BAUMÜLLER

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DC Shunt-Wound Motors

GN...N 100 – 200

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1. DC shunt-wound motors GN…N 100-200

Baumüller DC motors with power levels up to 230 kW are fully laminated and have 4 poles. The GNA DC motors are cooled by a separately driven radial fan with various filter systems providing IP23 protection.

1.1. General technical data

Type of construction EN60034	IM B3	horizontal mounting for size 100-200
	IM B5	horizontal mounting for size 100-160
	IM B35	horizontal mounting for size 100-200
	IM V1	vertical mounting, shaft end to the bottom
	IM V3	vertical mounting, shaft end to the top
Type of protection	IP23	internally cooled, with fan (IP20 for type of construction V) EN 60034-5
Connection	Main connection	terminal box
	Control connection	tachometer connection (option pulse encoder, 12-pin connector)
	Brake	inside terminal box
	Thermal sensor	inside terminal box 2 thermal relays for switch off
Type of cooling	IC 06	internally cooled machine with fan
Temperature rise	$\Delta\vartheta \leq 125K$	insulation class H acc. to EN 60034
Environmental conditions for running	Class 3K3/3Z12 as per DIN EN 60721-3-3, however: temperature range 0-40 °C	Represents 0 to 40 °C at 5 % to 85 % rel. humidity and an absolute humidity of 1 g/m³ to 25 g/m³ and an installation height up to approx. 1,400 m.
Environmental conditions for long-term storage	Class 1K2/1M1 DIN EN 60721-3-1, however: temperature range -15-60 °C	Represents -15 to 60 °C at 5 % to 85 % rel. humidity and an absolute humidity of 1 g/m³ to 25 g/m³; at temperatures below 3 °C you should drain the cooling water
Environmental conditions for transport	Class 2K2/2M1 DIN EN 60721-3-2, however: temperature range -15-60 °C	Represents -15 to 60 °C at 5 % to 85 % rel. humidity and an absolute humidity of 1 g/m³ to 25 g/m³; at temperatures below 3 °C you should drain the cooling water
Balance quality	A	Acc. to DIN EN 60034-14 (VDE 0530 Part 14): 2004-09
	B	On request (for ball bearing only)
Vibration-resistant up to	radial 3 g / axial 1 g	10 Hz - 55 Hz acc. to EN 60068-2-6
Flange	acc. to IEC 42948	Axial or radial tolerance acc. to DIN 42955 N option R
Shaft end	cylindrical	according to DIN 748 with keyway DIN 6885; centring with internal thread acc. to DIN 332 form D (also available without keyway); Dim. d:Tolerance (without keyway h6)
Holding brake		optional
Actual speed encoder		DC-Tacho incremental encoder (optional) other encoders on request
Shaft height		according to DIN 747
Noise level		according to EN60034-9

1.2. General safety instructions

The standard versions of the motors are unsuitable for operation in salty or aggressive atmospheres and are not suitable for erection outdoors.
If, with an air-cooled motor, the air is contaminated with dust particles or similar substances in the surrounding air, which cannot be kept out efficiently by the filter elements in use, then the a conversation with the manufacturer is necessary to find a solution to the problem.

CAUTION:
With allocation of the motor in a specific protection class, it is a standardized brief test procedure. This can vary considerably depending on the actual environmental conditions at the site of installation.

Depending on the environmental conditions, such as the chemical consistency of the dust materials or the cooling media being used at the site of installation, evaluation of the suitability of the motor based on the type of protection is only possible to a limited extent (e.g. electrically conducting dust materials or aggressive coolant vapors or coolant fluids). In these cases the motor must additionally be protected by appropriate measures on the machine side.

1.3. Performance Definition Performance Definition

The power output stated in the list applies to continuous running duty (S 1) at nominal speed, at a maximum ambient temperature of 40°C and at a site altitude of less than 1000m above sea level. The armature circuit is fed with direct current whose harmonic content does not exceed 25%.

You must operate the motor close to the nominal working point. Running the motor for a relatively long period of time and reaching less than 60% of the nominal power results in under load operation. You must ask the manufacturer to take special measures for this, otherwise the full warranty cannot be granted.

If motors are to be operated at an ambient temperature of more than 40°C or at site altitudes of more than 1000m above sea level, the required list power P_L is the product of factors k_1 or k_2 and the required power P.

Ambient temperature	40°C	45°C	50°C	55°C	60°C
Correction factor k_1 approximately	1	1.06	1.13	1.22	1.34
Altitude above sea level up to	1000 m	2000 m	3000 m	4000 m	5000 m
Correction factor k_2 approximately	1	1.07	1.16	1.27	1.55

At ambient temperatures above 40°C and with motors of enclosed design, contact the manufacturer for any design modifications that may be required.

In the case of sites above 1000m where the ambient temperature drops by approx. 10°C per 1000m, power correction is not necessary.

Operating Modes

Please inquire at the factory about motors for intermediate periodic loading (S 3), continuous duty with intermittent loading (S 6), short-time duty (S 2) and about motors for switching operation (S 4, S 5, S 7). If necessary, please quote operating and break times, torques, transformation ratios etc. inquire at the factory. You can roughly calculate as shown below the necessary list power, P_L from the product of k_4 and the required power output P for operating modes S 2, S 3 and S 6:

Intermediate periodic loading S 3 with duty cycle	15%	25%	40%	60%
With internally cooled machines factor k_4	0.6	0.7	0.8	0.9
Continuous duty with intermittent loading S 6 with duty cycle	15%	25%	40%	60%
With internally cooled machines factor k_4	0.6	0.6	0.65	0.8
Short-time duty S 2 with duty cycle	10 min	30 min	60 min	90 min
With internally cooled machines factor k_4	0.6	0.73	0.9	0.96

When placing your order, you must state the following operating and ambient conditions:

- **light load less than 60% of nominal load, for a relatively long period**
- **temperature of cooling air less than 10° C**
- **relative humidity less than 10% or greater than 80%**
- **for gases and vapours occur, such as silicone or oil, for example, you must state the type and concentration.**

Overload capacity

In accordance with EN 60034, the motors have a 1.5-fold current overload capacity for 45 seconds at the rated voltage and the rated excitation (note the reduced values with field weakening operation).

Controlled speed reduction

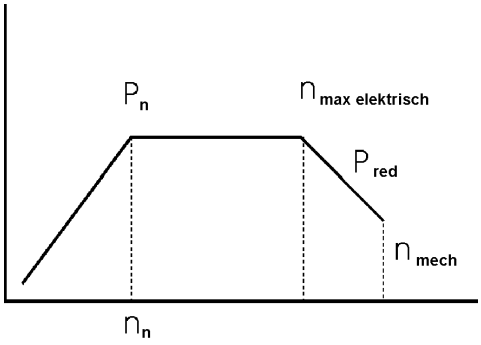
You reduce the RPM speed by reducing the armature voltage.
The DC motors in this catalogue have a constant torque of up to 50 RPM downwards in the armature control range.

Controlled speed increase

Increasing the RPM speed is carried out by means of field weakening without losses starting from the basic RPM speed. In this connection, you can retain the list power for the basic RPM speed across the field weakening range assuming that the increase in the RPM speed does not exceed the value $n_{max\ electrical}$ is stated in the list.
In the case of short-time duty or intermediate periodic loading, it is permissible to increase the power above the list power.
In field weakening operation, there is a limited overload capacity.
Field weakening above $n_{max\ electrical}$ is possible in many cases; however, it always results in a reduction in power.

Excitation

The exciter power losses in the list refer to separately excited machines without a stabilizing series winding.
In the case of switch off on the DC side, a free-wheeling diode or a parallel resistor must protect the field winding from closing over voltages.
By preference, you should use the standard voltage of 310V as the field voltage. In this case it is also possible to use different voltages; in particular, the 340V output voltage that can be obtained from the bridge circuit with a 400V feed.

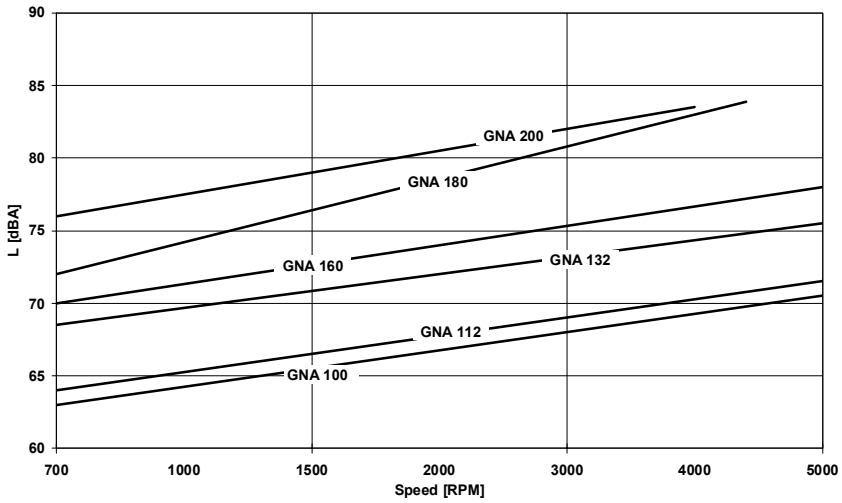


n_n	rated RPM speed
$n_{max\ electrical}$	max. field weakening RPM speed at P_n = constant
n_{mech}	maximum permissible operating RPM speed
P_n	nominal power, constant in RPM speed range from n_n to n_{max} or $n_{max\ electrical}$
P_{red}	reduced full-load power (safe commutation limit)

Stabilizing series winding

A stabilizing series winding can be fitted on request to stabilize the RPM speed.
All motors that are intended for tachometer control, as well as compensated motors, are executed without a stabilizing series winding.

1.4. Noise level



The internally ventilated motors do not exceed the limit values stipulated in EN 60034-9.
A sound absorber reduces the noise level by 3dBA.

1.5. Type Selection

Converting list values to the desired RPM speed:
Normally, you start from the next highest RPM speed. You set the desired – lower – RPM speed by reducing the armature voltage on the armature voltage regulator. The torque remains constant with the output reducing with the RPM speed.
Starting from the next lowest RPM speed, you can set the desired – higher – RPM speed at constant output by field weakening (reducing the exciter current). This is an option with the field supply.

1.6. Preferred Types

The motor types that are shown in the technical data with a grey background are preferred types.

The technical design of the preferred types is as follows:

- fan at top, on B side, fan screw to right
- rectangular filter to B side
- connection box on right, on B side, PGs according to dimensional drawing
- tachometer generator GHT S 42 with 20V/1000 RPM
- type of construction IM B3
- type of protection IP 23
- ball bearings
- 2 thermal protectors (one in commutating pole and one in field for switch off)
- insulation material class H
- exciter voltage 310V
- paintwork RAL 7001, 9005, 6011, 7015 or primed (7032)

1.7. Types of construction

Follow types of contruction are available:
-IM B3, B6, B7, B8, B35
The size 100-200 can be offer on request at B5.
-IM V5, V6, V1/V5, V3/V6.
The V-types of construction at the normal design are available only with the protection class IP20.
On request, it is also possible to use higher protection class.

Types of construction according to DIN EN 60034

IEC-Code I	IEC-Code II
IM B 3	IM 1001
IM B 5	IM 3001
IM B 6	IM 1051
IM B 7	IM 1061
IM B 8	IM 1071
IM B 14	IM 3601
IM B 35	IM 2001
IM B 34	IM 2101

IEC-Code I	IEC-Code II
IM V 1	IM 3011
IM V 3	IM 3031
IM V 5	IM 1011
IM V 6	IM 1031
IM V 18	IM 3611
IM V 19	IM 3631
IM V 15	IM 2011
IM V 36	IM 2031

On request, further types of construction are also possible.

1.8. Type Code

G	N	A	132	M	N	A56E	O	1	B	T

Encoder

T Tachometer

E Encoder – on request

S Miscellaneous

Encoder manufacturer

B Baumüller

H Hübner – on request

S Miscellaneous – on request

Type of construction

1 Pedestal version

2 Pedestal flange version

Brake

O No brake

G Disk brake

Armature circuit execution

Standard execution

Construction length

Construction size, axle height

Air cooling

A Mounted radial fan

F Force-ventilated via pipe – on request

Shunt

Direct current

2. Technical Data

2.1. GNA 100

2.1.1. GNA 100 SN

Speed n Armature voltage Ua of:				Out-	Out-	n max	Armature	Tor-	Tor-	Effectivity		In-	Armature circuit	Order Designation	
				put	put	electr.	cur-rent:	que	que			duc-tivity	im-peda nce		
400	420	460	480	Pab	Pab		Ia	M	M	eta A	eta tot	La	Ra		
[V]	[V]	[V]	[V]	[kW]	[hp]	[min-1]	[A]	[Nm]	[lbf ft]	[%]	[%]	[mH]	[Ohm]		
3520				10.8	14	4800	31	29.3	22	86.3	83.8	6.3	0.78	GNA 100 SN-	273O
	3720			11.4	15	4800	31	29.3	22	86.7	84.4	6.3	0.78	GNA 100 SN-	273P
		4110		12.6	17	4800	31	29.3	22	87.4	85.3	6.3	0.78	GNA 100 SN-	273R
			4300	13.2	18	4800	31	29.3	22	87.8	85.7	6.3	0.78	GNA 100 SN-	273T
2820				9	12	3700	27	30.5	22	84.3	81.5	9.2	1.17	GNA 100 SN-	27FO
	2980			9.5	13	3700	27	30.5	22	84.8	82.2	9.2	1.17	GNA 100 SN-	27FP
		3300		10.5	14	3700	27	30.5	22	85.7	83.3	9.2	1.17	GNA 100 SN-	27FR
			3460	11	15	3700	27	30.5	22	86.1	83.8	9.2	1.17	GNA 100 SN-	27FT
2540				8.2	11	3200	25	30.8	23	83.3	80.4	11.1	1.45	GNA 100 SN-	274O
	2690			8.7	12	3200	25	30.8	23	83.9	81.1	11.1	1.45	GNA 100 SN-	274P
		2980		9.6	13	3200	25	30.8	23	84.9	82.3	11.1	1.45	GNA 100 SN-	274R
			3130	10.1	14	3200	25	30.8	23	85.4	82.9	11.1	1.45	GNA 100 SN-	274T
1970				6.5	9	3000	20	31.5	23	80.8	77.4	19.2	2.23	GNA 100 SN-	275O
	2090			6.9	9	3000	20	31.5	23	81.6	78.3	19.2	2.23	GNA 100 SN-	275P
		2320		7.7	10	3000	20	31.5	23	82.8	79.7	19.2	2.23	GNA 100 SN-	275R
			2440	8.1	11	3000	20	31.5	23	83.4	80.4	19.2	2.23	GNA 100 SN-	275T
1750				59	8	2700	19	31.9	24	77.7	74.1	24.1	2.58	GNA 100 SN-	27IO
	1860			6.2	8	2700	19	31.9	24	78.6	751	24.1	2.58	GNA 100 SN-	27IP
		2070		6.9	9	2700	19	31.9	24	80	76.8	24.1	2.58	GNA 100 SN-	27IR
			2180	7.3	10	2700	19	31.9	24	80.7	77.6	24.1	2.58	GNA 100 SN-	27IT
1530				5.1	7	2300	17	31.8	23	76.1	72.2	30.8	3.15	GNA 100 SN-	276O
	1630			5.4	7	2300	17	31.8	23	77.1	73.4	30.8	3.15	GNA 100 SN-	276P
		1820		6.1	8	2300	17	31.8	23	78.7	75.2	30.8	3.15	GNA 100 SN-	276R
			1910	6.4	9	2300	17	31.8	23	79.4	76	30.8	3.15	GNA 100 SN-	276T

Form Factor	< 1.03	Excitation Power	360W	Operating Mode	S 1	Weight 55kg
Mech. limit speed	7000 RPM	Excitation current at 310V	1.2A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.017kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.1.2. GNA 100 MN

Speed n Armature voltage Ua of:				Out-put	Out-put	n max electr.	Armature current:	Tor-que	Tor-que	Effectivity		In-duc-tivity	Arma-ture circuit im-peda nce	Order Designation	
400 [V]	420 [V]	460 [V]	480 [V]	Pab [kW]	Pab [hp]	[min-1]	Ia [A]	M [Nm]	M [lbf ft]	eta A [%]	eta tot [%]	La [mH]	Ra [Ohm]		
2780				10.8	14	4600	31	37.1	27	86.3	83.4	6.8	0.81	GNA 100 MN-	27DO
	2930			11.4	15	4600	31	37.1	27	86.7	84	6.8	0.81	GNA 100 MN-	27DP
		3240		12.6	17	4600	31	37.1	27	87.5	85	6.8	0.81	GNA 100 MN-	27DR
			3400	13.2	18	4600	31	37.1	27	87.9	85.5	6.8	0.81	GNA 100 MN-	27DT
2450				9.8	13	4100	27	38.2	28	85.1	82	8.6	0.98	GNA 100 MN-	273O
	2590			10.4	14	4100	27	38.2	28	85.6	82.7	8.6	0.98	GNA 100 MN-	273P
		2860		11,4	15	4100	27	38.2	28	86.5	83.8	8.6	0.98	GNA 100 MN-	273R
			3000	12	16	4100	27	38.2	28	86.9	84.3	8.6	0.98	GNA 100 MN-	273T
1950				8	11	3300	25	39	29	82.6	79	12.8	1.48	GNA 100 MN-	27FO
	2060			8.4	11	3300	25	39	29	83.2	79.8	12.8	1.48	GNA 100 MN-	27FP
		2290		9.3	12	3300	25	39	29	84.4	81.2	12.8	1.48	GNA 100 MN-	27FR
			2400	9.8	13	3300	25	39	29	84.8	81.8	12.8	1.48	GNA 100 MN-	27FT
1600				6.6	9	2800	20	39.4	29	79.6	75.7	17.9	2.12	GNA 100 MN-	27GO
	1700			7	9	2800	20	39.4	29	80.4	76.7	17.9	2.12	GNA 100 MN-	27GP
		1890		7.8	10	2800	20	39.4	29	81.8	78.3	17.9	2.12	GNA 100 MN-	27GR
			1990	8.2	11	2800	20	39.4	29	82.4	79	17.9	2.12	GNA 100 MN-	27GT
1280				5.3	7	2300	19	39.2	29	76.7	72.1	23.8	2.8	GNA 100 MN-	275O
	1360			5.6	8	2300	19	39.2	29	77.6	73.2	23.8	2.8	GNA 100 MN-	275P
		1520		6.2	8	2300	19	39.2	29	79.2	75.1	23.8	2.8	GNA 100 MN-	275R
			1600	6.6	9	2300	19	39.2	29	80	76	23.8	2.8	GNA 100 MN-	275T

Form Factor	< 1.03	Excitation Power	430W	Operating Mode	S 1	Weight 73kg
Mech. limit speed	7000 RPM	Excitation current at 310V	1.4A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.022kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.1.3. GNA 100 LN

Speed n Armature voltage Ua of:				Out-put	Out-put	n max electr.	Armature current:	Tor-que	Tor-que	Effectivity		In-duc-tivity	Arma-ture circuit im-peda nce	Order Designation	
400 [V]	420 [V]	460 [V]	480 [V]	Pab [kW]	Pab [hp]	[min-1]	Ia [A]	M [Nm]	M [lbf ft]	eta A [%]	eta tot [%]	La [mH]	Ra [Ohm]		
2930				13.2	18	4500	38	43	32	88	85.2	4.8	0.53	GNA 100 LN-	272O
	3090			13.9	19	4500	38	43	32	88.4	85.7	4.8	0.53	GNA 100 LN-	272P
		3410		15.4	21	4500	37	43	32	89.1	86.6	4.8	053	GNA 100 LN-	272R
			3570	16.1	22	4500	37	43	32	89.4	87	4.8	0.53	GNA 100 LN-	272T
2470				11.7	16	4200	34	45.3	33	86.7	83.6	6.6	0.75	GNA 100 LN-	27CO
	2610			12.4	17	4200	34	45.3	33	87.2	84.2	6.6	0.75	GNA 100 LN-	27CP
		2880		13.6	18	4200	34	45.3	33	88	85.2	6.6	0.75	GNA 100 LN-	27CR
			3020	14.3	19	4200	34	45.3	33	88.3	85.7	6.6	0.75	GNA 100 LN-	27CT
2130				10.3	14	3900	30	46.2	34	85.5	82,1	8.5	0.97	GNA 100 LN-	27DO
	2250			10.9	15	3900	30	46.2	34	86.1	82.8	8.5	0.97	GNA 100 LN-	27DP
		2490		12	16	3900	30	46.2	34	87	84	8.5	0.97	GNA 100 LN-	27DR
			2610	12.6	17	3900	30	46.2	34	87.4	84.5	8.5	0.97	GNA 100 LN-	27DT
1870				9.2	12	3300	27	47	35	84.3	80.6	10.9	1.17	GNA 100 LN-	273O
	1980			9.7	13	3300	27	47	35	84.9	81.3	10.9	1.17	GNA 100 LN-	273P
		2190		10.8	14	3300	27	47	35	85.9	82.6	10.9	1.17	GNA 100 LN-	273R
			2300	11.3	15	3300	27	47	35	86.4	83.2	10.9	1.17	GNA 100 LN-	273T
1340				6.6	9	2500	21	46.7	34	79.4	74.9	15.6	2.17	GNA 100 LN-	274O
	1420			6.9	9	2500	21	46.7	34	80.2	75.8	15.6	2.17	GNA 100 LN-	274P
		1580		7.7	10	2500	21	46.7	34	81.6	77.5	15.6	2.17	GNA 100 LN-	274R
			1660	8.1	11	2500	21	46.7	34	82.3	78.3	15.6	2.17	GNA 100 LN-	274T

Form Factor	< 1.03	Excitation Power	500W	Operating Mode	S 1	Weight 93kg
Mech. limit speed	6000 RPM	Excitation current at 310V	1.6A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.027kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.2. GNA 112

2.2.1. GNA 112 SN

Speed n Armature voltage Ua of:				Out-put	Out-put	n max electr.	Armature current:	Tor-que	Tor-que	Effectivity		In-duc-tivity	Arma-ture circuit im-peda nce	Order Designation	
400 [V]	420 [V]	460 [V]	480 [V]	Pab [kW]	Pab [hp]	[min-1]	Ia [A]	M [Nm]	M [lbf ft]	eta A [%]	eta tot [%]	La [mH]	Ra [Ohm]		
3100				22	30	4500	62	67.8	50	89.3	87.3	5.2	0.32	GNA 112 SN-	472O
	3270			232	31	4500	62	67.8	50	89.6	87,7	5.2	0.32	GNA 112 SN-	472P
		3610		25.6	34	4500	62	67.8	50	90.3	88.5	5.2	0.32	GNA 112 SN-	472R
			3770	26.8	36	4500	62	67.8	50	90.5	88.8	5.2	0.32	GNA 112 SN-	472T
2620				18.5	25	3900	52	67.4	50	88.3	86	7.1	0.43	GNA 112 SN-	47CO
	2760			19.5	26	3900	52	67.4	50	88.7	86.5	7.1	0.43	GNA 112 SN-	47CP
		3050		21.5	29	3900	52	674	50	89.4	87.4	7.1	0.43	GNA 112 SN-	47CR
			3200	22.6	30	3900	52	67.4	50	89.7	87.8	7.1	0.43	GNA 112 SN-	47CT
2250				15.9	21	2900	46	67.5	50	86.6	84	9.2	0.58	GNA 112 SN-	47DO
	2380			16.8	23	2900	46	67.5	50	87.1	84.7	9.2	0.58	GNA 112 SN-	47DP
		2630		18.6	25	2900	46	67.5	50	88	85.7	9.2	0.58	GNA 112 SN-	47DR
			2750	19.4	26	2900	46	67.5	50	88.3	86.1	9.2	0.58	GNA 112 SN-	47DT
1970				13.9	19	2900	41	67.4	50	85.6	82.7	11.7	0.75	GNA 112 SN-	473O
	2080			14.7	20	2900	41	67.4	50	86.1	83.4	11.7	0.75	GNA 112 SN-	473P
		2310		16.3	22	2900	41	67.4	50	87.1	84.6	11.7	0.75	GNA 112 SN-	473R
			2420	17.1	23	2900	41	67.4	50	87.5	85.1	11.7	0.75	GNA 112 SN-	473T
1420				10.2	14	2600	31	68.6	51	825	78.9	20.7	1.32	GNA 112 SN-	474O
	1500			10.8	14	2600	31	68.6	51	83.2	79.8	20.7	1.32	GNA 112 SN-	474P
		1670		12	16	2600	31	68.6	51	84.5	81.2	20.7	1.32	GNA 112 SN-	474R
			1760	12.6	17	2600	31	68.6	51	85	81.9	20.7	1.32	GNA 112 SN-	474T
1090				7.8	10	2000	25	68.3	50	79.3	75	32.2	2.03	GNA 112 SN-	475O
	1160			8.3	11	2000	25	68.3	50	80.2	76.1	32.2	2.03	GNA 112 SN-	475P
		1290		9.2	12	2000	25	68.3	50	81.6	77.8	32.2	2.03	GNA 112 SN-	475R
			1360	9.7	13	2000	25	68.3	50	82.3	78.6	32.2	2.03	GNA 112 SN-	475T

Form Factor	< 1.03	Excitation Power	560W	Operating Mode	S 1	Weight 100kg
Mech. limit speed	6700 RPM	Excitation current at 310V	1.8A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.05kgm²	Insulation material class	H	Type of cooling	IC 06	

2.2.2. GNA 112 MN

Speed n Armature voltage Ua of:				Out-put	Out-put	n max electr.	Armature current:	Tor-que	Tor-que	Effectivity		In-duc-tivity	Arma-ture circuit im-peda nce	Order Designation	
400	420	460	480	Pab	Pab		Ia	M	M	eta A	eta tot	La	Ra		
[V]	[V]	[V]	[V]	[kW]	[hp]	[min-1]	[A]	[Nm]	[lbf ft]	[%]	[%]	[mH]	[Ohm]		
2970				23.9	32	4300	67	76.9	57	88.9	86.9	4.5	0.25	GNA 112 MN-	47BO
	3130			25.2	34	4300	67	76.9	57	89.3	87.3	4.5	0.25	GNA 112 MN-	47BP
		3450		27.8	37	4300	67	76.9	57	89.9	88.1	4.5	0.25	GNA 112 MN-	47BR
			3610	29.1	39	4300	67	76.9	57	90.2	88.5	4.5	0.25	GNA 112 MN-	47BT
2430				20	27	4200	57	78.6	58	87.6	85.2	6.6	0.4	GNA 112 MN-	472O
	2560			21.1	28	4200	57	78.6	58	88	85.7	6.6	0.4	GNA 112 MN-	472P
		2830		23.3	31	4200	57	78.6	58	88.8	86.7	6.6	0.4	GNA 112 MN-	472R
			2970	24.5	33	4200	57	78.6	58	89.1	87.1	6.6	0.4	GNA 112 MN-	472T
2050				17.5	23	3600	50	81.5	60	87.1	84.4	9	0.52	GNA 112 MN-	47CO
	2160			18.4	25	3600	50	81.5	60	87.5	85	9	0.52	GNA 112 MN-	47CP
		2390		20.4	27	3600	50	81.5	60	88.4	86	9	0.52	GNA 112 MN-	47CR
			2510	21.4	29	3600	50	81.5	60	88.8	86.5	9	0.52	GNA 112 MN-	47CT
1550				13.2	18	3000	39	81.3	60	84.2	80.9	14.8	0.86	GNA 112 MN-	473O
	1640			14	19	3000	39	81.3	60	84.8	81.7	14.8	0.86	GNA 112 MN-	473P
		1820		15.5	21	3000	39	81.3	60	85.9	83	14.8	0.86	GNA 112 MN-	473R
			1910	16.3	22	3000	39	81.3	60	86.4	83.6	14.8	0.86	GNA 112 MN-	473T

Form Factor	< 1.03	Excitation Power	650W	Operating Mode	S 1	Weight 122kg
Mech. limit speed	6700 RPM	Excitation current at 310V	2.1A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.06kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.2.3. GNA 112 LN

Speed n Armature voltage Ua of:				Out-put	Out-put	n max electr.	Armature current:	Tor-que	Tor-que	Effectivity		In-duc-tivity	Arma-ture circuit im-peda nce	Order Designation	
400 [V]	420 [V]	460 [V]	480 [V]	Pab [kW]	Pab [hp]	[min-1]	Ia [A]	M [Nm]	M [lbf ft]	eta A [%]	eta tot [%]	La [mH]	Ra [Ohm]		
3040				28	38	4800	79	87.9	65	88.7	86.7	3.7	0.21	GNA 112 LN-	47AO
	3200			29.5	40	4800	79	87.9	65	89	87.2	3.7	0.21	GNA 112 LN-	47AP
		3530		32.5	44	4800	79	87.9	65	89.7	88	3.7	0.21	GNA 112 LN-	47AR
			3690	34	46	4800	79	87.9	65	90	88.3	3.7	0.21	GNA 112 LN-	47AT
2400				23.5	32	4200	66	93.5	69	88.4	86.1	5.7	0.29	GNA 112 LN-	47BO
	2530			24.8	33	4200	66	93.5	69	88.8	86.7	5.7	0.29	GNA 112 LN-	47BP
		2790		27.3	37	4200	66	93.5	69	89.5	87.5	5.7	0.29	GNA 112 LN-	47BR
			2920	28.6	38	4200	66	93.5	69	89.9	87.9	5.7	0.29	GNA 112 LN-	47BT
1950				19.3	26	3800	56	94.5	70	86.4	83.8	8.2	0.46	GNA 112 LN-	472O
	2060			20.4	27	3800	56	94.5	70	86.9	84.4	8.2	0.46	GNA 112 LN-	472P
		2280		22.6	30	3800	56	94.5	70	87.8	85.5	8.2	0.46	GNA 112 LN-	472R
			2390	23.7	32	3800	56	94.5	70	88.2	86	8.2	0.46	GNA 112 LN-	472T
1240				12.4	17	2600	37	95.5	70	83	79.3	18.6	1	GNA 112 LN-	473O
	1310			13.1	18	2600	37	95.5	70	83.7	80.1	18.6	1	GNA 112 LN-	473P
		1460		14.6	20	2600	37	95.5	70	84.9	81.6	18.6	1	GNA 112 LN-	473R
			1530	15.3	21	2600	37	95.5	70	85.4	82.2	18.6	1	GNA 112 LN-	473T

Form Factor	< 1.03	Excitation Power	700W	Operating Mode	S 1	Weight 152kg
Mech. limit speed	5300 RPM	Excitation current at 310V	2.3A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.08kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.3. GNA 132

2.3.1. GNA 132 KN

Speed n Armature voltage Ua of:				Out-put	Out-put	n max electr.	Armature current:	Tor-que	Tor-que	Effectivity		In-duc-tivity	Arma-ture circuit im-peda nce	Order Designation	
400 [V]	420 [V]	460 [V]	480 [V]	Pab [kW]	Pab [hp]	[min-1]	Ia [A]	M [Nm]	M [lbf ft]	eta A [%]	eta tot [%]	La [mH]	Ra [Ohm]		
2950				23	31	4500	67	74.5	55	86.5	83.8	5.2	0.3	GNA 132 KN-	272O
	3110			24.3	33	4500	66	74.5	55	86.9	84.3	5.2	0.3	GNA 132 KN-	272P
		3440		26.8	36	4500	66	74.5	55	87.7	85.3	5.2	0.3	GNA 132 KN-	272R
			3600	28.1	38	4500	66	74.5	55	88.1	85.7	5.2	0.3	GNA 132 KN-	272T
2500				20.5	27	4000	59	78.3	58	86.9	83.8	7.1	0.39	GNA 132 KN-	27CO
	2640			21.6	29	4000	59	78.3	58	87.3	84.4	7.1	0.39	GNA 132 KN-	27CP
		2920		23.9	32	4000	59	78.3	58	88.2	85.4	7.1	0.39	GNA 132 KN-	27CR
			3050	25	34	4000	59	78.3	58	88.5	85.9	7.1	0.39	GNA 132 KN-	27CT
2110				18.2	24	3600	53	82.3	61	85.8	82.4	9.5	0.53	GNA 132 KN-	473O
	2230			19.2	26	3600	53	82.3	61	86.3	83.1	9.5	0.53	GNA 132 KN-	473P
		2470		21.3	29	3600	53	82.3	61	87.2	84.3	9.5	0.53	GNA 132 KN-	473R
			2590	22.3	30	3600	53	82.3	61	87.6	84.8	9.5	0.53	GNA 132 KN-	473T
1520				13.5	18	2900	41	84.8	63	82.7	78.6	16.6	0.9	GNA 132 KN-	474O
	1610			14.3	19	2900	41	84.8	63	83.4	79.4	16.6	0.9	GNA 132 KN-	474P
		1790		15.9	21	2900	41	84.8	63	84.6	80.9	16.6	0.9	GNA 132 KN-	474R
			1880	16.7	22	2900	41	84.8	63	85.1	81.6	16.6	0.9	GNA 132 KN-	474T
1160				10.3	14	2100	33	84.8	63	78.3	73.5	25.9	1.45	GNA 132 KN-	475O
	1230			10.9	15	2100	33	84.8	63	79.2	74.5	25.9	1.45	GNA 132 KN-	475P
		1370		12.2	16	2100	33	84.8	63	80.7	76.3	25.9	1.45	GNA 132 KN-	475R
			1450	12.9	17	2100	33	84.8	63	81.4	77.2	25.9	1.45	GNA 132 KN-	475T

Form Factor	< 1.03	Excitation Power	750W	Operating Mode	S 1	Weight 125kg
Mech. limit speed	5300 RPM	Excitation current at 310V	2.4A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.07kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.3.2. GNA 132 SN

Speed n Armature voltage Ua of:				Out-put	Out-put	n max electr.	Armature current:	Tor-que	Tor-que	Effectivity		In-duc-tivity	Arma-ture circuit im-peda nce	Order Designation	
400	420	460	480	Pab	Pab		Ia	M	M	eta A	eta tot	La	Ra		
[V]	[V]	[V]	[V]	[kW]	[hp]	[min-1]	[A]	[Nm]	[lbf ft]	[%]	[%]	[mH]	[Ohm]		
2910				34.5	46	4500	97	113	83	88.8	86.6	3.9	0.19	GNA 132 SN-	47BO
	3070			36.4	49	4500	97	113	83	89.2	87.1	3.9	0.19	GNA 132 SN-	47BP
		3380		40.1	54	4500	97	113	83	89.9	87.9	3.9	0.19	GNA 132 SN-	47BR
			3540	42	56	4500	97	113	83	90.1	88.3	3.9	0.19	GNA 132 SN-	47BT
2390				29	39	4000	82	116	86	88.1	85.5	5.7	0.28	GNA 132 SN-	472O
	2520			30.6	41	4000	82	116	86	88.5	86	5.7	0.28	GNA 132 SN-	472P
		2790		33.8	45	4000	82	116	86	89.3	87	5.7	0.28	GNA 132 SN-	472R
			2920	35.4	47	4000	82	116	86	89.6	87.4	5.7	0.28	GNA 132 SN-	472T
2130				26.5	36	3600	76	119	88	87.2	84.4	7	0.34	GNA 132 SN-	272O
	2250			28	38	3600	76	119	88	87.7	85	7	0.34	GNA 132 SN-	272P
		2490		31	42	3600	76	119	88	88.5	86	7	0.34	GNA 132 SN-	272R
			2600	32.3	43	3600	76	119	88	88.8	86.5	7	0.34	GNA 132 SN-	272T
1520				19	25	2900	56	119	88	85	81.3	12.8	0.63	GNA 132 SN-	473O
	1610			20.1	27	2900	56	119	88	85.6	82.1	12.8	0.63	GNA 132 SN-	473P
		1780		22.3	30	2900	56	119	88	86.6	83.4	12.8	0.63	GNA 132 SN-	473R
			1870	23.4	31	2900	56	119	88	87.1	84	12.8	0.63	GNA 132 SN-	473T
1090				13.8	19	2100	42	121	89	81.4	76.8	22.5	1.06	GNA 132 SN-	474O
	1160			14.7	20	2100	42	121	89	82.2	77.8	22.5	1.06	GNA 132 SN-	474P
		1290		16.3	22	2100	42	121	89	83.5	79.5	22.5	1.06	GNA 132 SN-	474R
			1350	17.1	23	2100	42	121	89	84.1	80.2	22.5	1.06	GNA 132 SN-	474T

Form Factor	< 1.03	Excitation Power	1000W	Operating Mode	S 1	Weight 160kg
Mech. limit speed	5300 RPM	Excitation current at 310V	3.2A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.09kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.3.3. GNA 132 MN

Speed n Armature voltage Ua of:				Out-put	Out-put	n max electr.	Armature current:	Tor-que	Tor-que	Effectivity		In-duc-tivity	Arma-ture circuit im-peda nce	Order Designation	
400 [V]	420 [V]	460 [V]	480 [V]	Pab [kW]	Pab [hp]	[min-1]	Ia [A]	M [Nm]	M [lbf ft]	eta A [%]	eta tot [%]	La [mH]	Ra [Ohm]		
3170				50	67	4500	139	151	111	89.9	88	2.5	0.11	GNA 132 MN-	271O
	3340			52.7	71	4500	139	151	111	90.3	88.4	2.5	0.11	GNA 132 MN-	271P
		3680		58	78	4500	139	151	111	90.8	89.2	2.5	0.11	GNA 132 MN-	271R
			3850	60.7	81	4500	139	151	111	91.1	89.5	2.5	0.11	GNA 132 MN-	271T
2600				42.5	57	4300	119	156	115	89.5	87.3	3.6	0.16	GNA 132 MN-	47AO
	2740			44.8	60	4300	119	156	115	89.8	87.7	3.6	0.16	GNA 132 MN-	47AP
		3020		49.4	66	4300	119	156	115	90.5	88.5	3.6	0.16	GNA 132 MN-	47AR
			3160	51.6	69	4300	119	156	115	90.8	88.9	3.6	0.16	GNA 132 MN-	47AT
2040				35	47	3400	99	164	121	88	85.5	5.6	0.24	GNA 132 MN-	47BO
	2150			36.9	49	3400	99	164	121	88.5	86	5.6	0.24	GNA 132 MN-	47BP
		2380		40.8	55	3400	99	164	121	89.3	87	5.6	0.24	GNA 132 MN-	47BR
			2490	42.7	57	3400	99	164	121	89.6	87.4	5.6	0.24	GNA 132 MN-	47BT
1490				26	35	2800	76	167	123	86.1	82.8	9.9	0.44	GNA 132 MN-	272O
	1580			27.6	37	2800	76	167	123	86.7	83.5	9.9	0.44	GNA 132 MN-	272P
		1750		30.5	41	2800	76	167	123	87.7	84.7	9.9	0.44	GNA 132 MN-	272R
			1830	31.9	43	2800	76	167	123	88.1	85.2	9.9	0.44	GNA 132 MN-	272T
1050				18	24	1900	55	164	121	82.1	77.9	18	0.75	GNA 132 MN-	473O
	1110			19	25	1900	55	164	121	82.8	78.7	18	0.75	GNA 132 MN-	473P
		1240		21.3	29	1900	55	164	121	84.2	80.4	18	0.75	GNA 132 MN-	473R
			1300	22.3	30	1900	55	164	121	84.8	81.1	18	0.75	GNA 132 MN-	473T

Form Factor	< 1.03	Excitation Power	1200 W	Operating Mode	S 1	Weight 185 kg
Mech. limit speed	5300 RPM	Excitation current at 310V	3.9 A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.12 kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.3.4. GNA 132 LN

Speed n Armature voltage Ua of:				Out-put	Out-put	n max electr.	Armature current:	Tor-que	Tor-que	Effectivity		In-duc-tivity	Arma-ture circuit im-peda nce	Order Designation	
400 [V]	420 [V]	460 [V]	480 [V]	Pab [kW]	Pab [hp]	[min-1]	Ia [A]	M [Nm]	M [lbf ft]	eta A [%]	eta tot [%]	La [mH]	Ra [Ohm]		
2660				51	68	4000	143	183	135	89.2	87.1	2.7	0.11	GNA 132 LN-	471O
	2800			53.7	72	4000	143	183	135	89.6	87.5	2.7	0.11	GNA 132 LN-	471P
		3090		59.3	80	4000	143	183	135	90.2	88.3	2.7	0.11	GNA 132 LN-	471R
			3230	61.9	83	4000	143	183	135	90.5	88.7	2.7	0.11	GNA 132 LN-	471T
1950				40	54	3500	114	196	145	88	85.4	4.8	0.19	GNA 132 LN-	47AO
	2060			42.3	57	3500	114	196	145	88.5	85.9	4.8	0.19	GNA 132 LN-	47AP
		2270		46.6	62	3500	114	196	145	89.2	86.9	4.8	0.19	GNA 132 LN-	47AR
			2380	48.8	65	3500	114	196	145	89.6	87.4	4.8	0.19	GNA 132 LN-	47AT
1530				32.5	44	2800	94	203	150	86.9	83.7	7.5	0.29	GNA 132 LN-	47BO
	1620			34.4	46	2800	94	203	150	87.4	84.4	7.5	0.29	GNA 132 LN-	47BP
		1790		38	51	2800	94	203	150	88.3	85.5	7.5	0.29	GNA 132 LN-	47BR
			1870	39.7	53	2800	93	203	150	88.7	86	7.5	0.29	GNA 132 LN-	47BT
1240				26.8	36	2400	79	206	152	85.1	81.5	11	0.44	GNA 132 LN-	472O
	1310			28.3	38	2400	79	206	152	85.7	82.2	11	0.44	GNA 132 LN-	472P
		1450		31.3	42	2400	79	206	152	86.8	83.6	11	0.44	GNA 132 LN-	472R
			1530	33.1	44	2400	79	206	152	87.3	84.2	11	0.44	GNA 132 LN-	472T

Form Factor	< 1.03	Excitation Power	1300W	Operating Mode	S 1	Weight 250kg
Mech. limit speed	4000 RPM	Excitation current at 310V	4.0A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.16kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.4. GNA 160

2.4.1. GNA 160 SN

Speed n Armature voltage Ua of:				Out- put	Out- put	n max electr.	Armat ure cur- rent:	Tor- que	Tor- que	Effectivity		In- duc- tivity	Arma- ture circuit im- peda nce	Order Designation	
400 [V]	420 [V]	460 [V]	480 [V]	Pab [kW]	Pab [hp]	[min-1]	Ia [A]	M [Nm]	M [lbf ft]	eta A [%]	eta tot [%]	La [mH]	Ra [Ohm]		
3070				81	109	4300	223	252	186	90.6	88.7	1.4	0.052	GNA 160 SN-	471O
	3230			85.2	114	4300	223	252	186	90.9	89.1	1.4	0.052	GNA 160 SN-	471P
		3560		94	126	4300	223	252	186	91.5	89.8	1.4	0.052	GNA 160 SN-	471R
			3720	98	131	4300	223	252	186	91.7	90.1	1.4	0.052	GNA 160 SN-	471T
2750				75	101	4100	207	261	193	90.8	88.7	1.8	0.065	GNA 160 SN-	271O
	2900			79.1	106	4100	206	261	193	91.1	89.2	1.8	0.065	GNA 160 SN-	271P
		3190		87	117	4100	206	261	193	91.7	89.9	1.8	0.065	GNA 160 SN-	271R
			3340	91.1	122	4100	206	261	193	91.9	90.2	1.8	0.065	GNA 160 SN-	271T
2260				64	86	3900	179	271	200	89.6	87.3	2.6	0.091	GNA 160 SN-	47AO
	2380			67.4	90	3900	178	271	200	90	87.8	2.6	0.091	GNA 160 SN-	47AP
		2630		74.5	100	3900	178	271	200	90.7	88.6	2.6	0.091	GNA 160 SN-	47AR
			2750	77.9	104	3900	178	271	200	91	89	2.6	0.091	GNA 160 SN-	47AT
1780				53	71	3200	149	284	209	88.9	86.1	4	0.144	GNA 160 SN-	47BO
	1880			56	75	3200	149	284	209	89.4	86.7	4	0.144	GNA 160 SN-	47BP
		2070		61.6	83	3200	149	284	209	90.1	87.6	4	0.144	GNA 160 SN-	47BR
			2170	64.6	87	3200	149	284	209	90.4	88.1	4	0.144	GNA 160 SN-	47BT
1300				38	51	2600	110	279	206	86.4	82.8	7	0.246	GNA 160 SN-	272O
	1370			40	54	2600	110	279	206	86.9	83.4	7	0.246	GNA 160 SN-	272P
		1520		44.4	60	2600	110	279	206	87.9	84.7	7	0.246	GNA 160 SN-	272R
			1590	46.5	62	2600	110	279	206	88.3	85.2	7	0.246	GNA 160 SN-	272T

Form Factor	< 1.03	Excitation Power	1920W	Operating Mode	S 1	Weight 240kg
Mech. limit speed	4500 RPM	Excitation current at 310V	6.2A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.24kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.4.2. GNA 160 MN

Speed n Armature voltage Ua of:				Out-put	Out-put	n max electr.	Armature current:	Tor-que	Tor-que	Effectivity		In-duc-tivity	Arma-ture cir-cuit imped-ance	Order Designation	
400 [V]	420 [V]	460 [V]	480 [V]	Pab [kW]	Pab [hp]	[min-1]	Ia [A]	M [Nm]	M [lbf ft]	eta A [%]	eta tot [%]	La [mH]	Ra [Ohm]		
2590				100	134	3200	270	369	272	92.4	90.7	1.5	0.045	GNA 160 MN-	Y7AO
	2730			105	141	3500	270	369	272	92.7	91	1.5	0.045	GNA 160 MN-	Y7AP
		3000		116	156	3800	270	369	272	93.2	91.6	1.5	0.045	GNA 160 MN-	Y7AR
			3140	121	162	3800	270	369	272	93.4	91.9	1.5	0.045	GNA 160 MN-	Y7AT
2120				84	113	3900	233	378	279	90.3	88.3	2.1	0.068	GNA 160 MN-	471O
	2230			88.4	119	3900	232	378	279	90.7	88.8	2.1	0.068	GNA 160 MN-	471P
		2460		97.5	131	3900	232	378	279	91.3	89.6	2.1	0.068	GNA 160 MN-	471R
			2580	102	137	3900	232	378	279	91.6	89.6	2.1	0.068	GNA 160 MN-	471T
1680				69	93	3000	193	392	289	89.6	87.2	3.3	0.1	GNA 160 MN-	Y72O
	1770			72.7	97	3000	192	392	289	90	87.7	3.3	0.1	GNA 160 MN-	Y72P
		1950		80.1	107	3000	192	392	289	90.7	88.6	3.3	0.1	GNA 160 MN-	Y72R
			2050	84.2	113	3000	192	392	289	91	89	3.3	0.1	GNA 160 MN-	Y72T
1220				50	67	2400	143	391	288	87.4	84.3	5.9	0.19	GNA 160 MN-	47BO
	1290			52.9	71	2400	143	391	288	87.9	85	5.9	0.19	GNA 160 MN-	47BP
		1420		58.2	78	2400	143	391	288	88.8	86.1	5.9	0.19	GNA 160 MN-	47BR
			1490	61.1	82	2400	143	391	288	89.2	86.6	5.9	0.19	GNA 160 MN-	47BT
880				37.5	50	1800	110	407	300	85	81.2	10.4	0.32	GNA 160 MN-	272O
	930			39.6	53	1800	110	407	300	85.7	82	10.4	0.32	GNA 160 MN-	272P
		1030		43.9	59	1800	110	407	300	86.8	83.4	10.4	0.32	GNA 160 MN-	272R
			1080	46	62	1800	110	407	300	87.3	84	10.4	0.32	GNA 160 MN-	272T

Form Factor	< 1.03	Excitation Power	2100W	Operating Mode	S 1	Weight 320kg
Mech. limit speed	4500 RPM	Excitation current at 310V	6.7A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.35kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.4.3. GNA 160 LN

Speed n Armature voltage Ua of:				Out-put	Out-put	n max electr.	Armature current:	Tor-que	Tor-que	Effectivity		In-duc-tivity	Arma-ture circuit im-peda nce	Order Designation	
400	420	460	480	Pab	Pab		Ia	M	M	eta A	eta tot	La	Ra		
[V]	[V]	[V]	[V]	[kW]	[hp]	[min-1]	[A]	[Nm]	[lbf ft]	[%]	[%]	[mH]	[Ohm]		
2730				122	164	3300	334	427	315	91.5	89.6	1.1	0.033	GNA 160 LN-	Y71O
	2870			128	172	3300	333	427	315	91.7	90	1.1	0.033	GNA 160 LN-	Y71P
		3160		141	189	3300	333	427	315	92.3	90.7	1.1	0.033	GNA 160 LN-	Y71R
2500				112	150	3300	306	428	316	91.5	89.5	1.3	0.038	GNA 160 LN-	W71O
	2630			118	158	3300	306	428	316	91.8	89.9	1.3	0.038	GNA 160 LN-	W71P
		2900		130	174	3300	305	428	316	92.3	90.6	1.3	0.038	GNA 160 LN-	W71R
			3030	136	182	3300	305	428	316	92.6	90.9	1.3	0.038	GNA 160 LN-	W71T
2020				95	127	2500	260	449	331	91.4	89.1	2	0.056	GNA 160 LN-	Y7AO
	2130			100	134	2700	260	449	331	91.7	89.5	2	0.056	GNA 160 LN-	Y7AP
		2340		110	148	2900	259	449	331	92.3	90.2	2	0.056	GNA 160 LN-	Y7AR
			2450	115	154	3000	259	449	331	92.5	90.6	2	0.056	GNA 160 LN-	Y7AT
1650				80	107	3000	224	463	341	89.5	86.9	2.8	0.084	GNA 160 LN-	471O
	1740			84.4	113	3000	223	463	341	89.9	87.4	2.8	0.084	GNA 160 LN-	471P
		1920		93.1	125	3000	223	463	341	90.6	88.3	2.8	0.084	GNA 160 LN-	471R
			2010	97.5	131	3000	223	463	341	90.9	88.7	2.8	0.084	GNA 160 LN-	471T
1080				53	71	2100	152	469	346	87.2	83.5	6.2	0.183	GNA 160 LN-	27AO
	1140			55.9	75	2100	152	469	346	87.7	84.1	6.2	0.183	GNA 160 LN-	27AP
		1260		61.8	83	2100	152	469	346	88.6	85.3	6.2	0.183	GNA 160 LN-	27AR
			1320	64.8	87	2100	152	469	346	89	85.9	6.2	0.183	GNA 160 LN-	27AT

Form Factor	< 1.03	Excitation Power	2200W	Operating Mode	S 1	Weight 410kg
Mech. limit speed	3300 RPM	Excitation current at 310V	6.9A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.45kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.5. GNA 180

2.5.1. GNA 180 SN

Speed n Armature voltage Ua of:				Out-	Out-	n max	Armature	Tor-	Tor-	Effectivity		In-	Armature circuit	Order Designation	
				put	put	electr.	cur-rent:	que	que			duc-tivity	im-peda nce		
400	420	460	480	Pab	Pab		Ia	M	M	eta A	eta tot	La	Ra		
[V]	[V]	[V]	[V]	[kW]	[hp]	[min-1]	[A]	[Nm]	[lbf ft]	[%]	[%]	[mH]	[Ohm]		
2950				138	185	4000	375	447	330	92.1	90.8	0.9	0.029	GNA 180 SN-	S71O
	3110			146	196	4000	375	447	330	92.4	91.1	0.9	0.029	GNA 180 SN-	S71P
		3420		160	215	4000	375	447	330	92.9	91.7	0.9	0.029	GNA 180 SN-	S71R
			3570	167	224	4000	374	447	330	93.1	91.9	0.9	0.029	GNA 180 SN-	S71T
1				110	148	4000	302	461	340	91.1	89.4	1.4	0.052	GNA 180 SN-	471O
	2400			116	156	4000	302	461	340	91.4	89.8	1.4	0.052	GNA 180 SN-	471P
		2650		128	172	4000	302	461	340	92	90.5	1.4	0.052	GNA 180 SN-	471R
2030				100	134	3000	276	470	347	90.6	88.8	1.7	0.063	GNA 180 SN-	271O
	2140			105	141	3000	276	470	347	90.9	89.2	1.7	0.063	GNA 180 SN-	271P
		2360		116	156	3000	276	470	347	91.6	90	1.7	0.063	GNA 180 SN-	271R
			2470	122	164	3000	276	470	347	91.8	90.3	1.7	0.063	GNA 180 SN-	271T
1650				80	107	2600	223	463	341	89.7	87.5	2.6	0.091	GNA 180 SN-	W72O
	1740			84.4	113	2600	223	463	341	90.1	88	2.6	0.091	GNA 180 SN-	W72P
		1920		93.1	125	3000	223	463	341	90.8	88.9	2.6	0.091	GNA 180 SN-	W72R
			2010	97.5	131	3200	223	463	341	91.1	89.3	2.6	0.091	GNA 180 SN-	W72T
1070				53.5	72	1900	156	477	352	85.7	82.8	5.5	0.2	GNA 180 SN-	472O
	1130			56.5	76	2300	156	477	352	86.3	83.5	5.5	0.2	GNA 180 SN-	472P
		1250		62.5	84	2300	156	477	352	87.4	84.8	5.5	0.2	GNA 180 SN-	472R

Form Factor	< 1.03	Excitation Power	2100W	Operating Mode	S 1	Weight 429kg
Mech. limit speed	4000 RPM	Excitation current at 310V	6.7A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.41kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.5.2. GNA 180 MN

Speed n Armature voltage Ua of:				Out-put	Out-put	n max electr.	Armature current:	Tor-que	Tor-que	Effectivity		In-duc-tivity	Arma-ture circuit im-peda nce	Order Designation	
400	420	460	480	Pab	Pab		Ia	M	M	eta A	eta tot	La	Ra		
[V]	[V]	[V]	[V]	[kW]	[hp]	[min-1]	[A]	[Nm]	[lbf ft]	[%]	[%]	[mH]	[Ohm]		
2580				150	201	3000	407	555	409	92	90.6	0.9	0.028	GNA 180 MN-	W71O
	2720			158	212	3000	407	555	409	92.3	91	0.9	0.028	GNA 180 MN-	W71P
		2990		174	233	3000	407	555	409	92.8	91.6	0.9	0.028	GNA 180 MN-	W71R
2210				133	178	3000	363	575	424	91.6	90	1.2	0.036	GNA 180 MN-	S71O
	2330			140	188	3000	363	575	424	91.9	90.4	1.2	0.036	GNA 180 MN-	S71P
		2560		154	207	3000	362	575	424	92.4	91.1	1.2	0.036	GNA 180 MN-	S71R
			2680	161	216	3000	362	575	424	92.7	91.4	1.2	0.036	GNA 180 MN-	S71T
1710				107	143	2600	296	598	441	90.4	88.5	1.9	0.063	GNA 180 MN-	471O
	1800			113	152	2800	296	598	441	90.7	88.9	1.9	0.063	GNA 180 MN-	471P
		1990		125	168	2800	296	598	441	91.4	89.8	1.9	0.063	GNA 180 MN-	471R
1380				84.5	113	2100	236	585	431	89.5	87.2	2.9	0.09	GNA 180 MN-	Z71O
	1460			89.4	120	2300	237	585	431	90	87.8	2.9	0.09	GNA 180 MN-	Z71P
		1610		98.6	132	2700	236	585	431	90.7	88.7	2.9	0.09	GNA 180 MN-	Z71R
			1680	103	138	2700	235	585	431	91	89	2.9	0.09	GNA 180 MN-	Z71T
1050				66	89	1800	189	600	443	87.3	84.5	4.7	0.146	GNA 180 MN-	S72O
	1110			69.8	94	2000	189	600	443	87.8	85.2	4.7	0.146	GNA 180 MN-	S72P
		1230		77.3	104	2100	189	600	443	88.8	86.3	4.7	0.146	GNA 180 MN-	S72R
			1290	81.1	109	2100	189	600	443	89.2	86.8	4.7	0.146	GNA 180 MN-	S72T

Form Factor	< 1.03	Excitation Power	2300W	Operating Mode	S 1	Weight 460kg
Mech. limit speed	3000 RPM	Excitation current at 310V	7,2A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.52kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.5.3. GNA 180 LN

Speed n Armature voltage Ua of:				Out-put	Out-put	n max electr.	Armature current:	Tor-que	Tor-que	Effectivity		In-duc-tivity	Arma-ture circuit im-peda nce	Order Designation	
400	420	460	480	Pab	Pab		Ia	M	M	eta A	eta tot	La	Ra		
[V]	[V]	[V]	[V]	[kW]	[hp]	[min-1]	[A]	[Nm]	[lbf ft]	[%]	[%]	[mH]	[Ohm]		
2200				145	194	2400	395	629	464	91.8	90.2	1	0.031	GNA 180 LN-	W71O
	2320			153	205	2400	395	629	464	92.1	90.6	1	0.031	GNA 180 LN-	W71P
1880				130	174	2400	356	660	487	91.4	89.7	1.4	0.04	GNA 180 LN-	S71O
	1980			137	184	2400	355	660	487	91.8	90.1	1.4	0.04	GNA 180 LN-	S71P
		2180		151	202	2400	355	660	487	92.3	90.8	1.4	0.04	GNA 180 LN-	S71R
			2280	158	212	2400	355	660	487	92.6	91.1	1.4	0.04	GNA 180 LN-	S71T
1450				104	139	2200	290	685	505	89.7	87.5	2.2	0.07	GNA 180 LN-	471O
	1530			110	148	2400	290	685	505	90.1	88.1	2.2	0.07	GNA 180 LN-	471P
		1690		121	162	2400	290	685	505	90.8	88.9	2.2	0.07	GNA 180 LN-	471R
			1770	127	170	2400	290	685	505	91.1	89.3	2.2	0.07	GNA 180 LN-	471T
1040				74	99	1600	211	679	501	87.7	84.9	4.2	0.125	GNA 180 LN-	W72O
	1100			78.3	105	1900	211	679	501	88.2	85.5	4.2	0.125	GNA 180 LN-	W72P
		1210		84.1	113	1900	210	679	501	89.1	86.6	4.2	0.125	GNA 180 LN-	W72R
			1270	90.4	121	1900	210	679	501	89.5	87.1	4.2	0.125	GNA 180 LN-	W72T

Form Factor	< 1.03	Excitation Power	2450W	Operating Mode	S 1	Weight 530kg
Mech. limit speed	2450 RPM	Excitation current at 310V	7.5A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.61kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.6. GNA 200

2.6.1. GNA 200 SN

Speed n Armature voltage Ua of:				Out- put	Out- put	n max electr.	Armat ure cur- rent:	Tor- que	Tor- que	Effectivity		In- duc- tivity	Arma- ture circuit im- peda nce	Order Designation	
400 [V]	420 [V]	460 [V]	480 [V]	Pab [kW]	Pab [hp]	[min-1]	Ia [A]	M [Nm]	M [lbf ft]	eta A [%]	eta tot [%]	La [mH]	Ra [Ohm]		
2800				192	257	3800	519	655	483	92.6	91.5	0.58	0.017	GNA 200 SN-	Y71O
	2950			202	271	3800	519	655	483	92.8	91.8	0.58	0.017	GNA 200 SN-	Y71P
		3240		213	286	3800	499	629	464	93	92.1	0.58	0.017	GNA 200 SN-	Y71R
			3380	223	299	3800	498	629	464	93.2	92.3	0.58	0.017	GNA 200 SN-	Y71T
2150				153	205	3000	415	680	502	92.2	90.9	1.03	0.03	GNA 200 SN-	Y61O
	2260			161	216	3400	414	680	502	92.5	91.2	1.03	0.03	GNA 200 SN-	Y61P
		2490		177	237	3400	414	680	502	93	91.8	1.03	0.03	GNA 200 SN-	Y61R
			2600	185	248	3400	414	680	502	93.2	92.1	1.03	0.03	GNA 200 SN-	Y61T
1870				130	174	3000	355	664	490	91.5	90.1	1.51	0.044	GNA 200 SN-	K71O
	1970			137	184	3000	355	664	490	91.9	90.5	1.51	0.044	GNA 200 SN-	K71P
		2170		151	202	3000	355	664	490	92.4	91.1	1.51	0.044	GNA 200 SN-	K71R
			2270	158	212	3000	355	664	490	92.7	91.4	1.51	0.044	GNA 200 SN-	K71T
1360				95	127	2200	267	669	493	89.1	87.2	2.43	0.07	GNA 200 SN-	Y72O
	1430			100	134	2300	266	669	493	89.6	87.7	2.43	0.07	GNA 200 SN-	Y72P
		1580		111	149	2300	266	669	493	90.3	88.6	2.43	0.07	GNA 200 SN-	Y72R
			1650	116	156	2500	266	669	493	90.7	89	2.43	0.07	GNA 200 SN-	Y72T

Form Factor	< 1.03	Excitation Power	2200W	Operating Mode	S 1	Weight 515kg
Mech. limit speed	3800 RPM	Excitation current at 310V	7.1A	Type of protection	IP 23	Uncompensated
Moment of inertia	0.86kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.6.2. GNA 200 MN

Speed n Armature voltage Ua of:				Out-put	Out-put	n max electr.	Armature current:	Tor-que	Tor-que	Effectivity		In-duc-tivity	Arma-ture circuit im-peda nce	Order Designation	
400	420	460	480	Pab	Pab		Ia	M	M	eta A	eta tot	La	Ra		
[V]	[V]	[V]	[V]	[kW]	[hp]	[min-1]	[A]	[Nm]	[lbf ft]	[%]	[%]	[mH]	[Ohm]		
2260				185	248	3800	500	782	577	92.5	91.3	0.94	0.02	GNA 200 MN-	Y71O
	2380			195	261	3800	500	782	577	92.8	91.7	0.94	0.02	GNA 200 MN-	Y71P
		2610		214	287	3800	498	782	577	93.2	92.2	0.94	0.02	GNA 200 MN-	Y71R
			2730	223	299	3800	498	782	577	93.5	92.5	0.94	0.02	GNA 200 MN-	Y71T
1730				145	194	3000	395	800	590	91.8	90.3	1.24	0.035	GNA 200 MN-	Y61O
	1820			152	204	3500	394	800	590	92.1	90.7	1.24	0.035	GNA 200 MN-	Y61P
		2010		168	225	3800	395	800	590	92.7	91.4	1.24	0.035	GNA 200 MN-	Y61R
			2100	176	236	3800	395	800	590	92.9	91.7	1.24	0.035	GNA 200 MN-	Y61T
1520				125	168	2300	343	785	579	91.1	89.4	1.82	0.05	GNA 200 MN-	K71O
	1600			132	177	2500	343	785	579	91.5	89.9	1.82	0.05	GNA 200 MN-	K71P
		1760		145	194	2800	342	785	579	92.1	90.6	1.82	0.05	GNA 200 MN-	K71R
			1850	152	204	2800	343	785	579	92.4	91	1.82	0.05	GNA 200 MN-	K71T
1100				94	126	1800	264	816	602	88.8	86.8	2.93	0.081	GNA 200 MN-	Y72O
	1160			99.1	133	2000	264	816	602	89.3	87.3	2.93	0.081	GNA 200 MN-	Y72P
		1280		109	146	2000	264	816	602	90.1	88.3	2.93	0.081	GNA 200 MN-	Y72R
			1340	115	154	2000	264	816	602	90.5	88.7	2.93	0.081	GNA 200 MN-	Y72T
720				59	79	1400	175	783	578	84.3	81.3	8.15	0.199	GNA 200 MN-	K72O
	760			62.4	84	1600	175	783	578	84.9	82.1	8.15	0.199	GNA 200 MN-	K72P
		840		69.2	93	1700	174	783	578	86.1	83.4	8.15	0.199	GNA 200 MN-	K72R
			890	72.6	97	1700	175	783	578	86.7	84.2	8.15	0.199	GNA 200 MN-	K72T

Form Factor	< 1.03	Excitation Power	2550W	Operating Mode	S 1	Weight 620kg
Mech. limit speed	3800 RPM	Excitation current at 310V	8.2A	Type of protection	IP 23	Uncompensated
Moment of inertia	1.03kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.6.3. GNA 200 LN

Speed n Armature voltage Ua of:				Out-put	Out-put	n max electr.	Armature current:	Tor-que	Tor-que	Effectivity		In-duc-tivity	Arma-ture circuit im-peda nce	Order Designation	
400	420	460	480	Pab	Pab		Ia	M	M	eta A	eta tot	La	Ra		
[V]	[V]	[V]	[V]	[kW]	[hp]	[min-1]	[A]	[Nm]	[lbf ft]	[%]	[%]	[mH]	[Ohm]		
1760				180	241	2900	488	976	720	92.2	90.9	0.89	0.023	GNA 200 LN-	Y71O
	1850			189	253	3000	487	976	720	92.5	91.2	0.89	0.023	GNA 200 LN-	Y71P
		2040		209	280	3000	487	976	720	93	91.9	0.89	0.023	GNA 200 LN-	Y71R
			2130	218	292	3000	486	976	720	93.3	92.1	0.89	0.023	GNA 200 LN-	Y71T
1340				140	188	2300	384	998	736	91.1	89.5	1.54	0.042	GNA 200 LN-	Y61O
	1410			147	197	2700	383	998	736	91.5	89.9	1.54	0.042	GNA 200 LN-	Y61P
		1550		162	217	3000	382	998	736	92.1	90.6	1.54	0.042	GNA 200 LN-	Y61R
			1630	170	228	3000	384	998	736	92.4	91	1.54	0.042	GNA 200 LN-	Y61T
850				92	123	1700	261	1034	763	88.1	85.7	3.7	0.096	GNA 200 LN-	Y72O
	900			97	130	1800	262	1034	763	88.7	86.4	3.7	0.096	GNA 200 LN-	Y72P
		990		107	143	1900	260	1034	763	89.5	87.4	3.7	0.096	GNA 200 LN-	Y72R
			1040	113	152	2000	261	1034	763	89.9	87.9	3.7	0.096	GNA 200 LN-	Y72T

Form Factor	< 1.03	Excitation Power	2800W	Operating Mode	S 1	Weight 750kg
Mech. limit speed	3000 RPM	Excitation current at 310V	9.0A	Type of protection	IP 23	Uncompensated
Moment of inertia	1.31kgm^2	Insulation material class	H	Type of cooling	IC 06	

2.7. Bearings and Shaft Loading

All machines have rolling-contact bearings. Normally, the floating bearing is on the drive side and the locating bearing is on the non-drive side. Machines with roller bearings on the drive side are only available for increased radial force. When placing your order, please state the radial forces.

Bearing Assignment of Ball Bearings for A Side

Size	A side	B side
100	6208 2ZR C3	6306 2ZR C3
112	6210 2ZR C3	6209 2ZR C3
132	6212 2ZR C3	6211 2ZR C3
160	6214 2ZR C3	6212 2ZR C3
180	6213 C3	6310 2RSR C3
200	6314 C3	6310 2RSR C3

Bearing Assignment of Roller Bearings for A Side

Size	A side	B side
100	NU 208 E	6306 2ZR C3
112	NU 210 E	6209 2ZR C3
132	NU 212 E	6211 2ZR C3
160	NU 214 E	6212 2ZR C3
180	NU 2213 E	6310 2RSR C3
200	NU 314 E	6310 2RSR C3

At the bearings for the sizes 100-200 exists a permanently lubrication.

NOTE:
In the option "roller bearings for A-side" the rotor is secured by default with a transport lock.
If the machine will be transport after mounting of a driven element, a suitable method for the axial and radial fixation of the rotor must are taken.

Determining the radial forces F_R

When using belt pulleys, the radial load is calculated according to the following formula:

$$F_R = k\frac{2\cdot 10^7 \cdot P}{n\cdot D}\ [N]$$

P = nominal power in kW
n = rated RPM speed in RPM
D = disk diameter in mm

By approximation, the belt tension factor, k, is as follows:
k = 1.8...2.5 for V—belts
k = 2.2...3.5 for flat belts
(Observe the information provided by the belt manufacturer!)

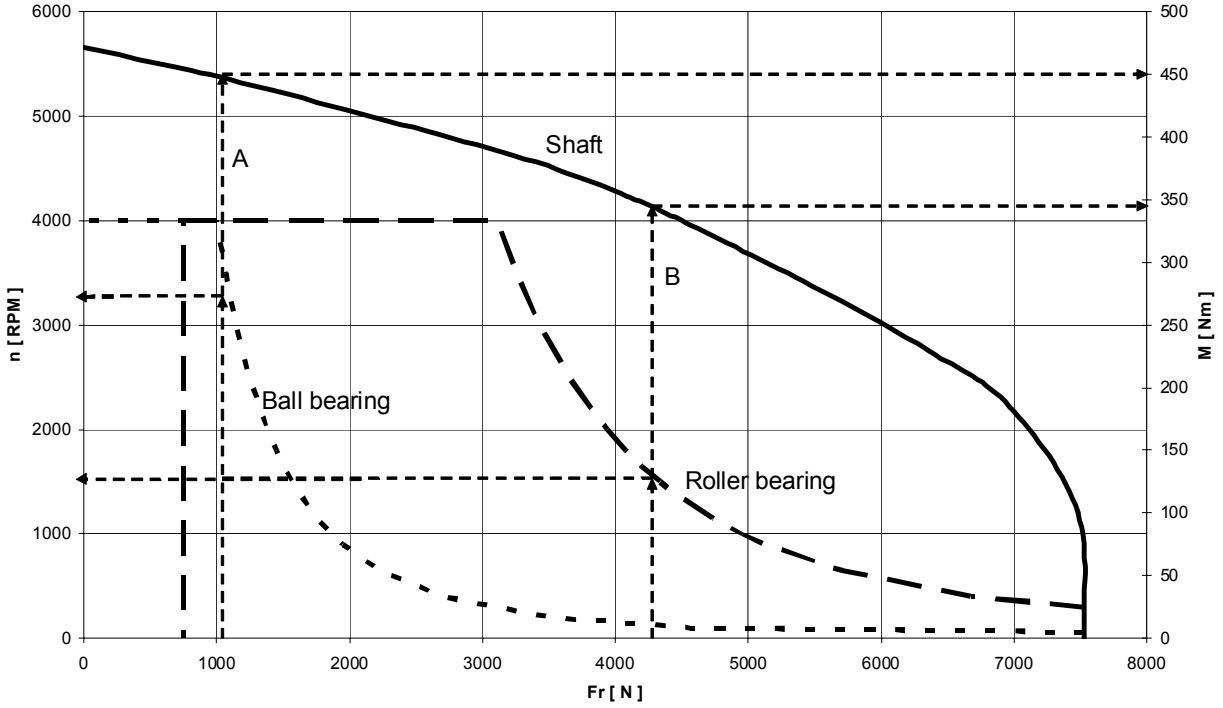
To ensure safe transmission of the torque, it is necessary to exploit the feather key's entire bearing length. Ignoring this can lead to the risk of too high a level of compressive load per unit area on the feather key, which can result in a motor defect. Apart from this, when mounting drive elements (e.g. belt pulleys) you must always push them all the way to the shaft collar on the shaft end. Ignoring this can lead to the risk of the shaft breaking!

Permissible Radial Forces F_R at the Shaft End

All the bearings have rated service lives of approximately 20,000 operating hours. In this connection, you must not exceed the loading values stated below. The stated permissible radial forces F_R apply only to motors that are installed horizontally without additional axial forces. If axial forces occur, you must consult the manufacturer.

2.8. Radial Force Diagrams

Sample diagram



Explanation to the sample diagram

Force applied to end of shaft end (in case of force applied to middle of shaft end Fr ×1.1)
bearing life 20,000h; shaft end with keyway

Case A – ball bearings:

Using the application's radial force, Fr, you can determine in the ball bearing characteristic curve the bearing's maximum RPM speed.

Radial force 1100 N => maximum RPM speed 3250 RPM

The maximum torque that can still be transmitted results from the shaft characteristic curve.

Radial force 1100 N => torque that can still be transmitted 450 Nm

Case B – roller bearings:

Using the application's radial force, Fr, you can determine in the roller bearing characteristic curve the bearing's maximum RPM speed.

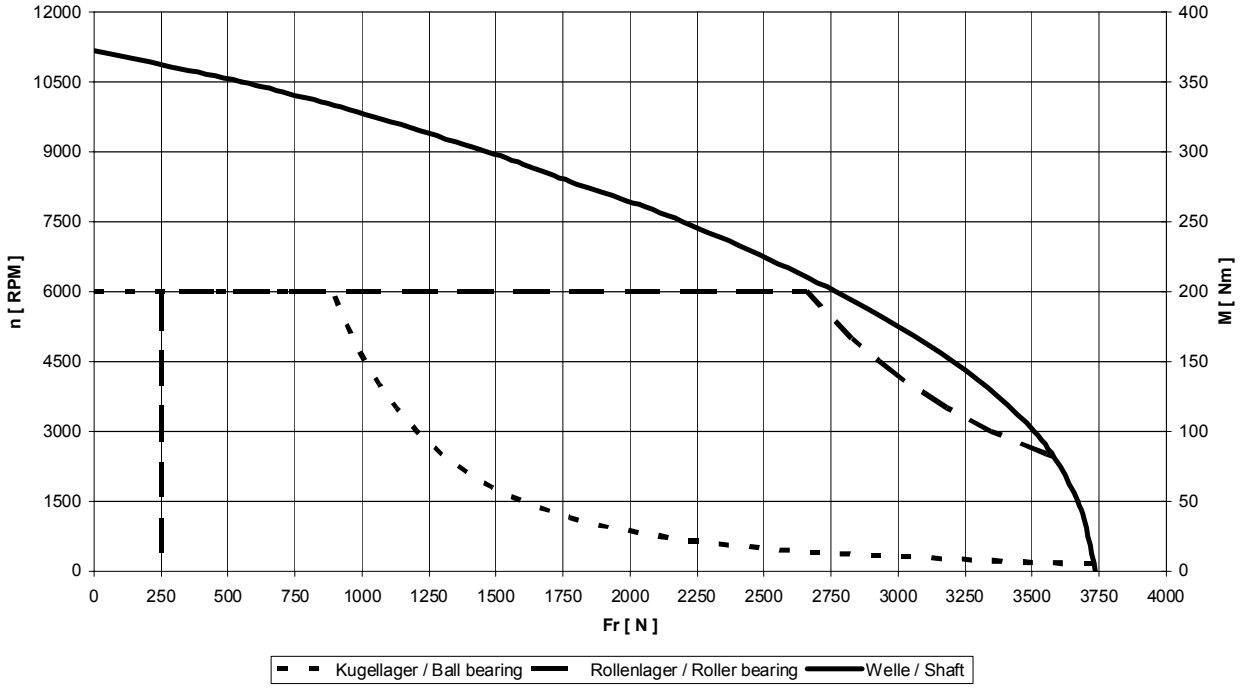
Radial force 4300 N => maximum RPM speed 1500 RPM

The maximum torque that can still be transmitted results from the shaft characteristic curve.

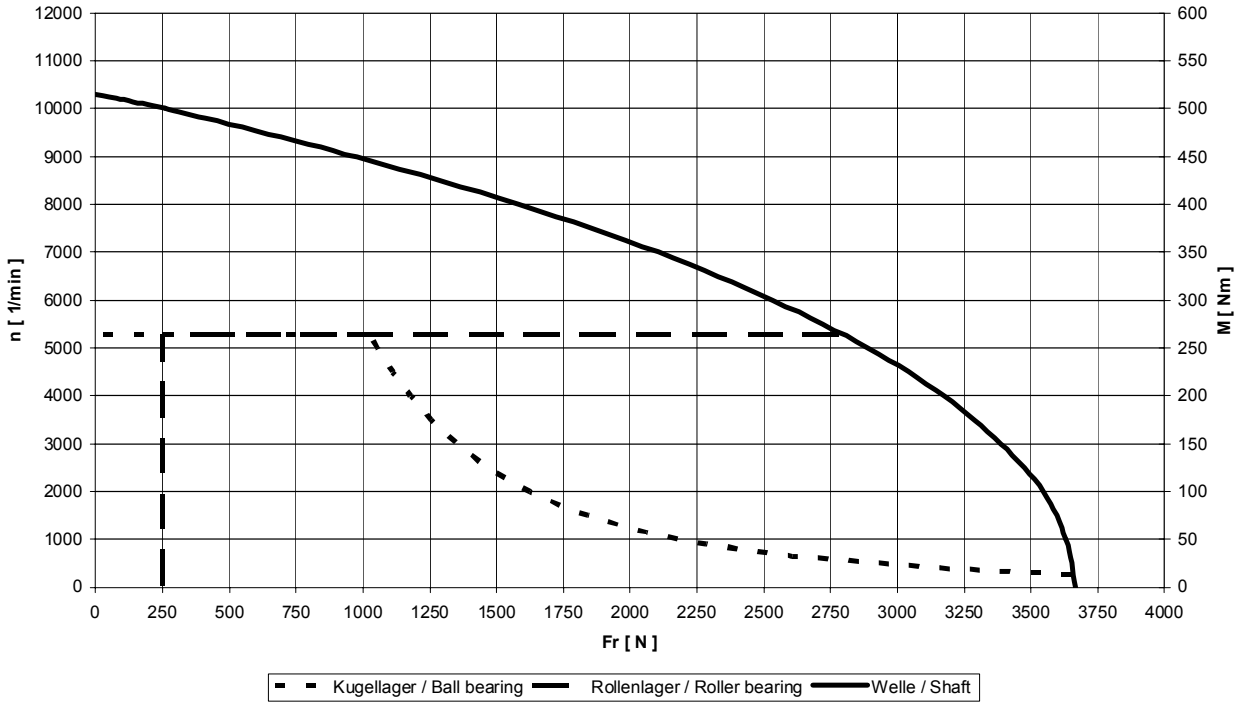
Radial force 4300 N => torque that can still be transmitted 345 Nm

The roller bearing needs a minimum radial force of 800 N to ensure this bearing service life.

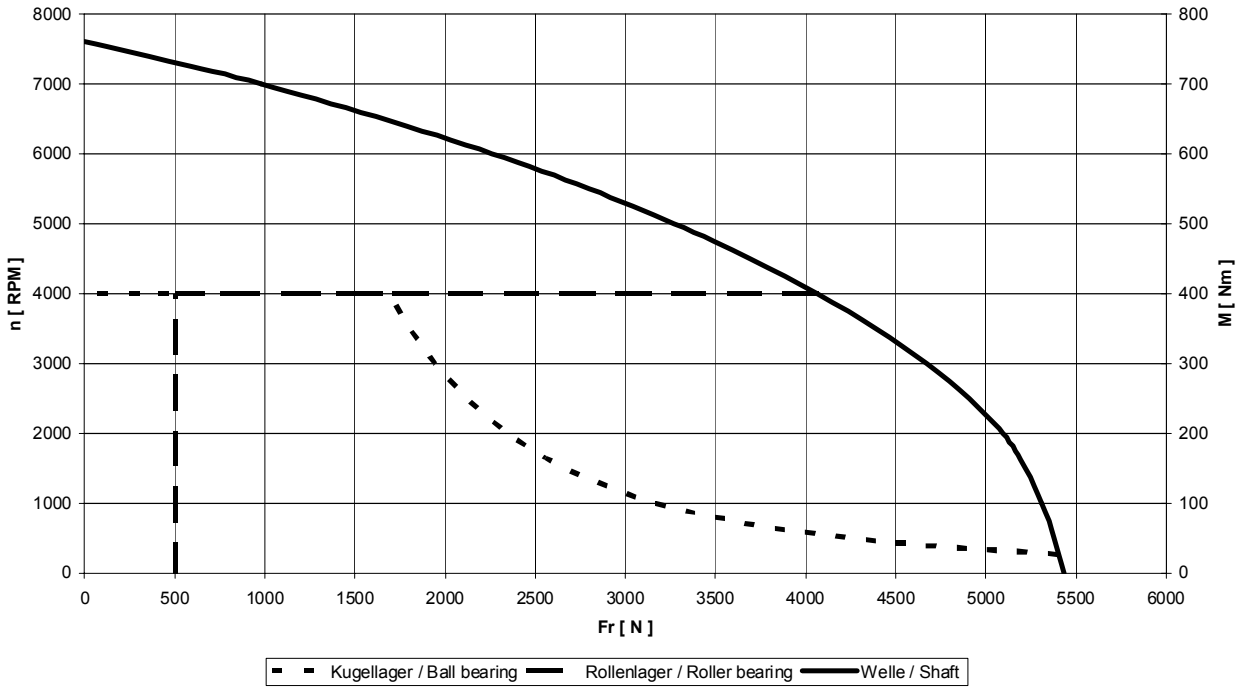
GN. 100 .N



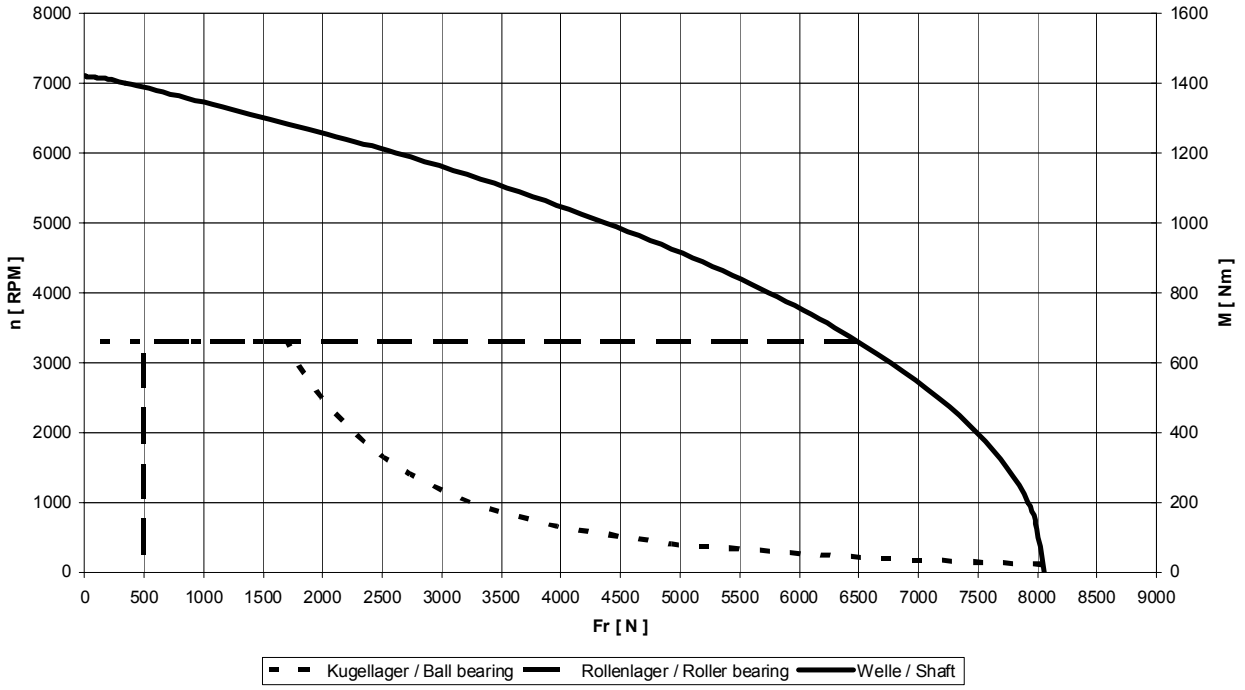
GN. 112 .N



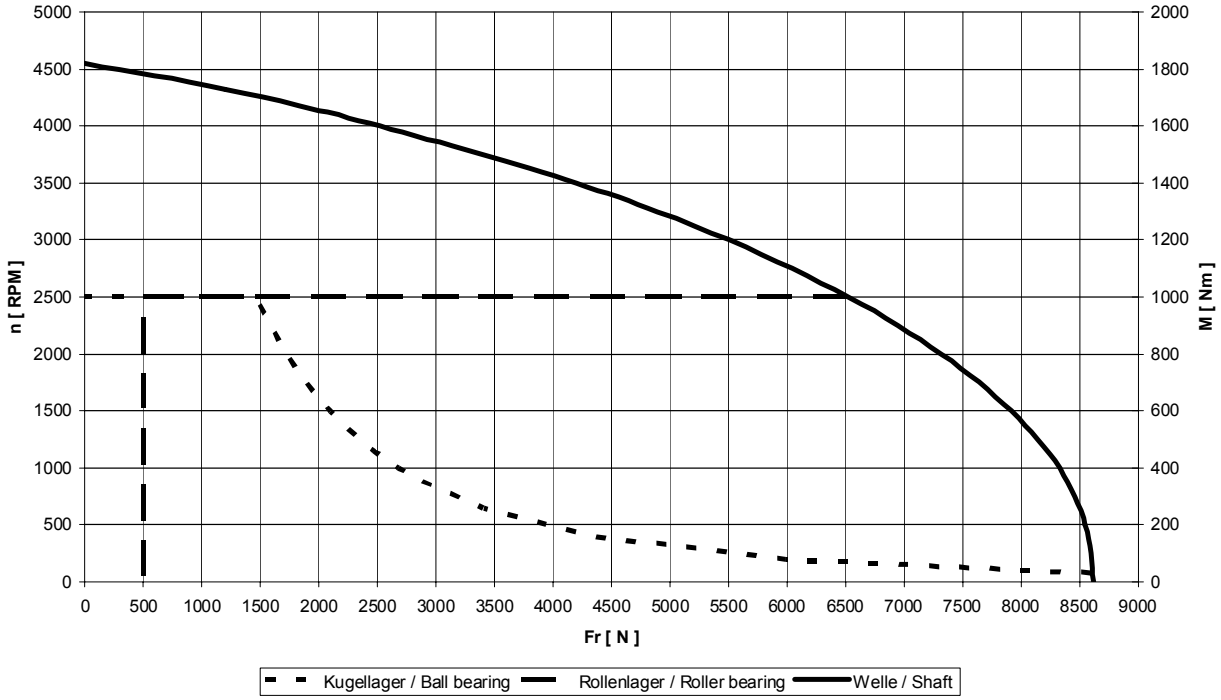
GN. 132 .N



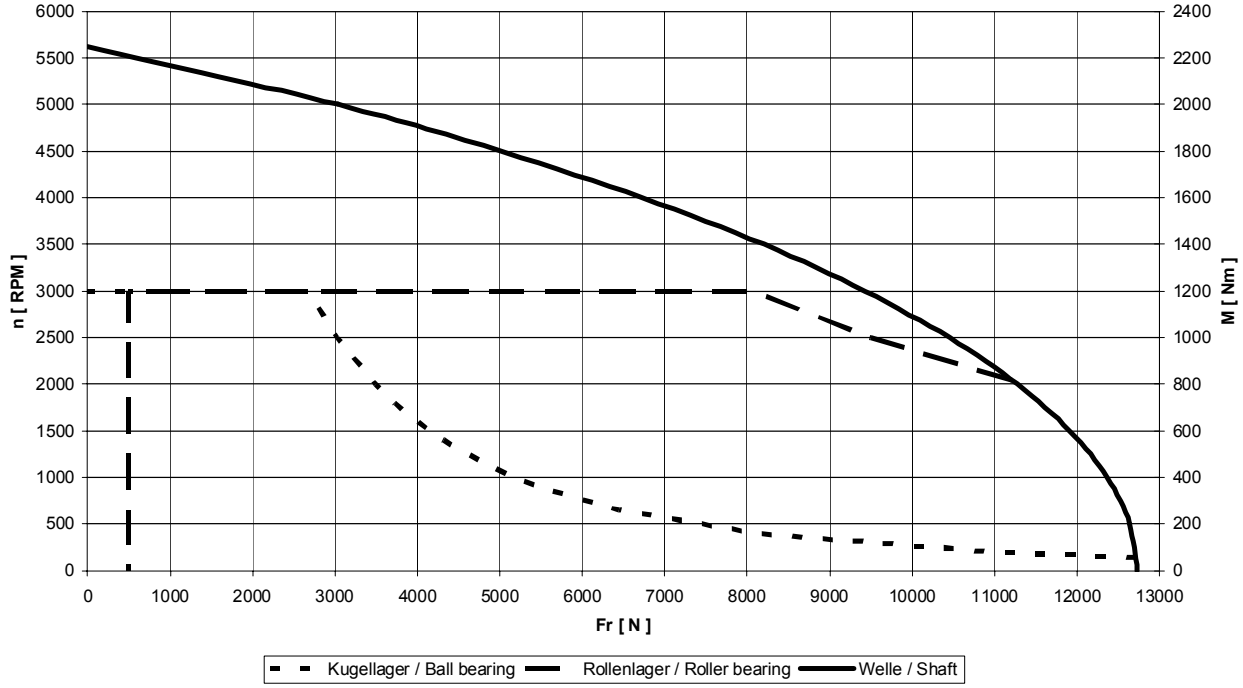
GN. 160 .N



GN. 180 .N



GN. 200 .N



3. Motor components (options)

3.1. Holding brake

für Motortyp	Brake type	Break torque M4 for Holding breake [Nm]	Input power [W]	Max. perm. switching energy Wperm. per switching operation [kJ]	Disengaging time [s]	Engaging time [s]	Inertia [kgm²]	max. perm. speed [min^{-1}]	Weight [kg]
GN.100	SB 50	50	80	10	0,120	0,160	0,0005	4000	5
GN.112	SB100	100	106	15	0,180	0,250	0,0015	3500	9,5
GN.132	SB 200	200	170	20	0,225	0,300	0,0040	3000	13
GN.160	SB 200	200	170	20	0,225	0,300	0,0040	3000	13

For use the holding brake the following must be observed:

- 3 emergency stops (individual braking operations) per hour possible if evenly distributed.
- Switching times values are valid for switching on the AC side, in a cold state, with basic air gap and holding brake.
- Disengaging time – Time until the brake has completely disengaged (brake without torque).
- Engaging time – Time until the brake torque is reached.
- M4 ... static torque.
- All information are valid for the installation on a horizontal shaft.
- The supplier must be contacted before vertical installation.
- Requirements other than those indicated on request.

Braking time / switching energy / switching capacity

It is useful to check that the brake is suited for its application. To do this, the brake energy and braking power must be determined.

Determining the braking time

t_B $$t_B = \frac{\sum J \cdot \Delta n}{9{,}55 \cdot (M_B \pm M_L)} + t_0 \text{ in s}$$

$\sum J$ Total moment of inertia in kgm² = J_{mot} + J_{zus} (relative to the motor shaft)
J_{mot} Motor moment of inertia in kgm²
J_{zus} Additional moment of inertia in kgm² (referred to the motor shaft)
Δn Motor speed in RPM
M_B Braking torque in Nm
M_L Load torque in Nm (positively calculated if it decelerates, negatively calculated if it accelerates)
t_0 Time in s from the switching instant to the full extent of the braking torque (response time)
i Number of working cycles per hour

Determine the switching energy:

$$W_R = \frac{\sum J \cdot \Delta n^2}{182{,}4} \cdot \frac{M_B}{(M_B \pm M_L)} \quad \text{in} \quad \frac{\text{Joule}}{\text{switching operation}}$$

$W_{Rperm} \leq$ Value from table

Determine the switching capacity:

$$P_R = \frac{W_R \cdot i}{1000} \quad \text{in} \quad \frac{kJ}{h}$$

$P_{Rperm.} \leq$ Value from table

In most cases, t_0 is negligible. If this is not the case and the time t_0 must be reduced, you can achieve this by interrupting the magnet circuit on the DC side. However, this measure must be known before dimensioning the brake motor.

3.1.1. Brake supply

Standard: Normal voltage 24 DC Supply with transformer and rectifier
Option: Normal voltage 104 and 176V DC Supply using brake supply unit
The brake supply unit must be order separately.
The brakes are designed with micro-switch (normally open contact). The silver contacts are coated with a layer of gold, which enables two applications. By maximum load of the gold layer, the gold layer can be burned irreversible. In this case, the contact material "gold layer" can not longer be used.

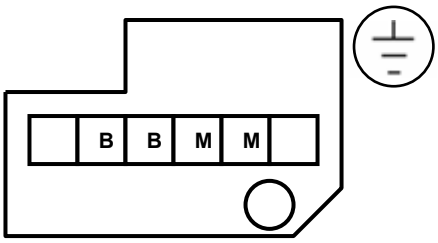
Electrical data of the switches:

Contact material	Min. load	Ideal range of use		Max. load
Gold coat	0 mA; 0 V up to 3 Mio. cycles	0 mA; 0 V up to 3 Mio. cycles	10 mA; 12 V up to 1 Mio. cycles	0,1 A; 12 V up to 100.000 cycles
Argent	10 mA; 12 V up to 3 Mio. cycles	100 mA; 12 V up to 3Mio. cycles	5 A; 30 V up to 50.000 cycles	5 A; 30 V up to 50.000 cycles

The brakes can be executed optional with hand ventilation and lock.

3.1.2. Brake connection

Brake connection clamp



B – Brake
M – Micro switch

3.2. Encoder

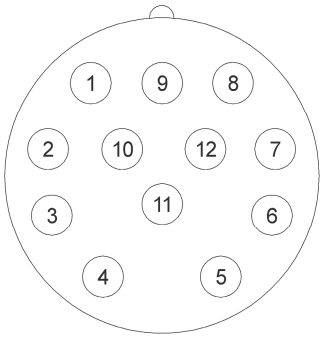
3.2.1. Direct voltage tachometers

Type	Mounting	Direct voltage at 1000 RPM [V]	n_{Max} [RPM]	Max. Nominal current [A]
GHT S 42	Hollow shaft	20	9000	0.01
GHT S 44	Hollow shaft	40	6000	0.01
GHT S 46	Hollow shaft	60	4000	0.01
REO 444 R	Coupling	60	12000	0.18
TDP 0.2 T-4	Coupling	60	9000	0.067

3.2.1. Pulse encoder

	DFS60
Incremental Signals	TTL HTL
Number of steps	1024 1…65536 (on request)
Maximum output frequency	820 kHz
Maximum operating speed	10000 1/min
Operating voltage range	4,5…5,5 V, TTL 10 ... 32 V, TTL 10…32 V, HTL
Operating current without load (mA)	40 mA
Shock according to DIN EN 60068-2-27 (6 ms)	50 g
Vibration according to DIN EN 60068-2-6 (10 – 2000 Hz)	20 g

DFS60 connection



Pin	Signal
1	U2 –
2	U_p sense
3	U0 +
4	U0 –
5	U1 +
6	U1 –
7	-
8	U2 +
9	Shielding
10	0V
11	0V sense
12	U_p

View of contact side of the integral socket

NOTE:
This transmitter is a component susceptible to ESD.
The technical data is specification from the transmitter manufacturer.

3.3. Encoder cable for pulse encoder

3.3.1. Technical Data

1. Technical description – non—trailing

- LiYCY, 5x (2x0.14mm²) + 2x0.5mm² copper strand, stranded in pairs
- Sheath PVC, grey
- 1st side: 12—pin round signal connector with 12 female contacts
- 2nd side: Free line end
- External diameter 8.5mm (± 4mm)
- Bending radius: $r \geq 170$mm
- Nominal voltage: $250V_{AC}$

2. Technical description – trailing

- Li12YC11Y, 5x (2x0.14mm²) + 2x0.5mm² copper strand, stranded in pairs
- Sheath PUR, black
- 1st side: 12—pin round signal connector with 12 female contacts
- 2nd side: Free line end
- Labelled with Baumüller logo, white
- External diameter 8.0mm (± 2mm)
- Bending radius: $r \geq 80$ mm (flexible application)
- Nominal voltage: $300V_{AC}$

3.3.2. Application Information

Operating Temperatures

	Trailing	Non—trailing
Limit temperature	on the surface	on the surface
Application involving no movement/little movement	———	- 20 °C to + 80 °C
Application involving continuous movement	- 20 °C to + 70 °C	- 5 °C to + 80 °C

Laying the line on the motor.
The lines must not touch the motor surface.

3.3.3. Ordering data for encoder cables

Encoder cables/precut cables with connectors

Encoder cable
Non—trailing, precut
Cable 5 x (2 x 0.14 mm²) + 2 x 0.5 mm²
with connector

Length in m	article number
3	198665
5	197054
8	198794
10	197053
15	197052
20	197051
25	197050
30	198524
35	210416
40	215131
45	231706
55	212339
65	227194

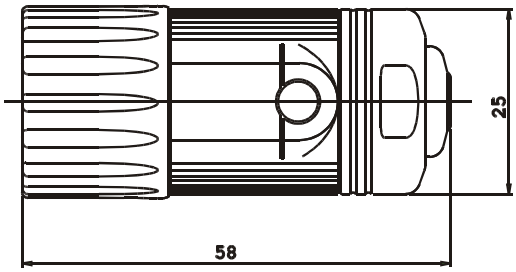
Encoder cable
Trailing, precut
Cable 5 x (2 x 0.14 mm²) + 2 x 0.5 mm²
with connector

Length in m	article number
3	198962
5	198963
8	198964
10	198965
15	198966
20	198967
25	198968
30	198969
35	225360
40	208829

Encoder connector	Article number
Encoder connector	231086

3.3.4. Drawing encoder connector

Encoder connector



3.4. Connection - Terminal Designation

DC machines	Machine winding of type of winding or conductor in DC supply network	Connection designations according to DIN VDE 0530, Part 8, adapted to IEC 34-8
	Armature winding	A 1 - A 2
	Commutating winding Symmetrically divided	B1 - B2 1B1 - 1B2 2B1 - 2B2
	Field winding (separately excited)	F1 - F2

3.5. Cooling

GNA...N motors have a radial separately driven fan mounted on the side or at the top. This fan sucks the air into the motor on the B side and blows it out via the lateral openings in the drive end shield.

With version GNF....N, an external can unit can feed the cooling air to the motor via pipes. Refer to the table below for the amount of cooling air and the pressure.

Necessary cooling air volume and pressure

Size	Air volume [m³/s]	Pressure [Pa]
100	0.08	420
112	0.10	380
132	0.22	800
160	0.32	1200
180	0.40	1200
200	0.50	1400

The stated values apply to the direction of air flow from the B side to the A side.
In the opposite direction, approximately 10% higher air volumes are needed.

Fan assignment to motor

Δ/Y 200-265V / 345-460V 50 // 60Hz

Size	Power [kW]	Nominal current [A]	Fan/ fan motor	Rated power input [kW]	Flow rate [m³/min]	Stat. pressure [Pa]	Nom. speed [1/min]	Spec. ratio
100	0,08 // 0,12	0,57 / 0,33	BFB 398/ ODF 56-2A	0,12	4,8	438	2880	1
112	0,08 // 0,12	0,57 / 0,33	BFB 398/ ODF 56-2A	0,12	4,8	438	2880	1
132	0,45 // 0,6	2,4 / 1,4	BFB 635/ ODF 71-2	0,52	13,9	879	2850	1

Δ/Y 265-345V / 460-600V 50 // 60Hz

Size	Power [kW]	Nominal current [A]	Fan/ fan motor	Rated power input [kW]	Flow rate [m³/min]	Stat. pressure [Pa]	Nom. speed [1/min]	Spec. ratio
100	0,08 // 0,12	0,45 / 0,26	BFB 398/ ODF 56-2A	0,12	4,8	438	2880	1
112	0,08 // 0,12	0,45 / 0,26	BFB 398/ ODF 56-2A	0,12	4,8	438	2880	1
132	0,45 // 0,6	2,25 / 1,3	BFB 635/ ODF 71-2	0,52	13,9	879	2850	1

Δ/Y 230/400V // 280/480V 50 // 60Hz

Size	Power [kW]	Nominal current [A]	Fan/ fan motor	Rated power input [kW]	Flow rate [m³/min]	Stat. pressure [Pa]	Nom. speed [1/min]	Spec. ratio
160	1,1 // 1,65	5,5 / 3,2	BFB 752/ ODF 90-L2	0,54	14,5	1048	2962	1
180	1,1 // 1,65	5,5 / 3,2	BFB 752/ ODF 90-L2	0,54	14,5	1048	2962	1
200	3 // 3,6	11,8 / 11,8	BFB 880/ ODF 100-LB2	1,48	29,3	1350	2980	1

The stated nominal currents are maximum values.

Air flow monitoring

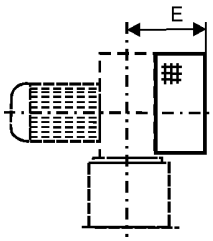
To ensure that the motor functions correctly, you must ensure that it is cooled adequately.
To monitor the flow of cooling air, you can optionally install an air flow monitoring facility in the blower.
Switching capacity of the micro switches: Resistive load cos φ 1: to 30 V DC 0.1 A or 30—250 V AC 5 A
Inductive load cos φ 0.6: to 30 V DC 0.1 A or 30—250 V AC 3 A

The contacts open when the air through flow is too low.

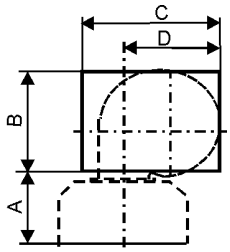
Filter

Rectangular filter

Dimensions with blower at top, with asterisk (*) blower at side (in mm)



Filter to B side

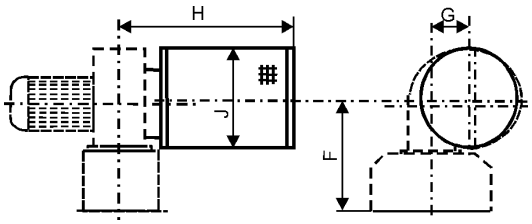


View towards A side

Motor Size	Blower Type	A	A*	b	c	D	D*	e
100	BFB 398	120		176	246	147	157	145
112	BFB 398	130	150	176	246	157		145
132	BFB 635	158	178	236	336	235		189
160	BFB 752	190	206	276	386	271		280
180	BFB 752	210	215	276	386	271		280
200	BFB 880	244	254	336	476	332		410

Round filter

Dimensions with blower at top, with asterisk (*) blower at side (in mm)

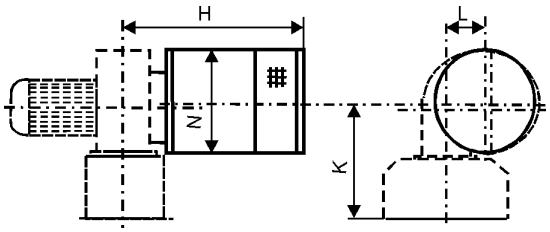


Motor Size	Blower Type	F	F*	G	G*	H	J
100	BFB 398	202		61	71	311	174
112	BFB 398	211	231	71		311	174
132	BFB 635	267	287	99		460	252
160	BFB 752	326	342	100		570	306
180	BFB 752	345	350	100		570	306
200	BFB 880	390	400	122		860	356

With size 100 filter to B- side
With sizes 112-200 filter to A- side

Sound absorber

Dimensions with blower at top, with asterisk (*) blower at side (in mm)



Motor Size	Blower Type	K	K*	L	L*	H	N
100	BFB 398	——		——		——	——
112	BFB 398	——		——		——	——
132	BFB 635	267	287	99		460	256
160	BFB 752	326	342	100		580	306
180	BFB 752	345	350	100		580	306
200	BFB 880	390	400	122		860	356

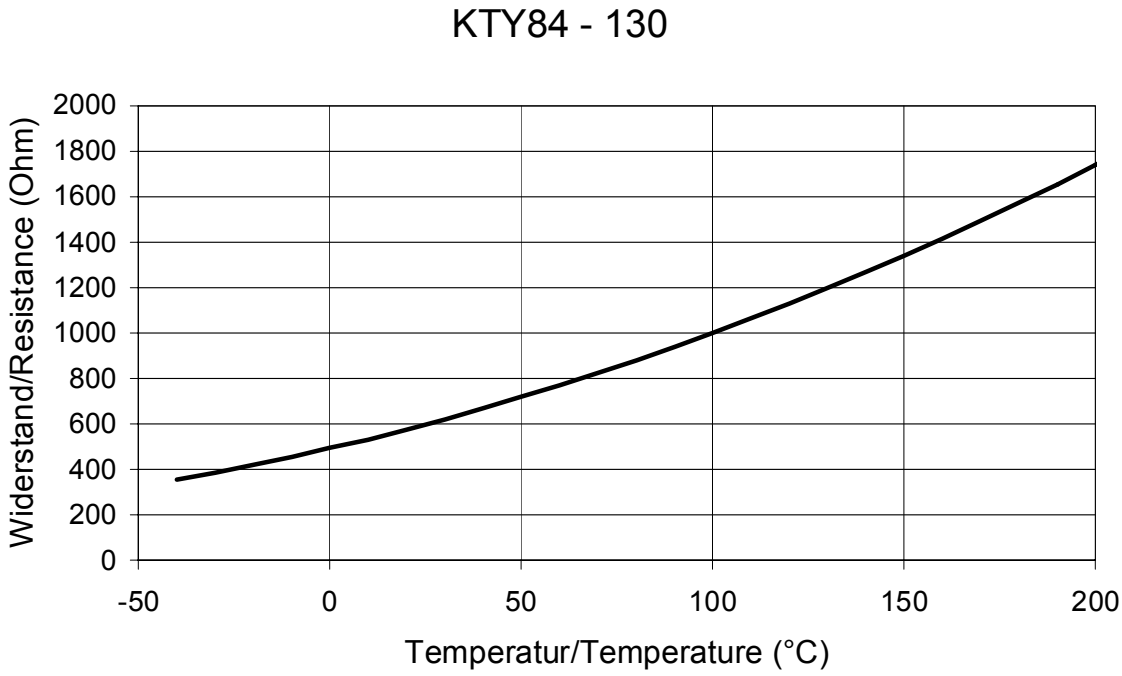
Sound absorber to A side by default.
A sound absorber to the B side is possible; in this case, the sound absorber must be supported on the customer side.
In the case of sound absorbers at the side, support must be on the customer side.

3.6. Temperature monitoring

Thermal relays

As standard, motors are fitted with two thermal relays for temperature monitoring one of which is in the commutating pole and the other in the field winding for switching off.
Switching capacity of the thermal relays:
AC cos φ 1.0 250 V 2.5 A; 500 V 0.75 A; AC cos φ 0.6 250 V 1.6 A; 500 V 0.5 A; DC 24 V 1.6 A
Optional, it is possible to use two KTY 84 temperature sensors for temperature monitoring.
On request, it is also possible to use PTC thermistors or Pt100 measuring shunts. You can also use further temperature monitoring facilities, e.g. for alerts.
The contacts are implemented as NCC contacts.

Temperature detector (option)



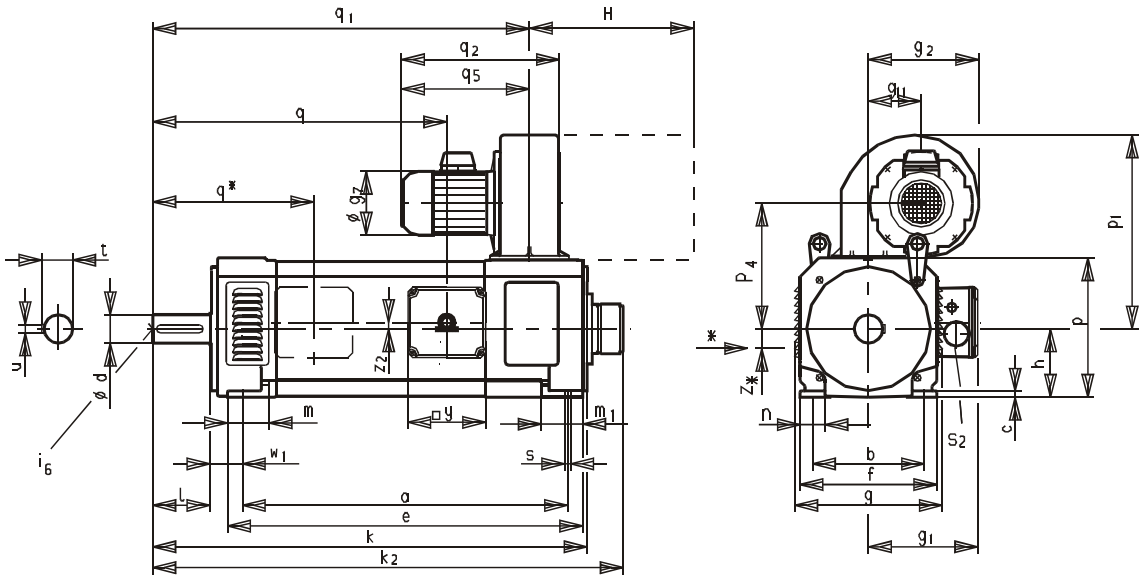
The KTY 84—130 temperature detector continuously monitors the motor temperature
Feeding a measuring current of 2mA to the detector yields the resistance curve shown above.

3.7. Brush monitoring

With the motors, you can optionally install potential-free micro switches to monitor the remaining length of the carbon brushes.
Switching capacity of the micro switches:
Resistive load: 28V DC — 7A or 230V AC — 3A; Inductive load: 28V DC — 4A or 230V AC — 2A
Important: Operating voltage at least 24—28 V DC, 230 V AC. Minimum current per contact of 15mA.
The contacts open when the carbons are worn down.

4. Dimensional drawings

4.1. GNA 100-200 N (IM B3)



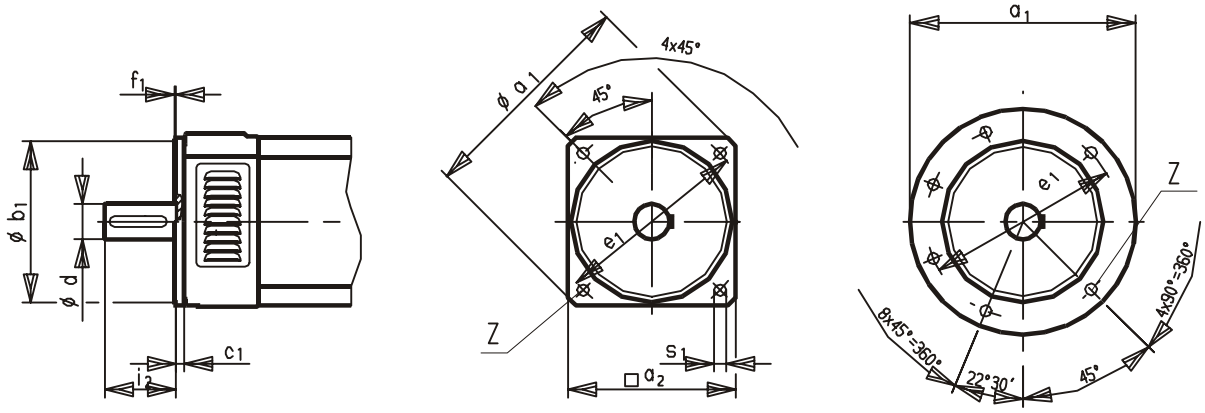
* Dimensions with fan installed at side

Size	Shaft						Pedestal								Flange									
	d	l	t	u	i_6	w_1	a	b	c	e	f	s	m / m_1	n	a_1	b_1	c_1	e_1	f_1	i_2	s_1	a_2	z	A/B
100 SN	38	80	41	10	M 12	63	305	160	10	341	196	12	75	38	250	180	11	215	4	80	14	—	4	b
100 MN							360			396														
100 LN							410			446														
112 SN	42	110	45	12	M 16	56	460	190	10	490	220	12	59/46	50	300	230	14	265	4	110	14	240	4	A
112 MN							510			540														
112 LN							570			600														
132 KN	48	110	51.5	14	M 16	63	460	216	12	503	264	12	80/49	57	350	250	16	300	5	110	18	260	4	A
132 SN							510			553														
132 MN							590			633														
132 LN							690			733														
160 SN	60	140	64	18	M20	70	614	254	12	653	312	14	85/60	65	400	300	20	350	5	140	18	312	4	A
160 MN							724			763														
160 LN							834			873														
180 SN	65	140	69	18	M20	121	392	279	16	432	328	15	57	65	400	300	15	350	5	140	18	—	4	B
180 MN							502			542														
180 LN							572			612														
200 SN	70	140	74.5	20	M20	133	455	318	18	501	376	18	64	80	450	350	16	400	5	140	18	—	8	B
200 MN							540			586														
200 LN							660			706														

4.2. GNA 100-200 N (IM B35)

Positions of flanges drilled holes

Version A **Version B**

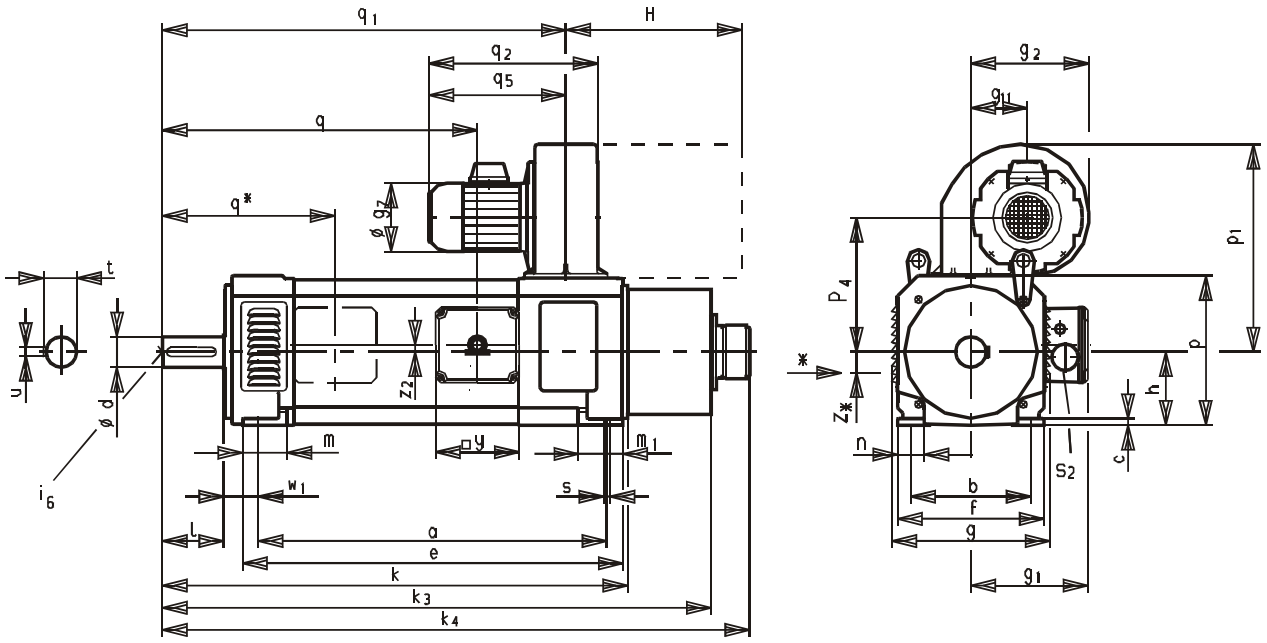


Centring in shaft ends according to DIN 332 shape D
Version with a second shaft end on request
k_2 with tachometer GHT

Fittings of shaft ends according to DIN 748 T3
Flange version according to DIN 42948
Forced ventilation can be rotated by 180°

Motor																			fan	* Dim. with fan mounted at side					
g	g_1	g_2	g_7	g_{11}	h	k	k_2	p	p_1	p_4	q	q*	q_1	q_2	q_5	S_2	y	z_2	H	Typ	g^*_2	g^*_{11}	p^*_1	p^*_4	q^*_1	z*
236	175	163	108	68	100	510	581	220	300	195	324	-	445	230	185	1M25	152	0	311	BFB 398	173	78	300	195	445	0
						565	636				379		500			1M20									500	
						615	686				429		550												550	
245	205	173	108	78	112	652	725	230	310	205	385	317	558	230	185	2M40	190	0	311	BFB 398	173	78	330	225	558	0
						702	775				435		608			1M20									608	
						762	835				495		668												668	
285	240	237	145	114	132	659	732	270	410	252	360	352	560	346	277	2M50	225	0	460	BFB 635	237	114	430	272	560	0
						709	782				410		610			2M25									610	
						789	862				490		690												690	
						889	962				590		790												790	
340	265	269	179	125	160	856	930	324	480	300	520	392	738	387	317	2M50	225	0	570	BFB 752	269	125	495	315	722	0
						966	1040				630		848			2M25									832	
						1076	1150				740		958												942	
385	380	269	179	125	180	944	1015	370	500	320	536	379	794	387	317	6M32	330	58,5	570	BFB 752	269	125	505	325	784	0
						1054	1125				646		904			3M25									894	
						1124	1195				716		974												964	
425	400	312	200	147	200	1016	1090	410	580	365	616	385	881	485	385	6M32	330	72,5	860	BFB 880	312	147	590	375	881	0
						1101	1175				701		966			3M25									966	
						1221	1295				821		1086												1086	

4.3. GNA 100-200 N G (motor with brake, IM B3)



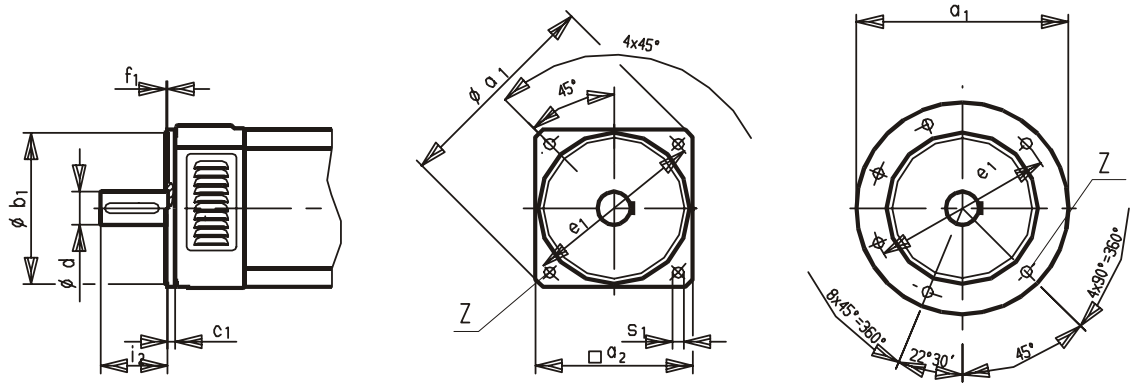
* Dimensions with fan installed at side

Size	Shaft						Pedestal								Flange									
	d	l	t	u	i_6	w_1	a	b	c	e	f	s	m/ m_1	n	a_1	b_1	c_1	e_1	f_1	i_2	s_1	a_2	z	A/B
100 SN	38	80	41	10	M 12	63	305	160	10	341	196	12	75	38	250	180	11	215	4	80	14	—	4	b
100 MN							360			396														
100 LN							410			446														
112 SN	42	110	45	12	M 16	56	460	190	10	490	220	12	59/46	50	300	230	14	265	4	110	14	240	4	A
112 MN							510			540														
112 LN							570			600														
132 KN	48	110	51.5	14	M 16	63	460	216	12	503	264	12	80/49	57	350	250	16	300	5	110	18	260	4	A
132 SN							510			553														
132 MN							590			633														
132 LN							690			733														
160 SN	60	140	64	18	M20	70	614	254	12	653	312	14	85/60	65	400	300	20	350	5	140	18	312	4	A
160 MN							724			763														
160 LN							834			873														
180 SN	65	140	69	18	M20	121	392	279	16	432	328	15	57	65	400	300	15	350	5	140	18	—	4	b
180 MN							502			542														
180 LN							572			612														
200 SN	70	140	74.5	20	M20	133	455	318	18	501	376	18	64	80	450	350	16	400	5	140	18	—	8	b
200 MN							540			586														
200 LN							660			706														

4.4. GNA 100-200 N G (motor with brake, IM B35)

Positions of flanges drilled holes

Version A **Version B**



Centring in shaft ends according to DIN 332 shape D
Version with a second shaft end on request
k_2 with tachometer GHT
k_4 with brake and tachometer GHT

Fittings of shaft ends according to DIN 748 T3
Flange version according to DIN 42948
k_3 with brake
Forced ventilation can be rotated by 180°

Motor																				fan	* Dim. w. fan mounted at side					
g	g_1	g_2	g_7	g_{11}	h	k	k_3	k_4	p	p_1	p_4	q	q*	q_1	q_2	q_5	S_2	y	z_2	h	Type	g^*_2	g^*_{11}	p^*_1	p^*_4	q^*_1	z*
236	175	163	108	68	100	510	595	680	220	300	195	324	-	445	230	185	1M25	152	0	311	BFB 398	173	78	300	195	445	0
						565	650	735				379		500			1M20									500	
						615	700	785				429		550												550	
245	205	173	108	78	112	652	755	830	230	310	205	385	317	558	230	185	2M40	190	0	311	BFB 398	173	78	330	225	558	0
						702	805	880				435		608			1M20									608	
						762	865	940				495		668												668	
285	240	237	145	114	132	659	770	850	270	410	252	360	352	560	346	277	2M50	225	0	460	BFB 635	237	114	430	272	560	0
						709	820	900				410		610			2M25									610	
						789	900	980				490		690												690	
						889	1000	1080				590		790												790	
340	265	269	179	125	160	856	970	1045	324	480	300	520	382	738	387	317	2M50	225	0	570	BFB 752	269	125	495	315	722	0
						966	1080	1155				630		848			2M25									832	
						1076	1190	1265				740		958												942	
385	380	269	179	125	180	944	on request		370	500	320	536	379	794	387	317	6M32	330	58,5	570	BFB 752	269	125	505	325	784	0
						1054						646		904			3M25									894	
						1124						716		974												964	
425	400	312	200	147	200	1016	on request		410	580	365	616	385	881	485	385	6M32	330	72,5	860	BFB 880	312	147	590	375	881	0
						1101						701		966			3M25									966	
						1221						821		1086												1086	

5. Commissioning and maintenance instructions

For motor commissioning, please contact us for our commissioning and maintenance instructions.

00520 for internally cooled DC-shunt motors with ball bearings

00526 for internally cooled DC-shunt motors with roller bearings

6. Declaration of Conformity

This chapter contains general information on EC Directives, the CE marking and the Declaration of Conformity.

6.1. What is an EC Directive?

EC Directives stipulate specific requirements. The Directives are compiled by the corresponding organisations within the EU and transposed by all EU member states into national law to guarantee free trade within the European Union.

An EC Directive only outlines basic minimum requirements. More detailed requirements are included in standards to which the Directive makes direct reference.

6.2. What does the CE marking signify?

a) The CE marking symbolises conformity to all the obligations incumbent on manufacturers for the product by virtue of the Community Directives providing for its affixing.

b) The CE marking affixed to industrial products symbolises the fact that the natural or legal person having affixed or been responsible for affixing the said marking has verified that the product conforms to all Community provisions for total harmonisation which apply to it and has been the subject of the appropriate conformity evaluation procedures.

Council Decision 93/465/EEC, appendix I B. a) + c)

We affix the CE marking to the device and include it in the documentation as soon as we have established that the product fulfils the requirements outlined in the relevant Directives.

If this Baumüller product is used in your machine as specified, you can assume that the product satisfies the requirements stipulated in 2006/95/EC.

Correct installation is a decisive factor in ensuring that this product complies with 89/336/EEC (EMC Directive). Since you are installing the product yourself, you are also responsible for ensuring compliance with 89/336/EEC.

We will provide you with assistance in the form of EMC information, which can be found in the corresponding technical instructions. Once you have satisfied all the requirements outlined in this documentation and the technical instructions, you can assume (or "suppose") that the product meets all the requirements stipulated in the EMC Directive.

Please remember to observe all binding national, local and system-specific regulations as well.

In order for you to operate your machine within the EU, the following must be available:

- Mark of conformity (CE symbol)
- Declaration(s) of Conformity relating to the relevant Directive(s) for the machine

6.3. Definition of terms in the Declaration of Conformity

A Declaration of Conformity based on this documentation is a declaration that the electrical equipment brought into circulation meets all the basic health and safety regulations that currently apply.

By including the Declaration of Conformity in this chapter, Baumüller Nürnberg GmbH declares that the product complies with all the relevant basic health and safety regulations from the Directives and standards listed in the Declaration of Conformity.

6.4. EU - Declaration of Conformity

CE

EG-Konformitätserklärung
gemäß

- Richtlinie 2006/95/EG
  (betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen)

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Hiermit erklären wir, dass die nachfolgend genannten Produkte aufgrund ihrer Konzeption, Konstruktion und Bauart in der von uns in Verkehr gebrachten Ausführung den grundlegenden Anforderungen der oben genannten Richtlinie einschließlich der zum Zeitpunkt der Erklärung geltenden Änderungen entsprechen.

Hinweise:

1. Bei Umbau oder Änderungen am Produkt verliert diese Erklärung mit sofortiger Wirkung ihre Gültigkeit.

2. Diese Erklärung bescheinigt die Übereinstimmung mit der genannten Richtlinie, stellt aber keine Zusicherung von darüber hinaus gehenden Produkteigenschaften dar.

Angewandte harmonisierte Normen:

- DIN EN 60034-1:2004
  Drehende elektrische Maschinen – Teil 1:
  Bemessung und Betriebsverhalten
- DIN EN 60034-5:2001/A1:2007
  Drehende elektrische Maschinen – Teil 5:
  Schutzarten aufgrund der Gesamtkonstruktion von drehenden elektrischen Maschinen (IP-Code) – Einteilung
- DIN EN 60034-6:1993
  Drehende elektrische Maschinen – Teil 6:
  Einteilung der Kühlverfahren (IC-Code)

(Wird fortgesetzt auf der nächsten Seite…)

EU-Declaration of Conformity
according

- Directive 2006/95/EC
  (relating to electrical equipment designed for use within certain voltage limits)

Manufacturer

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Internet: www.baumueller.de

We declare, that the products referred to in the following conform in their concept, construction and design as lauched by us to the above mentioned directive(s) and their respective changes which were valid at the point of declaration.

Notes:

1. By modifying or alternating the device(s) this declaration immediately becomes invalid.

2. This declaration confirms the compliance with the directive listed, but it is no covenant of any further product properties.

Applied harmonised standards:

- DIN EN 60034-1:2004
  Rotating electrical machines – Part 1:
  Rating and performance
- DIN EN 60034-5:2001/A1:2007
  Rotating electrical machines – Part 5:
  Degree of protection provided by integral design of rotating electrical machines (IP-Code) – Classification
- DIN EN 60034-6:1993
  Rotating electrical machines – Part 6:
  Methods of cooling (IC-Code)

(To be continued on the next page…)

(... Fortsetzung von der vorherigen Seite)

- DIN EN 60034-7:1993/A1:2001
  Drehende elektrische Maschinen - Teil 7:
  Klassifizierung für Bauarten, der Aufstellungsarten und der Klemmkasten-Lage (IM-Code)
- DIN EN 60034-9:2005/A1:2007
  Drehende elektrische Maschinen – Teil 9:
  Geräuschgrenzwerte
- DIN EN 60034-11:2004
  Drehende elektrische Maschinen – Teil 11:
  Thermischer Schutz
- DIN EN 60034-14:2004/A1:2007
  Drehende elektrische Maschinen – Teil 14:
  Mechanische Schwingungen von bestimmten Maschinen mit einer Achshöhe von 56 mm und höher – Messung, Bewertung und Grenzwerte der Schwingstärke
- DIN EN 60204-1:2006
  Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen - Teil 1:
  Allgemeine Anforderungen
- DIN EN 61800-5-1:2007
  Elektrische Leistungsantriebssysteme mit einstellbarer Drehzahl – Teil 5-1:
  Anforderungen an die Sicherheit – Elektrische, thermische und energetische Anforderungen

(... continued from the previous page)

- DIN EN 60034-7:1993/A1:2001
  Rotating electrical machines - Part 7: Classification of types of construction, mounting arrangements and terminal box position (IM code)
- DIN EN 60034-9:2005/A1:2007
  Rotating electrical machines – Part 9:
  Noise limits
- DIN EN 60034-11: 2004
  Rotating electrical machines – Part 11:
  Thermal protection
- DIN EN 60034-14:2004/A1:2007
  Rotating electrical machines – Part 14:
  Mechanical vibration of certain machines with shaft heights 56 mm and higher – Measurement, evaluation and limits of vibration severity
- DIN EN 60204-1:2006
  Safety of machinery - Electrical equipment of machines - Part 1:
  General requirements
- DIN EN 61800-5-1:2007
  Adjustable speed electrical power drive systems – Part 5-1:
  Safety requirements – Electrical, thermal and energy

Produkt / Product (x): optionaler Buchstabe / optional character (x,y): alternative Buschstaben oder Zahlen / alternative character or number	**Jahr der erstmaligen CE-Kennzeichnung / Year of first CE marking**
GN{A,F}100x{S,M,L}N **GN{A,F}112x{S,M,L}N** **GN{A,F}132x{S,M,L}N** **GN{A,F}160x{S,M,L}N** **GN{A,F}180x{S,M,L}N** **GN{A,F}200x{S,M,L}N**	**1998**

Nürnberg, 28.11.2012

i.V. Seidler

Dipl. Ing. Siegfried Seidler

Leiter Entwicklung Motoren
Head of Motor Development

i.A. Buchner

Dipl.-Ing.(FH)Stefan Buchner

Bereichsleitung Produktion
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