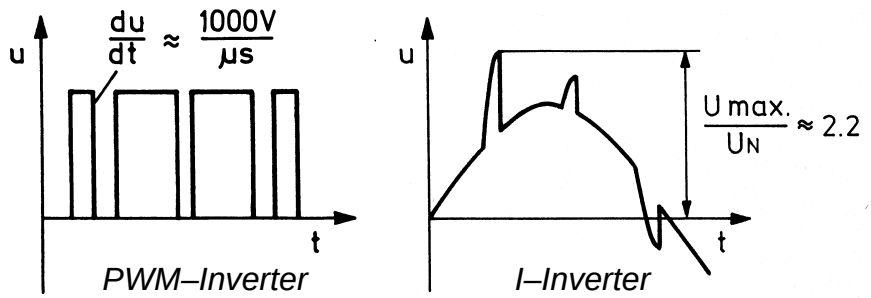


Fig. 16: Typical motor voltage for PWM and I–inverter operation

Table 3: Maximum motor voltages for DYNAVERT® I–inverters

Rated voltage U_N	400 V	500 V	690 V
Maximum motor voltage U_{max} (maximum value of conductor voltage)	900 V	1050 V	1400 V

5.1.2 Voltage stress by I–Inverter

I–Inverters stress the motor insulation by the occurring voltage peaks (**Figure 16**), causing that the maximum voltage exceeds the voltage amplitude at mains operation. The height of the voltage peaks depends among others on the inverter design. **Table 3** indicates the maximum values of the motor voltage for an operation with inverters of the type Loher DYNAVERT® I. Differences in the maximum voltage can result with inverters from other manufacturers.

The standard insulation system of the Loher–Motors is sufficiently designed to such an extent that up to rated voltages of 690 V an operation with Loher DYNAVERT® I–Inverters or similar inverters is possible without restrictions. For higher rated voltages a special insulation is required (upon request, surcharge).

5.2 Noise

Table 4 indicates the measuring surface sound–pressure level $\overline{L}_{pfA}$ as well as the sound–power level L_{WA} for motors without explosion protection as well as for motors of the protection type "Flameproof Enclosure".

The noise values are applicable for rated operation (rated power and rated frequency 50 Hz). The noise measurements are made under load in the noise test room according to DIN EN ISO 1680. The tolerance is + 3 dB(A).

For inverter operation at rated frequency and depending on the working machine, the speed range and the power P_1 to P_5 a noise increase has to be expected due to the non sinusoidal voltages and currents. The increase depends on the inverter type, the pole number of the motor and the power. **Table 5** indicates average values for the noise increase at rated frequency.

At decreasing frequency/speed the noise reduces. Practical experience shows that with high–quality inverters many motors in partial load operation, which means reduced speed and reduced power, develop lower noises than in mains operation.

Figure 17 shows the typical noise behaviour of the motors for an operation with the PWM–Inverters
Loher DYNAVERT® T
and the I–Inverters
Loher DYNAVERT® I.
Depending on the power and the number of poles results a variation range for the decrease ΔL of the sound pressure level. The continuous and the dashed line indicated the average values.

Table 5: Average noise increase ΔL for inverter operation at rated frequency

Inverter type	Average noise increase ΔL of the sound pressure level
DYNAVERT® T	0–3 dB(A)
DYNAVERT® I	1–3 dB(A)

Table 4: Measuring surface sound pressure level and sound power level at rated power for the Types A... and D...

	$\overline{L}_{pfA}$ Measuring surface sound pressure level L_{WA} Sound power level Motors in standard design – Noise grade 1								**Noise–reduced motors[1] Noise grade 3 Unidirectional fan For FS 355 LN/LX up to FS 500 with inlet silencer**			
Type AN / DN	2–pole 3000 min^{-1}		4–pole 1500 min^{-1}		6–pole 1000 min^{-1}		8–pole 750 min^{-1}		2–pole 3000 min^{-1}		4–pole 1500 min^{-1}	
Frame size	$\overline{L}_{pfA}$ dB(A)	L_{WA} dB(A)	$\overline{L}_{pfA}$ dB(A)	L_{WA} dB(A)	$\overline{L}_{pfA}$ dB(A)	L_{WA} dB(A)	$\overline{L}_{pfA}$ dB(A)	L_{WA} dB(A)	$\overline{L}_{pfA}$ dB(A)	L_{WA} dB(A)	$\overline{L}_{pfA}$ dB(A)	L_{WA} dB(A)
071	52	63	46	57	45	56	42	53	–	–	–	–
080	56	67	47	58	45	56	43	54	–	–	–	–
090	60	72	49	60	47	58	46	57	–	–	–	–
100	64	76	54	66	50	62	49	61	–	–	–	–
112	64	76	54	66	54	66	53	65	55	66	–	–
132	63	75	59	71	60	72	55	67	57	69	–	–
160	68	80	64	76	63	75	61	73	61	73	–	–
180	70	83	63	76	62	75	63	76	62	75	–	–
200	73	86	63	76	60	73	64	77	63	76	–	–
225	73	86	64	77	62	75	60	73	64	77	–	–
250	76	90	66	80	64	78	61	75	66	80	–	–
280	77	91	68	82	66	80	65	79	68	82	–	–
315	80	94	70	84	70	84	69	83	70	84	–	–
355 LB/LC/LD	82	97	73	88	75	90	73	88	77	92	–	–
355 LN/LL/LX	78	93.5	76	91.5	74	89.5	75	90.5	74	89.5	–	–
400	80	96	78	94	75	91	77	93	77	93	75	91
450	82	98.5	80	96.5	77	93.5	79	95.5	79	95.5	77	93.5
500	–	–	82	99	79	96	80	97	81	98	79	96

1 Motor length (Dimension L or LC) increases for noise grade 3. Dimension drawing upon request.

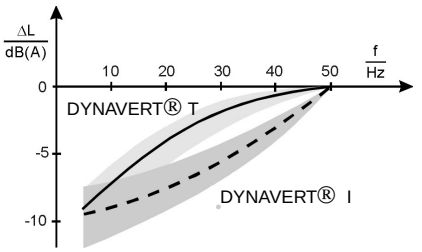


Fig. 17: Decrease ΔL of sound–pressure level in partial–load operation (reduced frequency and power)

With the infinitely variable speed control it is also possible to operate the motor on the resonance point of a specific motor component (e.g. end shield or terminal box). In this case a noise increase of a few dB(A) exceeding the average noise level can occur. In most cases a frequency change of less than 1 Hz is sufficient to avoid this appearance.

In case of a frequency– or speed increase exceeding the rated frequency the motor noise increases. Above all the fan noise is responsible for the noise increase in self–ventilated motors. The mechanically and magnetically caused contents in the overall noise are also increasing – but not to such an extent as the fan noise – with the frequency. For motors with a higher frequency range (e.g. 87 Hz–motors or motors with field weakening) it is therefore recommendable that forced ventilation is used.

Figure 18 shows the average increase ΔL of the measuring–surface sound–pressure level for self–ventilated motors and for motors with forced ventilation.

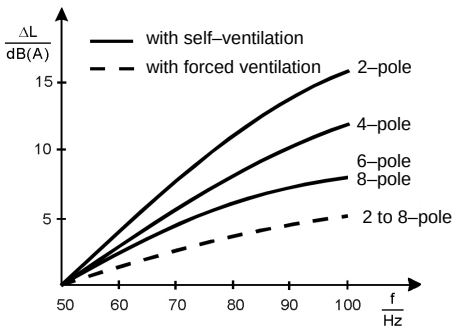


Fig. 18: Average increase ΔL of measuring–surface sound–pressure level for self–ventilated motors and for motors with forced ventilation at an operation exceeding the rated frequency of 50 Hz

5.3 Overload capability

The assignment tables indicate the torque values at which the motors can be operated in continuous duty (Duty Type: S1) without exceeding the admissible temperature limits. A momentary overload is admissible depending on the base load, the duration and initial temperature of the motor.

Note:
The motor can produce a higher torque only when it is fed by the inverter with a higher current. For the normal motor control to a constant flux there is a linear interconnection between torque and current up to the 1.5fold rated torque approximately; i.e.: a 1.5fold rated torque requires the 1.5fold rated current approximately. Exact data on request.

By utilization of the overload capability it is often possible to use smaller motors. In the following it is differentiated between an overloading of the cold motor and the overloading of the motor at operating temperature.

5.3.1 Overload capability of the cold motor

A utilization of the overload capability of the cold motor is possible e.g. for starting of the drive. At the beginning of an overloading the motor has the temperature of the coolant (for normal conditions a coolant temperature ≤ 40°C is supposed).

For motor types without explosion protection applies:

- In cold state (motor temperature ≤ 40°C) the motors can be operated within the admissible control range with the 1.5fold rated current for 10min at any frequency and speed. Following to this an operation at a reduced torque corresponding to the assignment tables is admissible.

For EEx d–motors applies:

- In cold state (motor temperature ≤ 40°C) the motors can be operated within the admissible control range with the 1.5fold rated current for 60s at any frequency and speed. Following to this an operation at a reduced torque corresponding to the assignment tables is admissible.

In case of a longer or higher overloading an inquiry is necessary.

5.3.2 Overloading of the motor at operating temperature

The comments in this chapter are limited to motors without explosion protection!

The overloading of motors at operating temperature is of importance e.g. for working machines with an alternating load. An operation at momentary overloading is possible, when the ”thermal equilibrium” of the motor is equalized by a following low load operation and consequently low heat development.

A simplified conversion process for the overload capability is described below.

This requires the compliance with two conditions:

1. The maximum torque must not reach the breakdown torque of the motor too closely. In the following it is provided that the relation maximum torque M_{max} to rated torque M_N is limited to $\mathbf{M_{max} / M_N \leq 1.5}$.
2. A periodic working cycle of max. 10min duration is required: $\mathbf{t_S \leq 10min}$.

The conversion process differentiates an overloading at constant cooling and an overloading at a varying cooling.

5.3.2.1 Overload capability at constant cooling

A constant cooling is obtained

- for forced–ventilated motors
- for self–ventilated motors at constant speed

Figure 19 shows a working cycle during which the motor is loaded for the time t_o with M_{Lmax} over the limit torque M and is underloaded during the remaining time of the working cycle**.**

Table 6 offers a help for project planning of such drive systems. The table shows depending on the relation maximum torque M_{Lmax} to minimum torque M_{Lmin} and on the relative duration of the overloading t_o/t_s the required thermal limit torque M (referred to the minimum torque M_{Lmin}).

Table 6 shows e.g. that for an overloading of $M_{Lmax}/M_{Lmin} = 2$ during the duration $t_o/t_s = 0.5$ the thermal limit torque only requires the 1.58fold value of the minimum torque.

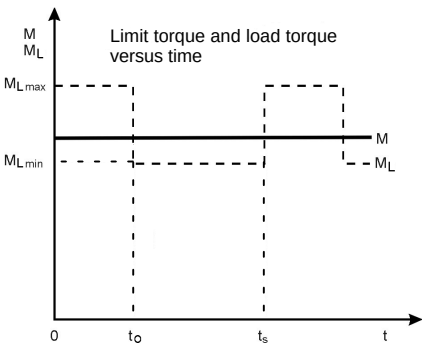


Fig. 19: Overload capability at constant cooling

Table 6: Overload capability at constant cooling

	Overload capability M / M_{Lmin}								
t_o / t_s M_{Lmax}/M_{Lmin}	**0.10**	**0.20**	**0.30**	**0.40**	**0.50**	**0.60**	**0.70**	**0.80**	**0.90**
1.1	1.01	1.02	1.03	1.04	1.05	1.06	1.7	1.08	1.09
1.2	1.02	1.04	1.06	1.08	1.10	1.12	1.14	1.16	1.18
1.3	1.03	1.07	1.10	1.13	1.16	1.19	1.22	1.25	1.27
1.4	1.05	1.09	1.13	1.18	1.22	1.26	1.29	1.33	1.37
1.5	1.06	1.12	1.17	1.22	1.27	1.32	1.37	1.41	1.46
1.6	1.08	1.15	1.21	1.27	1.33	1.39	1.45	1.50	1.55
1.7	1.09	1.17	1.25	1.33	1.39	1.46	1.52	1.58	1.64
1.8	1.11	1.20	1.29	1.38	1.46	1.53	1.60	1.67	1.74
1.9	1.12	1.23	1.34	1.43	1.52	1.60	1.68	1.76	1.83
2.0	1.14	1.26	1.38	1.48	1.58	1.67	1.76	1.84	1.92
2.1	1.16	1.30	1.42	1.54	1.64	1.75	1.84	1.93	2.02
2.2	1.18	1.33	1.47	1.59	1.71	1.82	1.92	2.02	2.11
2.3	1.20	1.36	1.51	1.65	1.77	1.89	2.00	2.11	2.20
2.4	1.21	1.40	1.56	1.70	1.84	1.96	2.08	2.19	2.30
2.5	1.23	1.43	1.60	1.76	1.90	2.04	2.16	2.28	2.39

The following example explains the procedure.

Example:
The motor type has to be determined for a 4–pole forced ventilated 50 Hz–motor with $M_{Lmin} = 120$ Nm, $M_{Lmax} = 210$ Nm, $t_o/t_s = 0.2$ and a utilization to insulation Class B.
For $M_{Lmax}/M_{Lmin} = 210$ Nm/120 Nm = 1.75 the next higher value of M_{Lmax}/M_{Lmin} is chosen in the left column of Table 6. For this value and the overload duration of $t_o/t_s = 0.2$ Table 6 indicates the overload capability of $M/M_{Lmin} = 1.20$. This means that for thermal reasons the limit torque of the motor in this duty type only needs to exceed the minimum torque by 20%:

$$M = 1.20 \cdot M_{Lmin}$$
$$= 1.20 \cdot 120 \text{ Nm} = 144 \text{ Nm}$$

In accordance with the assignment table the motor ANLA–180LB–04 with $P_N = 22$ kW is sufficient for this limit torque.

The relation maximum torque to rated torque of $M_{Lmax}/M_N = 210/143 = 1.47$ remains below the critical value of $M_{Lmax}/M_N = 1.5$.

With

$$M_N = 9550 \frac{P_N/\text{kW}}{n_N/\text{min}^{-1}} \text{ Nm}$$

$$= 9550 \frac{22}{1465} \text{ Nm} \quad = 143 \text{ Nm}$$

Therefore the motor is suitable.

If the motor were chosen only depending on the occurring maximum torque of $M_{Lmax} = 210$ Nm, this would result in the two types larger motor ANLA–225SE–04. This proves that the utilization of the overload capability results in a smaller motor type (possibly also in a smaller inverter) and thus in lower costs.

5.3.2.2 Overload capability of self–ventilated motors at constant load torque

For motors with self–ventilation the cooling effect changes with the frequency and the speed respectively. This has to be considered for the determination of the overload capability

The procedure for a constant load torque is explained in the following.
Figure 20 shows that at a low speed the motor is overloaded for the duration t_o, whereas for the remaining time of the working cycle t_s it is underloaded at the high speed

For the overload capability the limit torque of the motor at high (h) and low (l) speed is important.

For the limit torque at high speed e.g. $M_h = M_1$ (M_1 in the assignment table) has to be applied and for M_l depending on the control range:

Control range	M_l
1:3	$M_l = M_{L2}$
1:5	$M_l = M_{L3}$
1:10	$M_l = M_{L4}$

The following example shows how to determine the overload capability by means of **Table 7**.

Example:

For a drive system with a constant load torque M_L = 55 Nm, control range 1:10, Utilization B and the working cycle $t_o/t_s = 0.3$ (t_s<10min) the smallest suitable 4–pole motor has to be determined.

First a motor without utilization of the overload capability is chosen in the assignment tables.

In this case it is the motor type ANGA–160LB–04 with P_N = 15 kW. At low speed this motor has the limit torque $M_l = M_{L4}$ = 66 Nm and at a high speed the limit torque $M_h = M_{L1}$ = 98 Nm.

With $M_h/M_1 = M_{L1}/M_{L4}$ = 98 Nm / 66 Nm = 1.48 ≈1.5 and t_o/t_s = 0.3 it will be found in Table 7: M_L/M_l = 1.37.

This means that for this duty type the motor is allowed to exceed its limit torque of $M_l = M_{L4}$ = 66 Nm momentarily by 37% at low speed.

In the second step it is tried to make it with a smaller motor.
Motor ANGA–160MB–04 is chosen with P_N = 11 kW, as well as M_{L1} = 75 Nm and M_{L4} = 48.5 Nm. (Power and limit torques are lower by approx. 25% compared to the previous type).

For the smaller motor results with M_h/M_1 = 1.55 acc. to Table 7:
M_L/M_l = 1.41.
This means that at a low speed the smaller motor can be overloaded by 41%. In this duty type the motor can therefore be subject to a constant load torque of M_L = 1.41 · 48.5 Nm = 68 Nm. Since this value is over the requested value of 55 Nm, the motor is sufficiently dimensioned.

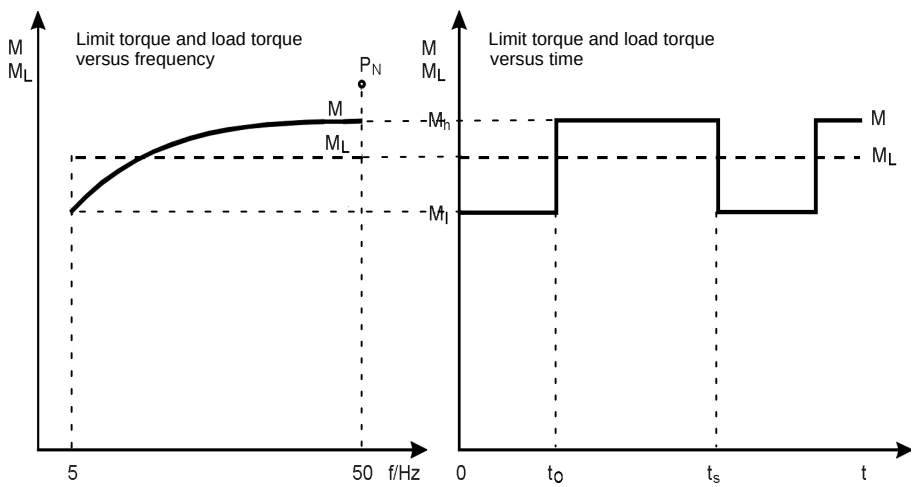


Fig. 20: Overload capability for variable cooling and constant load torque

Table 7: Overload capability at variable cooling and constant load torque

t_o / t_s / M_h/M_l	Overload capability M_L / M_l 0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
1.05	1.05	1.04	1.04	1.03	1.03	1.02	1.02	1.01	1.01
1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01
1.15	1.14	1.12	1.11	1.09	1.08	1.06	1.05	1.03	1.02
1.20	1.18	1.16	1.14	1.12	1.10	1.08	1.06	1.04	1.02
1.25	1.23	1.20	1.18	1.16	1.13	1.11	1.08	1.05	1.03
1.30	1.27	1.25	1.22	1.19	1.16	1.13	1.10	1.07	1.03
1.35	1.32	1.29	1.26	1.22	1.19	1.15	1.12	1.08	1.04
1.40	1.37	1.33	1.29	1.26	1.22	1.18	1.13	1.09	1.05
1.45	1.41	1.37	1.33	1.29	1.25	1.20	1.15	1.10	1.05
1.50	1.46	1.41	1.37	1.32	1.27	1.22	1.17	1.12	1.06
1.55	1.50	1.46	1.41	1.36	1.30	1.25	1.19	1.13	1.07
1.60	1.55	1.50	1.45	1.39	1.33	1.27	1.21	1.15	1.08
1.65	1.60	1.54	1.49	1.43	1.36	1.30	1.23	1.16	1.08
1.70	1.64	1.58	1.52	1.46	1.39	1.33	1.25	1.17	1.09
1.75	1.69	1.63	1.56	1.50	1.43	1.35	1.27	1.19	1.10
1.80	1.74	1.67	1.60	1.53	1.46	1.38	1.29	1.20	1.11
1.85	1.78	1.71	1.64	1.57	1.49	1.40	1.31	1.22	1.11
1.90	1.83	1.76	1.68	1.60	1.52	1.43	1.34	1.23	1.12
1.95	1.88	1.80	1.72	1.64	1.55	1.46	1.36	1.25	1.13
2.00	1.92	1.84	1.76	1.67	1.58	1.48	1.38	1.26	1.14

5.4 Inverter operation of explosion–proof motors

Explosion–proof motors can be operated at inverters when the compliance of the explosion protection is ensured. For this reason it is required as follows:

- the inverters have to be installed outside the hazardous area
- the admissible maximum voltages on the terminal boxes must be kept (see Chapter 5.4.4)
- the limit speeds must not be exceeded (see Chapter 5.6)
- for motors of the protection types EEx d, EEx e, EEx n the regulations indicated in the Chapters 5.4.1 to 5.4.3 are additionally applicable

5.4.1 Motors in ignition protection EEx d: "Flameproof Enclosure" acc. to EN 50018

The EEx d–motors of this catalogue are allowed to be used in the hazardous areas of Zone 1 and Zone 2.

For inverter operation these motors have to be equipped with a thermal motor protection (TMS, see 5.8) as sole protection[1]. For EEx d–motors in the temperature classes T1 to T4 global certificates of conformity are available which are also including the inverter operation. The motors can be operated at the inverter up to the maximum frequency and maximum voltage stamped on the motor rating plate, if sole protection at inverter operation is ensured. Since no special tests are required, no additional costs will incur.

5.4.2 Motors in ignition protection EEx e: "Increased Safety" acc. to EN 50019

The EEx e–motors are allowed to be used in the hazardous areas of Zone 1 and Zone 2.

The motors have to be equipped with a thermal motor protection (TMS) as sole protection[1]. In order to ensure the explosion protection the EEx e–motors must be tested and certified together with the respective inverter. The inverter parameters (e.g. voltage–frequency characteristic) set for the test are not allowed to be changed any more (test expenditure, extra costs).

5.4.3 Motors in ignition protection EEx n: "Non–sparking" or "Non–sparking electrical equipment" acc. to EN 50021

The EEx n–motors are allowed to be used in the hazardous area of Zone 2. The motors have to be equipped with a thermal motor protection (TMS) as sole protection[1]. Like the EEx e–motors, the motors in ignition protection EEx n must be tested and certified together with the respective inverter in order to ensure the explosion protection. The inverter parameters (e.g. voltage–frequency characteristic) set for the test are not allowed to be changed any more.

The test expenditure for EEx n–motors together with Loher DYNAVERT®–Inverters might possibly be lower than for the EEx e–motors (test expenditure, extra costs).

The power outputs and torques achievable for inverter operation correspond in Temperature Class 3 with those of the A–Motors.
Therefore the assignment tables from Page 12 – 43 can be used for motors in ignition protection EEx nA II T3. [2]

5.4.4 Terminal boxes

On the terminal boxes of explosion–proof Loher motors (EEx d, EEx e, EEx n) for rated voltages up to 690 V momentary voltage peaks of 1866 V are admissible. This value is clearly over the admissible voltage for the insulation (see Fig. 15).

When the maximum admissible voltage of the insulation is observed, the admissible voltage on the terminal box will also be kept.

For an operation with PWM–Inverters care must be taken that the voltage peaks caused by the reflections of the voltage surges are not exceeding the admissible values (see Chapter 5.1.1).

For an operation with I–Inverters the commutation voltage peak has to be observed (see Chapter 5.1.2).

5.5 Shaft voltages and bearing currents

It is known about mains–operated motors that due to the magnetic asymmetries a voltage is produced along the mechanical shaft. The grease film of the antifriction bearings has an insulating effect, so that low shaft voltages cannot yet cause any currents. If, however, the shaft voltage exceeds a limit value the grease film is punctured. A circulating current flows through the shaft, the bearings and the stator frame, which might cause a destruction of the bearings.

This phenomenon occurs only in larger motors from approx. frame size 355. In order to avoid bearing damages one bearing will then be insulated.

For the operation with PWM–Inverters additional bearing currents can occur. These are mostly caused by the steep voltage rises which occur at switching. Without inverter output filter voltage variations of more than 10 kV/µs can occur at the winding terminals.

In order to avoid damaging bearing currents the following measures are recommended for inverters, electrical machines and for the whole system:

Inverter:

- Reduction of the voltage rises. Non–critical values can be achieved with a du/dt–filter at the inverter output, e.g. du/dt < 0.5 kV/µs.
- For very long motor cables (> 300 m) a sine filter can be required (see 5.1.1.1).
- Selection of a moderate pulse frequency (depending on the power some kHz).
- Selection of a pulse pattern with low common mode voltage.
- Simultaneous switchovers are to be avoided.

Electrical machine:

- For machines from frame size 315 the non–drive end bearing will be insulated by the insulation of the bearing seat on the motor shaft or by using electrically insulated antifriction bearings. When a tachometer is installed the insulation must not be short–circuited by it. Insulation is perhaps also required for the tachometer.
- Use of an insulating coupling to avoid currents through the working machine.
- Use of a rotor earth brush, if necessary.

System:

- Shielded cable between inverter and machine (placed on both sides)
- Reliable earthing of motor, inverter and working machine.

[1] For motors from frame size 280 a TMS–sole protection is perhaps only possible for inverter operation (see 5.8). These motors must be especially identified for inverter operation. The motors can also be protected by a comparable protective device, which can be totally or partially a component of the inverter.
[2] Observe the limit speeds acc. to the Tables 8 to 10, Page 97! Higher speeds on request.

5.6 Mechanical limit speeds

For an operation over the rated frequency it must be observed that the maximum speeds are limited by the limit values of the antifriction bearings, the critical rotor speed and the strength of the rotating parts. In accordance with EN 50014 for motors used in the hazardous area of Zone 1 or 2, the circumferential speed is also limited and consequently the speed of plastic fans.

For three–phase motors without explosion protection and for motors in protection type EEx n the limit speeds indicated in **Table 8** are applicable, for motors in protection type EEx d the limit speeds according to **Table 9**.

Table 8: Mechanical limit speeds for motors without explosion protection (Types A..A) and motors in protection type ”n” (Types A..K) for the frame sizes 90 to 500

Number of poles	FS	90	100	112	132	160	180	200	225	250	280	315	355 LB LC LD	355 LN LX	400 LL LN LX	450 LL LN LX	500 LL LN LX
2	n/min^{-1}	6000	6000	6000	6000	6000	6000	5200	5200	4800	4200	4000	4000	3200	3000	3000	—
	f/Hz	100	100	100	100	100	100	87	87	80	70	66	66	53	50	50	—
4	n/min^{-1}	4500	4500	4500	4500	4500	4500	4500	4500	4500	4200	3700	3200	2400	2250	2100	1800
	f/Hz	150	150	150	150	150	150	150	150	150	140	123	106	80	75	70	60
6	n/min^{-1}	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	3700	3200	2400	2200	2100	1800
	f/Hz	200	200	200	200	200	200	200	200	200	200	185	160	120	110	105	90
8	n/min^{-1}	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	2400	2100	2100	1800
	f/Hz	200	200	200	200	200	200	200	200	200	200	200	200	160	140	140	120

The motors in protection type ”n” require at the speeds indicated on the right of the stepped line the use of metal fans, if the operating speed exceeds the value according to table 10 (surcharge).

Table 9: Mechanical limit speeds for EEx d–motors of the frame sizes 71 to 500

Number of poles	FS	71	80	90	100	112	132	160	180	200	225	250	280	315	355 LB LC LD	355 LN LX	400 LL LN LX	450 LL LN LX	500 LL LN LX
2	n/min^{-1}	6000	6000	6000	6000	6000	6000	6000	5800	5200	4600	4600	4000	4000	3600	3600	3000	3000	—
	f/Hz	100	100	100	100	100	100	100	96	87	76	76	66	66	60	60	50	50	—
4	n/min^{-1}	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	3800	3700	2700	2700	2250	2100	1800
	f/Hz	150	150	150	150	150	150	150	150	150	150	150	126	123	90	90	75	70	60
6	n/min^{-1}	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	3800	3700	2600	2600	2200	2100	1800
	f/Hz	200	200	200	200	200	200	200	200	200	200	200	190	185	130	130	110	105	90
8	n/min^{-1}	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	2550	2550	2100	2100	1800
	f/Hz	200	200	200	200	200	200	200	200	200	200	200	200	200	170	170	140	140	120

For speeds indicated on the right of the stepped line metal fans have to be used, if the operating speed exceeds the value according to table 10 (surcharge).

Table 10: Limit speeds for plastic fans in case of protection type ”n” and ”EEx d IIC”

Number of poles	FS	100	112	132	160	180	200	225	250	280	315
2	n/min^{-1}	5450	5450	5610	5020	3970	4590	3970	3820	3600	3600
	f/Hz	91	91	94	84	66	77	66	64	60	60
4	n/min^{-1}	5450	5450	4650	3910	3530	3000	3000	3820	2580	—
	f/Hz	182	182	155	130	118	100	100	127	86	—
6	n/min^{-1}	5450	5450	4650	3910	3530	3000	3000	2580	2290	—
	f/Hz	273	273	233	196	177	150	150	129	115	—
8	n/min^{-1}	5450	5450	4650	3910	3530	3000	3000	2580	2290	—
	f/Hz	362	362	310	260	235	200	200	172	153	—

Motors for inverter operation with higher speeds than indicated in Table 8 and 9 are available on request (surcharge).

5.7 Relubrication intervals, grease life, grease quantities

Loher–Motors up to frame size 280 have permanent lubrication. According to experience the filled–in grease will be sufficient for several years.

From frame size 315 (upon request also the frame sizes 160 to 280) the motors will be equipped with a regreasing device and a grease regulation.

The relubrication intervals for an operation at the rated speed are indicated in the **Tables 11 and 12.**

At speeds which are higher than the rated speed, the grease life and the relubrication intervals t_f are reduced. With reference to the corresponding time $t_{f\,50}$ at 50 Hz results the reduction indicated in **Table 13**.

Table 11: Grease life, grease quantities and relubrication intervals for motors without explosion protection (A..A) and protection type ”n” (A..K)

Frame size	Grease life with permanent lubrication or relubrication interval with regreasing device in service hours at rated speed						Grease quantity in grammes per bearing for	
	Horizontal mounting (B)			Vertical mounting (V)			Permanent lubrication	Relubrication
	3000 min–1	1500 min–1	<=1000 min–1	3000 min–1	1500 min–1	<=1000 min–1		
90	33000	40000	40000	24000	33000	33000	11	—
100							15	—
112				17000	24000		25	—
132	24000						50	—
160							70	—
180							80	—
200							60	—
225	20000			13000			70	—
250							90	—
280							120	—
315	4000	—	—	2800	—	—	—	35
315	—	8000	11000	—	5600	8000	—	25
355 LB/LC/LD	4000	—	—	2800	—	—	—	35
355 LB/LC/LD	—	8000	11000	—	4000	5600	—	50
355 LL/LN/LX	4000	—	—	2000	—	—	—	35
355 LL/LN/LX	—	8000	11000	—	2800	4000	—	50
400	4000	—	—	2000	—	—	—	35
400	—	5600	8000	—	2000	4000	—	60
450	4000	—	—	2000	—	—	—	DE:40, NDE:35
450	—	5600	8000	—	2000	2800	—	70
500	—	5600	8000	—	2000	2800	—	80

Table 13: Reduction of grease life or relubrication intervals

f / Hz	60	70	80	90	100
t_f / t_{f50}	0.75	0.65	0.55	0.50	0.45

Table 12: Grease life, grease quantities and relubrication intervals for motors in protection type ”EEx d IIC” (D...)

Frame size	Grease life with permanent lubrication or relubrication interval with regreasing device in service hours at rated speed						Grease quantity in grammes per bearing for	
	Horizontal mounting (B)			Vertical mounting (V)			Permanent lubrication	Relubrication
	3000 min–1	1500 min–1	<=1000 min–1	3000 min–1	1500 min–1	<=1000 min–1		
71	33000	40000	40000	24000	33000	33000	5	—
80							9	—
90							11	—
100							15	—
112				17000	24000		25	—
132	24000						50	—
160							80	—
180	20000			13000			100	—
200							130	—
225							190	—
250		—	—		—	—	190	—
250	—	40000	40000	——	24000	33000	260	—
280	20000	—	—	13000	—	—	260	—
280	—	40000	40000	—	24000	33000	310	—
315	4000	—	—	2800	—	—	—	35
315	—	8000	11000	—	5600	8000	—	25
355 LB/LC/LD	4000	—	—	2800	—	—	—	35
355 LB/LC/LD	—	8000	11000	—	4000	5600	—	50
355 LL/LN/LX	4000	—	—	2000	—	—	—	35
355 LL/LN/LX	—	8000	11000	—	2800	4000	—	50
400	4000	—	—	2000	—	—	—	35
400	—	5600	8000	—	2000	4000	—	60
450	4000	—	—	2000	—	—	—	DE:40, NDE:35
450	—	5600	8000	—	2000	2800	—	70
500	—	5600	8000	—	2000	2800	—	80

5.8 Motor protection

If a monitoring of the motor temperature is requested, a thermal motor protection (TMS) is recommendable

For motors up to approx. frame size 280 the sole protection is also possible with TMS.

For motors beyond frame size 280 approximately, a sole protection is often only possible in connection with the inverter. In this case the inverter limits the maximum possible motor current.
For EEx e– and EEx n–motors the relating correspondence has to be certified.

It is not recommendable to protect the motors by means of commercial motor–circuit switches.

TMS =	Thermal motor protection: Temperature of stator winding is monitored by PTC–thermistors
Sole protection =	The TMS protects both the stator winding and the squirrel cage against inadmissible heating. This sole protection is applicable for mains– as well as inverter–operated motors.

5.9 Electromagnetic compatibility (EMC)

EMC describes the electromagnetic behaviour of electric devices or installations with respect to the

- Emission of interference
- Immunity to interference

5.9.1 EMC–Directive

The target of the EMC–Directive 89/336/EEC and the German EMC–Law is that all electrical devices are functioning together and next to each other without disturbance.

The EC–Certificate of Conformity confirms the compliance with the EMC–Directive and the EMC–Law.

As defined by EMC an electric drive system with e.g. asynchronous motors, inverters, cables, control systems and monitoring equipment can only be considered as an entity. An EC–Certificate of Conformity for a single component, e.g. for the asynchronous machine, is only significant to a certain extent. In accordance with the EMC–Law it is not required either, if the components – as usual for industrial drives – are only delivered to competent specialists for the installation into machines and equipments.

The European Harmonized Standards (EN) will be applicable to assess the emitted interference and the immunity to interference of asynchronous machines. The following chapters describe the EMC–behaviour of mains–operated and inverter–operated Loher–Asynchronous Machines as well as of additional equipment.

5.9.1.1 Mains–operated asynchronous machines

Emitted interference:
The asynchronous machines meet the limit values of Class B to EN 55011 and as to the emitted interference they can therefore be used without special measures both in an industrial and residential/industrial environment (corresponds with EN 50081 Part 1 and Part 2).

Tests according to
DIN EN 60034–1 Chapter 12
are not required.

Immunity to interference:
Mains–operated three–phase asynchronous machines are insensitive to high frequencies which can be both line–specific and radiation–specific.

As regards the interference immunity to low–frequency mains voltage harmonics (mains distortion) the requirements acc. to EN 60034–1 Chapter 12 have to be met, i.e. the voltage harmonic factor HVF must not exceed the value 0.03.

The voltage harmonic factor HVF is defined as follows:

$$HVF = \sqrt{\Sigma \frac{u_n^2}{n}}$$

with

u_n = harmonic voltage referred to the rated voltage

n = order of harmonic

5.9.1.2 Inverter–operated asynchronous machines

Emitted interference:
The EMC–behaviour depends on the system ”inverter–cable–asynchronous machine”. Therefore no generally applicable statement is possible.

The terminal boxes of Loher–Asynchronous machines offer the possibility of EMC–adequate cable entries.
The installation instructions of the inverter manufacturers have to be observed.

Immunity to interference:
For inverter–operated asynchronous machines the harmonic content of the power supply system depends on the inverter. This has to be considered for the assignment and dimensioning of the asynchronous machine. The instructions of the inverter manufacturers as well as the instructions in
DIN IEC/TS 60034–17: “Cage induction motors when fed from Converters–Application guide” have to be considered.

5.9.1.3 Additional equipment

This refers especially to winding temperature sensors PT 100, PTC thermistors, machine heaters, tachometers, oscillation monitoring devices and the like.

Independently functionable components:
Components which are independently functionable (e.g. oscillation monitoring systems) have to be used in accordance with the correspondingly applicable regulations. Proofs can be made available upon request.

Not independently functionable components:
Components which are not independently functionable must be specially considered together with the additional equipment (e.g. evaluators) required for its function and under consideration of the manufacturer data.

6 Motors for high speeds

Motors for high speeds are based on the totally enclosed fan–cooled standard motors. With adequate modifications higher speeds can be achieved than for the standard motors. The achievable speeds and power outputs are indicated in **Figure 21**.

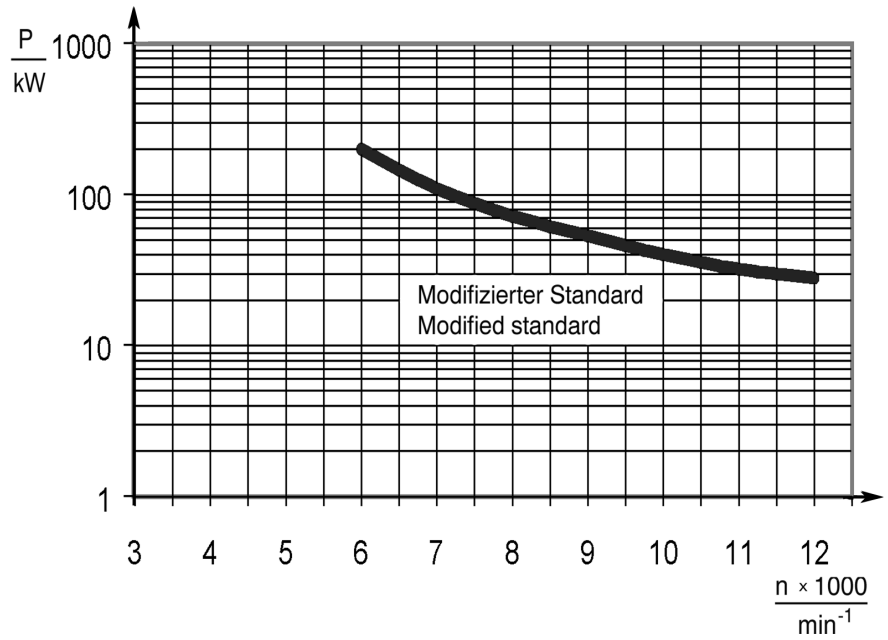


Fig. 21: Power–speed–limit of motors for high speeds