

## g500-B + m540-P bevel geared motor





## Contents

|                                             |           |
|---------------------------------------------|-----------|
| <b>About this document</b>                  | <b>5</b>  |
| Document description                        | 5         |
| Further documents                           | 6         |
| Notations and conventions                   | 7         |
| <b>Product information</b>                  | <b>8</b>  |
| Product description                         | 8         |
| Identification of the products              | 10        |
| Features                                    | 11        |
| The modular system                          | 12        |
| Designs                                     | 13        |
| Mounting positions                          | 17        |
| <b>Information on project planning</b>      | <b>21</b> |
| Safety instructions                         | 21        |
| Basic safety instructions                   | 21        |
| Application as directed                     | 21        |
| Residual hazards                            | 22        |
| General information                         | 24        |
| Drive dimensioning                          | 28        |
| Final configuration                         | 33        |
| Surface and corrosion protection            | 33        |
| Lubricants                                  | 34        |
| Ventilation                                 | 35        |
| <b>Mechanical installation</b>              | <b>38</b> |
| Important notes                             | 38        |
| Transport                                   | 39        |
| Installation                                | 40        |
| <b>Electrical installation</b>              | <b>41</b> |
| Important notes                             | 41        |
| Preparation                                 | 42        |
| <b>Technical data</b>                       | <b>43</b> |
| Notes regarding the given data              | 43        |
| Standards and operating conditions          | 44        |
| Conformities and approvals                  | 44        |
| Protection of persons and device protection | 44        |
| EMC data                                    | 45        |
| Environmental conditions                    | 45        |
| Gearbox data                                | 46        |
| Gearboxes with adapter                      | 49        |
| Radial forces and axial forces              | 53        |
| Selection tables                            | 55        |
| Motor – inverter assignment                 | 68        |
| Dimensions                                  | 70        |
| Basic dimensions                            | 71        |
| Additional lengths                          | 80        |
| Weights                                     | 81        |
| Basic weights                               | 81        |
| Additional weights                          | 81        |

# Contents

|                                          |            |
|------------------------------------------|------------|
| <b>Product extensions</b>                | <b>82</b>  |
| Torque plates                            | 82         |
| Shaft covers                             | 83         |
| Motor connection                         | 85         |
| Connection options                       | 85         |
| Assignment of the terminal boxes         | 86         |
| Assignment of the connectors HAN         | 90         |
| Connection via terminal box              | 92         |
| Connection via HAN connector             | 94         |
| Brakes                                   | 95         |
| Spring-applied application brake         | 96         |
| Feedback                                 | 106        |
| Resolver                                 | 106        |
| Incremental encoder                      | 106        |
| Blower                                   | 107        |
| Standard version                         | 107        |
| Temperature monitoring                   | 108        |
| PTC thermistor                           | 108        |
| <b>Product codes</b>                     | <b>109</b> |
| <b>Motor data</b>                        | <b>111</b> |
| Rated data                               | 111        |
| Rated data 50 Hz                         | 111        |
| Rated data 60 Hz                         | 113        |
| Rated data 87 Hz                         | 115        |
| Ecodesign Directive                      | 117        |
| <b>Environmental notes and recycling</b> | <b>121</b> |
| <b>Appendix</b>                          | <b>122</b> |
| Good to know                             | 122        |
| Operating modes of the motor             | 122        |
| Enclosures                               | 123        |



## About this document

### Document description

This document addresses to all persons who want to carry out any configurations with the products described.

The data and information compiled in this document serve to support you in the dimensioning and selection processes and in carrying out the electrical and mechanical installation. You will receive information regarding product extensions and accessories.

- The document includes safety instructions which must be observed.
- All persons working on and with the drives must have the documentation at hand during work and observe the information and notes relevant for it.
- The documentation must always be complete and in a perfectly readable state.



## Further documents



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Information and tools with regard to the Lenze products can be found on the Internet:

[www.lenze.com](http://www.lenze.com) → Downloads

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## Notations and conventions

This document uses the following conventions to distinguish different types of information:

| Numbers |                         |                                                                                   |                                                                                                                                                                                                |
|---------|-------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | Decimal separator       | Point                                                                             | In general, the decimal point is used.<br>Example: 1 234.56                                                                                                                                    |
| Warning |                         |                                                                                   |                                                                                                                                                                                                |
|         | UL warning              | UL                                                                                | Are used in English and French.                                                                                                                                                                |
|         | UR warning              | UR                                                                                |                                                                                                                                                                                                |
| Text    |                         |                                                                                   |                                                                                                                                                                                                |
|         | Programs                | » «                                                                               | Software<br>Example: »Engineer«, »EASY Starter«                                                                                                                                                |
| Icons   |                         |                                                                                   |                                                                                                                                                                                                |
|         | Page reference          |  | Reference to another page with additional information<br>Example:  16 = see page 16                           |
|         | Documentation reference |  | Reference to another documentation with additional information<br>Example:  EDKxxx = see documentation EDKxxx |

### Layout of the safety instructions

#### **DANGER!**

Indicates an extremely hazardous situation. Failure to comply with this instruction will result in severe irreparable injury and even death.

---

#### **WARNING!**

Indicates an extremely hazardous situation. Failure to comply with this instruction may result in severe irreparable injury and even death.

---

#### **CAUTION!**

Indicates a hazardous situation. Failure to comply with this instruction may result in slight to medium injury.

---

#### **NOTICE**

Indicates a material hazard. Failure to comply with this instruction may result in material damage.

---



## Product information

### Product description

When used in combination with three-phase AC motors, our bevel gearboxes form a compact, powerful drive unit. Numerous options at the input and output end provide for the drive to be exactly adapted to your application.

The efficient bevel gearboxes are characterized by high permissible radial forces, closely stepped ratios and a low backlash. They are available in a 3-stage design with a torque of up to 20,000 Nm and a ratio of up to  $i = 240$ .

#### Versions

- High-efficient right-angle gearbox in a compact design for space-saving installation
- Market standard shaft dimensions and standardized flanges for easy machine integration
- Low backlash and high torsional rigidity during positioning provide for exact results

#### Three-phase AC motors for mains and inverter operation

In a power range from 1.5 to 55 kW, Lenze offers inverter-compatible three-phase AC motors in accordance with the Ecodesign Directive for more extensive tasks.

These motors have efficiency class IE3 and can be used for the versions required for open-loop or closed-loop inverter operation.

#### Customer benefit

- Efficiency class IE3 for the greatest economic benefit
- Space-saving thanks to compact direct attachment to Lenze gearboxes
- Can be used universally for a wide range of machine tasks due to the market-oriented modular system
- Conventional connectors ensure quick connection, also during servicing



Gearbox g500-B8000 with motor m540-P180/M4



## Flexible in motor mounting

For motor mounting, Lenze offers a scalable modular system of gearboxes with adapters.

Power is transmitted between the motor and gearbox via a flexible jaw coupling or a plug-in hollow shaft. The shaft holders are available for motor shafts with or without featherkey, depending on the design.

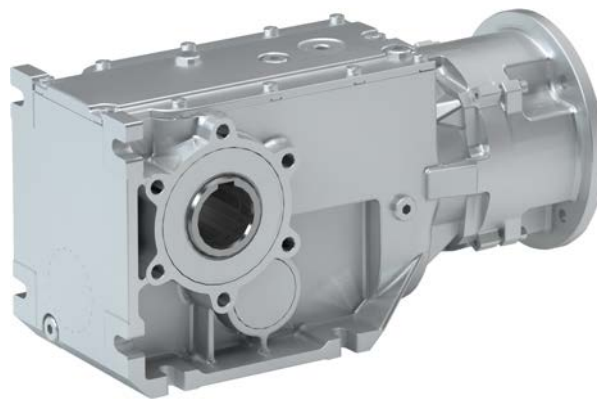
## Customer benefit

- Can be used universally for a wide range of machine tasks due to the market-oriented modular system
- Simple plug-in motor mounting
- Mounting motors according to IEC 72/DIN 42948
- Mounting motors according to NEMA C/TC
- Mounting servo motors with square flange according to IEC 72/DIN 42948
- Torsional vibration damping power transmission of the coupling
- Motor shaft connection, low backlash or backlash-free, depending on version

More information can be found under:

► [Gearbox data](#) 46

► [Gearboxes with adapter](#) 49



g500-B bevel gearbox with adapter for IEC standard motors



## Identification of the products

### Gearbox product name

| Gearbox type  | Product range |   | Type | Rated torque Nm | Product     |
|---------------|---------------|---|------|-----------------|-------------|
| Bevel gearbox | g500          | - | B    | 8000            | g500-B8000  |
|               |               |   |      | 13000           | g500-B13000 |
|               |               |   |      | 20000           | g500-B20000 |

### Three-phase AC motor product name

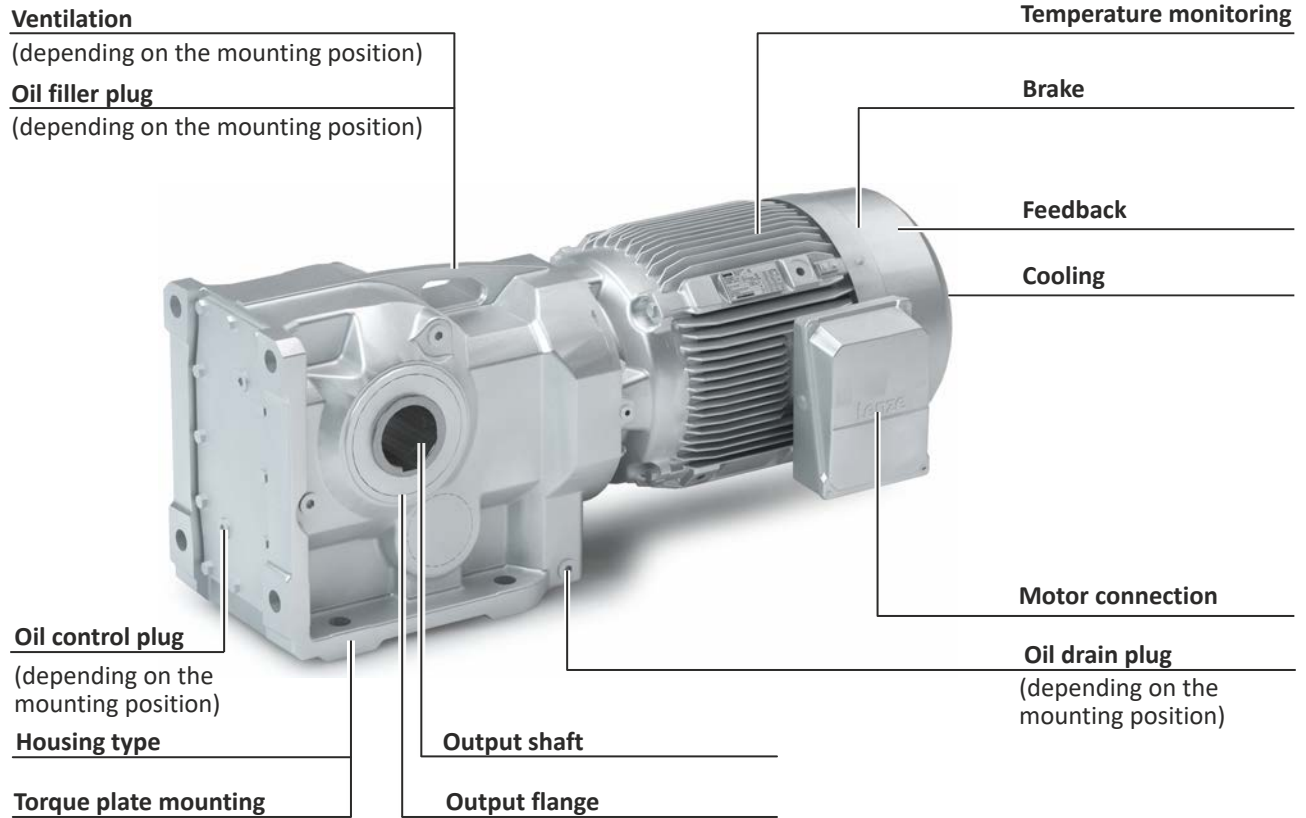
|         |      |   |   |    |        |   |   |
|---------|------|---|---|----|--------|---|---|
| Example | m540 | - | P | 90 | supply | L | 4 |
|---------|------|---|---|----|--------|---|---|

| Meaning              | Variant | Product name |  |   |                                                            |   |   |
|----------------------|---------|--------------|--|---|------------------------------------------------------------|---|---|
| Product family       |         | m550         |  |   |                                                            |   |   |
| Efficiency class     | IE3     |              |  | P |                                                            |   |   |
| Size                 |         |              |  |   | 90<br>100<br>112<br>132<br>160<br>180<br>200<br>225<br>250 |   |   |
| Motor length         | Medium  |              |  |   |                                                            | M |   |
|                      | Long    |              |  |   |                                                            | L |   |
| Number of pole pairs | 4-pole  |              |  |   |                                                            |   | 4 |



## Features

The following figure provides an overview of the elements and connections on the product. Their position, size and appearance may vary.





## The modular system



Values printed in bold are standard designs. Values that are not printed in bold are potential extensions, some of them including a surcharge.

### Geared motors 8000 Nm to 20000 Nm

| Gearbox                             |    | g500-B8000                                                 | g500-B13000                                   | g500-B20000 |
|-------------------------------------|----|------------------------------------------------------------|-----------------------------------------------|-------------|
| Min. motor assignment               |    | m540-P90                                                   | m540-P100                                     | m540-P112   |
| Max. motor assignment               |    | m540-P250                                                  | m540-P250                                     | m540-P250   |
| Technical data                      |    |                                                            |                                               |             |
| Max. output torque                  | Nm | 8000                                                       | 13000                                         | 20000       |
| Min. drive power at 50 Hz           | kW | 1.5                                                        | 2.2                                           | 4.0         |
| Max. drive power at 50 Hz           | kW | 55                                                         | 55                                            | 55          |
| Mounting position                   |    |                                                            |                                               |             |
| Standard                            |    | <b>M1, M2, M3, M4, M5, M6 (ABCDEF)</b>                     |                                               |             |
| Combined                            |    | -                                                          |                                               |             |
| Color                               |    | <b>Primed</b><br>Painted in RAL colors                     |                                               |             |
| Surface and corrosion protection    |    | <b>OKS-S</b><br>Different types of OKS                     |                                               |             |
| Output shaft                        |    |                                                            |                                               |             |
| Solid shaft with featherkey (V)     | mm | 90 x 170                                                   | 110 x 210                                     | 120 x 210   |
| <b>Hollow shaft with keyway (H)</b> | mm | 90                                                         | 100                                           | 120         |
| Hollow shaft with shrink disc (S)   | mm | 95                                                         | 105                                           | 125         |
| Shaft material                      |    | Steel                                                      |                                               |             |
| Output shaft bearing                |    | Standard                                                   |                                               |             |
| Gearbox version                     |    | <b>With foot (HBR)/(VBR/SBR)</b><br>Without centring (HDR) |                                               |             |
|                                     |    | With centring (HCR/VCR/SCR)                                | <b>With foot and centering(HAR)/(VAR/SAR)</b> |             |
|                                     |    | With output flange (HCK/VCK/SCK)                           | With foot and output flange (HAK/VAK/SAK)     |             |
| Output flange                       | mm | 450                                                        | 550                                           | 660         |
| Ventilation                         |    | <b>Vent valve</b><br>Oil compensation reservoir            |                                               |             |
| Cooling                             |    | <b>Integral fan</b><br>Blowers                             |                                               |             |
| Product extensions                  |    |                                                            |                                               |             |
| Torque plate                        |    | On the housing foot                                        |                                               |             |
| Shaft cover                         |    | Hollow shaft cover, hoseproof<br>Shrink disc cover         |                                               |             |
| Connection method                   |    | Y/Δ                                                        |                                               |             |
| Connection type                     |    | <b>Terminal box</b><br>HAN connector                       |                                               |             |
| Spring-applied brake                |    | <b>Without</b><br>Application brake                        |                                               |             |
| Feedback                            |    | <b>Without</b><br>Incremental encoder                      |                                               |             |
| Temperature monitoring              |    | PTC thermistor                                             |                                               |             |



## Designs

### Gearbox versions



Please observe the available gearbox designs!

► [The modular system](#) 12

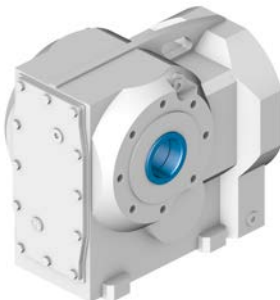
### g500-B8000

#### Hollow shaft, with foot

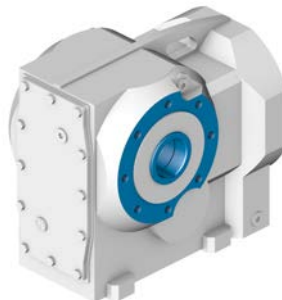


Without centring (HBR)

#### Hollow shaft, without foot



Without centring (HDR)



With centering (HCR)



Flange with through holes (HCK)

# Product information

The modular system  
Designs

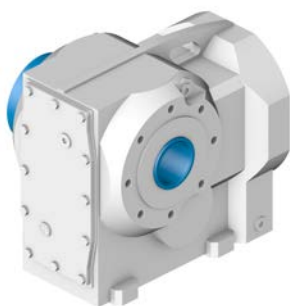


## Hollow shaft with shrink disc, with foot

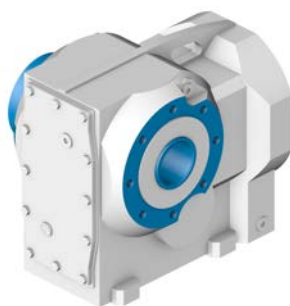


Without centring (SBR)

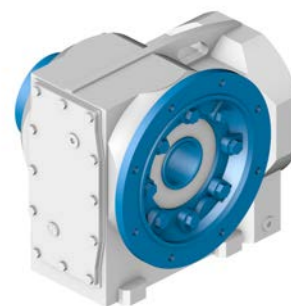
## Hollow shaft with shrink disc, without foot



Without centring (SDR)



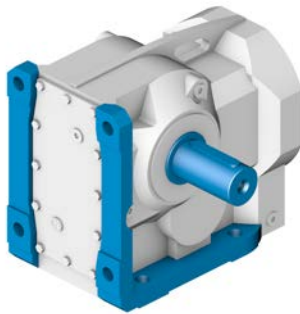
With centring (SCR)



Flange with through holes (SCK)

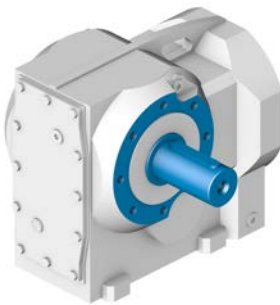


**Solid shaft, with foot**

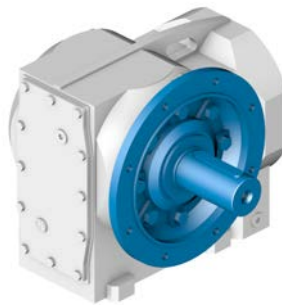


Without centring (VBR)

**Solid shaft, without foot**



With centering (VCR)



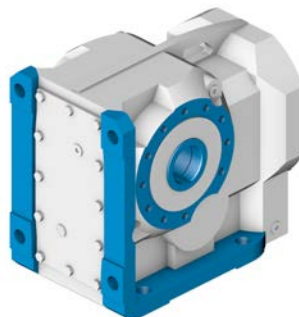
Flange with through holes (VCK)

**g500-B13000 ... B20000**

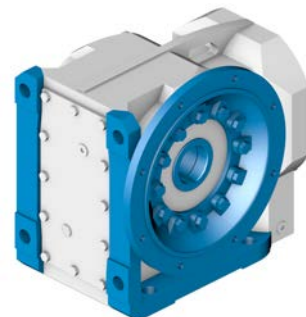
**Hollow shaft, with foot**



Without centring (HBR)



With centring (HAR)



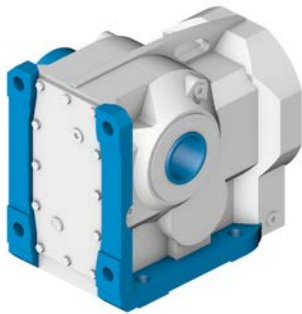
Flange with through holes (HAK)

# Product information

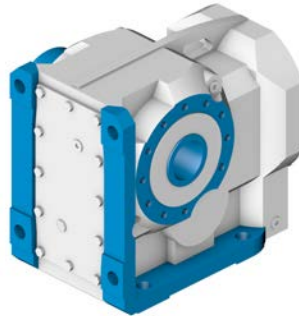
The modular system  
Designs



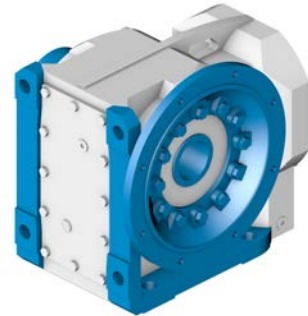
## Hollow shaft with shrink disc, with foot



Without centring (SBR)

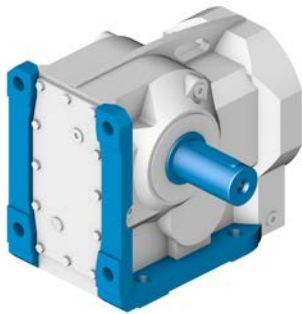


With centring (SAR)

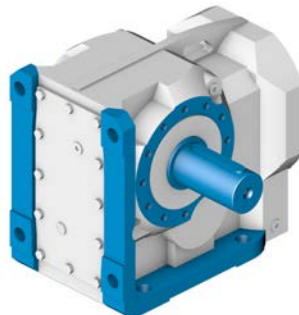


Flange with through holes (SAK)

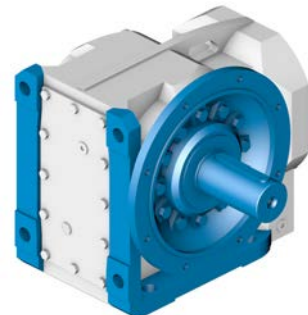
## Solid shaft, with foot



Without centring (VBR)



With centring (VAR)

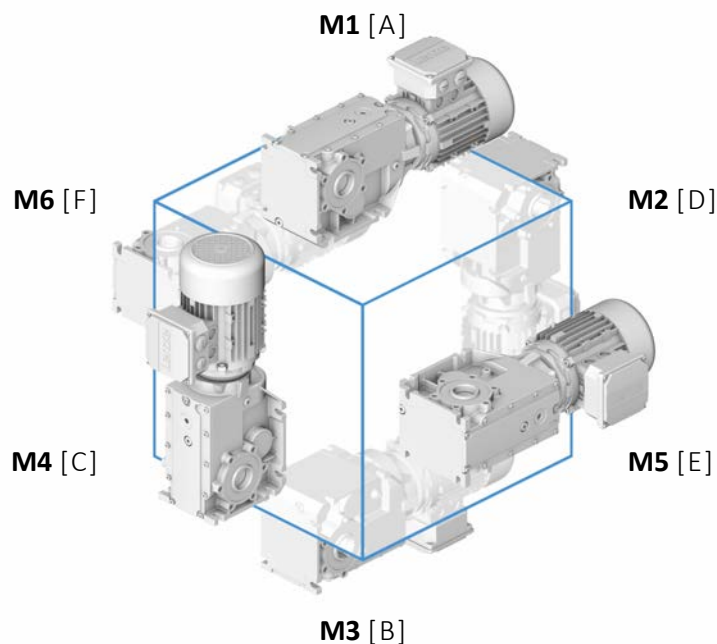


Flange with through holes (VAK)



## Mounting positions

Details of the mounting position are needed to ensure the corresponding lubricant amount, position of the ventilation, oil checks and oil drain plug on the gearbox.



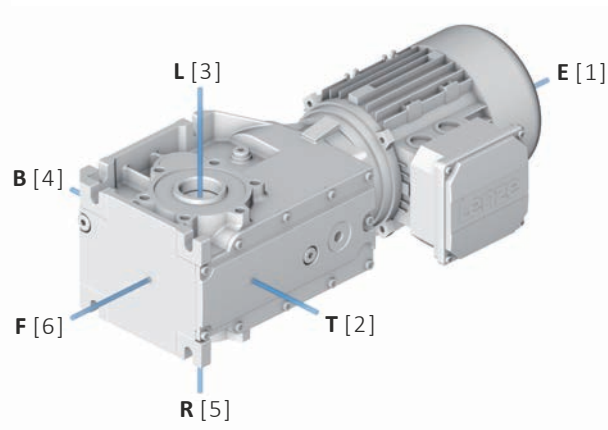
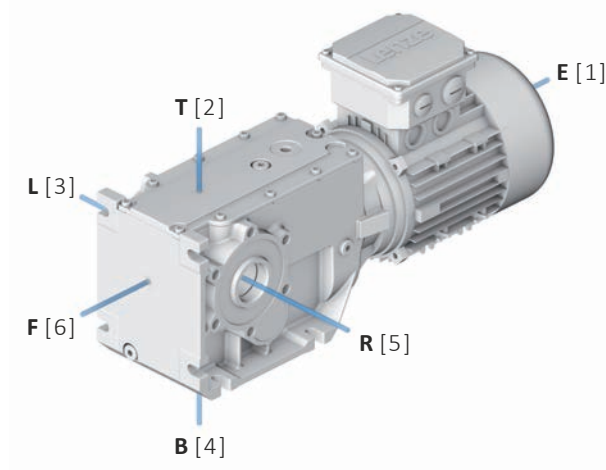
### Defined positions on the geared motor

All of the defined positions refer to the areas on the geared motor in mounting position **M1 (A)**.

Position of the built-on accessories with T, L, R, B, F, E (Top, Left, Right, Bottom, Front, and End)

If the geared motor is rotated into a different mounting position M2 ... M6 (B...F), the defined positions on the geared motor are retained.

Example: Mounting position M5 (E)

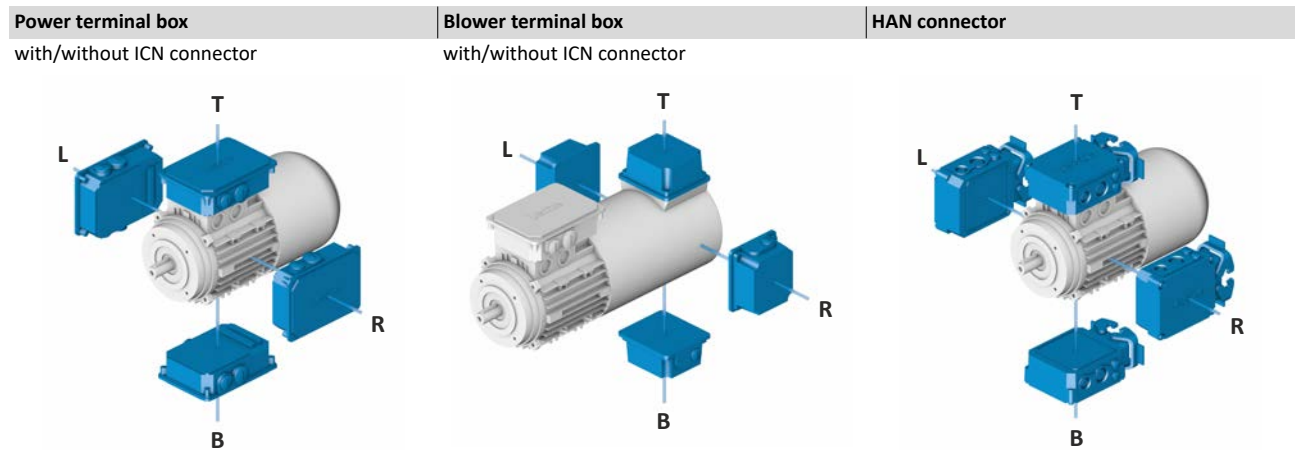


# Product information

The modular system  
Mounting positions



## Positions of the terminal boxes/connectors

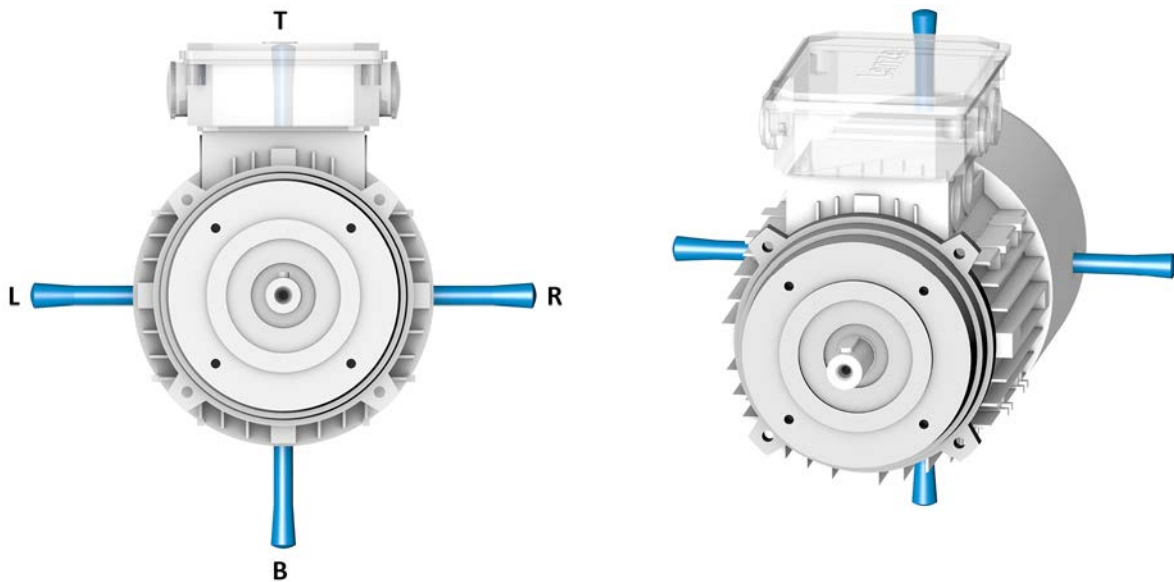


## Positions of the connections

HAN connector



## Position of the manual release lever

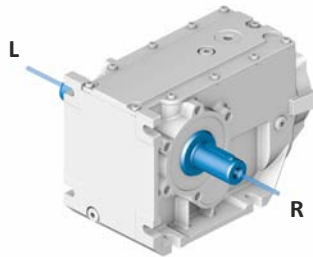




## Position of the solid shaft



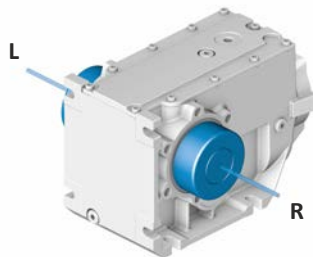
Double-ended output shaft journal "L+R".



## Position of the hollow shaft with shrink disc



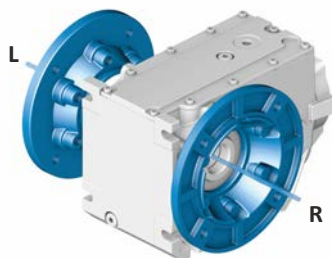
Output flange and shrink disc are not possible in the same position.



## Position of the output flange



Output flange on both sides "L+R".



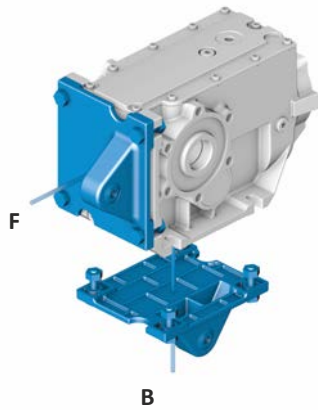
# Product information

The modular system  
Mounting positions

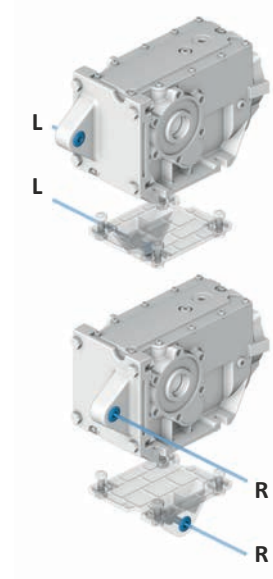


## Position of the torque plate on the housing foot

Position of the torque plate



Position of the rubber buffer on the torque plate





## Information on project planning

### Safety instructions

#### Basic safety instructions

Disregarding the following basic safety instructions and safety information may lead to severe personal injury and damage to property!

- Only use the product as directed.
- Never commission the product in the event of visible damage.
- Never modify the product technically.
- Never commission the product before assembly has been completed.
- Never operate the product without the required covers.
- Connect/disconnect all pluggable connections only in deenergized condition!
- Only remove the product from the installation in the deenergized state.
- The product can – depending on their degree of protection – have live, movable or rotating parts during or after operation. Surfaces can be hot.
- Observe the specifications of the corresponding documentation. This is the condition for safe and trouble-free operation and the achievement of the specified product features.
- The procedural notes and circuit details given in the associated documentation are suggestions and their transferability to the respective application has to be checked. The manufacturer of the product does not take responsibility for the suitability of the process and circuit proposals.
- All work with and on the product may only be carried out by qualified personnel. IEC 60364 and CENELEC HD 384 define the qualifications of these persons:
  - They are familiar with installing, mounting, commissioning, and operating the product.
  - They have the corresponding qualifications for their work.
  - They know and can apply all regulations for the prevention of accidents, directives, and laws applicable at the place of use.

#### Application as directed

- The product is a professional equipment intended for use by trades, specific professions or industry and not for sale to the general public. IEC 60050 [IEV 161-05-05]
- To prevent personal injury and damage to property, higher-level safety and protection systems must be used!
- All transport locks must be removed.
- Mounted eye bolts on the motor are not suitable for transporting geared motors.
- The product may only be operated under the specified operating conditions and in the specified mounting positions.
- The product may be operated on the mains or on the inverter.
- Only certified application brakes may be used as safety brakes for functional safety.
- The product must not be operated in private areas, in potentially explosive atmospheres and in areas with harmful gases, oils, acids and radiation.



## Residual hazards

Even if notes given are taken into consideration and protective measures are implemented, the occurrence of residual risks cannot be fully prevented.

The user must take the residual hazards mentioned into consideration in the risk assessment for his/her machine/system.

If the above is disregarded, this can lead to severe injuries to persons and damage to property!

### Product

Observe the warning labels on the product!



**Dangerous electrical voltage:**

Before working on the product, make sure there is no voltage applied to the power terminals!  
After mains disconnection, the power terminals will still carry the hazardous electrical voltage for the time given next to the symbol!



**Electrostatic sensitive devices:**

Before working on the product, the staff must ensure to be free of electrostatic charge!



**High leakage current:**

Carry out fixed installation and PE connection in compliance with:  
EN 61800-5-1 / EN 60204-1



**Hot surface:**

Use personal protective equipment or wait until the device has cooled down!

### Protection of persons

- The power terminals may carry voltage in the switched-off state or when the motor is stopped.
  - Before working, check whether all power terminals are deenergized.
- Voltages may occur on the drive components (e.g. capacitive, caused by inverter supply).
  - Careful earthing in the marked positions of the components must be carried out.
- There is a risk of burns from hot surfaces.
  - Provide protection against accidental contact.
  - Use personal protective equipment or wait until the device has cooled down.
  - Prevent contact with flammable substances.
- There is a risk of injury due to rotating parts.
  - Before working on the drive system, ensure that the motor is at a standstill.
- There is a risk of accidental start-up or electric shock.

### Motor protection

- Installed temperature sensors are no full protection for the machine.
  - If necessary, limit the maximum current. Parameterize the inverter so that it will be switched off after some seconds of operation with  $I > I_{rated}$ , especially if there is a risk of blocking.
  - Integrated overload protection does not prevent overloading under all conditions.
- The fuses are no motor protection.
  - Use a current-dependent motor protection switch.
  - Use the built-in temperature sensors.



### **Gearbox protection**

- Excessive vibration accelerations and resonances will damage the gearbox.
  - Do not operate the gearbox at vibration accelerations  $> 2 \text{ g}$  ( $20 \text{ m/s}^2$ ) of the machine.
  - Do not operate the gearbox in the resonance range of the machine.
- Excessive torques will damage the gearboxes.
  - Do not exceed the output torques specified on the nameplate.
- Excessive input speeds lead to increased temperatures.
  - Do not exceed the input speeds specified on the nameplate.
- Avoid excessive lateral forces on the gearbox shaft.
  - Align the shafts of the gearbox and driven machine exactly with each other.
- Machine elements can be damaged by a lack of lubricant.
  - Mount the gearbox only in the mounting position indicated on the nameplate.
  - When changing the lubricant, use the lubricant type and quantity specified on the nameplate.



## General information

### NOTICE

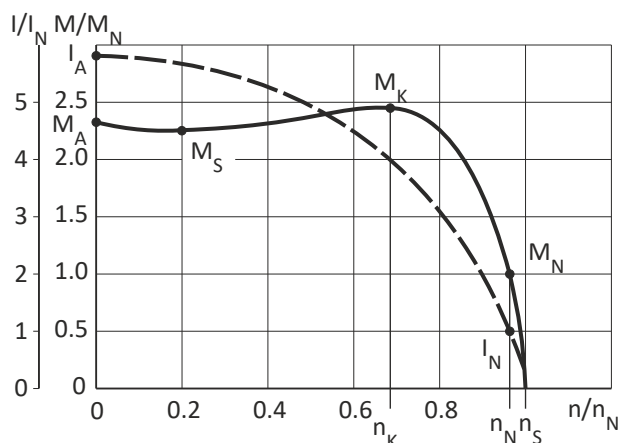
For gearboxes with hollow shaft and shrink disk  
observe the following requirements for the machine shaft:

- Fit tolerance h6
- Material yield strength  $R_e \geq 360 \text{ MPa}$
- Modulus of elasticity approx.  $210000 \text{ MPa}$
- Surface roughness  $R_z \leq 15 \text{ }\mu\text{m}$
- No radial, axial forces and forces due to stress/rotation permissible

### Operation with mains power

If operated with mains power, the three-phase AC motor starts up in accordance with the speed-torque characteristic when switched on. It follows this characteristic until it reaches its stable operating point. The operating point is reached when the load or rated torque ( $M_N$ ) is smaller than the starting torque ( $M_A$ ) and pull-up torque ( $M_S$ ). The rated speed ( $n_N$ ) of the drive is always less than the arithmetic synchronous speed ( $n_S$ ).

The difference between rated and synchronous speed relative to the synchronous speed is called the slip.





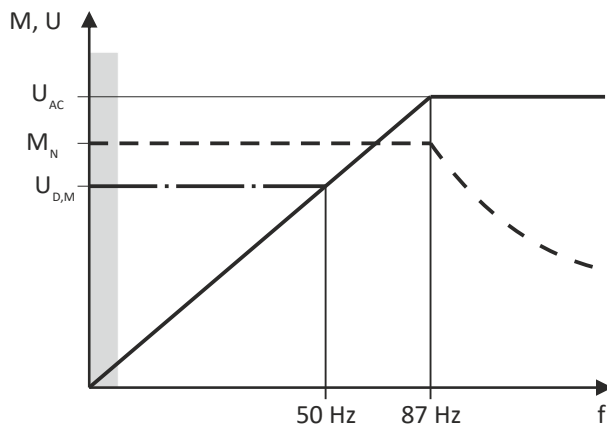
## Operation on the frequency inverter

### Standard setting

The frequency inverter is set for easy operation on a three-phase AC motor with vector control by default. The rated torque of the motor is available in a setting range up to 50 Hz in this mode of operation.

### Extended setting range up to 87 Hz

If the frequency inverter's U/f reference point is set to 87 Hz, the rated torque can be taken into account in an extended setting range. A 230/400 V motor is used here, for example, and operated in delta on a 400 V frequency inverter. The setting range is increased by 40 %. The inverter must be dimensioned for a rated motor current of 230 V.



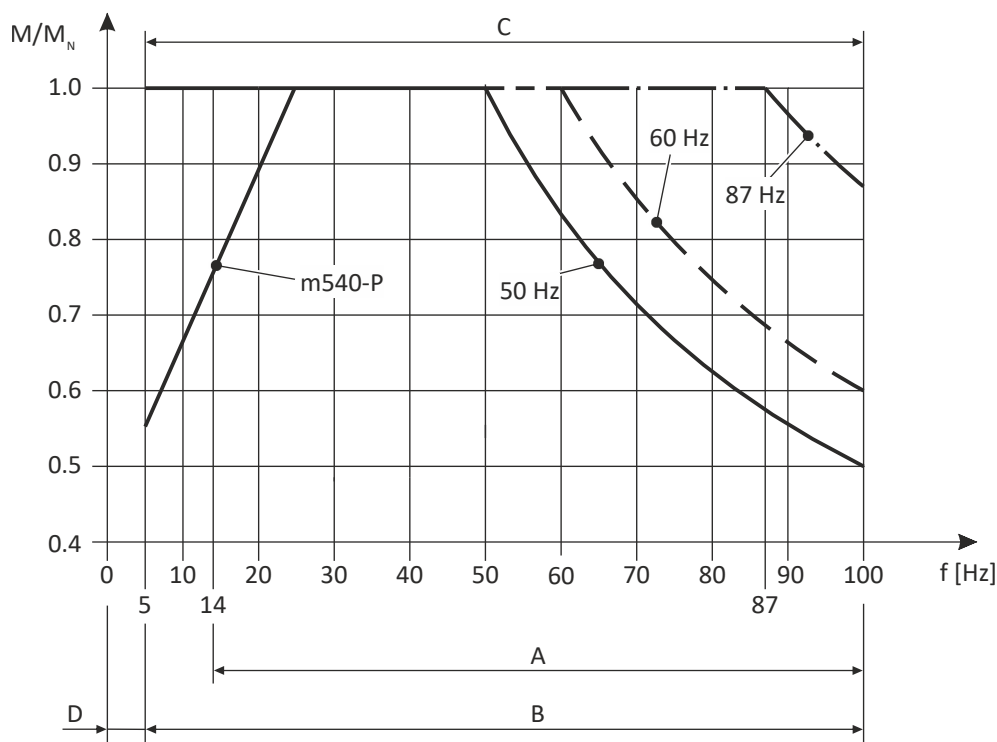


### Torque reduction at low motor frequencies

At low motor frequencies (usually < 20 Hz) and with an integral fan, the motor is not cooled sufficiently at the rated torque. The motor can be operated from 5 Hz by reducing the torque accordingly.

Constant cooling takes place over the entire speed range in motors with a blower. This means that they can be used with their rated torque from 5 Hz.

The diagram shows the motor size-dependent torque reduction for self-ventilated motors, taking into account the thermal behavior during operation at the inverter.



- A Operation with integral fan and brake
- B Operation with integral fan and brakes with a wide range voltage of DC 180 ... 205 V or AC 400 ... 460 V  
Operation with integral fan and "holding current reduction" brake control
- C Operation with blower
- D Operation below 5 Hz is possible depending on the application and the control method.  
Verification of the application by Lenze required.

### Thermal power limit

The thermal power limit, defined by the heat balance, limits the permissible continuous gearbox power. It is affected by

- the churning losses in the lubricant. These are determined by the mounting position and the circumferential speed of the gears
- the load and the speed spectrum.
- the ambient conditions: temperature, air circulation, input or dissipation of heat via shafts and the foundations.



## NOTICE

A thermal check with the Drive Solution Designer (DSD) or contacting your Lenze representative is required if

- ▶ the input speed  $n_1 > 1500$  rpm is fallen below in case of the gearbox ratios given in the following.
- ▶ the drive speeds mentioned in the following will be exceeded as a function of the mounting position. For a short period of time up to 5 min, 30 % higher speeds are permissible.
- ▶ the ambient temperature is predominantly above +30 °C.

| Gearbox               |  | Ratio i |  |
|-----------------------|--|---------|--|
| g500-B8000 ... B20000 |  | ≤ 60    |  |

| Motor             | Mounting position M1 | Mounting position M3, M5, M6 | Mounting position M2, M4 |
|-------------------|----------------------|------------------------------|--------------------------|
| m540-P90 ... P250 | 1500 rpm             | 1500 rpm                     | 1500 rpm                 |



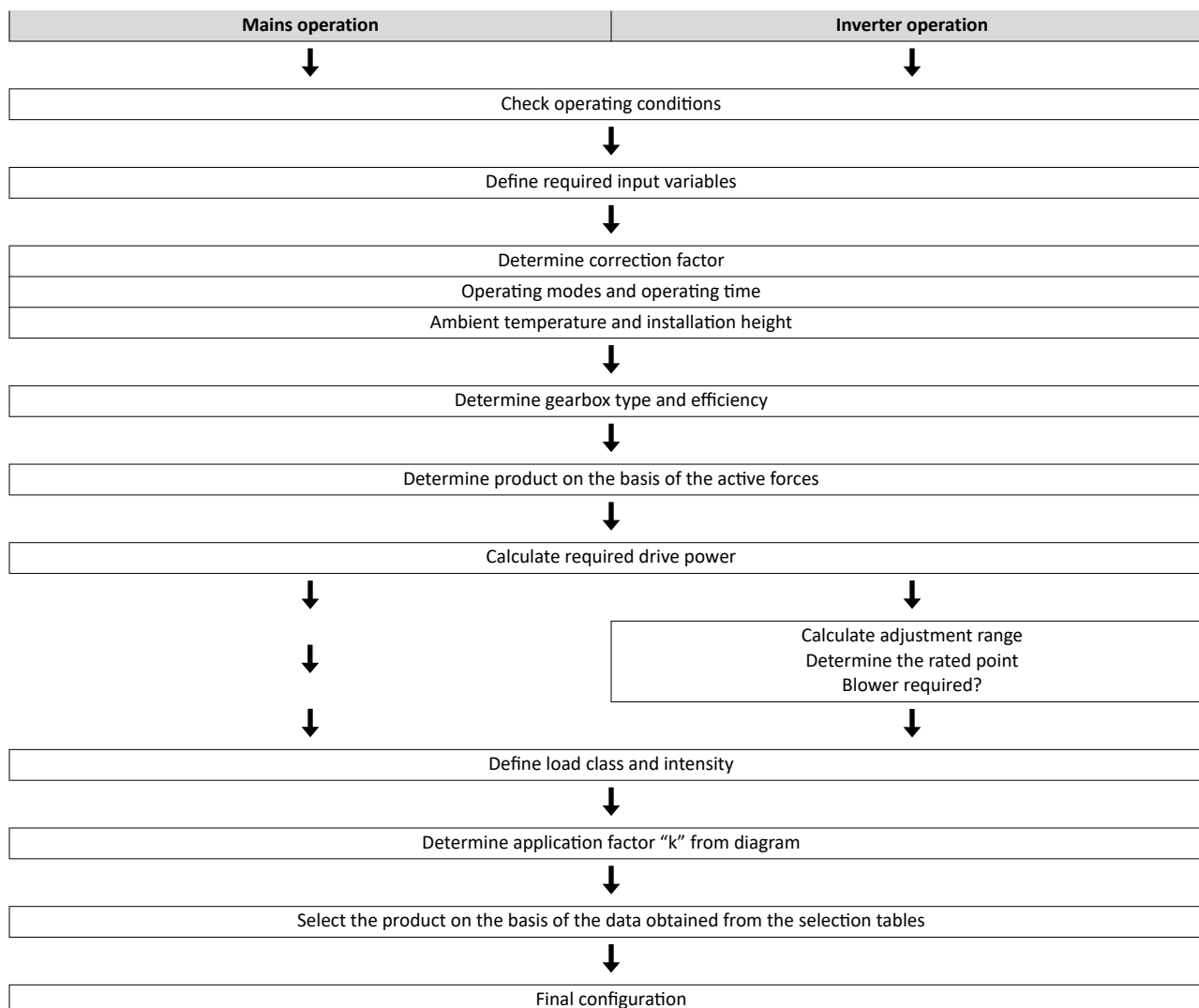
## Drive dimensioning

In order to carry out an accurate drive dimensioning process, you can use our configuring software, the »Drive Solution Designer«.

With the »Drive Solution Designer«, you can design the drive both quickly and to a high quality. The software contains profound and proven expertise with regard to drive applications and mechatronic drive components.

Please get in touch with your Lenze representative.

### Operation chart



### Check operating conditions

| Check                |
|----------------------|
| Approvals            |
| Conformities         |
| Supply voltage       |
| Degree of protection |
| Ambient temperature  |
| Surface protection   |

► Standards and operating conditions [44](#)

► Surface and corrosion protection [33](#)



## Define required input variables

| Necessary input variables                                                            | Note                                                                                       | Symbol      | Unit              |
|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------|-------------------|
| Operating time / day                                                                 |                                                                                            | OD          |                   |
| Ambient temperature                                                                  |                                                                                            | $T_V$       | °C                |
| Site altitude amsl                                                                   |                                                                                            | H           | m                 |
| Radial force                                                                         |                                                                                            | $F_{rad}$   | N                 |
| Axial force                                                                          |                                                                                            | $F_{ax}$    | N                 |
| Transmission element at the output<br>Effective diameter of the transmission element | Gear wheels, sprockets ...                                                                 | $d_w$       | mm                |
| Load torque                                                                          | For short-term load peaks                                                                  | $M_{L,max}$ | Nm                |
|                                                                                      | In rated operation                                                                         | $M_L$       | Nm                |
|                                                                                      | In mains operation, $M_{L,max}/M_L$ should be < 2.0 to guarantee a safe start of the motor |             |                   |
| Load speed                                                                           |                                                                                            | $n_{L,max}$ | rpm               |
|                                                                                      | In inverter operation                                                                      | $n_{L,min}$ | rpm               |
| Runtime for $M_{L,max}$                                                              | In inverter operation                                                                      |             | %                 |
| External moments of inertia                                                          |                                                                                            | $J_{ext}$   | kgcm <sup>2</sup> |
| Switching operations per hour                                                        |                                                                                            | $S_H$       | 1/h               |

## Determine correction factor

| Operating modes S1, S2, S3, S6, and operating time |       |                   |            |                   |            |                   |            |
|----------------------------------------------------|-------|-------------------|------------|-------------------|------------|-------------------|------------|
| Operating mode S1                                  |       | Operating mode S2 |            | Operating mode S3 |            | Operating mode S6 |            |
| ED                                                 | $k_L$ | ED                | $k_L$      | ED                | $k_L$      | ED                | $k_L$      |
| %                                                  |       | min               |            | %                 |            | %                 |            |
| 100                                                | 1.0   | 10                | 1.4 - 1.5  | 15                | 1.4 - 1.5  | 15                | 1.5 - 1.6  |
|                                                    |       | 30                | 1.15 - 1.2 | 25                | 1.3 - 1.4  | 25                | 1.4 - 1.5  |
|                                                    |       | 60                | 1.07 - 1.1 | 40                | 1.15 - 1.2 | 40                | 1.3 - 1.4  |
|                                                    |       | 90                | 1.0 - 1.05 | 60                | 1.05 - 1.1 | 60                | 1.15 - 1.2 |

► Operating modes of the motor [122](#)

| Installation height amsl |          |          |          |
|--------------------------|----------|----------|----------|
| ≤ 1000 m                 | ≤ 2000 m | ≤ 3000 m | ≤ 4000 m |
| Correction factor        |          |          |          |
| $k_H$                    | $k_H$    | $k_H$    | $k_H$    |
| 1                        | 0.95     | .90      | .85      |

| Ambient temperature |          |          |
|---------------------|----------|----------|
| ≤ 40 °C             | ≤ 45 °C  | ≤ 50 °C  |
| Correction factor   |          |          |
| $k_{TU}$            | $k_{TU}$ | $k_{TU}$ |
| 1                   | 0.95     | 0.90     |

| Mounting position |                   |       |       |       |       |       |
|-------------------|-------------------|-------|-------|-------|-------|-------|
| Gearboxes         | Mounting position |       |       |       |       |       |
|                   | M1                | M2    | M3    | M4    | M5    | M6    |
|                   | Correction factor |       |       |       |       |       |
|                   | $k_E$             | $k_E$ | $k_E$ | $k_E$ | $k_E$ | $k_E$ |
| g500-H            | 1.00              | 0.70  | 0.80  | 0.80  | 1.00  | 1.00  |
| g500-S            | 1.00              | 0.70  | 0.80  | 0.85  | 0.80  | 0.90  |
| g500-B            | 1.00              | 0.70  | 0.80  | 0.80  | 0.80  | 0.80  |

► Selection tables [55](#)



### Gearbox efficiency

| Gearboxes | Gearbox efficiency |  |
|-----------|--------------------|--|
|           | $\eta_{c1}$        |  |
| g500-B    |                    |  |
| 2-stage   | 0.96               |  |
| 3-stage   | 0.95               |  |
| 4-stage   | 0.94               |  |

### Determine product on the basis of the forces

| Transmission element           |                  |   | Gear wheels                                             | Sprockets                           | Toothed belt pulleys<br>(depending on the pretension) | Narrow V-belt<br>(depending on the pretension) |
|--------------------------------|------------------|---|---------------------------------------------------------|-------------------------------------|-------------------------------------------------------|------------------------------------------------|
| Additional radial force factor | f <sub>z</sub>   |   | ≥ 17 teeth: 1.0                                         | ≥ 20 teeth: 1.0                     | With belt tightener: 2.0 – 2.5                        | 1.5 – 2.0                                      |
|                                |                  |   | < 17 teeth: 1.15                                        | < 20 teeth: 1.25<br>< 13 teeth: 1.4 | Without belt tightener: 2.5 – 3.0                     |                                                |
|                                |                  |   | Calculation                                             |                                     | Check                                                 |                                                |
| Radial force                   | F <sub>rad</sub> | N | $F_{rad} = 2000 \times \frac{M_{L,max} \times f_z}{dw}$ |                                     | $F_{rad} \leq f_W \times F_{rad,max}$                 |                                                |
| Axial force                    | F <sub>ax</sub>  | N |                                                         |                                     | $F_{ax} \leq F_{rad,max} \times 0.5$                  |                                                |

dw Effective diameter of transmission element in mm

$f_w$  Additional load factor

► [Radial forces and axial forces](#) 53

### Calculate drive power

|                      |    |                                                                                                |  |
|----------------------|----|------------------------------------------------------------------------------------------------|--|
| Required Drive power | kW | $P_1 = \frac{M_L \times \eta_{L,max}}{9549 \times k_L \times k_H \times k_{TU} \times \eta_g}$ |  |
|----------------------|----|------------------------------------------------------------------------------------------------|--|

$k_L$  Correction factor - operating mode

$k_{TU}$  Correction factor - ambient temperature

$k_H$  Correction factor - site altitude

$\eta_g$  Gearbox efficiency

### Intensity and load class for mains operation

|           |       | Calculation                                                       |  |
|-----------|-------|-------------------------------------------------------------------|--|
| Intensity | $F_I$ | $F_I = \frac{\frac{J_L}{i^2} + J_M + J_B + J_Z}{J_M + J_B + J_Z}$ |  |

$i$  Ratio of gearbox

$J_B$  Moment of inertia of brake

$J_L$  Load moment of inertia

$J_Z$  Additional moment of inertia (handwheel, 2nd shaft end ...)

$J_M$  Motor moment of inertia

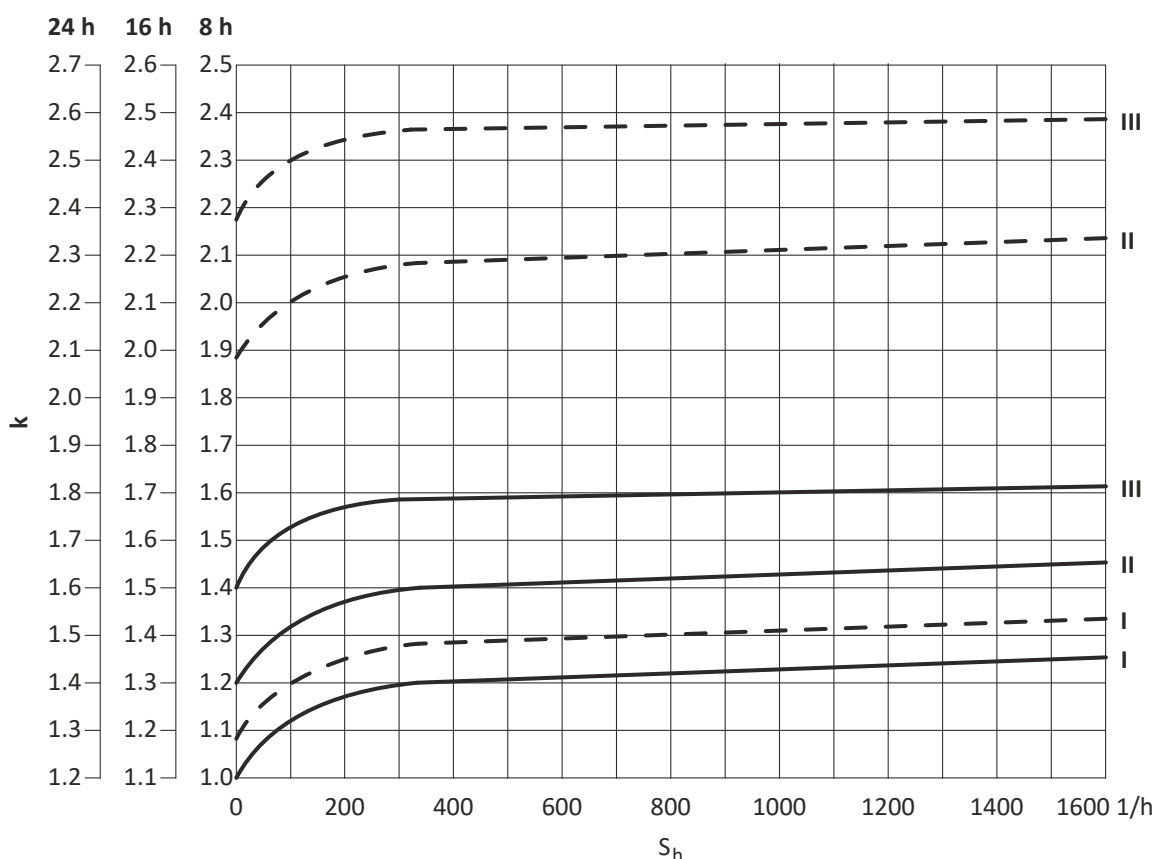
| Intensity           | Load type                                                     | Load class |
|---------------------|---------------------------------------------------------------|------------|
| $F_I \leq 1.25$     | Smooth operation, small or light jolts                        | I          |
| $1.25 < F_I \leq 4$ | Uneven operation, average jolts                               | II         |
| $F_I > 4$           | Uneven operation, severe jolts and/or <b>alternating load</b> | III        |



## Intensity and load class for inverter operation

|                    | Calculation                                                   |                                              |
|--------------------|---------------------------------------------------------------|----------------------------------------------|
| Intensity          | $M_I = \frac{M_{L,max}}{M_L}$                                 | For alternating load, select load class III! |
| Intensity          | Load type                                                     | Load class                                   |
| $M_I \leq 1.5$     | Smooth operation, small or light jolts                        | I                                            |
| $1.5 < M_I \leq 2$ | Uneven operation, average jolts                               | II                                           |
| $2 < M_I \leq 2.5$ | Uneven operation, severe jolts and/or <b>alternating load</b> | III                                          |

## Application factor k



- k Application factor
- $S_h$  Switching rate
- Ratio of motor stalling torque/rated torque < 2.5
- Ratio of motor stalling torque/rated torque ≥ 2.5

Stalling/rated motor torque ▶ [Rated data](#) 111

## Check and select product

Data ▶ [Selection tables](#) 55

## Mains operation

| Selection table | Screening               | Unit | Note                                                                     |
|-----------------|-------------------------|------|--------------------------------------------------------------------------|
| Rated frequency | 50                      | Hz   |                                                                          |
| Rated power     | $P_{rated} \geq P_1$    | kW   |                                                                          |
| Output torque   | $M_2 \geq M_L$          | Nm   | The geared motor must be able to provide enough torque for $M_{L,max}$ . |
| Output speed    | $n_2 \approx n_{L,max}$ | rpm  |                                                                          |
| Load factor     | $c \geq k$              |      |                                                                          |



### Inverter operation

| Selection table                            | Check                             | Unit | Note                                                                            |
|--------------------------------------------|-----------------------------------|------|---------------------------------------------------------------------------------|
| Rated frequency                            | 50/87                             | Hz   |                                                                                 |
| Rated power                                | $P_{\text{rated}} \geq P_1$       | kW   |                                                                                 |
| Output torque                              | $M_2 \geq M_L$                    | Nm   | The geared motor must be able to provide enough torque for $M_{L,\text{max}}$ . |
| Max. Output speed                          | $n_2 \approx n_{L,\text{max}}$    | rpm  |                                                                                 |
| Min. Output speed                          |                                   |      |                                                                                 |
| Self-ventilated                            | $n_{21} \approx n_{L,\text{min}}$ | rpm  | Adjustment ranges $\leq 2.5$ (50 Hz)<br>Adjustment ranges $\leq 4.35$ (87 Hz)   |
| Forced-ventilated                          |                                   |      |                                                                                 |
| Self-ventilated<br>(Output torque reduced) | $n_{22} \approx n_{L,\text{min}}$ | rpm  | Adjustment ranges $\leq 10$ (50 Hz)<br>Adjustment ranges $\leq 17.4$ (87 Hz)    |
| Load factor                                | $c \geq k$                        |      |                                                                                 |

| Order information | Example     |
|-------------------|-------------|
| Geared motor      |             |
| Gearbox           | g500-B8000  |
| Motor             | m540-P90/L4 |
| Gearbox ratio i   | 140.930     |
| Number of stages  | 3           |



## Final configuration

|                       | Screening                                                                                                                                                                  |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connection dimensions | Output shaft<br>Output flange/foot                                                                                                                                         |
| Mounting position     | Geared motor<br>Connector/terminal box<br>Driven shaft/output flange                                                                                                       |
| Product extensions    | Torque plate<br>Shaft cover<br>Connector/terminal box<br>Brake<br>Feedback<br>Blower<br>Temperature monitoring<br>Second shaft end<br>Handwheel<br>Protection cover<br>... |

More information about the final configuration:

► [The modular system](#) 12

► [Product extensions](#) 82

## Surface and corrosion protection

Depending on the ambient conditions, the surface and corrosion protection system (called OKS) offers solutions for optimum protection.

Various surface coatings ensure that the motors operate reliably at high air humidity, in outdoor installation or in the presence of atmospheric impurities. Any color from the "RAL Classic" collection can be chosen for the top coat.

| Surface and corrosion protection | Applications                                                                                                               | Product                                                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
|                                  |                                                                                                                            | g500-H5000 ... H14000<br>g500-S8000 ... S19000<br>g500-B8000 ... B20000 |
| OKS-G (primed)                   | • Dependent on subsequent top coat applied                                                                                 | Optionally                                                              |
| OKS-S (small)                    | • Standard applications<br>• Internal installation in heated buildings<br>• Air humidity up to 90 %                        | Standard                                                                |
| OKS-M (medium)                   | • Internal installation in non-heated buildings<br>• Covered, protected external installation<br>• Air humidity up to 95 % | Optionally                                                              |

| Surface and corrosion protection | Corrosivity category | Surface coating                                                                         | Color                                           | Coating thickness |
|----------------------------------|----------------------|-----------------------------------------------------------------------------------------|-------------------------------------------------|-------------------|
|                                  | DIN EN ISO 12944-2   | Design                                                                                  |                                                 |                   |
| OKS-G (primed)                   | -                    | • Dip priming of the gray cast iron parts<br>• 2K PUR priming coat                      | -                                               | 60 ... 90 µm      |
| OKS-S (small)                    | Comparable to C1     | • Dip priming of the gray cast iron parts<br>• 2K-PUR top coat                          | • Standard: RAL 7012<br>• Optional: RAL Classic | 80 ... 120 µm     |
| OKS-M (medium)                   | Comparable to C2     | • Dip priming of the gray cast iron parts<br>• 2K PUR priming coat<br>• 2K-PUR top coat |                                                 | 110 ... 160 µm    |



## Lubricants

| Lubricant            | CLP 220                       |              |             |          |           | CLP 460 |              |             |          |           |
|----------------------|-------------------------------|--------------|-------------|----------|-----------|---------|--------------|-------------|----------|-----------|
| Ambient temperature  | 0 ... +40 °C                  |              |             |          |           |         |              |             |          |           |
| Specification        | Mineral oil with EP additives |              |             |          |           |         |              |             |          |           |
| Changing interval    |                               |              |             |          |           |         |              |             |          |           |
| Operating hours      | 16000                         |              |             |          |           |         |              |             |          |           |
| Not later than after | 3 years                       |              |             |          |           |         |              |             |          |           |
| At oil temperature   | 80 °C                         |              |             |          |           |         |              |             |          |           |
| Manufacturer         | Fuchs                         |              | Klüber      | Shell    |           | Fuchs   |              | Klüber      | Shell    |           |
| Manufacturer series  | Renolin                       |              | Klüberoil   | Omala    |           | Renolin |              | Klüberoil   | Omala    |           |
| Manufacturer type    | CLP 220                       | CLP Plus 220 | GEM 1-220 N | S2 G 220 | S2 GX 220 | CLP 460 | CLP Plus 460 | GEM 1-460 N | S2 G 460 | S2 GX 460 |

| Lubricant            | CLP HC 220                            |        |                 |                 | CLP HC 220USDA H1 |                   | CLP HC 320     |        |                 |                 |
|----------------------|---------------------------------------|--------|-----------------|-----------------|-------------------|-------------------|----------------|--------|-----------------|-----------------|
| Ambient temperature  | -30 ... +40 °C                        |        |                 |                 | -20 ... +40 °C    |                   | -20 ... +50 °C |        |                 |                 |
| Specification        | Synthetic oil (polyalfaolefins basis) |        |                 |                 |                   |                   |                |        |                 |                 |
| Changing interval    |                                       |        |                 |                 |                   |                   |                |        |                 |                 |
| Operating hours      | 25000                                 |        |                 |                 | 16000             |                   | 25000          |        |                 |                 |
| Not later than after | 4 years                               |        |                 |                 | 3 years           |                   | 4 years        |        |                 |                 |
| At oil temperature   | 80 °C                                 |        |                 |                 |                   |                   |                |        |                 |                 |
| Manufacturer         | Fuchs                                 |        | Klüber          | Shell           | Fuchs             | Klüber            | Fuchs          |        | Klüber          | Shell           |
| Manufacturer series  | Renolin Unisyn                        |        | Klübersyn<br>th | Omala           | Cassida<br>Fluid  | Klüberoil         | Renolin Unisyn |        | Klübersyn<br>th | Omala           |
| Manufacturer type    | CLP 220                               | XT 220 | GEM<br>4-220 N  | S4 GX HD<br>220 | GL 220            | 4<br>UH1-220<br>N | CLP 320        | XT 320 | GEM<br>4-320 N  | S4 GX HD<br>320 |

### Lubricant amounts for stocking

All lubricant amounts are reference values for a change of lubricant. They serve stocking purposes, for example.

The exact values can be found on the nameplate.

| Gearbox       | M1 (A) | M2 (D) | M3 (B) | M4 (C) | M5 (F) | M6 (E) |
|---------------|--------|--------|--------|--------|--------|--------|
|               | I      | I      | I      | I      | I      | I      |
| g500-B8000-3  | 9.7    | 22     | 30.5   | 36     | 24     | 24     |
| g500-B13000-3 | 17     | 31     | 48.5   | 59.5   | 39     | 39     |
| g500-B20000-3 | 24.5   | 54     | 76     | 90     | 60     | 60     |

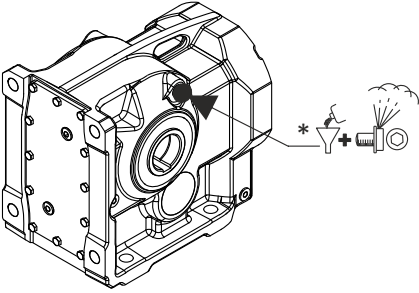
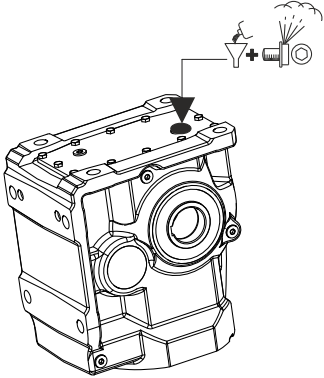
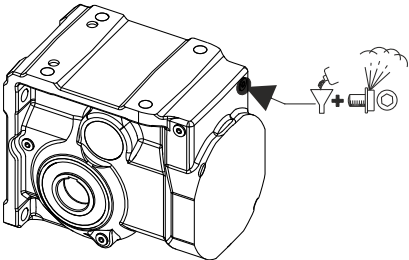
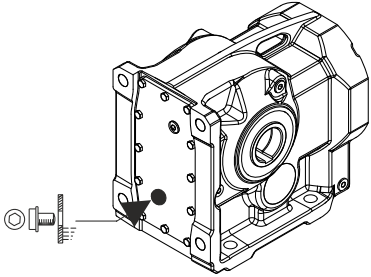
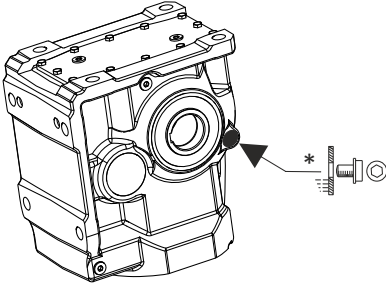
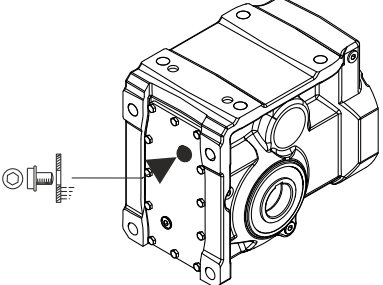
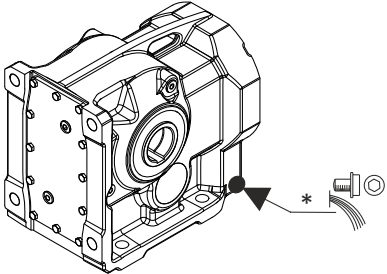
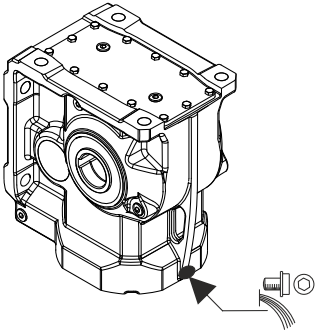
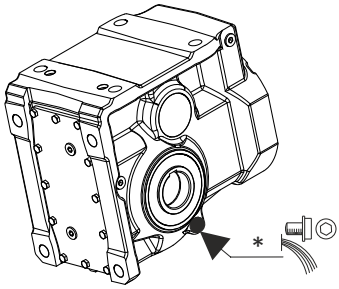


## Ventilation

### NOTICE

- For gearboxes with ventilation, a gap of at least 30 mm has to be observed to the machine wall on the corresponding gearbox side.

#### g500-B8000 ... B20000

| Mounting position M1 (A)                                                            | Mounting position M2 (D)                                                            | Mounting position M3 (B)                                                              |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Filling and ventilation                                                             |                                                                                     |                                                                                       |
|    |    |    |
| Check                                                                               |                                                                                     |                                                                                       |
|  |  |  |
| Drain                                                                               |                                                                                     |                                                                                       |
|  |  |  |

\* Bore hole on both sides

Information on project planning

Final configuration  
Ventilation



| Mounting position M4 (C) | Mounting position M5 (E) | Mounting position M6 (F) |
|--------------------------|--------------------------|--------------------------|
| Filling and ventilation  |                          |                          |
|                          |                          |                          |
| Check                    |                          |                          |
|                          |                          |                          |
| Drain                    |                          |                          |
|                          |                          |                          |

\* Bore hole on both sides



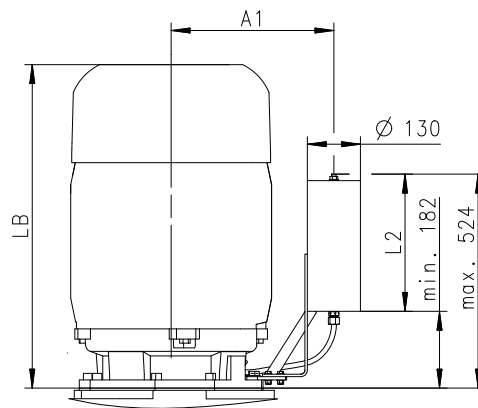
## Gearbox with oil compensation reservoir for mounting position M4 (C)

In order to guarantee a reliable lubrication of the toothed parts in mounting position M4 (C) (motor is on the gearbox vertical from the top), a high filling level is required in the gearbox. As a result of the reduced volume of air in the gearbox, this may lead to oil escaping from the ventilation at higher input speeds. The oil compensation reservoir increases the expansion space for the lubricant.

The oil compensation reservoir can be ordered as a mounting set for fastening to the gearbox.

If insufficient space is available, the oil compensation reservoir can also be mounted over the gearbox hose connection on nearby system parts.

## Dimensions of oil compensation reservoir



| Gearbox     | A1  | L2  |
|-------------|-----|-----|
|             | mm  | mm  |
| g500-B8000  | 376 | 166 |
| g500-B13000 | 399 | 336 |
| g500-B20000 | 427 | 336 |



## Mechanical installation

### Important notes

- Install the product according to the information in the chapter "Standards and operating conditions".
  - ▶ [Standards and operating conditions](#)  44
- The technical data and the data regarding the supply conditions can be found on the nameplate and in this documentation.
- Ambient media – especially chemically aggressive ones – may damage shaft sealing rings, lacquers and plastics.
- Lenze offers special surface and corrosion protection in this case.



## Transport

- Ensure appropriate handling.
- Make sure that all component parts are securely mounted. Secure or remove loose component parts.
- Only use safely fixed transport aids (e.g., eye bolts or support plates).
- Do not damage any components during transport.
- Avoid electrostatic discharges on electronic components and contacts.
- Avoid impacts.
- Check the carrying capacity of the hoists and load handling devices. The weights can be found in the shipping documents.
- Secure the load against tipping and falling down.
- Standing beneath suspended loads is prohibited.



## Installation

- The mounting surfaces must be plane, torsionally rigid and free from vibrations.
- The mounting areas must be suited to absorb the forces and torques generated during operation.
- Ensure an unhindered ventilation.
- For versions with a fan, keep a minimum distance of 10 % from the outside diameter of the fan cover in intake direction.



## Electrical installation

### Important notes

#### **DANGER!**

##### **Risk of injury and risk of burns from dangerous voltage**

Power terminals may also carry voltage in the switched-off state or when the motor is stopped and may cause life-threatening cardiac arrhythmia and serious burns.

- ▶ Disconnect the product from the mains.
- ▶ Check that the power terminals are deenergized before starting work.

- 
- When working on energized products, comply with the applicable national accident prevention regulations.
  - The electrical installation must be carried out according to the appropriate regulations (e.g. cable cross-sections, fuses, PE connection).
  - The manufacturer of the system or machine is responsible for adherence to the limits required in connection with EMC legislation.

##### **Connection for high leakage current**

If the leakage current is greater than 3.5 mA for alternating current or greater than 10 mA for direct current, the standard EN 61800-5-1 requires that at least one or more of the following measures be met:

- The minimum PE conductor cross-section is 10 mm<sup>2</sup> with Cu or 16 mm<sup>2</sup> with Al.
- Attachment of an additional protective grounding conductor with the same cross-section as the original protective grounding conductor.
  - Do not place the additional terminal on the same terminal.
- Provide automatic disconnection of the mains in case of interruption of the protective conductor.

▶ [Connection options](#)  85

##### **Operation on an external inverter**

A max. pulse voltage amplitude of  $U_{pk} = 1560 \text{ V}$  at the motor terminals must not be exceeded.

Here, the minimum pulse rise time must be  $t_r = 0.1 \text{ } \mu\text{s}$ .

If it cannot be ruled out that the permissible voltage peaks will be exceeded or that the minimum pulse rise time will not be reached, the following measures must be initiated:

- Reduction of the DC-bus voltage (threshold for brake chopper voltage)
- Use of filters, chokes
- Use of special motor cables



## Preparation

### EMC-compliant wiring



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The EMC-compliant wiring is described in detail in the documentation of the Lenze inverters.

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## Technical data

### Notes regarding the given data

#### Catalog data

The power values, torques and speeds specified in the configuration are rounded values and apply to:

- Operating time per day = 8 hrs (100 % ED)
- Duty class up to 10 switching operations per hour
- Ambient temperature = -30 ... +40 °C
- Site altitude  $\leq 1000$  m above mean sea level
- The selection tables indicate the mechanically permissible power levels and torques.
- The ratings apply to the operating mode S1 (acc. to EN 60034-1).

#### NOTICE

In case of other operating conditions, the achievable values can differ for those mentioned.

► In case of extreme operating conditions, please get in touch with your Lenze representative.

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# Technical data

Standards and operating conditions  
Conformities and approvals



## Standards and operating conditions

### Conformities and approvals

More information and certificates of approval can be found under

[g500 + m500 bevel geared motors \(Lenze.com\)](https://www.lenze.com/g500+m500-bevel-geared-motors)

| Europe         |                         |                |                                                                                                                    |                 |                           |
|----------------|-------------------------|----------------|--------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------|
| Country        | Conformity/<br>approval | Law/standard   | Description                                                                                                        | Special feature | Product<br>representation |
|                |                         |                |                                                                                                                    |                 |                           |
| European Union | CE                      | (EU) 2019/1781 | Regulation laying down ecodesign requirements for electric motors and speed control                                | -               | CE mark                   |
|                |                         | 2009/125/EC    | Ecodesign Directive                                                                                                |                 |                           |
|                |                         | 2011/65/EU     | RoHS                                                                                                               |                 |                           |
|                |                         | 2014/30/EU     | EMC Directive                                                                                                      |                 |                           |
|                |                         | 2014/35/EU     | Low-Voltage Directive                                                                                              |                 |                           |
| Great Britain  | UKCA                    | S.I. 2012/3032 | The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 | -               | UKCA mark                 |
|                |                         | S.I. 2016/1091 | The Electromagnetic Compatibility Regulations 2016                                                                 |                 |                           |
|                |                         | S.I. 2016/1101 | The Electrical Equipment (Safety) Regulations 2016                                                                 |                 |                           |
|                |                         | S.I. 2021/745  | The Ecodesign for Energy-Related Products and Energy Information Regulations 2021                                  |                 |                           |

| America |                         |                                            |                                                                           |                 |                            |
|---------|-------------------------|--------------------------------------------|---------------------------------------------------------------------------|-----------------|----------------------------|
| Country | Conformity/<br>approval | Law/standard                               | Description                                                               | Special feature | Product<br>representation  |
| Canada  | CSA                     | CSA 22.1 No. 100                           | CSA Standard for Motors and Generators                                    | -               | cURus mark                 |
|         | NrCAN                   | SOR/2016-311 (Division 12 - Subdivision A) | Energy Efficiency Regulations                                             |                 | UL Energy mark             |
| USA     | DOE                     | 10 CFR Part 431 - Subpart B                | Energy Efficiency Program for Certain Commercial and Industrial Equipment |                 | UL Energy mark + CC number |
|         | UL                      | UL 1004-1                                  | UL Standard for Rotating Electrical Machines                              |                 | cURus mark                 |

| Asia    |                         |              |                                                                                                                                 |                 |                           |
|---------|-------------------------|--------------|---------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------|
| Country | Conformity/<br>approval | Law/standard | Description                                                                                                                     | Special feature | Product<br>representation |
| China   | -                       | GB 18613     | Minimum allowable values of energy efficiency and energy efficiency grades for small and medium three-phase asynchronous motors | -               | CEL mark                  |
|         |                         | GB/T 26572   | Requirements on concentration limits for certain restricted substances in electrical and electronic products                    |                 | EFUP mark                 |
|         | CCC                     | GB 12350     | Safety requirements of small power motors                                                                                       |                 | CCC mark                  |

### Protection of persons and device protection

| Temperature class |                |            |                   |
|-------------------|----------------|------------|-------------------|
| -                 | EN IEC 60034-1 | F (155 °C) | Insulation system |
| Utilization       |                | B (130 °C) | Utilization       |



## EMC data

### Environmental conditions

|                      |                             |                                |                                          |
|----------------------|-----------------------------|--------------------------------|------------------------------------------|
| Energy efficiency    |                             |                                |                                          |
| 10 CFR               | 10 CFR Part 431             | -                              | -                                        |
| GB                   | GB 18613-2012               |                                |                                          |
| Premium Efficiency   | EN IEC 60034-30-1           | IE3 class                      |                                          |
| Climate              |                             |                                |                                          |
| Operation            | EN 60721-3-3:1995 + A2:1997 | 3K3 (-20 ...+40 °C)            | Operation without brake, self-ventilated |
|                      |                             | 3K3 (-20 ...+60 °C)            |                                          |
| Site altitude        |                             |                                |                                          |
| 0 ... 1000 m amsl    | -                           | Without current derating       |                                          |
| 1000 ... 4000 m amsl |                             | With derating                  | Current derating by 5 %/1000 m           |
| Air humidity         |                             |                                |                                          |
| -                    | -                           | Average relative humidity 85 % | Without condensation                     |



## Gearbox data

The following tables contain the most important data of the gearbox for attachable motors of a geared motor.

The data given for speed, torque and power are valid if the

- input speed  $n_1 = 1400$  rpm
- Application factor  $c = 1.0$

In order to calculate the exact ratio, the number of teeth  $z_g$  (driven) can be divided by the number of teeth  $z_t$  (driving).

### g500-B8000, 3-stage gearboxes

| output speed | Max. output torque | Ratio   | Number of teeth |       | Max. backlash |
|--------------|--------------------|---------|-----------------|-------|---------------|
| $n_2$        | $M_{2, \max}$      | $i$     | $z_g$           | $z_t$ | Standard      |
| rpm          | Nm                 |         |                 |       | '             |
| 205          | 3630               | 6.820   | 89528           | 13125 | 10            |
| 174          | 3720               | 8.040   | 54872           | 6825  | 10            |
| 143          | 3850               | 9.810   | 118408          | 12075 | 10            |
| 124          | 3950               | 11.260  | 124184          | 11025 | 10            |
| 113          | 4030               | 12.440  | 150176          | 12075 | 10            |
| 98.9         | 4140               | 14.150  | 17328           | 1225  | 10            |
| 97.4         | 6660               | 14.380  | 10469           | 728   | 8             |
| 79.8         | 6890               | 17.540  | 22591           | 1288  | 8             |
| 69.5         | 7070               | 20.150  | 23693           | 1176  | 8             |
| 62.9         | 7210               | 22.250  | 7163            | 322   | 8             |
| 55.3         | 7420               | 25.300  | 4959            | 196   | 8             |
| 48.8         | 7630               | 28.660  | 36917           | 1288  | 8             |
| 43.3         | 7760               | 32.330  | 12673           | 392   | 8             |
| 39.5         | 7850               | 35.400  | 80997           | 2288  | 7             |
| 32.4         | 8000               | 43.180  | 174783          | 4048  | 7             |
| 28.2         | 8000               | 49.600  | 8729            | 176   | 7             |
| 25.6         | 8000               | 54.760  | 55419           | 1012  | 7             |
| 22.5         | 8000               | 62.280  | 5481            | 88    | 7             |
| 19.8         | 8000               | 70.560  | 285621          | 4048  | 7             |
| 17.6         | 8000               | 79.590  | 14007           | 176   | 7             |
| 15.8         | 8000               | 88.810  | 1421            | 16    | 7             |
| 14.0         | 8000               | 99.790  | 439089          | 4400  | 7             |
| 12.4         | 8000               | 112.680 | 456141          | 4048  | 7             |
| 11.0         | 8000               | 127.160 | 89523           | 704   | 7             |
| 9.9          | 8000               | 140.930 | 17052           | 121   | 7             |
| 8.8          | 8000               | 158.650 | 558453          | 3520  | 7             |
| 7.8          | 8000               | 178.970 | 188993          | 1056  | 7             |
| 7.3          | 8000               | 190.920 | 285621          | 1496  | 7             |
| 6.9          | 8000               | 202.860 | 285621          | 1408  | 7             |
| 5.9          | 8000               | 237.030 | 83433           | 352   | 7             |



**g500-B13000, 3-stage gearboxes**

| output speed | Max. output torque | Ratio   | Number of teeth |       | Max. backlash |
|--------------|--------------------|---------|-----------------|-------|---------------|
|              |                    |         |                 |       | Standard      |
| $n_2$        | $M_{2, \max}$      | i       | $z_g$           | $z_t$ |               |
| rpm          | Nm                 |         |                 |       | '             |
| 204          | 6130               | 6.860   | 34034           | 4959  | 11            |
| 160          | 6360               | 8.780   | 112574          | 12825 | 10            |
| 140          | 6530               | 10.010  | 22253           | 2223  | 10            |
| 115          | 6760               | 12.200  | 143990          | 11799 | 10            |
| 105          | 11900              | 13.390  | 59007           | 4408  | 7             |
| 81.8         | 12400              | 17.120  | 65059           | 3800  | 7             |
| 71.7         | 12700              | 19.530  | 77163           | 3952  | 7             |
| 58.8         | 13000              | 23.800  | 83215           | 3496  | 7             |
| 51.8         | 13000              | 27.020  | 1513            | 56    | 7             |
| 47.6         | 13000              | 29.430  | 25721           | 874   | 7             |
| 45.5         | 13000              | 30.750  | 42809           | 1392  | 7             |
| 35.6         | 13000              | 39.330  | 141599          | 3600  | 6             |
| 31.2         | 13000              | 44.860  | 55981           | 1248  | 6             |
| 25.6         | 13000              | 54.680  | 181115          | 3312  | 6             |
| 22.6         | 13000              | 62.070  | 62567           | 1008  | 6             |
| 20.7         | 13000              | 67.610  | 55981           | 828   | 6             |
| 18.4         | 13000              | 76.230  | 16465           | 216   | 6             |
| 16.4         | 13000              | 85.510  | 141599          | 1656  | 6             |
| 14.6         | 13000              | 95.830  | 36223           | 378   | 6             |
| 13.1         | 13000              | 106.720 | 23051           | 216   | 6             |
| 11.7         | 13000              | 119.830 | 431383          | 3600  | 6             |
| 10.6         | 13000              | 132.240 | 437969          | 3312  | 6             |
| 9.3          | 13000              | 150.550 | 260147          | 1728  | 6             |
| 8.4          | 13000              | 166.310 | 16465           | 99    | 6             |
| 7.6          | 13000              | 185.230 | 29637           | 160   | 6             |
| 6.7          | 13000              | 208.350 | 135013          | 648   | 6             |
| 6.3          | 13000              | 223.300 | 273319          | 1224  | 6             |



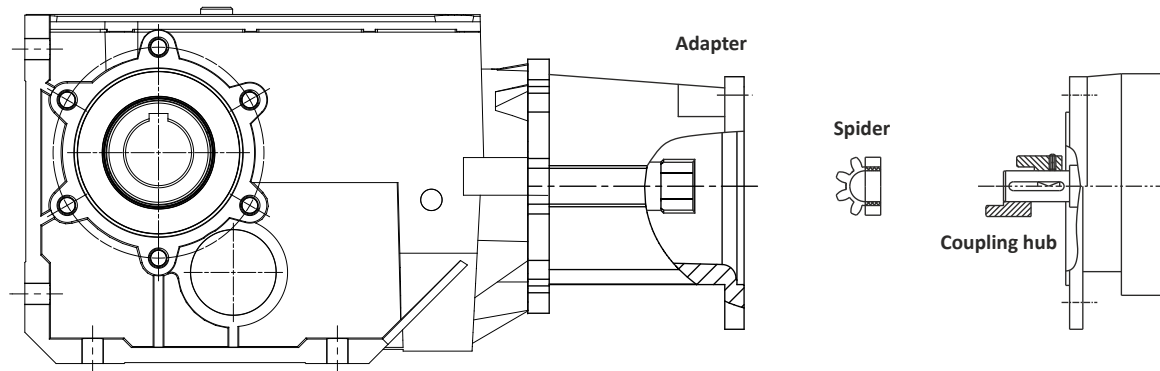
**g500-B20000, 3-stage gearboxes**

| output speed | Max. output torque | Ratio   | Number of teeth |       | Max. backlash |
|--------------|--------------------|---------|-----------------|-------|---------------|
|              |                    |         |                 |       | Standard      |
| $n_2$        | $M_{2, \max}$      | i       | $z_g$           | $z_t$ |               |
| rpm          | Nm                 |         |                 |       | '             |
| 118          | 19500              | 11.890  | 6552            | 551   | 7             |
| 93.7         | 19500              | 14.940  | 8232            | 551   | 6             |
| 74.7         | 19500              | 18.750  | 8904            | 475   | 6             |
| 66.4         | 19500              | 21.090  | 5208            | 247   | 6             |
| 55.2         | 19500              | 25.370  | 11088           | 437   | 6             |
| 49.3         | 19500              | 28.390  | 153972          | 5423  | 6             |
| 39.2         | 19500              | 35.670  | 193452          | 5423  | 6             |
| 31.3         | 19500              | 44.760  | 209244          | 4675  | 6             |
| 27.8         | 19500              | 50.340  | 122388          | 2431  | 6             |
| 23.1         | 19500              | 60.580  | 23688           | 391   | 6             |
| 20.8         | 19500              | 67.360  | 12596           | 187   | 6             |
| 18.8         | 19500              | 74.350  | 319788          | 4301  | 6             |
| 16.8         | 19500              | 83.440  | 15604           | 187   | 6             |
| 14.8         | 19500              | 94.550  | 406644          | 4301  | 6             |
| 13.4         | 19500              | 104.560 | 19552           | 187   | 6             |
| 12.0         | 19500              | 117.000 | 43757           | 374   | 6             |
| 10.8         | 19500              | 130.050 | 55272           | 425   | 6             |
| 9.8          | 19500              | 142.280 | 611940          | 4301  | 6             |
| 8.7          | 19500              | 160.980 | 60207           | 374   | 6             |
| 7.8          | 19500              | 178.490 | 367164          | 2057  | 6             |
| 7.0          | 19100              | 199.510 | 186543          | 935   | 6             |



## Gearboxes with adapter

### Versions with flexible coupling

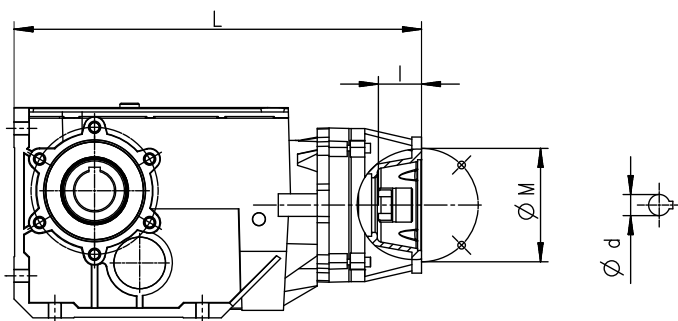


Power is transmitted between the motor and gearbox via a flexible coupling. The gearbox shaft is designed as a claw on the motor side. The counterpart, the coupling hub, is placed on the motor shaft and secured axially. A spider is arranged between the two claws, which can absorb shocks and ensures torsional vibration-damping power transmission.

- Coupling hub with keyway
  - Positive power transmission
  - Suitable for normal operation
- Clamping hub with tangential terminal screw and keyway
  - Positive and non-positive power transmission
  - Suitable for reversing duty
- Tension ring hub without keyway
  - Non-positive power transmission
  - Suitable for reversing duty



### Dimensions of gearbox with adapter for IEC standard motors



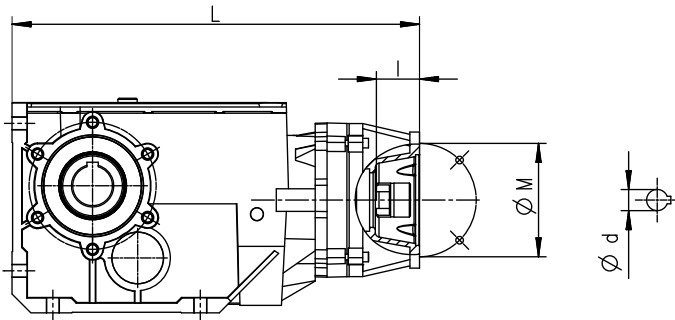
Gearbox dimensions ► [Basic dimensions](#) 71

Versions with flexible coupling

| Motor             |            |       |     | Adapter |            | Gearbox g500 |         |         |
|-------------------|------------|-------|-----|---------|------------|--------------|---------|---------|
|                   | Size       | Shaft |     |         | Size       | -B8000       | -B13000 | -B20000 |
|                   |            | d     | l   | M       |            | L            | L       | L       |
| kW                |            | mm    | mm  | mm      |            | mm           | mm      | mm      |
| 1.1<br>1.5        | 90         | 24    | 50  | FT165   | <b>T51</b> | 704          | -       | -       |
| 2.2<br>3.0<br>4.0 | 100<br>112 | 28    | 60  | FT215   | <b>T55</b> | 743          | 828     | 879     |
| 5.5<br>7.5        | 132        | 38    | 80  | FF265   | <b>T61</b> | 819          | 899     | 949     |
| 11.0<br>15.0      | 160        | 42    | 110 | FT300   | <b>T65</b> | 864          | 944     | 994     |
| 18.5<br>22.0      | 180        | 48    | 110 | FT300   | <b>T66</b> | 864          | 944     | 994     |
| 30.0              | 200        | 55    | 110 | FT350   | <b>T70</b> | 909          | 989     | 1039    |
| 37.0<br>45.0      | 225        | 60    | 140 | FT400   | <b>T76</b> | 962          | 1037    | 1085    |
| 55.0              | 250        | 65    | 140 | FT500   | <b>T81</b> | 994          | 1074    | 1119    |
| 75.0<br>90.0      | 280        | 75    | 140 | FT500   | <b>T82</b> | -            | 950     | 996     |
| 110<br>132        | 315        | 80    | 170 | FT600   | <b>T86</b> | -            | -       | 1020    |



### Dimensions of gearbox with adapter for NEMA motors



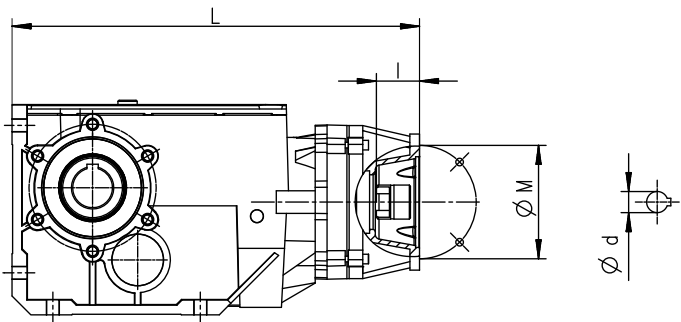
Gearbox dimensions ► [Basic dimensions](#) 71

Versions with flexible coupling

| Motor      |       |       | Adapter |            | Gearbox g500 |         |         |
|------------|-------|-------|---------|------------|--------------|---------|---------|
| Size       | Shaft |       |         | Size       | -B8000       | -B13000 | -B20000 |
|            | d     | I     | M       |            | L            | L       | L       |
|            | inch  | inch  | inch    |            | mm           | mm      | mm      |
| 143/145 TC | 0.875 | 2.250 | 5.875   | <b>A14</b> | 707          | -       | -       |
| 182/184 TC | 1.125 | 2.750 | 7.252   | <b>A18</b> | 755          | 840     | -       |
| 213/215 TC | 1.375 | 3.375 | 7.252   | <b>A21</b> | 823          | 904     | 954     |
| 254/256 TC | 1.625 | 4.000 | 7.252   | <b>A25</b> | 853          | 934     | 984     |
| 284/286 TC | 1.875 | 4.625 | 9.000   | <b>A28</b> | 871          | 952     | 1002    |
| 324/326 TC | 2.125 | 5.250 | 11.000  | <b>A32</b> | 955          | 1029    | 1078    |
| 364/365 TC | 2.375 | 5.875 | 11.000  | <b>A36</b> | 1002         | 1083    | 1128    |



Dimensions of gearboxes with adapter for servo motors



Gearbox dimensions ▶ [Basic dimensions](#) 71

Versions with flexible coupling

| Motor |       |     | Adapter |      | Gearbox g500 |         |         |
|-------|-------|-----|---------|------|--------------|---------|---------|
|       | Shaft |     |         | Size | -B8000       | -B13000 | -B20000 |
| M     | d     | l   | M       |      | L            | L       | L       |
| mm    | mm    | mm  | mm      |      | mm           | mm      | mm      |
| 130   | 24    | 58  | FT130   | E07  | 663          | 719     | -       |
| 165   | 32    | 80  | FT165   | E09  | 645          | 731     | 782     |
| 215   | 38    | 80  | FT215   | E11  | 679          | 760     | 810     |
| 300   | 48    | 110 | FT300   | G13  | 846          | 926     | 976     |
| 350   | 55    | 110 | FT350   | G16  | 908          | 983     | 1031    |



## Radial forces and axial forces

### Permissible radial force

The calculation of the permissible radial force must take account of the additional load factor  $f_w$ .

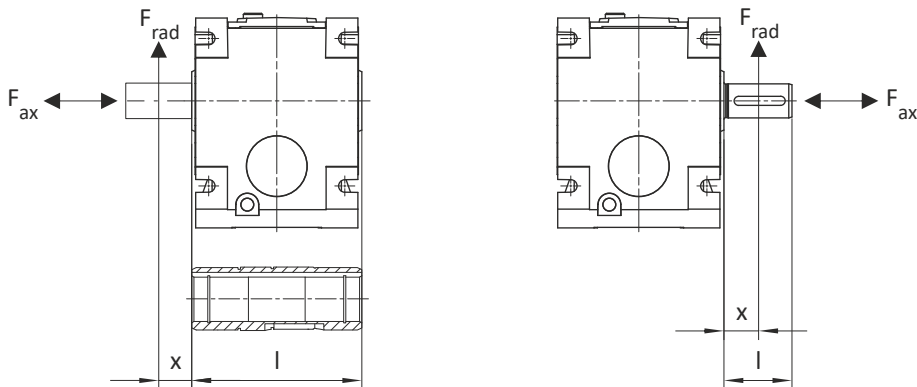
$$F_{\text{rad, perm}} = f_w \times F_{\text{rad, max}}$$

### Permissible axial force

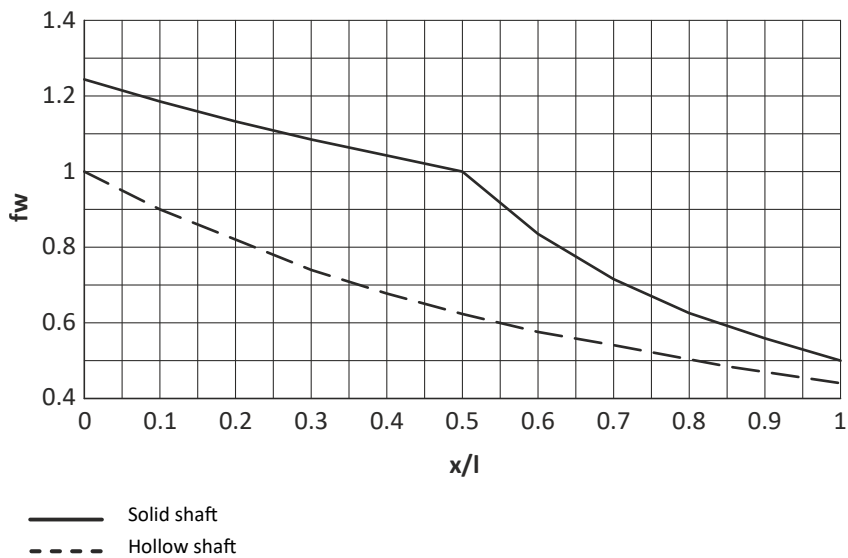
If there is no radial force, the maximum axial force is 50% of the value in the table  $F_{\text{rad, max}}$

$$F_{\text{ax, zul}} = 0.5 \times F_{\text{rad, max}}$$

### Application of forces



### Additional load factor $f_w$ on the drive shaft





The values given in the tables refer to the centre shaft end force application point and are minimum values calculated according to the most unfavourable conditions (force application angle, mounting position, direction of rotation). The values were calculated with a load capacity of  $c = 1.3$  and an input speed of 1400 rpm.



In case of different operating conditions, considerably higher forces can be transmitted. Please get in touch with your Lenze representative



A hollow shaft with shrink disc (SAR/SBR/SCR/SDR/SAK/SCK) requires a check by Lenze.

### Max. radial force, gearbox with hollow shaft (H□□)

| Getriebe    | Output speed $n_2$ [rpm]                |       |       |        |        |        |
|-------------|-----------------------------------------|-------|-------|--------|--------|--------|
|             | 160                                     | 100   | 63    | 40     | 25     | 16     |
|             | Max. radial force $F_{rad,max}$ [rated] |       |       |        |        |        |
| g500-B8000  | 32000                                   | 35000 | 38000 | 45000  | 55000  | 65000  |
| g500-B13000 | 45000                                   | 45000 | 53000 | 65000  | 70000  | 70000  |
| g500-B20000 |                                         | 76000 | 90000 | 104000 | 104000 | 104000 |

### Max. radial force, gearbox with solid shaft, without flange (V□R)

| Getriebe    | Output speed $n_2$ [rpm]                |       |       |       |       |        |
|-------------|-----------------------------------------|-------|-------|-------|-------|--------|
|             | 160                                     | 100   | 63    | 40    | 25    | 16     |
|             | Max. radial force $F_{rad,max}$ [rated] |       |       |       |       |        |
| g500-B8000  | 34000                                   | 36000 | 42000 | 50000 | 59000 | 65000  |
| g500-B13000 | 45000                                   | 45000 | 56000 | 62000 | 70000 | 70000  |
| g500-B20000 |                                         | 51000 | 61000 | 77000 | 96000 | 104000 |

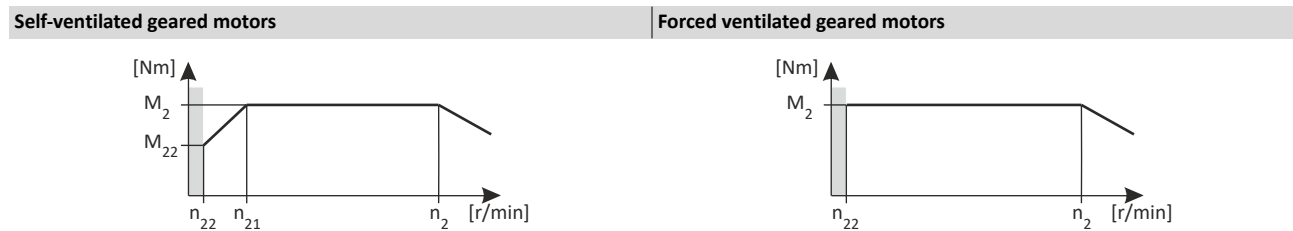
### Max. radial force, gearbox with solid shaft and flange (V□K)

| Getriebe    | Output speed $n_2$ [rpm]                |       |       |       |       |        |
|-------------|-----------------------------------------|-------|-------|-------|-------|--------|
|             | 160                                     | 100   | 63    | 40    | 25    | 16     |
|             | Max. radial force $F_{rad,max}$ [rated] |       |       |       |       |        |
| g500-B8000  | 34000                                   | 36000 | 42000 | 50000 | 59000 | 71500  |
| g500-B13000 | 45000                                   | 45000 | 56000 | 62000 | 73000 | 77000  |
| g500-B20000 |                                         | 51000 | 61000 | 77000 | 96000 | 114000 |



## Selection tables

### Torque characteristic with inverter operation



20 Hz to 50 or 87 Hz: Operation at constant torque.  
Below 20 Hz ( $n_{21}$ ): Derating without separate fan.  
Below 5 Hz ( $n_{22}$ ): Verification of the application by Lenze required.

5 Hz to 50 or 87 Hz: Operation at constant torque.  
Below 5 Hz ( $n_{22}$ ): Verification of the application by Lenze required.

### Notes on the selection tables

The selection tables represent the available combinations of gearbox, number of stages, ratio and motor for the mounting position M1. They only serve as a rough overview.

The following legend shows the layout of the selection tables:

| Example                                    | Explanation                                     |
|--------------------------------------------|-------------------------------------------------|
| 50 Hz: $P_{\text{rated}} = 1.5 \text{ kW}$ | Rated motor power at a rated frequency of 50 Hz |
| 87 Hz: $P_{\text{rated}} = 2.6 \text{ kW}$ | Rated motor power at a frequency of 87 Hz       |

| Inverter operation |          |          |       |                 |       |     |                |       |     | Geared motor      |         |            |             |   |     |
|--------------------|----------|----------|-------|-----------------|-------|-----|----------------|-------|-----|-------------------|---------|------------|-------------|---|-----|
|                    |          |          |       | Mains operation |       |     |                |       |     |                   |         |            |             |   |     |
| 5 Hz -             |          | - 20 Hz  |       | 50 Hz (1:10)    |       |     | 87 Hz (1:17.4) |       |     |                   |         |            |             |   |     |
| $n_{22}$           | $M_{22}$ | $n_{21}$ | $M_2$ | $n_2$           | $M_2$ | c   | $n_2$          | $M_2$ | c   | J                 | i       |            |             | z | m   |
| rpm                | Nm       | rpm      | Nm    | rpm             | Nm    |     | rpm            | Nm    |     | kgcm <sup>2</sup> |         |            |             |   | kg  |
| 1.0                | 735      | 5.1      | 1335  | 10.3            | 1335  | 6.0 | -              | -     | -   | 65.000            | 140.930 | g500-B8000 | m540-P90/L4 | 3 | 257 |
| 0.9                | 827      | 4.6      | 1503  | 9.1             | 1503  | 5.3 | 16.1           | 1503  | 5.3 | 63.000            | 158.650 | g500-B8000 | m540-P90/L4 | 3 | 257 |
| 0.8                | 933      | 4.1      | 1696  | 8.1             | 1696  | 4.7 | 14.3           | 1696  | 4.7 | 60.000            | 178.970 | g500-B8000 | m540-P90/L4 | 3 | 257 |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| <div>Basic weight</div> <div>Number of gear stages</div> <div>Motor product name</div> <div>Gearbox product name</div> <div>Ratio</div> <div>Moment of inertia without brake</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <div>Data at 87 Hz</div> <div>Data at 50 Hz</div> <div><math>n_2</math> = Output speed - <math>M_2</math> = Output torque</div> <div>c = the load capacity of the gearbox is the ratio of the permissible rated torque of the gearbox to the rated torque of the motor (converted to the output shaft). c must always be greater than the application factor determined for the application. k</div> <div> <math display="block">c = \frac{M_{2,zul}}{M_{1,N} \times i \times \eta_{Getr}} &gt; k</math> </div> <div>Data at 20 Hz</div> <div><math>n_{21}</math> = Output speed - <math>M_2</math> = Output torque</div> <div>Data at 5 Hz</div> <div><math>n_{22}</math> = Output speed - <math>M_{22}</math> = Output torque (Externally cooled motors can deliver the torque <math>M_2</math> over the entire adjustment range)</div> |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |



### 50 Hz: 1.5 kW

### 87 Hz: 2.6 kW

| Inverter operation |                 |                 |                |                |                |     |                |                |     |                   |         | Geared motor |             |   |     |
|--------------------|-----------------|-----------------|----------------|----------------|----------------|-----|----------------|----------------|-----|-------------------|---------|--------------|-------------|---|-----|
| 5 Hz -             |                 | - 20 Hz         |                | 50 Hz (1:10)   |                |     | 87 Hz (1:17.4) |                |     |                   |         |              |             |   |     |
| n <sub>22</sub>    | M <sub>22</sub> | n <sub>21</sub> | M <sub>2</sub> | n <sub>2</sub> | M <sub>2</sub> | c   | n <sub>2</sub> | M <sub>2</sub> | c   | J                 | i       |              |             | z | m   |
| rpm                | Nm              | rpm             | Nm             | rpm            | Nm             |     | rpm            | Nm             |     | kgcm <sup>2</sup> |         |              |             |   | kg  |
| 0.8                | 933             | 4.1             | 1696           | 8.1            | 1696           | 4.7 | 14.3           | 1696           | 4.7 | 60.000            | 178.970 | g500-B8000   | m540-P90/L4 | 3 | 257 |
| 0.8                | 995             | 3.8             | 1809           | 7.6            | 1809           | 4.4 | 13.4           | 1809           | 4.4 | 59.000            | 190.920 | g500-B8000   | m540-P90/L4 | 3 | 257 |
| 0.7                | 1057            | 3.6             | 1922           | 7.1            | 1922           | 4.2 | 12.6           | 1922           | 4.2 | 58.000            | 202.860 | g500-B8000   | m540-P90/L4 | 3 | 257 |
| 0.6                | 1236            | 3.1             | 2246           | 6.1            | 2246           | 3.6 | 10.8           | 2246           | 3.6 | 56.100            | 237.030 | g500-B8000   | m540-P90/L4 | 3 | 257 |

### 50 Hz: 2.2 kW

### 87 Hz: 3.9 kW

| Inverter operation |                 |                 |                |                |                |     |                |                |     |                   |         | Geared motor |              |   |     |
|--------------------|-----------------|-----------------|----------------|----------------|----------------|-----|----------------|----------------|-----|-------------------|---------|--------------|--------------|---|-----|
| 5 Hz -             |                 | - 20 Hz         |                | 50 Hz (1:10)   |                |     | 87 Hz (1:17.4) |                |     |                   |         |              |              |   |     |
| n <sub>22</sub>    | M <sub>22</sub> | n <sub>21</sub> | M <sub>2</sub> | n <sub>2</sub> | M <sub>2</sub> | c   | n <sub>2</sub> | M <sub>2</sub> | c   | J                 | i       |              |              | z | m   |
| rpm                | Nm              | rpm             | Nm             | rpm            | Nm             |     | rpm            | Nm             |     | kgcm <sup>2</sup> |         |              |              |   | kg  |
| 1.1                | 959             | 5.8             | 1738           | 11.5           | 1738           | 4.6 | 20.3           | 1738           | 4.6 | 159.000           | 127.160 | g500-B8000   | m540-P100/M4 | 3 | 271 |
| 1.0                | 1063            | 5.2             | 1927           | 10.4           | 1927           | 4.2 | 18.3           | 1927           | 4.2 | 156.000           | 140.930 | g500-B8000   | m540-P100/M4 | 3 | 271 |
| 0.9                | 1196            | 4.6             | 2169           | 9.2            | 2169           | 3.7 | 16.2           | 2169           | 3.7 | 154.000           | 158.650 | g500-B8000   | m540-P100/M4 | 3 | 271 |
| 0.8                | 1350            | 4.1             | 2447           | 8.2            | 2447           | 3.3 | 14.4           | 2447           | 3.3 | 151.000           | 178.970 | g500-B8000   | m540-P100/M4 | 3 | 271 |
| 0.8                | 1440            | 3.8             | 2610           | 7.7            | 2610           | 3.1 | 13.5           | 2610           | 3.1 | 150.000           | 190.920 | g500-B8000   | m540-P100/M4 | 3 | 271 |
| 0.7                | 1530            | 3.6             | 2773           | 7.2            | 2773           | 2.9 | 12.7           | 2773           | 2.9 | 149.000           | 202.860 | g500-B8000   | m540-P100/M4 | 3 | 271 |
| 0.7                | 1571            | 3.5             | 2848           | 7.0            | 2848           | 4.6 | 12.4           | 2848           | 4.6 | 160.000           | 208.350 | g500-B13000  | m540-P100/M4 | 3 | 457 |
| 0.6                | 1684            | 3.3             | 3053           | 6.6            | 3053           | 4.3 | 11.5           | 3053           | 4.3 | 158.000           | 223.300 | g500-B13000  | m540-P100/M4 | 3 | 457 |
| 0.6                | 1787            | 3.1             | 3240           | 6.2            | 3240           | 2.5 | 10.9           | 3240           | 2.5 | 147.100           | 237.030 | g500-B8000   | m540-P100/M4 | 3 | 271 |

### 50 Hz: 3 kW

### 87 Hz: 5.2 kW

| Inverter operation |                 |                 |                |                |                |     |                |                |     |                   |         | Geared motor |              |   |     |
|--------------------|-----------------|-----------------|----------------|----------------|----------------|-----|----------------|----------------|-----|-------------------|---------|--------------|--------------|---|-----|
| 5 Hz -             |                 | - 20 Hz         |                | 50 Hz (1:10)   |                |     | 87 Hz (1:17.4) |                |     |                   |         |              |              |   |     |
| n <sub>22</sub>    | M <sub>22</sub> | n <sub>21</sub> | M <sub>2</sub> | n <sub>2</sub> | M <sub>2</sub> | c   | n <sub>2</sub> | M <sub>2</sub> | c   | J                 | i       |              |              | z | m   |
| rpm                | Nm              | rpm             | Nm             | rpm            | Nm             |     | rpm            | Nm             |     | kgcm <sup>2</sup> |         |              |              |   | kg  |
| 1.6                | 916             | 8.2             | 1664           | 16.4           | 1664           | 4.8 | 28.9           | 1664           | 4.6 | 171.000           | 88.810  | g500-B8000   | m540-P100/L4 | 3 | 271 |
| 1.5                | 1030            | 7.3             | 1870           | 14.6           | 1870           | 4.3 | 25.8           | 1870           | 4.1 | 166.000           | 99.790  | g500-B8000   | m540-P100/L4 | 3 | 271 |
| 1.3                | 1163            | 6.5             | 2111           | 13.0           | 2111           | 3.8 | 22.8           | 2111           | 3.8 | 163.000           | 112.680 | g500-B8000   | m540-P100/L4 | 3 | 271 |
| 1.1                | 1312            | 5.7             | 2383           | 11.5           | 2383           | 3.4 | 20.2           | 2383           | 3.4 | 159.000           | 127.160 | g500-B8000   | m540-P100/L4 | 3 | 271 |
| 1.0                | 1454            | 5.2             | 2641           | 10.4           | 2641           | 3.0 | 18.2           | 2641           | 3.0 | 156.000           | 140.930 | g500-B8000   | m540-P100/L4 | 3 | 271 |
| 1.0                | 1553            | 4.8             | 2821           | 9.7            | 2821           | 4.6 | 17.1           | 2821           | 4.6 | 173.000           | 150.550 | g500-B13000  | m540-P100/L4 | 3 | 457 |
| 0.9                | 1637            | 4.6             | 2973           | 9.2            | 2973           | 2.7 | 16.2           | 2973           | 2.7 | 154.000           | 158.650 | g500-B8000   | m540-P100/L4 | 3 | 271 |
| 0.9                | 1716            | 4.4             | 3116           | 8.8            | 3116           | 4.2 | 15.5           | 3116           | 4.2 | 168.000           | 166.310 | g500-B13000  | m540-P100/L4 | 3 | 457 |
| 0.8                | 1847            | 4.1             | 3353           | 8.2            | 3353           | 2.4 | 14.4           | 3353           | 2.4 | 151.000           | 178.970 | g500-B8000   | m540-P100/L4 | 3 | 271 |
| 0.8                | 1911            | 3.9             | 3471           | 7.9            | 3471           | 3.8 | 13.9           | 3471           | 3.8 | 164.000           | 185.230 | g500-B13000  | m540-P100/L4 | 3 | 457 |
| 0.8                | 1970            | 3.8             | 3577           | 7.6            | 3577           | 2.2 | 13.5           | 3577           | 2.2 | 150.000           | 190.920 | g500-B8000   | m540-P100/L4 | 3 | 271 |
| 0.7                | 2093            | 3.6             | 3801           | 7.2            | 3801           | 2.1 | 12.7           | 3801           | 2.1 | 149.000           | 202.860 | g500-B8000   | m540-P100/L4 | 3 | 271 |
| 0.7                | 2150            | 3.5             | 3904           | 7.0            | 3904           | 3.3 | 12.3           | 3904           | 3.3 | 160.000           | 208.350 | g500-B13000  | m540-P100/L4 | 3 | 457 |
| 0.6                | 2304            | 3.3             | 4184           | 6.5            | 4184           | 3.1 | 11.5           | 4184           | 3.1 | 158.000           | 223.300 | g500-B13000  | m540-P100/L4 | 3 | 457 |
| 0.6                | 2446            | 3.1             | 4441           | 6.2            | 4441           | 1.8 | 10.8           | 4441           | 1.8 | 147.100           | 237.030 | g500-B8000   | m540-P100/L4 | 3 | 271 |



**50 Hz: 4 kW**

**87 Hz: 7.35 kW**

| Inverter operation |                 |                 |                |                |                |     |                |                |     |                   |         | Geared motor |              |   |     |
|--------------------|-----------------|-----------------|----------------|----------------|----------------|-----|----------------|----------------|-----|-------------------|---------|--------------|--------------|---|-----|
| 5 Hz -             |                 | - 20 Hz         |                | 50 Hz (1:10)   |                |     | 87 Hz (1:17.4) |                |     |                   |         |              |              |   |     |
| n <sub>22</sub>    | M <sub>22</sub> | n <sub>21</sub> | M <sub>2</sub> | n <sub>2</sub> | M <sub>2</sub> | c   | n <sub>2</sub> | M <sub>2</sub> | c   | J                 | i       |              |              | z | m   |
| rpm                | Nm              | rpm             | Nm             | rpm            | Nm             |     | rpm            | Nm             |     | kgcm <sup>2</sup> |         |              |              |   | kg  |
| 2.1                | 971             | 10.3            | 1767           | 20.7           | 1767           | 4.5 | 36.4           | 1767           | 4.3 | 213.000           | 70.560  | g500-B8000   | m540-P112/M4 | 3 | 271 |
| 1.8                | 1095            | 9.2             | 1994           | 18.3           | 1994           | 4.0 | 32.3           | 1994           | 3.8 | 207.000           | 79.590  | g500-B8000   | m540-P112/M4 | 3 | 271 |
| 1.6                | 1222            | 8.2             | 2224           | 16.4           | 2224           | 3.6 | 28.9           | 2224           | 3.4 | 201.000           | 88.810  | g500-B8000   | m540-P112/M4 | 3 | 271 |
| 1.5                | 1373            | 7.3             | 2499           | 14.6           | 2499           | 3.2 | 25.8           | 2499           | 3.0 | 196.000           | 99.790  | g500-B8000   | m540-P112/M4 | 3 | 271 |
| 1.4                | 1468            | 6.8             | 2673           | 13.7           | 2673           | 4.9 | 24.1           | 2673           | 4.6 | 224.000           | 106.720 | g500-B13000  | m540-P112/M4 | 3 | 457 |
| 1.3                | 1550            | 6.5             | 2822           | 13.0           | 2822           | 2.8 | 22.8           | 2822           | 2.8 | 193.000           | 112.680 | g500-B8000   | m540-P112/M4 | 3 | 271 |
| 1.2                | 1649            | 6.1             | 3001           | 12.2           | 3001           | 4.3 | 21.4           | 3001           | 4.3 | 217.000           | 119.830 | g500-B13000  | m540-P112/M4 | 3 | 457 |
| 1.1                | 1749            | 5.7             | 3185           | 11.5           | 3185           | 2.5 | 20.2           | 3185           | 2.5 | 189.000           | 127.160 | g500-B8000   | m540-P112/M4 | 3 | 271 |
| 1.1                | 1819            | 5.5             | 3312           | 11.0           | 3312           | 3.9 | 19.4           | 3312           | 3.9 | 210.000           | 132.240 | g500-B13000  | m540-P112/M4 | 3 | 457 |
| 1.0                | 1939            | 5.2             | 3530           | 10.4           | 3530           | 2.3 | 18.2           | 3530           | 2.3 | 186.000           | 140.930 | g500-B8000   | m540-P112/M4 | 3 | 271 |
| 1.0                | 2071            | 4.8             | 3771           | 9.7            | 3771           | 3.5 | 17.1           | 3771           | 3.5 | 203.000           | 150.550 | g500-B13000  | m540-P112/M4 | 3 | 457 |
| 0.9                | 2183            | 4.6             | 3974           | 9.2            | 3974           | 2.0 | 16.2           | 3974           | 2.0 | 184.000           | 158.650 | g500-B8000   | m540-P112/M4 | 3 | 271 |
| 0.9                | 2215            | 4.5             | 4032           | 9.1            | 4032           | 4.8 | 16.0           | 4032           | 4.8 | 220.000           | 160.980 | g500-B20000  | m540-P112/M4 | 3 | 707 |
| 0.9                | 2288            | 4.4             | 4166           | 8.8            | 4166           | 3.1 | 15.5           | 4166           | 3.1 | 198.000           | 166.310 | g500-B13000  | m540-P112/M4 | 3 | 457 |
| 0.8                | 2456            | 4.1             | 4471           | 8.2            | 4471           | 4.4 | 14.4           | 4471           | 4.4 | 213.000           | 178.490 | g500-B20000  | m540-P112/M4 | 3 | 707 |
| 0.8                | 2462            | 4.1             | 4483           | 8.2            | 4483           | 1.8 | 14.4           | 4483           | 1.8 | 181.000           | 178.970 | g500-B8000   | m540-P112/M4 | 3 | 271 |
| 0.8                | 2548            | 3.9             | 4639           | 7.9            | 4639           | 2.8 | 13.9           | 4639           | 2.8 | 194.000           | 185.230 | g500-B13000  | m540-P112/M4 | 3 | 457 |
| 0.8                | 2627            | 3.8             | 4782           | 7.6            | 4782           | 1.7 | 13.5           | 4782           | 1.7 | 180.000           | 190.920 | g500-B8000   | m540-P112/M4 | 3 | 271 |
| 0.7                | 2745            | 3.7             | 4997           | 7.3            | 4997           | 3.8 | 12.9           | 4997           | 3.8 | 207.000           | 199.510 | g500-B20000  | m540-P112/M4 | 3 | 707 |
| 0.7                | 2791            | 3.6             | 5081           | 7.2            | 5081           | 1.6 | 12.7           | 5081           | 1.6 | 179.000           | 202.860 | g500-B8000   | m540-P112/M4 | 3 | 271 |
| 0.7                | 2866            | 3.5             | 5219           | 7.0            | 5219           | 2.5 | 12.3           | 5219           | 2.5 | 190.000           | 208.350 | g500-B13000  | m540-P112/M4 | 3 | 457 |
| 0.6                | 3072            | 3.3             | 5593           | 6.5            | 5593           | 2.3 | 11.5           | 5593           | 2.3 | 188.000           | 223.300 | g500-B13000  | m540-P112/M4 | 3 | 457 |
| 0.6                | 3261            | 3.1             | 5937           | 6.2            | 5937           | 1.4 | 10.8           | 5937           | 1.4 | 177.100           | 237.030 | g500-B8000   | m540-P112/M4 | 3 | 271 |



50 Hz: 5.5 kW

87 Hz: 9.6 kW

| Inverter operation |                 |                 |                |                |                |     |                |                |     |                   |         | Geared motor |              |   |     |
|--------------------|-----------------|-----------------|----------------|----------------|----------------|-----|----------------|----------------|-----|-------------------|---------|--------------|--------------|---|-----|
| 5 Hz -             |                 | - 20 Hz         |                | 50 Hz (1:10)   |                |     | 87 Hz (1:17.4) |                |     |                   |         |              |              |   |     |
| n <sub>22</sub>    | M <sub>22</sub> | n <sub>21</sub> | M <sub>2</sub> | n <sub>2</sub> | M <sub>2</sub> | c   | n <sub>2</sub> | M <sub>2</sub> | c   | J                 | i       |              |              | z | m   |
| rpm                | Nm              | rpm             | Nm             | rpm            | Nm             |     | rpm            | Nm             |     | kgcm <sup>2</sup> |         |              |              |   | kg  |
| 2.9                | 932             | 14.8            | 1693           | 29.6           | 1693           | 4.7 | 52.0           | 1693           | 4.5 | 410.000           | 49.600  | g500-B8000   | m540-P132/M4 | 3 | 299 |
| 2.6                | 1029            | 13.4            | 1869           | 26.8           | 1869           | 4.3 | 47.1           | 1869           | 4.1 | 403.000           | 54.760  | g500-B8000   | m540-P132/M4 | 3 | 299 |
| 2.3                | 1170            | 11.8            | 2126           | 23.6           | 2126           | 3.8 | 41.4           | 2126           | 3.6 | 392.000           | 62.280  | g500-B8000   | m540-P132/M4 | 3 | 299 |
| 2.1                | 1326            | 10.4            | 2408           | 20.8           | 2408           | 3.3 | 36.6           | 2408           | 3.2 | 383.000           | 70.560  | g500-B8000   | m540-P132/M4 | 3 | 299 |
| 1.9                | 1432            | 9.6             | 2602           | 19.3           | 2602           | 5.0 | 33.8           | 2602           | 4.7 | 428.000           | 76.230  | g500-B13000  | m540-P132/M4 | 3 | 485 |
| 1.8                | 1495            | 9.2             | 2716           | 18.5           | 2716           | 3.0 | 32.4           | 2716           | 2.8 | 377.000           | 79.590  | g500-B8000   | m540-P132/M4 | 3 | 299 |
| 1.7                | 1607            | 8.6             | 2918           | 17.2           | 2918           | 4.5 | 30.2           | 2918           | 4.2 | 415.000           | 85.510  | g500-B13000  | m540-P132/M4 | 3 | 485 |
| 1.6                | 1669            | 8.3             | 3031           | 16.6           | 3031           | 2.6 | 29.1           | 3031           | 2.5 | 371.000           | 88.810  | g500-B8000   | m540-P132/M4 | 3 | 299 |
| 1.5                | 1800            | 7.7             | 3271           | 15.3           | 3271           | 4.0 | 26.9           | 3271           | 3.8 | 405.000           | 95.830  | g500-B13000  | m540-P132/M4 | 3 | 485 |
| 1.5                | 1875            | 7.4             | 3406           | 14.7           | 3406           | 2.4 | 25.9           | 3406           | 2.2 | 366.000           | 99.790  | g500-B8000   | m540-P132/M4 | 3 | 299 |
| 1.4                | 2005            | 6.9             | 3642           | 13.8           | 3642           | 3.6 | 24.2           | 3642           | 3.4 | 394.000           | 106.720 | g500-B13000  | m540-P132/M4 | 3 | 485 |
| 1.3                | 2117            | 6.5             | 3846           | 13.0           | 3846           | 2.1 | 22.9           | 3846           | 2.1 | 363.000           | 112.680 | g500-B8000   | m540-P132/M4 | 3 | 299 |
| 1.2                | 2198            | 6.3             | 3993           | 12.6           | 3993           | 4.9 | 22.1           | 3993           | 4.9 | 426.000           | 117.000 | g500-B20000  | m540-P132/M4 | 3 | 735 |
| 1.2                | 2251            | 6.1             | 4090           | 12.3           | 4090           | 3.2 | 21.5           | 4090           | 3.2 | 387.000           | 119.830 | g500-B13000  | m540-P132/M4 | 3 | 485 |
| 1.1                | 2389            | 5.8             | 4340           | 11.6           | 4340           | 1.8 | 20.3           | 4340           | 1.8 | 359.000           | 127.160 | g500-B8000   | m540-P132/M4 | 3 | 299 |
| 1.1                | 2443            | 5.7             | 4439           | 11.3           | 4439           | 4.4 | 19.8           | 4439           | 4.4 | 413.000           | 130.050 | g500-B20000  | m540-P132/M4 | 3 | 735 |
| 1.1                | 2485            | 5.6             | 4513           | 11.1           | 4513           | 2.9 | 19.5           | 4513           | 2.9 | 380.000           | 132.240 | g500-B13000  | m540-P132/M4 | 3 | 485 |
| 1.0                | 2648            | 5.2             | 4810           | 10.4           | 4810           | 1.7 | 18.3           | 4810           | 1.7 | 356.000           | 140.930 | g500-B8000   | m540-P132/M4 | 3 | 299 |
| 1.0                | 2673            | 5.2             | 4856           | 10.3           | 4856           | 4.0 | 18.1           | 4856           | 4.0 | 402.000           | 142.280 | g500-B20000  | m540-P132/M4 | 3 | 735 |
| 1.0                | 2829            | 4.9             | 5138           | 9.8            | 5138           | 2.5 | 17.1           | 5138           | 2.5 | 373.000           | 150.550 | g500-B13000  | m540-P132/M4 | 3 | 485 |
| 0.9                | 2981            | 4.6             | 5415           | 9.3            | 5415           | 1.5 | 16.3           | 5415           | 1.5 | 354.000           | 158.650 | g500-B8000   | m540-P132/M4 | 3 | 299 |
| 0.9                | 3024            | 4.6             | 5494           | 9.1            | 5494           | 3.6 | 16.0           | 5494           | 3.6 | 390.000           | 160.980 | g500-B20000  | m540-P132/M4 | 3 | 735 |
| 0.9                | 3125            | 4.4             | 5676           | 8.8            | 5676           | 2.3 | 15.5           | 5676           | 2.3 | 368.000           | 166.310 | g500-B13000  | m540-P132/M4 | 3 | 485 |
| 0.8                | 3353            | 4.1             | 6092           | 8.2            | 6092           | 3.2 | 14.5           | 6092           | 3.2 | 383.000           | 178.490 | g500-B20000  | m540-P132/M4 | 3 | 735 |
| 0.8                | 3362            | 4.1             | 6108           | 8.2            | 6108           | 1.3 | 14.4           | 6108           | 1.3 | 351.000           | 178.970 | g500-B8000   | m540-P132/M4 | 3 | 299 |
| 0.8                | 3480            | 4.0             | 6322           | 7.9            | 6322           | 2.1 | 13.9           | 6322           | 2.1 | 364.000           | 185.230 | g500-B13000  | m540-P132/M4 | 3 | 485 |
| 0.8                | 3587            | 3.8             | 6516           | 7.7            | 6516           | 1.2 | 13.5           | 6516           | 1.2 | 350.000           | 190.920 | g500-B8000   | m540-P132/M4 | 3 | 299 |
| 0.7                | 3748            | 3.7             | 6809           | 7.4            | 6809           | 2.8 | 12.9           | 6809           | 2.8 | 377.000           | 199.510 | g500-B20000  | m540-P132/M4 | 3 | 735 |
| 0.7                | 3811            | 3.6             | 6923           | 7.2            | 6923           | 1.2 | 12.7           | 6923           | 1.2 | 349.000           | 202.860 | g500-B8000   | m540-P132/M4 | 3 | 299 |
| 0.7                | 3914            | 3.5             | 7111           | 7.1            | 7111           | 1.8 | 12.4           | 7111           | 1.8 | 360.000           | 208.350 | g500-B13000  | m540-P132/M4 | 3 | 485 |
| 0.6                | 4195            | 3.3             | 7621           | 6.6            | 7621           | 1.7 | 11.6           | 7621           | 1.7 | 358.000           | 223.300 | g500-B13000  | m540-P132/M4 | 3 | 485 |
| 0.6                | 4453            | 3.1             | 8090           | 6.2            | 8090           | 1.0 | 10.9           | 8090           | 1.0 | 347.100           | 237.030 | g500-B8000   | m540-P132/M4 | 3 | 299 |



**50 Hz: 7.5 kW**

**87 Hz: 13.1 kW**

| Inverter operation |                 |                 |                |                |                |     |                |                |     |                   |         | Geared motor |              |   |     |
|--------------------|-----------------|-----------------|----------------|----------------|----------------|-----|----------------|----------------|-----|-------------------|---------|--------------|--------------|---|-----|
| 5 Hz -             |                 | - 20 Hz         |                | 50 Hz (1:10)   |                |     | 87 Hz (1:17.4) |                |     |                   |         |              |              |   |     |
| n <sub>22</sub>    | M <sub>22</sub> | n <sub>21</sub> | M <sub>2</sub> | n <sub>2</sub> | M <sub>2</sub> | c   | n <sub>2</sub> | M <sub>2</sub> | c   | J                 | i       |              |              | z | m   |
| rpm                | Nm              | rpm             | Nm             | rpm            | Nm             |     | rpm            | Nm             |     | kgcm <sup>2</sup> |         |              |              |   | kg  |
| 4.1                | 910             | 20.8            | 1655           | 41.4           | 1655           | 4.7 | 72.7           | 1655           | 4.0 | 570.000           | 35.400  | g500-B8000   | m540-P132/L4 | 3 | 299 |
| 3.4                | 1110            | 17.0            | 2019           | 33.9           | 2019           | 4.0 | 59.6           | 2019           | 3.8 | 545.000           | 43.180  | g500-B8000   | m540-P132/L4 | 3 | 299 |
| 2.9                | 1275            | 14.8            | 2319           | 29.5           | 2319           | 3.5 | 51.9           | 2319           | 3.3 | 530.000           | 49.600  | g500-B8000   | m540-P132/L4 | 3 | 299 |
| 2.6                | 1408            | 13.4            | 2560           | 26.8           | 2560           | 3.1 | 47.0           | 2560           | 3.0 | 523.000           | 54.760  | g500-B8000   | m540-P132/L4 | 3 | 299 |
| 2.3                | 1596            | 11.8            | 2902           | 23.6           | 2902           | 4.5 | 41.5           | 2902           | 4.3 | 574.000           | 62.070  | g500-B13000  | m540-P132/L4 | 3 | 485 |
| 2.3                | 1601            | 11.8            | 2911           | 23.5           | 2911           | 2.8 | 41.3           | 2911           | 2.6 | 512.000           | 62.280  | g500-B8000   | m540-P132/L4 | 3 | 299 |
| 2.1                | 1738            | 10.9            | 3161           | 21.7           | 3161           | 4.1 | 38.1           | 3161           | 3.9 | 563.000           | 67.610  | g500-B13000  | m540-P132/L4 | 3 | 485 |
| 2.1                | 1814            | 10.4            | 3299           | 20.8           | 3299           | 2.4 | 36.5           | 3299           | 2.3 | 503.000           | 70.560  | g500-B8000   | m540-P132/L4 | 3 | 299 |
| 1.9                | 1960            | 9.6             | 3564           | 19.2           | 3564           | 3.7 | 33.8           | 3564           | 3.5 | 548.000           | 76.230  | g500-B13000  | m540-P132/L4 | 3 | 485 |
| 1.8                | 2046            | 9.2             | 3721           | 18.4           | 3721           | 2.2 | 32.4           | 3721           | 2.0 | 497.000           | 79.590  | g500-B8000   | m540-P132/L4 | 3 | 299 |
| 1.7                | 2145            | 8.8             | 3901           | 17.6           | 3901           | 5.0 | 30.9           | 3901           | 4.7 | 600.000           | 83.440  | g500-B20000  | m540-P132/L4 | 3 | 735 |
| 1.7                | 2198            | 8.6             | 3997           | 17.1           | 3997           | 3.3 | 30.1           | 3997           | 3.1 | 535.000           | 85.510  | g500-B13000  | m540-P132/L4 | 3 | 485 |
| 1.6                | 2283            | 8.3             | 4152           | 16.5           | 4152           | 1.9 | 29.0           | 4152           | 1.8 | 491.000           | 88.810  | g500-B8000   | m540-P132/L4 | 3 | 299 |
| 1.5                | 2431            | 7.8             | 4420           | 15.5           | 4420           | 4.4 | 27.2           | 4420           | 4.2 | 579.000           | 94.550  | g500-B20000  | m540-P132/L4 | 3 | 735 |
| 1.5                | 2464            | 7.7             | 4480           | 15.3           | 4480           | 2.9 | 26.9           | 4480           | 2.8 | 525.000           | 95.830  | g500-B13000  | m540-P132/L4 | 3 | 485 |
| 1.5                | 2565            | 7.4             | 4665           | 14.7           | 4665           | 1.7 | 25.8           | 4665           | 1.6 | 486.000           | 99.790  | g500-B8000   | m540-P132/L4 | 3 | 299 |
| 1.4                | 2688            | 7.0             | 4888           | 14.0           | 4888           | 4.0 | 24.6           | 4888           | 3.8 | 560.000           | 104.560 | g500-B20000  | m540-P132/L4 | 3 | 735 |
| 1.4                | 2743            | 6.9             | 4989           | 13.7           | 4989           | 2.6 | 24.1           | 4989           | 2.5 | 514.000           | 106.720 | g500-B13000  | m540-P132/L4 | 3 | 485 |
| 1.3                | 2897            | 6.5             | 5268           | 13.0           | 5268           | 1.5 | 22.9           | 5268           | 1.5 | 483.000           | 112.680 | g500-B8000   | m540-P132/L4 | 3 | 299 |
| 1.2                | 3008            | 6.3             | 5470           | 12.5           | 5470           | 3.6 | 22.0           | 5470           | 3.6 | 546.000           | 117.000 | g500-B20000  | m540-P132/L4 | 3 | 735 |
| 1.2                | 3080            | 6.1             | 5602           | 12.2           | 5602           | 2.3 | 21.5           | 5602           | 2.3 | 507.000           | 119.830 | g500-B13000  | m540-P132/L4 | 3 | 485 |
| 1.1                | 3269            | 5.8             | 5945           | 11.5           | 5945           | 1.4 | 20.3           | 5945           | 1.4 | 479.000           | 127.160 | g500-B8000   | m540-P132/L4 | 3 | 299 |
| 1.1                | 3343            | 5.7             | 6080           | 11.3           | 6080           | 3.2 | 19.8           | 6080           | 3.2 | 533.000           | 130.050 | g500-B20000  | m540-P132/L4 | 3 | 735 |
| 1.1                | 3400            | 5.6             | 6182           | 11.1           | 6182           | 2.1 | 19.5           | 6182           | 2.1 | 500.000           | 132.240 | g500-B13000  | m540-P132/L4 | 3 | 485 |
| 1.0                | 3623            | 5.2             | 6588           | 10.4           | 6588           | 1.2 | 18.3           | 6588           | 1.2 | 476.000           | 140.930 | g500-B8000   | m540-P132/L4 | 3 | 299 |
| 1.0                | 3658            | 5.2             | 6651           | 10.3           | 6651           | 2.9 | 18.1           | 6651           | 2.9 | 522.000           | 142.280 | g500-B20000  | m540-P132/L4 | 3 | 735 |
| 1.0                | 3870            | 4.9             | 7038           | 9.7            | 7038           | 1.9 | 17.1           | 7038           | 1.9 | 493.000           | 150.550 | g500-B13000  | m540-P132/L4 | 3 | 485 |
| 0.9                | 4078            | 4.6             | 7417           | 9.2            | 7417           | 1.1 | 16.2           | 7417           | 1.1 | 474.000           | 158.650 | g500-B8000   | m540-P132/L4 | 3 | 299 |
| 0.9                | 4138            | 4.6             | 7526           | 9.1            | 7526           | 2.6 | 16.0           | 7526           | 2.6 | 510.000           | 160.980 | g500-B20000  | m540-P132/L4 | 3 | 735 |
| 0.9                | 4275            | 4.4             | 7775           | 8.8            | 7775           | 1.7 | 15.5           | 7775           | 1.7 | 488.000           | 166.310 | g500-B13000  | m540-P132/L4 | 3 | 485 |
| 0.8                | 4588            | 4.1             | 8344           | 8.2            | 8344           | 2.3 | 14.4           | 8344           | 2.3 | 503.000           | 178.490 | g500-B20000  | m540-P132/L4 | 3 | 735 |
| 0.8                | 4601            | 4.1             | 8367           | 8.2            | 8367           | 1.0 | 14.4           | 8367           | 1.0 | 471.000           | 178.970 | g500-B8000   | m540-P132/L4 | 3 | 299 |
| 0.8                | 4762            | 4.0             | 8659           | 7.9            | 8659           | 1.5 | 13.9           | 8659           | 1.5 | 484.000           | 185.230 | g500-B13000  | m540-P132/L4 | 3 | 485 |
| 0.8                | 4908            | 3.8             | 8925           | 7.7            | 8925           | 0.9 | 13.5           | 8925           | 0.9 | 470.000           | 190.920 | g500-B8000   | m540-P132/L4 | 3 | 299 |
| 0.7                | 5129            | 3.7             | 9327           | 7.3            | 9327           | 2.1 | 12.9           | 9327           | 2.1 | 497.000           | 199.510 | g500-B20000  | m540-P132/L4 | 3 | 735 |
| 0.7                | 5215            | 3.6             | 9483           | 7.2            | 9483           | 0.8 | 12.7           | 9483           | 0.8 | 469.000           | 202.860 | g500-B8000   | m540-P132/L4 | 3 | 299 |
| 0.7                | 5356            | 3.5             | 9740           | 7.0            | 9740           | 1.3 | 12.4           | 9740           | 1.3 | 480.000           | 208.350 | g500-B13000  | m540-P132/L4 | 3 | 485 |
| 0.6                | 5740            | 3.3             | 10439          | 6.6            | 10439          | 1.3 | 11.5           | 10439          | 1.3 | 478.000           | 223.300 | g500-B13000  | m540-P132/L4 | 3 | 485 |



**50 Hz: 11 kW**

**87 Hz: 19.2 kW**

| Inverter operation |                 |                 |                |                |                |     |                |                |     |                   |         | Geared motor |              |   |     |
|--------------------|-----------------|-----------------|----------------|----------------|----------------|-----|----------------|----------------|-----|-------------------|---------|--------------|--------------|---|-----|
| 5 Hz -             |                 | - 20 Hz         |                | 50 Hz (1:10)   |                |     | 87 Hz (1:17.4) |                |     | J                 | i       |              |              | z | m   |
| n <sub>22</sub>    | M <sub>22</sub> | n <sub>21</sub> | M <sub>2</sub> | n <sub>2</sub> | M <sub>2</sub> | c   | n <sub>2</sub> | M <sub>2</sub> | c   | J                 | i       |              |              |   |     |
| rpm                | Nm              | rpm             | Nm             | rpm            | Nm             |     | rpm            | Nm             |     | kgcm <sup>2</sup> |         |              |              |   | kg  |
| 11.7               | 466             | 59.5            | 847            | 119            | 847            | 4.8 | 208            | 847            | 4.0 | 927.000           | 12.440  | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 10.2               | 530             | 52.3            | 963            | 104            | 963            | 4.3 | 183            | 963            | 3.6 | 909.000           | 14.150  | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 6.5                | 833             | 33.3            | 1514           | 66.3           | 1514           | 4.8 | 116            | 1514           | 4.0 | 919.000           | 22.250  | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 5.7                | 947             | 29.2            | 1722           | 58.3           | 1722           | 4.3 | 102            | 1722           | 3.6 | 903.000           | 25.300  | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 5.1                | 1073            | 25.8            | 1951           | 51.5           | 1951           | 3.9 | 90.2           | 1951           | 3.3 | 889.000           | 28.660  | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 4.5                | 1211            | 22.9            | 2201           | 45.6           | 2201           | 3.5 | 80.0           | 2201           | 2.9 | 879.000           | 32.330  | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 4.1                | 1326            | 20.9            | 2410           | 41.7           | 2410           | 3.3 | 73.0           | 2410           | 2.7 | 940.000           | 35.400  | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 3.7                | 1473            | 18.8            | 2677           | 37.5           | 2677           | 4.9 | 65.7           | 2677           | 4.1 | 1028.000          | 39.330  | g500-B13000  | m540-P160/M4 | 3 | 501 |
| 3.4                | 1617            | 17.1            | 2939           | 34.2           | 2939           | 2.7 | 59.9           | 2939           | 2.6 | 915.000           | 43.180  | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 3.2                | 1680            | 16.5            | 3053           | 32.9           | 3053           | 4.3 | 57.6           | 3053           | 4.0 | 1010.000          | 44.860  | g500-B13000  | m540-P160/M4 | 3 | 501 |
| 2.9                | 1857            | 14.9            | 3376           | 29.7           | 3376           | 2.4 | 52.1           | 3376           | 2.3 | 900.000           | 49.600  | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 2.7                | 2048            | 13.5            | 3722           | 27.0           | 3722           | 3.5 | 47.3           | 3722           | 3.3 | 964.000           | 54.680  | g500-B13000  | m540-P160/M4 | 3 | 501 |
| 2.6                | 2051            | 13.5            | 3727           | 26.9           | 3727           | 2.2 | 47.2           | 3727           | 2.0 | 893.000           | 54.760  | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 2.4                | 2269            | 12.2            | 4124           | 24.3           | 4124           | 4.7 | 42.7           | 4124           | 4.5 | 1050.000          | 60.580  | g500-B20000  | m540-P160/M4 | 3 | 751 |
| 2.3                | 2324            | 11.9            | 4225           | 23.8           | 4225           | 3.1 | 41.6           | 4225           | 2.9 | 944.000           | 62.070  | g500-B13000  | m540-P160/M4 | 3 | 501 |
| 2.3                | 2332            | 11.9            | 4239           | 23.7           | 4239           | 1.9 | 41.5           | 4239           | 1.8 | 882.000           | 62.280  | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 2.2                | 2523            | 11.0            | 4585           | 21.9           | 4585           | 4.3 | 38.4           | 4585           | 4.0 | 1012.000          | 67.360  | g500-B20000  | m540-P160/M4 | 3 | 751 |
| 2.1                | 2532            | 10.9            | 4602           | 21.8           | 4602           | 2.8 | 38.2           | 4602           | 2.7 | 933.000           | 67.610  | g500-B13000  | m540-P160/M4 | 3 | 501 |
| 2.1                | 2642            | 10.5            | 4803           | 20.9           | 4803           | 1.7 | 36.6           | 4803           | 1.6 | 873.000           | 70.560  | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 2.0                | 2784            | 10.0            | 5061           | 19.8           | 5061           | 3.9 | 34.8           | 5061           | 3.7 | 994.000           | 74.350  | g500-B20000  | m540-P160/M4 | 3 | 751 |
| 1.9                | 2855            | 9.7             | 5189           | 19.3           | 5189           | 2.5 | 33.9           | 5189           | 2.4 | 918.000           | 76.230  | g500-B13000  | m540-P160/M4 | 3 | 501 |
| 1.8                | 2981            | 9.3             | 5417           | 18.5           | 5417           | 1.5 | 32.5           | 5417           | 1.4 | 867.000           | 79.590  | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 1.7                | 3125            | 8.9             | 5680           | 17.7           | 5680           | 3.4 | 31.0           | 5680           | 3.3 | 970.000           | 83.440  | g500-B20000  | m540-P160/M4 | 3 | 751 |
| 1.7                | 3202            | 8.7             | 5820           | 17.2           | 5820           | 2.2 | 30.2           | 5820           | 2.1 | 905.000           | 85.510  | g500-B13000  | m540-P160/M4 | 3 | 501 |
| 1.6                | 3326            | 8.3             | 6045           | 16.6           | 6045           | 1.3 | 29.1           | 6045           | 1.3 | 861.000           | 88.810  | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 1.5                | 3541            | 7.8             | 6436           | 15.6           | 6436           | 3.0 | 27.3           | 6436           | 2.9 | 949.000           | 94.550  | g500-B20000  | m540-P160/M4 | 3 | 751 |
| 1.5                | 3589            | 7.7             | 6523           | 15.4           | 6523           | 2.0 | 27.0           | 6523           | 1.9 | 895.000           | 95.830  | g500-B13000  | m540-P160/M4 | 3 | 501 |
| 1.5                | 3737            | 7.4             | 6792           | 14.8           | 6792           | 1.2 | 25.9           | 6792           | 1.1 | 856.000           | 99.790  | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 1.4                | 3916            | 7.1             | 7117           | 14.1           | 7117           | 2.7 | 24.7           | 7117           | 2.6 | 930.000           | 104.560 | g500-B20000  | m540-P160/M4 | 3 | 751 |
| 1.4                | 3996            | 6.9             | 7264           | 13.8           | 7264           | 1.8 | 24.2           | 7264           | 1.7 | 884.000           | 106.720 | g500-B13000  | m540-P160/M4 | 3 | 501 |
| 1.3                | 4220            | 6.6             | 7670           | 13.1           | 7670           | 1.0 | 22.9           | 7670           | 1.0 | 853.000           | 112.680 | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 1.2                | 4381            | 6.3             | 7964           | 12.6           | 7964           | 2.5 | 22.1           | 7964           | 2.5 | 916.000           | 117.000 | g500-B20000  | m540-P160/M4 | 3 | 751 |
| 1.2                | 4487            | 6.2             | 8156           | 12.3           | 8156           | 1.6 | 21.6           | 8156           | 1.6 | 877.000           | 119.830 | g500-B13000  | m540-P160/M4 | 3 | 501 |
| 1.1                | 4762            | 5.8             | 8655           | 11.6           | 8655           | 0.9 | 20.3           | 8655           | 0.9 | 849.000           | 127.160 | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 1.1                | 4870            | 5.7             | 8852           | 11.3           | 8852           | 2.2 | 19.9           | 8852           | 2.2 | 903.000           | 130.050 | g500-B20000  | m540-P160/M4 | 3 | 751 |
| 1.1                | 4952            | 5.6             | 9001           | 11.2           | 9001           | 1.4 | 19.5           | 9001           | 1.4 | 870.000           | 132.240 | g500-B13000  | m540-P160/M4 | 3 | 501 |
| 1.0                | 5278            | 5.3             | 9593           | 10.5           | 9593           | 0.8 | 18.3           | 9593           | 0.8 | 846.000           | 140.930 | g500-B8000   | m540-P160/M4 | 3 | 315 |
| 1.0                | 5328            | 5.2             | 9685           | 10.4           | 9685           | 2.0 | 18.2           | 9685           | 2.0 | 892.000           | 142.280 | g500-B20000  | m540-P160/M4 | 3 | 751 |
| 1.0                | 5638            | 4.9             | 10248          | 9.8            | 10248          | 1.3 | 17.2           | 10248          | 1.3 | 863.000           | 150.550 | g500-B13000  | m540-P160/M4 | 3 | 501 |
| 0.9                | 6028            | 4.6             | 10957          | 9.2            | 10957          | 1.8 | 16.1           | 10957          | 1.8 | 880.000           | 160.980 | g500-B20000  | m540-P160/M4 | 3 | 751 |
| 0.9                | 6228            | 4.4             | 11320          | 8.9            | 11320          | 1.2 | 15.5           | 11320          | 1.2 | 858.000           | 166.310 | g500-B13000  | m540-P160/M4 | 3 | 501 |
| 0.8                | 6684            | 4.1             | 12149          | 8.3            | 12149          | 1.6 | 14.5           | 12149          | 1.6 | 873.000           | 178.490 | g500-B20000  | m540-P160/M4 | 3 | 751 |
| 0.8                | 6936            | 4.0             | 12608          | 8.0            | 12608          | 1.0 | 14.0           | 12608          | 1.0 | 854.000           | 185.230 | g500-B13000  | m540-P160/M4 | 3 | 501 |
| 0.7                | 7471            | 3.7             | 13580          | 7.4            | 13580          | 1.4 | 13.0           | 13580          | 1.4 | 867.000           | 199.510 | g500-B20000  | m540-P160/M4 | 3 | 751 |
| 0.7                | 7802            | 3.6             | 14182          | 7.1            | 14182          | 0.9 | 12.4           | 14182          | 0.9 | 850.000           | 208.350 | g500-B13000  | m540-P160/M4 | 3 | 501 |
| 0.6                | 8362            | 3.3             | 15199          | 6.6            | 15199          | 0.9 | 11.6           | 15199          | 0.9 | 848.000           | 223.300 | g500-B13000  | m540-P160/M4 | 3 | 501 |



50 Hz: 15 kW

87 Hz: 26.3 kW

| Inverter operation |                 |                 |                |                |                |     |                |                |     |                   |         | Geared motor |              |   |     |
|--------------------|-----------------|-----------------|----------------|----------------|----------------|-----|----------------|----------------|-----|-------------------|---------|--------------|--------------|---|-----|
| 5 Hz -             |                 | - 20 Hz         |                | 50 Hz (1:10)   |                |     | 87 Hz (1:17.4) |                |     |                   |         |              |              |   |     |
| n <sub>22</sub>    | M <sub>22</sub> | n <sub>21</sub> | M <sub>2</sub> | n <sub>2</sub> | M <sub>2</sub> | c   | n <sub>2</sub> | M <sub>2</sub> | c   | J                 | i       |              |              | z | m   |
| rpm                | Nm              | rpm             | Nm             | rpm            | Nm             |     | rpm            | Nm             |     | kgcm <sup>2</sup> |         |              |              |   | kg  |
| 18.0               | 411             | 92.0            | 746            | 184            | 746            | 5.0 | 322            | 746            | 4.2 | 1184.000          | 8.040   | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 14.8               | 501             | 75.4            | 911            | 150            | 911            | 4.2 | 264            | 911            | 3.5 | 1131.000          | 9.810   | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 12.9               | 575             | 65.7            | 1045           | 131            | 1045           | 3.8 | 230            | 1045           | 3.2 | 1103.000          | 11.260  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 11.7               | 635             | 59.5            | 1155           | 119            | 1155           | 3.5 | 208            | 1155           | 2.9 | 1087.000          | 12.440  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 10.2               | 722             | 52.3            | 1314           | 104            | 1314           | 3.2 | 183            | 1314           | 2.6 | 1069.000          | 14.150  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 10.1               | 734             | 51.5            | 1335           | 103            | 1335           | 5.0 | 180            | 1335           | 4.2 | 1164.000          | 14.380  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 8.3                | 896             | 42.2            | 1628           | 84.1           | 1628           | 4.2 | 147            | 1628           | 3.5 | 1118.000          | 17.540  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 7.2                | 1029            | 36.7            | 1870           | 73.2           | 1870           | 3.8 | 128            | 1870           | 3.2 | 1093.000          | 20.150  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 6.5                | 1136            | 33.3            | 2065           | 66.3           | 2065           | 3.5 | 116            | 2065           | 2.9 | 1079.000          | 22.250  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 5.7                | 1292            | 29.2            | 2349           | 58.3           | 2349           | 3.2 | 102            | 2349           | 2.6 | 1063.000          | 25.300  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 5.1                | 1463            | 25.8            | 2660           | 51.5           | 2660           | 2.9 | 90.2           | 2660           | 2.4 | 1049.000          | 28.660  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 4.9                | 1503            | 25.1            | 2732           | 50.1           | 2732           | 4.8 | 87.8           | 2732           | 4.0 | 1123.000          | 29.430  | g500-B13000  | m540-P160/L4 | 3 | 518 |
| 4.7                | 1570            | 24.1            | 2854           | 48.0           | 2854           | 4.6 | 84.1           | 2854           | 3.8 | 1299.000          | 30.750  | g500-B13000  | m540-P160/L4 | 3 | 518 |
| 4.5                | 1651            | 22.9            | 3001           | 45.6           | 3001           | 2.6 | 80.0           | 3001           | 2.2 | 1039.000          | 32.330  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 4.1                | 1807            | 20.9            | 3286           | 41.7           | 3286           | 2.4 | 73.0           | 3286           | 2.0 | 1100.000          | 35.400  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 3.7                | 2008            | 18.8            | 3651           | 37.5           | 3651           | 3.6 | 65.7           | 3651           | 3.0 | 1188.000          | 39.330  | g500-B13000  | m540-P160/L4 | 3 | 518 |
| 3.4                | 2205            | 17.1            | 4008           | 34.2           | 4008           | 2.0 | 59.9           | 4008           | 1.9 | 1075.000          | 43.180  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 3.2                | 2285            | 16.5            | 4155           | 33.0           | 4155           | 4.7 | 57.8           | 4155           | 4.5 | 1324.000          | 44.760  | g500-B20000  | m540-P160/L4 | 3 | 768 |
| 3.2                | 2290            | 16.5            | 4164           | 32.9           | 4164           | 3.1 | 57.6           | 4164           | 3.0 | 1170.000          | 44.860  | g500-B13000  | m540-P160/L4 | 3 | 518 |
| 2.9                | 2532            | 14.9            | 4604           | 29.7           | 4604           | 1.7 | 52.1           | 4604           | 1.7 | 1060.000          | 49.600  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 2.9                | 2570            | 14.7            | 4673           | 29.3           | 4673           | 4.2 | 51.4           | 4673           | 4.0 | 1263.000          | 50.340  | g500-B20000  | m540-P160/L4 | 3 | 768 |
| 2.7                | 2792            | 13.5            | 5076           | 27.0           | 5076           | 2.6 | 47.3           | 5076           | 2.4 | 1124.000          | 54.680  | g500-B13000  | m540-P160/L4 | 3 | 518 |
| 2.6                | 2796            | 13.5            | 5083           | 26.9           | 5083           | 1.6 | 47.2           | 5083           | 1.5 | 1053.000          | 54.760  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 2.4                | 3093            | 12.2            | 5623           | 24.3           | 5623           | 3.5 | 42.7           | 5623           | 3.3 | 1210.000          | 60.580  | g500-B20000  | m540-P160/L4 | 3 | 768 |
| 2.3                | 3169            | 11.9            | 5762           | 23.8           | 5762           | 2.3 | 41.6           | 5762           | 2.1 | 1104.000          | 62.070  | g500-B13000  | m540-P160/L4 | 3 | 518 |
| 2.3                | 3180            | 11.9            | 5781           | 23.7           | 5781           | 1.4 | 41.5           | 5781           | 1.3 | 1042.000          | 62.280  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 2.2                | 3439            | 11.0            | 6253           | 21.9           | 6253           | 3.1 | 38.4           | 6253           | 3.0 | 1172.000          | 67.360  | g500-B20000  | m540-P160/L4 | 3 | 768 |
| 2.1                | 3452            | 10.9            | 6276           | 21.8           | 6276           | 2.1 | 38.2           | 6276           | 2.0 | 1093.000          | 67.610  | g500-B13000  | m540-P160/L4 | 3 | 518 |
| 2.1                | 3603            | 10.5            | 6550           | 20.9           | 6550           | 1.2 | 36.6           | 6550           | 1.2 | 1033.000          | 70.560  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 2.0                | 3796            | 10.0            | 6902           | 19.8           | 6902           | 2.8 | 34.8           | 6902           | 2.7 | 1154.000          | 74.350  | g500-B20000  | m540-P160/L4 | 3 | 768 |
| 1.9                | 3892            | 9.7             | 7076           | 19.3           | 7076           | 1.8 | 33.9           | 7076           | 1.7 | 1078.000          | 76.230  | g500-B13000  | m540-P160/L4 | 3 | 518 |
| 1.8                | 4064            | 9.3             | 7388           | 18.5           | 7388           | 1.1 | 32.5           | 7388           | 1.0 | 1027.000          | 79.590  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 1.7                | 4260            | 8.9             | 7746           | 17.7           | 7746           | 2.5 | 31.0           | 7746           | 2.4 | 1130.000          | 83.440  | g500-B20000  | m540-P160/L4 | 3 | 768 |
| 1.7                | 4366            | 8.7             | 7938           | 17.2           | 7938           | 1.6 | 30.2           | 7938           | 1.6 | 1065.000          | 85.510  | g500-B13000  | m540-P160/L4 | 3 | 518 |
| 1.6                | 4534            | 8.3             | 8244           | 16.6           | 8244           | 1.0 | 29.1           | 8244           | 0.9 | 1021.000          | 88.810  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 1.5                | 4827            | 7.8             | 8777           | 15.6           | 8777           | 2.2 | 27.3           | 8777           | 2.1 | 1109.000          | 94.550  | g500-B20000  | m540-P160/L4 | 3 | 768 |
| 1.5                | 4893            | 7.7             | 8896           | 15.4           | 8896           | 1.5 | 27.0           | 8896           | 1.4 | 1055.000          | 95.830  | g500-B13000  | m540-P160/L4 | 3 | 518 |
| 1.5                | 5095            | 7.4             | 9263           | 14.8           | 9263           | 0.9 | 25.9           | 9263           | 0.8 | 1016.000          | 99.790  | g500-B8000   | m540-P160/L4 | 3 | 332 |
| 1.4                | 5338            | 7.1             | 9706           | 14.1           | 9706           | 2.0 | 24.7           | 9706           | 1.9 | 1090.000          | 104.560 | g500-B20000  | m540-P160/L4 | 3 | 768 |
| 1.4                | 5449            | 6.9             | 9907           | 13.8           | 9907           | 1.3 | 24.2           | 9907           | 1.2 | 1044.000          | 106.720 | g500-B13000  | m540-P160/L4 | 3 | 518 |
| 1.2                | 5974            | 6.3             | 10861          | 12.6           | 10861          | 1.8 | 22.1           | 10861          | 1.8 | 1076.000          | 117.000 | g500-B20000  | m540-P160/L4 | 3 | 768 |
| 1.2                | 6118            | 6.2             | 11124          | 12.3           | 11124          | 1.2 | 21.6           | 11124          | 1.2 | 1037.000          | 119.830 | g500-B13000  | m540-P160/L4 | 3 | 518 |
| 1.1                | 6640            | 5.7             | 12072          | 11.3           | 12072          | 1.6 | 19.9           | 12072          | 1.6 | 1063.000          | 130.050 | g500-B20000  | m540-P160/L4 | 3 | 768 |
| 1.1                | 6752            | 5.6             | 12276          | 11.2           | 12276          | 1.1 | 19.5           | 12276          | 1.1 | 1030.000          | 132.240 | g500-B13000  | m540-P160/L4 | 3 | 518 |
| 1.0                | 7264            | 5.2             | 13208          | 10.4           | 13208          | 1.5 | 18.2           | 13208          | 1.5 | 1052.000          | 142.280 | g500-B20000  | m540-P160/L4 | 3 | 768 |
| 1.0                | 7686            | 4.9             | 13975          | 9.8            | 13975          | 0.9 | 17.2           | 13975          | 0.9 | 1023.000          | 150.550 | g500-B13000  | m540-P160/L4 | 3 | 518 |
| 0.9                | 8219            | 4.6             | 14943          | 9.2            | 14943          | 1.3 | 16.1           | 14943          | 1.3 | 1040.000          | 160.980 | g500-B20000  | m540-P160/L4 | 3 | 768 |
| 0.9                | 8491            | 4.4             | 15438          | 8.9            | 15438          | 0.8 | 15.5           | 15438          | 0.8 | 1018.000          | 166.310 | g500-B13000  | m540-P160/L4 | 3 | 518 |
| 0.8                | 9113            | 4.1             | 16569          | 8.3            | 16569          | 1.2 | 14.5           | 16569          | 1.2 | 1033.000          | 178.490 | g500-B20000  | m540-P160/L4 | 3 | 768 |
| 0.7                | 10186           | 3.7             | 18520          | 7.4            | 18520          | 1.0 | 13.0           | 18520          | 1.0 | 1027.000          | 199.510 | g500-B20000  | m540-P160/L4 | 3 | 768 |



**50 Hz: 18.5 kW**

**87 Hz: 32.2 kW**

| Inverter operation |                 |                 |                |                |                |     |                |                |     |                   |         | Geared motor |              |   |     |
|--------------------|-----------------|-----------------|----------------|----------------|----------------|-----|----------------|----------------|-----|-------------------|---------|--------------|--------------|---|-----|
| 5 Hz -             |                 | - 20 Hz         |                | 50 Hz (1:10)   |                |     | 87 Hz (1:17.4) |                |     |                   |         |              |              |   |     |
| n <sub>22</sub>    | M <sub>22</sub> | n <sub>21</sub> | M <sub>2</sub> | n <sub>2</sub> | M <sub>2</sub> | c   | n <sub>2</sub> | M <sub>2</sub> | c   | J                 | i       |              |              | z | m   |
| rpm                | Nm              | rpm             | Nm             | rpm            | Nm             |     | rpm            | Nm             |     | kgcm <sup>2</sup> |         |              |              |   | kg  |
| 21.3               | 431             | 108             | 784            | 216            | 784            | 4.6 | 378            | 784            | 3.9 | 1566.000          | 6.820   | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 18.0               | 508             | 91.4            | 924            | 183            | 924            | 4.0 | 321            | 924            | 3.4 | 1494.000          | 8.040   | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 14.8               | 620             | 74.9            | 1127           | 150            | 1127           | 3.4 | 263            | 1127           | 2.9 | 1441.000          | 9.810   | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 12.9               | 712             | 65.3            | 1294           | 131            | 1294           | 3.1 | 229            | 1294           | 2.6 | 1413.000          | 11.260  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 11.9               | 771             | 60.2            | 1402           | 121            | 1402           | 4.8 | 212            | 1402           | 4.0 | 1502.000          | 12.200  | g500-B13000  | m540-P180/M4 | 3 | 593 |
| 11.7               | 786             | 59.1            | 1429           | 118            | 1429           | 2.8 | 207            | 1429           | 2.4 | 1397.000          | 12.440  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 10.2               | 894             | 51.9            | 1626           | 104            | 1626           | 2.6 | 182            | 1626           | 2.1 | 1379.000          | 14.150  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 10.1               | 909             | 51.1            | 1652           | 102            | 1652           | 4.0 | 179            | 1652           | 3.4 | 1474.000          | 14.380  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 8.3                | 1109            | 41.9            | 2016           | 83.8           | 2016           | 3.4 | 147            | 2016           | 2.9 | 1428.000          | 17.540  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 7.2                | 1274            | 36.5            | 2315           | 73.0           | 2315           | 3.1 | 128            | 2315           | 2.6 | 1403.000          | 20.150  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 6.5                | 1406            | 33.0            | 2557           | 66.1           | 2557           | 2.8 | 116            | 2557           | 2.4 | 1389.000          | 22.250  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 6.1                | 1504            | 30.9            | 2735           | 61.8           | 2735           | 4.8 | 108            | 2735           | 4.0 | 1481.000          | 23.800  | g500-B13000  | m540-P180/M4 | 3 | 593 |
| 5.7                | 1599            | 29.1            | 2907           | 58.1           | 2907           | 2.6 | 102            | 2907           | 2.1 | 1373.000          | 25.300  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 5.4                | 1708            | 27.2            | 3105           | 54.4           | 3105           | 4.2 | 95.5           | 3105           | 3.5 | 1451.000          | 27.020  | g500-B13000  | m540-P180/M4 | 3 | 593 |
| 5.1                | 1811            | 25.6            | 3293           | 51.3           | 3293           | 2.3 | 90.0           | 3293           | 1.9 | 1359.000          | 28.660  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 4.9                | 1860            | 25.0            | 3382           | 49.9           | 3382           | 3.8 | 87.7           | 3382           | 3.2 | 1433.000          | 29.430  | g500-B13000  | m540-P180/M4 | 3 | 593 |
| 4.7                | 1943            | 23.9            | 3534           | 47.8           | 3534           | 3.7 | 83.9           | 3534           | 3.1 | 1609.000          | 30.750  | g500-B13000  | m540-P180/M4 | 3 | 593 |
| 4.5                | 2043            | 22.7            | 3715           | 45.5           | 3715           | 2.1 | 79.8           | 3715           | 1.7 | 1349.000          | 32.330  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 4.1                | 2237            | 20.8            | 4068           | 41.5           | 4068           | 1.9 | 72.9           | 4068           | 1.6 | 1410.000          | 35.400  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 4.1                | 2254            | 20.6            | 4099           | 41.2           | 4099           | 4.8 | 72.3           | 4099           | 4.0 | 1755.000          | 35.670  | g500-B20000  | m540-P180/M4 | 3 | 843 |
| 3.7                | 2486            | 18.7            | 4519           | 37.4           | 4519           | 2.9 | 65.6           | 4519           | 2.4 | 1498.000          | 39.330  | g500-B13000  | m540-P180/M4 | 3 | 593 |
| 3.4                | 2729            | 17.0            | 4962           | 34.0           | 4962           | 1.6 | 59.7           | 4962           | 1.5 | 1385.000          | 43.180  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 3.2                | 2829            | 16.4            | 5143           | 32.8           | 5143           | 3.8 | 57.6           | 5143           | 3.6 | 1634.000          | 44.760  | g500-B20000  | m540-P180/M4 | 3 | 843 |
| 3.2                | 2835            | 16.4            | 5155           | 32.8           | 5155           | 2.5 | 57.5           | 5155           | 2.4 | 1480.000          | 44.860  | g500-B13000  | m540-P180/M4 | 3 | 593 |
| 2.9                | 3135            | 14.8            | 5700           | 29.6           | 5700           | 1.4 | 52.0           | 5700           | 1.3 | 1370.000          | 49.600  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 2.9                | 3182            | 14.6            | 5785           | 29.2           | 5785           | 3.4 | 51.3           | 5785           | 3.2 | 1573.000          | 50.340  | g500-B20000  | m540-P180/M4 | 3 | 843 |
| 2.7                | 3456            | 13.4            | 6283           | 26.9           | 6283           | 2.1 | 47.2           | 6283           | 2.0 | 1434.000          | 54.680  | g500-B13000  | m540-P180/M4 | 3 | 593 |
| 2.6                | 3461            | 13.4            | 6293           | 26.8           | 6293           | 1.3 | 47.1           | 6293           | 1.2 | 1363.000          | 54.760  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 2.4                | 3829            | 12.1            | 6961           | 24.3           | 6961           | 2.8 | 42.6           | 6961           | 2.7 | 1520.000          | 60.580  | g500-B20000  | m540-P180/M4 | 3 | 843 |
| 2.3                | 3923            | 11.8            | 7133           | 23.7           | 7133           | 1.8 | 41.6           | 7133           | 1.7 | 1414.000          | 62.070  | g500-B13000  | m540-P180/M4 | 3 | 593 |
| 2.3                | 3936            | 11.8            | 7157           | 23.6           | 7157           | 1.1 | 41.4           | 7157           | 1.1 | 1352.000          | 62.280  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 2.2                | 4257            | 10.9            | 7740           | 21.8           | 7740           | 2.5 | 38.3           | 7740           | 2.4 | 1482.000          | 67.360  | g500-B20000  | m540-P180/M4 | 3 | 843 |
| 2.1                | 4273            | 10.9            | 7769           | 21.7           | 7769           | 1.7 | 38.2           | 7769           | 1.6 | 1403.000          | 67.610  | g500-B13000  | m540-P180/M4 | 3 | 593 |
| 2.1                | 4460            | 10.4            | 8108           | 20.8           | 8108           | 1.0 | 36.6           | 8108           | 0.9 | 1343.000          | 70.560  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 2.0                | 4699            | 9.9             | 8544           | 19.8           | 8544           | 2.3 | 34.7           | 8544           | 2.2 | 1464.000          | 74.350  | g500-B20000  | m540-P180/M4 | 3 | 843 |
| 1.9                | 4818            | 9.6             | 8760           | 19.3           | 8760           | 1.5 | 33.8           | 8760           | 1.4 | 1388.000          | 76.230  | g500-B13000  | m540-P180/M4 | 3 | 593 |
| 1.8                | 5030            | 9.2             | 9146           | 18.5           | 9146           | 0.9 | 32.4           | 9146           | 0.8 | 1337.000          | 79.590  | g500-B8000   | m540-P180/M4 | 3 | 407 |
| 1.7                | 5274            | 8.8             | 9588           | 17.6           | 9588           | 2.0 | 30.9           | 9588           | 1.9 | 1440.000          | 83.440  | g500-B20000  | m540-P180/M4 | 3 | 843 |
| 1.7                | 5404            | 8.6             | 9826           | 17.2           | 9826           | 1.3 | 30.2           | 9826           | 1.3 | 1375.000          | 85.510  | g500-B13000  | m540-P180/M4 | 3 | 593 |
| 1.5                | 5976            | 7.8             | 10865          | 15.5           | 10865          | 1.8 | 27.3           | 10865          | 1.7 | 1419.000          | 94.550  | g500-B20000  | m540-P180/M4 | 3 | 843 |
| 1.5                | 6057            | 7.7             | 11012          | 15.3           | 11012          | 1.2 | 26.9           | 11012          | 1.1 | 1365.000          | 95.830  | g500-B13000  | m540-P180/M4 | 3 | 593 |
| 1.4                | 6608            | 7.0             | 12015          | 14.1           | 12015          | 1.6 | 24.7           | 12015          | 1.5 | 1400.000          | 104.560 | g500-B20000  | m540-P180/M4 | 3 | 843 |
| 1.4                | 6745            | 6.9             | 12263          | 13.8           | 12263          | 1.1 | 24.2           | 12263          | 1.0 | 1354.000          | 106.720 | g500-B13000  | m540-P180/M4 | 3 | 593 |
| 1.2                | 7395            | 6.3             | 13445          | 12.6           | 13445          | 1.5 | 22.1           | 13445          | 1.5 | 1386.000          | 117.000 | g500-B20000  | m540-P180/M4 | 3 | 843 |
| 1.2                | 7573            | 6.1             | 13770          | 12.3           | 13770          | 0.9 | 21.5           | 13770          | 0.9 | 1347.000          | 119.830 | g500-B13000  | m540-P180/M4 | 3 | 593 |
| 1.1                | 8219            | 5.7             | 14944          | 11.3           | 14944          | 1.3 | 19.8           | 14944          | 1.3 | 1373.000          | 130.050 | g500-B20000  | m540-P180/M4 | 3 | 843 |



**50 Hz: 22 kW**

**87 Hz: 38.5 kW**

| Inverter operation |                 |                 |                |                |                |     |                |                |     |                   |         | Geared motor |              |   |     |
|--------------------|-----------------|-----------------|----------------|----------------|----------------|-----|----------------|----------------|-----|-------------------|---------|--------------|--------------|---|-----|
| 5 Hz -             |                 | - 20 Hz         |                | 50 Hz (1:10)   |                |     | 87 Hz (1:17.4) |                |     |                   |         |              |              |   |     |
| n <sub>22</sub>    | M <sub>22</sub> | n <sub>21</sub> | M <sub>2</sub> | n <sub>2</sub> | M <sub>2</sub> | c   | n <sub>2</sub> | M <sub>2</sub> | c   | J                 | i       |              |              | z | m   |
| rpm                | Nm              | rpm             | Nm             | rpm            | Nm             |     | rpm            | Nm             |     | kgcm <sup>2</sup> |         |              |              |   | kg  |
| 21.3               | 512             | 108             | 932            | 216            | 932            | 3.9 | 378            | 932            | 3.3 | 1666.000          | 6.820   | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 18.0               | 604             | 91.4            | 1098           | 183            | 1098           | 3.4 | 321            | 1098           | 2.8 | 1594.000          | 8.040   | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 14.8               | 737             | 74.9            | 1340           | 150            | 1340           | 2.9 | 263            | 1340           | 2.4 | 1541.000          | 9.810   | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 14.5               | 752             | 73.4            | 1367           | 147            | 1367           | 4.8 | 258            | 1367           | 4.0 | 1680.000          | 10.010  | g500-B13000  | m540-P180/L4 | 3 | 598 |
| 12.9               | 846             | 65.3            | 1538           | 131            | 1538           | 2.6 | 229            | 1538           | 2.1 | 1513.000          | 11.260  | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 11.9               | 917             | 60.2            | 1667           | 121            | 1667           | 4.1 | 212            | 1667           | 3.4 | 1602.000          | 12.200  | g500-B13000  | m540-P180/L4 | 3 | 598 |
| 11.7               | 935             | 59.1            | 1699           | 118            | 1699           | 2.4 | 207            | 1699           | 2.0 | 1497.000          | 12.440  | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 10.2               | 1063            | 51.9            | 1933           | 104            | 1933           | 2.1 | 182            | 1933           | 1.8 | 1479.000          | 14.150  | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 10.1               | 1081            | 51.1            | 1964           | 102            | 1964           | 3.4 | 179            | 1964           | 2.8 | 1574.000          | 14.380  | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 8.3                | 1318            | 41.9            | 2396           | 83.8           | 2396           | 2.9 | 147            | 2396           | 2.4 | 1528.000          | 17.540  | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 7.4                | 1467            | 37.6            | 2668           | 75.3           | 2668           | 4.8 | 132            | 2668           | 4.0 | 1649.000          | 19.530  | g500-B13000  | m540-P180/L4 | 3 | 598 |
| 7.2                | 1514            | 36.5            | 2753           | 73.0           | 2753           | 2.6 | 128            | 2753           | 2.1 | 1503.000          | 20.150  | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 6.5                | 1672            | 33.0            | 3040           | 66.1           | 3040           | 2.4 | 116            | 3040           | 2.0 | 1489.000          | 22.250  | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 6.1                | 1788            | 30.9            | 3251           | 61.8           | 3251           | 4.0 | 108            | 3251           | 3.3 | 1581.000          | 23.800  | g500-B13000  | m540-P180/L4 | 3 | 598 |
| 5.7                | 1901            | 29.1            | 3456           | 58.1           | 3456           | 2.2 | 102            | 3456           | 1.8 | 1473.000          | 25.300  | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 5.4                | 2030            | 27.2            | 3691           | 54.4           | 3691           | 3.5 | 95.5           | 3691           | 2.9 | 1551.000          | 27.020  | g500-B13000  | m540-P180/L4 | 3 | 598 |
| 5.1                | 2153            | 25.6            | 3915           | 51.3           | 3915           | 2.0 | 90.0           | 3915           | 1.6 | 1459.000          | 28.660  | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 4.9                | 2211            | 25.0            | 4021           | 49.9           | 4021           | 3.2 | 87.7           | 4021           | 2.7 | 1533.000          | 29.430  | g500-B13000  | m540-P180/L4 | 3 | 598 |
| 4.7                | 2311            | 23.9            | 4201           | 47.8           | 4201           | 3.1 | 83.9           | 4201           | 2.6 | 1709.000          | 30.750  | g500-B13000  | m540-P180/L4 | 3 | 598 |
| 4.5                | 2429            | 22.7            | 4417           | 45.5           | 4417           | 1.8 | 79.8           | 4417           | 1.5 | 1449.000          | 32.330  | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 4.1                | 2660            | 20.8            | 4836           | 41.5           | 4836           | 1.6 | 72.9           | 4836           | 1.4 | 1510.000          | 35.400  | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 4.1                | 2680            | 20.6            | 4873           | 41.2           | 4873           | 4.0 | 72.3           | 4873           | 3.3 | 1855.000          | 35.670  | g500-B20000  | m540-P180/L4 | 3 | 848 |
| 3.7                | 2955            | 18.7            | 5373           | 37.4           | 5373           | 2.4 | 65.6           | 5373           | 2.0 | 1598.000          | 39.330  | g500-B13000  | m540-P180/L4 | 3 | 598 |
| 3.4                | 3244            | 17.0            | 5899           | 34.0           | 5899           | 1.4 | 59.7           | 5899           | 1.3 | 1485.000          | 43.180  | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 3.2                | 3363            | 16.4            | 6115           | 32.8           | 6115           | 3.2 | 57.6           | 6115           | 3.0 | 1734.000          | 44.760  | g500-B20000  | m540-P180/L4 | 3 | 848 |
| 3.2                | 3371            | 16.4            | 6128           | 32.8           | 6128           | 2.1 | 57.5           | 6128           | 2.0 | 1580.000          | 44.860  | g500-B13000  | m540-P180/L4 | 3 | 598 |
| 2.9                | 3727            | 14.8            | 6776           | 29.6           | 6776           | 1.2 | 52.0           | 6776           | 1.1 | 1470.000          | 49.600  | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 2.9                | 3782            | 14.6            | 6877           | 29.2           | 6877           | 2.8 | 51.3           | 6877           | 2.7 | 1673.000          | 50.340  | g500-B20000  | m540-P180/L4 | 3 | 848 |
| 2.7                | 4109            | 13.4            | 7470           | 26.9           | 7470           | 1.7 | 47.2           | 7470           | 1.7 | 1534.000          | 54.680  | g500-B13000  | m540-P180/L4 | 3 | 598 |
| 2.6                | 4115            | 13.4            | 7481           | 26.8           | 7481           | 1.1 | 47.1           | 7481           | 1.0 | 1463.000          | 54.760  | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 2.4                | 4552            | 12.1            | 8276           | 24.3           | 8276           | 2.4 | 42.6           | 8276           | 2.2 | 1620.000          | 60.580  | g500-B20000  | m540-P180/L4 | 3 | 848 |
| 2.3                | 4664            | 11.8            | 8480           | 23.7           | 8480           | 1.5 | 41.6           | 8480           | 1.5 | 1514.000          | 62.070  | g500-B13000  | m540-P180/L4 | 3 | 598 |
| 2.3                | 4680            | 11.8            | 8508           | 23.6           | 8508           | 0.9 | 41.4           | 8508           | 0.9 | 1452.000          | 62.280  | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 2.2                | 5061            | 10.9            | 9202           | 21.8           | 9202           | 2.1 | 38.3           | 9202           | 2.0 | 1582.000          | 67.360  | g500-B20000  | m540-P180/L4 | 3 | 848 |
| 2.1                | 5080            | 10.9            | 9236           | 21.7           | 9236           | 1.4 | 38.2           | 9236           | 1.3 | 1503.000          | 67.610  | g500-B13000  | m540-P180/L4 | 3 | 598 |
| 2.1                | 5302            | 10.4            | 9639           | 20.8           | 9639           | 0.8 | -              | -              | -   | 1443.000          | 70.560  | g500-B8000   | m540-P180/L4 | 3 | 412 |
| 2.0                | 5586            | 9.9             | 10157          | 19.8           | 10157          | 1.9 | 34.7           | 10157          | 1.8 | 1564.000          | 74.350  | g500-B20000  | m540-P180/L4 | 3 | 848 |
| 1.9                | 5728            | 9.6             | 10414          | 19.3           | 10414          | 1.3 | 33.8           | 10414          | 1.2 | 1488.000          | 76.230  | g500-B13000  | m540-P180/L4 | 3 | 598 |
| 1.7                | 6269            | 8.8             | 11399          | 17.6           | 11399          | 1.7 | 30.9           | 11399          | 1.6 | 1540.000          | 83.440  | g500-B20000  | m540-P180/L4 | 3 | 848 |
| 1.7                | 6425            | 8.6             | 11682          | 17.2           | 11682          | 1.1 | 30.2           | 11682          | 1.1 | 1475.000          | 85.510  | g500-B13000  | m540-P180/L4 | 3 | 598 |
| 1.5                | 7104            | 7.8             | 12917          | 15.5           | 12917          | 1.5 | 27.3           | 12917          | 1.4 | 1519.000          | 94.550  | g500-B20000  | m540-P180/L4 | 3 | 848 |
| 1.5                | 7200            | 7.7             | 13092          | 15.3           | 13092          | 1.0 | 26.9           | 13092          | 0.9 | 1465.000          | 95.830  | g500-B13000  | m540-P180/L4 | 3 | 598 |
| 1.4                | 7856            | 7.0             | 14284          | 14.1           | 14284          | 1.4 | 24.7           | 14284          | 1.3 | 1500.000          | 104.560 | g500-B20000  | m540-P180/L4 | 3 | 848 |
| 1.4                | 8019            | 6.9             | 14579          | 13.8           | 14579          | 0.9 | 24.2           | 14579          | 0.9 | 1454.000          | 106.720 | g500-B13000  | m540-P180/L4 | 3 | 598 |
| 1.2                | 8791            | 6.3             | 15984          | 12.6           | 15984          | 1.2 | 22.1           | 15984          | 1.2 | 1486.000          | 117.000 | g500-B20000  | m540-P180/L4 | 3 | 848 |
| 1.1                | 9772            | 5.7             | 17766          | 11.3           | 17766          | 1.1 | 19.8           | 17766          | 1.1 | 1473.000          | 130.050 | g500-B20000  | m540-P180/L4 | 3 | 848 |



**50 Hz: 30 kW**

**87 Hz: 52.5 kW**

| Inverter operation |                 |                 |                |                |                |     |                |                |     |                   |         | Geared motor |              |   |     |
|--------------------|-----------------|-----------------|----------------|----------------|----------------|-----|----------------|----------------|-----|-------------------|---------|--------------|--------------|---|-----|
| 5 Hz -             |                 | - 20 Hz         |                | 50 Hz (1:10)   |                |     | 87 Hz (1:17.4) |                |     |                   |         |              |              |   |     |
| n <sub>22</sub>    | M <sub>22</sub> | n <sub>21</sub> | M <sub>2</sub> | n <sub>2</sub> | M <sub>2</sub> | c   | n <sub>2</sub> | M <sub>2</sub> | c   | J                 | i       |              |              | z | m   |
| rpm                | Nm              | rpm             | Nm             | rpm            | Nm             |     | rpm            | Nm             |     | kgcm <sup>2</sup> |         |              |              |   | kg  |
| 21.3               | 699             | 108             | 1271           | 216            | 1271           | 2.9 | 378            | 1271           | 2.4 | 2466.000          | 6.820   | g500-B8000   | m540-P200/M4 | 3 | 482 |
| 21.1               | 703             | 107             | 1278           | 214            | 1278           | 4.8 | 376            | 1278           | 4.0 | 2723.000          | 6.860   | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 18.0               | 824             | 91.4            | 1498           | 183            | 1498           | 2.5 | 321            | 1498           | 2.1 | 2394.000          | 8.040   | g500-B8000   | m540-P200/M4 | 3 | 482 |
| 16.5               | 900             | 83.7            | 1636           | 167            | 1636           | 3.9 | 294            | 1636           | 3.2 | 2528.000          | 8.780   | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 14.8               | 1005            | 74.9            | 1828           | 150            | 1828           | 2.1 | 263            | 1828           | 1.8 | 2341.000          | 9.810   | g500-B8000   | m540-P200/M4 | 3 | 482 |
| 14.5               | 1026            | 73.4            | 1865           | 147            | 1865           | 3.5 | 258            | 1865           | 2.9 | 2480.000          | 10.010  | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 12.9               | 1154            | 65.3            | 2098           | 131            | 2098           | 1.9 | 229            | 2098           | 1.6 | 2313.000          | 11.260  | g500-B8000   | m540-P200/M4 | 3 | 482 |
| 11.9               | 1250            | 60.2            | 2273           | 121            | 2273           | 3.0 | 212            | 2273           | 2.5 | 2402.000          | 12.200  | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 11.7               | 1275            | 59.1            | 2318           | 118            | 2318           | 1.7 | 207            | 2318           | 1.5 | 2297.000          | 12.440  | g500-B8000   | m540-P200/M4 | 3 | 482 |
| 10.8               | 1372            | 54.9            | 2495           | 110            | 2495           | 4.8 | 193            | 2495           | 4.0 | 2657.000          | 13.390  | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 10.2               | 1450            | 51.9            | 2636           | 104            | 2636           | 1.6 | 182            | 2636           | 1.3 | 2279.000          | 14.150  | g500-B8000   | m540-P200/M4 | 3 | 482 |
| 10.1               | 1474            | 51.1            | 2679           | 102            | 2679           | 2.5 | 179            | 2679           | 2.1 | 2374.000          | 14.380  | g500-B8000   | m540-P200/M4 | 3 | 482 |
| 8.5                | 1754            | 42.9            | 3190           | 85.9           | 3190           | 3.9 | 151            | 3190           | 3.2 | 2488.000          | 17.120  | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 8.3                | 1798            | 41.9            | 3268           | 83.8           | 3268           | 2.1 | 147            | 3268           | 1.8 | 2328.000          | 17.540  | g500-B8000   | m540-P200/M4 | 3 | 482 |
| 7.4                | 2001            | 37.6            | 3639           | 75.3           | 3639           | 3.5 | 132            | 3639           | 2.9 | 2449.000          | 19.530  | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 7.2                | 2065            | 36.5            | 3754           | 73.0           | 3754           | 1.9 | 128            | 3754           | 1.6 | 2303.000          | 20.150  | g500-B8000   | m540-P200/M4 | 3 | 482 |
| 6.9                | 2161            | 34.9            | 3930           | 69.7           | 3930           | 5.0 | 122            | 3930           | 4.1 | 2639.000          | 21.090  | g500-B20000  | m540-P200/M4 | 3 | 918 |
| 6.5                | 2280            | 33.0            | 4146           | 66.1           | 4146           | 1.7 | 116            | 4146           | 1.5 | 2289.000          | 22.250  | g500-B8000   | m540-P200/M4 | 3 | 482 |
| 6.1                | 2439            | 30.9            | 4435           | 61.8           | 4435           | 2.9 | 108            | 4435           | 2.5 | 2381.000          | 23.800  | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 5.7                | 2593            | 29.1            | 4714           | 58.1           | 4714           | 1.6 | 102            | 4714           | 1.3 | 2273.000          | 25.300  | g500-B8000   | m540-P200/M4 | 3 | 482 |
| 5.7                | 2600            | 29.0            | 4727           | 57.9           | 4727           | 4.1 | 102            | 4727           | 3.4 | 2535.000          | 25.370  | g500-B20000  | m540-P200/M4 | 3 | 918 |
| 5.4                | 2769            | 27.2            | 5034           | 54.4           | 5034           | 2.6 | 95.5           | 5034           | 2.2 | 2351.000          | 27.020  | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 5.1                | 2909            | 25.9            | 5290           | 51.8           | 5290           | 3.7 | 90.9           | 5290           | 3.1 | 2786.000          | 28.390  | g500-B20000  | m540-P200/M4 | 3 | 918 |
| 5.1                | 2937            | 25.6            | 5340           | 51.3           | 5340           | 1.4 | 90.0           | 5340           | 1.2 | 2259.000          | 28.660  | g500-B8000   | m540-P200/M4 | 3 | 482 |
| 4.9                | 3016            | 25.0            | 5484           | 49.9           | 5484           | 2.4 | 87.7           | 5484           | 2.0 | 2333.000          | 29.430  | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 4.7                | 3151            | 23.9            | 5729           | 47.8           | 5729           | 2.3 | 83.9           | 5729           | 1.9 | 2509.000          | 30.750  | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 4.5                | 3313            | 22.7            | 6024           | 45.5           | 6024           | 1.3 | 79.8           | 6024           | 1.1 | 2249.000          | 32.330  | g500-B8000   | m540-P200/M4 | 3 | 482 |
| 4.1                | 3628            | 20.8            | 6596           | 41.5           | 6596           | 1.2 | 72.9           | 6596           | 1.0 | 2310.000          | 35.400  | g500-B8000   | m540-P200/M4 | 3 | 482 |
| 4.1                | 3655            | 20.6            | 6646           | 41.2           | 6646           | 2.9 | 72.3           | 6646           | 2.5 | 2655.000          | 35.670  | g500-B20000  | m540-P200/M4 | 3 | 918 |
| 3.7                | 4031            | 18.7            | 7328           | 37.4           | 7328           | 1.8 | 65.6           | 7328           | 1.5 | 2398.000          | 39.330  | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 3.4                | 4425            | 17.0            | 8045           | 34.0           | 8045           | 1.0 | 59.7           | 8045           | 0.9 | 2285.000          | 43.180  | g500-B8000   | m540-P200/M4 | 3 | 482 |
| 3.2                | 4587            | 16.4            | 8340           | 32.8           | 8340           | 2.3 | 57.6           | 8340           | 2.2 | 2534.000          | 44.760  | g500-B20000  | m540-P200/M4 | 3 | 918 |
| 3.2                | 4597            | 16.4            | 8359           | 32.8           | 8359           | 1.6 | 57.5           | 8359           | 1.5 | 2380.000          | 44.860  | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 2.9                | 5083            | 14.8            | 9242           | 29.6           | 9242           | 0.9 | 52.0           | 9242           | 0.8 | 2270.000          | 49.600  | g500-B8000   | m540-P200/M4 | 3 | 482 |
| 2.9                | 5159            | 14.6            | 9380           | 29.2           | 9380           | 2.1 | 51.3           | 9380           | 2.0 | 2473.000          | 50.340  | g500-B20000  | m540-P200/M4 | 3 | 918 |
| 2.7                | 5604            | 13.4            | 10188          | 26.9           | 10188          | 1.3 | 47.2           | 10188          | 1.2 | 2334.000          | 54.680  | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 2.4                | 6208            | 12.1            | 11288          | 24.3           | 11288          | 1.7 | 42.6           | 11288          | 1.6 | 2420.000          | 60.580  | g500-B20000  | m540-P200/M4 | 3 | 918 |
| 2.3                | 6361            | 11.8            | 11565          | 23.7           | 11565          | 1.1 | 41.6           | 11565          | 1.1 | 2314.000          | 62.070  | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 2.2                | 6903            | 10.9            | 12551          | 21.8           | 12551          | 1.6 | 38.3           | 12551          | 1.5 | 2382.000          | 67.360  | g500-B20000  | m540-P200/M4 | 3 | 918 |
| 2.1                | 6929            | 10.9            | 12597          | 21.7           | 12597          | 1.0 | 38.2           | 12597          | 1.0 | 2303.000          | 67.610  | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 2.0                | 7619            | 9.9             | 13853          | 19.8           | 13853          | 1.4 | 34.7           | 13853          | 1.3 | 2364.000          | 74.350  | g500-B20000  | m540-P200/M4 | 3 | 918 |
| 1.9                | 7812            | 9.6             | 14204          | 19.3           | 14204          | 0.9 | 33.8           | 14204          | 0.9 | 2288.000          | 76.230  | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 1.7                | 8551            | 8.8             | 15547          | 17.6           | 15547          | 1.3 | 30.9           | 15547          | 1.2 | 2340.000          | 83.440  | g500-B20000  | m540-P200/M4 | 3 | 918 |
| 1.7                | 8763            | 8.6             | 15933          | 17.2           | 15933          | 0.8 | -              | -              | -   | 2275.000          | 85.510  | g500-B13000  | m540-P200/M4 | 3 | 668 |
| 1.5                | 9689            | 7.8             | 17617          | 15.5           | 17617          | 1.1 | 27.3           | 17617          | 1.1 | 2319.000          | 94.550  | g500-B20000  | m540-P200/M4 | 3 | 918 |
| 1.4                | 10715           | 7.0             | 19482          | 14.1           | 19482          | 1.0 | 24.7           | 19482          | 1.0 | 2300.000          | 104.560 | g500-B20000  | m540-P200/M4 | 3 | 918 |
| 1.2                | 11990           | 6.3             | 21800          | 12.6           | 21800          | 0.9 | 22.1           | 21800          | 0.9 | 2286.000          | 117.000 | g500-B20000  | m540-P200/M4 | 3 | 918 |



**50 Hz: 37 kW**

**87 Hz: 64.8 kW**

| Inverter operation |                 |                 |                |                |                |     |                |                |     |                   |         | Geared motor |              |   |     |
|--------------------|-----------------|-----------------|----------------|----------------|----------------|-----|----------------|----------------|-----|-------------------|---------|--------------|--------------|---|-----|
| 5 Hz -             |                 | - 20 Hz         |                | 50 Hz (1:10)   |                |     | 87 Hz (1:17.4) |                |     |                   |         |              |              |   |     |
| n <sub>22</sub>    | M <sub>22</sub> | n <sub>21</sub> | M <sub>2</sub> | n <sub>2</sub> | M <sub>2</sub> | c   | n <sub>2</sub> | M <sub>2</sub> | c   | J                 | i       |              |              | z | m   |
| rpm                | Nm              | rpm             | Nm             | rpm            | Nm             |     | rpm            | Nm             |     | kgcm <sup>2</sup> |         |              |              |   | kg  |
| 21.3               | 854             | 109             | 1559           | 217            | 1559           | 2.3 | 380            | 1559           | 1.9 | 4466.000          | 6.820   | g500-B8000   | m540-P225/M4 | 3 | 527 |
| 21.1               | 859             | 108             | 1568           | 216            | 1568           | 3.9 | 377            | 1568           | 3.3 | 4723.000          | 6.860   | g500-B13000  | m540-P225/M4 | 3 | 713 |
| 18.0               | 1007            | 92.0            | 1838           | 184            | 1838           | 2.0 | 322            | 1838           | 1.7 | 4394.000          | 8.040   | g500-B8000   | m540-P225/M4 | 3 | 527 |
| 16.5               | 1100            | 84.3            | 2007           | 168            | 2007           | 3.2 | 295            | 2007           | 2.6 | 4528.000          | 8.780   | g500-B13000  | m540-P225/M4 | 3 | 713 |
| 14.8               | 1229            | 75.4            | 2242           | 151            | 2242           | 1.7 | 264            | 2242           | 1.4 | 4341.000          | 9.810   | g500-B8000   | m540-P225/M4 | 3 | 527 |
| 14.5               | 1254            | 73.9            | 2288           | 148            | 2288           | 2.9 | 259            | 2288           | 2.4 | 4480.000          | 10.010  | g500-B13000  | m540-P225/M4 | 3 | 713 |
| 12.9               | 1410            | 65.7            | 2574           | 131            | 2574           | 1.5 | 230            | 2574           | 1.3 | 4313.000          | 11.260  | g500-B8000   | m540-P225/M4 | 3 | 527 |
| 11.9               | 1528            | 60.7            | 2789           | 121            | 2789           | 2.4 | 212            | 2789           | 2.0 | 4402.000          | 12.200  | g500-B13000  | m540-P225/M4 | 3 | 713 |
| 11.7               | 1558            | 59.5            | 2844           | 119            | 2844           | 1.4 | 208            | 2844           | 1.2 | 4297.000          | 12.440  | g500-B8000   | m540-P225/M4 | 3 | 527 |
| 10.8               | 1677            | 55.3            | 3061           | 110            | 3061           | 3.9 | 193            | 3061           | 3.2 | 4657.000          | 13.390  | g500-B13000  | m540-P225/M4 | 3 | 713 |
| 10.2               | 1772            | 52.3            | 3234           | 105            | 3234           | 1.3 | 183            | 3234           | 1.1 | 4279.000          | 14.150  | g500-B8000   | m540-P225/M4 | 3 | 527 |
| 10.1               | 1801            | 51.5            | 3287           | 103            | 3287           | 2.0 | 180            | 3287           | 1.7 | 4374.000          | 14.380  | g500-B8000   | m540-P225/M4 | 3 | 527 |
| 8.5                | 2144            | 43.2            | 3913           | 86.3           | 3913           | 3.2 | 151            | 3913           | 2.6 | 4488.000          | 17.120  | g500-B13000  | m540-P225/M4 | 3 | 713 |
| 8.3                | 2197            | 42.2            | 4009           | 84.3           | 4009           | 1.7 | 148            | 4009           | 1.4 | 4328.000          | 17.540  | g500-B8000   | m540-P225/M4 | 3 | 527 |
| 7.7                | 2348            | 39.5            | 4286           | 78.8           | 4286           | 4.6 | 138            | 4286           | 3.8 | 4745.000          | 18.750  | g500-B20000  | m540-P225/M4 | 3 | 963 |
| 7.4                | 2446            | 37.9            | 4464           | 75.7           | 4464           | 2.8 | 133            | 4464           | 2.4 | 4449.000          | 19.530  | g500-B13000  | m540-P225/M4 | 3 | 713 |
| 7.2                | 2524            | 36.7            | 4606           | 73.3           | 4606           | 1.5 | 128            | 4606           | 1.3 | 4303.000          | 20.150  | g500-B8000   | m540-P225/M4 | 3 | 527 |
| 6.9                | 2641            | 35.1            | 4821           | 70.1           | 4821           | 4.1 | 123            | 4821           | 3.4 | 4639.000          | 21.090  | g500-B20000  | m540-P225/M4 | 3 | 963 |
| 6.5                | 2787            | 33.3            | 5086           | 66.4           | 5086           | 1.4 | 116            | 5086           | 1.2 | 4289.000          | 22.250  | g500-B8000   | m540-P225/M4 | 3 | 527 |
| 6.1                | 2981            | 31.1            | 5440           | 62.1           | 5440           | 2.4 | 109            | 5440           | 2.0 | 4381.000          | 23.800  | g500-B13000  | m540-P225/M4 | 3 | 713 |
| 5.7                | 3169            | 29.2            | 5783           | 58.4           | 5783           | 1.3 | 102            | 5783           | 1.1 | 4273.000          | 25.300  | g500-B8000   | m540-P225/M4 | 3 | 527 |
| 5.7                | 3177            | 29.2            | 5799           | 58.3           | 5799           | 3.4 | 102            | 5799           | 2.8 | 4535.000          | 25.370  | g500-B20000  | m540-P225/M4 | 3 | 963 |
| 5.4                | 3384            | 27.4            | 6176           | 54.7           | 6176           | 2.1 | 95.8           | 6176           | 1.8 | 4351.000          | 27.020  | g500-B13000  | m540-P225/M4 | 3 | 713 |
| 5.1                | 3555            | 26.1            | 6489           | 52.1           | 6489           | 3.0 | 91.2           | 6489           | 2.5 | 4786.000          | 28.390  | g500-B20000  | m540-P225/M4 | 3 | 963 |
| 5.1                | 3589            | 25.8            | 6551           | 51.6           | 6551           | 1.2 | 90.3           | 6551           | 1.0 | 4259.000          | 28.660  | g500-B8000   | m540-P225/M4 | 3 | 527 |
| 4.9                | 3686            | 25.1            | 6727           | 50.2           | 6727           | 1.9 | 87.9           | 6727           | 1.6 | 4333.000          | 29.430  | g500-B13000  | m540-P225/M4 | 3 | 713 |
| 4.7                | 3851            | 24.1            | 7029           | 48.1           | 7029           | 1.9 | 84.2           | 7029           | 1.5 | 4509.000          | 30.750  | g500-B13000  | m540-P225/M4 | 3 | 713 |
| 4.5                | 4049            | 22.9            | 7390           | 45.7           | 7390           | 1.1 | 80.0           | 7390           | 0.9 | 4249.000          | 32.330  | g500-B8000   | m540-P225/M4 | 3 | 527 |
| 4.1                | 4433            | 20.9            | 8092           | 41.8           | 8092           | 1.0 | 73.1           | 8092           | 0.8 | 4310.000          | 35.400  | g500-B8000   | m540-P225/M4 | 3 | 527 |
| 4.1                | 4467            | 20.7            | 8153           | 41.4           | 8153           | 2.4 | 72.6           | 8153           | 2.0 | 4655.000          | 35.670  | g500-B20000  | m540-P225/M4 | 3 | 963 |
| 3.7                | 4926            | 18.8            | 8990           | 37.6           | 8990           | 1.5 | 65.8           | 8990           | 1.2 | 4398.000          | 39.330  | g500-B13000  | m540-P225/M4 | 3 | 713 |
| 3.4                | 5408            | 17.1            | 9870           | 34.2           | 9870           | 0.8 | -              | -              | -   | 4285.000          | 43.180  | g500-B8000   | m540-P225/M4 | 3 | 527 |
| 3.2                | 5606            | 16.5            | 10231          | 33.0           | 10231          | 1.9 | 57.8           | 10231          | 1.8 | 4534.000          | 44.760  | g500-B20000  | m540-P225/M4 | 3 | 963 |
| 3.2                | 5618            | 16.5            | 10254          | 32.9           | 10254          | 1.3 | 57.7           | 10254          | 1.2 | 4380.000          | 44.860  | g500-B13000  | m540-P225/M4 | 3 | 713 |
| 2.9                | 6304            | 14.7            | 11507          | 29.4           | 11507          | 1.7 | 51.4           | 11507          | 1.6 | 4473.000          | 50.340  | g500-B20000  | m540-P225/M4 | 3 | 963 |
| 2.7                | 6848            | 13.5            | 12499          | 27.0           | 12499          | 1.0 | 47.3           | 12499          | 1.0 | 4334.000          | 54.680  | g500-B13000  | m540-P225/M4 | 3 | 713 |
| 2.4                | 7587            | 12.2            | 13847          | 24.4           | 13847          | 1.4 | 42.7           | 13847          | 1.3 | 4420.000          | 60.580  | g500-B20000  | m540-P225/M4 | 3 | 963 |
| 2.3                | 7773            | 11.9            | 14188          | 23.8           | 14188          | 0.9 | 41.7           | 14188          | 0.9 | 4314.000          | 62.070  | g500-B13000  | m540-P225/M4 | 3 | 713 |
| 2.2                | 8436            | 11.0            | 15397          | 21.9           | 15397          | 1.3 | 38.4           | 15397          | 1.2 | 4382.000          | 67.360  | g500-B20000  | m540-P225/M4 | 3 | 963 |
| 2.1                | 8467            | 10.9            | 15454          | 21.9           | 15454          | 0.8 | -              | -              | -   | 4303.000          | 67.610  | g500-B13000  | m540-P225/M4 | 3 | 713 |
| 2.0                | 9311            | 10.0            | 16995          | 19.9           | 16995          | 1.2 | 34.8           | 16995          | 1.1 | 4364.000          | 74.350  | g500-B20000  | m540-P225/M4 | 3 | 963 |
| 1.7                | 10450           | 8.9             | 19073          | 17.7           | 19073          | 1.0 | 31.0           | 19073          | 1.0 | 4340.000          | 83.440  | g500-B20000  | m540-P225/M4 | 3 | 963 |
| 1.5                | 11841           | 7.8             | 21612          | 15.6           | 21612          | 0.9 | 27.4           | 21612          | 0.9 | 4319.000          | 94.550  | g500-B20000  | m540-P225/M4 | 3 | 963 |
| 1.4                | 13095           | 7.1             | 23900          | 14.1           | 23900          | 0.8 | -              | -              | -   | 4300.000          | 104.560 | g500-B20000  | m540-P225/M4 | 3 | 963 |



**50 Hz: 45 kW**

**87 Hz: 78.7 kW**

| Inverter operation |                 |                 |                |                |                |     |                |                |     |                   |        | Geared motor |              |   |     |
|--------------------|-----------------|-----------------|----------------|----------------|----------------|-----|----------------|----------------|-----|-------------------|--------|--------------|--------------|---|-----|
| 5 Hz -             |                 | - 20 Hz         |                | 50 Hz (1:10)   |                |     | 87 Hz (1:17.4) |                |     |                   |        |              |              |   |     |
| n <sub>22</sub>    | M <sub>22</sub> | n <sub>21</sub> | M <sub>2</sub> | n <sub>2</sub> | M <sub>2</sub> | c   | n <sub>2</sub> | M <sub>2</sub> | c   | J                 | i      |              |              | z | m   |
| rpm                | Nm              | rpm             | Nm             | rpm            | Nm             |     | rpm            | Nm             |     | kgcm <sup>2</sup> |        |              |              |   | kg  |
| 21.3               | 1043            | 109             | 1897           | 217            | 1897           | 1.9 | 380            | 1897           | 1.6 | 4966.000          | 6.820  | g500-B8000   | m540-P225/L4 | 3 | 562 |
| 21.1               | 1049            | 108             | 1908           | 216            | 1908           | 3.2 | 377            | 1908           | 2.7 | 5223.000          | 6.860  | g500-B13000  | m540-P225/L4 | 3 | 748 |
| 18.0               | 1230            | 92.0            | 2237           | 184            | 2237           | 1.7 | 322            | 2237           | 1.4 | 4894.000          | 8.040  | g500-B8000   | m540-P225/L4 | 3 | 562 |
| 16.5               | 1343            | 84.3            | 2443           | 168            | 2443           | 2.6 | 295            | 2443           | 2.2 | 5028.000          | 8.780  | g500-B13000  | m540-P225/L4 | 3 | 748 |
| 14.8               | 1501            | 75.4            | 2729           | 151            | 2729           | 1.4 | 264            | 2729           | 1.2 | 4841.000          | 9.810  | g500-B8000   | m540-P225/L4 | 3 | 562 |
| 14.5               | 1531            | 73.9            | 2785           | 148            | 2785           | 2.3 | 259            | 2785           | 2.0 | 4980.000          | 10.010 | g500-B13000  | m540-P225/L4 | 3 | 748 |
| 12.9               | 1722            | 65.7            | 3132           | 131            | 3132           | 1.3 | 230            | 3132           | 1.1 | 4813.000          | 11.260 | g500-B8000   | m540-P225/L4 | 3 | 562 |
| 11.9               | 1866            | 60.7            | 3394           | 121            | 3394           | 2.0 | 212            | 3394           | 1.7 | 4902.000          | 12.200 | g500-B13000  | m540-P225/L4 | 3 | 748 |
| 11.7               | 1903            | 59.5            | 3461           | 119            | 3461           | 1.2 | 208            | 3461           | 1.0 | 4797.000          | 12.440 | g500-B8000   | m540-P225/L4 | 3 | 562 |
| 10.8               | 2048            | 55.3            | 3725           | 110            | 3725           | 3.2 | 193            | 3725           | 2.7 | 5157.000          | 13.390 | g500-B13000  | m540-P225/L4 | 3 | 748 |
| 10.2               | 2164            | 52.3            | 3936           | 105            | 3936           | 1.1 | 183            | 3936           | 0.9 | 4779.000          | 14.150 | g500-B8000   | m540-P225/L4 | 3 | 562 |
| 10.1               | 2200            | 51.5            | 4000           | 103            | 4000           | 1.7 | 180            | 4000           | 1.4 | 4874.000          | 14.380 | g500-B8000   | m540-P225/L4 | 3 | 562 |
| 9.7                | 2285            | 49.5            | 4156           | 98.9           | 4156           | 4.7 | 173            | 4156           | 3.9 | 5486.000          | 14.940 | g500-B20000  | m540-P225/L4 | 3 | 998 |
| 8.5                | 2619            | 43.2            | 4763           | 86.3           | 4763           | 2.6 | 151            | 4763           | 2.2 | 4988.000          | 17.120 | g500-B13000  | m540-P225/L4 | 3 | 748 |
| 8.3                | 2683            | 42.2            | 4880           | 84.3           | 4880           | 1.4 | 148            | 4880           | 1.2 | 4828.000          | 17.540 | g500-B8000   | m540-P225/L4 | 3 | 562 |
| 7.7                | 2868            | 39.5            | 5216           | 78.8           | 5216           | 3.7 | 138            | 5216           | 3.1 | 5245.000          | 18.750 | g500-B20000  | m540-P225/L4 | 3 | 998 |
| 7.4                | 2987            | 37.9            | 5433           | 75.7           | 5433           | 2.3 | 133            | 5433           | 2.0 | 4949.000          | 19.530 | g500-B13000  | m540-P225/L4 | 3 | 748 |
| 7.2                | 3082            | 36.7            | 5606           | 73.3           | 5606           | 1.3 | 128            | 5606           | 1.1 | 4803.000          | 20.150 | g500-B8000   | m540-P225/L4 | 3 | 562 |
| 6.9                | 3226            | 35.1            | 5867           | 70.1           | 5867           | 3.3 | 123            | 5867           | 2.8 | 5139.000          | 21.090 | g500-B20000  | m540-P225/L4 | 3 | 998 |
| 6.5                | 3403            | 33.3            | 6190           | 66.4           | 6190           | 1.2 | 116            | 6190           | 1.0 | 4789.000          | 22.250 | g500-B8000   | m540-P225/L4 | 3 | 562 |
| 6.1                | 3640            | 31.1            | 6621           | 62.1           | 6621           | 2.0 | 109            | 6621           | 1.6 | 4881.000          | 23.800 | g500-B13000  | m540-P225/L4 | 3 | 748 |
| 5.7                | 3870            | 29.2            | 7038           | 58.4           | 7038           | 1.1 | 102            | 7038           | 0.9 | 4773.000          | 25.300 | g500-B8000   | m540-P225/L4 | 3 | 562 |
| 5.7                | 3881            | 29.2            | 7058           | 58.3           | 7058           | 2.8 | 102            | 7058           | 2.3 | 5035.000          | 25.370 | g500-B20000  | m540-P225/L4 | 3 | 998 |
| 5.4                | 4133            | 27.4            | 7517           | 54.7           | 7517           | 1.7 | 95.8           | 7517           | 1.4 | 4851.000          | 27.020 | g500-B13000  | m540-P225/L4 | 3 | 748 |
| 5.1                | 4343            | 26.1            | 7898           | 52.1           | 7898           | 2.5 | 91.2           | 7898           | 2.1 | 5286.000          | 28.390 | g500-B20000  | m540-P225/L4 | 3 | 998 |
| 5.1                | 4384            | 25.8            | 7973           | 51.6           | 7973           | 1.0 | -              | -              | -   | 4759.000          | 28.660 | g500-B8000   | m540-P225/L4 | 3 | 562 |
| 4.9                | 4502            | 25.1            | 8187           | 50.2           | 8187           | 1.6 | 87.9           | 8187           | 1.3 | 4833.000          | 29.430 | g500-B13000  | m540-P225/L4 | 3 | 748 |
| 4.7                | 4704            | 24.1            | 8555           | 48.1           | 8555           | 1.5 | 84.2           | 8555           | 1.3 | 5009.000          | 30.750 | g500-B13000  | m540-P225/L4 | 3 | 748 |
| 4.5                | 4945            | 22.9            | 8994           | 45.7           | 8994           | 0.9 | -              | -              | -   | 4749.000          | 32.330 | g500-B8000   | m540-P225/L4 | 3 | 562 |
| 4.1                | 5456            | 20.7            | 9923           | 41.4           | 9923           | 2.0 | 72.6           | 9923           | 1.6 | 5155.000          | 35.670 | g500-B20000  | m540-P225/L4 | 3 | 998 |
| 3.7                | 6016            | 18.8            | 10941          | 37.6           | 10941          | 1.2 | 65.8           | 10941          | 1.0 | 4898.000          | 39.330 | g500-B13000  | m540-P225/L4 | 3 | 748 |
| 3.2                | 6847            | 16.5            | 12452          | 33.0           | 12452          | 1.6 | 57.8           | 12452          | 1.5 | 5034.000          | 44.760 | g500-B20000  | m540-P225/L4 | 3 | 998 |
| 3.2                | 6862            | 16.5            | 12480          | 32.9           | 12480          | 1.0 | 57.7           | 12480          | 1.0 | 4880.000          | 44.860 | g500-B13000  | m540-P225/L4 | 3 | 748 |
| 2.9                | 7700            | 14.7            | 14004          | 29.4           | 14004          | 1.4 | 51.4           | 14004          | 1.3 | 4973.000          | 50.340 | g500-B20000  | m540-P225/L4 | 3 | 998 |
| 2.7                | 8364            | 13.5            | 15212          | 27.0           | 15212          | 0.9 | 47.3           | 15212          | 0.8 | 4834.000          | 54.680 | g500-B13000  | m540-P225/L4 | 3 | 748 |
| 2.4                | 9266            | 12.2            | 16853          | 24.4           | 16853          | 1.2 | 42.7           | 16853          | 1.1 | 4920.000          | 60.580 | g500-B20000  | m540-P225/L4 | 3 | 998 |
| 2.2                | 10303           | 11.0            | 18739          | 21.9           | 18739          | 1.0 | 38.4           | 18739          | 1.0 | 4882.000          | 67.360 | g500-B20000  | m540-P225/L4 | 3 | 998 |
| 2.0                | 11373           | 10.0            | 20684          | 19.9           | 20684          | 0.9 | 34.8           | 20684          | 0.9 | 4864.000          | 74.350 | g500-B20000  | m540-P225/L4 | 3 | 998 |
| 1.7                | 12763           | 8.9             | 23213          | 17.7           | 23213          | 0.8 | -              | -              | -   | 4840.000          | 83.440 | g500-B20000  | m540-P225/L4 | 3 | 998 |



**50 Hz: 55 kW**

**87 Hz: 87 kW**

| Inverter operation |                 |                 |                |                |                |     |                |                |     |                   |        | Geared motor |              |   |      |
|--------------------|-----------------|-----------------|----------------|----------------|----------------|-----|----------------|----------------|-----|-------------------|--------|--------------|--------------|---|------|
| 5 Hz -             |                 | - 20 Hz         |                | 50 Hz (1:10)   |                |     | 87 Hz (1:17.4) |                |     |                   |        |              |              |   |      |
| n <sub>22</sub>    | M <sub>22</sub> | n <sub>21</sub> | M <sub>2</sub> | n <sub>2</sub> | M <sub>2</sub> | c   | n <sub>2</sub> | M <sub>2</sub> | c   | J                 | i      |              |              | z | m    |
| rpm                | Nm              | rpm             | Nm             | rpm            | Nm             |     | rpm            | Nm             |     | kgcm <sup>2</sup> |        |              |              |   | kg   |
| 21.3               | 1271            | 109             | 2308           | 217            | 2308           | 1.6 | 381            | 2086           | 1.5 | 8766.000          | 6.820  | g500-B8000   | m540-P250/M4 | 3 | 662  |
| 21.1               | 1279            | 108             | 2322           | 216            | 2322           | 2.6 | 379            | 2099           | 2.4 | 9023.000          | 6.860  | g500-B13000  | m540-P250/M4 | 3 | 848  |
| 18.0               | 1499            | 92.0            | 2721           | 184            | 2721           | 1.4 | 323            | 2460           | 1.3 | 8694.000          | 8.040  | g500-B8000   | m540-P250/M4 | 3 | 662  |
| 16.5               | 1637            | 84.3            | 2971           | 169            | 2971           | 2.1 | 296            | 2686           | 2.0 | 8828.000          | 8.780  | g500-B13000  | m540-P250/M4 | 3 | 848  |
| 14.8               | 1829            | 75.4            | 3320           | 151            | 3320           | 1.2 | 265            | 3001           | 1.1 | 8641.000          | 9.810  | g500-B8000   | m540-P250/M4 | 3 | 662  |
| 14.5               | 1866            | 73.9            | 3388           | 148            | 3388           | 1.9 | 260            | 3062           | 1.8 | 8780.000          | 10.010 | g500-B13000  | m540-P250/M4 | 3 | 848  |
| 12.9               | 2099            | 65.7            | 3811           | 132            | 3811           | 1.0 | 231            | 3445           | 1.0 | 8613.000          | 11.260 | g500-B8000   | m540-P250/M4 | 3 | 662  |
| 12.2               | 2217            | 62.2            | 4024           | 125            | 4024           | 4.9 | 219            | 3637           | 4.5 | 9609.000          | 11.890 | g500-B20000  | m540-P250/M4 | 3 | 1098 |
| 11.9               | 2274            | 60.7            | 4129           | 122            | 4129           | 1.6 | 213            | 3732           | 1.5 | 8702.000          | 12.200 | g500-B13000  | m540-P250/M4 | 3 | 848  |
| 11.7               | 2319            | 59.5            | 4210           | 119            | 4210           | 1.0 | 209            | 3806           | 0.9 | 8597.000          | 12.440 | g500-B8000   | m540-P250/M4 | 3 | 662  |
| 10.8               | 2496            | 55.3            | 4531           | 111            | 4531           | 2.6 | 194            | 4096           | 2.4 | 8957.000          | 13.390 | g500-B13000  | m540-P250/M4 | 3 | 848  |
| 10.2               | 2638            | 52.3            | 4789           | 105            | 4789           | 0.9 | -              | -              | -   | 8579.000          | 14.150 | g500-B8000   | m540-P250/M4 | 3 | 662  |
| 10.1               | 2681            | 51.5            | 4867           | 103            | 4867           | 1.4 | 181            | 4399           | 1.3 | 8674.000          | 14.380 | g500-B8000   | m540-P250/M4 | 3 | 662  |
| 9.7                | 2785            | 49.5            | 5056           | 99.2           | 5056           | 3.9 | 174            | 4570           | 3.6 | 9286.000          | 14.940 | g500-B20000  | m540-P250/M4 | 3 | 1098 |
| 8.5                | 3192            | 43.2            | 5794           | 86.6           | 5794           | 2.1 | 152            | 5237           | 2.0 | 8788.000          | 17.120 | g500-B13000  | m540-P250/M4 | 3 | 848  |
| 8.3                | 3270            | 42.2            | 5936           | 84.5           | 5936           | 1.2 | 148            | 5366           | 1.1 | 8628.000          | 17.540 | g500-B8000   | m540-P250/M4 | 3 | 662  |
| 7.7                | 3495            | 39.5            | 6345           | 79.0           | 6345           | 3.1 | 139            | 5736           | 2.8 | 9045.000          | 18.750 | g500-B20000  | m540-P250/M4 | 3 | 1098 |
| 7.4                | 3641            | 37.9            | 6609           | 75.9           | 6609           | 1.9 | 133            | 5975           | 1.8 | 8749.000          | 19.530 | g500-B13000  | m540-P250/M4 | 3 | 848  |
| 7.2                | 3756            | 36.7            | 6819           | 73.5           | 6819           | 1.0 | 129            | 6164           | 1.0 | 8603.000          | 20.150 | g500-B8000   | m540-P250/M4 | 3 | 662  |
| 6.9                | 3932            | 35.1            | 7137           | 70.3           | 7137           | 2.7 | 123            | 6452           | 2.5 | 8939.000          | 21.090 | g500-B20000  | m540-P250/M4 | 3 | 1098 |
| 6.5                | 4148            | 33.3            | 7530           | 66.6           | 7530           | 1.0 | 117            | 6807           | 0.9 | 8589.000          | 22.250 | g500-B8000   | m540-P250/M4 | 3 | 662  |
| 6.1                | 4437            | 31.1            | 8054           | 62.3           | 8054           | 1.6 | 109            | 7281           | 1.5 | 8681.000          | 23.800 | g500-B13000  | m540-P250/M4 | 3 | 848  |
| 5.7                | 4716            | 29.2            | 8562           | 58.6           | 8562           | 0.9 | -              | -              | -   | 8573.000          | 25.300 | g500-B8000   | m540-P250/M4 | 3 | 662  |
| 5.7                | 4730            | 29.2            | 8586           | 58.4           | 8586           | 2.3 | 102            | 7761           | 2.1 | 8835.000          | 25.370 | g500-B20000  | m540-P250/M4 | 3 | 1098 |
| 5.4                | 5037            | 27.4            | 9144           | 54.8           | 9144           | 1.4 | 96.2           | 8266           | 1.3 | 8651.000          | 27.020 | g500-B13000  | m540-P250/M4 | 3 | 848  |
| 5.1                | 5293            | 26.1            | 9608           | 52.2           | 9608           | 2.0 | 91.5           | 8685           | 1.9 | 9086.000          | 28.390 | g500-B20000  | m540-P250/M4 | 3 | 1098 |
| 4.9                | 5486            | 25.1            | 9960           | 50.4           | 9960           | 1.3 | 88.3           | 9003           | 1.2 | 8633.000          | 29.430 | g500-B13000  | m540-P250/M4 | 3 | 848  |
| 4.7                | 5732            | 24.1            | 10407          | 48.2           | 10407          | 1.3 | 84.5           | 9407           | 1.2 | 8809.000          | 30.750 | g500-B13000  | m540-P250/M4 | 3 | 848  |
| 4.1                | 6650            | 20.7            | 12072          | 41.5           | 12072          | 1.6 | 72.8           | 10912          | 1.5 | 8955.000          | 35.670 | g500-B20000  | m540-P250/M4 | 3 | 1098 |
| 3.7                | 7332            | 18.8            | 13310          | 37.7           | 13310          | 1.0 | 66.1           | 12032          | 0.9 | 8698.000          | 39.330 | g500-B13000  | m540-P250/M4 | 3 | 848  |
| 3.2                | 8344            | 16.5            | 15148          | 33.1           | 15148          | 1.3 | 58.0           | 13693          | 1.4 | 8834.000          | 44.760 | g500-B20000  | m540-P250/M4 | 3 | 1098 |
| 3.2                | 8363            | 16.5            | 15182          | 33.0           | 15182          | 0.9 | 57.9           | 13724          | 0.9 | 8680.000          | 44.860 | g500-B13000  | m540-P250/M4 | 3 | 848  |
| 2.9                | 9384            | 14.7            | 17036          | 29.4           | 17036          | 1.1 | 51.6           | 15400          | 1.2 | 8773.000          | 50.340 | g500-B20000  | m540-P250/M4 | 3 | 1098 |
| 2.4                | 11293           | 12.2            | 20502          | 24.5           | 20502          | 1.0 | 42.9           | 18533          | 1.0 | 8720.000          | 60.580 | g500-B20000  | m540-P250/M4 | 3 | 1098 |
| 2.2                | 12557           | 11.0            | 22796          | 22.0           | 22796          | 0.9 | 38.6           | 20607          | 0.9 | 8682.000          | 67.360 | g500-B20000  | m540-P250/M4 | 3 | 1098 |



## Motor – inverter assignment

Supply voltage 1x 230/240 V

Rated frequency 50/60 Hz

| Rated power    | Motor       | Frequency inverter |                 |
|----------------|-------------|--------------------|-----------------|
|                |             | i510 cabinet       | i550 cabinet    |
| P <sub>N</sub> |             |                    |                 |
| kW             |             |                    |                 |
| 1.5            | m540-P90/L4 | i510-C1.5/230-1    | i550-C1.5/230-1 |
| 1.5            | m540-P90/L4 | i510-C1.5/230-2    | i550-C1.5/230-2 |
| 2.2            | m540-P90/L4 | i510-C2.2/230-1    | i550-C2.2/230-1 |
| 2.2            | m540-P90/L4 | i510-C2.2/230-2    | i550-C2.2/230-2 |

Supply voltage 3x 230/240 V

Rated frequency 50/60 Hz

| Rated power    | Motor        | Frequency inverter |                 |
|----------------|--------------|--------------------|-----------------|
|                |              | i510 cabinet       | i550 cabinet    |
| P <sub>N</sub> |              |                    |                 |
| kW             |              |                    |                 |
| 1.5            | m540-P90/L4  | i510-C1.5/230-2    | i550-C1.5/230-2 |
| 2.2            | m540-P100/M4 | i510-C2.2/230-2    | i550-C2.2/230-2 |
| 3              | m540-P100/L4 | i510-C4.0/230-3    | i550-C4.0/230-3 |
| 4              | m540-P112/M4 | i510-C4.0/230-3    | i550-C4.0/230-3 |
| 5.5            | m540-P132/M4 | i510-C5.5/230-3    | i550-C5.5/230-3 |



## Supply voltage 3x 400/480 V

Rated frequency 50/60 Hz

| Rated power | Motor        | Frequency inverter |                 |
|-------------|--------------|--------------------|-----------------|
|             |              | i510 cabinet       | i550 cabinet    |
| $P_N$       |              |                    |                 |
| kW          |              |                    |                 |
| 1.5         | m540-P90/L4  | i510-C1.5/400-3    | i550-C1.5/400-3 |
| 2.2         | m540-P100/M4 | i510-C2.2/400-3    | i550-C2.2/400-3 |
| 3           | m540-P100/L4 | i510-C3.0/400-3    | i550-C3.0/400-3 |
| 4           | m540-P112/M4 | i510-C4.0/400-3    | i550-C4.0/400-3 |
| 5.5         | m540-P132/M4 | i510-C5.5/400-3    | i550-C5.5/400-3 |
| 7.5         | m540-P132/L4 | i510-C7.5/400-3    | i550-C7.5/400-3 |
| 11          | m540-P160/M4 | i510-C11/400-3     | i550-C11/400-3  |
| 15          | m540-P160/L4 | -                  | i550-C15/400-3  |
| 18.5        | m540-P180/M4 | -                  | i550-C18/400-3  |
| 22          | m540-P180/L4 | -                  | i550-C22/400-3  |
| 30          | m540-P200/M4 | -                  | i550-C30/400-3  |
| 37          | m540-P225/M4 | -                  | i550-C37/400-3  |
| 45          | m540-P225/L4 | -                  | i550-C45/400-3  |
| 55          | m540-P250/M4 | -                  | i550-C55/400-3  |

Rated frequency 87 Hz

| Rated power | Motor        | Frequency inverter |                 |
|-------------|--------------|--------------------|-----------------|
|             |              | i510 cabinet       | i550 cabinet    |
| $P_N$       |              |                    |                 |
| kW          |              |                    |                 |
| 2.6         | m540-P90/L4  | i510-C3.0/400-3    | i550-C3.0/400-3 |
| 3.9         | m540-P100/M4 | i510-C4.0/400-3    | i550-C4.0/400-3 |
| 5.2         | m540-P100/L4 | i510-C5.5/400-3    | i550-C5.5/400-3 |
| 7.35        | m540-P112/M4 | i510-C7.5/400-3    | i550-C7.5/400-3 |
| 9.6         | m540-P132/M4 | i510-C11/400-3     | i550-C11/400-3  |
| 13.1        | m540-P132/L4 | -                  | i550-C15/400-3  |
| 19.2        | m540-P160/M4 | -                  | i550-C22/400-3  |
| 26.3        | m540-P160/L4 | -                  | i550-C30/400-3  |
| 32.2        | m540-P180/M4 | -                  | i550-C37/400-3  |
| 38.5        | m540-P180/L4 | -                  | i550-C45/400-3  |
| 52.5        | m540-P200/M4 | -                  | i550-C55/400-3  |
| 64.8        | m540-P225/M4 | -                  | i550-C75/400-3  |
| 78.7        | m540-P225/L4 | -                  | i550-C90/400-3  |
| 87          | m540-P250/M4 | -                  | i550-C90/400-3  |



Dimensions

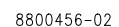
Notes on the basic dimensions

The following legend shows the layout of the dimension tables:

|                           |    |                                                      |        |        |
|---------------------------|----|------------------------------------------------------|--------|--------|
| Motor                     |    | m540-P                                               |        |        |
|                           |    | 90/L4                                                | 100/M4 | 100/L4 |
| Table content             |    | Explanation                                          |        |        |
| Total length              | L  | Total length of the drive without brake/feedback     |        |        |
| Motor length              | LB | Length of the motor without brake/feedback           |        |        |
| Motor diameter            | AC | Motor diameter                                       |        |        |
| Motor/connection distance | AD | Distance from center of motor to end of terminal box |        |        |



Gearbox design: Hollow shaft with foot (HBR/HDR/HCK/HCK)

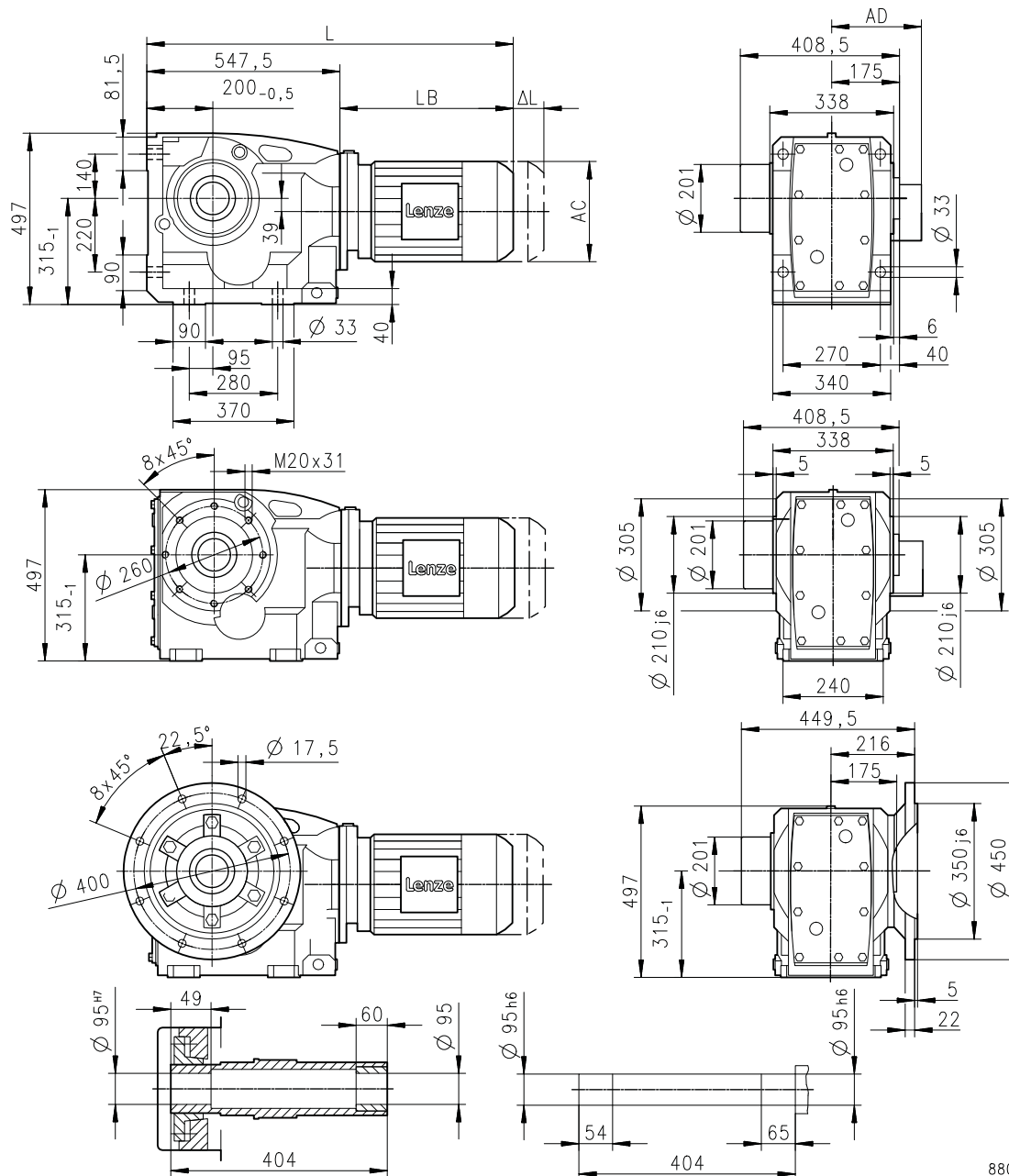


**Δ L ▶ Additional lengths**  80



**g500-B8000, 3-stage**

Gearbox design: Hollow shaft with shrink disc, with foot (SBR/SDR/SCR/SCK)



8800458-02

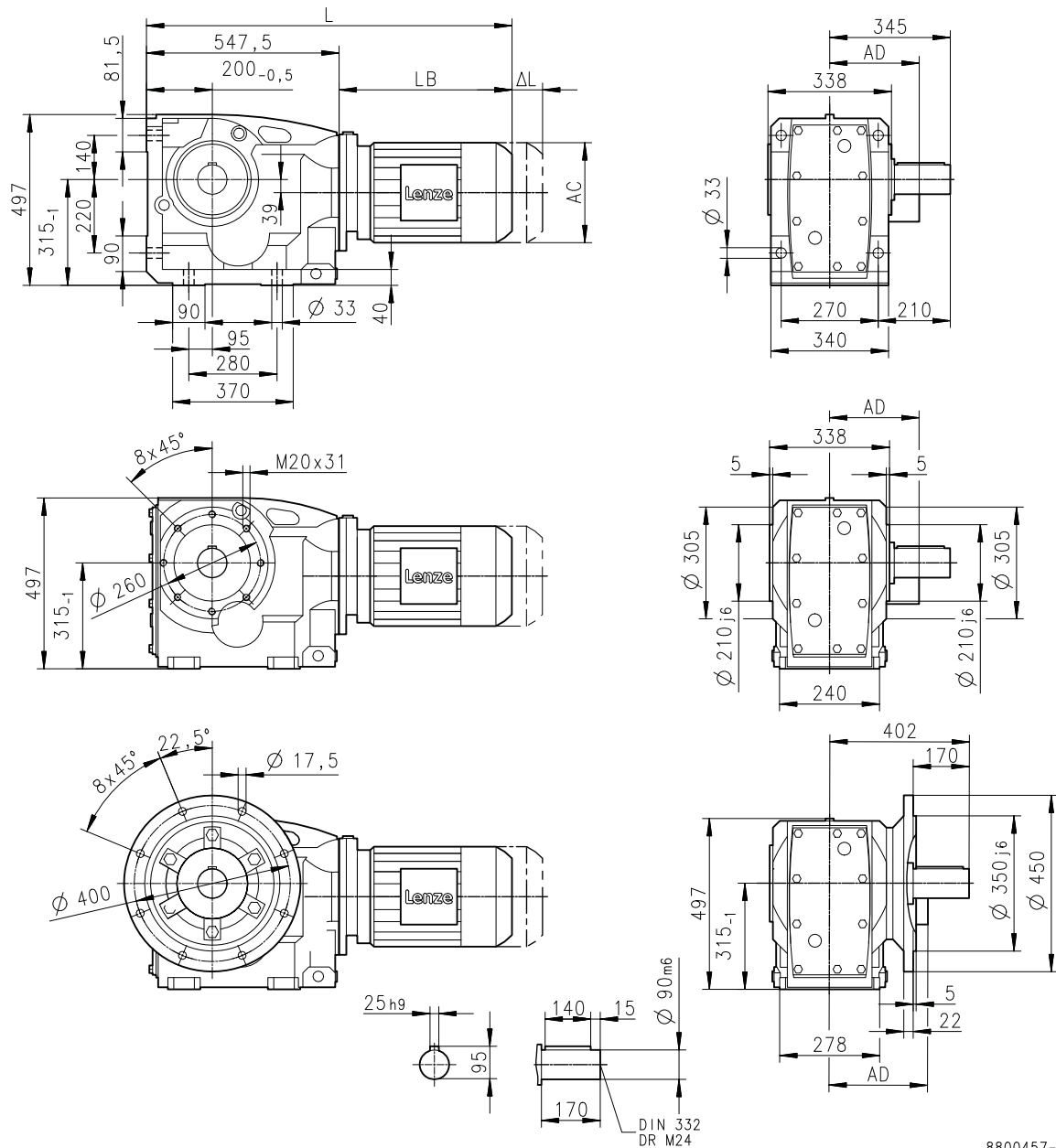
| Motor series              |    |    | m540-P         |                |       |                |       |       |       |       |       |       |       |       |
|---------------------------|----|----|----------------|----------------|-------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Motor                     |    |    | 090M4<br>090L4 | 100M4<br>100L4 | 112M4 | 132M4<br>132L4 | 160M4 | 160L4 | 180M4 | 180L4 | 200M4 | 225M4 | 225L4 | 250M4 |
| Total length              | L  | mm | 897            | 941            | 941   | 1017           | 1049  | 1109  | 1122  | 1152  | 1215  | 1241  | 1301  | 1301  |
| Motor length              | LB | mm | 349            | 393            | 393   | 469            | 501   | 561   | 574   | 604   | 667   | 693   | 753   | 753   |
| Motor diameter            | AC | mm | 174            | 198            | 222   | 264            | 318   | 318   | 353   | 353   | 393   | 439   | 439   | 487   |
| Motor/connection distance | AD | mm | 154            | 171            | 182   | 207            | 241   | 241   | 292   | 292   | 315   | 337   | 337   | 408   |

**Δ L ▶ Additional lengths**  80



### g500-B8000, 3-stage

Gearbox design: Solid shaft with foot (VBR/VCR/VCK)



8800457-02

| Motor series              |    |    | m540-P         |                |       |                |       |       |       |       |       |       |       |       |
|---------------------------|----|----|----------------|----------------|-------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Motor                     |    |    | 090M4<br>090L4 | 100M4<br>100L4 | 112M4 | 132M4<br>132L4 | 160M4 | 160L4 | 180M4 | 180L4 | 200M4 | 225M4 | 225L4 | 250M4 |
| Total length              | L  | mm | 897            | 941            | 941   | 1017           | 1049  | 1109  | 1122  | 1152  | 1215  | 1241  | 1301  | 1301  |
| Motor length              | LB | mm | 349            | 393            | 393   | 469            | 501   | 561   | 574   | 604   | 667   | 693   | 753   | 753   |
| Motor diameter            | AC | mm | 174            | 198            | 222   | 264            | 318   | 318   | 353   | 353   | 393   | 439   | 439   | 487   |
| Motor/connection distance | AD | mm | 154            | 171            | 182   | 207            | 241   | 241   | 292   | 292   | 315   | 337   | 337   | 408   |

Δ L ▶ Additional lengths 80

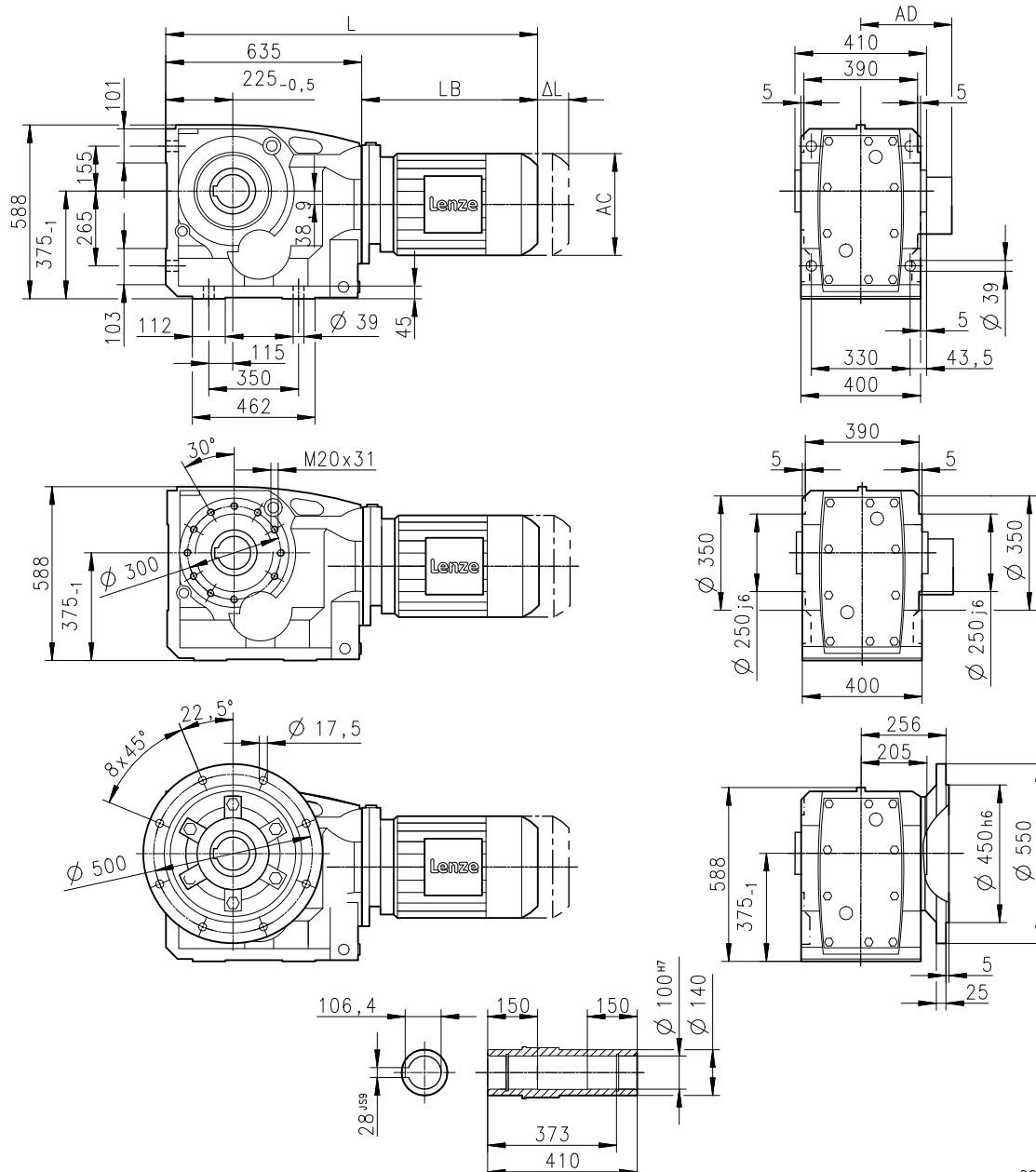
# Technical data

Dimensions  
Basic dimensions



## g500-B13000, 3-stage

Gearbox design: Hollow shaft with foot (HBR/HAR/HAK)



8800459-02

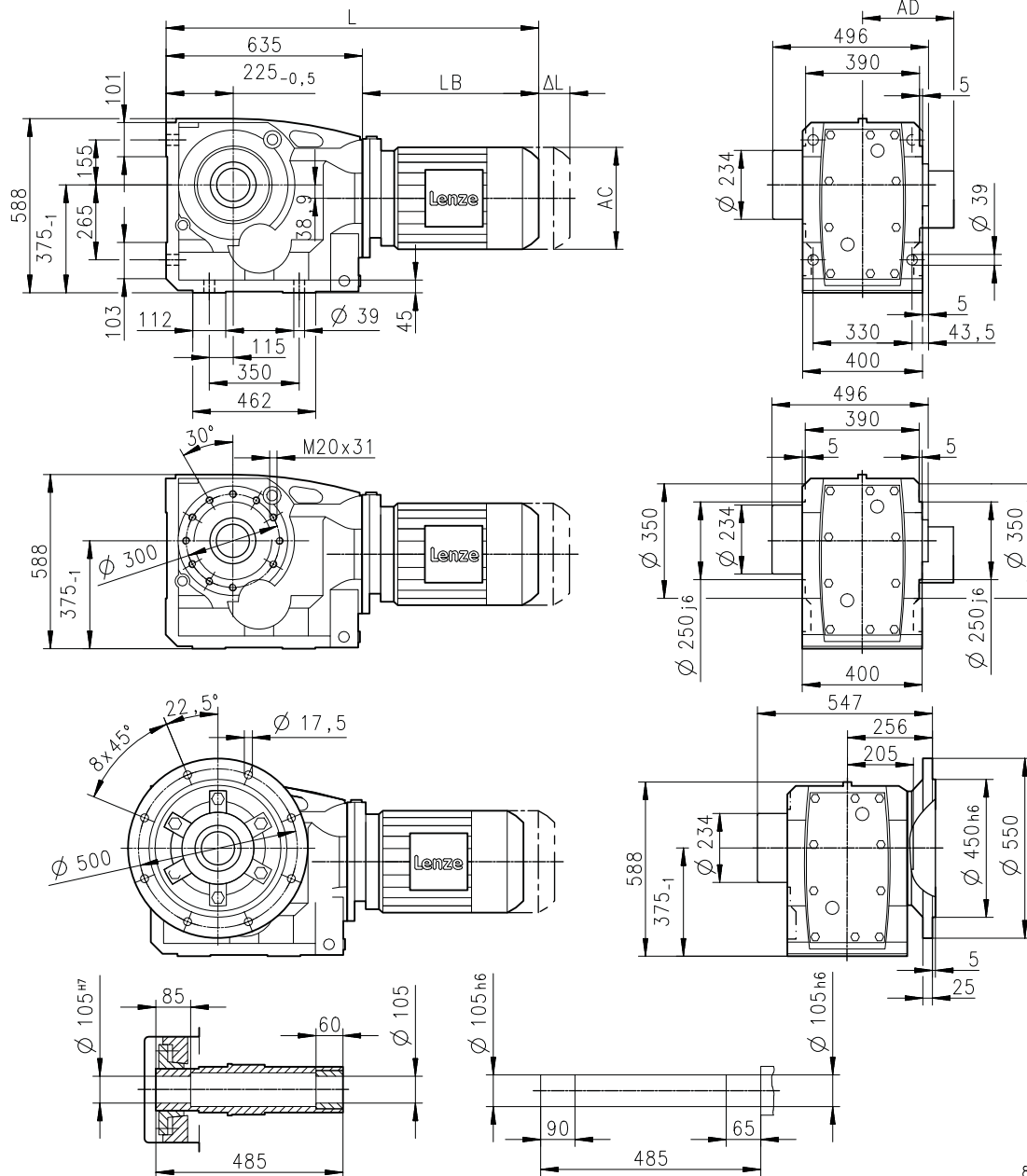
| Motor series              |    |    | m540-P         |       |                |       |       |       |       |       |       |       |       |
|---------------------------|----|----|----------------|-------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Motor                     |    |    | 100M4<br>100L4 | 112M4 | 132M4<br>132L4 | 160M4 | 160L4 | 180M4 | 180L4 | 200M4 | 225M4 | 225L4 | 250M4 |
| Total length              | L  | mm | 1026           | 1026  | 1097           | 1129  | 1189  | 1202  | 1232  | 1295  | 1316  | 1376  | 1427  |
| Motor length              | LB | mm | 391            | 391   | 462            | 494   | 554   | 567   | 597   | 660   | 681   | 741   | 792   |
| Motor diameter            | AC | mm | 198            | 222   | 264            | 318   | 318   | 353   | 353   | 393   | 439   | 439   | 487   |
| Motor/connection distance | AD | mm | 171            | 182   | 207            | 241   | 241   | 292   | 292   | 315   | 337   | 337   | 408   |

Δ L ▶ Additional lengths 80



## g500-B13000, 3-stage

Gearbox design: Hollow shaft with shrink disc, with foot (SBR/SAR/SAK)



8800461-02

| Motor series              |    |    | m540-P         |       |                |       |       |       |       |       |       |       |       |
|---------------------------|----|----|----------------|-------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Motor                     |    |    | 100M4<br>100L4 | 112M4 | 132M4<br>132L4 | 160M4 | 160L4 | 180M4 | 180L4 | 200M4 | 225M4 | 225L4 | 250M4 |
| Total length              | L  | mm | 1026           | 1026  | 1097           | 1129  | 1189  | 1202  | 1232  | 1295  | 1316  | 1376  | 1427  |
| Motor length              | LB | mm | 391            | 391   | 462            | 494   | 554   | 567   | 597   | 660   | 681   | 741   | 792   |
| Motor diameter            | AC | mm | 198            | 222   | 264            | 318   | 318   | 353   | 353   | 393   | 439   | 439   | 487   |
| Motor/connection distance | AD | mm | 171            | 182   | 207            | 241   | 241   | 292   | 292   | 315   | 337   | 337   | 408   |

Δ L ▶ Additional lengths 80

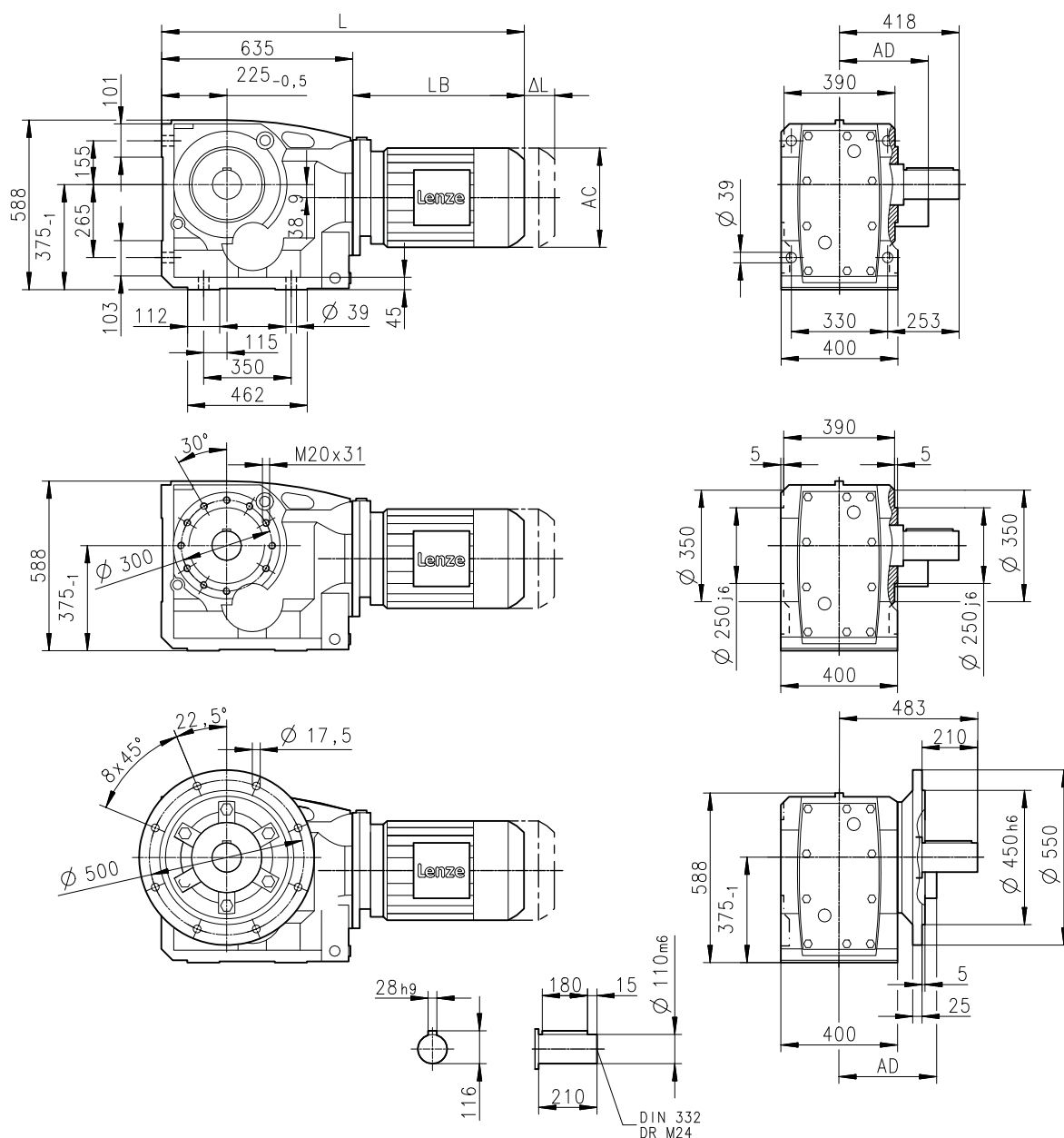
# Technical data

Dimensions  
Basic dimensions



## g500-B13000, 3-stage

Gearbox design: Solid shaft with foot (VBR/VAR/VAK)



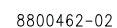
8800460-02

| Motor series              |    |    | m540-P         |       |                |       |       |       |       |       |       |       |       |
|---------------------------|----|----|----------------|-------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Motor                     |    |    | 100M4<br>100L4 | 112M4 | 132M4<br>132L4 | 160M4 | 160L4 | 180M4 | 180L4 | 200M4 | 225M4 | 225L4 | 250M4 |
| Total length              | L  | mm | 1026           | 1026  | 1097           | 1129  | 1189  | 1202  | 1232  | 1295  | 1316  | 1376  | 1427  |
| Motor length              | LB | mm | 391            | 391   | 462            | 494   | 554   | 567   | 597   | 660   | 681   | 741   | 792   |
| Motor diameter            | AC | mm | 198            | 222   | 264            | 318   | 318   | 353   | 353   | 393   | 439   | 439   | 487   |
| Motor/connection distance | AD | mm | 171            | 182   | 207            | 241   | 241   | 292   | 292   | 315   | 337   | 337   | 408   |

Δ L ▶ Additional lengths □ 80



Gearbox design: Hollow shaft with foot (HBR/HAR/HAK)



**Δ L ▶ Additional lengths**  80

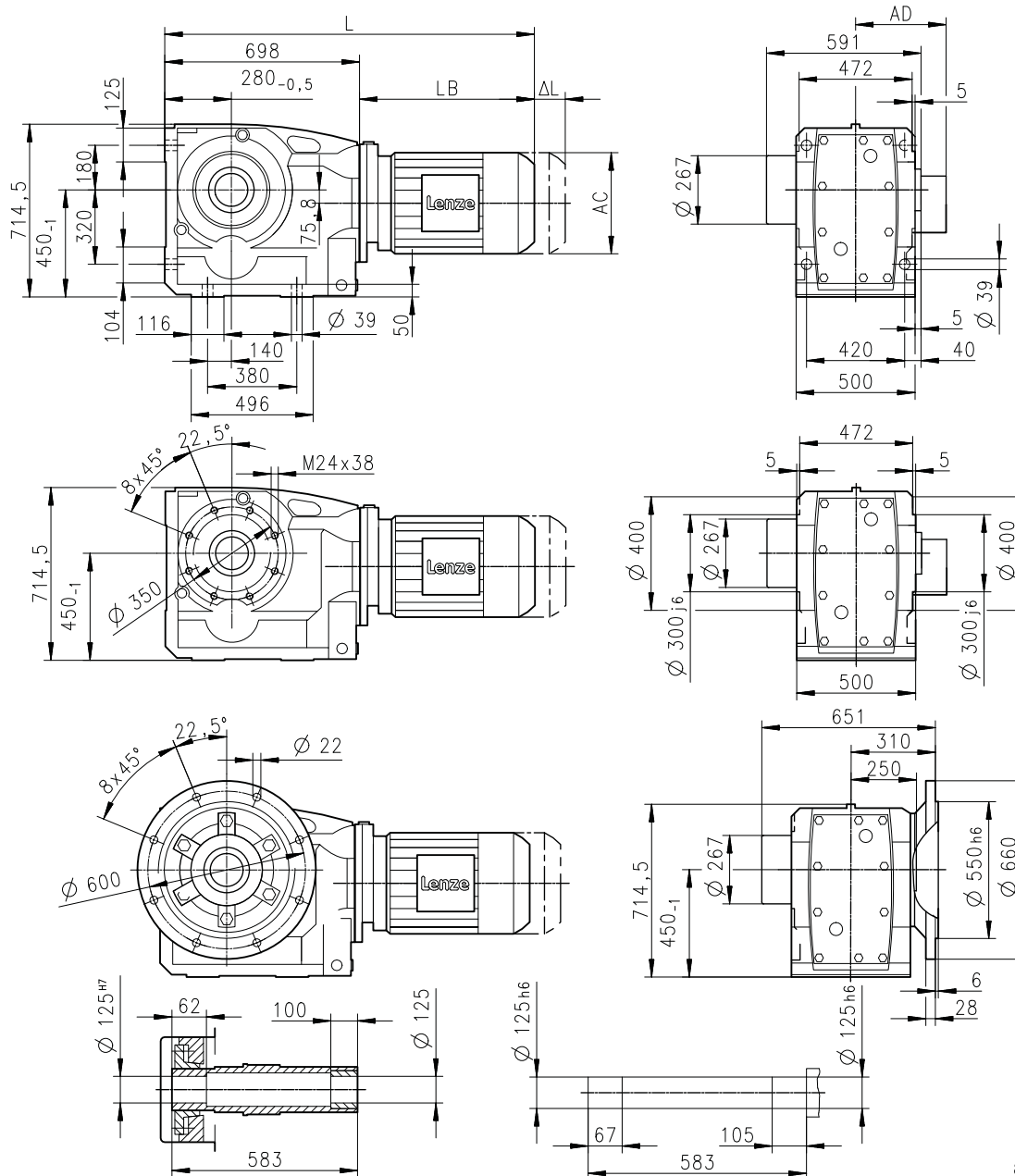
# Technical data

Dimensions  
Basic dimensions



## g500-B20000, 3-stage

Gearbox design: Hollow shaft with shrink disc, with foot (SBR/SAR/SAK)



8800464-02

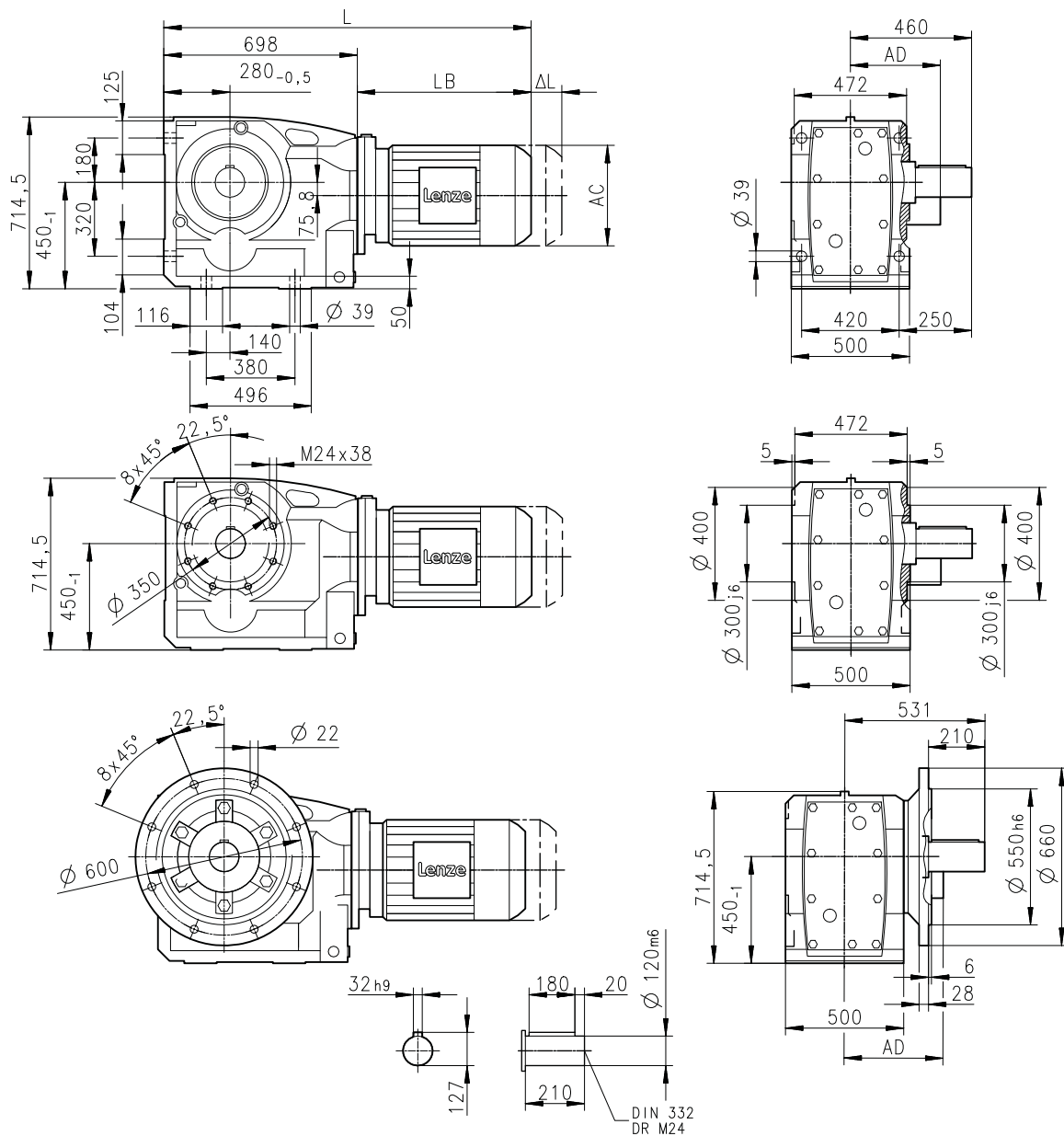
| Motor series              |    |    | m540-P |                |       |       |       |       |       |       |       |       |
|---------------------------|----|----|--------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Motor                     |    |    | 112M4  | 132M4<br>132L4 | 160M4 | 160L4 | 180M4 | 180L4 | 200M4 | 225M4 | 225L4 | 250M4 |
| Total length              | L  | mm | 1077   | 1147           | 1179  | 1239  | 1252  | 1282  | 1345  | 1364  | 1424  | 1472  |
| Motor length              | LB | mm | 379    | 449            | 481   | 541   | 554   | 584   | 647   | 666   | 726   | 774   |
| Motor diameter            | AC | mm | 222    | 264            | 318   | 318   | 353   | 353   | 393   | 439   | 439   | 487   |
| Motor/connection distance | AD | mm | 182    | 207            | 241   | 241   | 292   | 292   | 315   | 337   | 337   | 408   |

Δ L ▶ Additional lengths 80



## g500-B20000, 3-stage

Gearbox design: Solid shaft with foot (VBR/VAR/VAK)



8800463-02

| Motor series              |    |    | m540-P |                |       |       |       |       |       |       |       |       |
|---------------------------|----|----|--------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Motor                     |    |    | 112M4  | 132M4<br>132L4 | 160M4 | 160L4 | 180M4 | 180L4 | 200M4 | 225M4 | 225L4 | 250M4 |
| Total length              | L  | mm | 1077   | 1147           | 1179  | 1239  | 1252  | 1282  | 1345  | 1364  | 1424  | 1472  |
| Motor length              | LB | mm | 379    | 449            | 481   | 541   | 554   | 584   | 647   | 666   | 726   | 774   |
| Motor diameter            | AC | mm | 222    | 264            | 318   | 318   | 353   | 353   | 393   | 439   | 439   | 487   |
| Motor/connection distance | AD | mm | 182    | 207            | 241   | 241   | 292   | 292   | 315   | 337   | 337   | 408   |

Δ L ▶ Additional lengths 80



## Additional lengths

### Self-ventilated motors

| Motor                                  |     |      | m540-P |        |        |        |        |        |
|----------------------------------------|-----|------|--------|--------|--------|--------|--------|--------|
|                                        |     |      | 90/L4  | 100/M4 | 112/M4 | 132/M4 | 160/M4 | 180/M4 |
|                                        |     |      |        | 100/L4 |        | 132/L4 | 160/L4 | 180/L4 |
| With feedback                          | Δ L | [mm] | 92.5   | 93.5   | 95.0   | 95.0   | 95.0   | 95.0   |
| With spring-applied brake              | Δ L | [mm] | 70.0   | 78.5   | 73.0   | 105    | 116    | 129    |
| With spring-applied brake and feedback | Δ L | [mm] | 163    | 172    | 168    | 200    | 211    | 224    |

| Motor                                  |     |      | m540-P |        |        |
|----------------------------------------|-----|------|--------|--------|--------|
|                                        |     |      | 200/M4 | 225/M4 | 250/M4 |
|                                        |     |      |        | 225/L4 |        |
| With feedback                          | Δ L | [mm] | 95.0   | 125    | 125    |
| With spring-applied brake              | Δ L | [mm] | 147    | 239    | 225    |
| With spring-applied brake and feedback | Δ L | [mm] | 242    | 364    | 350    |

### Forced ventilated motors

| Motor                                  |     |      | m540-P |        |        |        |        |        |
|----------------------------------------|-----|------|--------|--------|--------|--------|--------|--------|
|                                        |     |      | 90/L4  | 100/M4 | 112/M4 | 132/M4 | 160/M4 | 180/M4 |
|                                        |     |      |        | 100/L4 |        | 132/L4 | 160/L4 | 180/L4 |
| Without feedback/brake                 | Δ L | [mm] | 85.0   | 81.5   | 81.0   | 115    | 131    | 132    |
| With feedback                          | Δ L | [mm] | 213    | 219    | 206    | 259    | 285    | 274    |
| With spring-applied brake              | Δ L | [mm] | 120    | 122    | 113    | 165    | 191    | 199    |
| With spring-applied brake and feedback | Δ L | [mm] | 213    | 219    | 206    | 259    | 285    | 274    |

| Motor                                  |     |      | m540-P |        |        |
|----------------------------------------|-----|------|--------|--------|--------|
|                                        |     |      | 200/M4 | 225/M4 | 250/M4 |
|                                        |     |      |        | 225/L4 |        |
| Without feedback/brake                 | Δ L | [mm] | 141    | 228    | 233    |
| With feedback                          | Δ L | [mm] | 293    | 787    | 827    |
| With spring-applied brake              | Δ L | [mm] | 233    | -      | -      |
| With spring-applied brake and feedback | Δ L | [mm] | 293    | -      | -      |



## Weights

### Basic weights



The basic weights are listed in the selection tables.

Weights with lubricant for mounting position M1, all data approximate values. The exact values can be found in the delivery documents

► [Selection tables](#) 55

Observe ► [Additional weights](#) 81!

### Additional weights



Add the individual additional weights to the basic weight depending on the design.

### Gearbox

| Gearbox                       |   |      | g500-B8000 | g500-B13000 | g500-B20000 |
|-------------------------------|---|------|------------|-------------|-------------|
| Solid shaft                   | m | kg   | 22.0       | 55.0        | 56.0        |
| Shrink disc                   | m | kg   | 6.2        | 18.0        | 15.0        |
| Flange                        | m | kg   | 75.0       | 71.0        | 116.0       |
| Foot                          | m | [kg] | 8.0        | -           | -           |
| Torque plate                  |   |      |            |             |             |
| Housing foot                  | m | kg   | 15.0       | 25.0        | 64.0        |
| Shaft cover                   |   |      |            |             |             |
| Shrink disc cover             | m | kg   | 0.5        | 0.6         | 0.9         |
| Hollow shaft cover, hoseproof | m | kg   | 0.5        | 0.6         | 0.9         |

### Motors

| Motor                     |   |    | m540-P |                  |        |                  |                  |                  |        |                  |        |
|---------------------------|---|----|--------|------------------|--------|------------------|------------------|------------------|--------|------------------|--------|
|                           |   |    | 90/L4  | 100/M4<br>100/L4 | 112/M4 | 132/M4<br>132/L4 | 160/M4<br>160/L4 | 180/M4<br>180/L4 | 200/M4 | 225/M4<br>225/L4 | 250/M4 |
| Blowers                   |   |    |        |                  |        |                  |                  |                  |        |                  |        |
| Without product extension | m | kg | 1.9    | 2.1              | 2.2    | 3.0              | 4.2              | 8.2              | 9.8    | 22.0             | 22.0   |
| Spring-applied brake      |   |    |        |                  |        |                  |                  |                  |        |                  |        |
| 08                        | m | kg | 1.5    |                  |        |                  |                  |                  |        |                  |        |
| 10                        | m | kg | 2.6    | 2.6              |        |                  |                  |                  |        |                  |        |
| 12                        | m | kg | 4.2    | 4.2              | 4.2    |                  |                  |                  |        |                  |        |
| 14                        | m | kg |        | 5.8              | 5.8    |                  |                  |                  |        |                  |        |
| 16                        | m | kg |        |                  |        | 8.7              |                  |                  |        |                  |        |
| 18                        | m | kg |        |                  |        | 12.6             | 12.6             |                  |        |                  |        |
| 20                        | m | kg |        |                  |        |                  | 12.6             | 12.6             | 12.6   |                  |        |
| 25                        | m | kg |        |                  |        |                  |                  |                  | 31.0   | 31.0             |        |
| 30                        | m | kg |        |                  |        |                  |                  |                  |        | 45.0             | 45.0   |
| 40                        | m | kg |        |                  |        |                  |                  |                  |        |                  | 80.0   |
| Manual release lever      | m | kg | ??     | ??               | ??     | ??               | ??               | ??               | ??     | ??               | ??     |
| Feedback                  | m | kg | 0.5    | 0.5              | 0.5    | 0.5              | 0.5              | 0.5              | 0.5    | 0.5              | 0.5    |

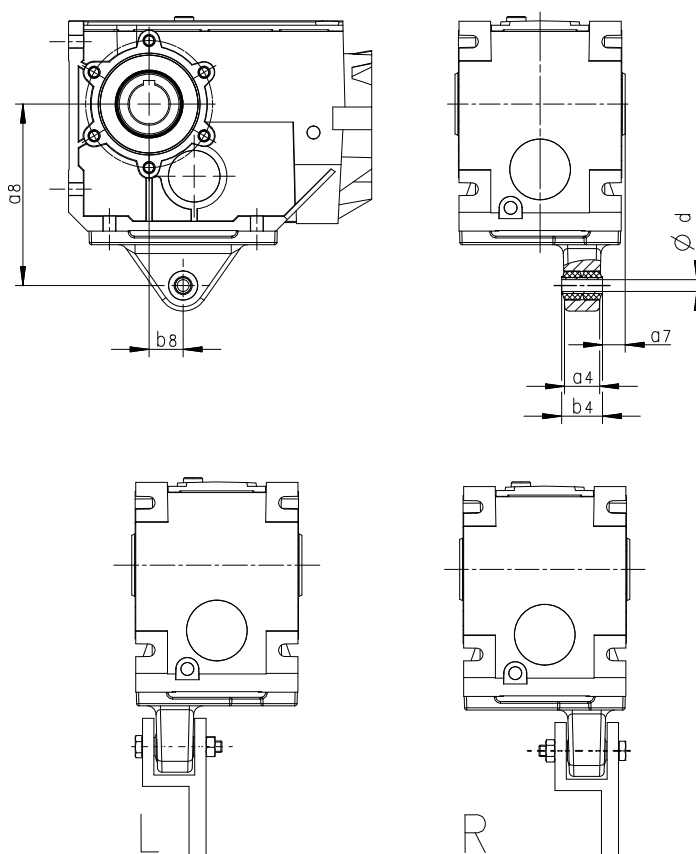


## Product extensions

### Torque plates

Torque support is usually provided by means of the foot or flange. The attachable torque plates are another option. In this case, torque support is provided only via one point and is suitable for shaft-mounted gearboxes, among other things. Included rubber buffers ensure low-stress installation and absorb any slight impacts.

The torque plates are available for being installed at the existing foot at the gearbox.



e4002718-01

| Gearbox     | Dimensions |      |      |      |      |      |
|-------------|------------|------|------|------|------|------|
|             | d          | a8   | b8   | a4   | b4   | a7   |
|             | [mm]       | [mm] | [mm] | [mm] | [mm] | [mm] |
| g500-B8000  | 25.0       | 450  | 74.0 | 50.0 | 56.0 | 77.0 |
| g500-B13000 | 40.0       | 550  | 60.0 | 80.0 | 88.0 | 7.00 |
| g500-B20000 | 40.0       | 700  | 50.0 | 80.0 | 88.0 | 1.25 |

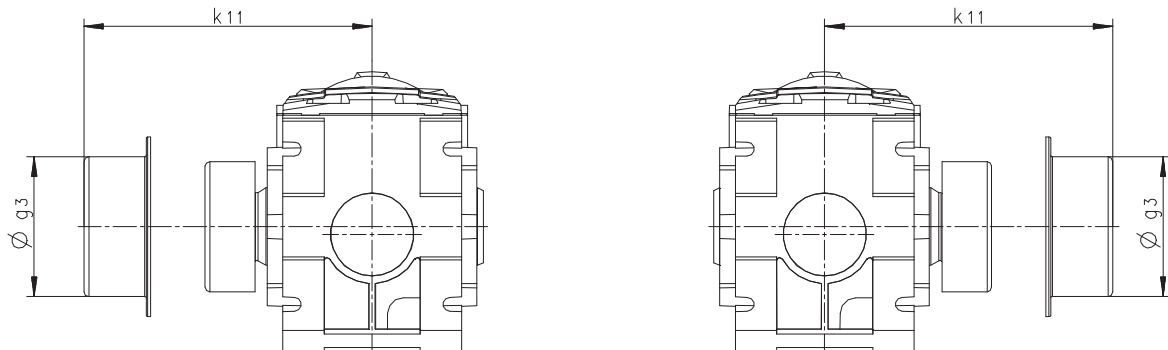


## Shaft covers

The shrink disc cover is provided for the shrink disc to be protected from contact.

The hoseproof hollow shaft cover protects the hollow shaft from objects falling in. It is sealed by a flat gasket between cover and housing. Thus, the hollow shaft is protected from dust and water jets on this side.

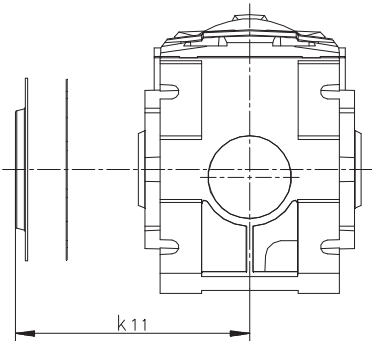
### Shrink disc cover



| Product     | Dimensions |     |
|-------------|------------|-----|
|             | g3         | k11 |
|             | mm         | mm  |
| g500-B8000  | 218        | 250 |
| g500-B13000 | 258        | 313 |
| g500-B20000 | 310        | 372 |



Hollow shaft cover, hoseproof



| Product     | Dimensions      |  |
|-------------|-----------------|--|
|             | k <sub>11</sub> |  |
|             | mm              |  |
| g500-B8000  | 250             |  |
| g500-B13000 | 313             |  |
| g500-B20000 | 372             |  |



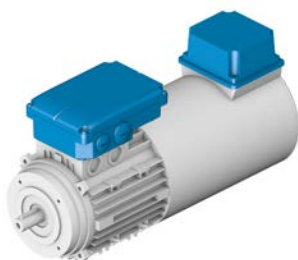
## Motor connection

### Connection options



The motors are equipped with a terminal box by default.

Alternatively, the HAN plug connector can be selected for quick commissioning or maintenance.



Terminal box with cable gland



HAN connector

The three-phase AC motors are intended for operation on constant mains and an inverter.

### Mains operation

For mains operation, the motors are available in the following mains voltages:

| Mains frequency | Mains voltage | Mains voltage range | Circuit |
|-----------------|---------------|---------------------|---------|
| Hz              | V             | V                   |         |
| 50              | 400           | 380 ... 420         | Y       |
|                 | 230           | 220 ... 240         | Δ       |
| 60              | 460           | 440 ... 480         | Y       |

The motors are rated for the specified mains voltage range.

According to EN 60034-1, the motors operate reliably in continuous operation at  $\pm 5\%$  of the line voltage range. This ensures reliable operation in the recommended range  $\pm 10\%$  of the IEC standard voltages 230 V, 400 V and 460 V.

### Frequency inverter operation

The base frequencies for frequency inverter operation have been set to the following rated voltages:

| Rated frequency | Rated voltage | Circuit |
|-----------------|---------------|---------|
| Hz              | V             |         |
| 50              | 400           | Y       |
|                 | 230           | Δ       |
| 87              | 400           | Δ       |

# Product extensions

Motor connection  
Assignment of the terminal boxes



## Assignment of the terminal boxes

Depending on the product extension of the motor, different terminal box sizes (KK5, KK6 or KK7) are used.



Only one temperature monitor can be connected in the terminal boxes.

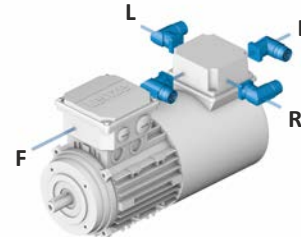
| Motor                                | m540-P |                  |        |                  |                  |                  |        |                  |        |
|--------------------------------------|--------|------------------|--------|------------------|------------------|------------------|--------|------------------|--------|
|                                      | 90/L4  | 100/M4<br>100/L4 | 112/M4 | 132/M4<br>132/L4 | 160/M4<br>160/L4 | 180/M4<br>180/L4 | 200/M4 | 225/M4<br>225/L4 | 250/M4 |
| Without product extensions           |        |                  |        |                  |                  |                  |        |                  |        |
| Terminal box                         | KK5    | KK5              | KK5    | KK5              | KK5              | KK6              | KK6    | KK6              | KK6    |
| Product extension - brake            |        |                  |        |                  |                  |                  |        |                  |        |
| Terminal box                         | KK6    | KK6              | KK6    | KK6              | KK6              | KK6              | KK6    | KK6              | KK6    |
| Product extension - feedback         |        |                  |        |                  |                  |                  |        |                  |        |
| Terminal box                         | KK7    | KK7              | KK7    | KK7              | KK7              | KK7              | KK7    | KK6              | KK6    |
| Product extension - brake + feedback |        |                  |        |                  |                  |                  |        |                  |        |
| Terminal box                         | KK7    | KK7              | KK7    | KK7              | KK7              | KK7              | KK7    | KK7              | KK7    |

## Positions of the connections

Positions on the motor terminal box



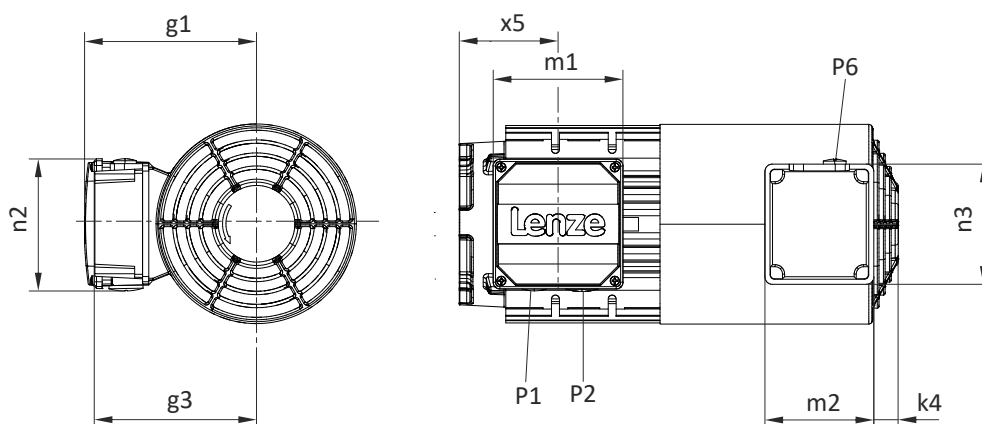
Positions on the blower terminal box



| Terminal box           | Positions | Note |
|------------------------|-----------|------|
| Motor terminal box KK5 |           |      |
| Cable glands           | L, E or R |      |
| Motor terminal box KK6 |           |      |
| Cable glands           | L, E or R |      |
| Motor terminal box KK7 |           |      |
| Cable glands           | L and R   |      |
| Blower terminal box    |           |      |
| Cable glands           | L, E or R |      |



## Dimensions of KK5 power terminal box



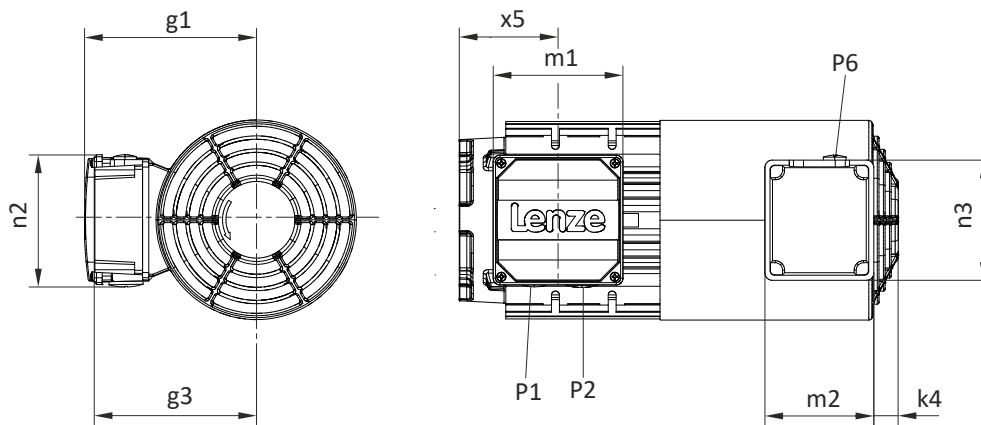
| Motor        |                |    | m540-P     |            |            |            |            |            |
|--------------|----------------|----|------------|------------|------------|------------|------------|------------|
|              |                |    | 90/L4      | 100/M4     | 112/M4     | 132/M4     | 160/M4     | 160/L4     |
|              |                |    |            | 100/L4     |            | 132/L4     |            |            |
| Gearbox      |                |    |            |            |            |            |            |            |
| g500-B8000   | x <sub>5</sub> | mm | 205        | 227        | 219        | 273        | 257        | 317        |
| g500-B13000  | x <sub>5</sub> | mm | -          | 226        | 217        | 267        | 250        | 310        |
| g500-B20000  | x <sub>5</sub> | mm | -          | -          | -          | 154        | 237        | 297        |
| Terminal box |                |    |            |            |            |            |            |            |
|              | g <sub>1</sub> | mm | 126        | 166        | 177        | 202        | 237        | 237        |
|              | m <sub>1</sub> | mm | 79.0       | 112        | 112        | 130        | 145        | 145        |
|              | n <sub>2</sub> | mm | 93.0       | 135        | 135        | 135        | 175        | 175        |
|              | P1             | mm | M20x1.5    | M32x1.5    | M32x1.5    | M32x1.5    | M40x1.5    | M40x1.5    |
|              | P2             | mm | M25x1.5    | M32x1.5    | M32x1.5    | M32x1.5    | M40x1.5    | M40x1.5    |
|              | k <sub>4</sub> | mm | 32         | 32         | 32         | 0          | 0          | 0          |
|              | m <sub>2</sub> | mm | 95         | 95         | 95         | 107        | 107        | 107        |
|              | n <sub>3</sub> | mm | 105        | 105        | 105        | 105        | 105        | 105        |
|              | P <sub>6</sub> | mm | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 |

# Product extensions

Motor connection  
Assignment of the terminal boxes



## Dimensions of KK6 power terminal box

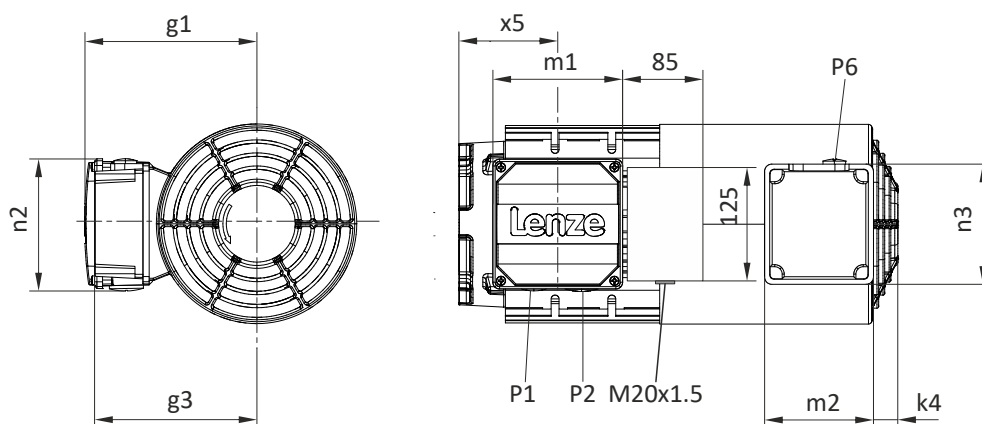


| Motor        |                |    | m540-P     |            |            |            |            |              |
|--------------|----------------|----|------------|------------|------------|------------|------------|--------------|
|              |                |    | 90/L4      | 100/M4     | 112/M4     | 132/M4     | 160/M4     | 160/L4       |
|              |                |    |            | 100/L4     |            | 132/L4     |            |              |
| Gearbox      |                |    |            |            |            |            |            |              |
| g500-B8000   | x <sub>5</sub> | mm | 205        | 227        | 219        | 273        | 257        | 317          |
| g500-B13000  | x <sub>5</sub> | mm | -          | 226        | 217        | 267        | 250        | 310          |
| g500-B20000  | x <sub>5</sub> | mm | -          | -          | -          | 154        | 237        | 297          |
| Terminal box |                |    |            |            |            |            |            |              |
|              | g <sub>1</sub> | mm | 154        | 171        | 182        | 207        | 241        | 241          |
|              | m <sub>1</sub> | mm | 123        | 135        | 135        | 162        | 180        | 180          |
|              | n <sub>2</sub> | mm | 120        | 135        | 135        | 162        | 180        | 180          |
|              | P1             | mm | M20x1.5    | M32x1.5    | M32x1.5    | M32x1.5    | M40x1.5    | M40x1.5      |
|              | P2             | mm | M25x1.5    | M32x1.5    | M32x1.5    | M32x1.5    | M40x1.5    | M40x1.5      |
|              | k <sub>4</sub> | mm | 32         | 32         | 32         | 0          | 0          | 0            |
|              | m <sub>2</sub> | mm | 95         | 95         | 95         | 107        | 107        | 107          |
|              | n <sub>3</sub> | mm | 105        | 105        | 105        | 105        | 105        | 105          |
|              | P <sub>6</sub> | mm | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5-- |

| Motor        |                |    | m540-P     |            |            |            |            |            |
|--------------|----------------|----|------------|------------|------------|------------|------------|------------|
|              |                |    | -P180/M4   | -P180/L4   | -P200/M4   | -P225/M4   | -P225/L4   | -P250/M4   |
| Gearbox      |                |    |            |            |            |            |            |            |
| g500-B8000   | x <sub>5</sub> | mm | 316        | 346        | 399        | 415        | 475        | 488        |
| g500-B13000  | x <sub>5</sub> | mm | 310        | 340        | 386        | 403        | 463        | 481        |
| g500-B20000  | x <sub>5</sub> | mm | 296        | 326        | 386        | 388        | 448        |            |
| Terminal box |                |    |            |            |            |            |            |            |
|              | g <sub>1</sub> | mm | 292        | 292        | 315        | 408        | 408        | 457        |
|              | m <sub>1</sub> | mm | 197        | 197        | 197        | 233        | 233        | 299        |
|              | n <sub>2</sub> | mm | 265        | 265        | 266        | 319        | 319        | 374        |
|              | P1             | mm | M40x1.5    | M40x1.5    | M50x1.5    | M63x1.5    | M50x1.5    | M63x1.5    |
|              | P2             | mm | M40x1.5    | M40x1.5    | M50x1.5    | M63x1.5    | M50x1.5    | M63x1.5    |
|              | k <sub>4</sub> | mm | 0          | 0          | 0          | 0          | 0          | 0          |
|              | m <sub>2</sub> | mm | 107        | 107        | 107        | 107        | 107        | 107        |
|              | n <sub>3</sub> | mm | 105        | 105        | 105        | 105        | 105        | 105        |
|              | P <sub>6</sub> | mm | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 |



## Dimensions of KK7 power terminal box



| Motor        |                |    | m540-P     |            |            |            |            |              |
|--------------|----------------|----|------------|------------|------------|------------|------------|--------------|
|              |                |    | 90/L4      | 100/M4     | 112/M4     | 132/M4     | 160/M4     | 160/L4       |
|              |                |    |            | 100/L4     |            | 132/L4     |            |              |
| Gearbox      |                |    |            |            |            |            |            |              |
| g500-B8000   | x <sub>5</sub> | mm | 205        | 227        | 219        | 273        | 257        | 317          |
| g500-B13000  | x <sub>5</sub> | mm | -          | 226        | 217        | 267        | 250        | 310          |
| g500-B20000  | x <sub>5</sub> | mm | -          | -          | -          | 154        | 237        | 297          |
| Terminal box |                |    |            |            |            |            |            |              |
|              | g <sub>1</sub> | mm | 154        | 171        | 182        | 207        | 241        | 241          |
|              | m <sub>1</sub> | mm | 123        | 135        | 135        | 162        | 180        | 180          |
|              | n <sub>2</sub> | mm | 120        | 135        | 135        | 162        | 180        | 180          |
|              | P1             | mm | M20x1.5    | M32x1.5    | M32x1.5    | M32x1.5    | M40x1.5    | M40x1.5      |
|              | P2             | mm | M25x1.5    | M32x1.5    | M32x1.5    | M32x1.5    | M40x1.5    | M40x1.5      |
|              | k <sub>4</sub> | mm | 32         | 32         | 32         | 0          | 0          | 0            |
|              | m <sub>2</sub> | mm | 95         | 95         | 95         | 107        | 107        | 107          |
|              | n <sub>3</sub> | mm | 105        | 105        | 105        | 105        | 105        | 105          |
|              | P <sub>6</sub> | mm | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5-- |

| Motor        |                |    | m540-P     |            |            |            |            |            |
|--------------|----------------|----|------------|------------|------------|------------|------------|------------|
|              |                |    | -P180/M4   | -P180/L4   | -P200/M4   | -P225/M4   | -P225/L4   | -P250/M4   |
| Gearbox      |                |    |            |            |            |            |            |            |
| g500-B8000   | x <sub>5</sub> | mm | 316        | 346        | 399        | 415        | 475        | 488        |
| g500-B13000  | x <sub>5</sub> | mm | 310        | 340        | 386        | 403        | 463        | 481        |
| g500-B20000  | x <sub>5</sub> | mm | 296        | 326        | 386        | 388        | 448        |            |
| Terminal box |                |    |            |            |            |            |            |            |
|              | g <sub>1</sub> | mm | 292        | 292        | 315        | 408        | 408        | 457        |
|              | m <sub>1</sub> | mm | 197        | 197        | 197        | 233        | 233        | 299        |
|              | n <sub>2</sub> | mm | 265        | 265        | 266        | 319        | 319        | 374        |
|              | P1             | mm | M40x1.5    | M40x1.5    | M50x1.5    | M63x1.5    | M50x1.5    | M63x1.5    |
|              | P2             | mm | M40x1.5    | M40x1.5    | M50x1.5    | M63x1.5    | M50x1.5    | M63x1.5    |
|              | k <sub>4</sub> | mm | 0          | 0          | 0          | 0          | 0          | 0          |
|              | m <sub>2</sub> | mm | 107        | 107        | 107        | 107        | 107        | 107        |
|              | n <sub>3</sub> | mm | 105        | 105        | 105        | 105        | 105        | 105        |
|              | P <sub>6</sub> | mm | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 |



Assignment of the connectors HAN

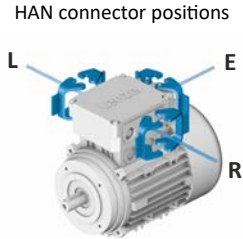
The power, brake and temperature monitoring can be connected in the HAN 10E connector.  
It is available with the power module 16 A.



The HAN 10E plug connector is only available for motors with the Y/Δ connection method.

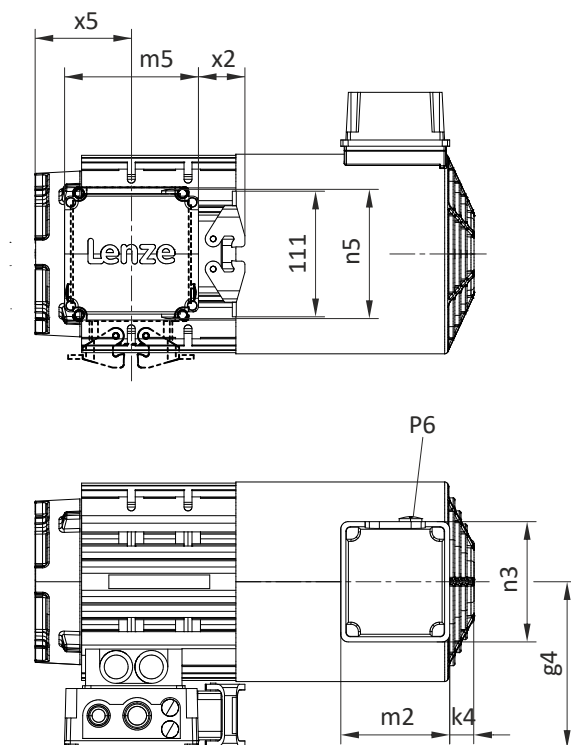
| Motor                                                                                                                               | m540-P |                  |        |                  |                  |                  |        |                  |        |
|-------------------------------------------------------------------------------------------------------------------------------------|--------|------------------|--------|------------------|------------------|------------------|--------|------------------|--------|
|                                                                                                                                     | 90/L4  | 100/M4<br>100/L4 | 112/M4 | 132/M4<br>132/L4 | 160/M4<br>160/L4 | 180/M4<br>180/L4 | 200/M4 | 225/M4<br>225/L4 | 250/M4 |
| HAN 10E connector                                                                                                                   |        |                  |        |                  |                  |                  |        |                  |        |
| Connection: <ul style="list-style-type: none"><li>• Power</li><li>• Brake</li><li>• PTC thermistor temperature monitoring</li></ul> | •      | •                | •      | -                | -                | -                | -      | -                | -      |

Positions of the connections





## Dimensions of HAN connector



| Motor        |       |    | m540-P     |            |            |            |
|--------------|-------|----|------------|------------|------------|------------|
|              |       |    | 90/L4      | 100/M4     | 100/L4     | 112/M4     |
| Gearbox      |       |    |            |            |            |            |
| g500-B8000   | $x_5$ | mm | 205        | 227        | 227        | 219        |
| g500-B13000  | $x_5$ | mm | -          | 226        | 226        | 217        |
| Terminal box |       |    |            |            |            |            |
|              | $g_4$ | mm | 154        | 171        | 171        | 182        |
|              | $x_2$ | mm | 46         | 46         | 46         | 46         |
|              | $m_5$ | mm | 123        | 135        | 135        | 135        |
|              | $n_5$ | mm | 120        | 135        | 135        | 135        |
|              | $k_4$ | mm | 32         | 32         | 32         | 32         |
|              | $m_2$ | mm | 95         | 95         | 95         | 95         |
|              | $n_3$ | mm | 105        | 105        | 105        | 105        |
|              | $P_6$ | mm | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 | 1x M16x1.5 |

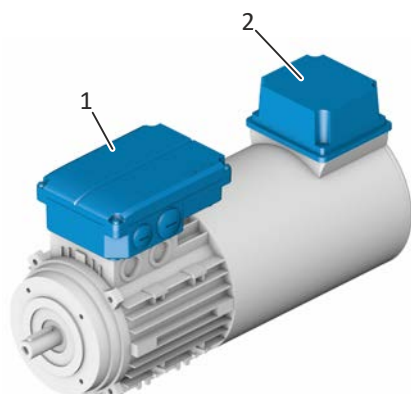
# Product extensions

Motor connection  
Connection via terminal box



## Connection via terminal box

### Position of the connections

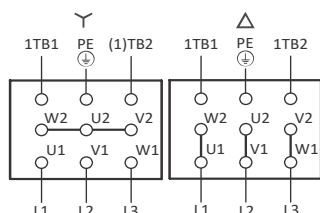


| Position | Meaning                                                                                                              | Note                                                                                                                                                                                                                                                                                  |
|----------|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1        | Power connection<br>Brake connection<br>PE connection<br>Feedback connection<br>Connection of temperature monitoring | For the terminal boxes "KK5 and KK6", the position of the power connections "L", "R" or "E" must be specified.                                                                                                                                                                        |
| 2        | Blower connection                                                                                                    | When ordering, specify the mounting position of the terminal box:<br><ul style="list-style-type: none"> <li>• Shown here: "T"</li> <li>• "L", "R" or "B"</li> </ul> If required, the terminal box can be rotated step by step by 90 ° after loosening the screws in the terminal box. |

### Power connection

#### Bridge arrangement

##### Y/Δ connection



| Terminal box, power |      |                                       |
|---------------------|------|---------------------------------------|
| Contact             | Name | Meaning                               |
| PE                  | PE   | PE conductor                          |
| U1                  | L1   | Motor winding phase                   |
| V1                  | L2   |                                       |
| W1                  | L3   |                                       |
| 1TB1                |      | PTC thermistor temperature monitoring |
| 1TB2                |      |                                       |

### DC brake connection

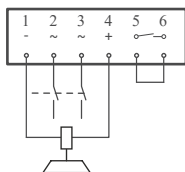
| Terminal box, DC brake |      |         |
|------------------------|------|---------|
| Contact                | Name | Meaning |
| BD1                    | +    | Brake + |
| BD2                    | -    | Brake - |



## Product extensions

Motor connection  
Connection via terminal box

### AC brake connection



Switching contact - DC switching

| Terminal box, AC brake |      |                                  |
|------------------------|------|----------------------------------|
| Contact                | Name | Meaning                          |
| ~                      | BA1  | Mains L1                         |
|                        | BA2  | Mains N                          |
| +                      | BD1  | Holding brake (factory-wired)    |
| -                      | BD2  |                                  |
| Switch symbol          |      | Switching contact - DC switching |

### Feedback connection

| Terminal box, incremental encoder HTL/TTL |                         |                            |
|-------------------------------------------|-------------------------|----------------------------|
| Contact                                   | Name                    | Meaning                    |
| +                                         | + UB                    | Supply +                   |
| -                                         | GND                     | Mass                       |
| A                                         | A/+COS                  | Track A / + COS            |
| A <sup>-</sup>                            | A <sup>-</sup> /Ref COS | Track A inverse /-COS      |
| B                                         | B/+SIN                  | Track B / +SIN             |
| B <sup>-</sup>                            | B <sup>-</sup> /Ref SIN | Track B inverse/-SIN       |
| 0                                         | 0                       | Zero track / + RS485       |
| 0 <sup>-</sup>                            | 0 <sup>-</sup>          | Zero track inverse /-RS485 |

### Connection of temperature monitoring

| Terminal box, temperature monitoring |      |                             |
|--------------------------------------|------|-----------------------------|
| Contact                              | Name | Meaning                     |
| TB1                                  |      | Temperature monitoring: TCO |
| TB2                                  |      |                             |
| 1TP1                                 |      |                             |
| 2TP1                                 |      |                             |
| R1                                   | +    | Temperature sensor PT1000 + |
| R2                                   | -    | Temperature sensor PT1000 - |
| 1TP2                                 |      | PTC150 thermistor           |
| 2TP2                                 |      | PTC130 thermistor           |

### Blower connection

| Terminal box, 1-phase separate fan |      |              |
|------------------------------------|------|--------------|
| Contact                            | Name | Meaning      |
| PE                                 | PE   | PE conductor |
| U1                                 | L1   | Mains        |
| U2                                 | N    |              |

| Terminal box, 3-phase separate fan |      |                  |
|------------------------------------|------|------------------|
| Contact                            | Name | Meaning          |
| PE                                 | PE   | PE conductor     |
| U1                                 | L1   | Mains connection |
| V1                                 | L2   |                  |
| W1                                 | L3   |                  |

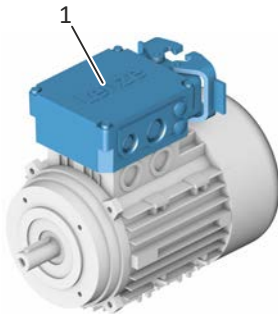
# Product extensions

Motor connection  
Connection via HAN connector



## Connection via HAN connector

### Position of the connections



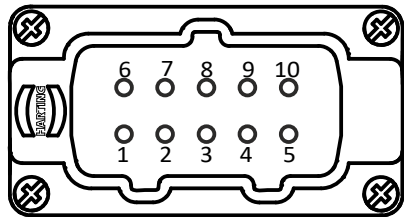
| Position | Meaning                                                                                       |
|----------|-----------------------------------------------------------------------------------------------|
| 1        | Power connection<br>Brake connection<br>PE connection<br>Connection of temperature monitoring |

### HAN 10E connector



The motor connection is specified in the counter plug.  
The connector is only suitable for motors with the connection method Y/ $\Delta$ .

### HAN 10E connector assignment



| Bridge arrangement in the HAN 10E mating connector |      |            |
|----------------------------------------------------|------|------------|
| Contact                                            | Name | Meaning    |
| 6-7-8                                              | Y    | Connection |
| 1-6                                                | Δ    |            |
| 2-7                                                |      |            |
| 3-8                                                |      |            |

| HAN 10 E |             |                        |
|----------|-------------|------------------------|
| Contact  | Name        | Meaning                |
| 1        | U1          | Motor winding phase    |
| 2        | V1          |                        |
| 3        | W1          |                        |
| 4        | +/-AC       | Brake                  |
| 5        | -/-AC       |                        |
| 6        | W2          | Motor winding phase    |
| 7        | U2          |                        |
| 8        | V2          |                        |
| 9        | TKO/+PT1000 | Temperature monitoring |
| 10       | TKO/-PT1000 |                        |



## Brakes

The motors can be ordered with a spring-applied brake to allow stopping or deceleration of the moving masses. The spring-applied brake operates according to the closed-circuit principle. In the deenergized state, the brake is closed, preventing possible movement of the motor shaft or the load after switching off or in the event of a power failure.

### Brake connection

If the installation is already supplied with DC voltage, a direct connection without rectifier is possible. High induction peaks may occur and a freewheeling diode or a spark suppressor should be provided.

A rectifier is required if the brake is connected to the mains. This is included in the scope of supply and is located in the motor's terminal box.

### Rectifier

The rectifier converts the connection's AC voltage into a DC voltage.

Alternatively, a half-wave bridge rectifier can be used for the application brake. This provides twice the voltage for a very short time (300 ms). As a result, the features of the brake – depending on the assignment of the brake's coil voltage and supply voltage – can be optimized in the form of a short-term overexcitation of the brake coil or a reduction of the holding current.

### AC or DC voltage switching

Brakes can be switched both before the rectifier (AC voltage switching) as well as after the rectifier (DC voltage switching). The choice of control system influences the engagement time of the armature plate, inter alia.

AC switching increases the engagement time by a factor of 5 to 10 compared to DC switching. This is to be observed taken into account when choosing the control system. DC switching is possible by simply removing a bridge and using the switching contact connection. However, this calls for two additional cores in the control cabinet.

DC switching is particularly expedient for lifting applications because a short engagement time is necessary here to guarantee a secure hold without any prior slipping of the load.

### Motor supply cables

If long motor supply cables are used, pay attention to the ohmic voltage drop along the cable and compensate for it with a higher voltage at the input end of the cable.

The following applies to Lenze system cables:

|                                                                                  |          |   |                            |
|----------------------------------------------------------------------------------|----------|---|----------------------------|
| $U[V] = U_B[V] + 0.08 \frac{[V]}{[A] \times [m]} \times I_{Lg}[m] \times I_B[A]$ | U        | V | Resulting supply voltage   |
|                                                                                  | $U_B$    | V | Rated voltage of the brake |
|                                                                                  | $I_{Lg}$ | m | Cable length               |
|                                                                                  | $I_B$    | A | Rated current of the brake |

### Manual release lever

To make positioning and maintenance work easier, the holding and application brake can be ordered with a manual release lever. By using the manual release lever, the brake can be released manually in deenergized operating state.

A lockable manual release lever can be ordered as an option. This is equipped with a clamping device to hold the brake in the released position.

# Product extensions

## Brakes

### Spring-applied application brake



### Spring-applied application brake

#### NOTICE

If used as a service brake, the braking torques are dependent on the motor speed to be braked.

► During braking from a high speed and in the event of emergency stops, the braking torque is significantly reduced.

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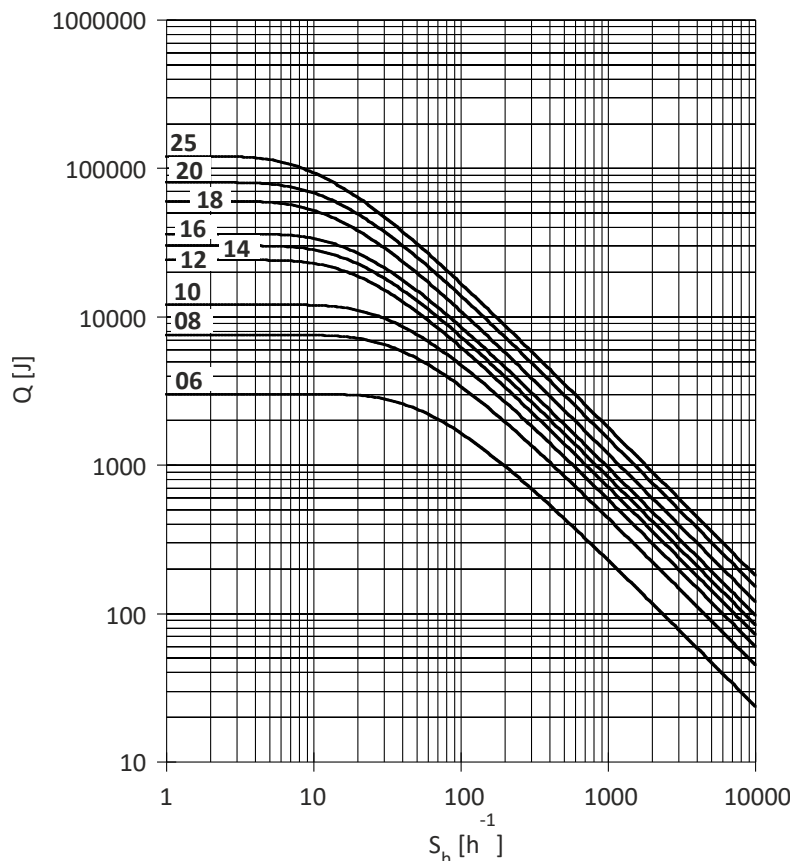
#### Friction linings

The application brakes are designed with low-wear friction linings:

- Long service life
- Short run-in process required
- Higher friction work until the brake is replaced
- Higher maximum switching work

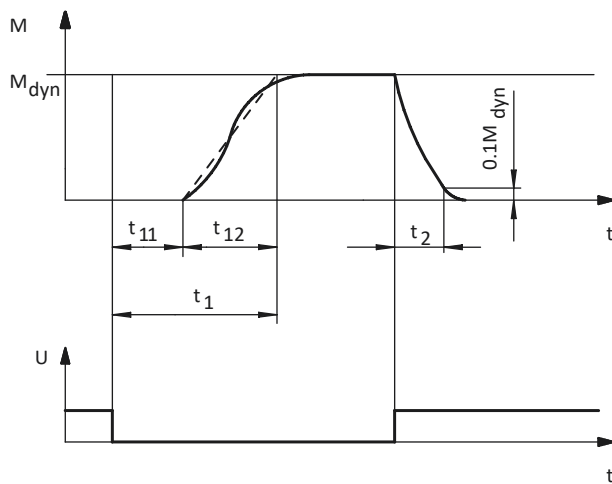


### Permissible friction energy



Q Switching energy per switching cycle  
 $S_h$  Switching rate  
 06 ... 25 Brake size

### Switching times of the spring-applied brakes



|           |                                               |          |                                 |
|-----------|-----------------------------------------------|----------|---------------------------------|
| $t_1$     | Engagement time                               | $t_{11}$ | Delay time during linking       |
| $t_2$     | Disengagement time (up to $M = 0.1 M_{dyn}$ ) | $t_{12}$ | Rise time of the braking torque |
| $M_{dyn}$ | Braking torque at constant speed              | U        | Voltage                         |

# Product extensions

Brakes

Spring-applied application brake



| Versions         | Protection class IP55                                    |
|------------------|----------------------------------------------------------|
|                  | Standard                                                 |
| Control          | DC supply<br>AC supply via rectifier in the terminal box |
| Supply voltages  |                                                          |
| DC voltage       | DC 24 V ±10 %<br>DC 205 V ±10 %                          |
| Mains voltage    | AC 230 V ±10 %<br>AC 400 V ±10 %<br>AC 460 V ±10 %       |
| Switching cycles |                                                          |
| Repetitive       | 1 x 10 <sup>6</sup>                                      |
| Reversing        | 1 x 10 <sup>6</sup>                                      |
| Friction lining  | Low-wear                                                 |
| Options          | Manual release<br>UL/CSA-approved                        |



### Braking torques

An application brake with several braking torques is available for every motor frame size for an optimum adjustment of the brake motor to the application. Starting from a standard braking torque, the braking torques can be adjusted up or down.

When the braking torque is reduced, great wear reserves can be attained. A higher braking torque is to be provided for lifting applications. In this case, the earth's gravity acts as an additional acceleration in a negative direction.

In addition, some applications require a 2-fold safety factor for the braking torque.

### Assignment of braking torques

| Motor        | Adjustable |               |                |                 |           |                   |        |                   |                   |        |  |  |
|--------------|------------|---------------|----------------|-----------------|-----------|-------------------|--------|-------------------|-------------------|--------|--|--|
|              | ABR 08     | ABR 10        | ABR 12         | ABR 14          | ABR 16    | ABR 18            | ABR 20 | ABR 25            | ABR 30            | ABR 40 |  |  |
|              | Nm         | Nm            | Nm             | Nm              | Nm        | Nm                | Nm     | Nm                | Nm                | Nm     |  |  |
| m540-P90/M4  | 4          | 8<br>16<br>20 | 14             |                 |           |                   |        |                   |                   |        |  |  |
| m540-P90/L4  | 8          |               | 32             |                 |           |                   |        |                   |                   |        |  |  |
| m540-P100/M4 |            |               | 14<br>32<br>40 | 38              |           |                   |        |                   |                   |        |  |  |
| m540-P100/L4 |            |               |                |                 |           |                   |        |                   |                   |        |  |  |
| m540-P112/M4 | 20         |               | 38<br>60       |                 |           |                   |        |                   |                   |        |  |  |
| m540-P132/M4 |            |               |                | 63<br>80<br>100 | 80<br>150 |                   |        |                   |                   |        |  |  |
| m540-P132/L4 |            |               |                |                 |           |                   |        |                   |                   |        |  |  |
| m540-P160/M4 |            |               |                |                 |           | 145<br>260        |        |                   |                   |        |  |  |
| m540-P160/L4 |            |               |                |                 |           |                   |        |                   |                   |        |  |  |
| m540-P180/M4 |            |               |                |                 |           | 145<br>260<br>315 |        |                   |                   |        |  |  |
| m540-P180/L4 |            |               |                |                 |           |                   |        |                   |                   |        |  |  |
| m540-P200/M4 |            |               |                |                 |           | 265<br>400        |        | 300<br>400<br>650 | 650<br>750<br>850 |        |  |  |
| m540-P225/M4 |            |               |                |                 |           |                   |        |                   |                   |        |  |  |
| m540-P225/L4 |            |               |                |                 |           |                   |        |                   |                   |        |  |  |
| m540-P250/M4 |            |               |                |                 |           |                   |        |                   |                   |        |  |  |

# Product extensions

Brakes  
Spring-applied application brake



## Rated data, Standard design, IP55

Application brake ABR 08, ABR 10

| Application brake                     |                   | ABR 08 |       | ABR 10 |       |       |
|---------------------------------------|-------------------|--------|-------|--------|-------|-------|
| Braking torque                        | Nm                | 4      | 8     | 8      | 16    | 20    |
| Power input                           | W                 | 25     | 25    | 30     | 30    | 30    |
| Moment of inertia                     | kgcm <sup>2</sup> | 0.61   | 0.61  | 2      | 2     | 2     |
| Braking torque is static              | Nm                | 4      | 8     | 8      | 16    | 20    |
| Min. static braking torque tolerance  | %                 | -25    | -25   | -25    | -25   | -25   |
| Max. static braking torque tolerance  | %                 | 35     | 35    | 35     | 35    | 35    |
| Dynamic braking torque                |                   |        |       |        |       |       |
| 100 rpm                               | Nm                | 4.0    | 8.0   | 8.0    | 16    | 20    |
| 1000 rpm                              | Nm                | 3.6    | 7.2   | 7.0    | 14    | 17    |
| 1200 rpm                              | Nm                | 3.5    | 7.0   | 6.8    | 14    | 17    |
| 1500 rpm                              | Nm                | 3.4    | 6.8   | 6.6    | 13    | 17    |
| 1800 rpm                              | Nm                | 3.3    | 6.7   | 6.5    | 13    | 16    |
| 3000 rpm                              | Nm                | 3.0    | 6.3   | 6.1    | 12    | 15    |
| 3600 rpm                              | Nm                | 3.0    | 6.1   | 5.9    | 12    | 15    |
| Min. dynamic braking torque tolerance | %                 | -25    | -25   | -25    | -25   | -25   |
| Max. dynamic braking torque tolerance | %                 | 35     | 35    | 35     | 35    | 35    |
| Friction energy                       |                   |        |       |        |       |       |
| 100 rpm                               | kJ                | 7.5    | 7.5   | 12     | 12    | 12    |
| 1000 rpm                              | kJ                | 7.5    | 7.5   | 12     | 12    | 12    |
| 1200 rpm                              | kJ                | 7.5    | 7.5   | 12     | 12    | 12    |
| 1500 rpm                              | kJ                | 7.5    | 7.5   | 12     | 12    | 12    |
| 1800 rpm                              | kJ                | 7.5    | 7.5   | 12     | 12    | 12    |
| 3000 rpm                              | kJ                | 7.5    | 7.5   | 12     | 12    | 12    |
| 3600 rpm                              | kJ                | 7.5    | 7.5   | 12     | 12    | 12    |
| Maximum speed - operation             | rpm               | 3600   | 3600  | 3600   | 3600  | 3600  |
| Maximum speed - idle state            | rpm               | 10000  | 10000 | 10000  | 10000 | 10000 |

| Application brake     |    | ABR 08             |                    | ABR 10             |                    |                    |
|-----------------------|----|--------------------|--------------------|--------------------|--------------------|--------------------|
| Braking torque        | Nm | 4                  | 8                  | 8                  | 16                 | 20                 |
| Delay time t11        |    |                    |                    |                    |                    |                    |
| DC voltage            | ms | 30                 | 15                 | 22                 | 28                 | 23                 |
| AC mains voltage      | ms | 30                 | 15                 | 22                 | 28                 | 23                 |
| Rise time t12         |    |                    |                    |                    |                    |                    |
| DC voltage            | ms | 20                 | 16                 | 14                 | 19                 | 15                 |
| AC mains voltage      | ms | 20                 | 16                 | 14                 | 19                 | 15                 |
| Engagement time t1    |    |                    |                    |                    |                    |                    |
| DC voltage            | ms | 50                 | 31                 | 36                 | 47                 | 38                 |
| AC mains voltage      | ms | 50                 | 31                 | 36                 | 47                 | 38                 |
| Disengagement time t2 |    |                    |                    |                    |                    |                    |
| DC voltage            | ms | 30                 | 57                 | 55                 | 76                 | 93                 |
| AC mains voltage      | ms | 30                 | 57                 | 55                 | 76                 | 93                 |
| Friction energy QBW   |    |                    |                    |                    |                    |                    |
| DC voltage            | MJ | 324                | 158                | 405                | 264                | 396                |
| AC mains voltage      | MJ | 324                | 158                | 405                | 264                | 396                |
| Reversing cycles      |    | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> |
| Repetitive cycles     |    | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> |



## Rated data, Standard design, IP55

Application brake ABR 12, ABR 14

| Application brake                     |                   | ABR 12 |       |       | ABR 14 |       |
|---------------------------------------|-------------------|--------|-------|-------|--------|-------|
| Braking torque                        | Nm                | 14     | 32    | 40    | 38     | 60    |
| Power input                           | W                 | 40     | 40    | 40    | 50     | 50    |
| Moment of inertia                     | kgcm <sup>2</sup> | 4.5    | 4.5   | 4.5   | 6.3    | 6.3   |
| Braking torque is static              | Nm                | 14     | 32    | 40    | 38     | 60    |
| Min. static braking torque tolerance  | %                 | -25    | -25   | -25   | -25    | -25   |
| Max. static braking torque tolerance  | %                 | 35     | 35    | 35    | 35     | 35    |
| Dynamic braking torque                |                   |        |       |       |        |       |
| 100 rpm                               | Nm                | 14     | 32    | 40    | 38     | 60    |
| 1000 rpm                              | Nm                | 12     | 27    | 34    | 32     | 51    |
| 1200 rpm                              | Nm                | 12     | 27    | 33    | 31     | 50    |
| 1500 rpm                              | Nm                | 11     | 26    | 32    | 30     | 48    |
| 1800 rpm                              | Nm                | 11     | 26    | 32    | 30     | 47    |
| 3000 rpm                              | Nm                | 10     | 24    | 30    | 28     | 44    |
| 3600 rpm                              | Nm                | 10     | 23    | 29    | -      | -     |
| Min. dynamic braking torque tolerance | %                 | -25    | -25   | -25   | -25    | -25   |
| Max. dynamic braking torque tolerance | %                 | 35     | 35    | 35    | 35     | 35    |
| Friction energy                       |                   |        |       |       |        |       |
| 100 rpm                               | kJ                | 24     | 24    | 24    | 30     | 30    |
| 1000 rpm                              | kJ                | 24     | 24    | 24    | 30     | 30    |
| 1200 rpm                              | kJ                | 24     | 24    | 24    | 30     | 30    |
| 1500 rpm                              | kJ                | 24     | 24    | 24    | 30     | 30    |
| 1800 rpm                              | kJ                | 24     | 24    | 24    | 30     | 30    |
| 3000 rpm                              | kJ                | 24     | 24    | 24    | 18     | 18    |
| 3600 rpm                              | kJ                | 7      | 7     | 7     | -      | -     |
| Maximum speed - operation             | rpm               | 3600   | 3600  | 3600  | 3000   | 3000  |
| Maximum speed - idle state            | rpm               | 10000  | 10000 | 10000 | 10000  | 10000 |

| Application brake     |    | ABR 12             |                    |                    | ABR 14             |                    |
|-----------------------|----|--------------------|--------------------|--------------------|--------------------|--------------------|
| Braking torque        | Nm | 14                 | 32                 | 40                 | 38                 | 60                 |
| Delay time t11        |    |                    |                    |                    |                    |                    |
| DC voltage            | ms | 27                 | 28                 | 24                 | 24                 | 17                 |
| AC mains voltage      | ms | 27                 | 28                 | 24                 | 24                 | 17                 |
| Rise time t12         |    |                    |                    |                    |                    |                    |
| DC voltage            | ms | 19                 | 25                 | 21                 | 36                 | 25                 |
| AC mains voltage      | ms | 19                 | 25                 | 21                 | 36                 | 25                 |
| Engagement time t1    |    |                    |                    |                    |                    |                    |
| DC voltage            | ms | 46                 | 53                 | 45                 | 60                 | 42                 |
| AC mains voltage      | ms | 46                 | 53                 | 45                 | 60                 | 42                 |
| Disengagement time t2 |    |                    |                    |                    |                    |                    |
| DC voltage            | ms | 65                 | 115                | 140                | 140                | 210                |
| AC mains voltage      | ms | 65                 | 115                | 140                | 140                | 210                |
| Friction energy QBW   |    |                    |                    |                    |                    |                    |
| DC voltage            | MJ | 948                | 530                | 948                | 1276               | 571                |
| AC mains voltage      | MJ | 948                | 530                | 948                | 1276               | 571                |
| Reversing cycles      |    | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> |
| Repetitive cycles     |    | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> |

# Product extensions

Brakes  
Spring-applied application brake



## Rated data, Standard design, IP55

Application brake ABR 16, ABR 18

| Application brake                     |                   | ABR 16 |       |       | ABR 18 |       |
|---------------------------------------|-------------------|--------|-------|-------|--------|-------|
| Braking torque                        | Nm                | 63     | 80    | 100   | 80     | 150   |
| Power input                           | W                 | 56     | 56    | 56    | 87     | 87    |
| Moment of inertia                     | kgcm <sup>2</sup> | 15     | 15    | 15    | 29     | 29    |
| Braking torque is static              | Nm                | 63     | 80    | 100   | 80     | 150   |
| Min. static braking torque tolerance  | %                 | -25    | -25   | -25   | -25    | -25   |
| Max. static braking torque tolerance  | %                 | 35     | 35    | 35    | 35     | 35    |
| Dynamic braking torque                |                   |        |       |       |        |       |
| 100 rpm                               | Nm                | 63     | 80    | 100   | 80     | 150   |
| 1000 rpm                              | Nm                | 52     | 66    | 82    | 64     | 121   |
| 1200 rpm                              | Nm                | 50     | 65    | 80    | 62     | 118   |
| 1500 rpm                              | Nm                | 50     | 63    | 79    | 62     | 115   |
| 1800 rpm                              | Nm                | 48     | 61    | 76    | 59     | 112   |
| 3000 rpm                              | Nm                | 45     | 57    | 72    | -      | -     |
| 3600 rpm                              | Nm                | -      | -     | -     | -      | -     |
| Min. dynamic braking torque tolerance | %                 | -25    | -25   | -25   | -25    | -25   |
| Max. dynamic braking torque tolerance | %                 | 35     | 35    | 35    | 35     | 35    |
| Friction energy                       |                   |        |       |       |        |       |
| 100 rpm                               | kJ                | 36     | 36    | 36    | 60     | 60    |
| 1000 rpm                              | kJ                | 36     | 36    | 36    | 60     | 60    |
| 1200 rpm                              | kJ                | 36     | 36    | 36    | 60     | 60    |
| 1500 rpm                              | kJ                | 36     | 36    | 36    | 60     | 60    |
| 1800 rpm                              | kJ                | 36     | 36    | 36    | 36     | 36    |
| 3000 rpm                              | kJ                | 11     | 11    | 11    | -      | -     |
| 3600 rpm                              | kJ                | -      | -     | -     | -      | -     |
| Maximum speed - operation             | rpm               | 3000   | 3000  | 3000  | 1800   | 1800  |
| Maximum speed - idle state            | rpm               | 10000  | 10000 | 10000 | 10000  | 10000 |

| Application brake     |    | ABR 16             |                    |                    | ABR 18             |                    |
|-----------------------|----|--------------------|--------------------|--------------------|--------------------|--------------------|
| Braking torque        | Nm | 63                 | 80                 | 100                | 80                 | 150                |
| Delay time t11        |    |                    |                    |                    |                    |                    |
| DC voltage            | ms | 34                 | 27                 | 24                 | 20                 | 33                 |
| AC mains voltage      | ms | 34                 | 27                 | 24                 | 20                 | 33                 |
| Rise time t12         |    |                    |                    |                    |                    |                    |
| DC voltage            | ms | 38                 | 30                 | 25                 | 20                 | 45                 |
| AC mains voltage      | ms | 38                 | 30                 | 25                 | 20                 | 45                 |
| Engagement time t1    |    |                    |                    |                    |                    |                    |
| DC voltage            | ms | 72                 | 57                 | 49                 | 40                 | 78                 |
| AC mains voltage      | ms | 72                 | 57                 | 49                 | 40                 | 78                 |
| Disengagement time t2 |    |                    |                    |                    |                    |                    |
| DC voltage            | ms | 170                | 220                | 280                | 180                | 270                |
| AC mains voltage      | ms | 170                | 220                | 280                | 180                | 270                |
| Friction energy QBW   |    |                    |                    |                    |                    |                    |
| DC voltage            | MJ | 2310               | 966                | 2310               | 2295               | 1542               |
| AC mains voltage      | MJ | 2310               | 966                | 2310               | 2295               | 1542               |
| Reversing cycles      |    | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> |
| Repetitive cycles     |    | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> |



### Rated data, Standard design, IP55

Application brake ABR 20, ABR 25

| Application brake                     |                   | ABR 20 |       |       | ABR 25 |       |
|---------------------------------------|-------------------|--------|-------|-------|--------|-------|
| Braking torque                        | Nm                | 145    | 260   | 315   | 265    | 400   |
| Power input                           | W                 | 100    | 100   | 100   | 110    | 110   |
| Moment of inertia                     | kgcm <sup>2</sup> | 73     | 73    | 73    | 200    | 200   |
| Braking torque is static              | Nm                | 145    | 260   | 315   | 265    | 400   |
| Min. static braking torque tolerance  | %                 | -25    | -25   | -25   | -25    | -25   |
| Max. static braking torque tolerance  | %                 | 35     | 35    | 35    | 35     | 35    |
| Dynamic braking torque                |                   |        |       |       |        |       |
| 100 rpm                               | Nm                | 145    | 260   | 315   | 265    | 400   |
| 1000 rpm                              | Nm                | 115    | 206   | 249   | 201    | 307   |
| 1200 rpm                              | Nm                | 112    | 201   | 243   | 196    | 300   |
| 1500 rpm                              | Nm                | 109    | 195   | 236   | 194    | 291   |
| 1800 rpm                              | Nm                | -      | -     | -     | -      | -     |
| 3000 rpm                              | Nm                | -      | -     | -     | -      | -     |
| 3600 rpm                              | Nm                | -      | -     | -     | -      | -     |
| Min. dynamic braking torque tolerance | %                 | -25    | -25   | -25   | -25    | -25   |
| Max. dynamic braking torque tolerance | %                 | 35     | 35    | 35    | 35     | 35    |
| Friction energy                       |                   |        |       |       |        |       |
| 100 rpm                               | kJ                | 80     | 80    | 80    | 120    | 120   |
| 1000 rpm                              | kJ                | 80     | 80    | 80    | 120    | 120   |
| 1200 rpm                              | kJ                | 80     | 80    | 80    | 120    | 120   |
| 1500 rpm                              | kJ                | 24     | 24    | 24    | 36     | 36    |
| 1800 rpm                              | kJ                | -      | -     | -     | -      | -     |
| 3000 rpm                              | kJ                | -      | -     | -     | -      | -     |
| 3600 rpm                              | kJ                | -      | -     | -     | -      | -     |
| Maximum speed - operation             | rpm               | 1500   | 1500  | 1500  | 1500   | 1500  |
| Maximum speed - idle state            | rpm               | 10000  | 10000 | 10000 | 10000  | 10000 |

| Application brake     |    | ABR 20             |                    |                    | ABR 25             |                    |
|-----------------------|----|--------------------|--------------------|--------------------|--------------------|--------------------|
| Braking torque        | Nm | 145                | 260                | 315                | 265                | 400                |
| Delay time t11        |    |                    |                    |                    |                    |                    |
| DC voltage            | ms | 72                 | 65                 | 60                 | 155                | 110                |
| AC mains voltage      | ms | 72                 | 65                 | 60                 | 155                | 110                |
| Rise time t12         |    |                    |                    |                    |                    |                    |
| DC voltage            | ms | 108                | 100                | 80                 | 120                | 120                |
| AC mains voltage      | ms | 108                | 100                | 80                 | 120                | 120                |
| Engagement time t1    |    |                    |                    |                    |                    |                    |
| DC voltage            | ms | 180                | 165                | 150                | 275                | 230                |
| AC mains voltage      | ms | 180                | 165                | 150                | 275                | 230                |
| Disengagement time t2 |    |                    |                    |                    |                    |                    |
| DC voltage            | ms | 230                | 340                | 410                | 230                | 390                |
| AC mains voltage      | ms | 230                | 340                | 410                | 230                | 390                |
| Friction energy QBW   |    |                    |                    |                    |                    |                    |
| DC voltage            | MJ | 4680               | 2322               | 3489               | 6480               | 3522               |
| AC mains voltage      | MJ | 4680               | 2322               | 3489               | 6480               | 3522               |
| Reversing cycles      |    | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> |
| Repetitive cycles     |    | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> |

# Product extensions

Brakes  
Spring-applied application brake



## Rated data, Standard design, IP55

Application brake ABR 30, ABR 40

| Application brake        |                   | ABR 30 |     |     | ABR 40 |     |     |
|--------------------------|-------------------|--------|-----|-----|--------|-----|-----|
| Braking torque           | Nm                | 300    | 400 | 650 | 650    | 750 | 850 |
| Power input              | W                 | 140    | 140 | 220 | 140    | 140 | 140 |
| Moment of inertia        | kgcm <sup>2</sup> | 195    | 195 | 195 | 445    | 445 | 445 |
| Braking torque is static | Nm                | 300    | 400 | 650 | 650    | 750 | 850 |
| Dynamic braking torque   |                   |        |     |     |        |     |     |
| 100 rpm                  | Nm                | 300    | 400 | 650 | 650    | 750 | 850 |
| 1000 rpm                 | Nm                | 231    | 308 | 501 | 481    | 555 | 629 |
| 1200 rpm                 | Nm                | 225    | 300 | 488 | 468    | 540 | 612 |
| 1500 rpm                 | Nm                | 219    | 292 | 475 | 455    | 525 | 595 |
| 1800 rpm                 | Nm                | 213    | 284 | 462 | 442    | 510 | 578 |
| 3000 rpm                 | Nm                | 198    | 264 | 429 | 410    | 473 | 536 |
| 3600 rpm                 | Nm                | -      | -   | -   | -      | -   | -   |
| Friction energy          |                   |        |     |     |        |     |     |
| 100 rpm                  | kJ                | 150    | 150 | 150 | 200    | 200 | 200 |
| 1000 rpm                 | kJ                | 150    | 150 | 150 | 200    | 200 | 200 |
| 1200 rpm                 | kJ                | 150    | 150 | 150 | 200    | 200 | 200 |
| 1500 rpm                 | kJ                | 150    | 150 | 150 | 200    | 200 | 200 |
| 1800 rpm                 | kJ                | 150    | 150 | 150 | 200    | 200 | 200 |
| 3000 rpm                 | kJ                | 150    | 150 | 150 | 200    | 200 | 200 |
| 3600 rpm                 | kJ                | -      | -   | -   | -      | -   | -   |

| Application brake     |    | ABR 30             |                    |                    | ABR 40             |                    |                    |
|-----------------------|----|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Braking torque        | Nm | 300                | 400                | 650                | 650                | 750                | 850                |
| Delay time t11        |    |                    |                    |                    |                    |                    |                    |
| DC voltage            |    | -                  | -                  | -                  | -                  | -                  | -                  |
| AC mains voltage      | ms | 120                | 105                | 70                 | 160                | 190                | 190                |
| Rise time t12         |    |                    |                    |                    |                    |                    |                    |
| DC voltage            |    | -                  | -                  | -                  | -                  | -                  | -                  |
| AC mains voltage      | ms | 130                | 130                | 130                | 160                | 160                | 160                |
| Engagement time t1    |    |                    |                    |                    |                    |                    |                    |
| DC voltage            |    | -                  | -                  | -                  | -                  | -                  | -                  |
| AC mains voltage      | ms | 250                | 235                | 200                | 320                | 350                | 350                |
| Disengagement time t2 |    |                    |                    |                    |                    |                    |                    |
| DC voltage            |    | -                  | -                  | -                  | -                  | -                  | -                  |
| AC mains voltage      | ms | 180                | 200                | 250                | 400                | 350                | 350                |
| Friction energy QBW   |    |                    |                    |                    |                    |                    |                    |
| DC voltage            |    | -                  | -                  | -                  | -                  | -                  | -                  |
| AC mains voltage      | MJ | 3700               | 3700               | 3700               | 4000               | 4000               | 4000               |
| Reversing cycles      |    | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> |
| Repetitive cycles     |    | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> | 1x 10 <sup>6</sup> |

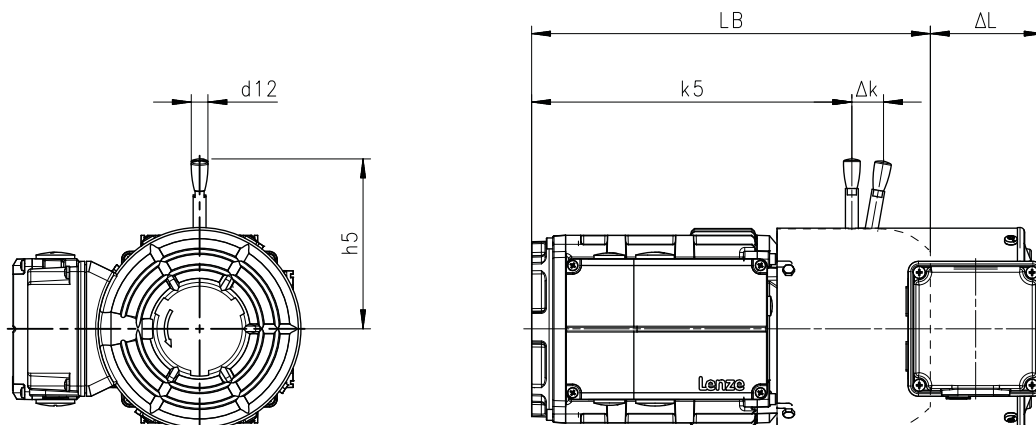


## Product extensions

Brakes  
Spring-applied application brake

### Dimensions of the manual release lever

Standard design, degree of protection IP54/55



8801081\_00

| Motor       |     |    | m540-P |       |       |        |       |        |       |        |       |        |       |        |       |
|-------------|-----|----|--------|-------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|
|             |     |    | 90/L4  |       |       | 100/M4 |       | 112/M4 |       | 132/M4 |       | 160/M4 |       | 160/L4 |       |
|             |     |    |        |       |       | 100/L4 |       |        |       | 132/L4 |       |        |       |        |       |
| Brake       |     |    | ABR08  | ABR10 | ABR12 | ABR10  | ABR12 | ABR12  | ABR14 | ABR16  | ABR18 | ABR18  | ABR20 | ABR18  | ABR20 |
| Gearbox     |     |    |        |       |       |        |       |        |       |        |       |        |       |        |       |
| g500-B8000  | k5  | mm | 308    | 319   | 321   | 354    | 356   | 348    | 352   | 431    | 444   | 461    | 468   | 521    | 528   |
| g500-B13000 | k5  | mm | -      | -     | -     | 353    | 355   | 346    | 350   | 425    | 438   | 454    | 461   | 514    | 521   |
| g500-B20000 | k5  | mm | -      | -     | -     | -      | -     | -      | -     | 312    | 325   | 441    | 448   | 501    | 508   |
| Brake       |     |    |        |       |       |        |       |        |       |        |       |        |       |        |       |
|             | Δ k | mm | 27     | 28    | 37    | 28     | 37    | 37     | 41    | 55     | 59    | 59     | 74    | 59     | 74    |
|             | h5  | mm | 136    | 132   | 161   | 132    | 161   | 161    | 195   | 240    | 279   | 279    | 319   | 279    | 319   |
|             | d12 | mm | 13.0   | 13.0  | 13.0  | 13.0   | 13.0  | 13.0   | 24.0  | 24.0   | 24.0  | 24.0   | 24.0  | 24.0   | 24.0  |

| Motor       |     |    | m540-P |        |        |        |        |        |        |        |        |        |
|-------------|-----|----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|             |     |    | 180/M4 | 180/L4 | 200/M4 |        | 225/M4 |        | 225/L4 |        | 250/M4 |        |
|             |     |    | ABR 20 | ABR 20 | ABR 20 | ABR 25 | ABR 25 | ABR 30 | ABR 25 | ABR 30 | ABR 30 | ABR 40 |
| Gearbox     |     |    |        |        |        |        |        |        |        |        |        |        |
| g500-B8000  | k5  | mm | 515    | 545    | 607    | 617    | 684    | 685    | 744    | 745    | 761    | 761    |
| g500-B13000 | k5  | mm | 509    | 539    | 594    | 604    | 672    | 673    | 732    | 733    | 754    | 754    |
| g500-B20000 | k5  | mm | 495    | 525    | 594    | 604    | 657    | 658    | 717    | 718    | -      | -      |
| Brake       |     |    |        |        |        |        |        |        |        |        |        |        |
|             | Δ k | mm | 74     | 74     | 74     | 103    | 103    | 69     | 103    | 69     | 69     | 65     |
|             | h5  | mm | 319    | 319    | 319    | 445    | 445    | 330    | 445    | 330    | 330    | 377    |
|             | d12 | mm | 24.0   | 24.0   | 24.0   | 24.0   | 24.0   | 24.0   | 24.0   | 24.0   | 24.0   | 24.0   |



## Feedback

### Resolver

The stator-supplied, 2-pole resolver with two stator windings shifted by 90 degrees and a rotor winding with a transformer winding can record both the speed and the rotor position, just like a single-turn absolute value encoder. The rotor position can be determined within one mechanical motor revolution after a voltage failure.

| Feedback type                          |                     |            | Resolver     |
|----------------------------------------|---------------------|------------|--------------|
| Feedback                               |                     |            | RS1          |
| Speed-dependent safety functions       |                     |            | nein         |
| Design                                 |                     |            | Mounting     |
| Resolution - angle                     |                     | '          | 0.8          |
| Min. accuracy                          |                     | '          | -10          |
| Max. accuracy                          |                     | '          | 10           |
| Absolute positioning                   |                     |            | 1 revolution |
| Max. speed                             | $n_{\max}$          | rpm        | 8000         |
| Max. DC input voltage                  | $V_{\text{in,max}}$ | V          | 10           |
| Max. input frequency                   | $f_{\text{in,max}}$ | kHz        | 4            |
| Ratio stator/rotor                     |                     |            | 0.3          |
| Min ratio tolerance                    |                     | %          | -5           |
| Max ratio tolerance                    |                     | %          | 5            |
| Rotor impedance                        | $Z_{\text{ro}}$     | $\Omega$   | 51+j90       |
| Stator impedance                       | $Z_{\text{so}}$     | $\Omega$   | 102+j150     |
| Impedance                              | $Z_{\text{rs}}$     | $\Omega$   | 44+j76       |
| Min. insulation resistance at DC 500 V | $R_{\text{min}}$    | M $\Omega$ | 10           |
| Number of pole pairs                   |                     |            | 1            |
| Max. angle error Min                   |                     | '          | -10          |
| Max. angle error Max                   |                     | '          | 10           |

### Incremental encoder

Incremental encoders can be used for speed measurement. Homing is required in order to enable positioning later.

#### Incremental HTL encoder

| Feedback type            |                     |     | Encoder             |                     |                     |
|--------------------------|---------------------|-----|---------------------|---------------------|---------------------|
| Feedback                 |                     |     | IG512-24V-H         | IG1024-24V-H        | IG2048-24V-H        |
| Design                   |                     |     | Mounting            | Mounting            | Mounting            |
| Pulses                   |                     |     | 512                 | 1024                | 2048                |
| Output signals           |                     |     | HTL                 | HTL                 | HTL                 |
| Interfaces               |                     |     | A, B; N; Ai, Bi; Ni | A, B; N; Ai, Bi; Ni | A, B; N; Ai, Bi; Ni |
| Absolute revolution      |                     |     | 0                   | 0                   | 0                   |
| Min. accuracy            |                     | '   | -2                  | -2                  | -2                  |
| Max. accuracy            |                     | '   | 2                   | 2                   | 2                   |
| Min. DC input voltage    | $V_{\text{in,min}}$ | V   | 8                   | 8                   | 8                   |
| Max. DC input voltage    | $V_{\text{in,max}}$ | V   | 30                  | 30                  | 30                  |
| Max. current consumption | $I_{\text{max}}$    | A   | 0.15                | 0.15                | 0.15                |
| Limit frequency          | $f_{\text{max}}$    | kHz | 160                 | 160                 | 160                 |



## Blower

The motor is optionally available with a blower for operation with the rated torque and low motor speeds or a higher switching frequency.

The blower cools the motor independent of the motor speed.

If a blower is used, the torque does not have to be reduced if operated below 20 Hz.



A higher powered motor with simultaneous derating can be used in many cases instead of a blower.

Torque reduction at low motor frequencies ► [General information](#) 24

## Standard version

| Motor series     |                    |    | m540-P |         |       |       |         |       |       |         |       |
|------------------|--------------------|----|--------|---------|-------|-------|---------|-------|-------|---------|-------|
| Size             |                    |    | 090    |         |       | 100   |         |       | 112   |         |       |
| Number of phases |                    |    | 1      | 3       | 3     | 1     | 3       | 3     | 1     | 3       | 3     |
|                  |                    |    | -      | Dreieck | Stern | -     | Dreieck | Stern | -     | Dreieck | Stern |
| Rated voltage    | V <sub>rated</sub> | V  | 230    | 230     | 400   | 230   | 230     | 400   | 230   | 230     | 400   |
| Rated power      | P <sub>rated</sub> | kW | 0.065  | 0.091   | 0.091 | 0.075 | 0.091   | 0.091 | 0.094 | 0.1     | 0.1   |
| Rated current    | I <sub>rated</sub> | A  | 0.29   | 0.38    | 0.22  | 0.3   | 0.37    | 0.22  | 0.37  | 0.35    | 0.2   |

| Motor series     |                    |    | m540-P |         |       |      |         |       |      |         |       |
|------------------|--------------------|----|--------|---------|-------|------|---------|-------|------|---------|-------|
| Size             |                    |    | 132    |         |       | 160  |         |       | 180  |         |       |
| Number of phases |                    |    | 1      | 3       | 3     | 1    | 3       | 3     | 1    | 3       | 3     |
|                  |                    |    | -      | Dreieck | Stern | -    | Dreieck | Stern | -    | Dreieck | Stern |
| Rated voltage    | V <sub>rated</sub> | V  | 230    | 230     | 400   | 230  | 230     | 400   | 230  | 230     | 400   |
| Rated power      | P <sub>rated</sub> | kW | 0.15   | 0.15    | 0.15  | 0.25 | 0.36    | 0.36  | 0.23 | 0.22    | 0.22  |
| Rated current    | I <sub>rated</sub> | A  | 0.57   | 0.58    | 0.33  | 0.97 | 0.93    | 0.56  | 0.93 | 0.71    | 0.4   |

| Motor series     |                    |    | m540-P |         |       |         |       |         |       |   |
|------------------|--------------------|----|--------|---------|-------|---------|-------|---------|-------|---|
| Size             |                    |    | 200    |         |       | 225     |       | 250     |       |   |
| Number of phases |                    |    | 1      | 3       | 3     | 3       | 3     | 3       | 3     | 3 |
|                  |                    |    | -      | Dreieck | Stern | Dreieck | Stern | Dreieck | Stern |   |
| Rated voltage    | V <sub>rated</sub> | V  | 230    | 230     | 400   | 230     | 400   | 230     | 400   |   |
| Rated power      | P <sub>rated</sub> | kW | 0.23   | 0.22    | 0.22  | 0.45    | 0.45  | 0.45    | 0.45  |   |
| Rated current    | I <sub>rated</sub> | A  | 0.93   | 0.85    | 0.51  | 2       | 1.15  | 2       | 1.15  |   |



## Temperature monitoring

### PTC thermistor

The PTC thermistor is operated in conjunction with a tripping unit. If the motor becomes too hot, the motor can be switched off with the aid of a contactor. In contrast to the thermal contact, a quick restart is possible.

#### Motor m540-P90

| Functional principle       |  |    | Sprunghafte Widerstandsänderung |
|----------------------------|--|----|---------------------------------|
| Operating temperature      |  | °C | 155                             |
| Min. switching temperature |  | °C | -5                              |
| Max. switching temperature |  | °C | 5                               |
| Temperature                |  | °C | -20                             |
| Rated resistance           |  |    |                                 |
| 155 °C                     |  |    | 1330                            |
| 140 °C                     |  |    | 550                             |
| -20 °C                     |  |    | 100                             |

#### Motor m540-P100 ... P250

| Functional principle       |  |    | Sprunghafte Widerstandsänderung |
|----------------------------|--|----|---------------------------------|
| Operating temperature      |  | °C | 155                             |
| Min. switching temperature |  | °C | -5                              |
| Max. switching temperature |  | °C | 5                               |
| Temperature                |  | °C | 140                             |
| Rated resistance           |  |    |                                 |
| 155 °C                     |  |    | 3990                            |
| 140 °C                     |  |    | 1650                            |
| -20 °C                     |  |    | 300                             |



## Product codes

### Gearbox product code

| Example              |                                              | G | 50 | A      | B | 045 | M | H | B | R | 2 | C           | 1A                                 |
|----------------------|----------------------------------------------|---|----|--------|---|-----|---|---|---|---|---|-------------|------------------------------------|
| Product type         | Gearboxes                                    | G |    |        |   |     |   |   |   |   |   |             |                                    |
| Product family       |                                              |   | 50 |        |   |     |   |   |   |   |   |             |                                    |
| Generation           |                                              |   |    | A<br>B |   |     |   |   |   |   |   |             |                                    |
| Gearbox type         | Bevel gearbox                                |   |    |        | B |     |   |   |   |   |   |             |                                    |
| Output torque        | 45 Nm                                        |   |    |        |   | 045 |   |   |   |   |   |             |                                    |
|                      | 110 Nm                                       |   |    |        |   | 111 |   |   |   |   |   |             |                                    |
|                      | 240 Nm                                       |   |    |        |   | 124 |   |   |   |   |   |             |                                    |
|                      | 450 Nm                                       |   |    |        |   | 145 |   |   |   |   |   |             |                                    |
|                      | 600 Nm                                       |   |    |        |   | 160 |   |   |   |   |   |             |                                    |
|                      | 820 Nm                                       |   |    |        |   | 182 |   |   |   |   |   |             |                                    |
|                      | 1500 Nm                                      |   |    |        |   | 215 |   |   |   |   |   |             |                                    |
|                      | 2700 Nm                                      |   |    |        |   | 227 |   |   |   |   |   |             |                                    |
|                      | 4300 Nm                                      |   |    |        |   | 243 |   |   |   |   |   |             |                                    |
|                      | 8000 Nm                                      |   |    |        |   | 280 |   |   |   |   |   |             |                                    |
|                      | 13000 Nm                                     |   |    |        |   | 313 |   |   |   |   |   |             |                                    |
|                      | 20000 Nm                                     |   |    |        |   | 320 |   |   |   |   |   |             |                                    |
| Type of construction | Geared motor                                 |   |    |        |   |     | M |   |   |   |   |             |                                    |
|                      | Gearboxes                                    |   |    |        |   |     | N |   |   |   |   |             |                                    |
| Shaft type           | Solid shaft with featherkey                  |   |    |        |   |     |   | V |   |   |   |             |                                    |
|                      | Hollow shaft with keyway                     |   |    |        |   |     |   | H |   |   |   |             |                                    |
|                      | Hollow shaft with shrink disc                |   |    |        |   |     |   | S |   |   |   |             |                                    |
| Housing type         | Foot mounting + centering                    |   |    |        |   |     |   |   | A |   |   |             |                                    |
|                      | Foot mounting                                |   |    |        |   |     |   |   | B |   |   |             |                                    |
|                      | With centering                               |   |    |        |   |     |   |   | C |   |   |             |                                    |
|                      | Threaded pitch circle                        |   |    |        |   |     |   |   | D |   |   |             |                                    |
| Flange mounting      | Without flange                               |   |    |        |   |     |   |   |   | R |   |             |                                    |
|                      | Flange with through holes                    |   |    |        |   |     |   |   |   | K |   |             |                                    |
| Number of stages     | 2-stage                                      |   |    |        |   |     |   |   |   |   | 2 |             |                                    |
|                      | 3-stage                                      |   |    |        |   |     |   |   |   |   | 3 |             |                                    |
|                      | 4-stage                                      |   |    |        |   |     |   |   |   |   | 4 |             |                                    |
| Motor mounting       | Integrated motor                             |   |    |        |   |     |   |   |   |   |   | C           |                                    |
|                      | IEC adapter with jaw coupling                |   |    |        |   |     |   |   |   |   |   | N<br>T      |                                    |
|                      | IEC adapter with plug-in hollow shaft        |   |    |        |   |     |   |   |   |   |   | H           |                                    |
|                      | NEMA adapter with jaw coupling               |   |    |        |   |     |   |   |   |   |   | A           |                                    |
|                      | NEMA adapter with plug-in hollow shaft       |   |    |        |   |     |   |   |   |   |   | B           |                                    |
|                      | Servomotor adapter with plug-in hollow shaft |   |    |        |   |     |   |   |   |   |   | S           |                                    |
|                      | Servomotor adapter with jaw coupling         |   |    |        |   |     |   |   |   |   |   | E<br>D<br>G |                                    |
| Drive size           |                                              |   |    |        |   |     |   |   |   |   |   |             | 1A<br>...<br>□H<br>08<br>...<br>82 |



## Motor product code

| Example          |                      | M | 54 | A | P | 090                                                         | M | 04 | 5 | E | 0 | 0 | C | C |
|------------------|----------------------|---|----|---|---|-------------------------------------------------------------|---|----|---|---|---|---|---|---|
| Product type     | Motor                | M |    |   |   |                                                             |   |    |   |   |   |   |   |   |
| Product family   |                      |   | 54 |   |   |                                                             |   |    |   |   |   |   |   |   |
| Version          |                      |   |    | A |   |                                                             |   |    |   |   |   |   |   |   |
| Efficiency class | IE3                  |   |    |   | P |                                                             |   |    |   |   |   |   |   |   |
| Size             |                      |   |    |   |   | 090<br>100<br>112<br>132<br>160<br>180<br>200<br>225<br>250 |   |    |   |   |   |   |   |   |
| Overall length   | Medium               |   |    |   |   |                                                             | M |    |   |   |   |   |   |   |
|                  | Long                 |   |    |   |   |                                                             | L |    |   |   |   |   |   |   |
| Number of poles  | 4-pole               |   |    |   |   |                                                             |   | 04 |   |   |   |   |   |   |
| Protection class | IP55                 |   |    |   |   |                                                             |   |    | 5 |   |   |   |   |   |
|                  | IP65                 |   |    |   |   |                                                             |   |    | 6 |   |   |   |   |   |
| Cooling          | Self-ventilation     |   |    |   |   |                                                             |   |    |   | E |   |   |   |   |
|                  | Forced ventilation   |   |    |   |   |                                                             |   |    |   | F |   |   |   |   |
| Brake            | Without              |   |    |   |   |                                                             |   |    |   |   | 0 |   |   |   |
|                  | Spring-applied brake |   |    |   |   |                                                             |   |    |   |   | F |   |   |   |
| Feedback         | Without              |   |    |   |   |                                                             |   |    |   |   |   | 0 |   |   |
|                  | Incremental encoder  |   |    |   |   |                                                             |   |    |   |   |   | E |   |   |
| Approvals        | None                 |   |    |   |   |                                                             |   |    |   |   |   |   | N |   |
|                  | CE                   |   |    |   |   |                                                             |   |    |   |   |   |   | C |   |
|                  | CE, cURus            |   |    |   |   |                                                             |   |    |   |   |   |   | U |   |
| Design types     | Internal key         |   |    |   |   |                                                             |   |    |   |   |   |   |   | C |



# Motor data

Rated data  
Rated data 50 Hz

## Motor data

### Rated data

### Rated data 50 Hz

| Motor                |                 |                   | m540-P |        |        |        |        |
|----------------------|-----------------|-------------------|--------|--------|--------|--------|--------|
|                      |                 |                   | 90/L4  | 100/M4 | 100/L4 | 112/M4 | 132/M4 |
| Rated power          | $P_{rated}$     | kW                | 1.5    | 2.2    | 3      | 4      | 5.5    |
| Rated speed          | $n_{rated}$     | rpm               | 1445   | 1465   | 1460   | 1460   | 1470   |
| Max. speed           | $n_{max}$       | rpm               | 3600   | 3600   | 3600   | 3600   | 3600   |
| Rated voltage        |                 |                   |        |        |        |        |        |
| Delta                | V               | V                 | 230    | 230    | 230    | 230    | 230    |
| Star                 | $V_{N, Y}$      | V                 | 400    | 400    | 400    | 400    | 400    |
| Rated current        |                 |                   |        |        |        |        |        |
| 230 V                | $I_{N, \Delta}$ | A                 | 5.50   | 7.60   | 10.2   | 13.7   | 18.7   |
| 400 V                | $I_{N, Y}$      | A                 | 3.15   | 4.40   | 5.90   | 7.90   | 10.8   |
| Starting current     | $I_a$           | A                 | 22.7   | 37.0   | 49.0   | 56.1   | 92.9   |
| Rated torque         | $M_{rated}$     | Nm                | 9.91   | 14.3   | 19.6   | 26.2   | 35.7   |
| Starting torque      | $M_a$           | Nm                | 26.8   | 45.8   | 49.0   | 62.9   | 104    |
| Stalling torque      | $M_b$           | Nm                | 35.7   | 62.9   | 76.4   | 96.9   | 132    |
| Power factor         | $\cos \phi$     |                   | 0.8    | 0.83   | 0.83   | 0.82   | 0.82   |
| Efficiency           |                 |                   |        |        |        |        |        |
| at 50 % $P_{rated}$  | $\eta$          |                   | 0.849  | 0.859  | 0.879  | 0.886  | 0.894  |
| at 75 % $P_{rated}$  | $\eta$          |                   | 0.859  | 0.870  | 0.885  | 0.892  | 0.900  |
| at 100 % $P_{rated}$ | $\eta$          |                   | 0.853  | 0.867  | 0.877  | 0.886  | 0.896  |
| Moment of inertia    | J               | kgcm <sup>2</sup> | 49.0   | 140    | 140    | 170    | 340    |
| Weight               | m               | kg                | 15.0   | 29.0   | 29.0   | 29.0   | 57.0   |

# Motor data

Rated data

Rated data 50 Hz



| Motor                |                 |                   | m540-P |        |        |        |        |
|----------------------|-----------------|-------------------|--------|--------|--------|--------|--------|
|                      |                 |                   | 132/L4 | 160/M4 | 160/L4 | 180/M4 | 180/L4 |
| Rated power          | $P_{rated}$     | kW                | 7.5    | 11     | 15     | 18.5   | 22     |
| Rated speed          | $n_{rated}$     | rpm               | 1465   | 1475   | 1475   | 1470   | 1470   |
| Max. speed           | $n_{max}$       | rpm               | 3600   | 3600   | 3600   | 3600   | 3600   |
| Rated voltage        |                 |                   |        |        |        |        |        |
| Delta                |                 | V                 | 230    | 230    | 230    | 230    | 230    |
| Star                 | $V_{N, Y}$      | V                 | 400    | 400    | 400    | 400    | 400    |
| Rated current        |                 |                   |        |        |        |        |        |
| 230 V                | $I_{N, \Delta}$ | A                 | 24.8   | 35.5   | 49.4   | 60.5   | 71.0   |
| 400 V                | $I_{N, Y}$      | A                 | 14.3   | 20.5   | 28.5   | 35.0   | 41.0   |
| Starting current     | $I_a$           | A                 | 117    | 156    | 242    | 252    | 279    |
| Rated torque         | $M_{rated}$     | Nm                | 48.9   | 71.2   | 97.1   | 120    | 143    |
| Starting torque      | $M_a$           | Nm                | 127    | 185    | 243    | 301    | 329    |
| Stalling torque      | $M_b$           | Nm                | 181    | 242    | 369    | 397    | 472    |
| Power factor         | $\cos \phi$     |                   | 0.84   | 0.84   | 0.82   | 0.82   | 0.83   |
| Efficiency           |                 |                   |        |        |        |        |        |
| at 50 % $P_{rated}$  | $\eta$          |                   | 0.908  | 0.912  | 0.915  | 0.930  | 0.936  |
| at 75 % $P_{rated}$  | $\eta$          |                   | 0.911  | 0.918  | 0.923  | 0.931  | 0.936  |
| at 100 % $P_{rated}$ | $\eta$          |                   | 0.904  | 0.914  | 0.921  | 0.926  | 0.930  |
| Moment of inertia    | J               | kgcm <sup>2</sup> | 460    | 830    | 990    | 1300   | 1400   |
| Weight               | m               | kg                | 57.0   | 73.0   | 90.0   | 165    | 170    |

| Motor                |                 |                   | m540-P |        |        |         |
|----------------------|-----------------|-------------------|--------|--------|--------|---------|
|                      |                 |                   | 200/M4 | 225/M4 | 225/L4 | 250/M4  |
| Rated power          | $P_{rated}$     | kW                | 30     | 37     | 45     | 55      |
| Rated speed          | $n_{rated}$     | rpm               | 1470   | 1478   | 1478   | 1482    |
| Max. speed           | $n_{max}$       | rpm               | 3600   | 3600   | 3600   | 3600    |
| Rated voltage        |                 |                   |        |        |        |         |
| Delta                |                 | V                 | 230    | 230    | 230    | 230     |
| Star                 | $V_{N, Y}$      | V                 | 400    | 400    | 400    | 400     |
| Rated current        |                 |                   |        |        |        |         |
| 230 V                | $I_{N, \Delta}$ | A                 | 95.5   | 115    | 139    | 167     |
| 400 V                | $I_{N, Y}$      | A                 | 55.0   | 66.0   | 80.0   | 96.0    |
| Starting current     | $I_a$           | A                 | 402    | 422    | 512    | 653     |
| Rated torque         | $M_{rated}$     | Nm                | 195    | 239    | 291    | 354     |
| Starting torque      | $M_a$           | Nm                | 507    | 598    | 757    | 885     |
| Stalling torque      | $M_b$           | Nm                | 604    | 646    | 786    | 1.03e+3 |
| Power factor         | $\cos \phi$     |                   | 0.84   | 0.86   | 0.86   | 0.87    |
| Efficiency           |                 |                   |        |        |        |         |
| at 50 % $P_{rated}$  | $\eta$          |                   | 0.942  | 0.944  | 0.951  | 0.950   |
| at 75 % $P_{rated}$  | $\eta$          |                   | 0.942  | 0.945  | 0.949  | 0.951   |
| at 100 % $P_{rated}$ | $\eta$          |                   | 0.936  | 0.939  | 0.942  | 0.946   |
| Moment of inertia    | J               | kgcm <sup>2</sup> | 2200   | 4200   | 4700   | 8500    |
| Weight               | m               | kg                | 240    | 285    | 320    | 420     |



# Motor data

Rated data  
Rated data 60 Hz

## Rated data 60 Hz

| Motor                |             |                   | m540-P |        |        |        |        |
|----------------------|-------------|-------------------|--------|--------|--------|--------|--------|
|                      |             |                   | 90/L4  | 100/M4 | 100/L4 | 112/M4 | 132/M4 |
| Rated power          | $P_{rated}$ | kW                | 1.5    | 2.2    | 3      | 3.7    | 5.5    |
| Rated speed          | $n_{rated}$ | rpm               | 1755   | 1770   | 1760   | 1770   | 1775   |
| Max. speed           | $n_{max}$   | rpm               | 3600   | 3600   | 3600   | 3600   | 3600   |
| Rated voltage        |             |                   |        |        |        |        |        |
| Star                 | $V_{N, Y}$  | V                 | 460    | 460    | 460    | 460    | 460    |
| Rated current        |             |                   |        |        |        |        |        |
| 460 V                | $I_{N, Y}$  | A                 | 2.85   | 3.80   | 5.10   | 6.50   | 9.30   |
| Starting current     | $I_a$       | A                 | 23.9   | 36.5   | 48.5   | 53.3   | 90.2   |
| Rated torque         | $M_{rated}$ | Nm                | 8.16   | 11.9   | 16.3   | 20.0   | 29.6   |
| Starting torque      | $M_a$       | Nm                | 24.5   | 41.7   | 50.5   | 58.0   | 115    |
| Stalling torque      | $M_b$       | Nm                | 35.1   | 60.7   | 75.0   | 86.0   | 133    |
| Power factor         | $\cos \phi$ |                   | 0.77   | 0.81   | 0.82   | 0.8    | 0.81   |
| Efficiency           |             |                   |        |        |        |        |        |
| at 50 % $P_{rated}$  | $\eta$      |                   | 0.846  | 0.872  | 0.883  | 0.877  | 0.905  |
| at 75 % $P_{rated}$  | $\eta$      |                   | 0.864  | 0.892  | 0.895  | 0.894  | 0.916  |
| at 100 % $P_{rated}$ | $\eta$      |                   | 0.865  | 0.895  | 0.895  | 0.895  | 0.917  |
| Moment of inertia    | J           | kgcm <sup>2</sup> | 49.0   | 140    | 140    | 170    | 340    |
| Weight               | m           | kg                | 15.0   | 29.0   | 29.0   | 29.0   | 57.0   |

| Motor                |             |                   | m540-P |        |        |        |        |
|----------------------|-------------|-------------------|--------|--------|--------|--------|--------|
|                      |             |                   | 132/L4 | 160/M4 | 160/L4 | 180/M4 | 180/L4 |
| Rated power          | $P_{rated}$ | kW                | 7.5    | 11     | 15     | 18.5   | 22     |
| Rated speed          | $n_{rated}$ | rpm               | 1770   | 1775   | 1780   | 1775   | 1775   |
| Max. speed           | $n_{max}$   | rpm               | 3600   | 3600   | 3600   | 3600   | 3600   |
| Rated voltage        |             |                   |        |        |        |        |        |
| Star                 | $V_{N, Y}$  | V                 | 460    | 460    | 460    | 460    | 460    |
| Rated current        |             |                   |        |        |        |        |        |
| 460 V                | $I_{N, Y}$  | A                 | 12.4   | 18.0   | 25.0   | 30.5   | 36.5   |
| Starting current     | $I_a$       | A                 | 119    | 160    | 238    | 238    | 281    |
| Rated torque         | $M_{rated}$ | Nm                | 40.5   | 59.2   | 80.5   | 99.5   | 118    |
| Starting torque      | $M_a$       | Nm                | 109    | 178    | 234    | 269    | 332    |
| Stalling torque      | $M_b$       | Nm                | 170    | 225    | 346    | 358    | 438    |
| Power factor         | $\cos \phi$ |                   | 0.83   | 0.83   | 0.81   | 0.81   | 0.81   |
| Efficiency           |             |                   |        |        |        |        |        |
| at 50 % $P_{rated}$  | $\eta$      |                   | 0.910  | 0.911  | 0.914  | 0.931  | 0.933  |
| at 75 % $P_{rated}$  | $\eta$      |                   | 0.918  | 0.923  | 0.928  | 0.937  | 0.938  |
| at 100 % $P_{rated}$ | $\eta$      |                   | 0.917  | 0.924  | 0.930  | 0.936  | 0.936  |
| Moment of inertia    | J           | kgcm <sup>2</sup> | 460    | 830    | 990    | 1300   | 1400   |
| Weight               | m           | kg                | 57.0   | 73.0   | 90.0   | 165    | 170    |

# Motor data

Rated data

Rated data 60 Hz



| Motor                |             |                   | m540-P |        |        |        |
|----------------------|-------------|-------------------|--------|--------|--------|--------|
|                      |             |                   | 200/M4 | 225/M4 | 225/L4 | 250/M4 |
| Rated power          | $P_{rated}$ | kW                | 30     | 37     | 45     | 55     |
| Rated speed          | $n_{rated}$ | rpm               | 1778   | 1782   | 1782   | 1786   |
| Max. speed           | $n_{max}$   | rpm               | 3600   | 3600   | 3600   | 3600   |
| Rated voltage        |             |                   |        |        |        |        |
| Star                 | $V_{N, Y}$  | V                 | 460    | 460    | 460    | 460    |
| Rated current        |             |                   |        |        |        |        |
| 460 V                | $I_{N, Y}$  | A                 | 48.0   | 58.0   | 71.0   | 84.0   |
| Starting current     | $I_a$       | A                 | 389    | 435    | 511    | 638    |
| Rated torque         | $M_{rated}$ | Nm                | 161    | 198    | 241    | 294    |
| Starting torque      | $M_a$       | Nm                | 483    | 555    | 699    | 823    |
| Stalling torque      | $M_b$       | Nm                | 564    | 595    | 723    | 941    |
| Power factor         | $\cos \phi$ |                   | 0.83   | 0.85   | 0.84   | 0.86   |
| Efficiency           |             |                   |        |        |        |        |
| at 50 % $P_{rated}$  | $\eta$      |                   | 0.938  | 0.942  | 0.949  | 0.951  |
| at 75 % $P_{rated}$  | $\eta$      |                   | 0.943  | 0.947  | 0.953  | 0.956  |
| at 100 % $P_{rated}$ | $\eta$      |                   | 0.941  | 0.945  | 0.950  | 0.954  |
| Moment of inertia    | J           | kgcm <sup>2</sup> | 2200   | 4200   | 4700   | 8500   |
| Weight               | m           | kg                | 240    | 285    | 320    | 420    |



# Motor data

Rated data  
Rated data 87 Hz

## Rated data 87 Hz

| Motor                       |                    |                   | m540-P |        |        |        |        |
|-----------------------------|--------------------|-------------------|--------|--------|--------|--------|--------|
|                             |                    |                   | 90/L4  | 100/M4 | 100/L4 | 112/M4 | 132/M4 |
| Rated power                 | $P_{\text{rated}}$ | kW                | 2.6    | 3.9    | 5.2    | 7.35   | 9.6    |
| Rated speed                 | $n_{\text{rated}}$ | rpm               | 2555   | 2575   | 2570   | 2570   | 2580   |
| Max. speed                  | $n_{\text{max}}$   | rpm               | 3600   | 3600   | 3600   | 3600   | 3600   |
| Max. torque                 | $M_{\text{max}}$   | Nm                | 35.5   | 62.5   | 75.9   | 96.4   | 130    |
| Rated voltage               |                    |                   |        |        |        |        |        |
| Delta                       | $V_{N, \Delta}$    | V                 | 400    | 400    | 400    | 400    | 400    |
| Rated current               |                    |                   |        |        |        |        |        |
| 400 V                       | $I_{N, \Delta}$    | A                 | 5.80   | 8.00   | 10.7   | 14.4   | 19.6   |
| Rated torque                | $M_{\text{rated}}$ | Nm                | 9.91   | 14.3   | 19.6   | 26.2   | 35.7   |
| Power factor                | $\cos \phi$        |                   | 0.76   | 0.82   | 0.82   | 0.81   | 0.81   |
| Efficiency                  |                    |                   |        |        |        |        |        |
| at 50 % $P_{\text{rated}}$  | $\eta$             |                   | 0.870  | 0.888  | 0.887  | 0.892  | 0.910  |
| at 75 % $P_{\text{rated}}$  | $\eta$             |                   | 0.880  | 0.898  | 0.897  | 0.902  | 0.920  |
| at 100 % $P_{\text{rated}}$ | $\eta$             |                   | 0.880  | 0.898  | 0.897  | 0.902  | 0.920  |
| Moment of inertia           | J                  | kgcm <sup>2</sup> | 49.0   | 140    | 140    | 170    | 340    |
| Weight                      | m                  | kg                | 15.0   | 29.0   | 29.0   | 29.0   | 57.0   |

| Motor                       |                    |                   | m540-P |        |        |        |        |
|-----------------------------|--------------------|-------------------|--------|--------|--------|--------|--------|
|                             |                    |                   | 132/L4 | 160/M4 | 160/L4 | 180/M4 | 180/L4 |
| Rated power                 | $P_{\text{rated}}$ | kW                | 13.1   | 19.2   | 26.3   | 32.2   | 38.5   |
| Rated speed                 | $n_{\text{rated}}$ | rpm               | 2575   | 2585   | 2585   | 2580   | 2580   |
| Max. speed                  | $n_{\text{max}}$   | rpm               | 3600   | 3600   | 3600   | 3600   | 3600   |
| Max. torque                 | $M_{\text{max}}$   | Nm                | 181    | 226    | 364    | 392    | 468    |
| Rated voltage               |                    |                   |        |        |        |        |        |
| Delta                       | $V_{N, \Delta}$    | V                 | 400    | 400    | 400    | 400    | 400    |
| Rated current               |                    |                   |        |        |        |        |        |
| 400 V                       | $I_{N, \Delta}$    | A                 | 26.0   | 36.6   | 50.9   | 62.3   | 73.1   |
| Rated torque                | $M_{\text{rated}}$ | Nm                | 48.9   | 71.2   | 97.1   | 120    | 143    |
| Power factor                | $\cos \phi$        |                   | 0.84   | 0.82   | 0.8    | 0.79   | 0.82   |
| Efficiency                  |                    |                   |        |        |        |        |        |
| at 50 % $P_{\text{rated}}$  | $\eta$             |                   | 0.909  | 0.913  | 0.915  | 0.921  | 0.923  |
| at 75 % $P_{\text{rated}}$  | $\eta$             |                   | 0.919  | 0.923  | 0.925  | 0.936  | 0.938  |
| at 100 % $P_{\text{rated}}$ | $\eta$             |                   | 0.919  | 0.923  | 0.925  | 0.936  | 0.938  |
| Moment of inertia           | J                  | kgcm <sup>2</sup> | 460    | 830    | 990    | 1300   | 1400   |
| Weight                      | m                  | kg                | 57.0   | 73.0   | 90.0   | 165    | 170    |

# Motor data

Rated data

Rated data 87 Hz



| Motor                |                 |                   | m540-P |        |        |        |
|----------------------|-----------------|-------------------|--------|--------|--------|--------|
|                      |                 |                   | 200/M4 | 225/M4 | 225/L4 | 250/M4 |
| Rated power          | $P_{rated}$     | kW                | 52.5   | 64.8   | 78.7   | 87     |
| Rated speed          | $n_{rated}$     | rpm               | 2580   | 2588   | 2588   | 2598   |
| Max. speed           | $n_{max}$       | rpm               | 3600   | 3600   | 3600   | 3600   |
| Max. torque          | $M_{max}$       | Nm                | 604    | 645    | 786    | 1020   |
| Rated voltage        |                 |                   |        |        |        |        |
| Delta                | $V_{N, \Delta}$ | V                 | 400    | 400    | 400    | 400    |
| Rated current        |                 |                   |        |        |        |        |
| 400 V                | $I_{N, \Delta}$ | A                 | 98.4   | 119    | 143    | 154    |
| Rated torque         | $M_{rated}$     | Nm                | 195    | 239    | 291    | 320    |
| Power factor         | $\cos \phi$     |                   | 0.83   | 0.85   | 0.86   | 0.86   |
| Efficiency           |                 |                   |        |        |        |        |
| at 50 % $P_{rated}$  | $\eta$          |                   | 0.928  | 0.916  | 0.919  | 0.923  |
| at 75 % $P_{rated}$  | $\eta$          |                   | 0.943  | 0.926  | 0.934  | 0.938  |
| at 100 % $P_{rated}$ | $\eta$          |                   | 0.943  | 0.926  | 0.934  | 0.938  |
| Moment of inertia    | J               | kgcm <sup>2</sup> | 2200   | 4200   | 4700   | 8500   |
| Weight               | m               | kg                | 240    | 285    | 320    | 420    |



## Ecodesign Directive

Product information acc. to REGULATION (EU) 2019/1781 (ANNEX I, Section 2)

### Legend

Efficiency ( $\eta_{\text{rated}}$ ,  $\eta$ ) The efficiency refers to the rated voltage and an ambient reference temperature of 25 °C.

Operating points (n; M) n = Speed as a percentage of the rated speed  $n_{\text{rated}}$ ; M= Torque as a percentage of the rated torque  $M_{\text{rated}}$

Power losses  $P_V$  (n; M) Power losses as a percentage of the rated output power  $P_{\text{rated}}$  for the operating points (n; M).

|                                   |                       |                   |                                                       |      |             |      |             |      |             |      |
|-----------------------------------|-----------------------|-------------------|-------------------------------------------------------|------|-------------|------|-------------|------|-------------|------|
| Rated efficiency at full load     | $\eta_{\text{rated}}$ | %                 | 84.1                                                  | 86.5 | 85.3        | 86.5 | 86.7        | 89.5 | 87.7        | 89.5 |
| Efficiency at 75 % rated load     | $\eta$                | %                 | 84.7                                                  | 86.4 | 85.9        | 86.4 | 87          | 89.2 | 88.5        | 89.5 |
| Efficiency at 50 % rated load     | $\eta$                | %                 | 83.4                                                  | 84.2 | 84.9        | 84.6 | 85.9        | 87.2 | 87.9        | 88.3 |
| Efficiency level                  |                       |                   | IE3                                                   |      |             |      |             |      |             |      |
| Name of the manufacturer          |                       |                   | Lenze SE · Hans-Lenze-Str. 1 · 31855 Aerzen · GERMANY |      |             |      |             |      |             |      |
| Commercial register number        |                       |                   | Hannover HRB 204803                                   |      |             |      |             |      |             |      |
| Model identifier of the product   |                       |                   | M54AP090M04                                           |      | M54AP090L04 |      | M54AP100M04 |      | M54AP100L04 |      |
| Number of poles of the motor      |                       |                   | 4                                                     |      |             |      |             |      |             |      |
| Rated output power                | $P_{\text{rated}}$    | kW                | 1.1                                                   |      | 1.5         |      | 2.2         |      | 3           |      |
| Rated input frequency             | $f_{\text{rated}}$    | Hz                | 50                                                    | 60   | 50          | 60   | 50          | 60   | 50          | 60   |
| Rated voltage                     | $V_{\text{rated}}$    | V                 | 400                                                   | 460  | 400         | 460  | 400         | 460  | 400         | 460  |
| Rated speed                       | $n_{\text{rated}}$    | min <sup>-1</sup> | 1440                                                  | 1750 | 1445        | 1755 | 1465        | 1770 | 1460        | 1760 |
| Number of motor phases            |                       |                   | Three-phase motor                                     |      |             |      |             |      |             |      |
| Altitudes above sea level         |                       | m                 | 0 ... 1000                                            |      |             |      |             |      |             |      |
| Ambient air temperature           |                       | °C                | -20 ... +40                                           |      |             |      |             |      |             |      |
| Maximum operating temperature     |                       | °C                | 155                                                   |      |             |      |             |      |             |      |
| Potentially explosive atmospheres |                       |                   | Operation in explosive atmospheres not permitted      |      |             |      |             |      |             |      |
| Power losses                      |                       |                   |                                                       |      |             |      |             |      |             |      |
| 25; 25                            | $P_V$ (n; M)          | %                 | 5                                                     | 5    | 3           | 3    | 2           | 3    | 2           | 3    |
| 25; 100                           | $P_V$ (n; M)          | %                 | 15                                                    | 15   | 14          | 14   | 10          | 9    | 11          | 11   |
| 50; 25                            | $P_V$ (n; M)          | %                 | 6                                                     | 6    | 4           | 4    | 3           | 4    | 3           | 4    |
| 50; 50                            | $P_V$ (n; M)          | %                 | 8                                                     | 8    | 6           | 6    | 5           | 5    | 5           | 5    |
| 50; 100                           | $P_V$ (n; M)          | %                 | 17                                                    | 17   | 15          | 15   | 11          | 11   | 12          | 12   |
| 90; 50                            | $P_V$ (n; M)          | %                 | 10                                                    | 10   | 8           | 8    | 6           | 7    | 6           | 7    |
| 90; 100                           | $P_V$ (n; M)          | %                 | 19                                                    | 19   | 18          | 18   | 13          | 13   | 14          | 14   |



|                                   |                       |                   |                                                       |      |             |      |             |      |             |      |
|-----------------------------------|-----------------------|-------------------|-------------------------------------------------------|------|-------------|------|-------------|------|-------------|------|
| Rated efficiency at full load     | $\eta_{\text{rated}}$ | %                 | 89.5                                                  | 88.6 | 89.6        | 91.7 | 90.4        | 91.7 | 91.4        | 92.4 |
| Efficiency at 75 % rated load     | $\eta$                | %                 | 89.4                                                  | 89.2 | 90          | 91.6 | 91.1        | 91.8 | 91.8        | 92.3 |
| Efficiency at 50 % rated load     | $\eta$                | %                 | 87.7                                                  | 88.6 | 89.4        | 90.5 | 90.8        | 91   | 91.2        | 91.1 |
| Efficiency level                  |                       |                   | IE3                                                   |      |             |      |             |      |             |      |
| Name of the manufacturer          |                       |                   | Lenze SE · Hans-Lenze-Str. 1 · 31855 Aerzen · GERMANY |      |             |      |             |      |             |      |
| Commercial register number        |                       |                   | Hannover HRB 204803                                   |      |             |      |             |      |             |      |
| Model identifier of the product   |                       |                   | M54AP112M04                                           |      | M54AP132M04 |      | M54AP132L04 |      | M54AP160M04 |      |
| Number of poles of the motor      |                       |                   | 4                                                     |      |             |      |             |      |             |      |
| Rated output power                | $P_{\text{rated}}$    | kW                | 3.7                                                   | 4    | 5.5         |      | 7.5         |      | 11          |      |
| Rated input frequency             | $f_{\text{rated}}$    | Hz                | 60                                                    | 50   | 50          | 60   | 50          | 60   | 50          | 60   |
| Rated voltage                     | $V_{\text{rated}}$    | V                 | 460                                                   | 400  | 400         | 460  | 400         | 460  | 400         | 460  |
| Rated speed                       | $n_{\text{rated}}$    | min <sup>-1</sup> | 1770                                                  | 1460 | 1470        | 1775 | 1465        | 1770 | 1475        | 1775 |
| Number of motor phases            |                       |                   | Three-phase motor                                     |      |             |      |             |      |             |      |
| Altitudes above sea level         |                       | m                 | 0 ... 1000                                            |      |             |      |             |      |             |      |
| Ambient air temperature           |                       | °C                | -20 ... +40                                           |      |             |      |             |      |             |      |
| Maximum operating temperature     |                       | °C                | 155                                                   |      |             |      |             |      |             |      |
| Potentially explosive atmospheres |                       |                   | Operation in explosive atmospheres not permitted      |      |             |      |             |      |             |      |
| Power losses                      |                       |                   |                                                       |      |             |      |             |      |             |      |
| 25; 25                            | $P_V (n; M)$          | %                 | 2                                                     | 2    | 2           | 2    | 2           | 2    | 2           | 2    |
| 25; 100                           | $P_V (n; M)$          | %                 | 10                                                    | 10   | 7           | 7    | 8           | 7    | 7           | 6    |
| 50; 25                            | $P_V (n; M)$          | %                 | 3                                                     | 3    | 2           | 2    | 2           | 2    | 3           | 2    |
| 50; 50                            | $P_V (n; M)$          | %                 | 5                                                     | 5    | 4           | 4    | 3           | 4    | 4           | 3    |
| 50; 100                           | $P_V (n; M)$          | %                 | 11                                                    | 11   | 8           | 8    | 9           | 8    | 8           | 7    |
| 90; 50                            | $P_V (n; M)$          | %                 | 6                                                     | 6    | 5           | 5    | 5           | 5    | 5           | 5    |
| 90; 100                           | $P_V (n; M)$          | %                 | 13                                                    | 13   | 10          | 10   | 10          | 10   | 9           | 9    |



|                                   |                       |                   |                                                       |      |             |      |             |      |             |      |
|-----------------------------------|-----------------------|-------------------|-------------------------------------------------------|------|-------------|------|-------------|------|-------------|------|
| Rated efficiency at full load     | $\eta_{\text{rated}}$ | %                 | 92.1                                                  | 93   | 92.6        | 93.6 | 93          | 93.6 | 93.6        | 94.1 |
| Efficiency at 75 % rated load     | $\eta$                | %                 | 92.3                                                  | 92.8 | 93.1        | 93.7 | 93.6        | 93.8 | 94.2        | 94.3 |
| Efficiency at 50 % rated load     | $\eta$                | %                 | 91.5                                                  | 91.4 | 93          | 93.1 | 93.6        | 93.3 | 94.2        | 93.8 |
| Efficiency level                  |                       |                   | IE3                                                   |      |             |      |             |      |             |      |
| Name of the manufacturer          |                       |                   | Lenze SE · Hans-Lenze-Str. 1 · 31855 Aerzen · GERMANY |      |             |      |             |      |             |      |
| Commercial register number        |                       |                   | Hannover HRB 204803                                   |      |             |      |             |      |             |      |
| Model identifier of the product   |                       |                   | M54AP160L04                                           |      | M54AP180M04 |      | M54AP180L04 |      | M54AP200M04 |      |
| Number of poles of the motor      |                       |                   | 4                                                     |      |             |      |             |      |             |      |
| Rated output power                | $P_{\text{rated}}$    | kW                | 15                                                    |      | 18.5        |      | 22          |      | 30          |      |
| Rated input frequency             | $f_{\text{rated}}$    | Hz                | 50                                                    | 60   | 50          | 60   | 50          | 60   | 50          | 60   |
| Rated voltage                     | $V_{\text{rated}}$    | V                 | 400                                                   | 460  | 400         | 460  | 400         | 460  | 400         | 460  |
| Rated speed                       | $n_{\text{rated}}$    | min <sup>-1</sup> | 1475                                                  | 1780 | 1470        | 1775 | 1470        | 1775 | 1470        | 1778 |
| Number of motor phases            |                       |                   | Three-phase motor                                     |      |             |      |             |      |             |      |
| Altitudes above sea level         |                       | m                 | 0 ... 1000                                            |      |             |      |             |      |             |      |
| Ambient air temperature           |                       | °C                | -20 ... +40                                           |      |             |      |             |      |             |      |
| Maximum operating temperature     |                       | °C                | 155                                                   |      |             |      |             |      |             |      |
| Potentially explosive atmospheres |                       |                   | Operation in explosive atmospheres not permitted      |      |             |      |             |      |             |      |
| Power losses                      |                       |                   |                                                       |      |             |      |             |      |             |      |
| 25; 25                            | $P_V(n; M)$           | %                 | 1                                                     | 2    | 2           | 1    | 1           | 1    | 1           | 1    |
| 25; 100                           | $P_V(n; M)$           | %                 | 6                                                     | 6    | 6           | 6    | 6           | 6    | 5           | 5    |
| 50; 25                            | $P_V(n; M)$           | %                 | 2                                                     | 3    | 2           | 2    | 2           | 2    | 2           | 2    |
| 50; 50                            | $P_V(n; M)$           | %                 | 3                                                     | 4    | 3           | 3    | 3           | 3    | 2           | 2    |
| 50; 100                           | $P_V(n; M)$           | %                 | 7                                                     | 8    | 7           | 6    | 7           | 7    | 6           | 6    |
| 90; 50                            | $P_V(n; M)$           | %                 | 4                                                     | 6    | 4           | 4    | 4           | 4    | 4           | 3    |
| 90; 100                           | $P_V(n; M)$           | %                 | 9                                                     | 10   | 8           | 8    | 8           | 8    | 7           | 7    |



|                                   |                       |                   |                                                       |      |             |      |             |      |
|-----------------------------------|-----------------------|-------------------|-------------------------------------------------------|------|-------------|------|-------------|------|
| Rated efficiency at full load     | $\eta_{\text{rated}}$ | %                 | 93.9                                                  | 94.5 | 94.2        | 95   | 94.6        | 95.4 |
| Efficiency at 75 % rated load     | $\eta$                | %                 | 94.5                                                  | 94.7 | 94.9        | 95.3 | 95.1        | 95.6 |
| Efficiency at 50 % rated load     | $\eta$                | %                 | 94.4                                                  | 94.2 | 95.1        | 94.9 | 95          | 95.1 |
| Efficiency level                  |                       |                   | IE3                                                   |      |             |      |             |      |
| Name of the manufacturer          |                       |                   | Lenze SE · Hans-Lenze-Str. 1 · 31855 Aerzen · GERMANY |      |             |      |             |      |
| Commercial register number        |                       |                   | Hannover HRB 204803                                   |      |             |      |             |      |
| Model identifier of the product   |                       |                   | M54AP225M04                                           |      | M54AP225L04 |      | M54AP250M04 |      |
| Number of poles of the motor      |                       |                   | 4                                                     |      |             |      |             |      |
| Rated output power                | $P_{\text{rated}}$    | kW                | 37                                                    |      | 45          |      | 55          |      |
| Rated input frequency             | $f_{\text{rated}}$    | Hz                | 50                                                    | 60   | 50          | 60   | 50          | 60   |
| Rated voltage                     | $V_{\text{rated}}$    | V                 | 400                                                   | 460  | 400         | 460  | 400         | 460  |
| Rated speed                       | $n_{\text{rated}}$    | min <sup>-1</sup> | 1478                                                  | 1782 | 1478        | 1782 | 1482        | 1786 |
| Number of motor phases            |                       |                   | Three-phase motor                                     |      |             |      |             |      |
| Altitudes above sea level         |                       | m                 | 0 ... 1000                                            |      |             |      |             |      |
| Ambient air temperature           |                       | °C                | -20 ... +40                                           |      |             |      |             |      |
| Maximum operating temperature     |                       | °C                | 155                                                   |      |             |      |             |      |
| Potentially explosive atmospheres |                       |                   | Operation in explosive atmospheres not permitted      |      |             |      |             |      |
| Power losses                      |                       |                   |                                                       |      |             |      |             |      |
| 25; 25                            | $P_V (n; M)$          | %                 | 1                                                     | 1    | 1           | 1    | 1           | 1    |
| 25; 100                           | $P_V (n; M)$          | %                 | 5                                                     | 5    | 5           | 5    | 4           | 4    |
| 50; 25                            | $P_V (n; M)$          | %                 | 1                                                     | 1    | 1           | 1    | 1           | 1    |
| 50; 50                            | $P_V (n; M)$          | %                 | 2                                                     | 2    | 2           | 2    | 2           | 2    |
| 50; 100                           | $P_V (n; M)$          | %                 | 6                                                     | 5    | 5           | 5    | 4           | 5    |
| 90; 50                            | $P_V (n; M)$          | %                 | 3                                                     | 3    | 3           | 3    | 3           | 3    |
| 90; 100                           | $P_V (n; M)$          | %                 | 7                                                     | 7    | 6           | 6    | 6           | 6    |



## Environmental notes and recycling

Lenze has been certified to the worldwide environmental management standard for many years (DIN EN ISO 14001). As part of our environmental policy and the associated climate responsibility, please note the following information on hazardous ingredients and the recycling of Lenze products and their packaging:



Lenze products are partly subject to the EU Directive on the restriction of certain hazardous substances in electrical and electronic equipment 2011/65/EU: RoHS Directive [UKCA: S.I. 2012/3032 - The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012] . This is documented accordingly in the EU declaration of conformity and with the CE mark.



The crossed-out wheeled bin symbol is located on the equipment. This information indicates that used electrical and electronic products must not be disposed of with normal household waste.

The EU Directive 2012/19/EU: Directive on waste electrical and electronic equipment (WEEE) [UKCA: S.I. 2013/3113 - The Waste Electrical and Electronic Equipment Regulations 2013] , which has been transposed into national law by the respective EU member states, applies to the disposal of equipment. As a customer, you have the option of disposing of the electrical and electronic equipment that you have purchased from us and that is subject to WEEE via the Lenze branch in your country.

Lenze addresses in Europe: <https://www.lenze.com/en-de/company/global-presence>

Some Lenze products contain batteries/rechargeable batteries in accordance with EU Directive 2006/66/EC: Battery Directive [UKCA: S.I. 2009/890 - The Waste Batteries and Accumulators Regulations 2009] . Any batteries/rechargeable batteries included are designed to last the life of the product and do not need to be replaced or otherwise removed by the end user.



Lenze products are usually sold with cardboard or plastic packaging. This packaging complies with EU Directive 94/62/EC: Directive on packaging and packaging waste [UKCA: S.I. 1997/648 - The Producer Responsibility Obligations (Packaging Waste) Regulations 1997] . The required disposal route is indicated by material-specific labels with the "recycling triangle". Example: "21 - other cardboard"

REACH

Lenze products are subject to REGULATION (EC) No 1907/2006: REACH Regulation [UKCA: S.I. 2008/2852 - The REACH Enforcement Regulations 2008] . When used as intended, exposure of substances to humans, animals and the environment is excluded.

Lenze products are industrial electrical and electronic products and are disposed of professionally. Both the mechanical and electrical components such as electric motors, gearboxes or inverters contain valuable raw materials that can be recycled and reused. Proper recycling and thus maintaining the highest possible level of recyclability is therefore important and sensible from an economic and ecological point of view.

- Coordinate professional disposal with your waste disposal company.
- Separate mechanical and electrical components, packaging, hazardous waste (e.g. gear oils) and batteries/rechargeable batteries wherever possible.
- Dispose of the separated waste in an environmentally sound and proper manner (no household waste or municipal bulky waste).

| What?                                     | Material                                           | Disposal instructions                                                               |
|-------------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------|
| Pallets                                   | Wood                                               | Return to manufacturers, freight forwarders or reusable materials collection system |
| Packaging material                        | Paper, cardboard, pasteboard, plastics             | Collect and dispose of separately                                                   |
| Products                                  |                                                    |                                                                                     |
| Electronic devices                        | Metal, plastics, circuit boards, heatsinks         | As electronic waste give to professional disposer for recycling                     |
| Gearbox                                   | Oil                                                | Drain oil and dispose of separately                                                 |
|                                           | Casting, steel, aluminium                          | Dispose as metal scrap                                                              |
| Motors                                    | Casting, copper, rotors, magnets, potting compound | As engine scrap give to professional disposer for recycling                         |
| Dry-cell batteries/rechargeable batteries |                                                    | As used batteries give to professional disposer for recycling                       |



Further information on Lenze's environmental and climate responsibility and on the topic of energy efficiency can be found on the Internet:

[www.Lenze.com](http://www.Lenze.com) → search word: "Sustainability"



## Appendix

### Good to know

#### Operating modes of the motor

Operating modes S1 ... S10 as specified by EN 60034-1 describe the basic stress of an electrical machine.

#### The most important operating modes

| Continuous operation S1                                                                                                                                                                                                                                                                                                                                                           | Short-time operation S2                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Operation with a constant load until the motor reaches the thermal steady state. The motor may be actuated continuously with its rated power.</p>                                                                                                                                                                                                                              | <p>Operation with constant load; however, the motor does not reach the thermal steady state. During the following standstill, the motor winding cools down to the ambient temperature again. The increase in power depends on the load duration.</p>                                                                                                                                                                                     |
| Intermittent operation S3                                                                                                                                                                                                                                                                                                                                                         | Non-intermittent periodic operation S6                                                                                                                                                                                                                                                                                                                                                                                                   |
| <p>Sequence of identical duty cycles comprising operation with a constant load and subsequent standstill. Start-up and braking processes do not have an impact on the winding temperature. The steady-state is not reached. The guide values apply to a cycle duration of 10 minutes. The power increase depends on the cycle duration and on the load period/downtime ratio.</p> | <p>Sequence of identical duty cycles comprising operation with a constant load and subsequent no-load operation. The motor cools down during the no-load phase. Start-up and braking processes do not have an impact on the winding temperature. The steady-state is not reached. The guide values apply to a cycle duration of 10 minutes. The power increase depends on the cycle duration and on the load period/idle time ratio.</p> |

P Power  
t Time  
 $t_L$  Idle time  
 $\theta$  Temperature

$P_v$  Power loss  
 $t_B$  Load period  
 $t_S$  Cycle duration



## Enclosures

The protection class indicates the suitability of a product for specific ambient conditions with regard to humidity as well as the protection against contact and the ingress of foreign particles. The protection classes are classified in the EN 60034-5/ EN IEC 60529.

The first code number after the code letters IP indicates the protection against the ingress of foreign particles and dust. The second code number refers to the protection against the ingress of humidity.

| Code number 1 | Degree of protection                                                                                         | Code number 2 | Degree of protection                                                                                          |
|---------------|--------------------------------------------------------------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------|
| 0             | No protection                                                                                                | 0             | No protection                                                                                                 |
| 1             | Protection against the ingress of foreign particles $d > 50$ mm. No protection in case of deliberate access. | 1             | Protection against vertically dripping water (dripping water).                                                |
| 2             | Protection against medium-sized foreign particles, $d > 12$ mm, keeping away fingers or the like.            | 2             | Protection against diagonally falling water (dripping water), $15^\circ$ compared to normal service position. |
| 3             | Protection against small foreign particles $d > 2.5$ mm. Keeping away tools, wires or the like.              | 3             | Protection against spraying water, up to $60^\circ$ from vertical.                                            |
| 4             | Protection against granular foreign particles, $d > 1$ mm, keeping away tools, wire or the like.             | 4             | Protection against spraying water from all directions.                                                        |
| 5             | Protection against dust deposits (dust-protected), complete protection against contact.                      | 5             | Protection against water jets from all directions.                                                            |
| 6             | Protection against the ingress of dust (dust-proof), complete protection against contact.                    | 6             | Protection against choppy seas or heavy water jets (flood protection).                                        |

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