L-force catalogue

Automation systems
Drive solutions

Controls
Inverter
Motors
Gearboxes
Engineering Tools

Motors: IE3 three-phase AC motors m500

Gearboxes: GST helical gearboxes, GFL shaft-mounted helical gearbox, GKS helical-bevel gearbox

Lenze
As easy as that.

Contents of the L-force catalogue

Selected portfolio

Additional portfolio

Lenze makes many things easy for you.

With our motivated and committed approach, we work together with you to create the best possible solution and set your ideas in motion - whether you are looking to optimise an existing machine or develop a new one. We always strive to make things easy and seek perfection therein. This is anchored in our thinking, in our services and in every detail of our products. It's as easy as that!

1

Developing ideas

Are you looking to build the best machine possible and already have some initial ideas? Then get these down on paper together with us, starting with small innovative details and stretching all the way to completely new machines. Working together, we will develop an intelligent and sustainable concept that is perfectly aligned with your specific requirements.

2

Drafting concepts

We see welcome challenges in your machine tasks, supporting you with our comprehensive expertise and providing valuable impetus for your innovations. We take a holistic view of the individual motion and control functions here and draw up consistent, end-to-end drive and automation solutions for you - keeping everything as easy as possible and as extensive as necessary.

3

Implementing solutions

Our easy formula for satisfied customers is to establish an active partnership with fast decision making processes and an individually tailored offer. We have been using this principle to meet the ever more specialised customer requirements in the field of machine engineering for many years.

4

Manufacturing machines

Functional diversity in perfect harmony: as one of the few full-range providers in the market, we can provide you with precisely those products that you actually need for any machine task – no more and no less. Our L-force product portfolio, a consistent platform for implementing drive and automation tasks, is invaluable in this regard.

5

Ensuring productivity

Productivity, reliability and new performance peaks on a daily basis – these are our key success factors for your machine. After delivery, we offer you cleverly devised service concepts to ensure continued safe operation. The primary focus here is on technical support, based on the excellent application expertise of our highly-skilled and knowledgeable after-sales team.

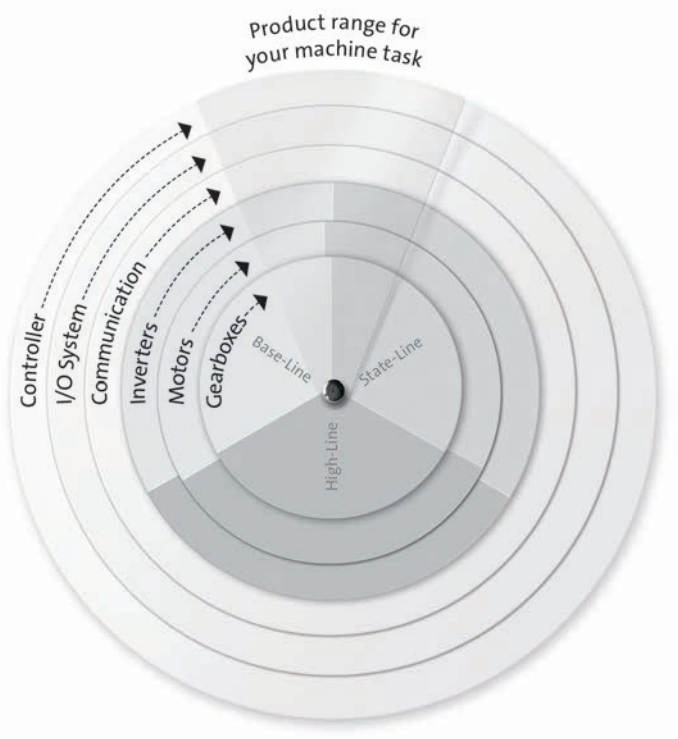
A matter of principle: the right products for every application.

Lenze's extensive L-force product portfolio follows a very simple principle. The functions of our finely scaled products are assigned to the three lines Base-Line, State-Line or High-Line.

But what does this mean for you? It allows you to quickly recognise which products represent the best solution for your own specific requirements.

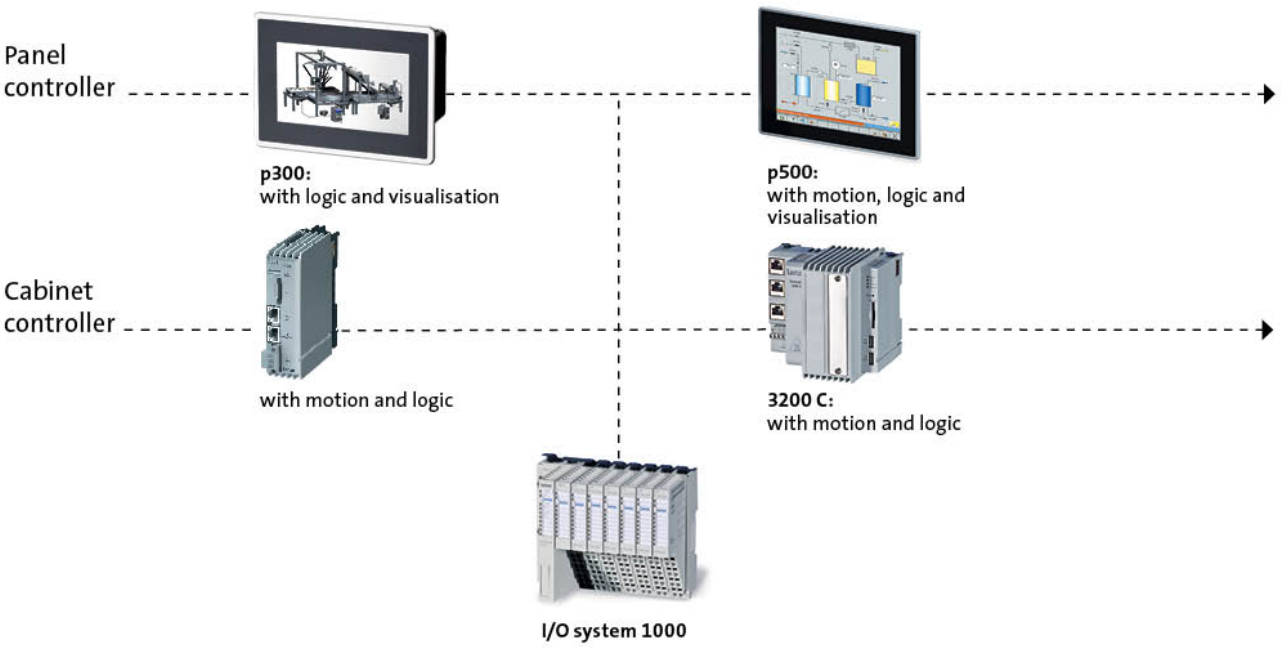
Powerful products with a major impact:
- Easy handling
- High quality and durability
- Reliable technologies in tune with the latest developments

Lenze products undergo the most stringent testing in our own laboratory. This allows us to ensure that you will receive consistently high quality and a long service life. In addition to this, five logistics centres ensure that the Lenze products you select are available for quick delivery anywhere across the globe. It's as easy as that!

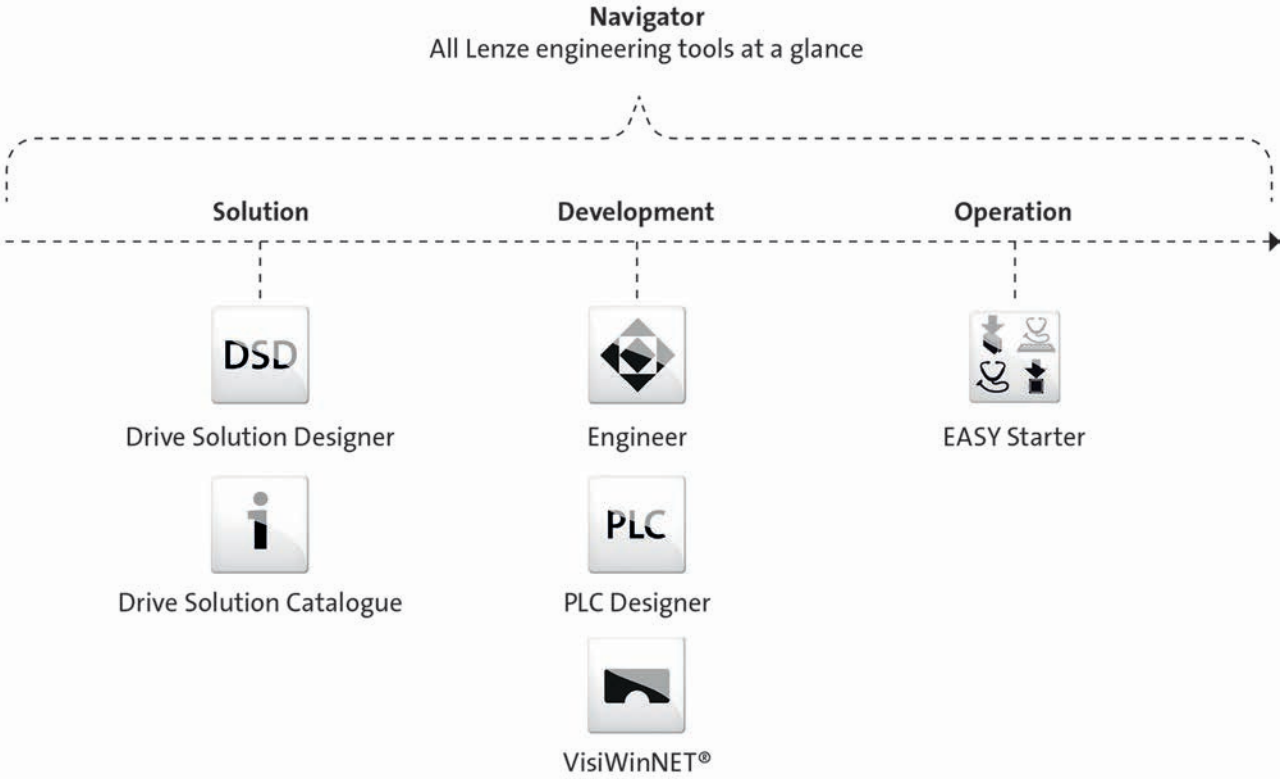


L-force product portfolio

Controls

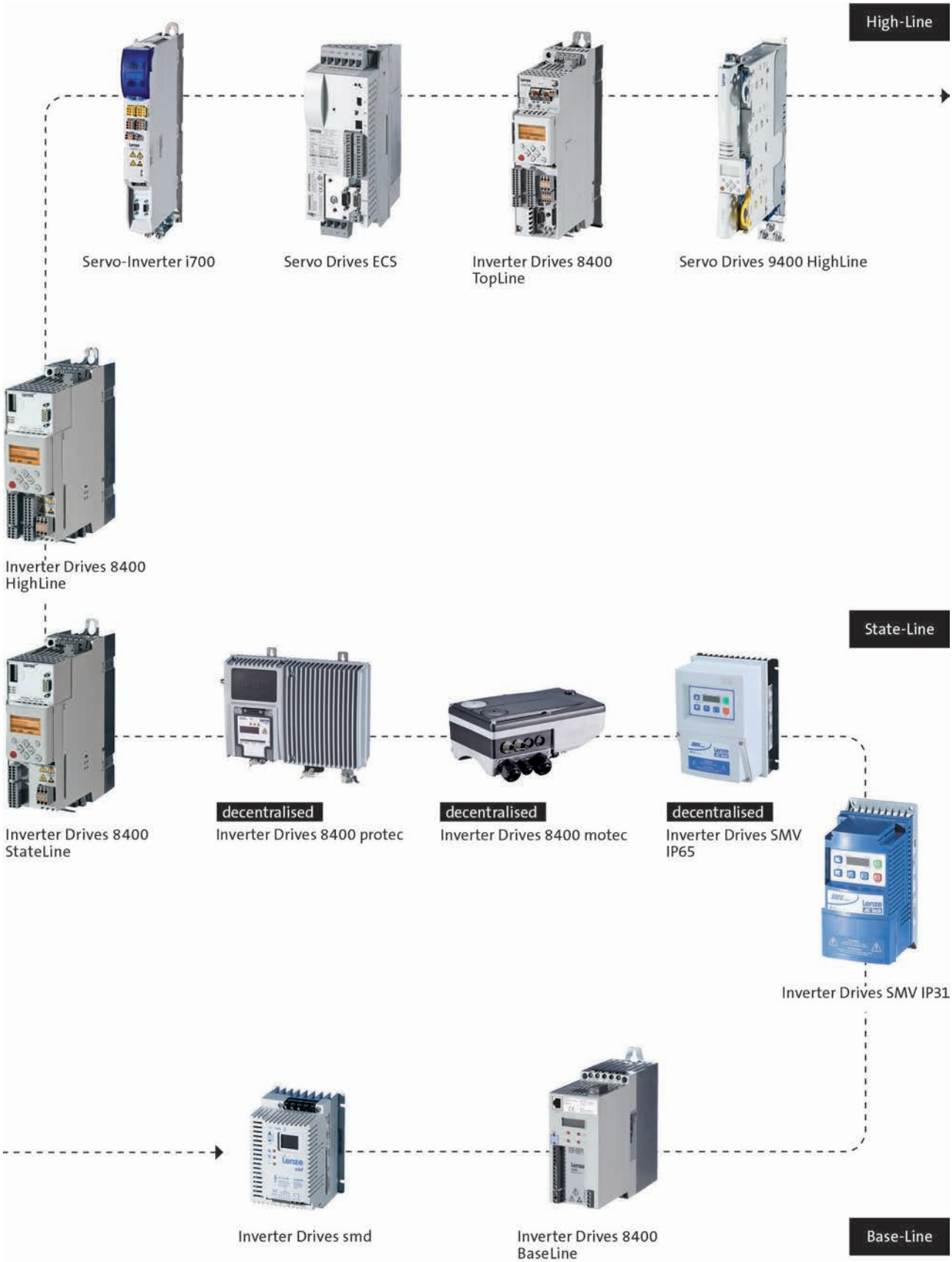


Engineering Tools



L-force product portfolio

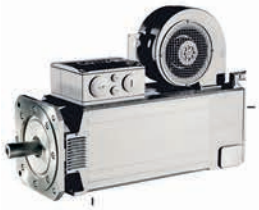
Inverter



L-force product portfolio

Motors

High-Line



MQA asynchronous servo motors

SDSGS synchronous servo motors

MDXKS synchronous servo motors

Synchronous servo motors MCS

Asynchronous servo motors MCA

Asynchronous servo motors SDSGA

State-Line

MF three-phase AC motors

MH three-phase AC motors

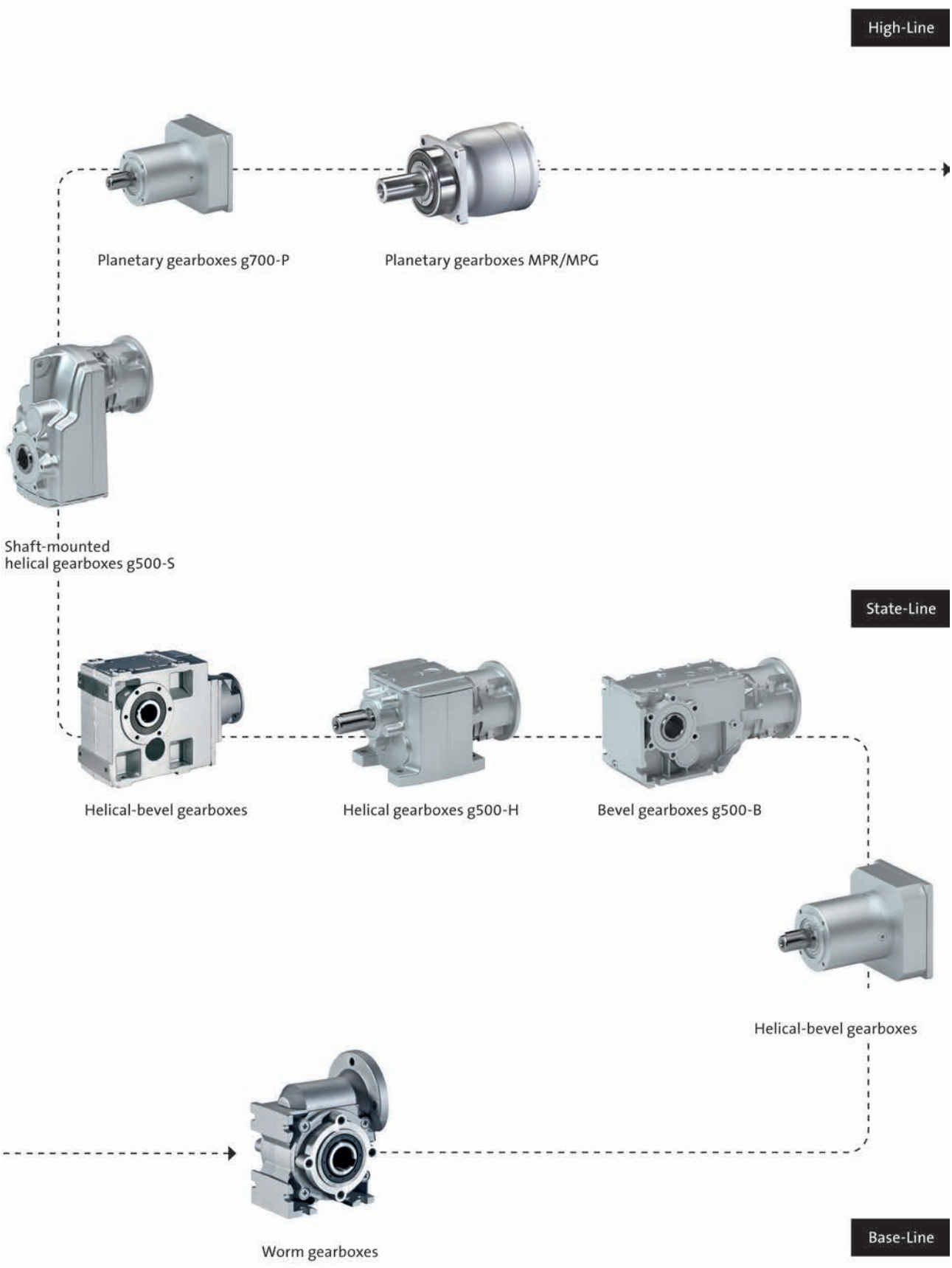
MD three-phase AC motors

Basic MD/MH three-phase AC motors

Base-Line

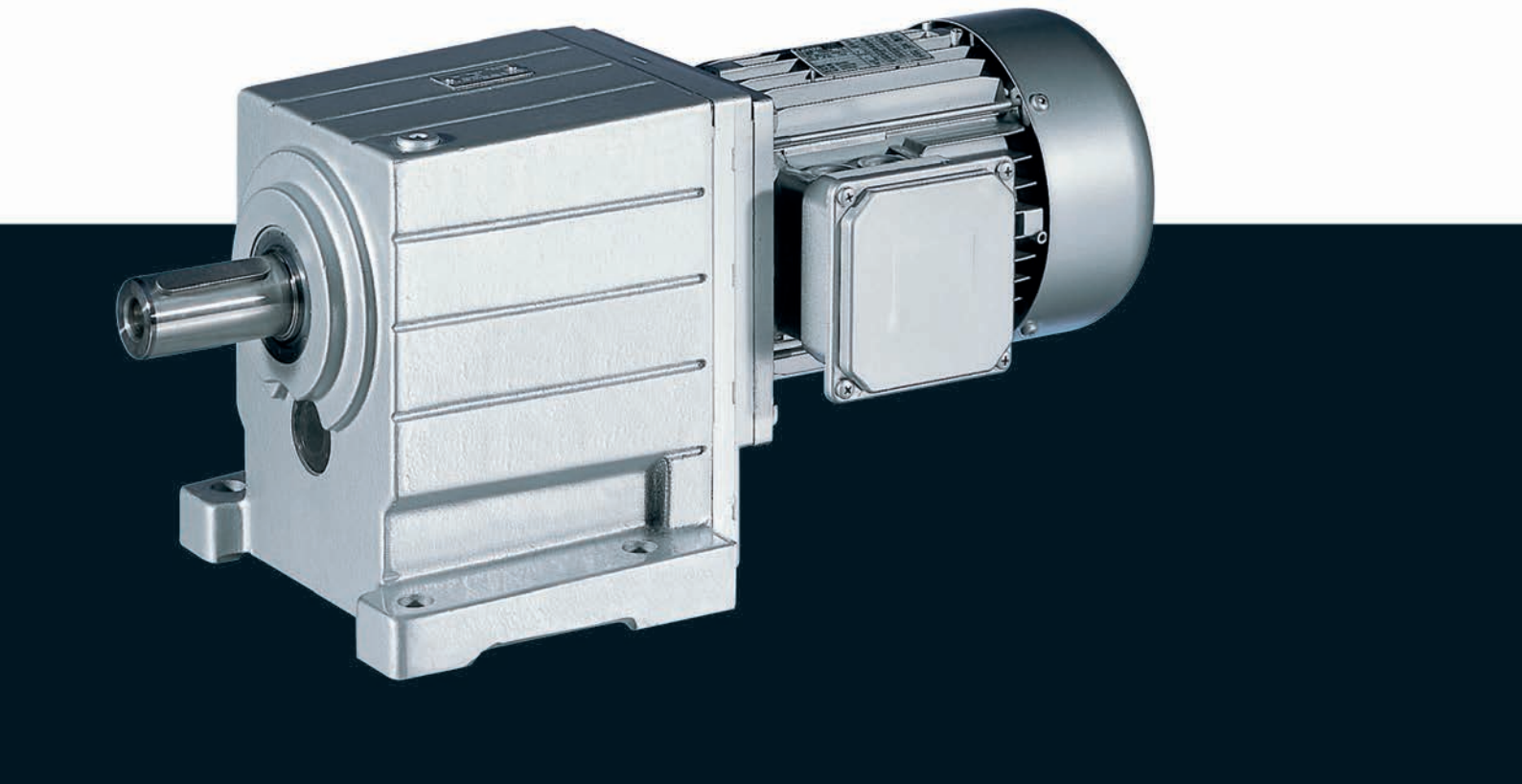
L-force product portfolio

Gearboxes



GST helical gear-boxes

Inverter operation
5.5 ... 45 kW (efficiency class IE3)



GST helical gearboxes

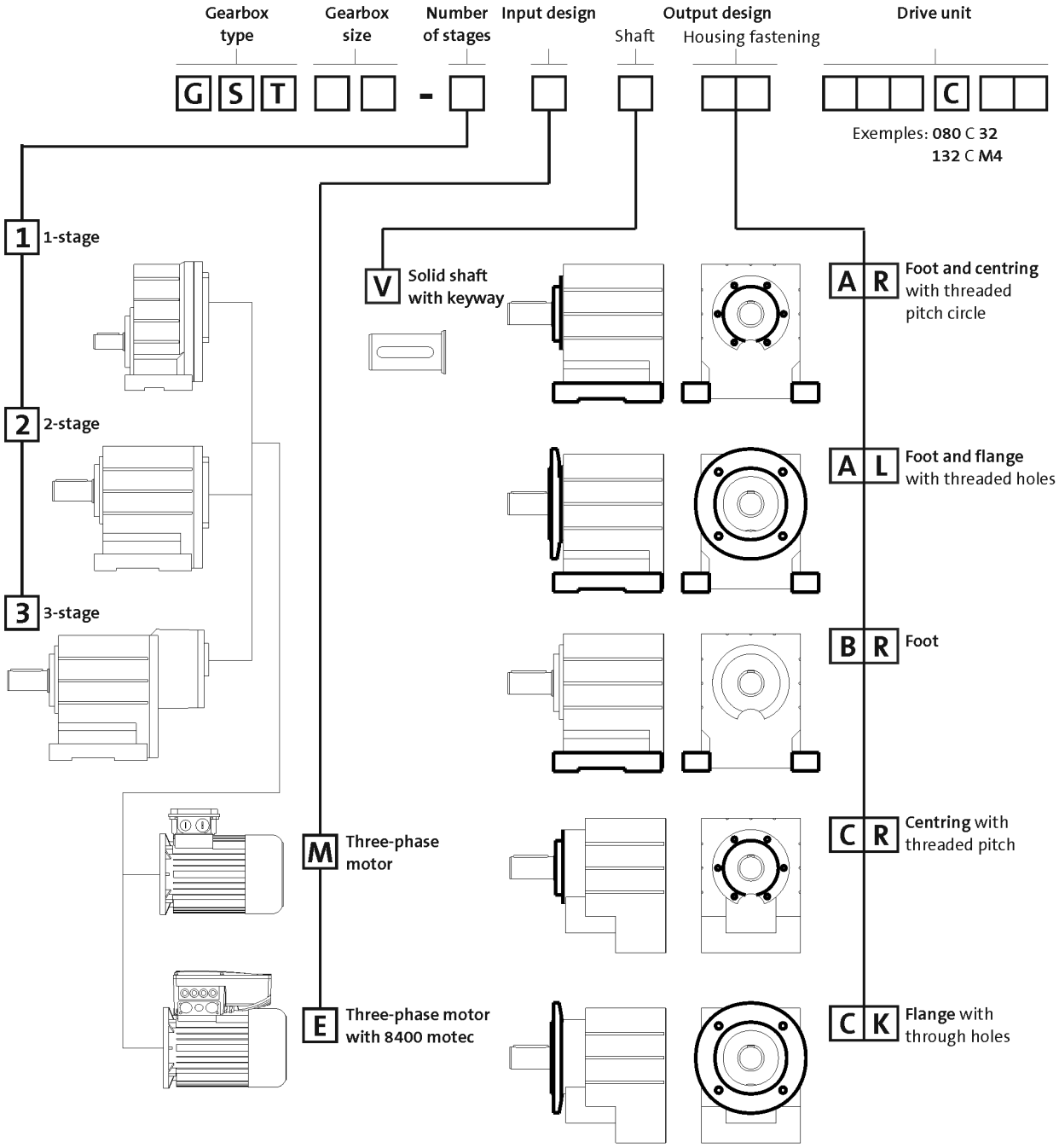
Contents

List of abbreviations

$\eta_{c=1}$		Efficiency
c		Load capacity
f_N	[Hz]	Rated frequency
$F_{ax,max}$	[N]	Max. axial force
$F_{rad,max}$	[N]	Max. radial force
H_{max}	[m]	Site altitude
i		Ratio
J	[kgcm²]	Moment of inertia
m	[kg]	Mass
M_2	[Nm]	Output torque
n_2	[r/min]	Output speed
n_N	[r/min]	Rated speed
P_N	[kW]	Rated power
$S_{hü}$	[1/h]	Transition operating frequency
$T_{opr,max}$	[°C]	Max. ambient operating temperature
$T_{opr,min}$	[°C]	Min. ambient operating temperature
$U_{N,\Delta}$	[V]	Rated voltage
$U_{N,Y}$	[V]	Rated voltage

CE	Communauté Européenne
CSA	Canadian Standards Association
DIN	Deutsches Institut für Normung e.V.
EMC	Electromagnetic compatibility
EN	European standard
IEC	International Electrotechnical Commission
IM	International Mounting Code
IP	International Protection Code
NEMA	National Electrical Manufacturers Association
UL	Underwriters Laboratory Listed Product
UR	Underwriters Laboratory Recognized Product
VDE	Verband deutscher Elektrotechniker (Association of German Electrical Engineers)
CCC	China Compulsory Certificate
GOST	Certificate for Russian Federation
cURus	Combined certification marks of UL for the USA and Canada
UkrSEPRO	Certificate for Ukraine

Product key

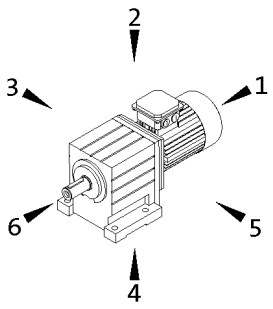
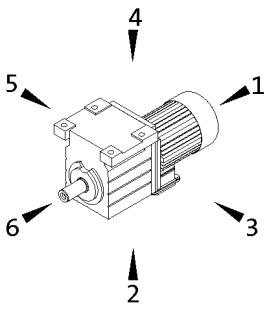
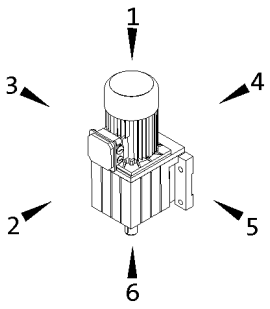
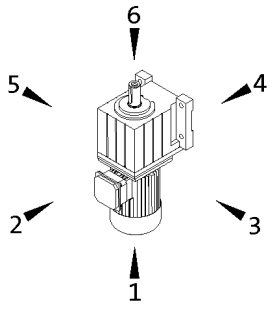
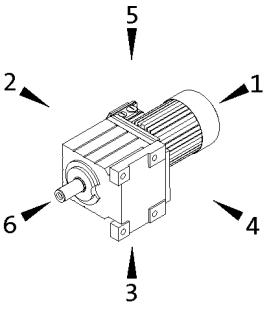
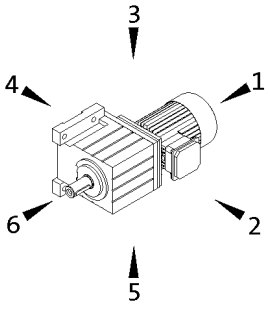


	Output design		
	V	K	L
	d x l [mm]	Øa2 [mm]	Øa2 [mm]
GST03-2	14x28	120/140/160	
	20x40	120/140/160	
GST04-1	16x32	120/140/160	
GST04-2	20x40	120/140/160	120/140
GST05-1	20x40	120/140/160/200	
GST05-2/3	25x50	120/140/160/200	120/140/160
GST06-1	25x50	160/200	

	Output design		
	V	K	L
	d x l [mm]	Øa2 [mm]	Øa2 [mm]
GST06-2/3	30x60	160/200	160/200
GST07-1	30x60	200/250	
GST07-2/3	40x80	200/250	200/250
GST09-1	40x80	250/300	
GST09-2/3	50x100	250/300	250/300
GST11-2/3	60x120	300/350	300/350
GST14-2/3	80x160	350/400	350/400

Product key

Mounting position (A to F) and position of system blocks (1 to 6)

A	B	C
		
D	**E**	**F**
		

Terminal box / motec: 2, 3, 4, 5

Gearbox designs

Basic versions	
Motor efficiency	Standard efficiency Increased efficiency (IE2) Premium efficiency (IE3)
Surface and corrosion protection	No OKS (unpainted, aluminium housing) for GST03 OKS-G (primer: grey) OKS-S (paint: RAL 7012)
Lubricant	CLP 460 (mineral)
Ventilation	Oil control plugs for GST05 to 14 Breather elements for GST06 ... 14

Options	
Surface and corrosion protection	OKS-G (primer: grey) for GST03-2 OKS-S (special paint according to RAL) OKS-M (special paint according to RAL) OKS-L (special paint according to RAL)
Lubricant	CLP HC 320 (synthetic) CLP HC 220 USDA H1 (synthetic)
Shaft sealing rings	Driven shaft: Viton
Bearings	Driven shaft: reinforced for GST04 to 09-2/3
Ventilation	Breather elements for GST05 Compensation reservoir for GST09 to 14-2 in mounting position C
Nameplate	Metal nameplate (supplied loose) Adhesive nameplate (supplied loose)

Product information

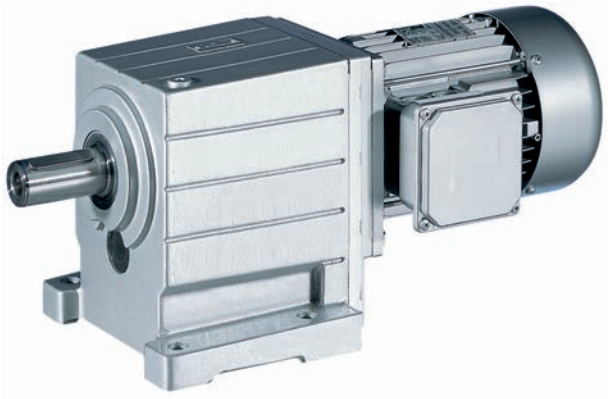
Lenze provides a geared motor construction kit, which covers a wide range of requirements. Numerous drive-side and output-side options enable precise adaptation of the drive to the specific application. This is the basis for versatile applications and functional scalability of our gearboxes and geared motors.
The modular concept and high power density make extremely compact sizes possible. Optimised teeth profiles and ground gears ensure low-noise operation and low backlash. The gearboxes are of compact and hence space-saving construction.

Robust design with high efficiency

Together with three-phase AC motors, our helical gearboxes form a compact and powerful drive unit. They are rugged in design and feature high permissible radial forces, closely stepped speed reduction ratios and minimum backlash. The gearboxes are available as 1 and 2 and 3-stage versions with a torque of up to 5,920 Nm and a ratio of up to i= 435.

Types

- 1-, 2- and 3-stage gearboxes
- Solid shaft with keyway
- Foot or flange mounting
- With m500 three-phase AC motors (efficiency classes IE3) in the power range 5.5 ... 45 kW



Functions and features

Gearbox type	GST
Housing	
Design	Cuboid
Material	Aluminium / cast iron
Solid shaft	
Design	with keyway to DIN 6885
Tolerance	k6 (d ≤ 50 mm) m6 (d > 50 mm)
Material	Tempered steel C45 or 42CrMo4
Hollow shaft	
Design	
Tolerance	
Material	
Toothed parts	
Design	Ground tooth flanks Optimised tooth flank geometry
Material	Case-hardened steel
Shaft-hub joint	
	1st stage/prestage/helical (bevel) gearbox: Friction-type connection Output stage (= 2nd, 3rd or 4th stage): Friction-type or positive-fit connection
Shaft sealing rings	
Design	With dust lip
Material	NB / FP
Bearing	
Design	Ball bearing / tapered-roller bearing depending on size and design
Lubricants	
Standard	DIN 51502
Quantities	corresponding to mounting position (see operating instructions)
Mechanical efficiency	
1-stage gearboxes [$\eta_{c=1}$]	0.98
2-stage gearboxes [$\eta_{c=1}$]	0.97
3-stage gearboxes [$\eta_{c=1}$]	0.95
4-stage gearboxes [$\eta_{c=1}$]	
Notes	

Functions and features

Lubricants

Lenze gearboxes and geared motors are ready for operation on delivery and are filled with lubricants specific to both the drive and the design. The mounting position and design specified in the order are key factors in choosing the volume of lubricant.

The lubricants listed in the lubricant table are approved for use in Lenze drives.

Lubricant table

Mode	CLP 460	CLP HC 320	CLP HC 220 USDA H1
Ambient temperature [°C]	0 ... +40	-25 ... +50	-20 ... +40
Specification	Mineral based oil with additives	Synthetic-based oil (synthetic hydrocarbon / poly-alpha-olefin oil)	
Note			For food processing industry
Changing interval	16000 operating hours not later than after three years (oil temperature 70 to 80 °C)	25000 operating hours not later than after three years (oil temperature 70 to 80 °C)	16000 operating hours not later than after three years (oil temperature 70 to 80 °C)
Fuchs	Fuchs Renolin CLP 460	Fuchs Renolin Unisyn CLP 320	bremer & leguil Cassida Fluid GL 220
Klüber	Klüberoil GEM1-460 N	Klübersynth GEM4-320 N	Klüberoil 4 UH1-220 N
Shell	Shell Omala S2 G 460	Shell Omala S4 GX HD 320	

► Please contact your Lenze sales office if you are operating at ambient temperatures in areas up to< -20 °C bzw. > or up to +40°C.

Functions and features

Surface and corrosion protection

For optimum protection of geared motors against ambient conditions, the surface and corrosion protection system (OKS) offers tailor-made solutions.

Various surface coatings combined with other protective measures ensure that the geared motors operate reliably even at high air humidity, in outdoor installations or in the presence of atmospheric impurities. Any colour from the RAL Classic collection can be chosen for the top coat. The geared motors are also available unpainted (no surface and corrosion protection).

Surface and corrosion protection system	Applications	Measures
	Catalogue text	Catalogue text
OKS-G (primed)	• Dependent on subsequent top coat applied	• 2K PUR priming coat (grey) • Zinc-coated screws • Rust-free breather elements Optional measures • Stainless steel nameplate
OKS-S (small)	• Standard applications • Internal installation in heated buildings • Air humidity up to 90%	• Surface coating as per corrosivity category C1 (in line with EN 12944-2) • Zinc-coated screws • Rust-free breather elements Optional measures • Stainless steel nameplate
OKS-M (medium)	• Internal installation in non-heated buildings • Covered, protected external installation • Air humidity up to 95%	• Surface coating as per corrosivity category C2 (in line with EN 12944-2) • Zinc-coated screws • Rust-free breather elements Optional measures • Stainless steel shaft • Stainless steel nameplate • Rust-free shrink disc (on request)
OKS-L (high)	• External installation • Air humidity above 95% • Chemical industry plants • Food industry	• Surface coating as per corrosivity category C3 (in line with EN 12944-2) • Blower cover and B end shield additionally primed • Cable glands with gaskets • Corrosion-resistant brake with cover ring, stainless friction plate, and chrome-plated armature plate (on request) • All screws/screw plugs zinc-coated • Stainless breather elements • Threaded holes that are not used are closed by means of plastic plugs Optional measures • Sealed recesses on motor (on request) • Stainless steel shaft • Stainless steel nameplate • Rust-free shrink disc (on request) • Additional priming coat on cast iron fan • Oil expansion tank and torque plates painted separately and supplied loose

Functions and features

Structure of surface coating

Surface and corrosion protection system	Corrosivity category	Surface coating	Colour
	DIN EN ISO 12944-2	Structure	
Without OKS (uncoated)		Dipping primed gearbox	
OKS-G (primed)		Dipping primed gearbox 2K PUR priming coat	
OKS-S (small)	Comparable to C1	Dipping primed gearbox 2K-PUR top coat	Standard: RAL 7012 Optional: RAL Classic
OKS-M (medium)	Comparable to C2	Dipping primed gearbox 2K PUR priming coat 2K-PUR top coat	Standard: RAL 7012 Optional: RAL Classic
OKS-L (high)	Comparable to C3	Dipping primed gearbox 2K PUR priming coat 2K-PUR top coat	Standard: RAL 7012 Optional: RAL Classic

► The gearboxes GST 03 have an aluminium housing, therefore a dipping primer is dispensed with in the case of these gearboxes.

Functions and features

Ventilation

Non-ventilated gearboxes
No ventilation is required for gearboxes GST03 to 04.

Gearboxes that may optionally be equipped with ventilation
Special measures are not usually required when using the GST05 gearbox. In borderline cases, e.g. at input speeds > 2000 r/min, we recommend the use of breather elements, which we can supply if required.

Ventilated gearboxes
Gearboxes GST06 to 14 are supplied with breather elements as standard.

Special measures for mounting position C (motor on top)
We recommend that an oil compensation reservoir is always used with gearbox sizes G□□09 to 14 in this mounting position. This reservoir can be purchased as an option. For illustrations and measures, please refer to the Accessories chapter.

This is not required at higher ratios or low input speeds. Please contact Lenze for confirmation in this case.

Dimensioning

General information about the data provided in this catalogue

The powers, torques and speeds specified in this catalogue are rounded values and are valid under the following conditions:

- Operating time/day = 8 h (100% OT)
- Duty class I for up to 10 switching operations/h
- Mounting positions and designs in this catalogue
- Standard lubricant
- T_{amb} = 20 °C for gearboxes,
  T_{amb} = 40 °C for motors (in accordance with EN 60034)
- Site altitude < = 1000 m amsl
- The selection tables provide the permissible mechanical powers and torques. For notes on the thermal power limit, see chapter drive dimensioning.
- The rated power specified for motors and geared motors applies to operating mode S1 (in accordance with EN 60034).

Under different operating conditions, the values obtained may vary from those listed here.
In the case of extreme operating conditions, please consult your Lenze sales office.

Dimensioning

Thermal power limit

The thermal power limit, defined by the heat balance, limits the permissible gearbox continuous power. It may be less than the mechanical power ratings listed in the selection tables.

The thermal power limit 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
- the ambient conditions: temperature, air circulation, input or dissipation via shafts and the foundation

Please consult your Lenze sales office
- if the following input speeds n_1 are exceeded on a continuous basis (continuous is defined as more than 8 h/day):

Motor frame size	Mounting position A, B, E, F	Mounting position C, D
063 ... 100	3000 r/min	3000 r/min
112 ... 132	3000 r/min	1500 r/min
160 ... 225	2000 r/min	1500 r/min

- if the following input speeds n_1 are exceeded:

Motor frame size	Mounting position A, B, E, F	Mounting position C, D
063 ... 100	4000 r/min	3000 r/min
112 ... 132	4000 r/min	2000 r/min
160 ... 225	3000 r/min	1500 r/min

- or if you are using the following gearbox type, size and ratio combinations at an input speed of n_1 > 1500 r/min:

Gearbox type	Gearbox size	Ratio i
GST helical gearboxes	07, 09, 11, 14	≤ 10

Possible ways of extending the application area

- synthetic lubricant (option)
- shaft sealing rings made from FP material/Viton (option)
- reduction in lubricant quantity
- cooling of the geared motor by means of air convection on the machine/system

Dimensioning

Load capacity and application factor

Load capacity c of gearbox
Rated value for the load capacity of Lenze geared motors.
- c is the ratio of the permissible rated torque of the gearbox to the rated torque supplied by the drive component (e.g. the built-in Lenze motor).
- The value of c must always be greater than the value of the application factor k calculated for the application.

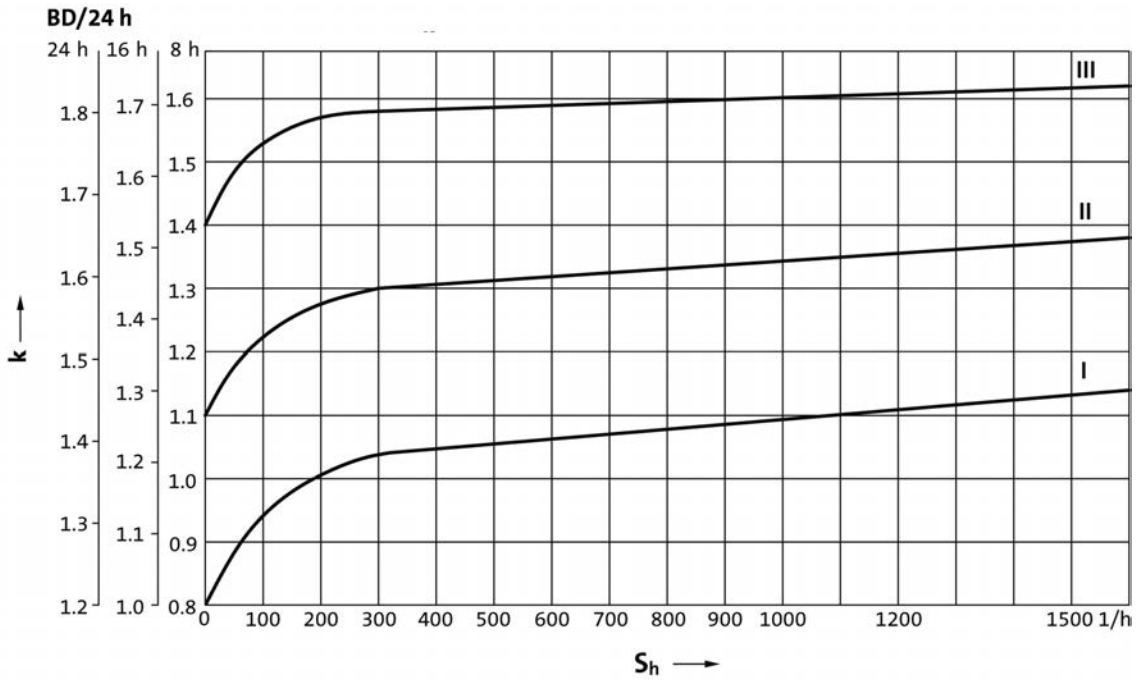
Requierement: c ≥ k

Application factor k (according to DIN 3990)
Takes into account the influence of temporally variable loads which are actually present during the anticipated operating time of gearboxes and geared motors.
k is determined by:
- the type of load
- the load intensity
- temporal influences

Duty class	Load type	Intensity	
I	Smooth operation, small or light jolts	$F_I \leq 1.25$	$F_I = \frac{\frac{J_L}{i^2} + J_M + J_B + J_Z}{J_M + J_B + J_Z}$
II	Uneven operation, average jolts	$1.25 < F_I \leq 4$	
III	Uneven operation, severe jolts and/or alternating load	$F_I > 4$	

J_L= moment of inertia of the load
i = gearbox ratio
J_M= moment of inertia of the motor
J_B= moment of inertia of the motor brake
J_Z= moment of inertia of additional built-on motor accessories

Application factor (inverter operation)



S_h= switching operations/hour

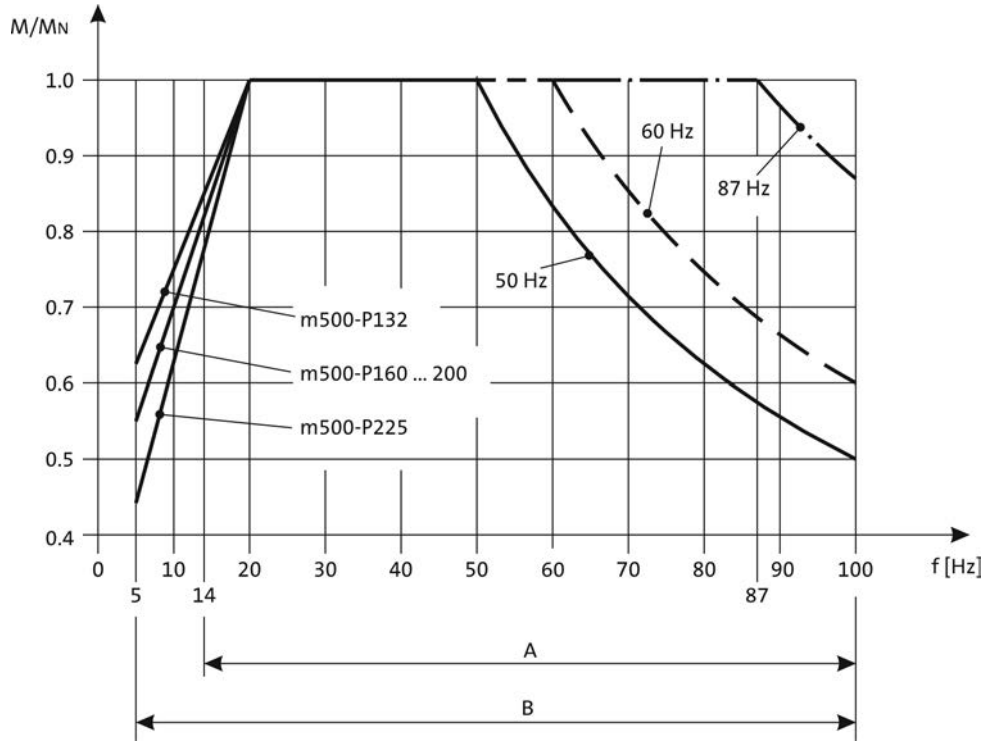
Dimensioning

Torque derating at low motor frequencies

During operation with the rated torque at low speeds (< 20 Hz), the integral fan does not rotate fast enough anymore to ensure sufficient cooling of the motor. In order to prevent overheating, operation without a blower requires a torque reduction of the motor.
The blower cools the motor steadily and irrespective of the motor speed. A torque reduction is not required and the motor can be actuated with its rated torque from 5 Hz to the rated frequency.

The diagram shows the motor frame size-dependent torque reduction for self-ventilated motors, taking the thermal behaviour during actuation of the inverter into consideration.

Torque characteristics



A = Operation with integral fan and brake
B = Operation with integral fan and brake control "Holding current reduction"

6.1

You can use the Drive Solution Designer for precise drive dimensioning.

The Drive Solution Designer helps you to carry out a fast and high-quality drive dimensioning.
The software includes well-founded and proven knowledge on drive applications and electro-mechanical drive components.

Please contact your Lenze sales office.

Dimensioning

Notes on the selection tables

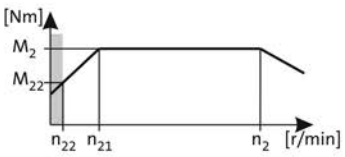
The selection tables show the available combinations of gearbox type, number of stages, ratio and motor. They are used only to provide basic orientation.
The following legend indicates the structure of the selection tables.

Rated power Prated of the drive motor depending on the rated frequency

50 Hz: P_N = 5.5 kW
87 Hz: P_N = 9.6 kW

2-stufige Getriebe ← **Number of the gear stage of the gearbox**

Torque diagram



Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
118	432	2.9	12	268	49	432	118	432	2.9				12.362	GST09	-P132M4	69
116	439	1.4	12	272	48	439	116	439	1.4				12.571	GST07	-P132M4	63

Product Gearbox

Product Motor

Ratio i

Page number for dimensions

Load capacity c of the gearbox
c is the ratio between the permissible rated torque of the gearbox and the rated torque of the three-phase AC motor (converted to the driven shaft).
c must be always higher than the service factor **k** determined for the application **k**.

$$c = \frac{M_{2,zul}}{M_{1N} \cdot i \cdot \eta_{Getr}} > k$$

Mains operation
Output speed **n2**
Output torque **M2**

Inverter operation
The speed and torque data are valid for self-ventilated and forced ventilated drives. Forced ventilated drives can always output the torque **M2** in the entire setting ranges. In the case of self-ventilated drives, a reduction to **M22** is required in the lower speed range.

The following applies to self-ventilated geared motors:
n22 is the minimum speed where the torque **M22** is permissible, from **n21** to **n2**, the maximum torque is **M2**
The following applies to forced ventilated geared motors:
From the minimum speed **n22** to **n2**, the maximum torque is **M2**

Motor voltages

The power values and torques indicated in the selection tables refer to the following motor voltages:
- 50 Hz : Δ 230 V / Y 400 V
- 87 Hz : 400 V

Notes on ordering

We want to be sure that you receive the correct products in good time.

To allow us to achieve this we need:
- your address and your company data
- our product key for the individual products in this catalogue
- your delivery date and delivery address

Ordering procedure
Please use the ordering information checklist to ensure that you provide all the ordering information required for the various products.

The ordering information checklist, the product key, the basic versions, options, mounting position and position of the system blocks will be found in the General – Product key section.

A list of Lenze's worldwide sales offices can be found on the Internet: www.Lenze.com.

Ordering details checklist

☐ **Offer**

Page __ of __

☐ **Order**

Customer No.

Job No.

Fax No. _____

Sender

Company _____ Made out by (name) _____

Street/P.O. Box _____ Department _____

P.O. Box, City _____ Telephone No. _____

Date _____ Signature _____

Delivery address (if different)

Street/P.O. Box _____ Desired delivery date _____

P.O. Box, City _____ Dispatching notes _____

Invoice recipient (if different)

Street/P.O. Box _____

Postal code, City _____

6.1

Ordering details checklist

Customer No. ☐☐☐☐☐☐☐☐

Job No. ☐☐☐☐☐☐☐☐☐☐

Page __

Quantity ☐☐☐☐

Efficiency class ☐ High efficiency (IE3)

Rated frequency ☐ 50 Hz ☐ 60 Hz ☐ 87 Hz

Ratio i ☐☐☐☐

GST ☐☐ – ☐ 1 / 2 / 3 ☐ M / E ☐ V ☐ A / B / C ☐ R / K / L

Motor frame size ☐☐☐C☐☐

Solid shaft d = ☐ mm (only with GST03)

Flange a_2 = ☐ mm

Mounting position A ☐ B ☐ C ☐ D ☐ E ☐ F ☐

Position of system blocks Terminal box 2 ☐ 3 ☐ 4 ☐ 5 ☐

Surface and corrosion protection

GST03: ☐ Without OKS (unpainted)

GST04 ... 14: ☐ OKS-S colour: RAL 7012 ☐ OKS-G (primed)

Options

Special lubricants

☐ CLP HC 320 (synthetic)

☐ CLP HC 220 USDA H1 (for the food industry)

Surface and corrosion protection

☐ OKS-S (small)

☐ OKS-M (medium) RAL ☐☐☐☐

☐ OKS-L (high)

☐ OKS-G (primed) only with GST03

Output shaft bearing

☐ Reinforced bearing for GST04 ... 09-2

Shaft sealing rings

☐ Viton

Breathing

☐ Breather elements for GST05

☐ Compensation reservoir in mounting position for GST 09 ... 14-2

6.1

Ordering details checklist

Three-phase AC motors options

Customer No. ☐☐☐☐☐☐☐☐

Job No. ☐☐☐☐☐☐☐☐☐☐

Page __

Motor connection

Terminal box

- ☐ with plug-in connector ICN 6-pin. Adhere to permissible rated motor current 20 A!
- ☐ with plug-in connector ICN 8-pin. Adhere to permissible rated motor current 20 A!
- ☐ with plug-in connector HAN10E. Adhere to permissible rated current 16 A!
- ☐ with plug-in connector HAN-Modular. Adhere to permissible rated current 16 / 40 A!

Cable entry — in position 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

Blower

☐ 1~ ☐ 3~

☐ Terminal box with plug-in connector ICN

Terminal box position 2 ☐ 3 ☐ 4 ☐ 5 ☐

Spring-applied brake

Brake version ☐ Standard

Brake size ☐

Characteristic torque ☐ Nm

Rated voltage AC ☐ DC ☐ ☐ V

Rectifier — Only in the case of AC supply voltage

- ☐ Half-wave rectifier
- ☐ Bridge rectifier
- ☐ Bridge/half-wave rectifier (overexcitation)
- ☐ Bridge/half-wave rectifier (holding current reduction)

Brake options — Manual release lever in position 2 ☐ 3 ☐ 4 ☐ 5 ☐

☐ Low-noise version (Standard in the case of brake with speed/position encoder)

6.1

Ordering details checklist

Three-phase AC motors options

Customer No. ☐☐☐☐☐☐☐☐

Job No. ☐☐☐☐☐☐☐☐☐☐

Page __

Speed/position encoder

Resolver ☐ RS1

Incremental encoder HTL ☐ IG128-24V-H ☐ IG512-24V-H ☐ IG1024-24V-H ☐ IG2048-24V-H

Incremental encoder TTL ☐ IG512-5V-T ☐ IG1024-5V-T ☐ IG2048-5V-T

Feedback with ICN connector ☐ IG128-24V-H not possible with plug-in connector!

Motor protection

☐ TKO ☐ KTY 83-110 ☐ KTY 84-130

☐ PTC

Further options

☐ 2nd nameplate (adhesive nameplate/metal nameplate)

6.1

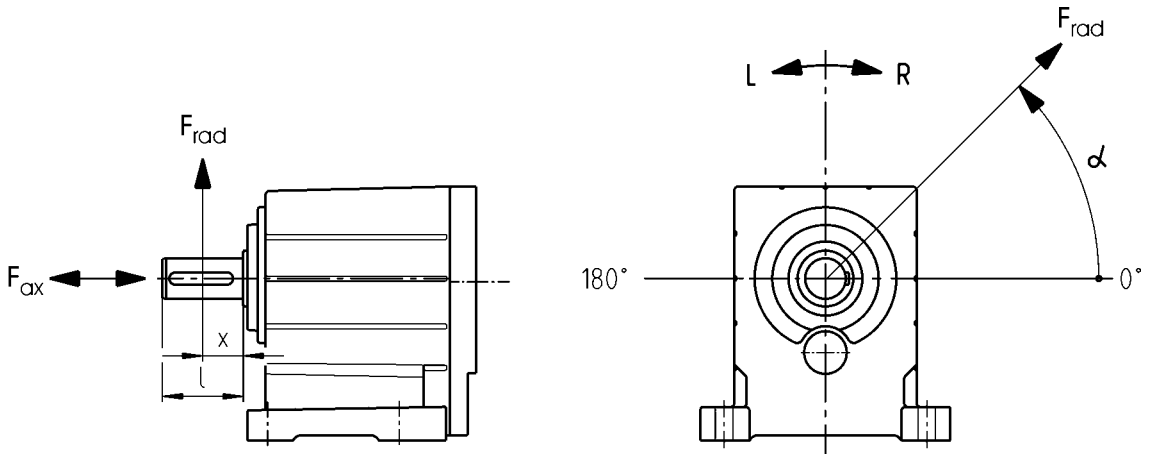
Permissible radial and axial forces at output

Permissible radial force
$F_{rad,per} = \min(f_w \times f_\alpha \times F_{rad,max}\ ;\ f_w \times F_{rad,max}$ at $n_2 \leq 50$ r/min)

Permissible axial force
$F_{ax,per} = F_{ax,max}$ if $F_{rad} = 0$

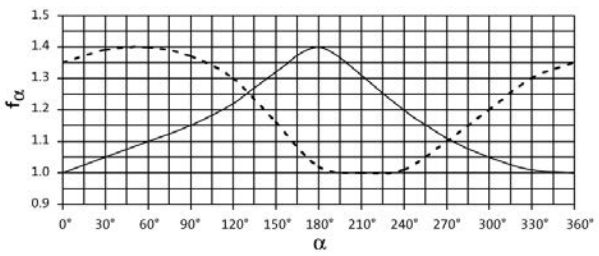
If F_{rad} **and** $F_{ax} \neq 0$, please contact your Lenze sales office.

Application of forces

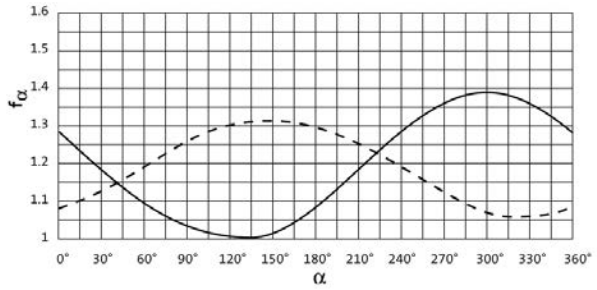


Effective direction factor f_α at output shaft

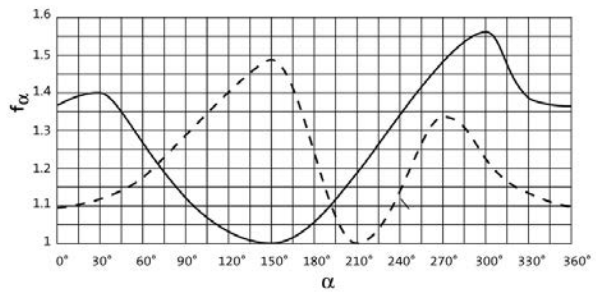
GST03-2



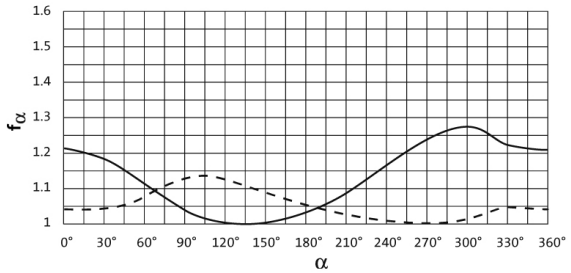
GST04 to 09-1



GST04 to 09-2, 3



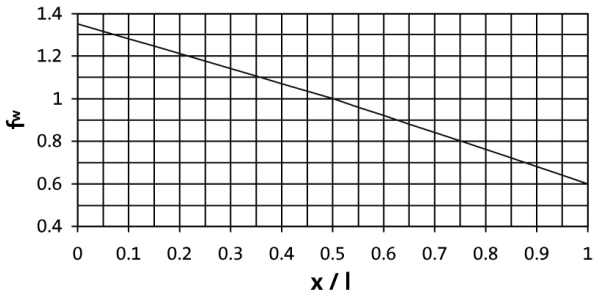
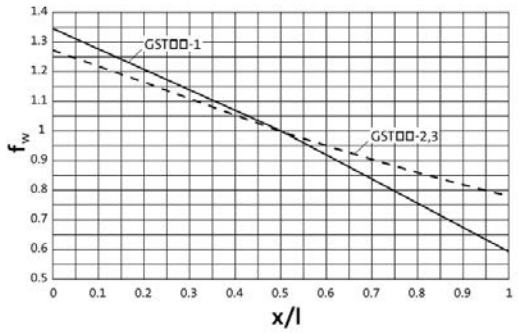
GST11 to 14-2, 3



——— Direction of rotation R
— — — Direction of rotation L

Permissible radial and axial forces at output

Additional load factor f_w at output shaft

GST03-2	GST04 to 09-1, 2, 3
	

GST□□-1

Size	n_2 [r/min]								
Gearbox	2500	1600	1000	600	400	200	125	80	≤50

	Max. radial force, Solid shaft								
	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GST04	100	180	440	600	850	1050	1050	1050	1050
GST05	100	250	550	750	1400	2000	2300	2300	2300
GST06	200	600	800	800	1100	2200	2900	3500	3500
GST07	700	1000	1200	1300	1900	3000	3900	4700	5300
GST09	1750	2200	2500	2500	3500	6200	7900	9000	9500

	Max. axial force, Solid shaft								
	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GST04	600	800	1000	1300	1400	1400	1400	1400	1400
GST05	800	1100	1400	2000	2000	2000	2000	2000	2000
GST06	900	1200	1500	2000	2500	2500	2500	2500	2500
GST07	1200	1600	2000	2700	3300	3700	3700	3700	3700
GST09	2500	3400	4300	5700	6800	7000	7000	7000	7000

6.1

- Application of force F_{rad}: centre of shaft journal (x = l/2)
- $F_{ax,max}$ only valid with F_{rad} = 0

Permissible radial and axial forces at output

GST□□-2 / 3 with standard bearings

Size	n_2 [r/min]									
Gearbox	1000	630	400	250	160	100	63	40	25	≤16

	Max. radial force, Solid shaft									
	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GST03	100	300	630	710	800	920	1100	1400	1500	1500
GST04	730	950	1250	1450	1700	2100	2500	2650	2650	2650
GST05	1150	1500	1950	2200	2600	3000	3500	3800	3900	3900
GST06	140	750	2350	2600	3100	3600	4300	4350	4350	4350
GST07	140	2050	3400	3800	4500	5400	6400	7600	9100	9500
GST09	1500	1950	6800	7600	9400	11500	11500	11500	11500	11500
GST11	11500	14400	17000	19000	21000	21000	21000	21000	21000	21000
GST14	16600	20700	24000	27000	31000	36000	39000	40000	40000	40000

	Max. axial force, Solid shaft									
	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GST03	300	400	600	700	800	900	1000	1000	1000	1000
GST04	600	800	1100	1300	1650	2000	2000	2000	2000	2000
GST05	1200	1600	2000	2300	2650	3100	3600	3600	3600	3600
GST06	500	600	850	900	1250	1800	2600	3600	4800	4800
GST07	1100	1500	1900	2200	2900	3900	5300	7000	7000	7000
GST09	1300	1800	2300	2800	4000	5600	8100	11000	12000	12000
GST11	5700	7600	9500	10000	11000	14000	16000	16000	16000	16000
GST14	9000	12000	15000	16000	18000	20000	20000	20000	20000	20000

- Application of force F_{rad}: centre of shaft journal (x = l/2)
- $F_{ax,max}$ only valid with F_{rad} = 0

Permissible radial and axial forces at output

GST□□-2 / 3 with reinforced bearing

Size	n_2 [r/min]									
Gearbox	1000	630	400	250	160	100	63	40	25	≤16

	Max. radial force, Solid shaft (reinforced bearings))									
	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GST04	1900	2350	2850	3150	3550	3750	3750	3750	3750	3750
GST05	3350	3950	4900	5400	5400	5400	5400	5400	5400	5400
GST06	4250	5100	6300	7000	7700	7700	7700	7700	7700	7700
GST07	5650	6850	8500	9500	10500	12500	13000	13000	13000	13000
GST09	11300	14000	16500	17000	17000	17000	17000	17000	17000	17000

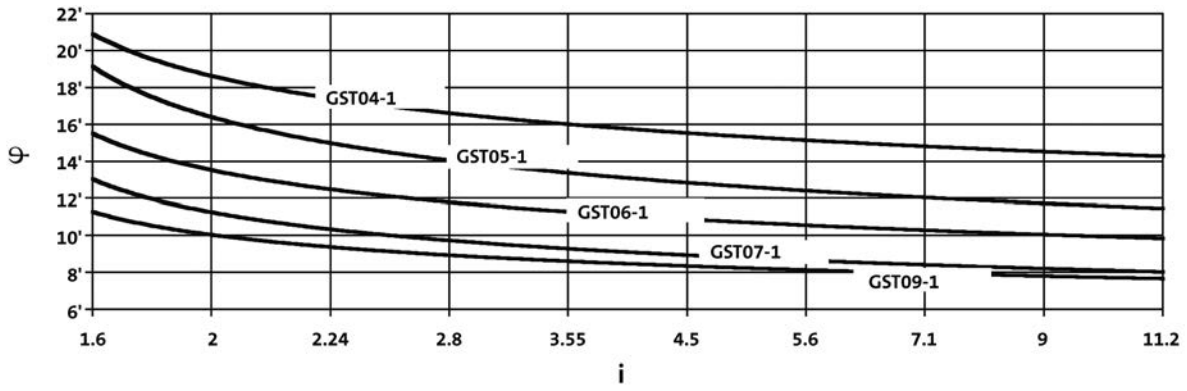
	Max. axial force, Solid shaft (reinforced bearings))									
	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GST04	1000	1300	1700	1900	2200	2500	2500	2500	2500	2500
GST05	2100	2800	3600	3900	4300	4500	4500	4500	4500	4500
GST06	2100	2800	3500	3600	4200	4900	5700	5700	5700	5700
GST07	3300	4400	5500	6100	7100	8300	9000	9000	9000	9000
GST09	4800	6400	8000	9000	10500	12500	14000	14000	14000	14000

- Application of force F_{rad}: centre of shaft journal (x = l/2)
- $F_{ax,max}$ only valid with F_{rad} = 0

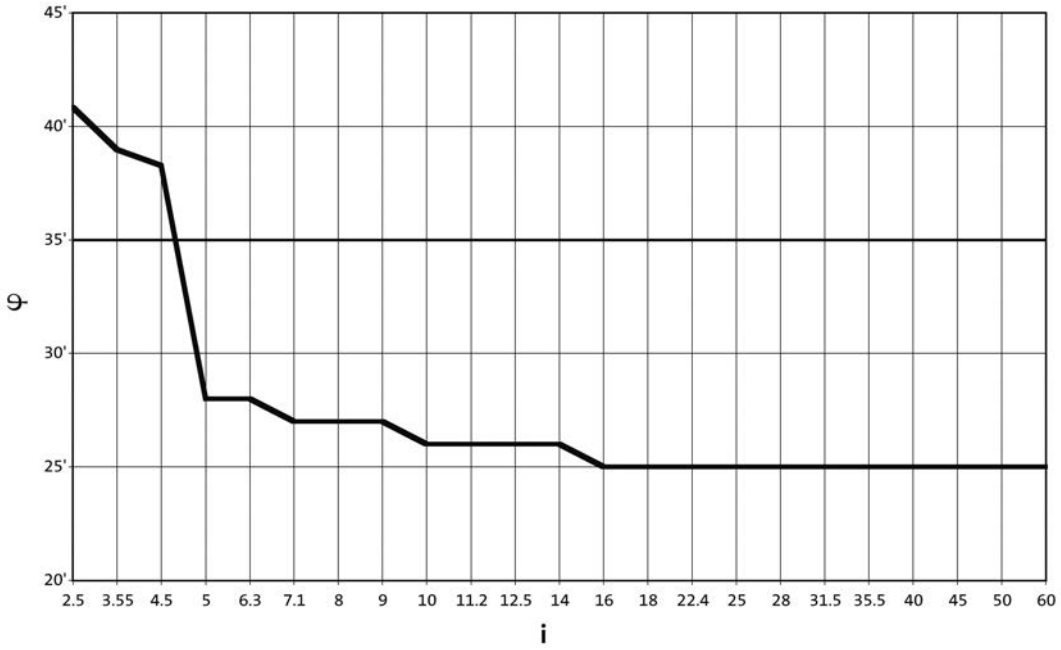
Output backlash in angular minutes

► Backlash ϕ depending on ratio i

GST04 to 09-1



GST03-2

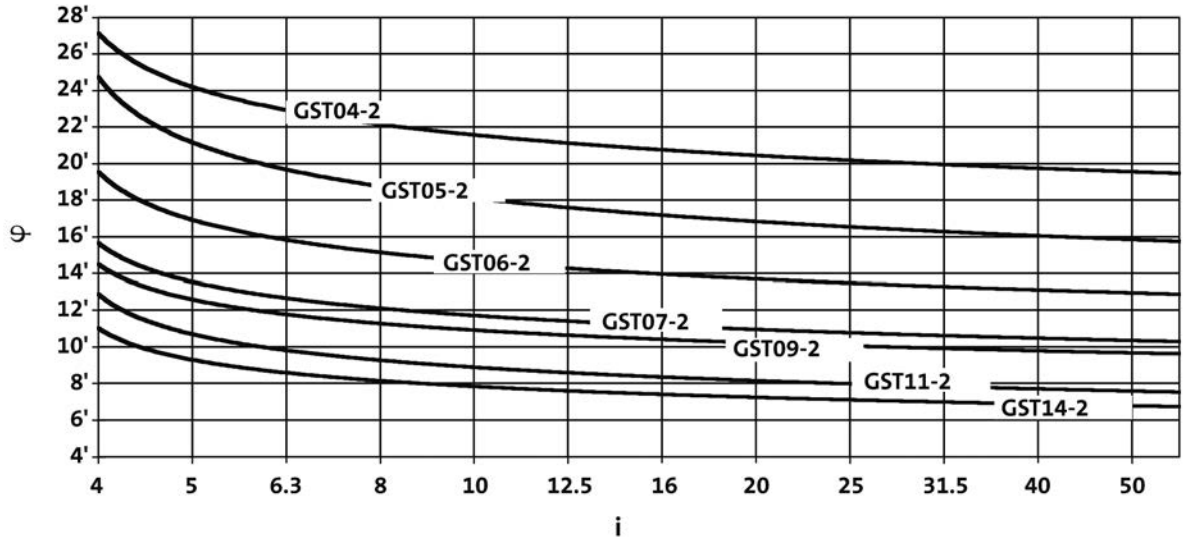


6.1

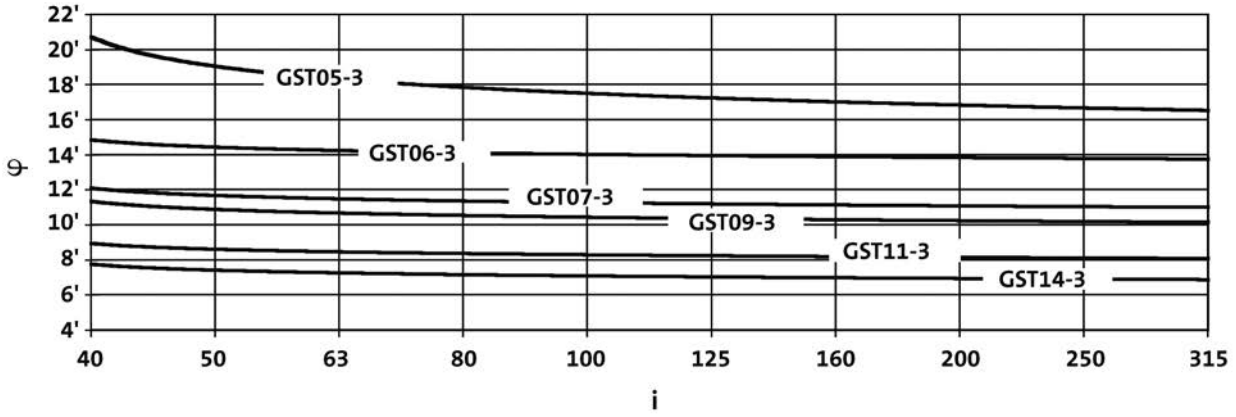
Output backlash in angular minutes

► Backlash ϕ depending on ratio i

GST04 to 14-2



GST05 to 14-3



6.1

Moments of inertia

GST□□-1

► Moment of inertia (J) depending on ratio i

Gearbox			GST04
1.600	J	[kgcm²]	0.267
2.048	J	[kgcm²]	0.194
2.240	J	[kgcm²]	0.172
2.857	J	[kgcm²]	0.126
3.500	J	[kgcm²]	0.099
4.400	J	[kgcm²]	0.067
5.667	J	[kgcm²]	0.047
7.182	J	[kgcm²]	0.031
9.000	J	[kgcm²]	0.022
11.857	J	[kgcm²]	0.013

Gearbox			GST05
1.600	J	[kgcm²]	0.760
2.048	J	[kgcm²]	0.549
2.240	J	[kgcm²]	0.480
2.857	J	[kgcm²]	0.354
3.500	J	[kgcm²]	0.272
4.556	J	[kgcm²]	0.175
5.667	J	[kgcm²]	0.129
7.333	J	[kgcm²]	0.062
8.900	J	[kgcm²]	0.060
11.375	J	[kgcm²]	0.039

Gearbox			GST06
1.600	J	[kgcm²]	2.010
2.048	J	[kgcm²]	1.460
2.240	J	[kgcm²]	1.270
2.857	J	[kgcm²]	0.969
3.500	J	[kgcm²]	0.736
4.556	J	[kgcm²]	0.481
5.667	J	[kgcm²]	0.359
7.333	J	[kgcm²]	0.226
8.900	J	[kgcm²]	0.167
11.250	J	[kgcm²]	0.109

Gearbox			GST07
1.625	J	[kgcm²]	6.120
2.000	J	[kgcm²]	4.780
2.240	J	[kgcm²]	4.020
2.857	J	[kgcm²]	2.690
3.500	J	[kgcm²]	2.150
4.556	J	[kgcm²]	1.370
5.583	J	[kgcm²]	1.050
7.333	J	[kgcm²]	0.664
8.900	J	[kgcm²]	0.494
11.250	J	[kgcm²]	0.320

Gearbox			GST09
1.560	J	[kgcm²]	22.200
2.048	J	[kgcm²]	15.600
2.333	J	[kgcm²]	12.200
2.810	J	[kgcm²]	9.580
3.444	J	[kgcm²]	7.300
4.667	J	[kgcm²]	4.600
5.667	J	[kgcm²]	3.510
7.333	J	[kgcm²]	2.260
8.900	J	[kgcm²]	1.660
11.250	J	[kgcm²]	1.110

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.

Moments of inertia

GST□□-2

► Moment of inertia (J) depending on ratio i

Gearbox			GST03
2.597	J	[kgcm²]	0.260
3.413	J	[kgcm²]	0.169
4.368	J	[kgcm²]	0.117
5.312	J	[kgcm²]	0.179
5.965	J	[kgcm²]	0.173
6.982	J	[kgcm²]	0.122
7.840	J	[kgcm²]	0.119
8.935	J	[kgcm²]	0.089
10.033	J	[kgcm²]	0.086
11.429	J	[kgcm²]	0.059
12.833	J	[kgcm²]	0.057
14.836	J	[kgcm²]	0.041
16.660	J	[kgcm²]	0.040
19.013	J	[kgcm²]	0.028
21.350	J	[kgcm²]	0.027
24.595	J	[kgcm²]	0.019
27.618	J	[kgcm²]	0.019
32.000	J	[kgcm²]	0.012
35.933	J	[kgcm²]	0.012
41.455	J	[kgcm²]	0.008
46.550	J	[kgcm²]	0.008
52.909	J	[kgcm²]	0.005
59.413	J	[kgcm²]	0.005

Gearbox			GST04
2.956	J	[kgcm²]	0.337
3.333	J	[kgcm²]	0.324
4.053	J	[kgcm²]	0.312
4.571	J	[kgcm²]	0.300
5.187	J	[kgcm²]	0.222
5.850	J	[kgcm²]	0.215
6.400	J	[kgcm²]	0.189
7.040	J	[kgcm²]	0.264
8.000	J	[kgcm²]	0.257
9.010	J	[kgcm²]	0.193
9.856	J	[kgcm²]	0.170
11.200	J	[kgcm²]	0.166
12.571	J	[kgcm²]	0.126
14.286	J	[kgcm²]	0.123
15.400	J	[kgcm²]	0.098
17.500	J	[kgcm²]	0.097
19.360	J	[kgcm²]	0.063
22.000	J	[kgcm²]	0.062
24.933	J	[kgcm²]	0.044
28.333	J	[kgcm²]	0.043
31.600	J	[kgcm²]	0.030
35.909	J	[kgcm²]	0.030
39.600	J	[kgcm²]	0.021
45.000	J	[kgcm²]	0.021
52.171	J	[kgcm²]	0.013
59.286	J	[kgcm²]	0.013

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.

Moments of inertia

GST□□-2

► Moment of inertia (J) depending on ratio i

Gearbox			GST05
2.956	J	[kgcm²]	0.986
3.333	J	[kgcm²]	0.944
4.053	J	[kgcm²]	0.903
4.571	J	[kgcm²]	0.864
5.187	J	[kgcm²]	0.637
5.850	J	[kgcm²]	0.613
6.400	J	[kgcm²]	0.533
7.238	J	[kgcm²]	0.400
8.163	J	[kgcm²]	0.388
9.010	J	[kgcm²]	0.543
10.000	J	[kgcm²]	0.300
11.200	J	[kgcm²]	0.462
13.016	J	[kgcm²]	0.178
14.356	J	[kgcm²]	0.131
16.190	J	[kgcm²]	0.128
17.500	J	[kgcm²]	0.271
20.044	J	[kgcm²]	0.164
22.778	J	[kgcm²]	0.161
24.933	J	[kgcm²]	0.119
28.333	J	[kgcm²]	0.117
32.267	J	[kgcm²]	0.079
36.667	J	[kgcm²]	0.078
39.160	J	[kgcm²]	0.058
44.500	J	[kgcm²]	0.057
50.050	J	[kgcm²]	0.039
56.875	J	[kgcm²]	0.038

Gearbox			GST06
3.033	J	[kgcm²]	2.720
3.333	J	[kgcm²]	2.610
4.160	J	[kgcm²]	2.510
4.571	J	[kgcm²]	2.410
5.324	J	[kgcm²]	1.760
5.850	J	[kgcm²]	1.710
6.400	J	[kgcm²]	1.470
7.040	J	[kgcm²]	2.070
8.163	J	[kgcm²]	1.060
9.010	J	[kgcm²]	1.500
10.000	J	[kgcm²]	0.820
11.200	J	[kgcm²]	1.260
12.571	J	[kgcm²]	0.955
14.286	J	[kgcm²]	0.932
15.400	J	[kgcm²]	0.748
17.500	J	[kgcm²]	0.733
20.044	J	[kgcm²]	0.457
22.778	J	[kgcm²]	0.450
24.933	J	[kgcm²]	0.332
28.333	J	[kgcm²]	0.326
32.267	J	[kgcm²]	0.221
36.667	J	[kgcm²]	0.218
39.160	J	[kgcm²]	0.162
44.500	J	[kgcm²]	0.160
49.500	J	[kgcm²]	0.110
56.250	J	[kgcm²]	0.108

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.

Moments of inertia

GST□□-2

► Moment of inertia (J) depending on ratio i

Gearbox			GST07
3.048	J	[kgcm²]	8.200
3.350	J	[kgcm²]	7.920
4.225	J	[kgcm²]	7.650
4.643	J	[kgcm²]	7.390
5.200	J	[kgcm²]	5.640
5.714	J	[kgcm²]	5.460
6.400	J	[kgcm²]	4.490
7.150	J	[kgcm²]	6.270
8.125	J	[kgcm²]	6.040
8.800	J	[kgcm²]	4.730
9.856	J	[kgcm²]	3.900
11.200	J	[kgcm²]	3.780
12.571	J	[kgcm²]	2.860
14.286	J	[kgcm²]	2.790
15.400	J	[kgcm²]	2.260
17.500	J	[kgcm²]	2.210
20.044	J	[kgcm²]	1.380
22.778	J	[kgcm²]	1.350
24.567	J	[kgcm²]	1.020
27.917	J	[kgcm²]	1.010
32.267	J	[kgcm²]	0.664
36.667	J	[kgcm²]	0.653
39.160	J	[kgcm²]	0.487
44.500	J	[kgcm²]	0.479
49.500	J	[kgcm²]	0.330
56.250	J	[kgcm²]	0.325

Gearbox			GST09
4.056	J	[kgcm²]	27.000
4.457	J	[kgcm²]	25.900
5.324	J	[kgcm²]	18.100
5.850	J	[kgcm²]	17.500
6.667	J	[kgcm²]	14.200
7.305	J	[kgcm²]	11.300
8.027	J	[kgcm²]	11.000
9.010	J	[kgcm²]	15.200
10.267	J	[kgcm²]	12.400
11.667	J	[kgcm²]	12.100
12.362	J	[kgcm²]	9.790
14.048	J	[kgcm²]	9.530
15.156	J	[kgcm²]	7.650
17.222	J	[kgcm²]	7.490
20.533	J	[kgcm²]	4.500
23.333	J	[kgcm²]	4.410
24.933	J	[kgcm²]	3.380
28.333	J	[kgcm²]	3.320
32.267	J	[kgcm²]	2.250
36.667	J	[kgcm²]	2.210
39.160	J	[kgcm²]	1.640
44.500	J	[kgcm²]	1.620
49.500	J	[kgcm²]	1.120
56.250	J	[kgcm²]	1.100

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.

Moments of inertia

GST□□-2

► Moment of inertia (J) depending on ratio i

Gearbox			GST11
4.056	J	[kgcm²]	82.200
4.457	J	[kgcm²]	79.000
5.324	J	[kgcm²]	55.400
5.850	J	[kgcm²]	53.500
6.400	J	[kgcm²]	45.700
6.864	J	[kgcm²]	67.500
7.800	J	[kgcm²]	65.100
9.010	J	[kgcm²]	46.800
9.856	J	[kgcm²]	40.200
11.200	J	[kgcm²]	39.000
12.571	J	[kgcm²]	29.400
14.286	J	[kgcm²]	28.700
15.400	J	[kgcm²]	23.000
17.500	J	[kgcm²]	22.500
20.289	J	[kgcm²]	14.300
23.056	J	[kgcm²]	14.100
24.933	J	[kgcm²]	10.600
28.333	J	[kgcm²]	10.400
32.267	J	[kgcm²]	7.040
36.667	J	[kgcm²]	6.930
39.160	J	[kgcm²]	5.150
44.500	J	[kgcm²]	5.080
49.500	J	[kgcm²]	3.520
56.250	J	[kgcm²]	3.440

Gearbox			GST14
4.225	J	[kgcm²]	226.000
4.643	J	[kgcm²]	216.000
5.200	J	[kgcm²]	168.000
5.714	J	[kgcm²]	161.000
6.286	J	[kgcm²]	141.000
7.150	J	[kgcm²]	183.000
8.027	J	[kgcm²]	100.000
8.800	J	[kgcm²]	139.000
9.841	J	[kgcm²]	75.100
11.000	J	[kgcm²]	119.000
12.362	J	[kgcm²]	89.000
14.048	J	[kgcm²]	86.600
15.156	J	[kgcm²]	67.600
17.222	J	[kgcm²]	66.000
20.044	J	[kgcm²]	45.800
22.778	J	[kgcm²]	44.900
24.567	J	[kgcm²]	33.200
27.917	J	[kgcm²]	32.600
32.267	J	[kgcm²]	21.500
36.667	J	[kgcm²]	21.200
39.160	J	[kgcm²]	15.700
44.500	J	[kgcm²]	15.500
49.500	J	[kgcm²]	10.600
56.250	J	[kgcm²]	10.500

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.

Moments of inertia

GST□□-3

► Moment of inertia (J) depending on ratio i

Gearbox			GST05
36.267	J	[kgcm²]	0.195
46.259	J	[kgcm²]	0.141
56.667	J	[kgcm²]	0.108
63.467	J	[kgcm²]	0.192
71.238	J	[kgcm²]	0.073
80.952	J	[kgcm²]	0.139
91.746	J	[kgcm²]	0.050
99.167	J	[kgcm²]	0.107
116.277	J	[kgcm²]	0.033
124.667	J	[kgcm²]	0.072
145.714	J	[kgcm²]	0.023
160.556	J	[kgcm²]	0.050
179.067	J	[kgcm²]	0.033
191.973	J	[kgcm²]	0.014
224.400	J	[kgcm²]	0.023
255.000	J	[kgcm²]	0.023
295.638	J	[kgcm²]	0.014
335.952	J	[kgcm²]	0.014

Gearbox			GST06
39.200	J	[kgcm²]	0.362
44.000	J	[kgcm²]	0.195
51.022	J	[kgcm²]	0.320
53.900	J	[kgcm²]	0.178
67.760	J	[kgcm²]	0.114
70.156	J	[kgcm²]	0.160
80.952	J	[kgcm²]	0.203
87.267	J	[kgcm²]	0.150
99.167	J	[kgcm²]	0.150
109.707	J	[kgcm²]	0.096
124.667	J	[kgcm²]	0.096
141.289	J	[kgcm²]	0.063
160.556	J	[kgcm²]	0.063
179.067	J	[kgcm²]	0.043
203.485	J	[kgcm²]	0.042
231.733	J	[kgcm²]	0.040
255.000	J	[kgcm²]	0.029
290.400	J	[kgcm²]	0.027
330.000	J	[kgcm²]	0.027
382.590	J	[kgcm²]	0.026
434.762	J	[kgcm²]	0.025

Gearbox			GST07
39.200	J	[kgcm²]	0.974
44.000	J	[kgcm²]	0.534
51.022	J	[kgcm²]	0.843
53.900	J	[kgcm²]	0.484
65.079	J	[kgcm²]	0.313
70.156	J	[kgcm²]	0.431
79.762	J	[kgcm²]	0.536
85.983	J	[kgcm²]	0.400
97.708	J	[kgcm²]	0.399
111.915	J	[kgcm²]	0.238
127.176	J	[kgcm²]	0.237
139.211	J	[kgcm²]	0.166
158.194	J	[kgcm²]	0.166
180.156	J	[kgcm²]	0.108
204.722	J	[kgcm²]	0.107
236.622	J	[kgcm²]	0.101
248.458	J	[kgcm²]	0.077
268.889	J	[kgcm²]	0.101
326.333	J	[kgcm²]	0.073
367.033	J	[kgcm²]	0.094
417.083	J	[kgcm²]	0.067

Gearbox			GST09
40.136	J	[kgcm²]	2.140
43.267	J	[kgcm²]	1.550
49.167	J	[kgcm²]	1.530
53.044	J	[kgcm²]	1.380
60.278	J	[kgcm²]	1.370
71.867	J	[kgcm²]	1.170
81.667	J	[kgcm²]	1.160
93.541	J	[kgcm²]	0.706
99.167	J	[kgcm²]	1.070
113.585	J	[kgcm²]	0.652
129.074	J	[kgcm²]	0.649
141.289	J	[kgcm²]	0.458
160.556	J	[kgcm²]	0.456
182.844	J	[kgcm²]	0.297
207.778	J	[kgcm²]	0.295
236.622	J	[kgcm²]	0.275
252.167	J	[kgcm²]	0.212
268.889	J	[kgcm²]	0.275
326.333	J	[kgcm²]	0.198
363.000	J	[kgcm²]	0.255
412.500	J	[kgcm²]	0.183

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.

Moments of inertia

GST□□-3

► Moment of inertia (J) depending on ratio i

Gearbox			GST11
40.816	J	[kgcm²]	6.360
44.000	J	[kgcm²]	5.660
50.000	J	[kgcm²]	5.600
57.968	J	[kgcm²]	4.770
61.250	J	[kgcm²]	4.080
71.011	J	[kgcm²]	3.520
80.694	J	[kgcm²]	3.500
87.267	J	[kgcm²]	3.220
99.167	J	[kgcm²]	3.200
112.933	J	[kgcm²]	2.930
129.074	J	[kgcm²]	1.940
146.993	J	[kgcm²]	1.770
158.194	J	[kgcm²]	1.400
180.156	J	[kgcm²]	1.290
207.778	J	[kgcm²]	0.880
236.622	J	[kgcm²]	0.818
252.167	J	[kgcm²]	0.633
268.889	J	[kgcm²]	0.816
326.333	J	[kgcm²]	0.589
363.000	J	[kgcm²]	0.756
412.500	J	[kgcm²]	0.545

Gearbox			GST14
40.185	J	[kgcm²]	24.400
42.580	J	[kgcm²]	18.300
48.386	J	[kgcm²]	18.100
53.148	J	[kgcm²]	20.500
59.321	J	[kgcm²]	13.200
69.042	J	[kgcm²]	11.500
78.457	J	[kgcm²]	11.400
93.541	J	[kgcm²]	6.570
96.157	J	[kgcm²]	10.400
106.296	J	[kgcm²]	6.520
130.278	J	[kgcm²]	6.000
139.211	J	[kgcm²]	4.420
158.194	J	[kgcm²]	4.400
171.111	J	[kgcm²]	5.490
204.722	J	[kgcm²]	2.860
236.622	J	[kgcm²]	2.650
248.458	J	[kgcm²]	2.060
268.889	J	[kgcm²]	2.650
326.333	J	[kgcm²]	1.920
363.000	J	[kgcm²]	2.450
412.500	J	[kgcm²]	1.780

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.

Weights, 4-pole motors

1-stage gearboxes

				m500				
				-P132L4	-P132M4	-P160L4	-P160M4	-P180L4 -P180M4
GST	GST06	m	[kg]		71			
	GST07	m	[kg]	92	80			
	GST09	m	[kg]	105	93	155	144	193

2-stage gearboxes

				m500						
				-P132L4	-P132M4	-P160L4	-P160M4	-P180L4 -P180M4	-P180V4	-P225M4
GST	GST06	m	[kg]	89	77					
	GST07	m	[kg]	102	90		142			
	GST09	m	[kg]	126	114	176	165	214		
	GST11	m	[kg]	164	152	214	203	252		
	GST14	m	[kg]	240	228	290	279	328	356	454

3-stage gearboxes

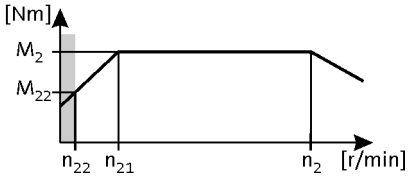
				m500				
				-P132L4	-P132M4	-P160L4	-P160M4	-P180M4
GST	GST09	m	[kg]		126			
	GST11	m	[kg]	186	174			
	GST14	m	[kg]	280	268	330	319	368

► Weights with oil filling for mounting position A; all values are approximate.
The weights relate to the basic version. Bear in mind that additional weights may be needed, e.g. for motor options.

Additional weights for gearboxes

Product	Mass	
	Foot	Flange
	m	m
	[kg]	[kg]
GST06	2.70	3.00
GST07	4.40	4.00
GST09	8.50	7.00
GST11	14.9	10.5
GST14	28.0	15.5

Selection tables, 4-pole motors



50 Hz: P_N = 5.5 kW
87 Hz: P_N = 9.6 kW

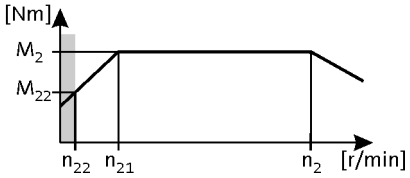
1-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
913	57	1.1	91	35	375	57	913	57	1.1	1606	56	0.9	1.600	GST06	-P132M4	51
899	58	1.8	89	36	369	58	899	58	1.8				1.625	GST07	-P132M4	57
730	71	1.8	73	44	300	71	730	71	1.8				2.000	GST07	-P132M4	57
713	73	1.0	71	45	293	73	713	73	1.0				2.048	GST06	-P132M4	51
652	79	1.7	65	49	268	79	652	79	1.7				2.240	GST07	-P132M4	57
511	101	1.6	51	63	210	101	511	101	1.6				2.857	GST07	-P132M4	57
417	124	1.4	41	77	171	124	417	124	1.4				3.500	GST07	-P132M4	57
321	161	1.2	32	100	132	161	321	161	1.2				4.556	GST07	-P132M4	57
313	165	2.3	31	103	129	165	313	165	2.3				4.667	GST09	-P132M4	63
258	201	2.3	26	125	106	201	258	201	2.3				5.667	GST09	-P132M4	63

2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
481	106	1.6	48	66	198	106	481	106	1.6				3.033	GST06	-P132M4	54
438	116	1.5	44	72	180	116	438	116	1.5				3.333	GST06	-P132M4	54
436	117	3.1	43	73	179	117	436	117	3.1				3.350	GST07	-P132M4	60
351	145	1.3	35	90	144	145	351	145	1.3				4.160	GST06	-P132M4	54
346	147	2.7	34	92	142	147	346	147	2.7				4.225	GST07	-P132M4	60
319	160	1.3	32	99	131	160	319	160	1.3				4.571	GST06	-P132M4	54
315	162	2.6	31	101	129	162	315	162	2.6				4.643	GST07	-P132M4	60
281	181	2.4	28	113	115	181	281	181	2.4				5.200	GST07	-P132M4	60
274	186	1.1	27	115	113	186	274	186	1.1				5.324	GST06	-P132M4	54
256	199	2.3	25	124	105	199	256	199	2.3				5.714	GST07	-P132M4	60
250	204	1.1	25	127	103	204	250	204	1.1				5.850	GST06	-P132M4	54
228	223	1.0	23	139	94	223	228	223	1.0				6.400	GST06	-P132M4	54
228	223	2.1	23	139	94	223	228	223	2.1				6.400	GST07	-P132M4	60
204	250	2.0	20	155	84	250	204	250	2.0				7.150	GST07	-P132M4	60
180	284	1.9	18	176	74	284	180	284	1.9				8.125	GST07	-P132M4	60
166	307	1.7	17	191	68	307	166	307	1.7				8.800	GST07	-P132M4	60
148	344	1.6	15	213	61	344	148	344	1.6				9.856	GST07	-P132M4	60
130	391	1.5	13	243	54	391	130	391	1.5				11.200	GST07	-P132M4	60
125	407	3.0	12	253	51	407	125	407	3.0				11.667	GST09	-P132M4	66
118	431	2.9	12	268	49	431	118	431	2.9				12.362	GST09	-P132M4	66
116	439	1.4	12	272	48	439	116	439	1.4				12.571	GST07	-P132M4	60
104	490	2.6	10	304	43	490	104	490	2.6				14.048	GST09	-P132M4	66
102	499	1.3	10	309	42	499	102	499	1.3				14.286	GST07	-P132M4	60
96	529	2.5	9.6	328	40	529	96	529	2.5				15.156	GST09	-P132M4	66
95	537	1.2	9.4	333	39	537	95	537	1.2				15.400	GST07	-P132M4	60

Selection tables, 4-pole motors



50 Hz: P_N = 5.5 kW
87 Hz: P_N = 9.6 kW

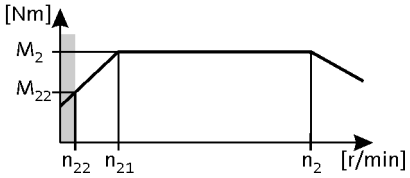
2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
85	601	2.3	8.4	373	35	601	85	601	2.3				17.222	GST09	-P132M4	66
83	611	1.1	8.3	379	34	611	83	611	1.1				17.500	GST07	-P132M4	60
71	717	2.1	7.1	445	29	717	71	717	2.1				20.533	GST09	-P132M4	66
63	814	1.9	6.2	505	26	814	63	814	1.9				23.333	GST09	-P132M4	66
59	870	3.2	5.8	540	24	870	59	870	3.2				24.933	GST11	-P132M4	72
59	870	1.8	5.8	540	24	870	59	870	1.8				24.933	GST09	-P132M4	66
52	989	3.0	5.1	613	21	989	52	989	3.0				28.333	GST11	-P132M4	72
52	989	1.5	5.1	613	21	989	52	989	1.5				28.333	GST09	-P132M4	66
45	1126	2.5	4.5	699	19	1126	45	1126	2.5				32.267	GST11	-P132M4	72
40	1280	2.3	4.0	794	16	1280	40	1280	2.3				36.667	GST11	-P132M4	72
37	1367	2.1	3.7	848	15	1367	37	1367	2.1				39.160	GST11	-P132M4	72
33	1553	1.9	3.3	963	14	1553	33	1553	1.9				44.500	GST11	-P132M4	72
30	1728	2.5	2.9	1072	12	1728	30	1728	2.5				49.500	GST14	-P132M4	78
26	1963	2.5	2.6	1218	11	1963	26	1963	2.5				56.250	GST14	-P132M4	78

3-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
36	1382	3.2	3.6	857	15	1382	36	1382	3.2				40.185	GST14	-P132M4	81
36	1403	1.8	3.6	870	15	1403	36	1403	1.8				40.816	GST11	-P132M4	75
34	1464	2.9	3.4	908	14	1464	34	1464	2.9				42.580	GST14	-P132M4	81
33	1513	1.6	3.3	938	14	1513	33	1513	1.6				44.000	GST11	-P132M4	75
30	1663	2.9	3.0	1032	12	1663	30	1663	2.9				48.386	GST14	-P132M4	81
29	1719	1.6	2.9	1066	12	1719	29	1719	1.6				50.000	GST11	-P132M4	75
28	1827	2.6	2.7	1133	11	1827	28	1827	2.6				53.148	GST14	-P132M4	81
25	1993	1.3	2.5	1236	10	1993	25	1993	1.3				57.968	GST11	-P132M4	75
25	2039	2.6	2.4	1265	10	2039	25	2039	2.6				59.321	GST14	-P132M4	81
24	2106	1.3	2.4	1306	9.8	2106	24	2106	1.3				61.250	GST11	-P132M4	75
21	2374	2.1	2.1	1472	8.7	2374	21	2374	2.1				69.042	GST14	-P132M4	81
21	2441	1.1	2.0	1514	8.4	2441	21	2441	1.1				71.011	GST11	-P132M4	75
19	2697	2.1	1.8	1673	7.6	2697	19	2697	2.1				78.457	GST14	-P132M4	81
18	2774	1.0	1.8	1721	7.4	2774	18	2774	1.0				80.694	GST11	-P132M4	75
16	3216	1.7	1.6	1995	6.4	3216	16	3216	1.7				93.541	GST14	-P132M4	81
15	3306	1.8	1.5	2050	6.2	3306	15	3306	1.8				96.157	GST14	-P132M4	81
14	3654	1.6	1.4	2267	5.6	3654	14	3654	1.6				106.296	GST14	-P132M4	81
11	4479	1.3	1.1	2778	4.6	4479	11	4479	1.3				130.278	GST14	-P132M4	81
11	4786	1.2	1.0	2969	4.3	4786	11	4786	1.2				139.211	GST14	-P132M4	81
9.2	5439	1.1	0.9	3373	3.8	5439	9.2	5439	1.1				158.194	GST14	-P132M4	81
8.5	5883	1.0	0.8	3649	3.5	5883	8.5	5883	1.0				171.111	GST14	-P132M4	81

Selection tables, 4-pole motors



50 Hz: P_N = 7.5 kW
87 Hz: P_N = 13.1 kW

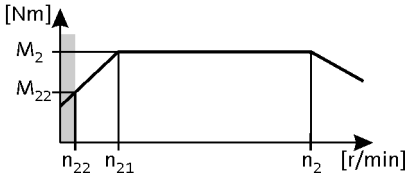
1-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
909	78	1.4	89	49	369	78	909	78	1.4				1.625	GST07	-P132L4	57
739	96	1.3	73	61	300	96	739	96	1.3				2.000	GST07	-P132L4	57
659	107	1.3	65	68	268	107	659	107	1.3				2.240	GST07	-P132L4	57
526	134	3.1	52	85	214	134	526	134	3.1				2.810	GST09	-P132L4	63
517	136	1.2	51	86	210	136	517	136	1.2				2.857	GST07	-P132L4	57
429	165	2.7	42	104	174	165	429	165	2.7				3.444	GST09	-P132L4	63
422	167	1.0	41	106	171	167	422	167	1.0				3.500	GST07	-P132L4	57
317	223	1.7	31	141	129	223	317	223	1.7				4.667	GST09	-P132L4	63
261	271	1.7	26	171	106	271	261	271	1.7				5.667	GST09	-P132L4	63

2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
487	143	1.2	48	90	198	143	487	143	1.2				3.033	GST06	-P132L4	54
485	143	2.5	48	91	197	143	485	143	2.5				3.048	GST07	-P132L4	60
443	157	1.1	44	99	180	157	443	157	1.1				3.333	GST06	-P132L4	54
441	158	2.3	43	100	179	158	441	158	2.3				3.350	GST07	-P132L4	60
350	199	2.0	34	126	142	199	350	199	2.0				4.225	GST07	-P132L4	60
318	218	1.9	31	138	129	218	318	218	1.9				4.643	GST07	-P132L4	60
284	245	1.8	28	155	115	245	284	245	1.8				5.200	GST07	-P132L4	60
259	269	1.7	25	170	105	269	259	269	1.7				5.714	GST07	-P132L4	60
231	301	1.5	23	191	94	301	231	301	1.5				6.400	GST07	-P132L4	60
207	336	1.5	20	213	84	336	207	336	1.5				7.150	GST07	-P132L4	60
202	344	3.2	20	218	82	344	202	344	3.2				7.305	GST09	-P132L4	66
184	378	3.0	18	239	75	378	184	378	3.0				8.027	GST09	-P132L4	66
182	382	1.4	18	242	74	382	182	382	1.4				8.125	GST07	-P132L4	60
168	414	1.3	17	262	68	414	168	414	1.3				8.800	GST07	-P132L4	60
164	424	2.7	16	268	67	424	164	424	2.7				9.010	GST09	-P132L4	66
150	464	1.2	15	294	61	464	150	464	1.2				9.856	GST07	-P132L4	60
144	483	2.4	14	306	58	483	144	483	2.4				10.267	GST09	-P132L4	66
132	527	1.1	13	334	54	527	132	527	1.1				11.200	GST07	-P132L4	60
127	549	2.2	12	347	51	549	127	549	2.2				11.667	GST09	-P132L4	66
120	582	2.2	12	368	49	582	120	582	2.2				12.362	GST09	-P132L4	66
118	591	1.0	12	374	48	591	118	591	1.0				12.571	GST07	-P132L4	60
105	661	1.9	10	418	43	661	105	661	1.9				14.048	GST09	-P132L4	66
98	713	1.9	9.6	451	40	713	98	713	1.9				15.156	GST09	-P132L4	66
86	810	1.7	8.4	513	35	810	86	810	1.7				17.222	GST09	-P132L4	66
73	955	2.9	7.1	604	30	955	73	955	2.9				20.289	GST11	-P132L4	72
72	966	1.5	7.1	611	29	966	72	966	1.5				20.533	GST09	-P132L4	66

Selection tables, 4-pole motors



50 Hz: P_N = 7.5 kW
87 Hz: P_N = 13.1 kW

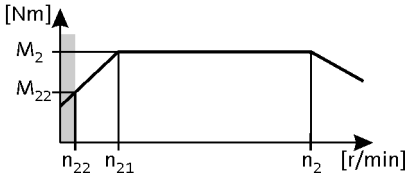
2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
64	1085	2.7	6.3	687	26	1085	64	1085	2.7				23.056	GST11	-P132L4	72
63	1098	1.4	6.2	695	26	1098	63	1098	1.4				23.333	GST09	-P132L4	66
59	1173	2.4	5.8	742	24	1173	59	1173	2.4				24.933	GST11	-P132L4	72
59	1173	1.4	5.8	742	24	1173	59	1173	1.4				24.933	GST09	-P132L4	66
52	1333	2.2	5.1	844	21	1333	52	1333	2.2				28.333	GST11	-P132L4	72
52	1333	1.1	5.1	844	21	1333	52	1333	1.1				28.333	GST09	-P132L4	66
46	1518	1.9	4.5	961	19	1518	46	1518	1.9				32.267	GST11	-P132L4	72
46	1518	3.1	4.5	961	19	1518	46	1518	3.1				32.267	GST14	-P132L4	78
40	1725	1.7	4.0	1092	16	1725	40	1725	1.7				36.667	GST11	-P132L4	72
40	1725	3.1	4.0	1092	16	1725	40	1725	3.1				36.667	GST14	-P132L4	78
38	1842	1.5	3.7	1166	15	1842	38	1842	1.5				39.160	GST11	-P132L4	72
38	1842	2.6	3.7	1166	15	1842	38	1842	2.6				39.160	GST14	-P132L4	78
33	2094	1.4	3.3	1325	14	2094	33	2094	1.4				44.500	GST11	-P132L4	72
33	2094	2.6	3.3	1325	14	2094	33	2094	2.6				44.500	GST14	-P132L4	78

3-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
37	1862	2.4	3.6	1179	15	1862	37	1862	2.4				40.185	GST14	-P132L4	81
36	1891	1.4	3.6	1197	15	1891	36	1891	1.4				40.816	GST11	-P132L4	75
35	1973	2.2	3.4	1249	14	1973	35	1973	2.2				42.580	GST14	-P132L4	81
34	2039	1.2	3.3	1290	14	2039	34	2039	1.2				44.000	GST11	-P132L4	75
31	2242	2.2	3.0	1419	12	2242	31	2242	2.2				48.386	GST14	-P132L4	81
30	2317	1.2	2.9	1466	12	2317	30	2317	1.2				50.000	GST11	-P132L4	75
28	2463	1.9	2.7	1559	11	2463	28	2463	1.9				53.148	GST14	-P132L4	81
25	2749	1.9	2.4	1740	10	2749	25	2749	1.9				59.321	GST14	-P132L4	81
21	3199	1.5	2.1	2025	8.7	3199	21	3199	1.5				69.042	GST14	-P132L4	81
21	3291	0.8	2.0	2083	8.4	3291	21	3291	0.8				71.011	GST11	-P132L4	75
19	3636	1.5	1.8	2301	7.6	3636	19	3636	1.5				78.457	GST14	-P132L4	81
16	4335	1.3	1.6	2743	6.4	4335	16	4335	1.3				93.541	GST14	-P132L4	81
15	4456	1.3	1.5	2820	6.2	4456	15	4456	1.3				96.157	GST14	-P132L4	81
14	4926	1.2	1.4	3117	5.6	4926	14	4926	1.2				106.296	GST14	-P132L4	81

Selection tables, 4-pole motors



50 Hz: P_N = 11.0 kW
87 Hz: P_N = 19.2 kW

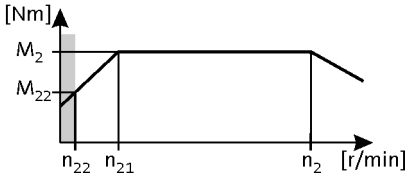
1-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
947	109	2.5	93	60	385	109	947	109	2.5				1.560	GST09	-P160M4	63
722	143	2.4	71	79	293	143	722	143	2.4				2.048	GST09	-P160M4	63
633	163	2.3	62	90	257	163	633	163	2.3				2.333	GST09	-P160M4	63
526	197	2.1	52	109	214	197	526	197	2.1				2.810	GST09	-P160M4	63
429	241	1.8	42	133	174	241	429	241	1.8				3.444	GST09	-P160M4	63

2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
485	210	1.7	48	116	197	210	485	210	1.7				3.048	GST07	-P160M4	60
441	231	1.6	43	128	179	231	441	231	1.6				3.350	GST07	-P160M4	60
364	280	3.1	36	155	148	280	364	280	3.1				4.056	GST09	-P160M4	66
350	291	1.4	34	161	142	291	350	291	1.4				4.225	GST07	-P160M4	60
332	307	3.0	33	170	135	307	332	307	3.0				4.457	GST09	-P160M4	66
318	320	1.3	31	177	129	320	318	320	1.3				4.643	GST07	-P160M4	60
284	359	1.2	28	198	115	359	284	359	1.2				5.200	GST07	-P160M4	60
278	367	2.7	27	203	113	367	278	367	2.7				5.324	GST09	-P160M4	66
259	394	1.1	25	218	105	394	259	394	1.1				5.714	GST07	-P160M4	60
253	403	2.5	25	223	103	403	253	403	2.5				5.850	GST09	-P160M4	66
231	441	1.1	23	244	94	441	231	441	1.1				6.400	GST07	-P160M4	60
222	460	2.3	22	254	90	460	222	460	2.3				6.667	GST09	-P160M4	66
202	504	2.2	20	279	82	504	202	504	2.2				7.305	GST09	-P160M4	66
184	554	2.1	18	306	75	554	184	554	2.1				8.027	GST09	-P160M4	66
164	621	1.8	16	344	67	621	164	621	1.8				9.010	GST09	-P160M4	66
144	708	1.7	14	392	58	708	144	708	1.7				10.267	GST09	-P160M4	66
132	772	3.1	13	427	54	772	132	772	3.1				11.200	GST11	-P160M4	72
127	804	1.5	12	445	51	804	127	804	1.5				11.667	GST09	-P160M4	66
120	852	1.5	12	472	49	852	120	852	1.5				12.362	GST09	-P160M4	66
118	867	2.9	12	480	48	867	118	867	2.9				12.571	GST11	-P160M4	72
105	969	1.3	10	536	43	969	105	969	1.3				14.048	GST09	-P160M4	66
104	985	2.6	10	545	42	985	104	985	2.6				14.286	GST11	-P160M4	72
98	1045	1.3	9.6	578	40	1045	98	1045	1.3				15.156	GST09	-P160M4	66
96	1062	2.5	9.4	588	39	1062	96	1062	2.5				15.400	GST11	-P160M4	72
86	1188	1.2	8.4	657	35	1188	86	1188	1.2				17.222	GST09	-P160M4	66
85	1207	2.3	8.3	668	34	1207	85	1207	2.3				17.500	GST11	-P160M4	72
73	1399	2.0	7.1	774	30	1399	73	1399	2.0				20.289	GST11	-P160M4	72
65	1571	3.2	6.4	869	26	1571	65	1571	3.2				22.778	GST14	-P160M4	78
64	1590	1.8	6.3	880	26	1590	64	1590	1.8				23.056	GST11	-P160M4	72
60	1694	3.1	5.9	937	24	1694	60	1694	3.1				24.567	GST14	-P160M4	78

Selection tables, 4-pole motors



50 Hz: P_N = 11.0 kW
87 Hz: P_N = 19.2 kW

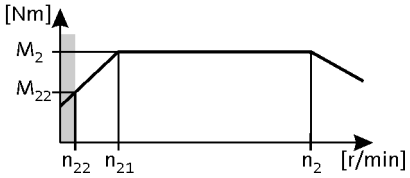
2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
59	1719	1.6	5.8	951	24	1719	59	1719	1.6				24.933	GST11	-P160M4	72
53	1925	2.8	5.2	1065	22	1925	53	1925	2.8				27.917	GST14	-P160M4	78
52	1954	1.5	5.1	1081	21	1954	52	1954	1.5				28.333	GST11	-P160M4	72
46	2225	2.4	4.5	1231	19	2225	46	2225	2.4				32.267	GST14	-P160M4	78
40	2528	2.3	4.0	1399	16	2528	40	2528	2.3				36.667	GST14	-P160M4	78
38	2700	2.0	3.7	1494	15	2700	38	2700	2.0				39.160	GST14	-P160M4	78
33	3068	1.9	3.3	1698	14	3068	33	3068	1.9				44.500	GST14	-P160M4	78

3-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
37	2729	1.6	3.6	1510	15	2729	37	2729	1.6				40.185	GST14	-P160M4	81
35	2892	1.5	3.4	1600	14	2892	35	2892	1.5				42.580	GST14	-P160M4	81
31	3286	1.5	3.0	1818	12	3286	31	3286	1.5				48.386	GST14	-P160M4	81
28	3610	1.3	2.7	1997	11	3610	28	3610	1.3				53.148	GST14	-P160M4	81
25	4029	1.3	2.4	2229	10	4029	25	4029	1.3				59.321	GST14	-P160M4	81
21	4689	1.1	2.1	2595	8.7	4689	21	4689	1.1				69.042	GST14	-P160M4	81
19	5329	1.1	1.8	2949	7.6	5329	19	5329	1.1				78.457	GST14	-P160M4	81

Selection tables, 4-pole motors



50 Hz: P_N = 15.0 kW
87 Hz: P_N = 26.3 kW

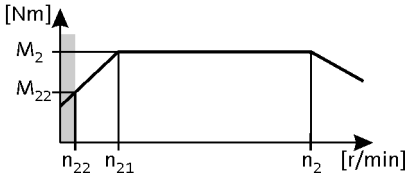
1-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product GST	m500	
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c				
942	150	1.9	93	82	385	150	942	150	1.9				1.560	GST09	-P160L4	63
718	197	1.7	71	108	293	197	718	197	1.7				2.048	GST09	-P160L4	63
630	224	1.7	62	123	257	224	630	224	1.7				2.333	GST09	-P160L4	63
523	270	1.6	52	148	214	270	523	270	1.6				2.810	GST09	-P160L4	63
427	331	1.3	42	182	174	331	427	331	1.3				3.444	GST09	-P160L4	63

2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product GST	m500	
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c				
362	383	2.3	36	211	148	383	362	383	2.3				4.056	GST09	-P160L4	66
330	421	2.2	33	232	135	421	330	421	2.2				4.457	GST09	-P160L4	66
276	503	3.2	27	277	113	503	276	503	3.2				5.324	GST11	-P160L4	72
276	503	2.0	27	277	113	503	276	503	2.0				5.324	GST09	-P160L4	66
251	553	3.2	25	304	103	553	251	553	3.2				5.850	GST11	-P160L4	72
251	553	1.8	25	304	103	553	251	553	1.8				5.850	GST09	-P160L4	66
230	605	3.0	23	333	94	605	230	605	3.0				6.400	GST11	-P160L4	72
221	630	1.7	22	347	90	630	221	630	1.7				6.667	GST09	-P160L4	66
214	649	3.2	21	357	87	649	214	649	3.2				6.864	GST11	-P160L4	72
201	691	1.6	20	380	82	691	201	691	1.6				7.305	GST09	-P160L4	66
189	737	2.9	19	405	77	737	189	737	2.9				7.800	GST11	-P160L4	72
183	759	1.5	18	417	75	759	183	759	1.5				8.027	GST09	-P160L4	66
163	852	2.7	16	468	67	852	163	852	2.7				9.010	GST11	-P160L4	72
163	852	1.3	16	468	67	852	163	852	1.3				9.010	GST09	-P160L4	66
149	932	2.5	15	512	61	932	149	932	2.5				9.856	GST11	-P160L4	72
143	971	1.2	14	534	58	971	143	971	1.2				10.267	GST09	-P160L4	66
131	1059	2.3	13	582	54	1059	131	1059	2.3				11.200	GST11	-P160L4	72
126	1103	1.1	12	606	51	1103	126	1103	1.1				11.667	GST09	-P160L4	66
119	1169	1.1	12	643	49	1169	119	1169	1.1				12.362	GST09	-P160L4	66
117	1189	2.1	12	653	48	1189	117	1189	2.1				12.571	GST11	-P160L4	72
105	1328	3.2	10	730	43	1328	105	1328	3.2				14.048	GST14	-P160L4	78
103	1351	1.9	10	743	42	1351	103	1351	1.9				14.286	GST11	-P160L4	72
97	1433	3.1	9.6	788	40	1433	97	1433	3.1				15.156	GST14	-P160L4	78
96	1456	1.9	9.4	800	39	1456	96	1456	1.9				15.400	GST11	-P160L4	72
85	1628	2.8	8.4	895	35	1628	85	1628	2.8				17.222	GST14	-P160L4	78
84	1654	1.7	8.3	910	34	1654	84	1654	1.7				17.500	GST11	-P160L4	72
73	1895	2.6	7.2	1042	30	1895	73	1895	2.6				20.044	GST14	-P160L4	78
73	1918	1.4	7.1	1055	30	1918	73	1918	1.4				20.289	GST11	-P160L4	72
65	2153	2.3	6.4	1184	26	2153	65	2153	2.3				22.778	GST14	-P160L4	78
64	2180	1.3	6.3	1198	26	2180	64	2180	1.3				23.056	GST11	-P160L4	72

Selection tables, 4-pole motors



50 Hz: P_N = 15.0 kW
87 Hz: P_N = 26.3 kW

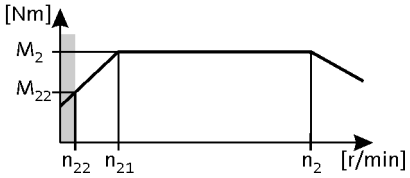
2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
60	2323	2.3	5.9	1277	24	2323	60	2323	2.3				24.567	GST14	-P160L4	78
59	2357	1.2	5.8	1296	24	2357	59	2357	1.2				24.933	GST11	-P160L4	72
53	2639	2.0	5.2	1451	22	2639	53	2639	2.0				27.917	GST14	-P160L4	78
52	2679	1.1	5.1	1473	21	2679	52	2679	1.1				28.333	GST11	-P160L4	72
46	3051	1.8	4.5	1677	19	3051	46	3051	1.8				32.267	GST14	-P160L4	78
40	3466	1.7	4.0	1906	16	3466	40	3466	1.7				36.667	GST14	-P160L4	78

3-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
37	3742	1.2	3.6	2057	15	3742	37	3742	1.2				40.185	GST14	-P160L4	81
35	3965	1.1	3.4	2180	14	3965	35	3965	1.1				42.580	GST14	-P160L4	81
30	4506	1.1	3.0	2477	12	4506	30	4506	1.1				48.386	GST14	-P160L4	81

Selection tables, 4-pole motors



50 Hz: P_N = 18.5 kW
87 Hz: P_N = 32.2 kW

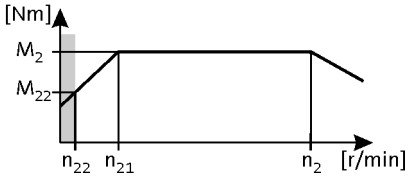
1-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
724	240	1.4	71	133	293	240	724	240	1.4				2.048	GST09	-P180M4	63
636	274	1.4	62	151	257	274	636	274	1.4				2.333	GST09	-P180M4	63
528	330	1.3	52	182	214	330	528	330	1.3				2.810	GST09	-P180M4	63
431	404	1.1	42	224	174	404	431	404	1.1				3.444	GST09	-P180M4	63

2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
366	469	3.2	36	259	148	469	366	469	3.2				4.056	GST11	-P180M4	72
366	469	1.9	36	259	148	469	366	469	1.9				4.056	GST09	-P180M4	66
333	515	3.1	33	285	135	515	333	515	3.1				4.457	GST11	-P180M4	72
333	515	1.8	33	285	135	515	333	515	1.8				4.457	GST09	-P180M4	66
279	615	2.6	27	340	113	615	279	615	2.6				5.324	GST11	-P180M4	72
279	615	1.6	27	340	113	615	279	615	1.6				5.324	GST09	-P180M4	66
254	676	2.6	25	374	103	676	254	676	2.6				5.850	GST11	-P180M4	72
254	676	1.5	25	374	103	676	254	676	1.5				5.850	GST09	-P180M4	66
232	740	2.4	23	409	94	740	232	740	2.4				6.400	GST11	-P180M4	72
222	771	1.4	22	426	90	771	222	771	1.4				6.667	GST09	-P180M4	66
203	844	1.3	20	467	82	844	203	844	1.3				7.305	GST09	-P180M4	66
185	928	1.2	18	513	75	928	185	928	1.2				8.027	GST09	-P180M4	66
165	1041	2.2	16	576	67	1041	165	1041	2.2				9.010	GST11	-P180M4	72
151	1137	3.2	15	629	61	1137	151	1137	3.2				9.841	GST14	-P180M4	78
151	1139	2.0	15	630	61	1139	151	1139	2.0				9.856	GST11	-P180M4	72
135	1271	3.1	13	703	55	1271	135	1271	3.1				11.000	GST14	-P180M4	78
132	1294	1.8	13	716	54	1294	132	1294	1.8				11.200	GST11	-P180M4	72
120	1429	2.9	12	790	49	1429	120	1429	2.9				12.362	GST14	-P180M4	78
118	1453	1.7	12	804	48	1453	118	1453	1.7				12.571	GST11	-P180M4	72
106	1624	2.6	10	898	43	1624	106	1624	2.6				14.048	GST14	-P180M4	78
104	1651	1.6	10	913	42	1651	104	1651	1.6				14.286	GST11	-P180M4	72
98	1752	2.6	9.6	969	40	1752	98	1752	2.6				15.156	GST14	-P180M4	78
96	1780	1.5	9.4	985	39	1780	96	1780	1.5				15.400	GST11	-P180M4	72
86	1991	2.3	8.4	1101	35	1991	86	1991	2.3				17.222	GST14	-P180M4	78
85	2023	1.4	8.3	1119	34	2023	85	2023	1.4				17.500	GST11	-P180M4	72
74	2317	2.1	7.2	1281	30	2317	74	2317	2.1				20.044	GST14	-P180M4	78
73	2345	1.2	7.1	1297	30	2345	73	2345	1.2				20.289	GST11	-P180M4	72
65	2633	1.9	6.4	1456	26	2633	65	2633	1.9				22.778	GST14	-P180M4	78
64	2665	1.1	6.3	1474	26	2665	64	2665	1.1				23.056	GST11	-P180M4	72
60	2839	1.8	5.9	1571	24	2839	60	2839	1.8				24.567	GST14	-P180M4	78
53	3227	1.7	5.2	1785	22	3227	53	3227	1.7				27.917	GST14	-P180M4	78

Selection tables, 4-pole motors

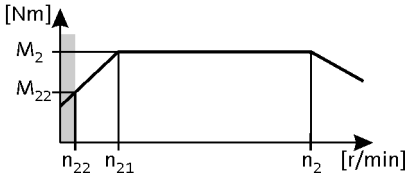


50 Hz: P_N = 18.5 kW
87 Hz: P_N = 32.2 kW

2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
46	3729	1.5	4.5	2063	19	3729	46	3729	1.5				32.267	GST14	-P180M4	78
40	4238	1.4	4.0	2344	16	4238	40	4238	1.4				36.667	GST14	-P180M4	78

Selection tables, 4-pole motors



50 Hz: P_N = 22.0 kW
87 Hz: P_N = 38.5 kW

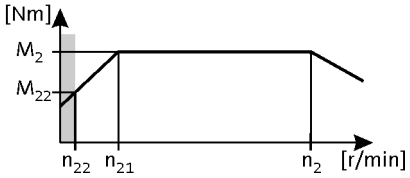
1-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
634	326	1.1	62	181	257	326	634	326	1.1				2.333	GST09	-P180L4	63
527	393	1.1	52	218	214	393	527	393	1.1				2.810	GST09	-P180L4	63

2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
278	733	2.2	27	406	113	733	278	733	2.2				5.324	GST11	-P180L4	72
278	733	1.4	27	406	113	733	278	733	1.4				5.324	GST09	-P180L4	66
253	806	2.2	25	446	103	806	253	806	2.2				5.850	GST11	-P180L4	72
236	866	3.1	23	479	96	866	236	866	3.1				6.286	GST14	-P180L4	78
231	881	2.0	23	488	94	881	231	881	2.0				6.400	GST11	-P180L4	72
222	918	1.2	22	508	90	918	222	918	1.2				6.667	GST09	-P180L4	66
203	1006	1.1	20	557	82	1006	203	1006	1.1				7.305	GST09	-P180L4	66
184	1106	2.9	18	612	75	1106	184	1106	2.9				8.027	GST14	-P180L4	78
184	1106	1.0	18	612	75	1106	184	1106	1.0				8.027	GST09	-P180L4	66
164	1241	1.8	16	687	67	1241	164	1241	1.8				9.010	GST11	-P180L4	72
150	1355	2.6	15	750	61	1355	150	1355	2.6				9.841	GST14	-P180L4	78
150	1357	1.7	15	752	61	1357	150	1357	1.7				9.856	GST11	-P180L4	72
120	1703	2.5	12	943	49	1703	120	1703	2.5				12.362	GST14	-P180L4	78
118	1731	1.5	12	959	48	1731	118	1731	1.5				12.571	GST11	-P180L4	72
105	1935	2.2	10	1071	43	1935	105	1935	2.2				14.048	GST14	-P180L4	78
104	1967	1.3	10	1089	42	1967	104	1967	1.3				14.286	GST11	-P180L4	72
98	2087	2.1	9.6	1156	40	2087	98	2087	2.1				15.156	GST14	-P180L4	78
96	2121	1.3	9.4	1174	39	2121	96	2121	1.3				15.400	GST11	-P180L4	72
86	2372	1.9	8.4	1313	35	2372	86	2372	1.9				17.222	GST14	-P180L4	78
85	2410	1.1	8.3	1335	34	2410	85	2410	1.1				17.500	GST11	-P180L4	72
74	2761	1.8	7.2	1529	30	2761	74	2761	1.8				20.044	GST14	-P180L4	78
65	3137	1.6	6.4	1737	26	3137	65	3137	1.6				22.778	GST14	-P180L4	78
60	3383	1.6	5.9	1873	24	3383	60	3383	1.6				24.567	GST14	-P180L4	78
53	3845	1.4	5.2	2129	22	3845	53	3845	1.4				27.917	GST14	-P180L4	78
46	4444	1.2	4.5	2461	19	4444	46	4444	1.2				32.267	GST14	-P180L4	78
40	5050	1.1	4.0	2796	16	5050	40	5050	1.1				36.667	GST14	-P180L4	78

Selection tables, 4-pole motors

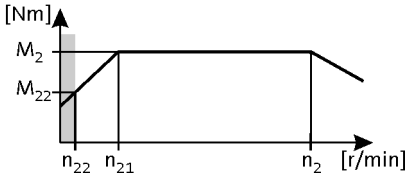


50 Hz: P_N = 30.0 kW
87 Hz: P_N = 52.5 kW

2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
184	1510	2.1	18	667	75	1510	184	1510	2.1				8.027	GST14	-P180V4	78
150	1851	1.9	15	817	61	1851	150	1851	1.9				9.841	GST14	-P180V4	78
120	2325	1.8	12	1026	49	2325	120	2325	1.8				12.362	GST14	-P180V4	78
98	2850	1.6	9.6	1258	40	2850	98	2850	1.6				15.156	GST14	-P180V4	78

Selection tables, 4-pole motors



50 Hz: P_N = 37.0 kW
87 Hz: P_N = 64.8 kW

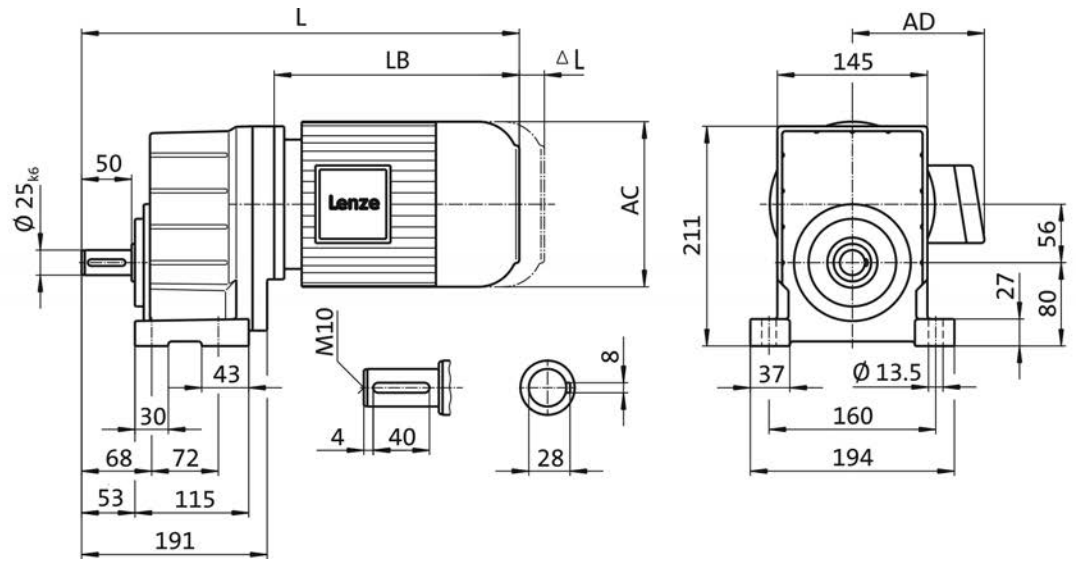
2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GST	m500	
185	1856	2.0	18	812	75	1856	185	1856	2.0				8.027	GST14	-P225M4	78
151	2275	1.7	15	996	61	2275	151	2275	1.7				9.841	GST14	-P225M4	78
74	4633	1.1	7.2	2028	30	4633	74	4633	1.1				20.044	GST14	-P225M4	78

Dimensions, 4-pole motors

GST06, 1-stage gearboxes

Dimensions with solid shaft and foot (VBR)

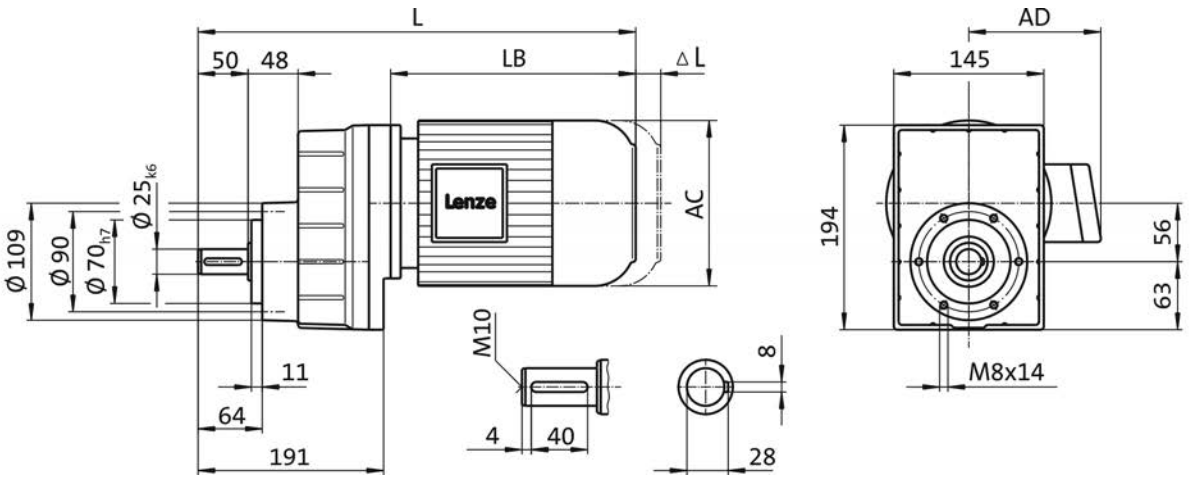


Product			m500
			-P132M4
Dimensions			
Total length	**L**	**[mm]**	650
Motor length	**LB**	**[mm]**	433.5
Length of motor options	**Δ L**	**[mm]**	200.5
Motor diameter	**AC**	**[mm]**	261
Distance motor/connection	**AD**	**[mm]**	182

Dimensions, 4-pole motors

GST06, 1-stage gearboxes

Dimensions with solid shaft and centering (VCR)

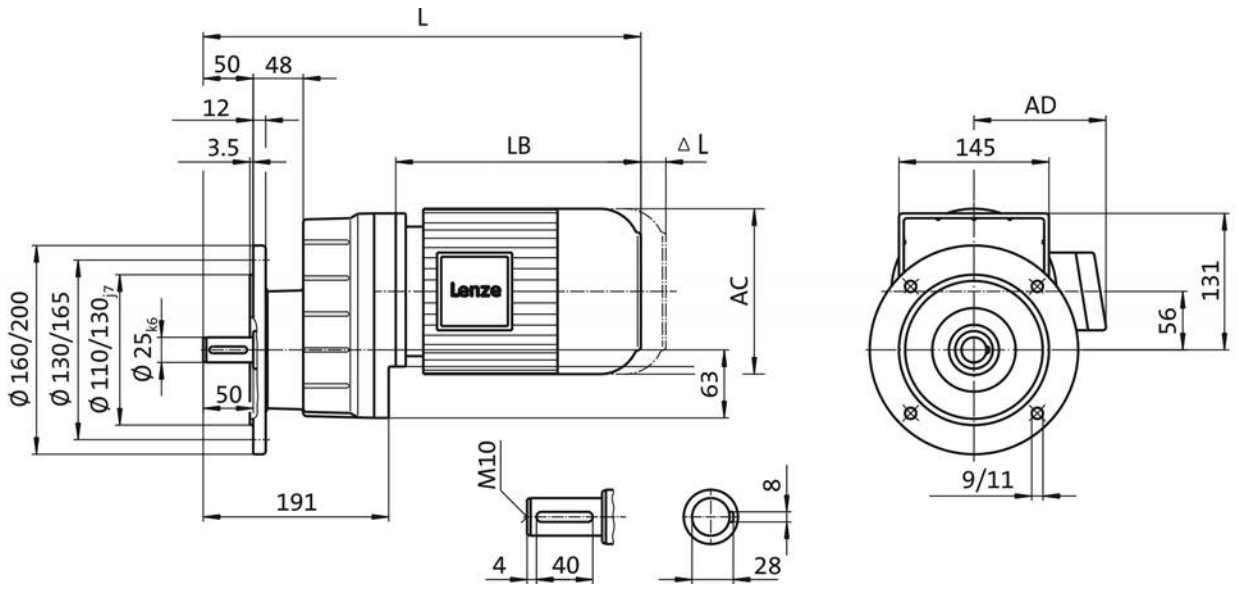


Product			m500
			-P132M4
Dimensions			
Total length	**L**	**[mm]**	650
Motor length	**LB**	**[mm]**	433.5
Length of motor options	**Δ L**	**[mm]**	200.5
Motor diameter	**AC**	**[mm]**	261
Distance motor/connection	**AD**	**[mm]**	182

Dimensions, 4-pole motors

GST06, 1-stage gearboxes

Dimensions with solid shaft and flange (VCK)

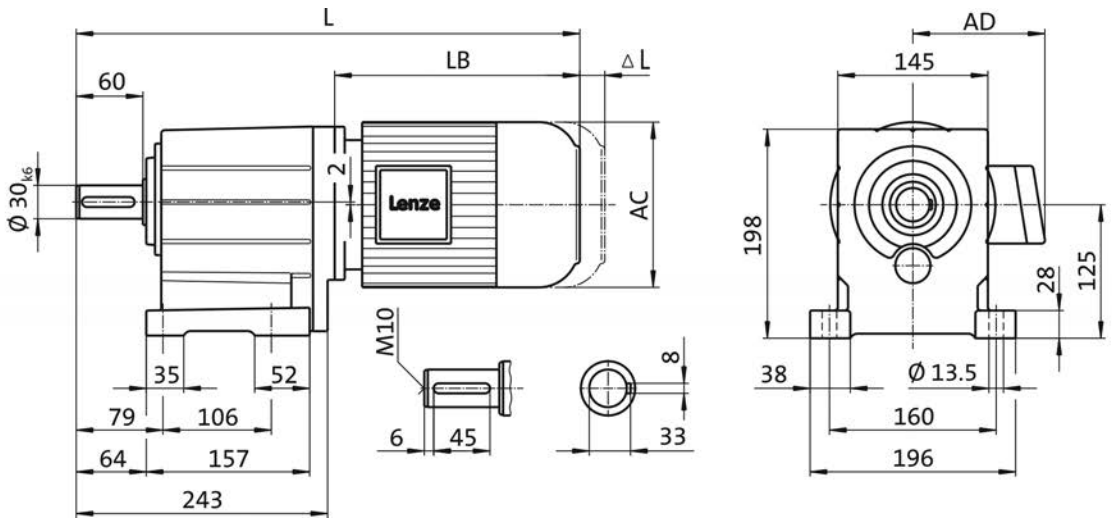


Product			m500
			-P132M4
Dimensions			
Total length	**L**	**[mm]**	650
Motor length	**LB**	**[mm]**	433.5
Length of motor options	**Δ L**	**[mm]**	200.5
Motor diameter	**AC**	**[mm]**	261
Distance motor/connection	**AD**	**[mm]**	182

Dimensions, 4-pole motors

GST06, 2-stage gearboxes

Dimensions with solid shaft and foot (VBR)

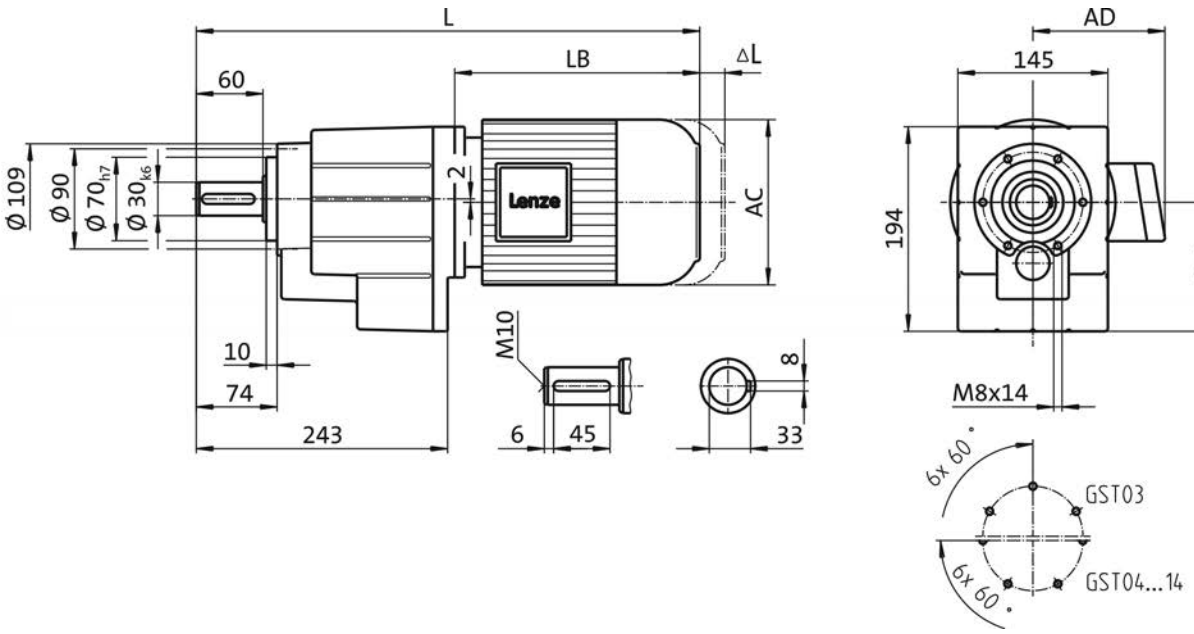


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	702	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GST06, 2-stage gearboxes

Dimensions with solid shaft and centering (VCR)

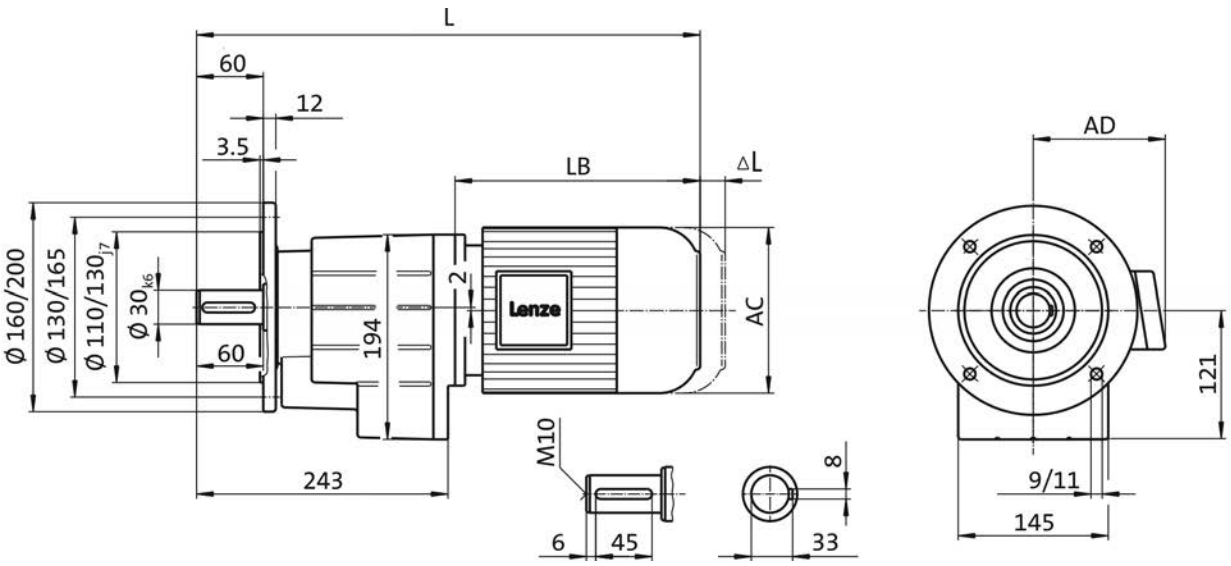


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	702	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GST06, 2-stage gearboxes

Dimensions with solid shaft and flange (VCK)

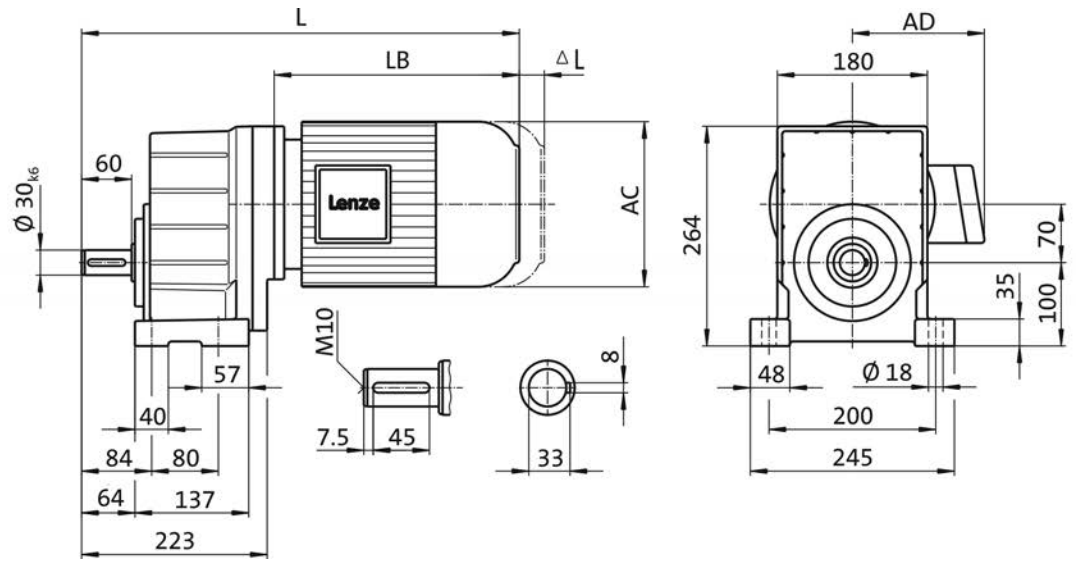


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	702	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GST07, 1-stage gearboxes

Dimensions with solid shaft and foot (VBR)

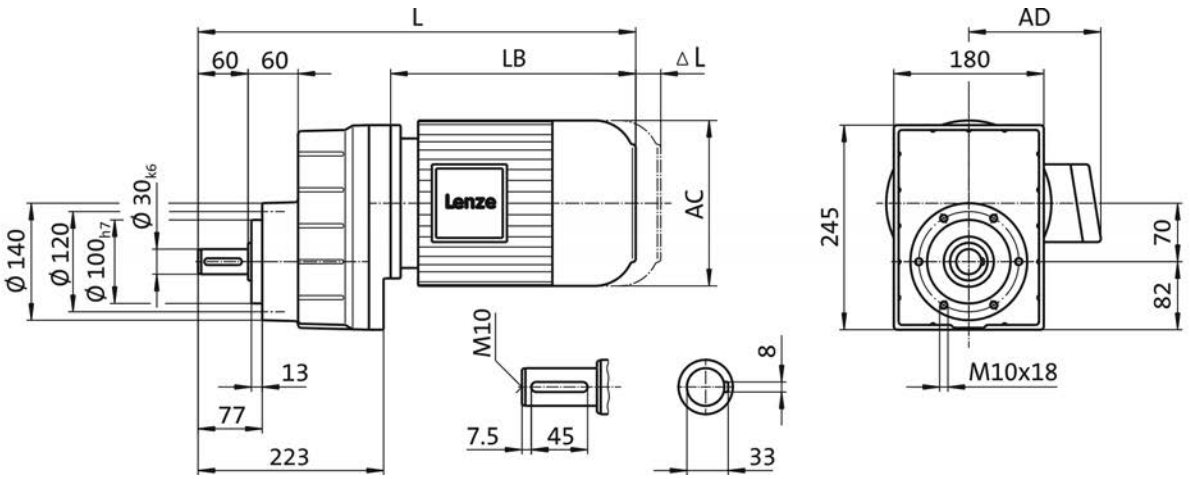


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	679	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GST07, 1-stage gearboxes

Dimensions with solid shaft and centering (VCR)

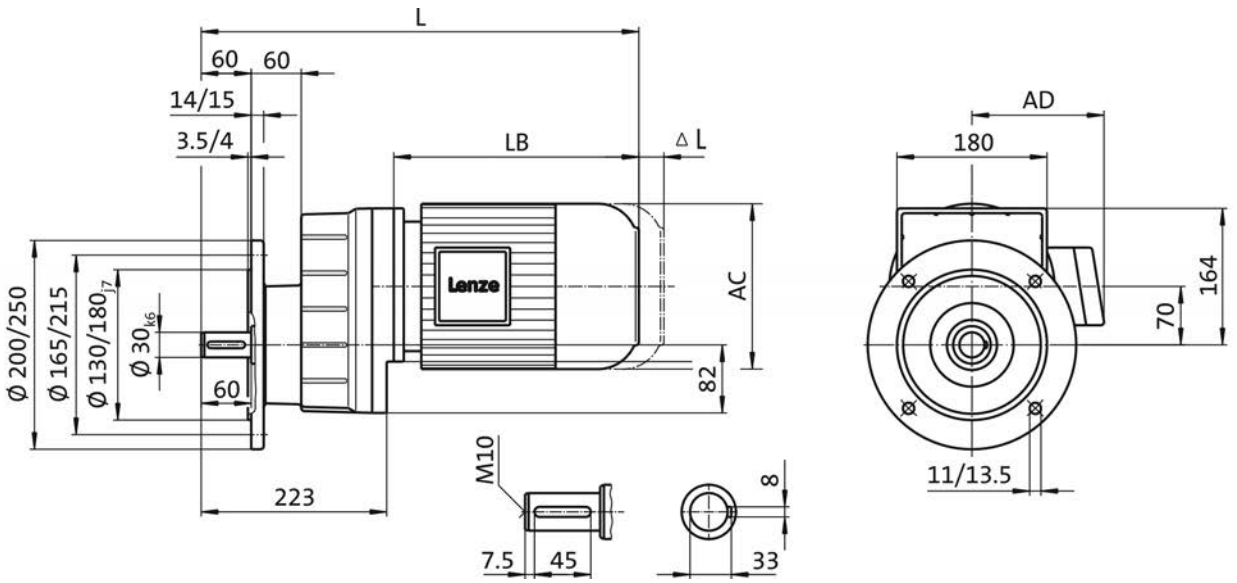


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	679	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GST07, 1-stage gearboxes

Dimensions with solid shaft and flange (VCK)

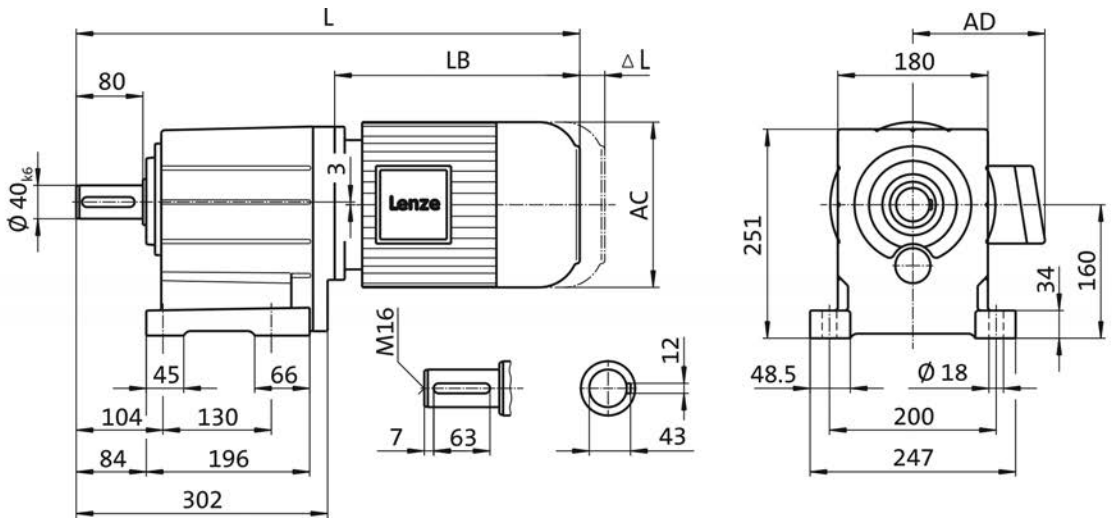


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	679	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GST07, 2-stage gearboxes

Dimensions with solid shaft and foot (VBR)



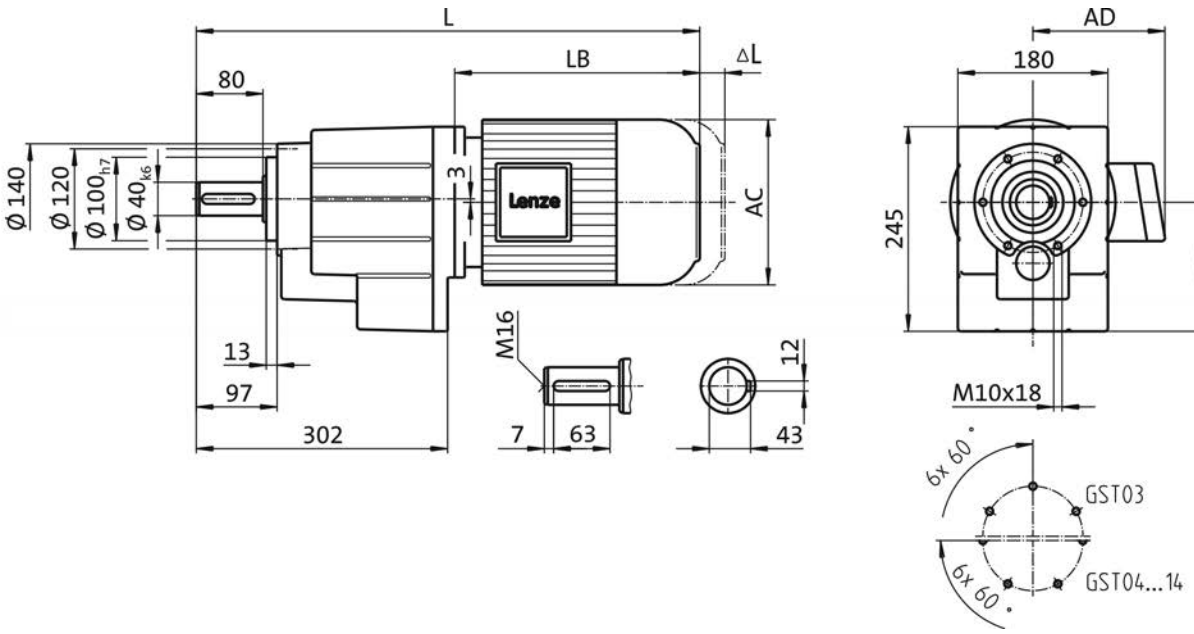
Product			m500		
			-P132L4	-P132M4	-P160M4
Dimensions					
Total length	**L**	**[mm]**	758		869
Motor length	**LB**	**[mm]**	433.5		539
Length of motor options	**Δ L**	**[mm]**	200.5		237
Motor diameter	**AC**	**[mm]**	261		313
Distance motor/connection	**AD**	**[mm]**	182		231

6.1

Dimensions, 4-pole motors

GST07, 2-stage gearboxes

Dimensions with solid shaft and centering (VCR)

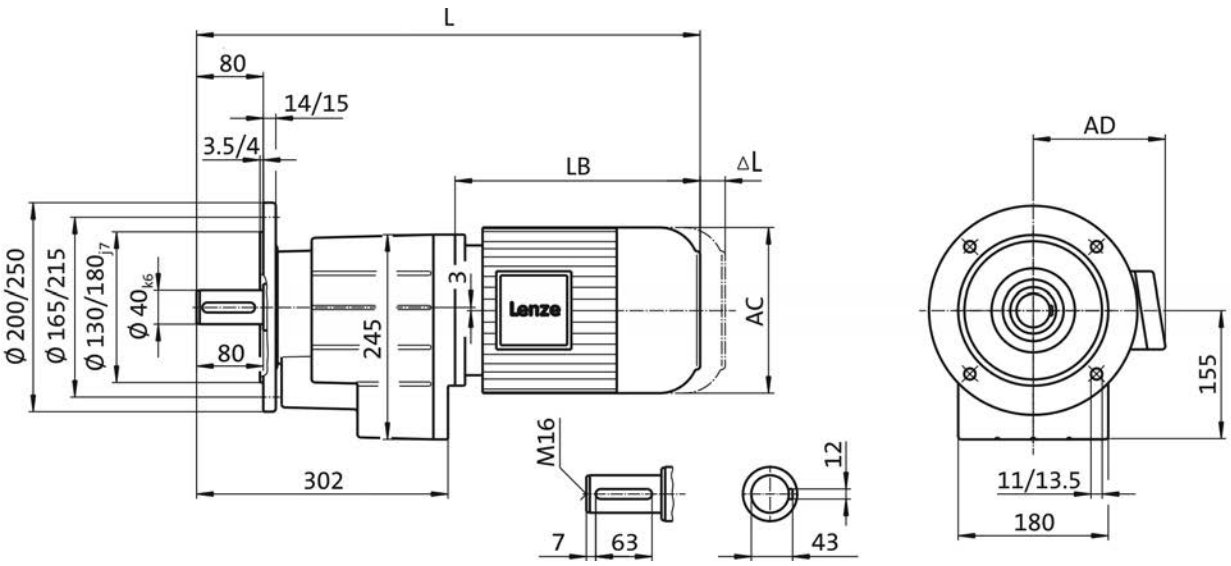


Product			m500		
			-P132L4	-P132M4	-P160M4
Dimensions					
Total length	**L**	**[mm]**	758		869
Motor length	**LB**	**[mm]**	433.5		539
Length of motor options	**Δ L**	**[mm]**	200.5		237
Motor diameter	**AC**	**[mm]**	261		313
Distance motor/connection	**AD**	**[mm]**	182		231

Dimensions, 4-pole motors

GST07, 2-stage gearboxes

Dimensions with solid shaft and flange (VCK)

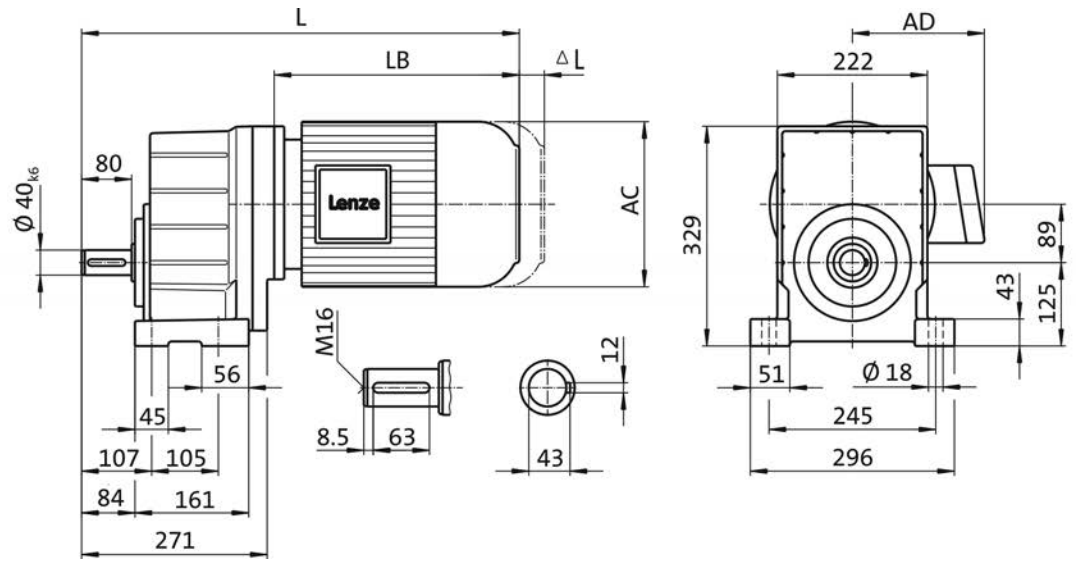


Product			m500		
			-P132L4	-P132M4	-P160M4
Dimensions					
Total length	**L**	**[mm]**	758		869
Motor length	**LB**	**[mm]**	433.5		539
Length of motor options	**Δ L**	**[mm]**	200.5		237
Motor diameter	**AC**	**[mm]**	261		313
Distance motor/connection	**AD**	**[mm]**	182		231

Dimensions, 4-pole motors

GST09, 1-stage gearboxes

Dimensions with solid shaft and foot (VBR)

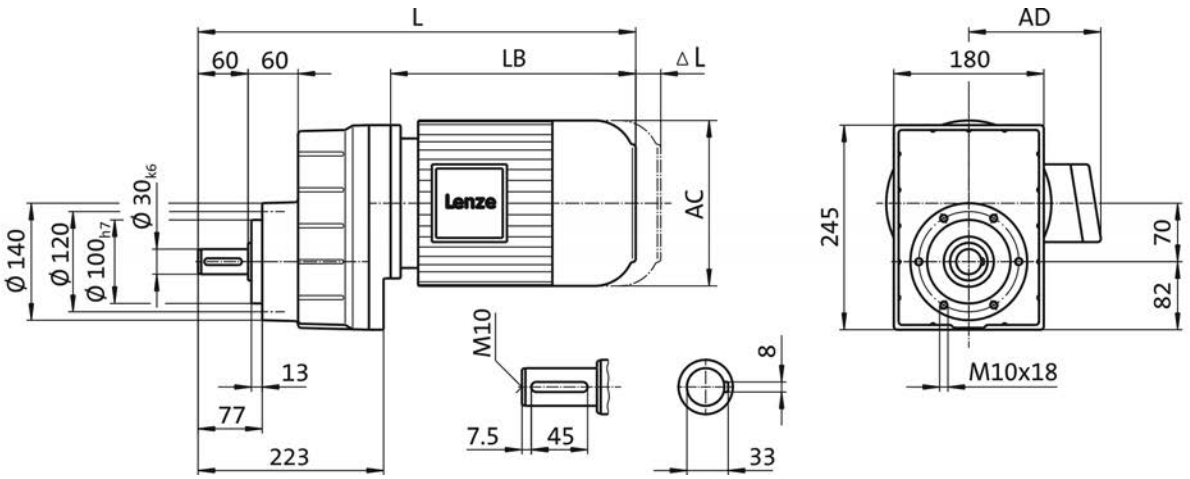


Product			m500					
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4
Dimensions								
Total length	**L**	**[mm]**	722		833		890	
Motor length	**LB**	**[mm]**	433.5		539		596.5	
Length of motor options	**Δ L**	**[mm]**	200.5		237		267	
Motor diameter	**AC**	**[mm]**	261		313		351	
Distance motor/connection	**AD**	**[mm]**	182		231		282	

Dimensions, 4-pole motors

GST09, 1-stage gearboxes

Dimensions with solid shaft and centering (VCR)

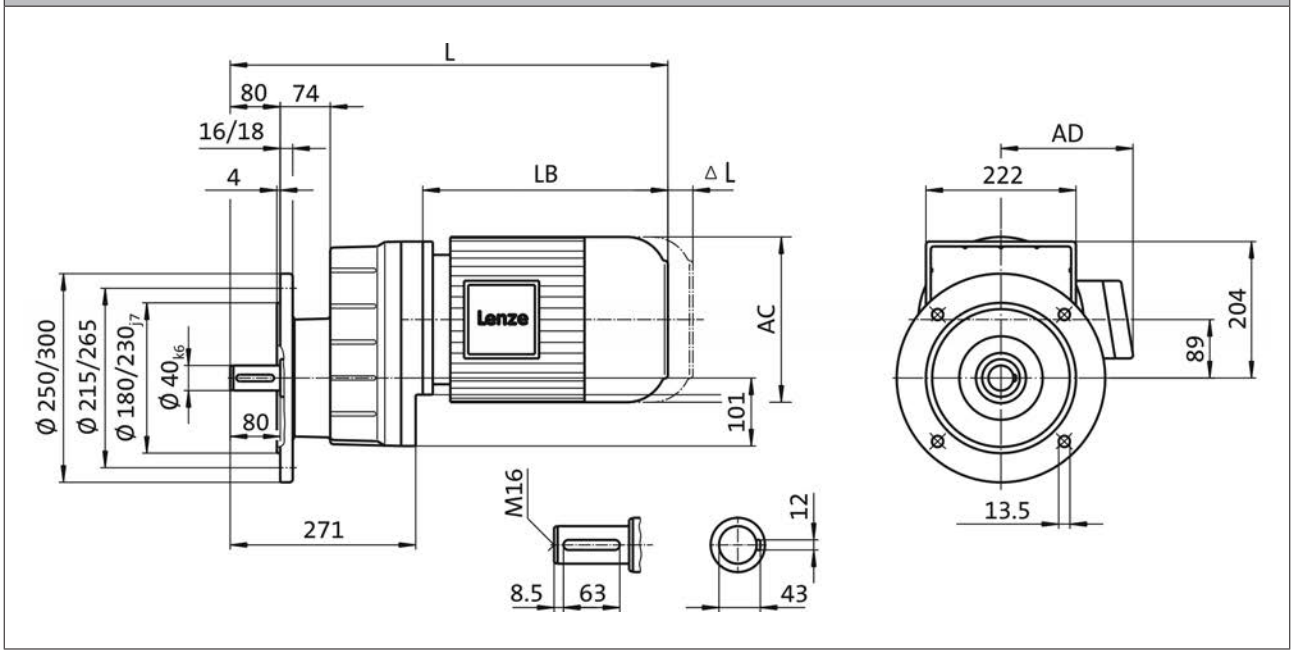


Product			m500					
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4
Dimensions								
Total length	**L**	**[mm]**	722		833		890	
Motor length	**LB**	**[mm]**	433.5		539		596.5	
Length of motor options	**Δ L**	**[mm]**	200.5		237		267	
Motor diameter	**AC**	**[mm]**	261		313		351	
Distance motor/connection	**AD**	**[mm]**	182		231		282	

Dimensions, 4-pole motors

GST09, 1-stage gearboxes

Dimensions with solid shaft and flange (VCK)

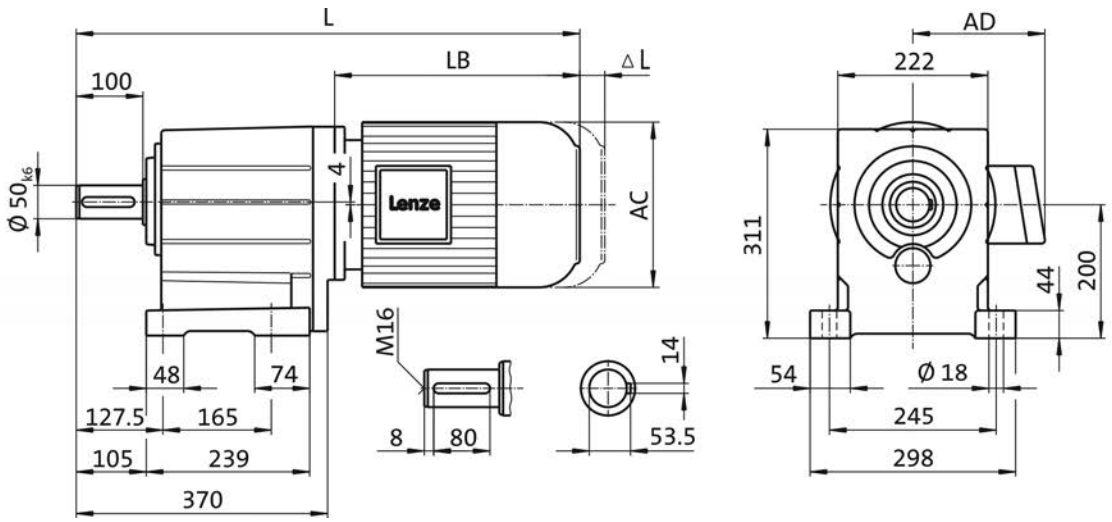


Product			m500					
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4
Dimensions								
Total length	**L**	**[mm]**	722		833		890	
Motor length	**LB**	**[mm]**	433.5		539		596.5	
Length of motor options	**Δ L**	**[mm]**	200.5		237		267	
Motor diameter	**AC**	**[mm]**	261		313		351	
Distance motor/connection	**AD**	**[mm]**	182		231		282	

Dimensions, 4-pole motors

GST09, 2-stage gearboxes

Dimensions with solid shaft and foot (VBR)

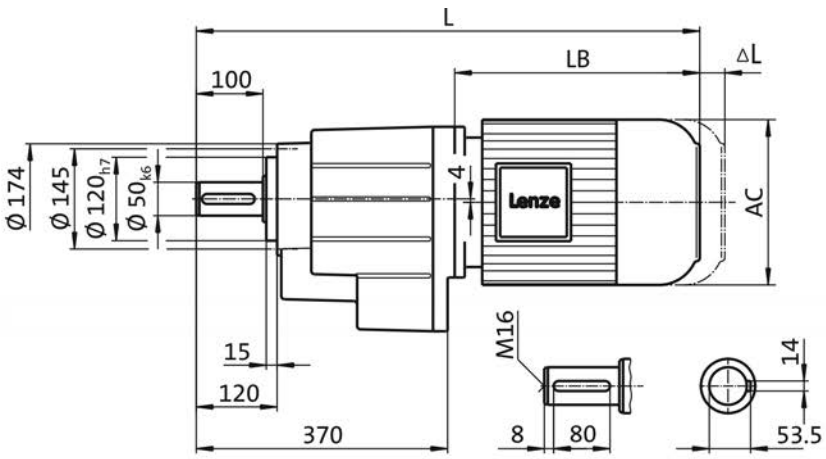


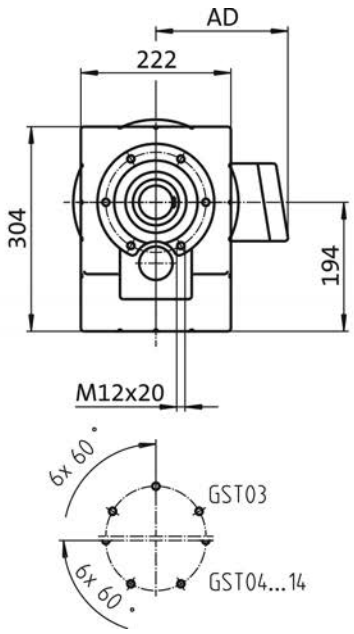
Product			m500					
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4
Dimensions								
Total length	**L**	**[mm]**	821		932		989	
Motor length	**LB**	**[mm]**	433.5		539		596.5	
Length of motor options	**Δ L**	**[mm]**	200.5		237		267	
Motor diameter	**AC**	**[mm]**	261		313		351	
Distance motor/connection	**AD**	**[mm]**	182		231		282	

Dimensions, 4-pole motors

GST09, 2-stage gearboxes

Dimensions with solid shaft and centering (VCR)



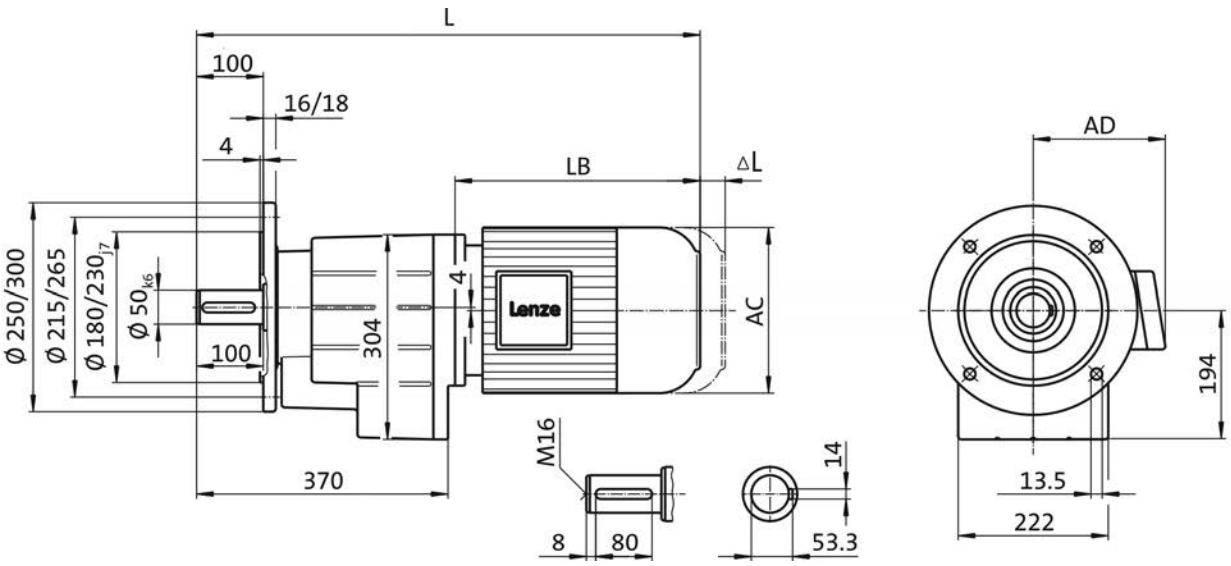


Product			m500					
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4
Dimensions								
Total length	**L**	**[mm]**	821		932		989	
Motor length	**LB**	**[mm]**	433.5		539		596.5	
Length of motor options	**Δ L**	**[mm]**	200.5		237		267	
Motor diameter	**AC**	**[mm]**	261		313		351	
Distance motor/connection	**AD**	**[mm]**	182		231		282	

Dimensions, 4-pole motors

GST09, 2-stage gearboxes

Dimensions with solid shaft and flange (VCK)

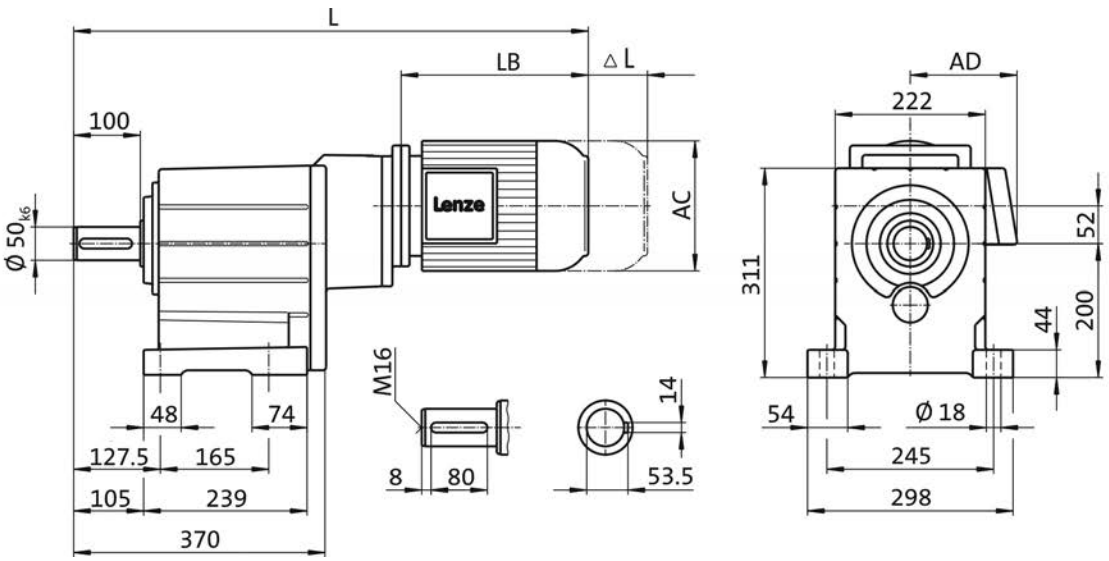


Product			m500					
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4
Dimensions								
Total length	**L**	**[mm]**	821		932		989	
Motor length	**LB**	**[mm]**	433.5		539		596.5	
Length of motor options	**Δ L**	**[mm]**	200.5		237		267	
Motor diameter	**AC**	**[mm]**	261		313		351	
Distance motor/connection	**AD**	**[mm]**	182		231		282	

Dimensions, 4-pole motors

GST09, 3-stage gearboxes

Dimensions with solid shaft and foot (VBR)

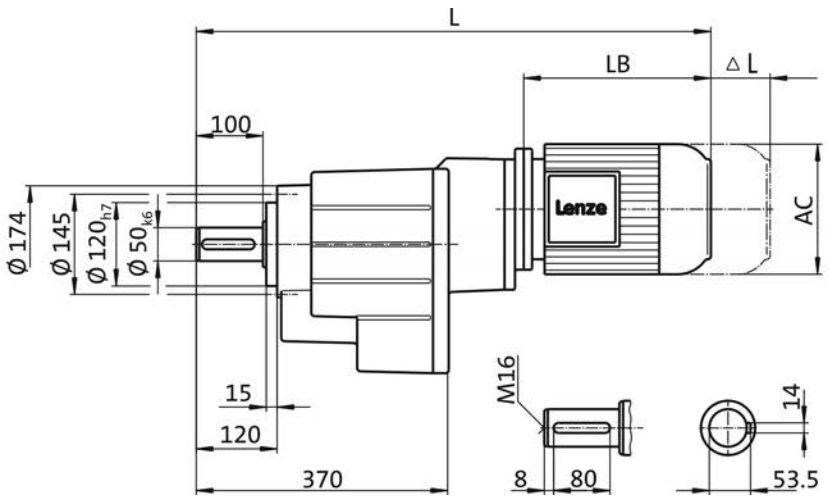


Product			m500
			-P132M4
Dimensions			
Total length	**L**	**[mm]**	944
Motor length	**LB**	**[mm]**	433.5
Length of motor options	**Δ L**	**[mm]**	200.5
Motor diameter	**AC**	**[mm]**	261
Distance motor/connection	**AD**	**[mm]**	182

Dimensions, 4-pole motors

GST09, 3-stage gearboxes

Dimensions with solid shaft and centering (VCR)

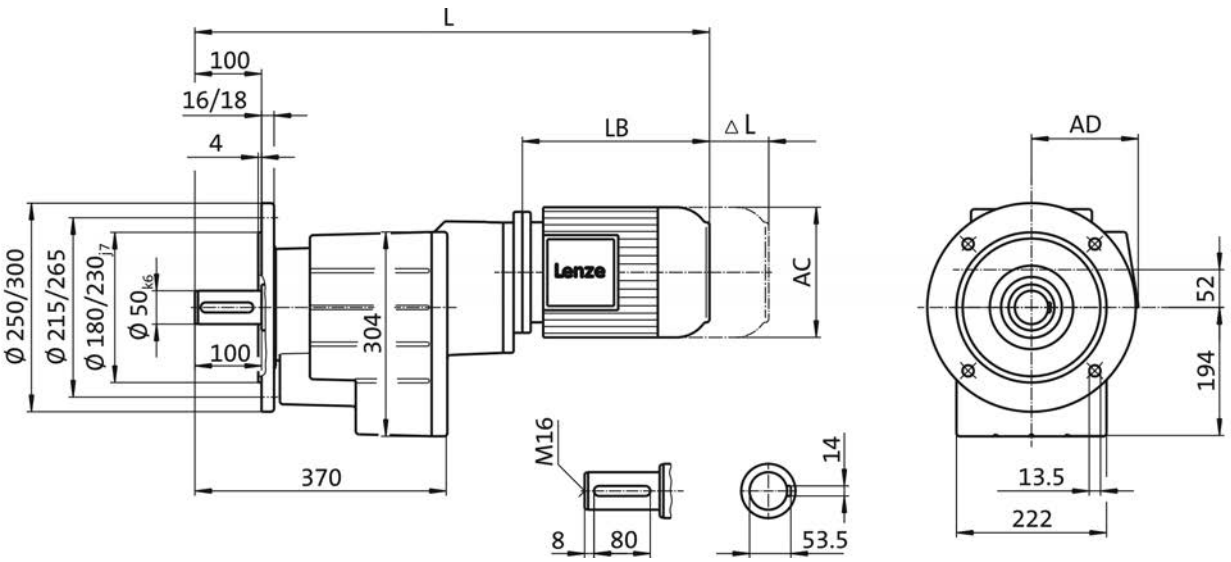


Product			m500
			-P132M4
Dimensions			
Total length	**L**	**[mm]**	944
Motor length	**LB**	**[mm]**	433.5
Length of motor options	**Δ L**	**[mm]**	200.5
Motor diameter	**AC**	**[mm]**	261
Distance motor/connection	**AD**	**[mm]**	182

Dimensions, 4-pole motors

GST09, 3-stage gearboxes

Dimensions with solid shaft and flange (VCK)

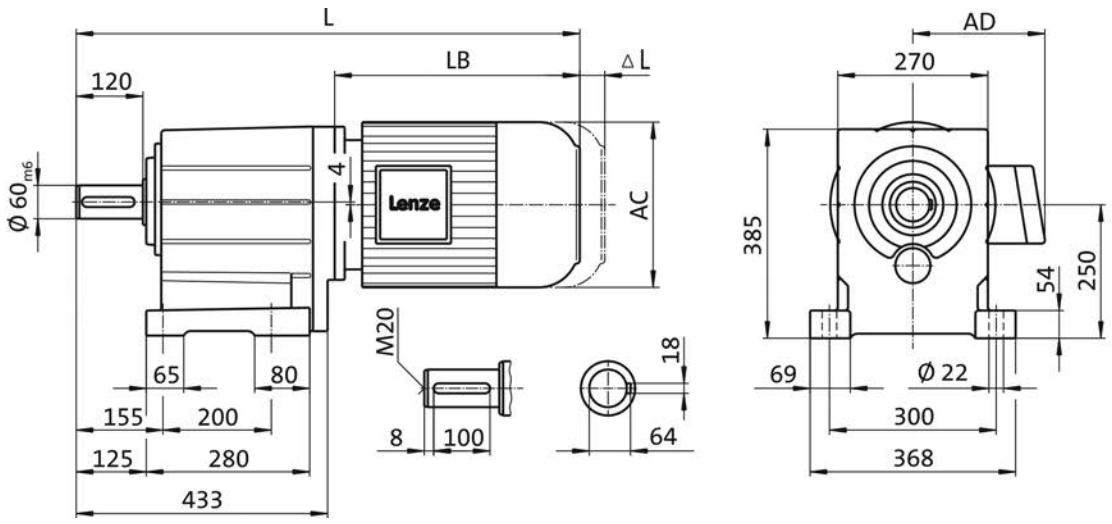


Product			m500
			-P132M4
Dimensions			
Total length	**L**	**[mm]**	944
Motor length	**LB**	**[mm]**	433.5
Length of motor options	**Δ L**	**[mm]**	200.5
Motor diameter	**AC**	**[mm]**	261
Distance motor/connection	**AD**	**[mm]**	182

Dimensions, 4-pole motors

GST11, 2-stage gearboxes

Dimensions with solid shaft and foot (VBR)

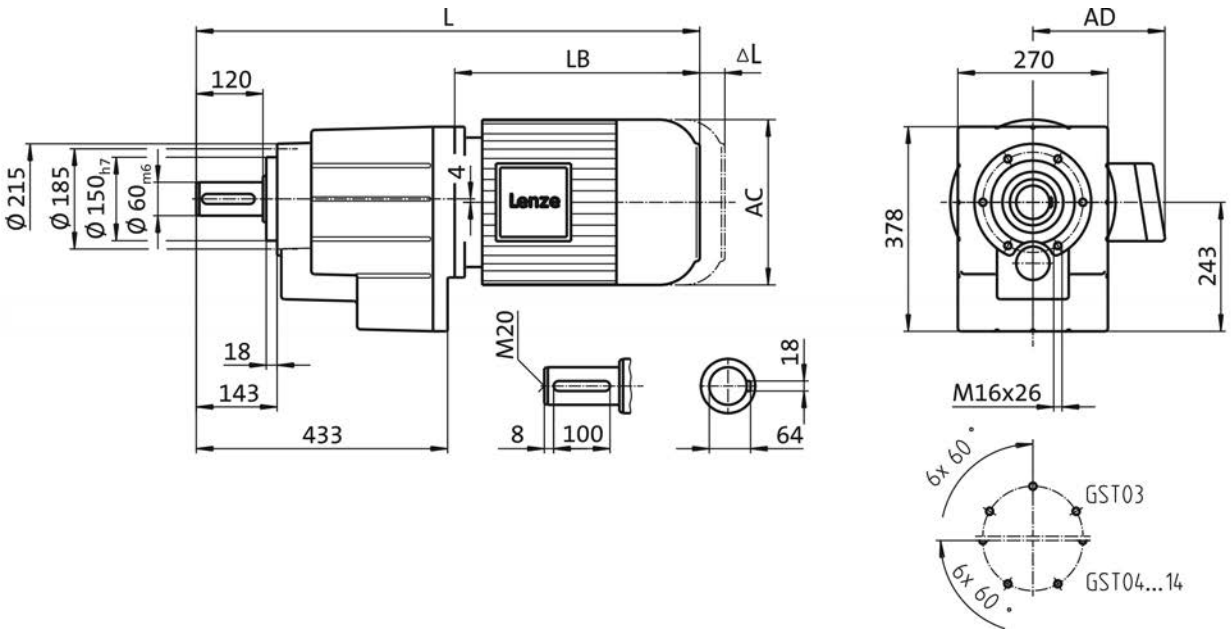


Product			m500					
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4
Dimensions								
Total length	**L**	**[mm]**	878		989		1046	
Motor length	**LB**	**[mm]**	433.5		539		596.5	
Length of motor options	**Δ L**	**[mm]**	200.5		237		267	
Motor diameter	**AC**	**[mm]**	261		313		351	
Distance motor/connection	**AD**	**[mm]**	182		231		282	

Dimensions, 4-pole motors

GST11, 2-stage gearboxes

Dimensions with solid shaft and centering (VCR)

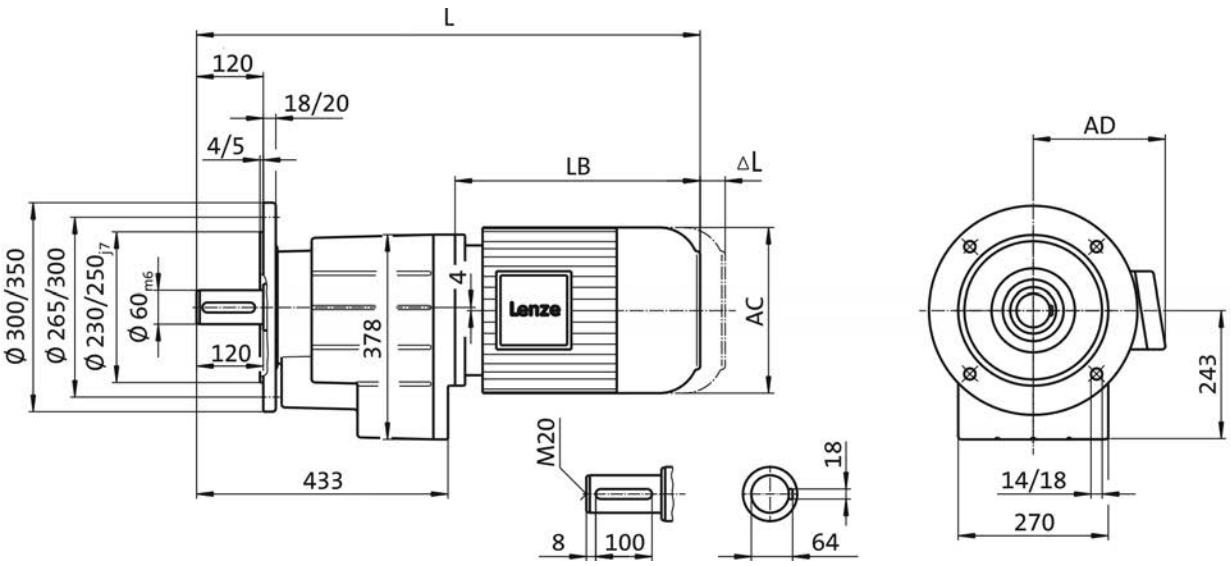


Product			m500					
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4
Dimensions								
Total length	**L**	**[mm]**	878		989		1046	
Motor length	**LB**	**[mm]**	433.5		539		596.5	
Length of motor options	**Δ L**	**[mm]**	200.5		237		267	
Motor diameter	**AC**	**[mm]**	261		313		351	
Distance motor/connection	**AD**	**[mm]**	182		231		282	

Dimensions, 4-pole motors

GST11, 2-stage gearboxes

Dimensions with solid shaft and flange (VCK)

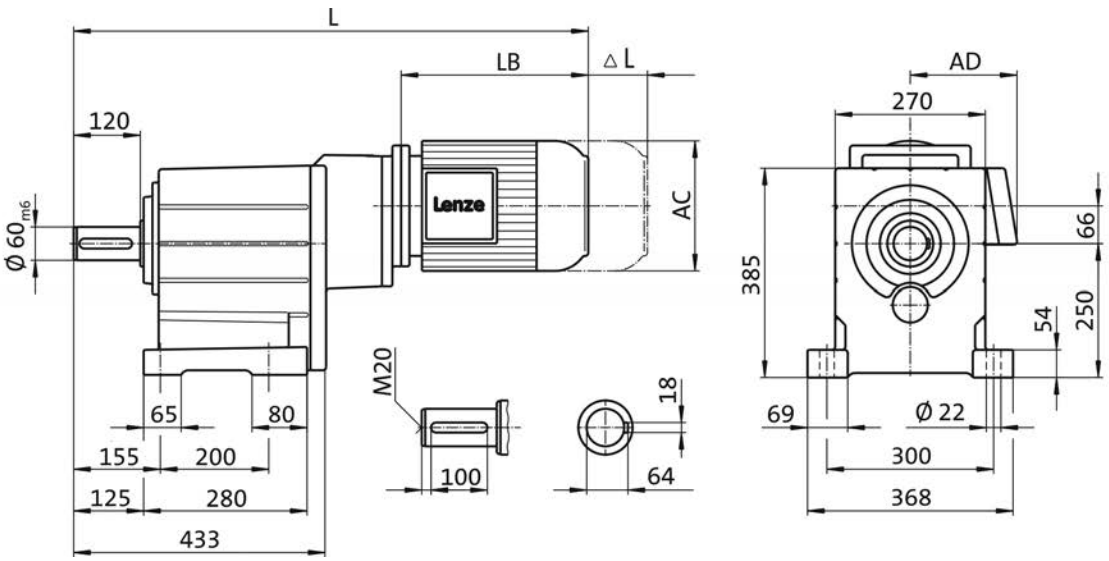


Product			m500					
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4
Dimensions								
Total length	**L**	**[mm]**	878		989		1046	
Motor length	**LB**	**[mm]**	433.5		539		596.5	
Length of motor options	**Δ L**	**[mm]**	200.5		237		267	
Motor diameter	**AC**	**[mm]**	261		313		351	
Distance motor/connection	**AD**	**[mm]**	182		231		282	

Dimensions, 4-pole motors

GST11, 3-stage gearboxes

Dimensions with solid shaft and foot (VBR)

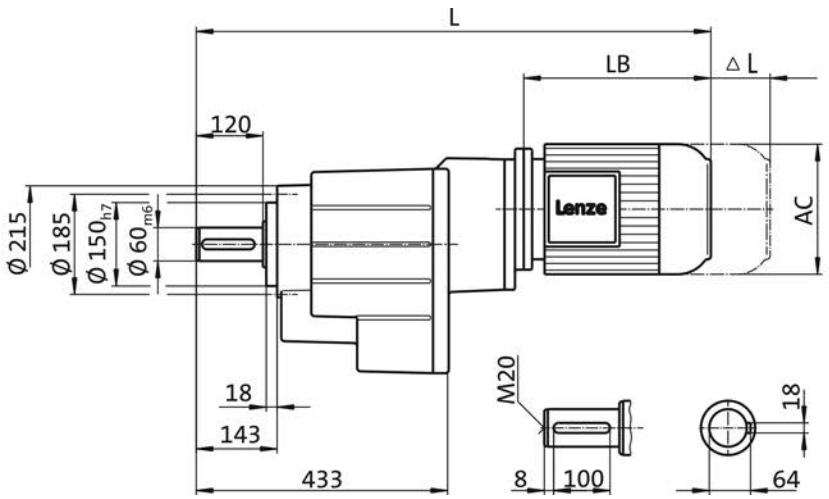


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	1020	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GST11, 3-stage gearboxes

Dimensions with solid shaft and centering (VCR)

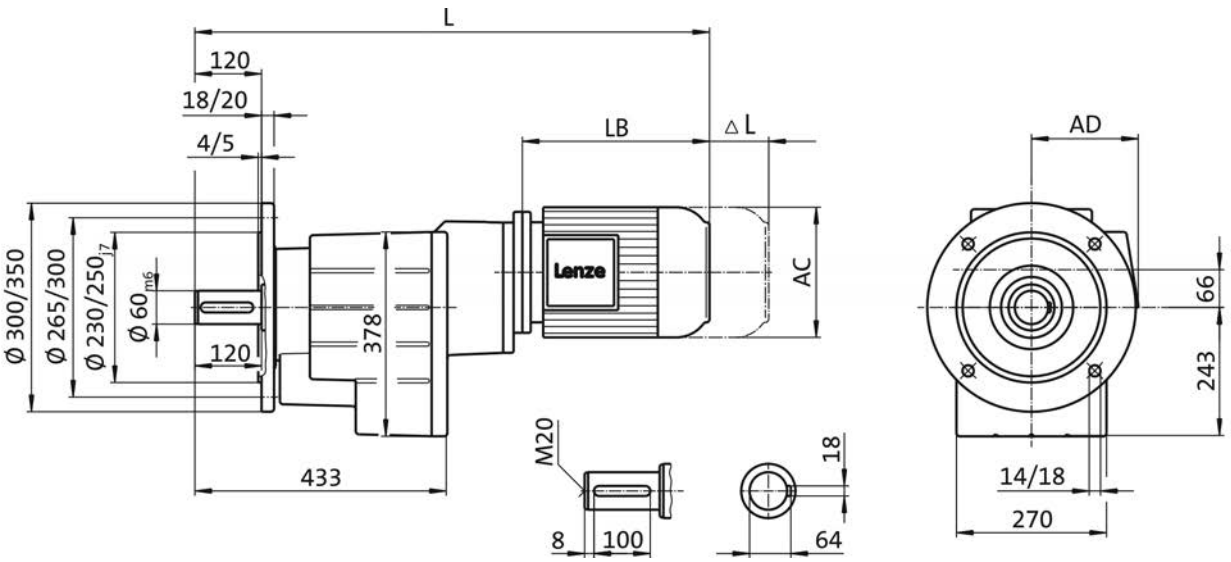


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	1020	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GST11, 3-stage gearboxes

Dimensions with solid shaft and flange (VCK)

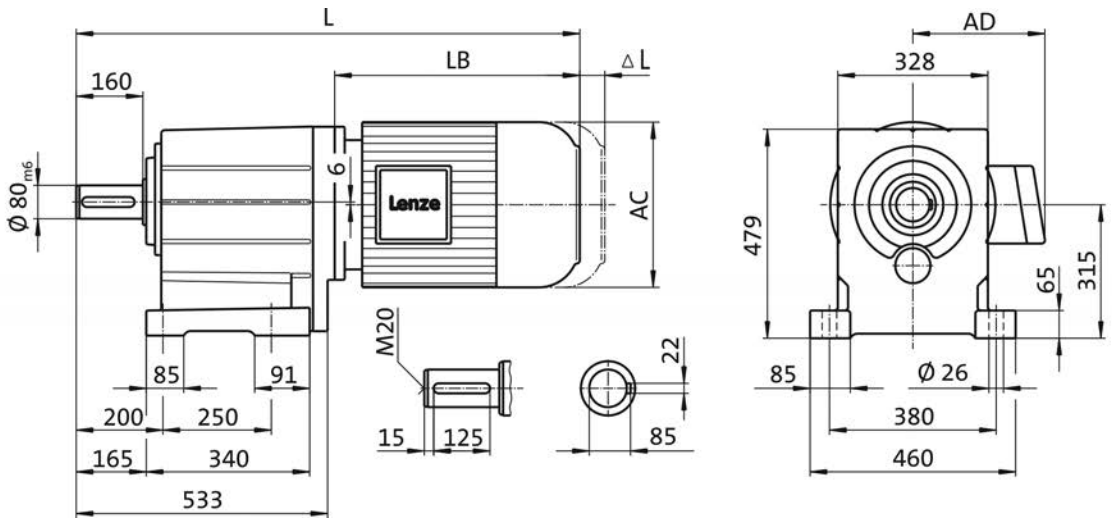


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	1020	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GST14, 2-stage gearboxes

Dimensions with solid shaft and foot (VBR)

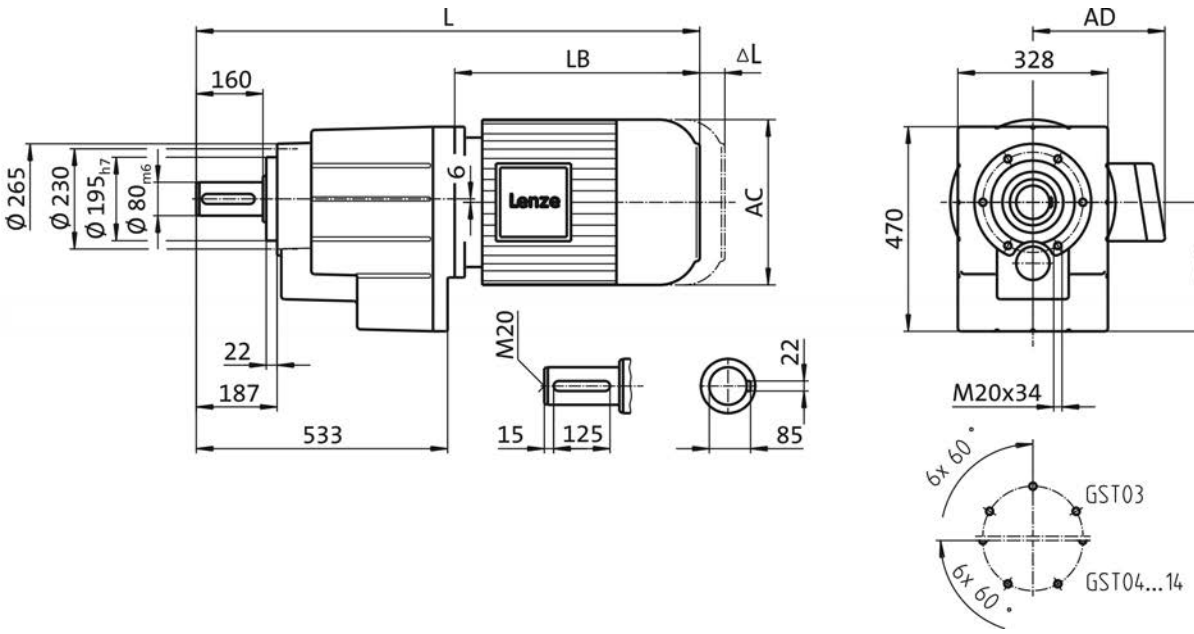


Product			m500							
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4	-P180V4	-P225M4
Dimensions										
Total length	**L**	**[mm]**	968		1079		1136		1185	1307
Motor length	**LB**	**[mm]**	433.5		539		596.5		645	767
Length of motor options	**Δ L**	**[mm]**	200.5		237		267			213
Motor diameter	**AC**	**[mm]**	261		313		351			456
Distance motor/connection	**AD**	**[mm]**	182		231		282			330

Dimensions, 4-pole motors

GST14, 2-stage gearboxes

Dimensions with solid shaft and centering (VCR)

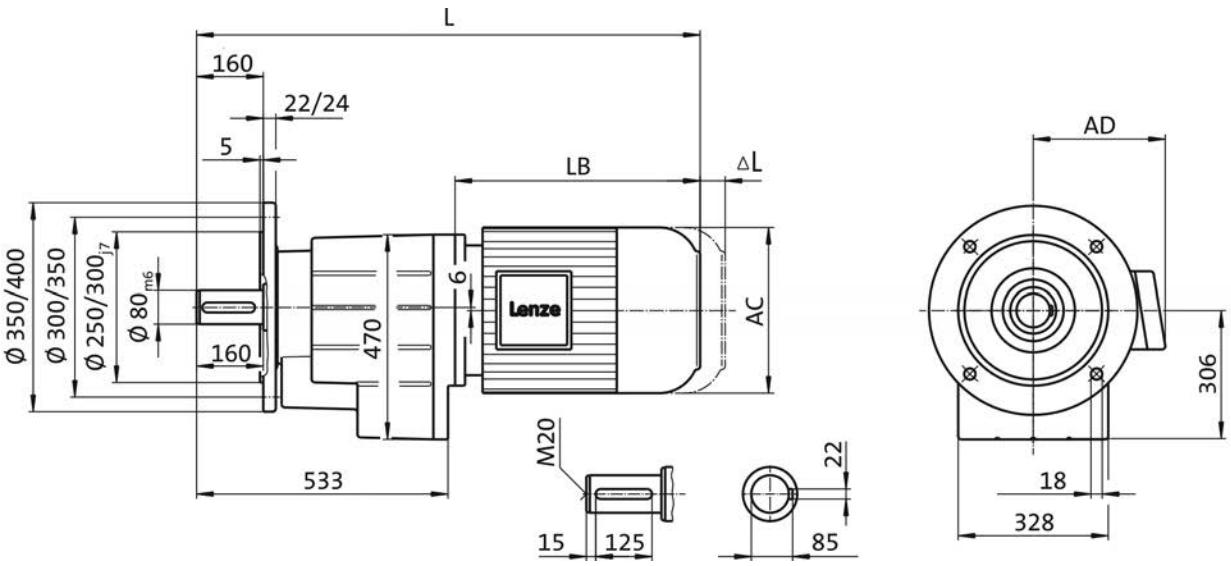


Product			m500							
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4	-P180V4	-P225M4
Dimensions										
Total length	**L**	**[mm]**	968		1079		1136		1185	1307
Motor length	**LB**	**[mm]**	433.5		539		596.5		645	767
Length of motor options	**Δ L**	**[mm]**	200.5		237		267			213
Motor diameter	**AC**	**[mm]**	261		313		351			456
Distance motor/connection	**AD**	**[mm]**	182		231		282			330

Dimensions, 4-pole motors

GST14, 2-stage gearboxes

Dimensions with solid shaft and flange (VCK)

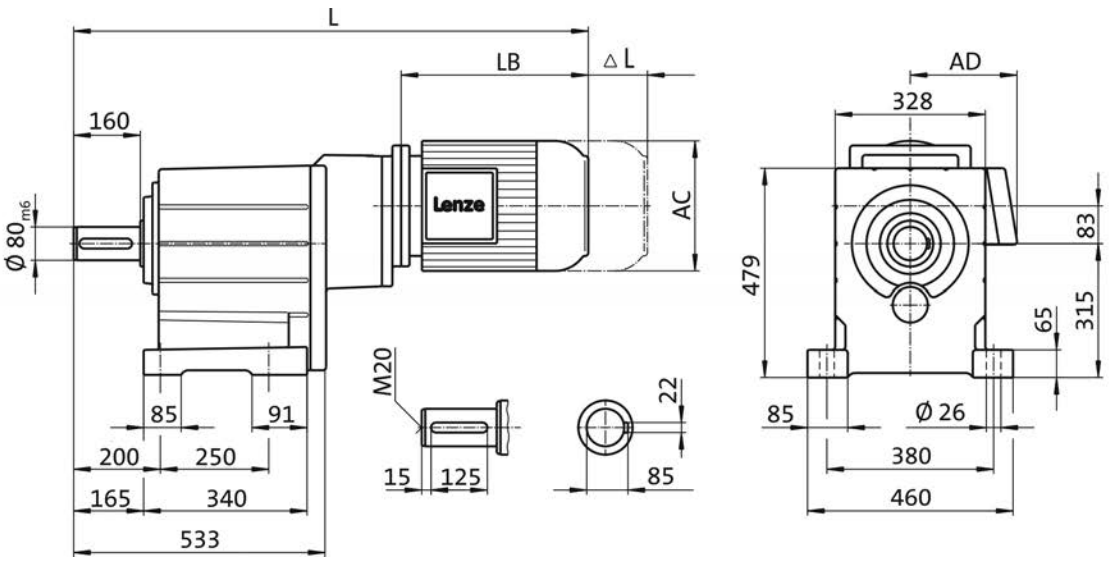


Product			m500							
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4	-P180V4	-P225M4
Dimensions										
Total length	**L**	**[mm]**	968		1079		1136		1185	1307
Motor length	**LB**	**[mm]**	433.5		539		596.5		645	767
Length of motor options	**Δ L**	**[mm]**	200.5		237		267			213
Motor diameter	**AC**	**[mm]**	261		313		351			456
Distance motor/connection	**AD**	**[mm]**	182		231		282			330

Dimensions, 4-pole motors

GST14, 3-stage gearboxes

Dimensions with solid shaft and foot (VBR)

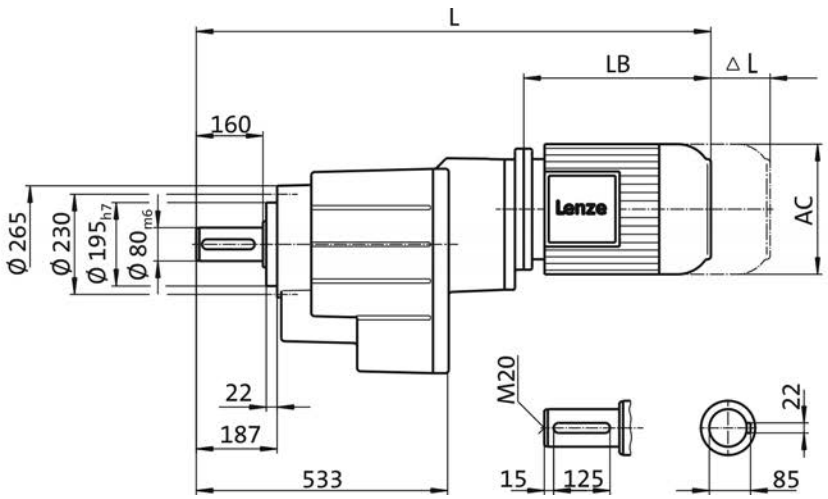


Product			m500				
			-P132L4	-P132M4	-P160L4	-P160M4	-P180M4
Dimensions							
Total length	**L**	**[mm]**	1144		1254		1312
Motor length	**LB**	**[mm]**	433.5		539		596.5
Length of motor options	**Δ L**	**[mm]**	200.5		237		267
Motor diameter	**AC**	**[mm]**	261		313		351
Distance motor/connection	**AD**	**[mm]**	182		231		282

Dimensions, 4-pole motors

GST14, 3-stage gearboxes

Dimensions with solid shaft and centering (VCR)

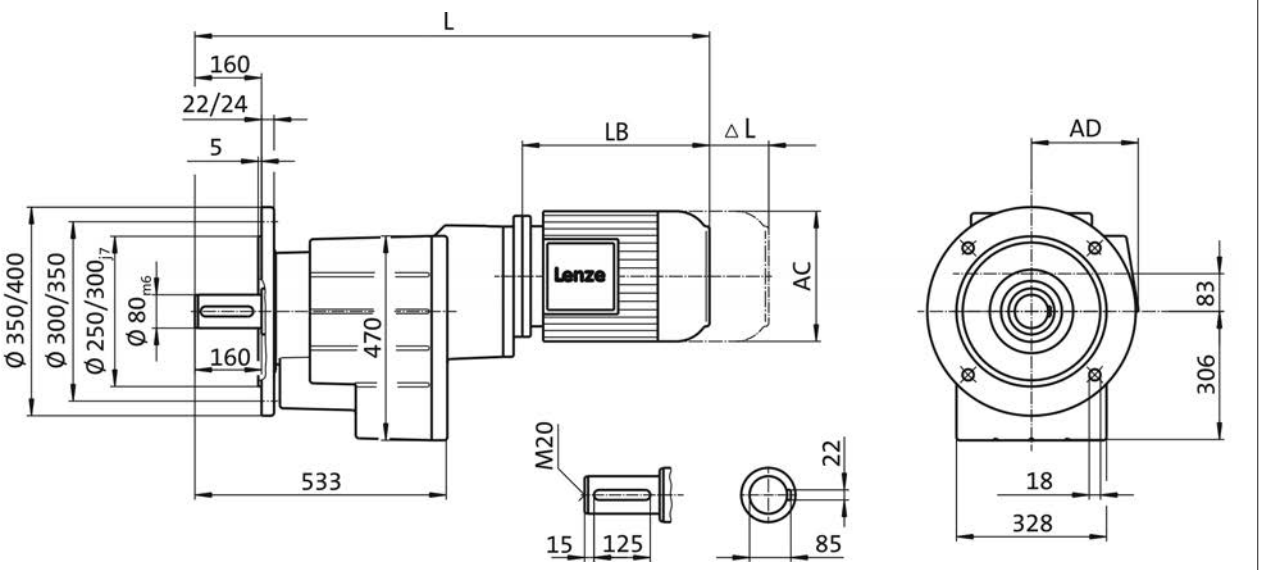


Product			m500				
			-P132L4	-P132M4	-P160L4	-P160M4	-P180M4
Dimensions							
Total length	**L**	**[mm]**	1144		1254		1312
Motor length	**LB**	**[mm]**	433.5		539		596.5
Length of motor options	**Δ L**	**[mm]**	200.5		237		267
Motor diameter	**AC**	**[mm]**	261		313		351
Distance motor/connection	**AD**	**[mm]**	182		231		282

Dimensions, 4-pole motors

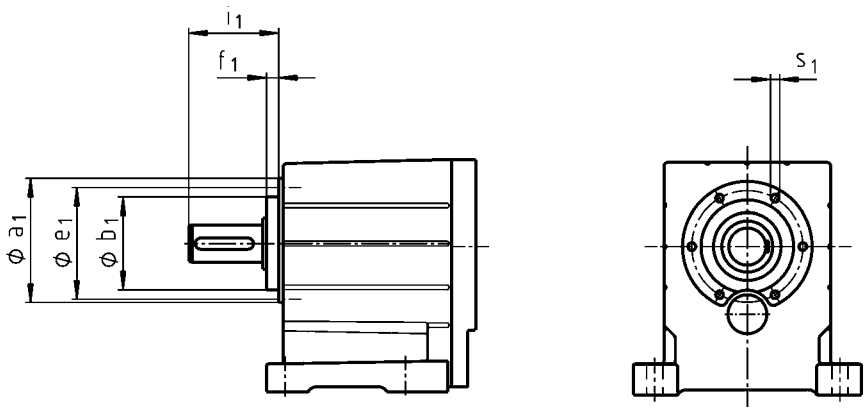
GST14, 3-stage gearboxes

Dimensions with solid shaft and flange (VCK)



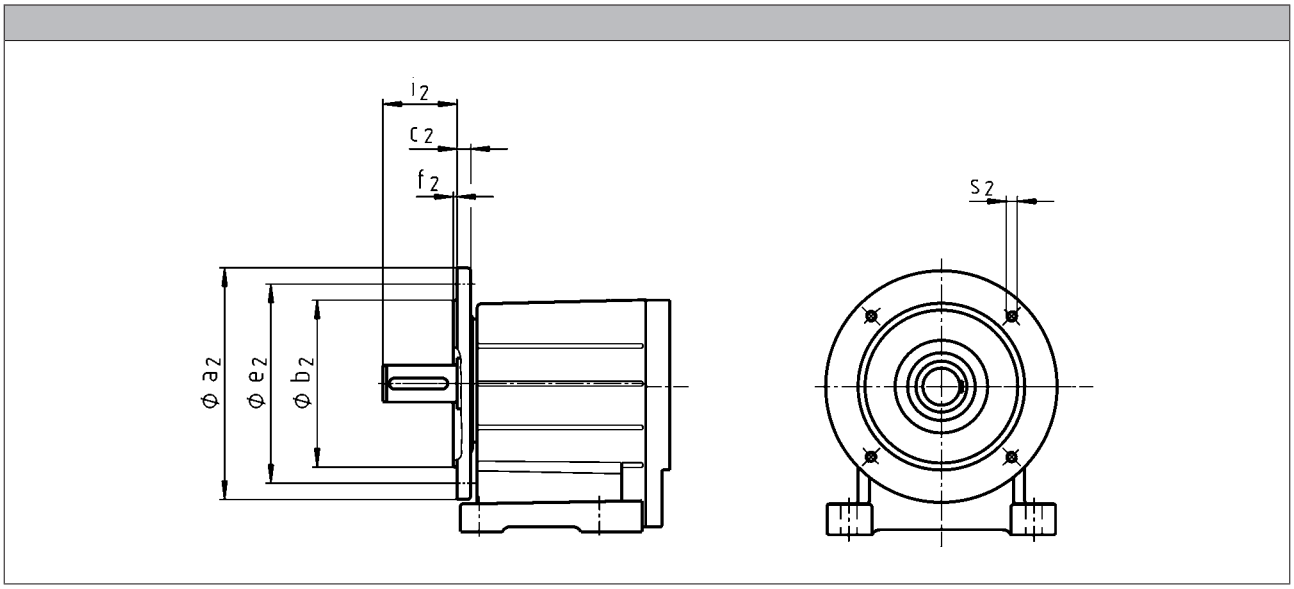
Product			m500				
			-P132L4	-P132M4	-P160L4	-P160M4	-P180M4
Dimensions							
Total length	**L**	**[mm]**	1144		1254		1312
Motor length	**LB**	**[mm]**	433.5		539		596.5
Length of motor options	**Δ L**	**[mm]**	200.5		237		267
Motor diameter	**AC**	**[mm]**	261		313		351
Distance motor/connection	**AD**	**[mm]**	182		231		282

GST□□-2/3M VAR



	a_1	b_1	e_1	f_1	i_1	s_1
		h7				
GST04	72	48	61	8.0	51.0	M5x10
GST05	88	58	74	9.0	62.0	M6x12
GST06	109	70	90	10.0	74.0	M8x14
GST07	140	100	120	13.0	97.0	M10x18
GST09	174	120	145	15.0	120.0	M12x20
GST11	215	150	185	18.0	143.0	M16x26
GST14	265	195	230	22.0	187.0	M20x34

GST□□-2/3M VAL

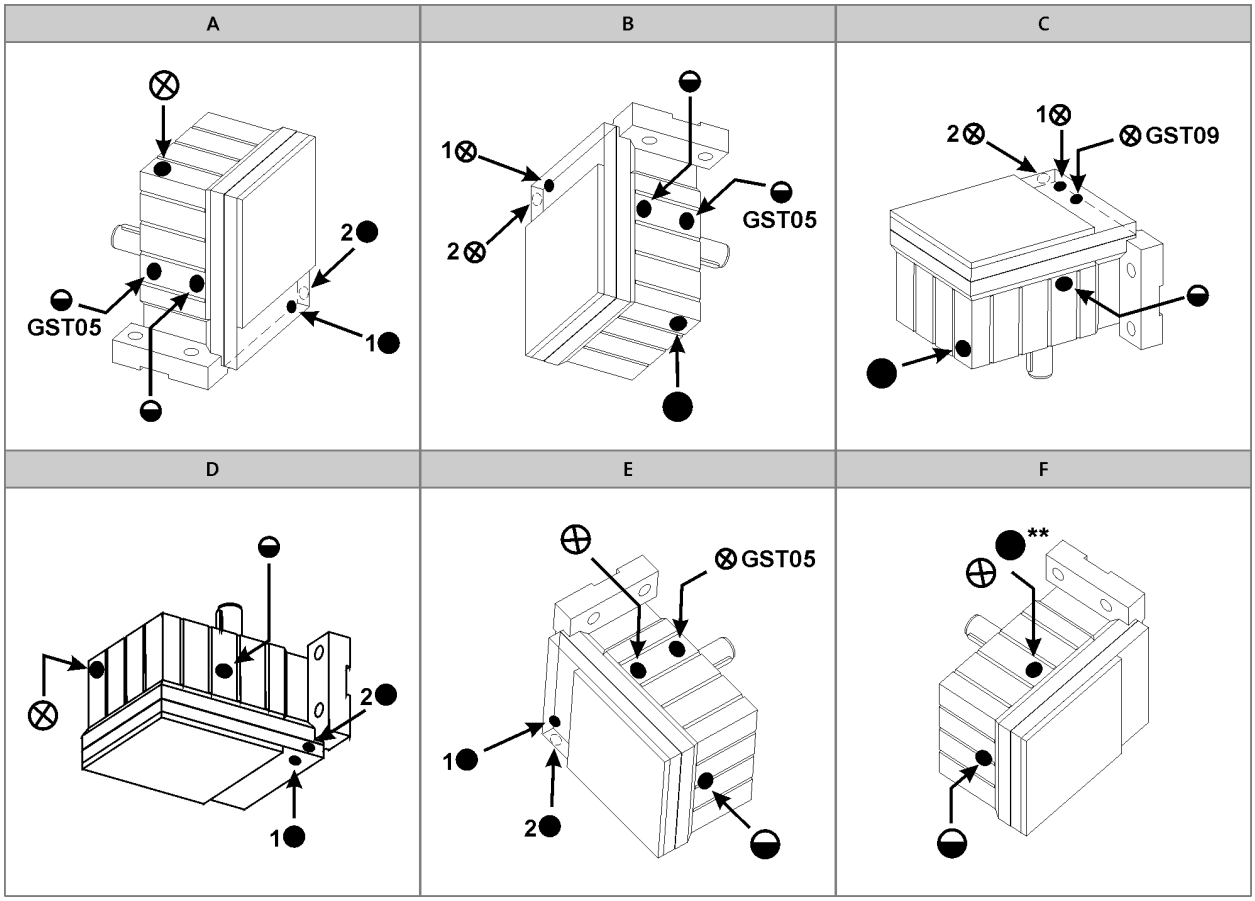


	a_2	b_2	c_2	e_2	f_2	i_2	s_2
		j7					
GST04	120 140	80 95	10 10	100 115	3.0 3.0	40	M6 M8
GST05	120 140 160	80 95 110	10 10 10	100 115 130	3.0 3.0 3.5	50	M6 M8 M8
GST06	160 200	110 130	12 12	130 165	3.5 3.5	60	M8 M10
GST07	200 250	130 180	14 15	165 215	3.5 4.0	80	M10 M12
GST09	250 300	180 230	16 18	215 265	4.0 4.0	100	M12 M12
GST11	300 350	230 250	18 20	265 300	4.0 5.0	120	M12 M16
GST14	350 400	250 300	22 24	300 350	5.0 5.0	160	M16 M16

Ventilations

Position of ventilation, sealing elements and oil level check

GST05...09-1



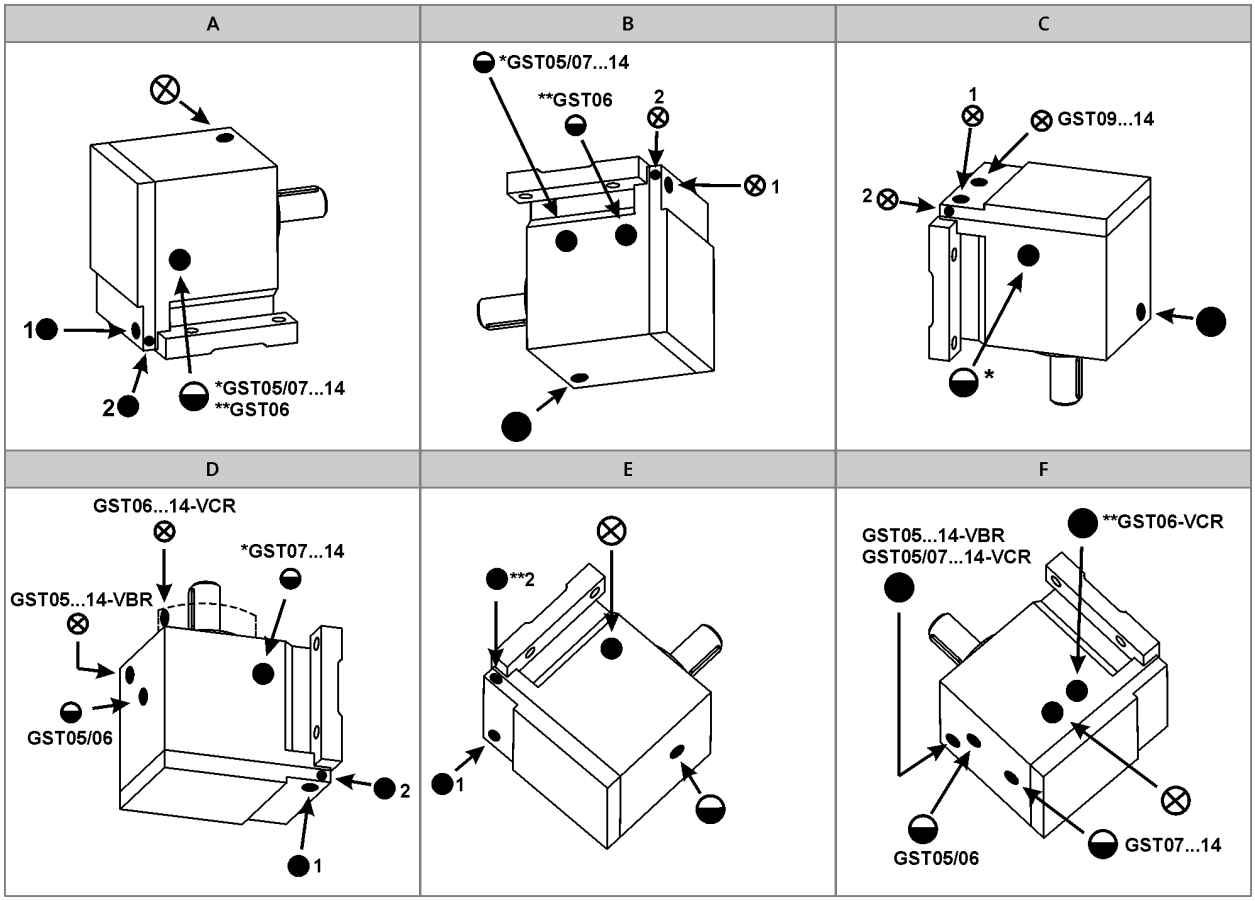
A to F Mounting position
⊗ Ventilation / Oil filler plug
● Oil drain plug
◒ Oil control plug
* On both sides
** On opposite side

Pos.1 standard
Pos.2 only for:
- GST05-1M V□□ 090□□□
- GST05-1M V□□ 100□□□
- GST06-1M V□□ 112□□□
- GST07-1M V□□ 160□□□

Ventilations

Position of ventilation, sealing elements and oil level check

GST05...14-2



A to F Mounting position
⊗ Ventilation / Oil filler plug
● Oil drain plug
◒ Oil control plug
* On both sides
** On opposite side

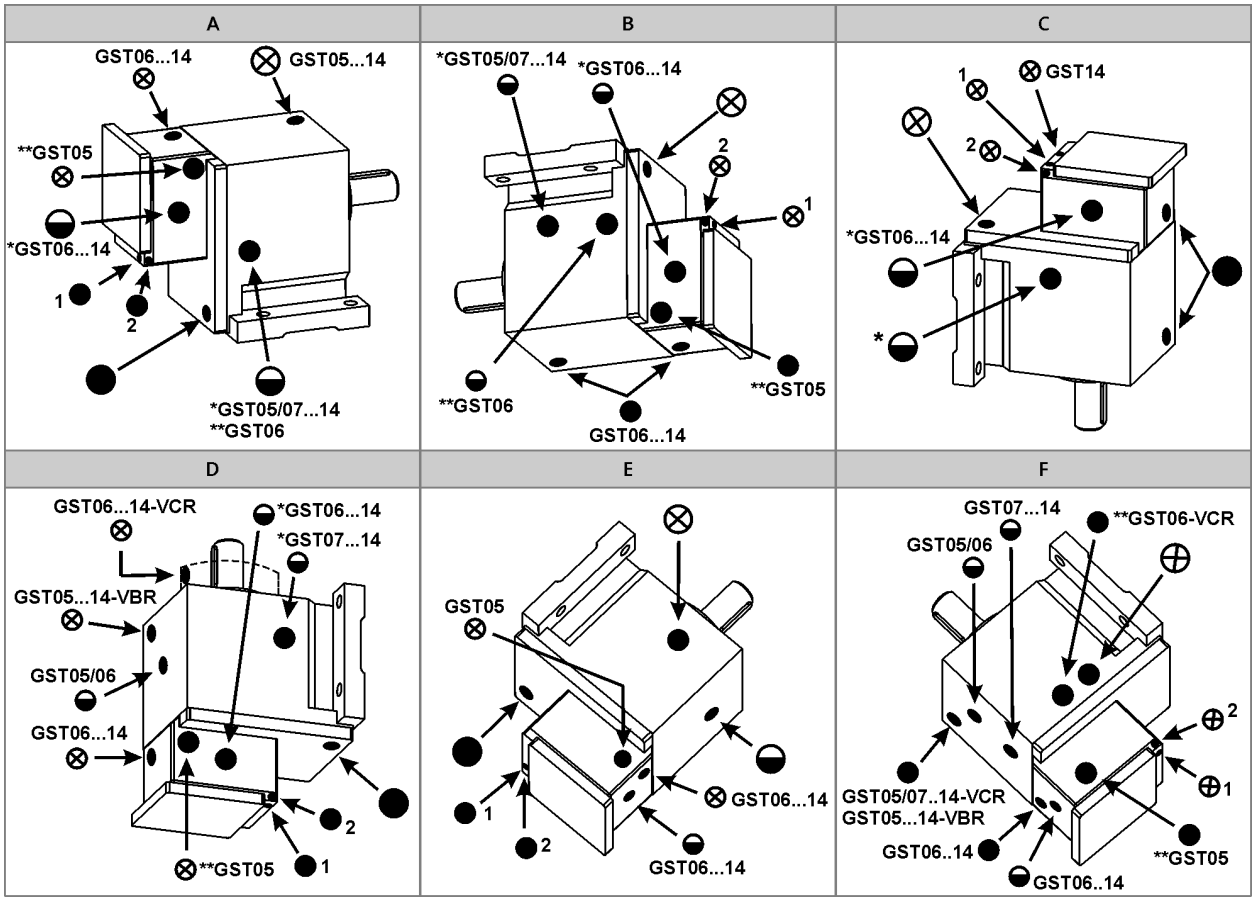
Pos.1 standard
Pos.2 only for:
- GST05-2M V□□ 090□□□
- GST05-2M V□□ 100□□□
- GST06-2M V□□ 112□□□
- GST07-2M V□□ 160□□□

6.1

Ventilations

Position of ventilation, sealing elements and oil level check

GST05...14-3



A to F Mounting position
⊗ Ventilation / Oil filler plug
● Oil drain plug
◒ Oil control plug
* On both sides
** On opposite side

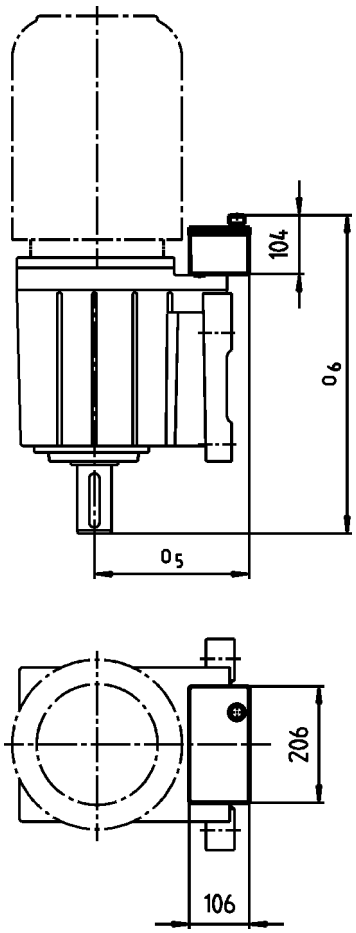
Pos.1 standard
Pos.2 only for:
- GST07-3M V□□ 090□□□
- GST07-3M V□□ 100□□□
- GST09-3M V□□ 112□□□

6.1

Ventilations

Compensation reservoir for mounting position C

GST□□-2



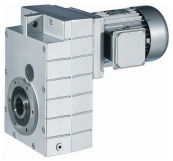
Motor	090 100		112		132		160 180 225	
	o_5	o_6	o_5	o_6	o_5	o_6	o_5	o_6
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
GST09	206	477	226	477	245	477	260	477
GST11	208	536	230	540	254	540	268	540
GST14			252	640	282	640	282	640

► Terminal box position 4 not permitted.

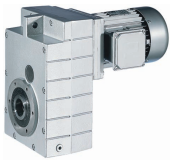
GFL shaft-mounted helical gearbox

Inverter operation
5.5 ... 45 kW (efficiency class IE3)

GFL shaft-mounted helical gearbox



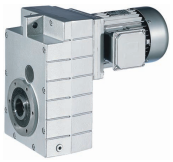
Contents



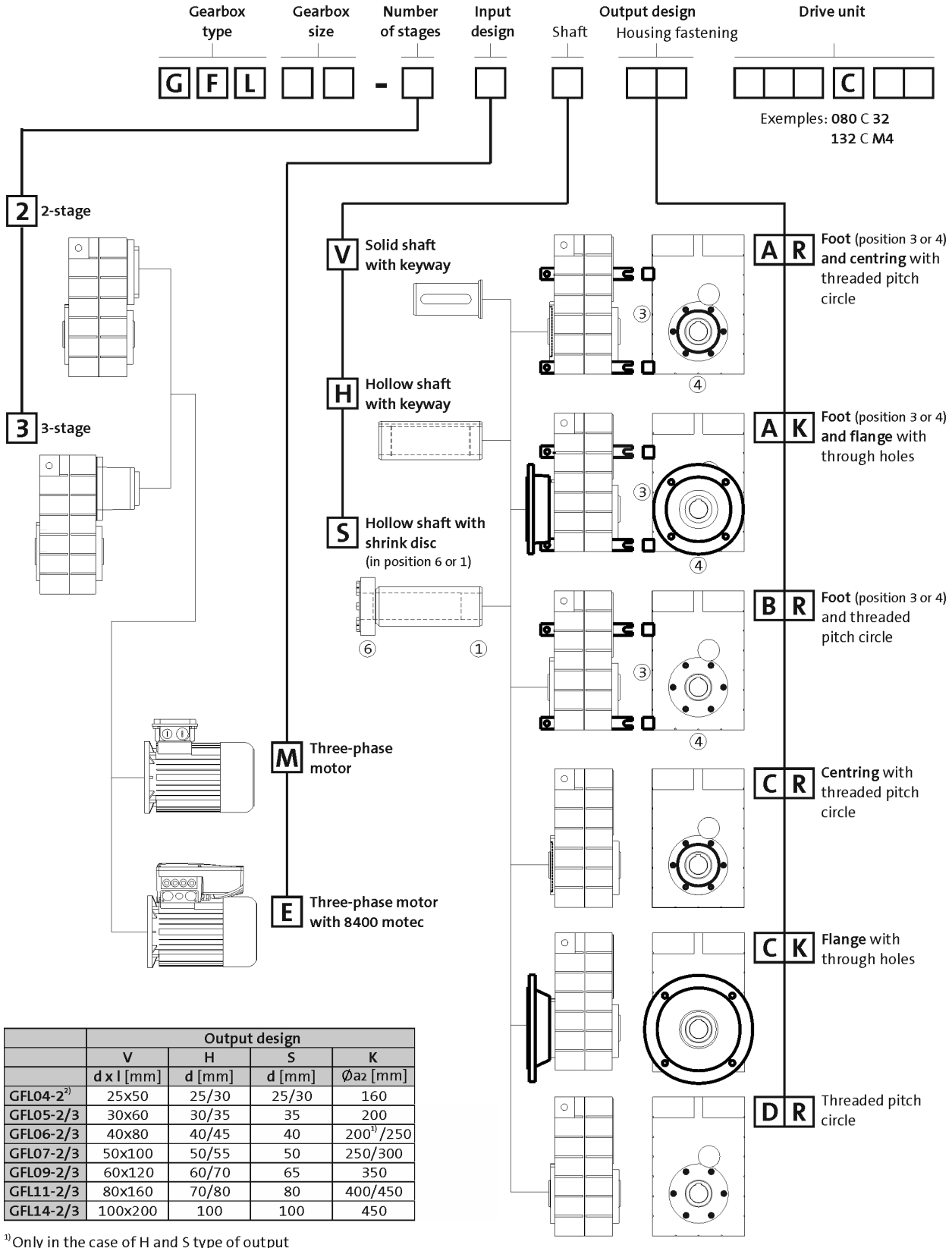
List of abbreviations

$\eta_{c=1}$		Efficiency
c		Load capacity
f_N	[Hz]	Rated frequency
$F_{ax,max}$	[N]	Max. axial force
$F_{rad,max}$	[N]	Max. radial force
H_{max}	[m]	Site altitude
i		Ratio
J	[kgcm²]	Moment of inertia
m	[kg]	Mass
M_2	[Nm]	Output torque
n_2	[r/min]	Output speed
n_N	[r/min]	Rated speed
P_N	[kW]	Rated power
$S_{hü}$	[1/h]	Transition operating frequency
$T_{opr,max}$	[°C]	Max. ambient operating temperature
$T_{opr,min}$	[°C]	Min. ambient operating temperature
$U_{N,\Delta}$	[V]	Rated voltage
$U_{N,Y}$	[V]	Rated voltage

CE	Communauté Européenne
CSA	Canadian Standards Association
DIN	Deutsches Institut für Normung e.V.
EMC	Electromagnetic compatibility
EN	European standard
IEC	International Electrotechnical Commission
IM	International Mounting Code
IP	International Protection Code
NEMA	National Electrical Manufacturers Association
UL	Underwriters Laboratory Listed Product
UR	Underwriters Laboratory Recognized Product
VDE	Verband deutscher Elektrotechniker (Association of German Electrical Engineers)
CCC	China Compulsory Certificate
GOST	Certificate for Russian Federation
cURus	Combined certification marks of UL for the USA and Canada
UkrSEPRO	Certificate for Ukraine

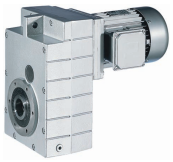


Product key



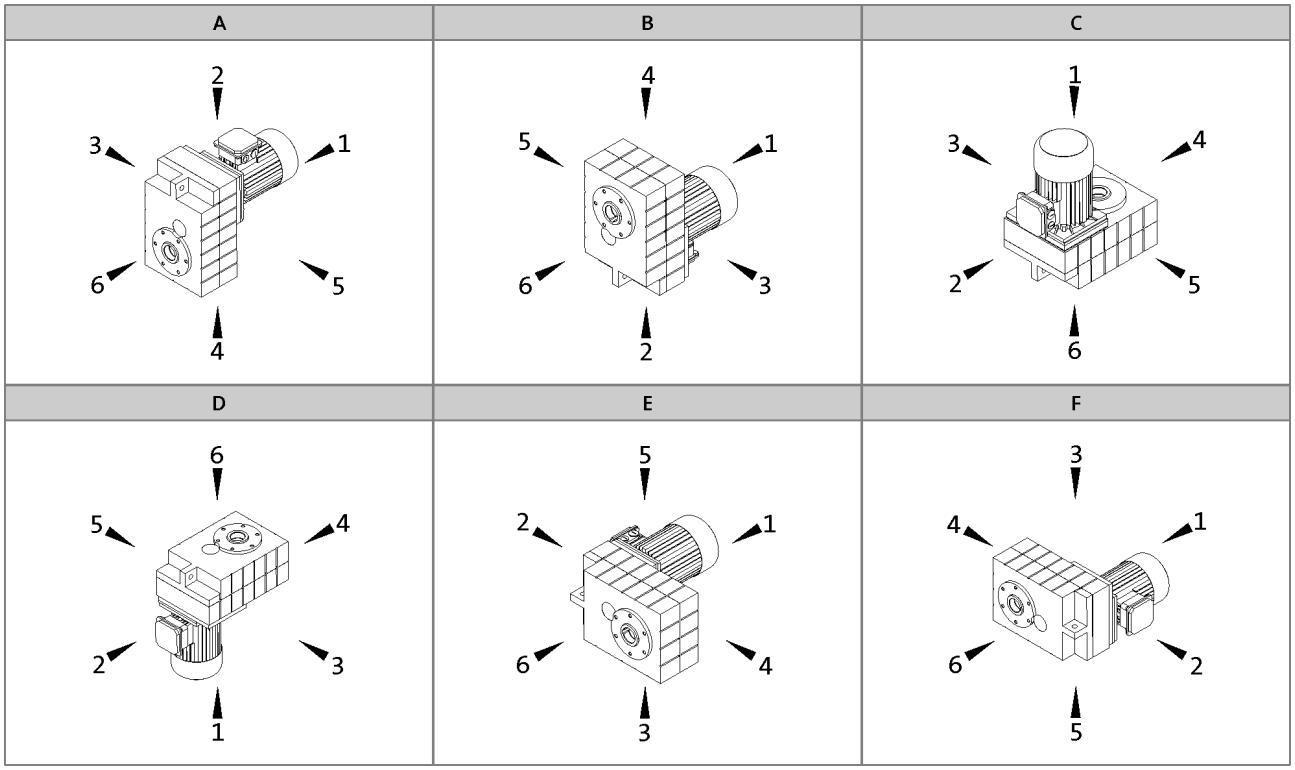
	Output design			
	V	H	S	K
	d x l [mm]	d [mm]	d [mm]	Øa2 [mm]
GFL04-2[2)]	25x50	25/30	25/30	160
GFL05-2/3	30x60	30/35	35	200
GFL06-2/3	40x80	40/45	40	200[1)]/250
GFL07-2/3	50x100	50/55	50	250/300
GFL09-2/3	60x120	60/70	65	350
GFL11-2/3	80x160	70/80	80	400/450
GFL14-2/3	100x200	100	100	450

[1)] Only in the case of H and S type of output
[2)] Output H version not possible with motor size 090



Product key

Mounting position (A to F) and position of system blocks (1 to 6)



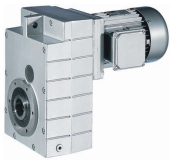
Hollow shaft: 0
Solid shaft: 6
Hollow shaft with shrink disc: 1, 6

Without foot: 0
Foot: 3, 4
Terminal box / motec: 2, 3, 4, 5

Gearbox designs

Basic versions	
Motor efficiency	Standard efficiency Increased efficiency (IE2) Premium efficiency (IE3)
Surface and corrosion protection	OKS-G (primer: grey) OKS-S (paint: RAL 7012)
Lubricant	CLP 460 (mineral)
Ventilation	Oil control plugs for GFL05 to 14 Breather elements for GFL06 ... 14

Options	
Surface and corrosion protection	OKS-S (special paint according to RAL) OKS-M (special paint according to RAL) OKS-L (special paint according to RAL)
Lubricant	CLP HC 320 (synthetic) CLP HC 220 USDA H1 (synthetic)
Shaft sealing rings	Driven shaft: Viton
Ventilation	Breather elements for GFL05 Compensation reservoir for GFL09 to 14-2 in mounting position C
Accessories	Rubber buffer for torque plate Shrink disc cover Mounting set for hollow shaft circlip
Nameplate	Metal nameplate (supplied loose) Adhesive nameplate (supplied loose)



Product information

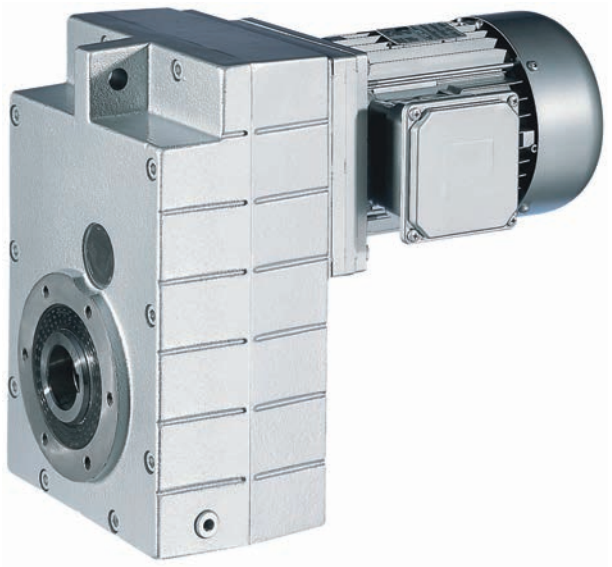
Lenze provides a geared motor construction kit, which covers a wide range of requirements. Numerous drive-side and output-side options enable precise adaptation of the drive to the specific application. This is the basis for versatile applications and functional scalability of our gearboxes and geared motors.
The modular concept and high power density make extremely compact sizes possible. Optimised teeth profiles and ground gears ensure low-noise operation and low backlash. The gearboxes are of compact and hence space-saving construction.

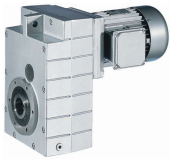
Types

- 2- and 3-stage gearboxes
- Hollow shaft with keyway or shrink disc
- Solid shaft with keyway
- Foot or flange mounting
- Torque plate, including rubber buffer
- With m500 three-phase AC motors (efficiency class IE3) in the power range 5.5 ... 45 kW

Compact and powerful

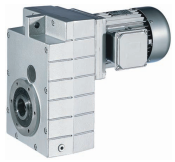
In combination with three-phase AC motors, our shaft-mounted helical gearboxes form a compact and effective drive unit. The low level of backlash of the gear teeth ensures highest precision. In addition, they can also distribute the power output and torque via an output shaft on both sides. The gearboxes are available in 2- and 3-stage versions with a torque of up to 11,615 Nm and a ratio of up to i=856.





Functions and features

Gearbox type	GFL
Housing	
Design	Cuboid
Material	Aluminium / cast iron
Solid shaft	
Design	with keyway to DIN 6885
Tolerance	k6 (d ≤ 50 mm) m6 (d > 50 mm)
Material	Tempered steel C45 or 42CrMo4
Hollow shaft	
Design	H: with keyway S: smooth
Tolerance	Bore H7
Material	Tempered steel C45
Toothed parts	
Design	Ground tooth flanks Optimised tooth flank geometry
Material	Case-hardened steel
Shaft-hub joint	
	1st stage/prestage/helical (bevel) gearbox: Friction-type connection Output stage (= 2nd, 3rd or 4th stage): Friction-type or positive-fit connection
Shaft sealing rings	
Design	With dust lip
Material	NB / FP
Bearing	
Design	Ball bearing / tapered-roller bearing depending on size and design
Lubricants	
Standard	DIN 51502
Quantities	corresponding to mounting position (see operating instructions)
Mechanical efficiency	
1-stage gearboxes [$\eta_{c=1}$]	
2-stage gearboxes [$\eta_{c=1}$]	0.97
3-stage gearboxes [$\eta_{c=1}$]	0.95
4-stage gearboxes [$\eta_{c=1}$]	
Notes	



Functions and features

Lubricants

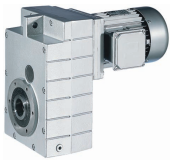
Lenze gearboxes and geared motors are ready for operation on delivery and are filled with lubricants specific to both the drive and the design. The mounting position and design specified in the order are key factors in choosing the volume of lubricant.

The lubricants listed in the lubricant table are approved for use in Lenze drives.

Lubricant table

Mode	CLP 460	CLP HC 320	CLP HC 220 USDA H1
Ambient temperature [°C]	0 ... +40	-25 ... +50	-20 ... +40
Specification	Mineral based oil with additives	Synthetic-based oil (synthetic hydrocarbon / poly-alpha-olefin oil)	
Note			For food processing industry
Changing interval	16000 operating hours not later than after three years (oil temperature 70 to 80 °C)	25000 operating hours not later than after three years (oil temperature 70 to 80 °C)	16000 operating hours not later than after three years (oil temperature 70 to 80 °C)
Fuchs	Fuchs Renolin CLP 460	Fuchs Renolin Unisyn CLP 320	bremer & leguil Cassida Fluid GL 220
Klüber	Klüberoil GEM1-460 N	Klübersynth GEM4-320 N	Klüberoil 4 UH1-220 N
Shell	Shell Omala S2 G 460	Shell Omala S4 GX HD 320	

► Please contact your Lenze sales office if you are operating at ambient temperatures in areas up to< -20 °C bzw. > or up to +40°C.



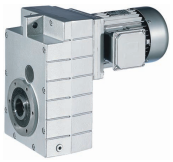
Functions and features

Surface and corrosion protection

For optimum protection of geared motors against ambient conditions, the surface and corrosion protection system (OKS) offers tailor-made solutions.

Various surface coatings combined with other protective measures ensure that the geared motors operate reliably even at high air humidity, in outdoor installations or in the presence of atmospheric impurities. Any colour from the RAL Classic collection can be chosen for the top coat. The geared motors are also available unpainted (no surface and corrosion protection).

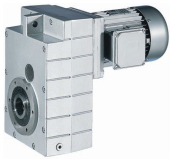
Surface and corrosion protection system	Applications	Measures
	Catalogue text	Catalogue text
OKS-G (primed)	• Dependent on subsequent top coat applied	• 2K PUR priming coat (grey) • Zinc-coated screws • Rust-free breather elements Optional measures • Stainless steel nameplate
OKS-S (small)	• Standard applications • Internal installation in heated buildings • Air humidity up to 90%	• Surface coating as per corrosivity category C1 (in line with EN 12944-2) • Zinc-coated screws • Rust-free breather elements Optional measures • Stainless steel nameplate
OKS-M (medium)	• Internal installation in non-heated buildings • Covered, protected external installation • Air humidity up to 95%	• Surface coating as per corrosivity category C2 (in line with EN 12944-2) • Zinc-coated screws • Rust-free breather elements Optional measures • Stainless steel shaft • Stainless steel nameplate • Rust-free shrink disc (on request)
OKS-L (high)	• External installation • Air humidity above 95% • Chemical industry plants • Food industry	• Surface coating as per corrosivity category C3 (in line with EN 12944-2) • Blower cover and B end shield additionally primed • Cable glands with gaskets • Corrosion-resistant brake with cover ring, stainless friction plate, and chrome-plated armature plate (on request) • All screws/screw plugs zinc-coated • Stainless breather elements • Threaded holes that are not used are closed by means of plastic plugs Optional measures • Sealed recesses on motor (on request) • Stainless steel shaft • Stainless steel nameplate • Rust-free shrink disc (on request) • Additional priming coat on cast iron fan • Oil expansion tank and torque plates painted separately and supplied loose



Functions and features

Structure of surface coating

Surface and corrosion protection system	Corrosivity category	Surface coating	Colour
	DIN EN ISO 12944-2	Structure	
Without OKS (uncoated)		Dipping primed gearbox	
OKS-G (primed)		Dipping primed gearbox 2K PUR priming coat	
OKS-S (small)	Comparable to C1	Dipping primed gearbox 2K-PUR top coat	Standard: RAL 7012 Optional: RAL Classic
OKS-M (medium)	Comparable to C2	Dipping primed gearbox 2K PUR priming coat 2K-PUR top coat	Standard: RAL 7012 Optional: RAL Classic
OKS-L (high)	Comparable to C3	Dipping primed gearbox 2K PUR priming coat 2K-PUR top coat	Standard: RAL 7012 Optional: RAL Classic



Functions and features

Ventilation

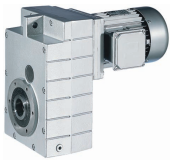
Non-ventilated gearboxes
No ventilation is required for the GFL04 gearbox.

Gearboxes that may optionally be equipped with ventilation
Special measures are not usually required when using the GFL05 gearbox. In borderline cases, e.g. at input speeds > 2000 r/min, we recommend the use of breather elements, which we can supply if required.

Ventilated gearboxes
The gearboxes GFL06 to 14 are supplied with breather elements as standard.

Special measures for mounting position C (motor on top)
We recommend that an oil compensation reservoir is always used with gearbox sizes G□□09 to 14 in this mounting position. This reservoir can be purchased as an option. For illustrations and measures, please refer to the Accessories chapter.

This is not required at higher ratios or low input speeds. Please contact Lenze for confirmation in this case.



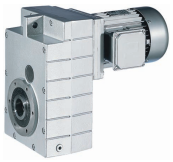
Dimensioning

General information about the data provided in this catalogue

The powers, torques and speeds specified in this catalogue are rounded values and are valid under the following conditions:

- Operating time/day = 8 h (100% OT)
- Duty class I for up to 10 switching operations/h
- Mounting positions and designs in this catalogue
- Standard lubricant
- T_{amb} = 20 °C for gearboxes,
  T_{amb} = 40 °C for motors (in accordance with EN 60034)
- Site altitude < = 1000 m amsl
- The selection tables provide the permissible mechanical powers and torques. For notes on the thermal power limit, see chapter drive dimensioning.
- The rated power specified for motors and geared motors applies to operating mode S1 (in accordance with EN 60034).

Under different operating conditions, the values obtained may vary from those listed here.
In the case of extreme operating conditions, please consult your Lenze sales office.



Dimensioning

Thermal power limit

The thermal power limit, defined by the heat balance, limits the permissible gearbox continuous power. It may be less than the mechanical power ratings listed in the selection tables.

The thermal power limit 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
- the ambient conditions: temperature, air circulation, input or dissipation via shafts and the foundation

Please consult your Lenze sales office
- if the following input speeds n_1 are exceeded on a continuous basis (continuous is defined as more than 8 h/day):

Motor frame size	Mounting position A, B, E, F	Mounting position C, D
063 ... 100	3000 r/min	3000 r/min
112 ... 132	3000 r/min	1500 r/min
160 ... 225	2000 r/min	1500 r/min

- if the following input speeds n_1 are exceeded:

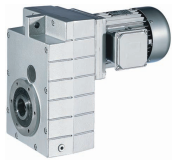
Motor frame size	Mounting position A, B, E, F	Mounting position C, D
063 ... 100	4000 r/min	3000 r/min
112 ... 132	4000 r/min	2000 r/min
160 ... 225	3000 r/min	1500 r/min

- or if you are using the following gearbox type, size and ratio combinations at an input speed of n_1 > 1500 r/min:

Gearbox type	Gearbox size	Ratio i
GFL shaft-mounted helical gearbox	07, 09, 11, 14	≤ 16

Possible ways of extending the application area

- synthetic lubricant (option)
- shaft sealing rings made from FP material/Viton (option)
- reduction in lubricant quantity
- cooling of the geared motor by means of air convection on the machine/system



Dimensioning

Load capacity and application factor

Load capacity c of gearbox
Rated value for the load capacity of Lenze geared motors.
- c is the ratio of the permissible rated torque of the gearbox to the rated torque supplied by the drive component (e.g. the built-in Lenze motor).
- The value of c must always be greater than the value of the application factor k calculated for the application.

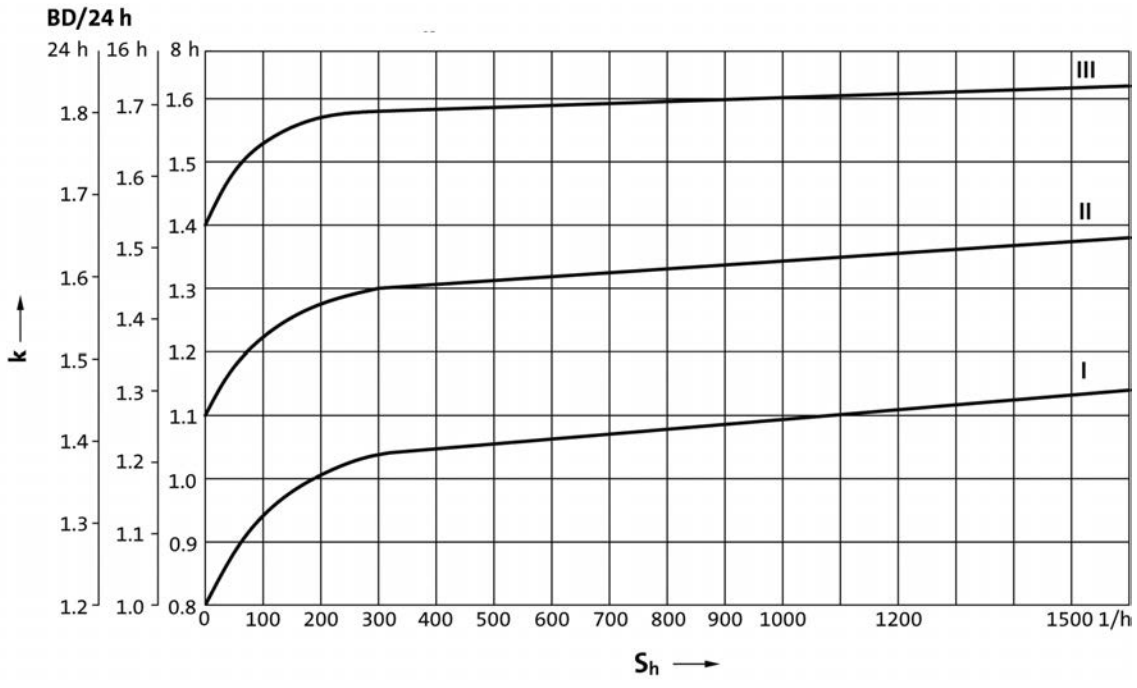
Requierement: c ≥ k

Application factor k (according to DIN 3990)
Takes into account the influence of temporally variable loads which are actually present during the anticipated operating time of gearboxes and geared motors.
k is determined by:
- the type of load
- the load intensity
- temporal influences

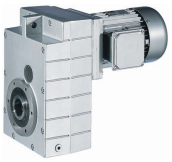
Duty class	Load type	Intensity	
I	Smooth operation, small or light jolts	$F_I \leq 1.25$	$F_I = \frac{\frac{J_L}{i^2} + J_M + J_B + J_Z}{J_M + J_B + J_Z}$
II	Uneven operation, average jolts	$1.25 < F_I \leq 4$	
III	Uneven operation, severe jolts and/or alternating load	$F_I > 4$	

J_L= moment of inertia of the load
i = gearbox ratio
J_M= moment of inertia of the motor
J_B= moment of inertia of the motor brake
J_Z= moment of inertia of additional built-on motor accessories

Application factor (inverter operation)



S_h= switching operations/hour



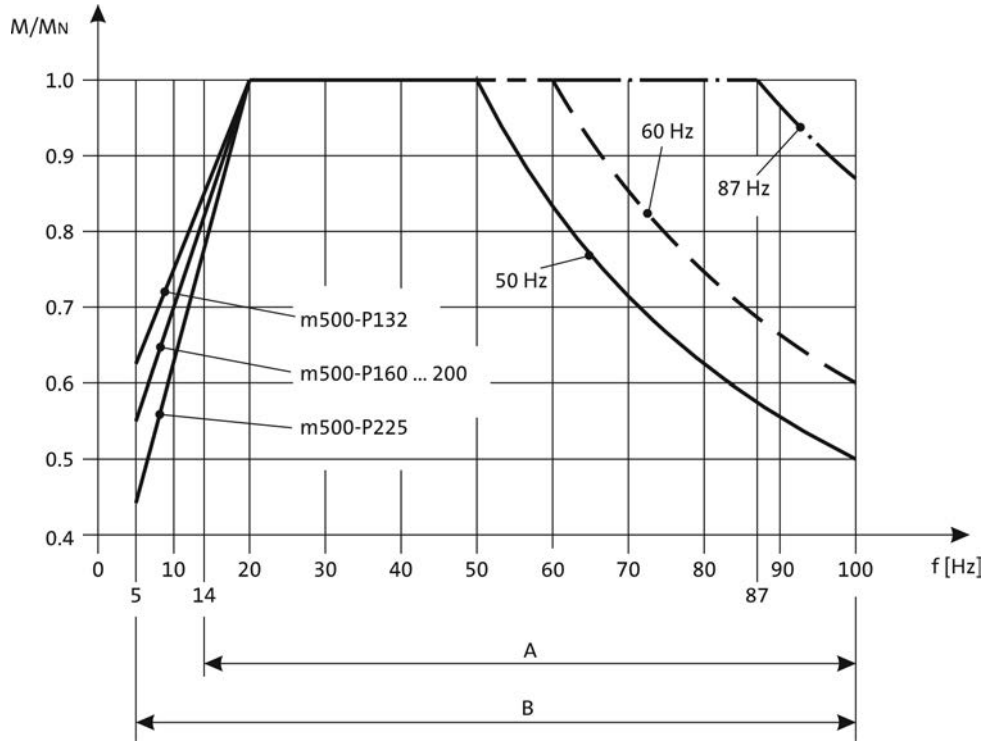
Dimensioning

Torque derating at low motor frequencies

During operation with the rated torque at low speeds (< 20 Hz), the integral fan does not rotate fast enough anymore to ensure sufficient cooling of the motor. In order to prevent overheating, operation without a blower requires a torque reduction of the motor.
The blower cools the motor steadily and irrespective of the motor speed. A torque reduction is not required and the motor can be actuated with its rated torque from 5 Hz to the rated frequency.

The diagram shows the motor frame size-dependent torque reduction for self-ventilated motors, taking the thermal behaviour during actuation of the inverter into consideration.

Torque characteristics



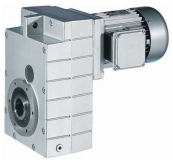
A = Operation with integral fan and brake
B = Operation with integral fan and brake control "Holding current reduction"

6.2

You can use the Drive Solution Designer for precise drive dimensioning.

The Drive Solution Designer helps you to carry out a fast and high-quality drive dimensioning.
The software includes well-founded and proven knowledge on drive applications and electro-mechanical drive components.

Please contact your Lenze sales office.



Dimensioning

Notes on the selection tables

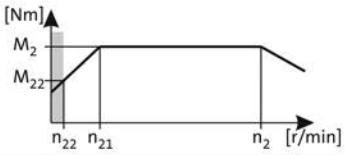
The selection tables show the available combinations of gearbox type, number of stages, ratio and motor. They are used only to provide basic orientation.
The following legend indicates the structure of the selection tables.

Rated power Prated of the drive motor depending on the rated frequency

50 Hz: P_N = 5.5 kW
87 Hz: P_N = 9.6 kW

2-stufige Getriebe ← **Number of the gear stage of the gearbox**

Torque diagram



Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GFL	m500	
397	128	2.7	40	80	163	128	397	128	2.7	687	129	2.2	3.675	GFL06	-P132M4	49
314	162	4.0	31	101	129	162	314	162	4.0				4.643	GFL07	-P132M4	53

Product Gearbox

Product Motor

Ratio i

Page number for dimensions

Load capacity c of the gearbox
c is the ratio between the permissible rated torque of the gearbox and the rated torque of the three-phase AC motor (converted to the driven shaft).
c must be always higher than the service factor **k** determined for the application **k**.

$$c = \frac{M_{2,zul}}{M_{1N} \cdot i \cdot \eta_{Getr}} > k$$

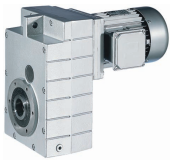
Mains operation
Output speed **n2**
Output torque **M2**

Inverter operation
The speed and torque data are valid for self-ventilated and forced ventilated drives. Forced ventilated drives can always output the torque **M2** in the entire setting ranges. In the case of self-ventilated drives, a reduction to **M22** is required in the lower speed range.

The following applies to self-ventilated geared motors:
n22 is the minimum speed where the torque **M22** is permissible, from **n21** to **n2**, the maximum torque is **M2**
The following applies to forced ventilated geared motors:
From the minimum speed **n22** to **n2**, the maximum torque is **M2**

Motor voltages

The power values and torques indicated in the selection tables refer to the following motor voltages:
- 50 Hz : Δ 230 V / Y 400 V
- 87 Hz : 400 V



Notes on ordering

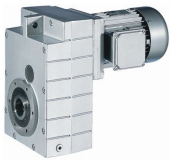
We want to be sure that you receive the correct products in good time.

To allow us to achieve this we need:
- your address and your company data
- our product key for the individual products in this catalogue
- your delivery date and delivery address

Ordering procedure
Please use the ordering information checklist to ensure that you provide all the ordering information required for the various products.

The ordering information checklist, the product key, the basic versions, options, mounting position and position of the system blocks will be found in the General – Product key section.

A list of Lenze's worldwide sales offices can be found on the Internet: www.Lenze.com.



Ordering details checklist

☐ **Offer**

Page __ of __

☐ **Order**

Customer No.

Job No.

Fax No. _____

Sender

Company _____ Made out by (name) _____

Street/P.O. Box _____ Department _____

P.O. Box, City _____ Telephone No. _____

Date _____ Signature _____

Delivery address (if different)

Street/P.O. Box _____ Desired delivery date _____

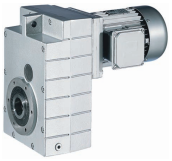
P.O. Box, City _____ Dispatching notes _____

Invoice recipient (if different)

Street/P.O. Box _____

Postal code, City _____

6.2



Ordering details checklist

Customer No. ☐☐☐☐☐☐☐☐

Job No. ☐☐☐☐☐☐☐☐☐☐

Page __

Quantity ☐☐☐☐

Efficiency class ☐ High efficiency (IE3)

Rated frequency ☐ 50 Hz ☐ 60 Hz ☐ 87 Hz

Ratio i ☐☐☐☐

GFL ☐☐ – ☐ 2 / 3 ☐ M / E ☐ V / H / S ☐ A / B / C / D ☐ R / K

Motor frame size ☐☐☐C☐☐

Hollow shaft d = ☐☐ mm

Flange a_2 = ☐☐ mm

Mounting position A ☐ B ☐ C ☐ D ☐ E ☐ F ☐

Position of system blocks

Shaft/shrink disc: 0 ☐ 6 ☐ 1 ☐

Foot: 0 ☐ 3 ☐ 4 ☐

Terminal box: 2 ☐ 3 ☐ 4 ☐ 5 ☐

Surface and corrosion protection

☐ OKS-S colour: RAL 7012

☐ OKS-G (primed)

Options

Special lubricants

☐ CLP HC 320 (synthetic)

☐ CLP HC 220 USDA H1 (for the food industry)

Surface and corrosion protection

☐ OKS-S (small)

☐ OKS-M (medium) ☐☐☐☐

☐ OKS-L (high)

☐ OKS-G (primed)

Accessories

☐ Rubber buffer for torque support

☐ Mounting set for hollow-shaft circlip

☐ Hollow shaft cover, hoseproof

Shaft sealing rings

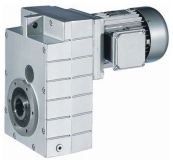
☐ Viton

Breathing

☐ Breather elements for GFL05

☐ Compensation reservoir in mounting position for GFL09 ... 14-2

6.2



Ordering details checklist

Three-phase AC motors options

Customer No. ☐☐☐☐☐☐☐☐

Job No. ☐☐☐☐☐☐☐☐☐☐

Page __

Motor connection

Terminal box
- ☐ with plug-in connector ICN 6-pin. Adhere to permissible rated motor current 20 A!
- ☐ with plug-in connector ICN 8-pin. Adhere to permissible rated motor current 20 A!
- ☐ with plug-in connector HAN10E. Adhere to permissible rated current 16 A!
- ☐ with plug-in connector HAN-Modular. Adhere to permissible rated current 16 / 40 A!

Cable entry — in position 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

Blower

☐ 1~ ☐ 3~

☐ Terminal box with plug-in connector ICN

Terminal box position 2 ☐ 3 ☐ 4 ☐ 5 ☐

Spring-applied brake

Brake version ☐ Standard

Brake size ☐

Characteristic torque ☐ Nm

Rated voltage AC ☐ DC ☐ ☐ V

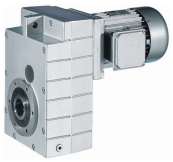
Rectifier — Only in the case of AC supply voltage

- ☐ Half-wave rectifier
- ☐ Bridge rectifier
- ☐ Bridge/half-wave rectifier (overexcitation)
- ☐ Bridge/half-wave rectifier (holding current reduction)

Brake options — Manual release lever in position 2 ☐ 3 ☐ 4 ☐ 5 ☐

☐ Low-noise version (Standard in the case of brake with speed/position encoder)

6.2



Ordering details checklist

Three-phase AC motors options

Customer No. ☐☐☐☐☐☐☐☐

Job No. ☐☐☐☐☐☐☐☐☐☐

Page __

Speed/position encoder

Resolver ☐ RS1

Incremental encoder HTL ☐ IG128-24V-H ☐ IG512-24V-H ☐ IG1024-24V-H ☐ IG2048-24V-H

Incremental encoder TTL ☐ IG512-5V-T ☐ IG1024-5V-T ☐ IG2048-5V-T

Feedback with ICN connector ☐ IG128-24V-H not possible with plug-in connector!

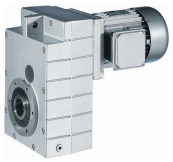
Motor protection

☐ TKO ☐ KTY 83-110 ☐ KTY 84-130

☐ PTC

Further options

☐ 2nd nameplate (adhesive nameplate/metal nameplate)



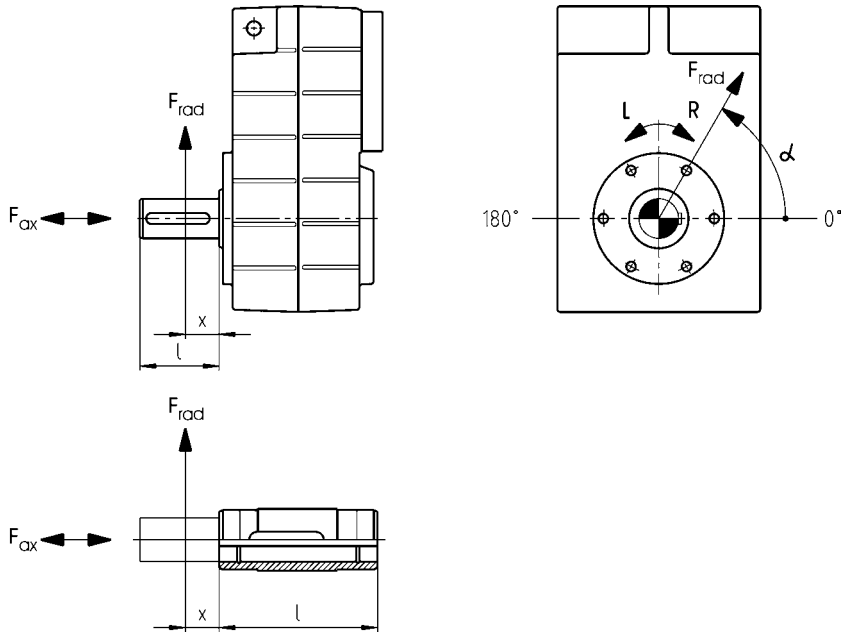
Permissible radial and axial forces at output

Permissible radial force
$F_{rad,per} = \min(f_w \times f_\alpha \times F_{rad,max}\ ;\ f_w \times F_{rad,max}$ at $n_2 \leq 16$ r/min)

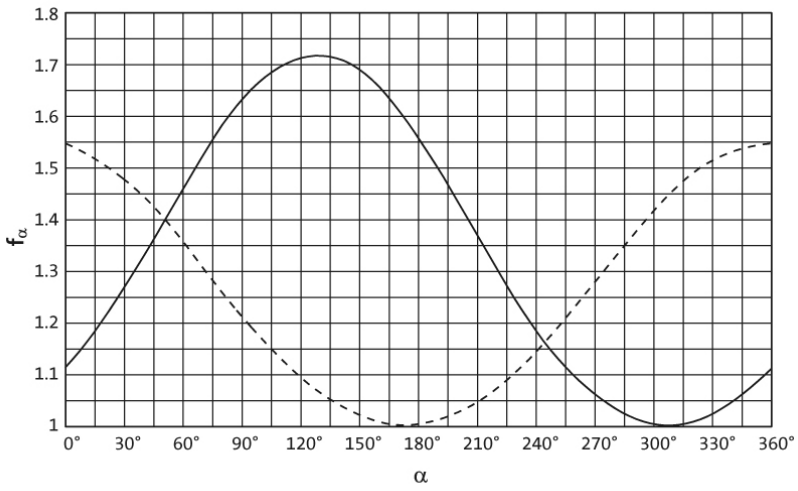
Permissible axial force
$F_{ax,per} = F_{ax,max}$ if $F_{rad} = 0$

If F_{rad} **and** $F_{ax} \neq 0$, please contact your Lenze sales office.

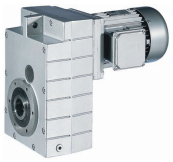
Application of forces



Effective direction factor f_α at output shaft

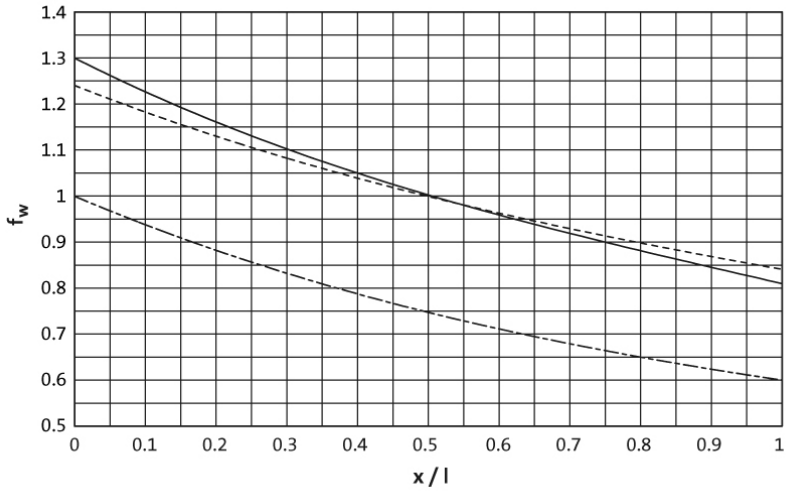


——— Direction of rotation R
— — — Direction of rotation L



Permissible radial and axial forces at output

Additional load factor f_w at output shaft



——— Solid shaft (V□□)
— · — Hollow shaft (H□□)
— — — Solid shaft with flange (V□K)

GFL□□-2/3□ H□□

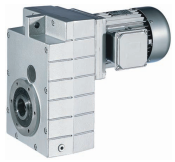
Size	n_2 [r/min]									
Gearbox	1000	630	400	250	160	100	63	40	25	≤16

	Max. radial force, Hollow shaft									
	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GFL04	2100	2700	2800	3200	3800	4600	5500	6300	7000	7000
GFL05	1800	2400	3000	3400	4100	5000	6000	7100	8000	8000
GFL06	2400	3300	4300	4700	5000	6600	8500	10800	12000	12000
GFL07	2200	3400	4500	5100	6400	7900	9300	11500	15000	16000
GFL09			5000	6000	7200	10500	13000	15000	22000	24000
GFL11			7300	8700	10000	14200	19000	23000	27000	30000
GFL14			8000	9000	9500	11500	14000	18000	30000	45000

6.2

	Max. axial force, Hollow shaft									
	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GFL04	1300	1700	2200	2600	3200	4200	5300	5500	5500	5500
GFL05	1600	2200	2800	3600	4200	5900	6600	6600	6600	6600
GFL06	2400	3200	4000	5200	6000	8500	10000	10000	10000	10000
GFL07	2000	2700	3400	4700	6000	8500	12000	14000	14000	14000
GFL09			3100	4200	5800	10000	13500	17000	21000	21000
GFL11			4700	6000	7500	14000	19000	25000	27000	27000
GFL14			4000	5000	6200	7500	11000	17500	31000	35000

- Application of force F_{rad}: at hollow shaft end face (x = 0)
- $F_{ax,max}$ only valid with F_{rad} = 0
- Neither radial nor axial forces are permissible for the hollow shaft with shrink disc (S□□).



Permissible radial and axial forces at output

GFL□□-2/3□ V□R

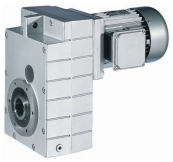
Size	n_2 [r/min]									
Gearbox	1000	630	400	250	160	100	63	40	25	≤16

	Max. radial force, Solid shaft without flange									
	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GFL04	1650	2100	2300	2700	3200	3600	3600	3600	3600	3600
GFL05	1400	1900	2400	2700	3200	4000	4800	5800	6200	6200
GFL06	1850	2500	3200	3600	3900	5100	6500	8400	9000	9000
GFL07	1650	2600	3200	3600	3900	5100	6500	8400	9000	9000
GFL09 [1)]			3800	4400	5500	8000	10000	12000	18000	18000
GFL11 [1)]			5500	6300	7300	11200	14500	17400	20500	23000
GFL14			47000	54000	62000	65000	65000	65000	65000	65000

	Max. axial force, Solid shaft without flange									
	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GFL04	1300	1700	2200	2600	3200	4200	5300	5500	5500	5500
GFL05	1600	2200	2800	3600	4200	5900	6600	6600	6600	6600
GFL06	2400	3200	4000	5200	6000	8500	10000	10000	10000	10000
GFL07	2000	2700	3400	4700	6000	8500	12000	14000	14000	14000
GFL09 [1)]			3100	4200	5800	10000	13500	17000	21000	21000
GFL11 [1)]			4700	6000	7500	14000	19000	25000	27000	27000
GFL14			25000	27000	29000	32000	35000	35000	35000	35000

[1)] Reinforced output shaft bearings are available on request for V□R versions.

► Application of force F_{rad}: centre of shaft journal (x = l/2)
► $F_{ax,max}$ only valid with F_{rad} = 0



Permissible radial and axial forces at output

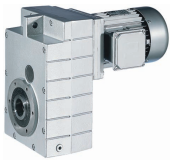
GFL□□-2/3□ V□K

Size	n_2 [r/min]									
Gearbox	1000	630	400	250	160	100	63	40	25	≤16

	Max. radial force, Solid shaft with flange									
	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GFL04	2300	2800	3200	3700	4400	4600	4600	4600	4600	4600
GFL05	2900	3700	4300	5100	5900	6800	7000	7000	7000	7000
GFL06	4000	5000	6100	7000	7800	9600	10000	10000	10000	10000
GFL07	4000	5200	6400	7400	8900	10500	12000	13000	14000	14000
GFL09			7800	9000	10500	14000	15000	15000	15000	15000
GFL11			12500	14500	17000	21500	26000	30000	30000	30000
GFL14			18000	20000	23000	27500	32000	38000	43000	43000

	Max. axial force, Solid shaft with flange									
	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GFL04	1300	1700	2200	2600	3200	4200	4400	4400	4400	4400
GFL05	1800	2400	3100	3900	4800	6400	6600	6600	6600	6600
GFL06	2500	3400	4300	5500	6500	8500	10000	10000	10000	10000
GFL07	3600	4800	6100	6500	7000	9500	11500	11500	11500	11500
GFL09			6100	6500	7000	9500	11500	11500	11500	11500
GFL11			6800	8500	10500	17000	22000	27000	27000	27000
GFL14			6000	8000	10000	13000	19000	26000	35000	35000

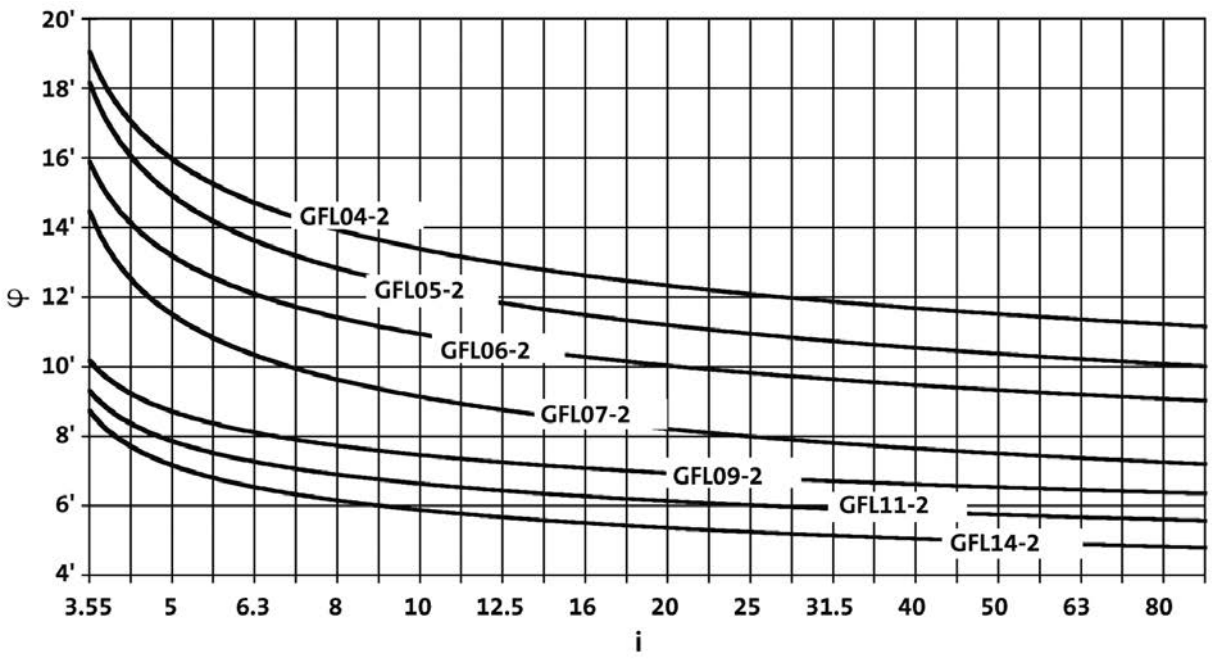
- Application of force F_{rad}: centre of shaft journal (x = l/2)
- $F_{ax,max}$ only valid with F_{rad} = 0



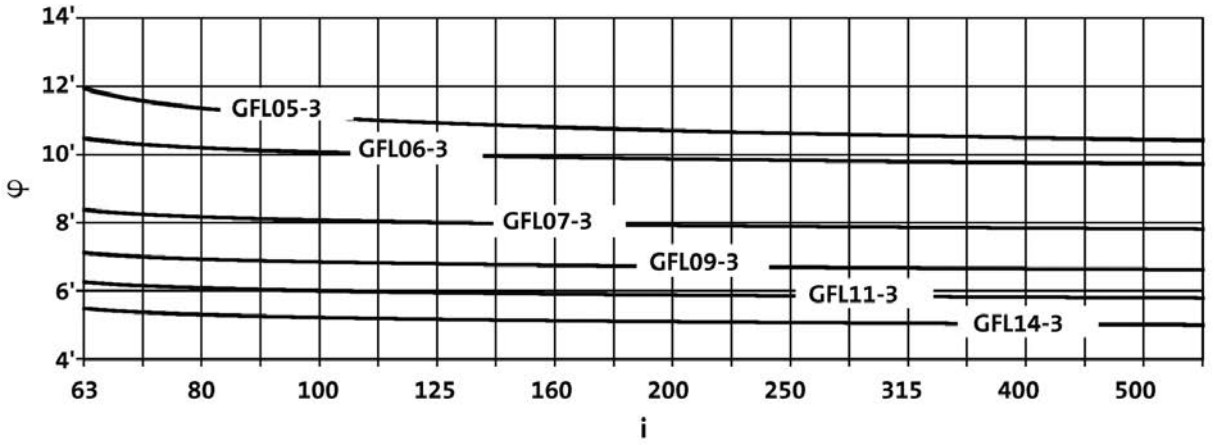
Output backlash in angular minutes

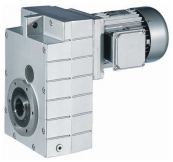
► Backlash ϕ depending on ratio i

GFL04 to 14-2



GFL05 to 14-3





Moments of inertia

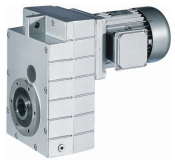
GFL□□-2

► Moment of inertia (J) depending on ratio i

Gearbox			GFL04
3.659	J	[kgcm²]	1.510
5.018	J	[kgcm²]	0.858
5.833	J	[kgcm²]	0.925
6.422	J	[kgcm²]	0.555
7.025	J	[kgcm²]	0.473
8.379	J	[kgcm²]	0.666
9.333	J	[kgcm²]	0.613
10.238	J	[kgcm²]	0.366
11.491	J	[kgcm²]	0.410
12.800	J	[kgcm²]	0.382
14.706	J	[kgcm²]	0.282
16.087	J	[kgcm²]	0.245
17.920	J	[kgcm²]	0.230
20.519	J	[kgcm²]	0.171
22.857	J	[kgcm²]	0.163
25.136	J	[kgcm²]	0.129
28.000	J	[kgcm²]	0.123
31.600	J	[kgcm²]	0.086
35.200	J	[kgcm²]	0.082
40.697	J	[kgcm²]	0.058
45.333	J	[kgcm²]	0.056
51.579	J	[kgcm²]	0.038
57.455	J	[kgcm²]	0.037
64.636	J	[kgcm²]	0.026
72.000	J	[kgcm²]	0.025
85.156	J	[kgcm²]	0.016
94.857	J	[kgcm²]	0.015

Gearbox			GFL05
3.333	J	[kgcm²]	1.677
4.571	J	[kgcm²]	2.133
5.133	J	[kgcm²]	2.372
5.667	J	[kgcm²]	2.329
6.400	J	[kgcm²]	0.822
7.040	J	[kgcm²]	1.470
7.771	J	[kgcm²]	1.450
9.010	J	[kgcm²]	0.951
9.946	J	[kgcm²]	0.885
11.360	J	[kgcm²]	1.082
12.800	J	[kgcm²]	1.012
14.538	J	[kgcm²]	0.746
15.904	J	[kgcm²]	0.603
17.920	J	[kgcm²]	0.609
20.286	J	[kgcm²]	0.428
22.857	J	[kgcm²]	0.434
24.850	J	[kgcm²]	0.345
28.000	J	[kgcm²]	0.331
32.344	J	[kgcm²]	0.204
36.444	J	[kgcm²]	0.195
40.233	J	[kgcm²]	0.148
45.333	J	[kgcm²]	0.142
52.067	J	[kgcm²]	0.093
58.667	J	[kgcm²]	0.090
63.190	J	[kgcm²]	0.068
71.200	J	[kgcm²]	0.064
80.763	J	[kgcm²]	0.043
91.000	J	[kgcm²]	0.042

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.



Moments of inertia

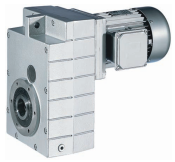
GFL□□-2

► Moment of inertia (J) depending on ratio i

Gearbox			GFL06
3.675	J	[kgcm²]	7.755
5.211	J	[kgcm²]	6.636
5.750	J	[kgcm²]	6.044
6.450	J	[kgcm²]	3.651
7.147	J	[kgcm²]	4.044
8.400	J	[kgcm²]	4.264
9.463	J	[kgcm²]	3.879
10.092	J	[kgcm²]	2.520
11.520	J	[kgcm²]	1.730
12.978	J	[kgcm²]	2.610
14.743	J	[kgcm²]	1.950
16.128	J	[kgcm²]	1.680
18.169	J	[kgcm²]	1.570
20.571	J	[kgcm²]	1.190
23.175	J	[kgcm²]	1.130
25.200	J	[kgcm²]	0.904
28.389	J	[kgcm²]	0.861
32.800	J	[kgcm²]	0.581
36.951	J	[kgcm²]	0.556
40.800	J	[kgcm²]	0.425
45.963	J	[kgcm²]	0.407
52.800	J	[kgcm²]	0.264
59.481	J	[kgcm²]	0.251
64.080	J	[kgcm²]	0.193
72.189	J	[kgcm²]	0.187
81.000	J	[kgcm²]	0.125
91.250	J	[kgcm²]	0.121

Gearbox			GFL07
3.350	J	[kgcm²]	19.570
4.643	J	[kgcm²]	11.988
5.159	J	[kgcm²]	11.120
5.695	J	[kgcm²]	18.094
6.400	J	[kgcm²]	9.831
7.150	J	[kgcm²]	11.878
8.324	J	[kgcm²]	13.113
9.379	J	[kgcm²]	12.037
9.714	J	[kgcm²]	8.030
11.538	J	[kgcm²]	8.520
13.000	J	[kgcm²]	7.970
14.200	J	[kgcm²]	6.350
15.904	J	[kgcm²]	5.270
17.920	J	[kgcm²]	4.980
20.286	J	[kgcm²]	3.470
22.857	J	[kgcm²]	3.268
24.850	J	[kgcm²]	2.645
28.000	J	[kgcm²]	2.525
32.344	J	[kgcm²]	1.690
36.444	J	[kgcm²]	1.610
39.642	J	[kgcm²]	1.250
44.667	J	[kgcm²]	1.200
52.067	J	[kgcm²]	0.783
58.667	J	[kgcm²]	0.753
63.190	J	[kgcm²]	0.573
71.200	J	[kgcm²]	0.555
79.875	J	[kgcm²]	0.366
90.000	J	[kgcm²]	0.358

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.



Moments of inertia

GFL□□-2

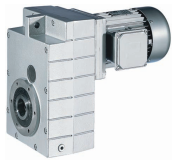
► Moment of inertia (J) depending on ratio i

Gearbox			GFL09
6.864	J	[kgcm²]	41.300
7.466	J	[kgcm²]	38.700
9.010	J	[kgcm²]	26.800
9.799	J	[kgcm²]	25.300
11.167	J	[kgcm²]	19.500
12.307	J	[kgcm²]	27.600
14.333	J	[kgcm²]	20.000
16.333	J	[kgcm²]	15.500
18.407	J	[kgcm²]	14.600
19.667	J	[kgcm²]	12.100
22.164	J	[kgcm²]	11.300
24.111	J	[kgcm²]	9.040
27.173	J	[kgcm²]	8.630
32.667	J	[kgcm²]	5.430
36.815	J	[kgcm²]	5.210
39.667	J	[kgcm²]	4.070
44.704	J	[kgcm²]	3.920
51.333	J	[kgcm²]	2.590
57.852	J	[kgcm²]	2.500
62.300	J	[kgcm²]	1.890
70.211	J	[kgcm²]	1.830
78.750	J	[kgcm²]	1.250
88.750	J	[kgcm²]	1.210

Gearbox			GFL11
6.864	J	[kgcm²]	124.000
7.466	J	[kgcm²]	116.000
9.010	J	[kgcm²]	79.600
9.799	J	[kgcm²]	74.800
10.720	J	[kgcm²]	65.000
12.480	J	[kgcm²]	81.500
14.538	J	[kgcm²]	58.400
15.904	J	[kgcm²]	51.300
17.920	J	[kgcm²]	48.300
20.286	J	[kgcm²]	36.100
22.857	J	[kgcm²]	34.300
24.850	J	[kgcm²]	26.900
28.000	J	[kgcm²]	25.700
32.739	J	[kgcm²]	17.100
36.889	J	[kgcm²]	16.500
40.233	J	[kgcm²]	12.600
45.333	J	[kgcm²]	12.200
52.067	J	[kgcm²]	8.080
58.667	J	[kgcm²]	7.810
63.190	J	[kgcm²]	5.900
71.200	J	[kgcm²]	5.720
79.875	J	[kgcm²]	3.870
90.000	J	[kgcm²]	3.760

Gearbox			GFL14
7.150	J	[kgcm²]	344.000
7.777	J	[kgcm²]	321.000
8.800	J	[kgcm²]	247.000
9.571	J	[kgcm²]	232.000
11.538	J	[kgcm²]	242.000
13.000	J	[kgcm²]	225.000
14.200	J	[kgcm²]	625.000
15.620	J	[kgcm²]	156.000
17.600	J	[kgcm²]	146.000
19.948	J	[kgcm²]	111.000
22.476	J	[kgcm²]	105.000
24.456	J	[kgcm²]	83.200
27.556	J	[kgcm²]	79.400
32.344	J	[kgcm²]	52.900
36.444	J	[kgcm²]	50.700
39.642	J	[kgcm²]	38.000
44.667	J	[kgcm²]	36.600
52.067	J	[kgcm²]	24.600
58.667	J	[kgcm²]	23.800
63.190	J	[kgcm²]	18.000
71.200	J	[kgcm²]	17.400
79.875	J	[kgcm²]	11.800
90.000	J	[kgcm²]	11.500

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.



Moments of inertia

GFL□□-3

► Moment of inertia (J) depending on ratio i

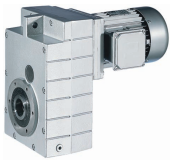
Gearbox			GFL05
61.653	J	[kgcm²]	0.202
78.639	J	[kgcm²]	0.145
90.123	J	[kgcm²]	0.197
101.547	J	[kgcm²]	0.196
114.952	J	[kgcm²]	0.142
129.524	J	[kgcm²]	0.141
140.817	J	[kgcm²]	0.109
158.667	J	[kgcm²]	0.109
177.027	J	[kgcm²]	0.073
199.467	J	[kgcm²]	0.073
227.989	J	[kgcm²]	0.051
256.889	J	[kgcm²]	0.050
288.948	J	[kgcm²]	0.033
325.576	J	[kgcm²]	0.033
362.100	J	[kgcm²]	0.023
408.000	J	[kgcm²]	0.023
477.052	J	[kgcm²]	0.014
537.524	J	[kgcm²]	0.014

Gearbox			GFL06
66.213	J	[kgcm²]	0.292
72.000	J	[kgcm²]	0.264
81.111	J	[kgcm²]	0.259
88.200	J	[kgcm²]	0.190
99.361	J	[kgcm²]	0.187
116.571	J	[kgcm²]	0.091
131.323	J	[kgcm²]	0.208
144.320	J	[kgcm²]	0.110
162.583	J	[kgcm²]	0.109
179.520	J	[kgcm²]	0.102
202.237	J	[kgcm²]	0.101
231.200	J	[kgcm²]	0.068
260.457	J	[kgcm²]	0.067
293.018	J	[kgcm²]	0.044
299.200	J	[kgcm²]	0.064
367.200	J	[kgcm²]	0.030
413.667	J	[kgcm²]	0.030
475.200	J	[kgcm²]	0.029
535.333	J	[kgcm²]	0.028
576.720	J	[kgcm²]	0.028
649.700	J	[kgcm²]	0.028
759.806	J	[kgcm²]	0.017
855.954	J	[kgcm²]	0.017

Gearbox			GFL07
65.306	J	[kgcm²]	0.790
72.452	J	[kgcm²]	0.894
81.636	J	[kgcm²]	0.880
92.413	J	[kgcm²]	0.609
104.127	J	[kgcm²]	0.601
113.206	J	[kgcm²]	0.448
127.556	J	[kgcm²]	0.442
147.347	J	[kgcm²]	0.275
166.025	J	[kgcm²]	0.271
183.285	J	[kgcm²]	0.194
206.519	J	[kgcm²]	0.192
224.636	J	[kgcm²]	0.180
253.111	J	[kgcm²]	0.179
290.706	J	[kgcm²]	0.112
327.556	J	[kgcm²]	0.111
352.811	J	[kgcm²]	0.081
397.533	J	[kgcm²]	0.080
430.222	J	[kgcm²]	0.104
522.133	J	[kgcm²]	0.075
562.391	J	[kgcm²]	0.073
633.680	J	[kgcm²]	0.073
718.786	J	[kgcm²]	0.047
809.900	J	[kgcm²]	0.046

Gearbox			GFL09
63.326	J	[kgcm²]	2.344
73.173	J	[kgcm²]	2.472
82.465	J	[kgcm²]	2.428
93.333	J	[kgcm²]	1.679
105.185	J	[kgcm²]	1.651
114.333	J	[kgcm²]	1.230
128.852	J	[kgcm²]	1.212
148.815	J	[kgcm²]	0.773
167.712	J	[kgcm²]	0.762
185.111	J	[kgcm²]	0.548
208.617	J	[kgcm²]	0.541
224.778	J	[kgcm²]	0.505
253.321	J	[kgcm²]	0.500
290.889	J	[kgcm²]	0.313
327.827	J	[kgcm²]	0.310
353.033	J	[kgcm²]	0.226
397.863	J	[kgcm²]	0.224
424.247	J	[kgcm²]	0.286
514.881	J	[kgcm²]	0.208
554.470	J	[kgcm²]	0.201
624.879	J	[kgcm²]	0.200
700.875	J	[kgcm²]	0.130
789.875	J	[kgcm²]	0.129

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.



Moments of inertia

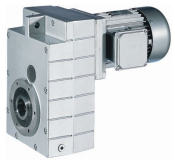
GFL□□-3

► Moment of inertia (J) depending on ratio i

Gearbox			GFL11
65.306	J	[kgcm²]	6.967
73.335	J	[kgcm²]	7.844
82.631	J	[kgcm²]	7.707
93.540	J	[kgcm²]	5.050
105.397	J	[kgcm²]	4.965
114.586	J	[kgcm²]	3.712
129.111	J	[kgcm²]	3.656
149.144	J	[kgcm²]	2.299
168.049	J	[kgcm²]	2.265
182.792	J	[kgcm²]	1.661
205.963	J	[kgcm²]	1.639
224.636	J	[kgcm²]	1.515
253.111	J	[kgcm²]	1.501
267.259	J	[kgcm²]	1.865
327.556	J	[kgcm²]	1.373
358.077	J	[kgcm²]	0.679
403.467	J	[kgcm²]	0.673
430.222	J	[kgcm²]	0.853
522.133	J	[kgcm²]	0.623
562.391	J	[kgcm²]	0.599
633.680	J	[kgcm²]	0.596
710.888	J	[kgcm²]	0.385
801.000	J	[kgcm²]	0.384

Gearbox			GFL14
64.296	J	[kgcm²]	26.316
68.708	J	[kgcm²]	19.862
77.418	J	[kgcm²]	19.381
85.037	J	[kgcm²]	21.590
104.889	J	[kgcm²]	9.324
114.126	J	[kgcm²]	8.318
128.593	J	[kgcm²]	8.144
136.889	J	[kgcm²]	16.779
156.148	J	[kgcm²]	5.917
170.074	J	[kgcm²]	6.962
202.074	J	[kgcm²]	3.692
224.636	J	[kgcm²]	4.742
253.111	J	[kgcm²]	4.697
273.778	J	[kgcm²]	5.759
332.444	J	[kgcm²]	4.300
352.811	J	[kgcm²]	2.163
397.533	J	[kgcm²]	2.145
430.222	J	[kgcm²]	2.727
522.133	J	[kgcm²]	1.984
562.391	J	[kgcm²]	1.910
633.680	J	[kgcm²]	1.903
710.888	J	[kgcm²]	1.259
801.000	J	[kgcm²]	1.254

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.



Weights, 4-pole motors

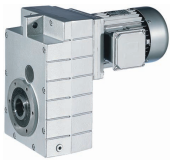
2-stage gearboxes

				m500						
				-P132L4	-P132M4	-P160L4	-P160M4	-P180L4 -P180M4	-P180V4	-P225M4
GFL	GFL06	m	[kg]	106	94					
	GFL07	m	[kg]	133	121	183	172			
	GFL09	m	[kg]	180	168	230	218	268	296	
	GFL11	m	[kg]	263	251	313	302	351	379	
	GFL14	m	[kg]	404	392	454	443	492	520	617

3-stage gearboxes

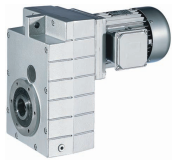
				m500			
				-P132L4	-P132M4	-P160L4	-P160M4
GFL	GFL11	m	[kg]	286	274		
	GFL14	m	[kg]	442	430	492	481

► Weights with oil filling for mounting position A; all values are approximate.
The weights relate to the basic version. Bear in mind that additional weights may be needed, e.g. for motor options.

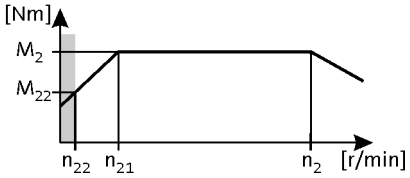


Additional weights for gearboxes

Product	Mass			
	Solid shaft	Shrink disc	Foot	Flange
	m	m	m	m
	[kg]	[kg]	[kg]	[kg]
GFL06	2.50	1.00	2.50	7.00
GFL07	5.00	1.50	4.00	11.0
GFL09	8.00	3.00	7.00	16.0
GFL11	16.0	5.00	14.0	24.0
GFL14	33.0	11.0	23.0	33.0



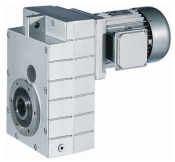
Selection tables, 4-pole motors



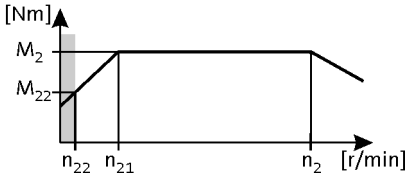
50 Hz: P_N = 5.5 kW
87 Hz: P_N = 9.6 kW

2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GFL	m500	
397	128	2.7	40	80	163	128	397	128	2.7	699	127	2.2	3.675	GFL06	-P132M4	47
315	162	4.0	31	101	129	162	315	162	4.0				4.643	GFL07	-P132M4	51
280	182	2.3	28	113	115	182	280	182	2.3				5.211	GFL06	-P132M4	47
254	201	2.2	25	125	104	201	254	201	2.2				5.750	GFL06	-P132M4	47
228	223	3.0	23	139	94	223	228	223	3.0				6.400	GFL07	-P132M4	51
226	225	1.6	23	140	93	225	226	225	1.6				6.450	GFL06	-P132M4	47
204	249	1.7	20	155	84	249	204	249	1.7				7.147	GFL06	-P132M4	47
174	293	2.1	17	182	71	293	174	293	2.1				8.400	GFL06	-P132M4	47
156	327	3.1	16	203	64	327	156	327	3.1				9.379	GFL07	-P132M4	51
154	330	1.8	15	205	63	330	154	330	1.8				9.463	GFL06	-P132M4	47
150	339	2.9	15	210	62	339	150	339	2.9				9.714	GFL07	-P132M4	51
145	352	1.3	14	219	60	352	145	352	1.3				10.092	GFL06	-P132M4	47
127	402	1.6	13	249	52	402	127	402	1.6				11.520	GFL06	-P132M4	47
127	403	2.7	13	250	52	403	127	403	2.7				11.538	GFL07	-P132M4	51
113	453	1.3	11	281	46	453	113	453	1.3				12.978	GFL06	-P132M4	47
112	454	2.4	11	281	46	454	112	454	2.4				13.000	GFL07	-P132M4	51
103	496	2.3	10	307	42	496	103	496	2.3				14.200	GFL07	-P132M4	51
99	515	1.2	9.8	319	41	515	99	515	1.2				14.743	GFL06	-P132M4	47
92	555	2.1	9.1	344	38	555	92	555	2.1				15.904	GFL07	-P132M4	51
91	563	1.1	9.0	349	37	563	91	563	1.1				16.128	GFL06	-P132M4	47
82	625	1.9	8.1	388	34	625	82	625	1.9				17.920	GFL07	-P132M4	51
72	708	1.8	7.1	439	30	708	72	708	1.8				20.286	GFL07	-P132M4	51
64	798	1.6	6.3	495	26	798	64	798	1.6				22.857	GFL07	-P132M4	51
61	842	3.2	6.0	522	25	842	61	842	3.2				24.111	GFL09	-P132M4	55
59	867	1.5	5.8	538	24	867	59	867	1.5				24.850	GFL07	-P132M4	51
54	948	2.9	5.3	588	22	948	54	948	2.9				27.173	GFL09	-P132M4	55
52	977	1.3	5.2	606	21	977	52	977	1.3				28.000	GFL07	-P132M4	51
45	1129	1.2	4.5	700	19	1129	45	1129	1.2				32.344	GFL07	-P132M4	51
45	1140	2.6	4.4	707	18	1140	45	1140	2.6				32.667	GFL09	-P132M4	55
40	1285	2.4	3.9	797	16	1285	40	1285	2.4				36.815	GFL09	-P132M4	55
37	1384	2.2	3.7	859	15	1384	37	1384	2.2				39.667	GFL09	-P132M4	55
33	1560	1.9	3.2	968	13	1560	33	1560	1.9				44.704	GFL09	-P132M4	55
32	1582	3.1	3.2	981	13	1582	32	1582	3.1				45.333	GFL11	-P132M4	59
28	1817	2.9	2.8	1127	12	1817	28	1817	2.9				52.067	GFL11	-P132M4	59
25	2048	2.6	2.5	1270	10	2048	25	2048	2.6				58.667	GFL11	-P132M4	59



Selection tables, 4-pole motors



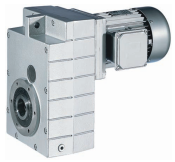
50 Hz: P_N = 5.5 kW
87 Hz: P_N = 9.6 kW

2-stage gearboxes

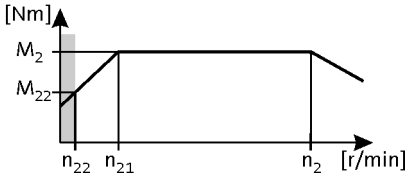
Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product GFL	m500	
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c				
23	2205	2.5	2.3	1368	9.5	2205	23	2205	2.5				63.190	GFL11	-P132M4	59
21	2485	2.2	2.0	1541	8.4	2485	21	2485	2.2				71.200	GFL11	-P132M4	59
18	2788	2.5	1.8	1729	7.5	2788	18	2788	2.5				79.875	GFL14	-P132M4	67
16	3141	2.5	1.6	1948	6.7	3141	16	3141	2.5				90.000	GFL14	-P132M4	67

3-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product GFL	m500	
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c				
23	2210	2.5	2.3	1371	9.3	2210	23	2210	2.5				64.296	GFL14	-P132M4	71
22	2245	1.3	2.2	1393	9.2	2245	22	2245	1.3				65.306	GFL11	-P132M4	63
21	2362	2.3	2.1	1465	8.7	2362	21	2362	2.3				68.708	GFL14	-P132M4	71
20	2521	1.1	2.0	1564	8.2	2521	20	2521	1.1				73.335	GFL11	-P132M4	63
19	2662	2.3	1.9	1651	7.8	2662	19	2662	2.3				77.418	GFL14	-P132M4	71
18	2841	1.1	1.8	1762	7.3	2841	18	2841	1.1				82.631	GFL11	-P132M4	63
17	2923	2.2	1.7	1813	7.1	2923	17	2923	2.2				85.037	GFL14	-P132M4	71
16	3216	1.0	1.6	1995	6.4	3216	16	3216	1.0				93.540	GFL11	-P132M4	63
14	3606	1.9	1.4	2237	5.7	3606	14	3606	1.9				104.889	GFL14	-P132M4	71
14	3623	1.0	1.4	2247	5.7	3623	14	3623	1.0				105.397	GFL11	-P132M4	63
13	3924	1.7	1.3	2434	5.3	3924	13	3924	1.7				114.126	GFL14	-P132M4	71
11	4421	1.7	1.1	2742	4.7	4421	11	4421	1.7				128.593	GFL14	-P132M4	71
11	4706	1.6	1.1	2919	4.4	4706	11	4706	1.6				136.889	GFL14	-P132M4	71
9.4	5368	1.5	0.9	3330	3.8	5368	9.4	5368	1.5				156.148	GFL14	-P132M4	71
8.6	5847	1.4	0.9	3627	3.5	5847	8.6	5847	1.4				170.074	GFL14	-P132M4	71
6.5	7723	1.1	0.6	4790	2.7	7723	6.5	7723	1.1				224.636	GFL14	-P132M4	71
5.8	8702	1.1	0.6	5397	2.4	8702	5.8	8702	1.1				253.111	GFL14	-P132M4	71
5.3	9412	1.0	0.5	5838	2.2	9412	5.3	9412	1.0				273.778	GFL14	-P132M4	71



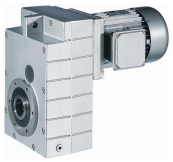
Selection tables, 4-pole motors



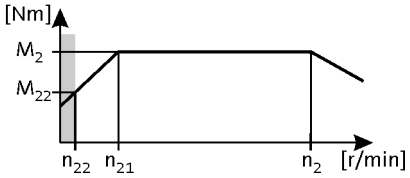
50 Hz: P_N = 7.5 kW
87 Hz: P_N = 13.1 kW

2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GFL	m500	
402	173	2.0	40	109	163	173	402	173	2.0				3.675	GFL06	-P132L4	47
318	218	3.0	31	138	129	218	318	218	3.0				4.643	GFL07	-P132L4	51
283	245	1.7	28	155	115	245	283	245	1.7				5.211	GFL06	-P132L4	47
257	271	1.6	25	171	104	271	257	271	1.6				5.750	GFL06	-P132L4	47
231	301	2.2	23	191	94	301	231	301	2.2				6.400	GFL07	-P132L4	51
229	303	1.2	23	192	93	303	229	303	1.2				6.450	GFL06	-P132L4	47
207	336	1.3	20	213	84	336	207	336	1.3				7.147	GFL06	-P132L4	47
207	336	2.7	20	213	84	336	207	336	2.7				7.150	GFL07	-P132L4	51
177	392	2.5	17	248	72	392	177	392	2.5				8.324	GFL07	-P132L4	51
176	395	1.5	17	250	71	395	176	395	1.5				8.400	GFL06	-P132L4	47
158	441	2.3	16	279	64	441	158	441	2.3				9.379	GFL07	-P132L4	51
156	445	1.3	15	282	63	445	156	445	1.3				9.463	GFL06	-P132L4	47
152	457	2.1	15	289	62	457	152	457	2.1				9.714	GFL07	-P132L4	51
128	542	1.2	13	343	52	542	128	542	1.2				11.520	GFL06	-P132L4	47
128	543	2.0	13	344	52	543	128	543	2.0				11.538	GFL07	-P132L4	51
114	612	1.8	11	387	46	612	114	612	1.8				13.000	GFL07	-P132L4	51
104	668	1.7	10	423	42	668	104	668	1.7				14.200	GFL07	-P132L4	51
93	748	1.6	9.1	474	38	748	93	748	1.6				15.904	GFL07	-P132L4	51
90	768	3.2	8.9	486	37	768	90	768	3.2				16.333	GFL09	-P132L4	55
82	843	1.4	8.1	534	34	843	82	843	1.4				17.920	GFL07	-P132L4	51
80	866	2.9	7.9	548	33	866	80	866	2.9				18.407	GFL09	-P132L4	55
75	925	2.8	7.4	586	31	925	75	925	2.8				19.667	GFL09	-P132L4	55
73	954	1.3	7.1	604	30	954	73	954	1.3				20.286	GFL07	-P132L4	51
67	1043	2.5	6.5	660	27	1043	67	1043	2.5				22.164	GFL09	-P132L4	55
65	1075	1.2	6.3	681	26	1075	65	1075	1.2				22.857	GFL07	-P132L4	51
61	1134	2.4	6.0	718	25	1134	61	1134	2.4				24.111	GFL09	-P132L4	55
59	1169	1.1	5.8	740	24	1169	59	1169	1.1				24.850	GFL07	-P132L4	51
54	1278	2.2	5.3	809	22	1278	54	1278	2.2				27.173	GFL09	-P132L4	55
53	1317	3.2	5.2	834	21	1317	53	1317	3.2				28.000	GFL11	-P132L4	59
45	1537	2.0	4.4	973	18	1537	45	1537	2.0				32.667	GFL09	-P132L4	55
45	1540	3.0	4.4	975	18	1540	45	1540	3.0				32.739	GFL11	-P132L4	59
40	1732	1.7	3.9	1096	16	1732	40	1732	1.7				36.815	GFL09	-P132L4	55
40	1735	2.7	3.9	1098	16	1735	40	1735	2.7				36.889	GFL11	-P132L4	59
37	1866	1.7	3.7	1181	15	1866	37	1866	1.7				39.667	GFL09	-P132L4	55
37	1893	2.6	3.6	1198	15	1893	37	1893	2.6				40.233	GFL11	-P132L4	59



Selection tables, 4-pole motors



50 Hz: P_N = 7.5 kW
87 Hz: P_N = 13.1 kW

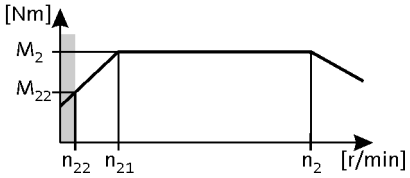
2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GFL	m500	
33	2103	1.4	3.2	1331	13	2103	33	2103	1.4				44.704	GFL09	-P132L4	55
33	2133	2.3	3.2	1350	13	2133	33	2133	2.3				45.333	GFL11	-P132L4	59
28	2450	3.1	2.8	1550	12	2450	28	2450	3.1				52.067	GFL14	-P132L4	67
28	2450	2.1	2.8	1550	12	2450	28	2450	2.1				52.067	GFL11	-P132L4	59
25	2760	3.1	2.5	1747	10	2760	25	2760	3.1				58.667	GFL14	-P132L4	67
25	2760	1.9	2.5	1747	10	2760	25	2760	1.9				58.667	GFL11	-P132L4	59
23	2973	2.6	2.3	1881	9.5	2973	23	2973	2.6				63.190	GFL14	-P132L4	67
23	2973	1.9	2.3	1881	9.5	2973	23	2973	1.9				63.190	GFL11	-P132L4	59
21	3350	2.6	2.0	2120	8.4	3350	21	3350	2.6				71.200	GFL14	-P132L4	67
21	3350	1.7	2.0	2120	8.4	3350	21	3350	1.7				71.200	GFL11	-P132L4	59

3-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GFL	m500	
23	2980	1.9	2.3	1886	9.3	2980	23	2980	1.9				64.296	GFL14	-P132L4	71
22	3184	1.7	2.1	2015	8.7	3184	22	3184	1.7				68.708	GFL14	-P132L4	71
19	3588	1.7	1.9	2271	7.8	3588	19	3588	1.7				77.418	GFL14	-P132L4	71
17	3941	1.6	1.7	2494	7.1	3941	17	3941	1.6				85.037	GFL14	-P132L4	71
14	4861	1.4	1.4	3076	5.7	4861	14	4861	1.4				104.889	GFL14	-P132L4	71
13	5289	1.3	1.3	3347	5.3	5289	13	5289	1.3				114.126	GFL14	-P132L4	71
12	5959	1.3	1.1	3771	4.7	5959	12	5959	1.3				128.593	GFL14	-P132L4	71
11	6344	1.2	1.1	4015	4.4	6344	11	6344	1.2				136.889	GFL14	-P132L4	71
9.5	7236	1.1	0.9	4579	3.8	7236	9.5	7236	1.1				156.148	GFL14	-P132L4	71
8.7	7881	1.1	0.9	4988	3.5	7881	8.7	7881	1.1				170.074	GFL14	-P132L4	71

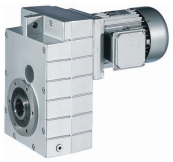
Selection tables, 4-pole motors



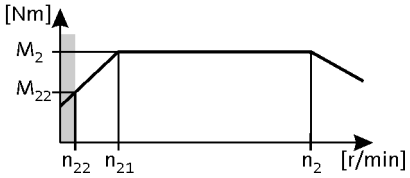
50 Hz: P_N = 11.0 kW
87 Hz: P_N = 19.2 kW

2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GFL	m500	
441	231	2.8	43	128	179	231	441	231	2.8				3.350	GFL07	-P160M4	51
318	320	2.0	31	177	129	320	318	320	2.0				4.643	GFL07	-P160M4	51
287	356	2.4	28	197	116	356	287	356	2.4				5.159	GFL07	-P160M4	51
260	393	2.3	26	217	105	393	260	393	2.3				5.695	GFL07	-P160M4	51
231	441	1.5	23	244	94	441	231	441	1.5				6.400	GFL07	-P160M4	51
207	493	1.9	20	273	84	493	207	493	1.9				7.150	GFL07	-P160M4	51
178	574	1.7	17	318	72	574	178	574	1.7				8.324	GFL07	-P160M4	51
158	647	1.5	16	358	64	647	158	647	1.5				9.379	GFL07	-P160M4	51
152	670	1.5	15	371	62	670	152	670	1.5				9.714	GFL07	-P160M4	51
132	770	3.0	13	426	54	770	132	770	3.0				11.167	GFL09	-P160M4	55
128	796	1.4	13	440	52	796	128	796	1.4				11.538	GFL07	-P160M4	51
120	849	2.6	12	470	49	849	120	849	2.6				12.307	GFL09	-P160M4	55
114	896	1.2	11	496	46	896	114	896	1.2				13.000	GFL07	-P160M4	51
104	979	1.2	10	542	42	979	104	979	1.2				14.200	GFL07	-P160M4	51
103	988	2.4	10	547	42	988	103	988	2.4				14.333	GFL09	-P160M4	55
93	1097	1.1	9.1	607	38	1097	93	1097	1.1				15.904	GFL07	-P160M4	51
91	1126	2.2	8.9	623	37	1126	91	1126	2.2				16.333	GFL09	-P160M4	55
83	1236	3.1	8.1	684	34	1236	83	1236	3.1				17.920	GFL11	-P160M4	59
80	1269	2.0	7.9	702	33	1269	80	1269	2.0				18.407	GFL09	-P160M4	55
75	1356	1.9	7.4	750	31	1356	75	1356	1.9				19.667	GFL09	-P160M4	55
73	1399	2.9	7.1	774	30	1399	73	1399	2.9				20.286	GFL11	-P160M4	59
67	1528	1.7	6.5	846	27	1528	67	1528	1.7				22.164	GFL09	-P160M4	55
65	1576	2.6	6.3	872	26	1576	65	1576	2.6				22.857	GFL11	-P160M4	59
61	1663	1.6	6.0	920	25	1663	61	1663	1.6				24.111	GFL09	-P160M4	55
60	1714	2.5	5.8	948	24	1714	60	1714	2.5				24.850	GFL11	-P160M4	59
54	1874	1.5	5.3	1037	22	1874	54	1874	1.5				27.173	GFL09	-P160M4	55
53	1931	2.2	5.2	1068	21	1931	53	1931	2.2				28.000	GFL11	-P160M4	59
45	2257	2.0	4.4	1249	18	2257	45	2257	2.0				32.739	GFL11	-P160M4	59
40	2544	1.8	3.9	1408	16	2544	40	2544	1.8				36.889	GFL11	-P160M4	59
37	2774	1.8	3.6	1535	15	2774	37	2774	1.8				40.233	GFL11	-P160M4	59
33	3126	1.6	3.2	1730	13	3126	33	3126	1.6				45.333	GFL11	-P160M4	59
28	3590	2.8	2.8	1987	12	3590	28	3590	2.8				52.067	GFL14	-P160M4	67
25	4045	2.8	2.5	2238	10	4045	25	4045	2.8				58.667	GFL14	-P160M4	67
23	4357	2.3	2.3	2411	9.5	4357	23	4357	2.3				63.190	GFL14	-P160M4	67
21	4910	2.2	2.0	2717	8.4	4910	21	4910	2.2				71.200	GFL14	-P160M4	67



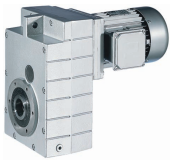
Selection tables, 4-pole motors



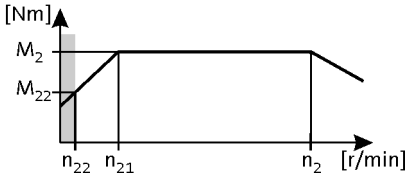
50 Hz: P_N = 11.0 kW
87 Hz: P_N = 19.2 kW

3-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GFL	m500	
23	4367	1.3	2.3	2416	9.3	4367	23	4367	1.3				64.296	GFL14	-P160M4	71
22	4667	1.2	2.1	2582	8.7	4667	22	4667	1.2				68.708	GFL14	-P160M4	71
19	5258	1.2	1.9	2910	7.8	5258	19	5258	1.2				77.418	GFL14	-P160M4	71
17	5776	1.1	1.7	3196	7.1	5776	17	5776	1.1				85.037	GFL14	-P160M4	71



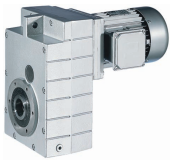
Selection tables, 4-pole motors



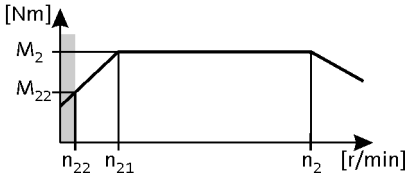
50 Hz: P_N = 15.0 kW
87 Hz: P_N = 26.3 kW

2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GFL	m500	
439	317	2.0	43	174	179	317	439	317	2.0				3.350	GFL07	-P160L4	51
317	439	1.5	31	241	129	439	317	439	1.5				4.643	GFL07	-P160L4	51
285	488	1.7	28	268	116	488	285	488	1.7				5.159	GFL07	-P160L4	51
258	538	1.7	26	296	105	538	258	538	1.7				5.695	GFL07	-P160L4	51
230	605	1.1	23	333	94	605	230	605	1.1				6.400	GFL07	-P160L4	51
214	649	3.2	21	357	87	649	214	649	3.2				6.864	GFL09	-P160L4	55
206	676	1.4	20	372	84	676	206	676	1.4				7.150	GFL07	-P160L4	51
197	706	3.1	19	388	80	706	197	706	3.1				7.466	GFL09	-P160L4	55
163	852	2.6	16	468	67	852	163	852	2.6				9.010	GFL09	-P160L4	55
151	918	1.1	15	505	62	918	151	918	1.1				9.714	GFL07	-P160L4	51
150	926	2.5	15	509	61	926	150	926	2.5				9.799	GFL09	-P160L4	55
132	1056	2.2	13	580	54	1056	132	1056	2.2				11.167	GFL09	-P160L4	55
119	1163	1.9	12	640	49	1163	119	1163	1.9				12.307	GFL09	-P160L4	55
118	1180	2.9	12	649	48	1180	118	1180	2.9				12.480	GFL11	-P160L4	59
103	1355	1.8	10	745	42	1355	103	1355	1.8				14.333	GFL09	-P160L4	55
101	1374	2.7	10	756	41	1374	101	1374	2.7				14.538	GFL11	-P160L4	59
92	1504	2.5	9.1	827	38	1504	92	1504	2.5				15.904	GFL11	-P160L4	59
90	1544	1.6	8.9	849	37	1544	90	1544	1.6				16.333	GFL09	-P160L4	55
82	1694	2.2	8.1	931	34	1694	82	1694	2.2				17.920	GFL11	-P160L4	59
80	1740	1.4	7.9	957	33	1740	80	1740	1.4				18.407	GFL09	-P160L4	55
75	1859	1.4	7.4	1022	31	1859	75	1859	1.4				19.667	GFL09	-P160L4	55
73	1918	2.1	7.1	1054	30	1918	73	1918	2.1				20.286	GFL11	-P160L4	59
66	2095	1.3	6.5	1152	27	2095	66	2095	1.3				22.164	GFL09	-P160L4	55
64	2161	1.9	6.3	1188	26	2161	64	2161	1.9				22.857	GFL11	-P160L4	59
61	2279	1.2	6.0	1253	25	2279	61	2279	1.2				24.111	GFL09	-P160L4	55
59	2349	1.8	5.8	1292	24	2349	59	2349	1.8				24.850	GFL11	-P160L4	59
54	2569	1.1	5.3	1412	22	2569	54	2569	1.1				27.173	GFL09	-P160L4	55
53	2647	1.6	5.2	1455	21	2647	53	2647	1.6				28.000	GFL11	-P160L4	59
45	3058	3.1	4.5	1681	19	3058	45	3058	3.1				32.344	GFL14	-P160L4	67
45	3095	1.5	4.4	1702	18	3095	45	3095	1.5				32.739	GFL11	-P160L4	59
40	3445	3.1	4.0	1894	17	3445	40	3445	3.1				36.444	GFL14	-P160L4	67
40	3487	1.3	3.9	1917	16	3487	40	3487	1.3				36.889	GFL11	-P160L4	59
37	3748	2.6	3.7	2060	15	3748	37	3748	2.6				39.642	GFL14	-P160L4	67
37	3804	1.3	3.6	2091	15	3804	37	3804	1.3				40.233	GFL11	-P160L4	59
33	4223	2.6	3.2	2322	13	4223	33	4223	2.6				44.667	GFL14	-P160L4	67



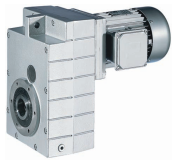
Selection tables, 4-pole motors



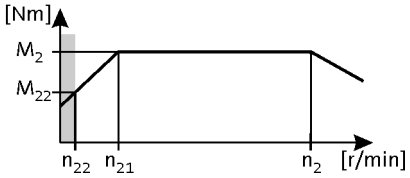
50 Hz: P_N = 15.0 kW
87 Hz: P_N = 26.3 kW

2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GFL	m500	
32	4286	1.1	3.2	2356	13	4286	32	4286	1.1				45.333	GFL11	-P160L4	59
28	4922	2.1	2.8	2706	12	4922	28	4922	2.1				52.067	GFL14	-P160L4	67
25	5546	2.0	2.5	3049	10	5546	25	5546	2.0				58.667	GFL14	-P160L4	67



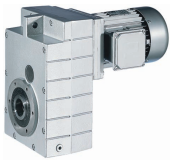
Selection tables, 4-pole motors



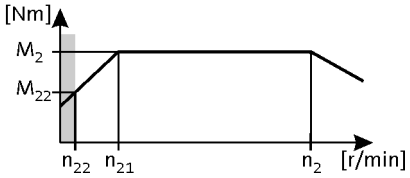
50 Hz: P_N = 18.5 kW
87 Hz: P_N = 32.2 kW

2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GFL	m500	
216	793	2.6	21	439	87	793	216	793	2.6				6.864	GFL09	-P180M4	55
199	863	2.5	19	477	80	863	199	863	2.5				7.466	GFL09	-P180M4	55
165	1041	2.1	16	576	67	1041	165	1041	2.1				9.010	GFL09	-P180M4	55
151	1133	2.0	15	627	61	1133	151	1133	2.0				9.799	GFL09	-P180M4	55
138	1239	3.1	14	685	56	1239	138	1239	3.1				10.720	GFL11	-P180M4	59
133	1291	1.8	13	714	54	1291	133	1291	1.8				11.167	GFL09	-P180M4	55
104	1657	1.4	10	916	42	1657	104	1657	1.4				14.333	GFL09	-P180M4	55
102	1680	2.2	10	929	41	1680	102	1680	2.2				14.538	GFL11	-P180M4	59
93	1838	2.1	9.1	1017	38	1838	93	1838	2.1				15.904	GFL11	-P180M4	59
91	1888	1.3	8.9	1044	37	1888	91	1888	1.3				16.333	GFL09	-P180M4	55
83	2071	1.8	8.1	1146	34	2071	83	2071	1.8				17.920	GFL11	-P180M4	59
81	2127	1.2	7.9	1177	33	2127	81	2127	1.2				18.407	GFL09	-P180M4	55
75	2273	1.1	7.4	1257	31	2273	75	2273	1.1				19.667	GFL09	-P180M4	55
73	2345	1.7	7.1	1297	30	2345	73	2345	1.7				20.286	GFL11	-P180M4	59
67	2562	1.0	6.5	1417	27	2562	67	2562	1.0				22.164	GFL09	-P180M4	55
65	2642	1.5	6.3	1461	26	2642	65	2642	1.5				22.857	GFL11	-P180M4	59
61	2827	3.2	5.9	1563	25	2827	61	2827	3.2				24.456	GFL14	-P180M4	67
60	2872	1.5	5.8	1589	24	2872	60	2872	1.5				24.850	GFL11	-P180M4	59
54	3185	3.2	5.3	1762	22	3185	54	3185	3.2				27.556	GFL14	-P180M4	67
53	3236	1.3	5.2	1790	21	3236	53	3236	1.3				28.000	GFL11	-P180M4	59
46	3738	2.5	4.5	2068	19	3738	46	3738	2.5				32.344	GFL14	-P180M4	67
45	3784	1.2	4.4	2093	18	3784	45	3784	1.2				32.739	GFL11	-P180M4	59
41	4212	2.5	4.0	2330	17	4212	41	4212	2.5				36.444	GFL14	-P180M4	67
40	4264	1.1	3.9	2358	16	4264	40	4264	1.1				36.889	GFL11	-P180M4	59
37	4582	2.1	3.7	2534	15	4582	37	4582	2.1				39.642	GFL14	-P180M4	67
37	4650	1.1	3.6	2572	15	4650	37	4650	1.1				40.233	GFL11	-P180M4	59
33	5162	2.1	3.2	2856	13	5162	33	5162	2.1				44.667	GFL14	-P180M4	67
29	6018	1.7	2.8	3329	12	6018	29	6018	1.7				52.067	GFL14	-P180M4	67
25	6781	1.7	2.5	3750	10	6781	25	6781	1.7				58.667	GFL14	-P180M4	67



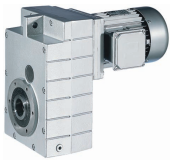
Selection tables, 4-pole motors



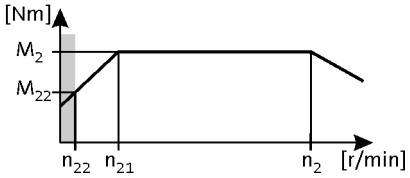
50 Hz: P_N = 22.0 kW
87 Hz: P_N = 38.5 kW

2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GFL	m500	
216	945	2.2	21	523	87	945	216	945	2.2				6.864	GFL09	-P180L4	55
216	945	3.1	21	523	87	945	216	945	3.1				6.864	GFL11	-P180L4	59
198	1028	2.1	19	569	80	1028	198	1028	2.1				7.466	GFL09	-P180L4	55
198	1028	3.1	19	569	80	1028	198	1028	3.1				7.466	GFL11	-P180L4	59
164	1241	1.8	16	687	67	1241	164	1241	1.8				9.010	GFL09	-P180L4	55
164	1241	2.9	16	687	67	1241	164	1241	2.9				9.010	GFL11	-P180L4	59
151	1350	1.7	15	747	61	1350	151	1350	1.7				9.799	GFL09	-P180L4	55
151	1350	2.8	15	747	61	1350	151	1350	2.8				9.799	GFL11	-P180L4	59
138	1476	2.6	14	818	56	1476	138	1476	2.6				10.720	GFL11	-P180L4	59
133	1538	1.5	13	852	54	1538	133	1538	1.5				11.167	GFL09	-P180L4	55
102	2002	1.9	10	1109	41	2002	102	2002	1.9				14.538	GFL11	-P180L4	59
95	2151	3.1	9.3	1191	38	2151	95	2151	3.1				15.620	GFL14	-P180L4	67
93	2190	1.7	9.1	1213	38	2190	93	2190	1.7				15.904	GFL11	-P180L4	59
84	2424	3.1	8.2	1342	34	2424	84	2424	3.1				17.600	GFL14	-P180L4	67
74	2747	2.9	7.3	1521	30	2747	74	2747	2.9				19.948	GFL14	-P180L4	67
73	2794	1.5	7.1	1547	30	2794	73	2794	1.5				20.286	GFL11	-P180L4	59
66	3095	2.9	6.5	1714	27	3095	66	3095	2.9				22.476	GFL14	-P180L4	67
61	3368	2.6	5.9	1865	25	3368	61	3368	2.6				24.456	GFL14	-P180L4	67
60	3422	1.3	5.8	1895	24	3422	60	3422	1.3				24.850	GFL11	-P180L4	59
54	3795	2.6	5.3	2101	22	3795	54	3795	2.6				27.556	GFL14	-P180L4	67
53	3856	1.1	5.2	2135	21	3856	53	3856	1.1				28.000	GFL11	-P180L4	59
46	4455	2.1	4.5	2466	19	4455	46	4455	2.1				32.344	GFL14	-P180L4	67
45	4509	1.0	4.4	2497	18	4509	45	4509	1.0				32.739	GFL11	-P180L4	59
41	5019	2.1	4.0	2779	17	5019	41	5019	2.1				36.444	GFL14	-P180L4	67
37	5460	1.8	3.7	3023	15	5460	37	5460	1.8				39.642	GFL14	-P180L4	67
33	6152	1.8	3.2	3406	13	6152	33	6152	1.8				44.667	GFL14	-P180L4	67
28	7171	1.4	2.8	3970	12	7171	28	7171	1.4				52.067	GFL14	-P180L4	67
25	8080	1.4	2.5	4474	10	8080	25	8080	1.4				58.667	GFL14	-P180L4	67



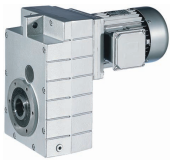
Selection tables, 4-pole motors



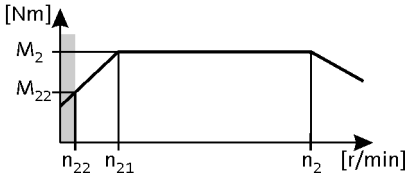
50 Hz: P_N = 30.0 kW
87 Hz: P_N = 52.5 kW

2-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GFL	m500	
164	1694	1.3	16	748	67	1694	164	1694	1.3				9.010	GFL09	-P180V4	55
164	1694	2.1	16	748	67	1694	164	1694	2.1				9.010	GFL11	-P180V4	59
151	1843	2.0	15	814	61	1843	151	1843	2.0				9.799	GFL11	-P180V4	59
138	2016	1.9	14	890	56	2016	138	2016	1.9				10.720	GFL11	-P180V4	59
132	2100	1.1	13	927	54	2100	132	2100	1.1				11.167	GFL09	-P180V4	55
74	3751	2.1	7.3	1656	30	3751	74	3751	2.1				19.948	GFL14	-P180V4	67
66	4227	2.1	6.5	1866	27	4227	66	4227	2.1				22.476	GFL14	-P180V4	67
60	4599	1.9	5.9	2031	25	4599	60	4599	1.9				24.456	GFL14	-P180V4	67
54	5182	1.9	5.3	2288	22	5182	54	5182	1.9				27.556	GFL14	-P180V4	67



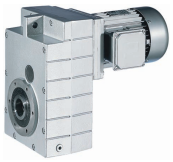
Selection tables, 4-pole motors



50 Hz: P_N = 37.0 kW
87 Hz: P_N = 64.8 kW

2-stage gearboxes

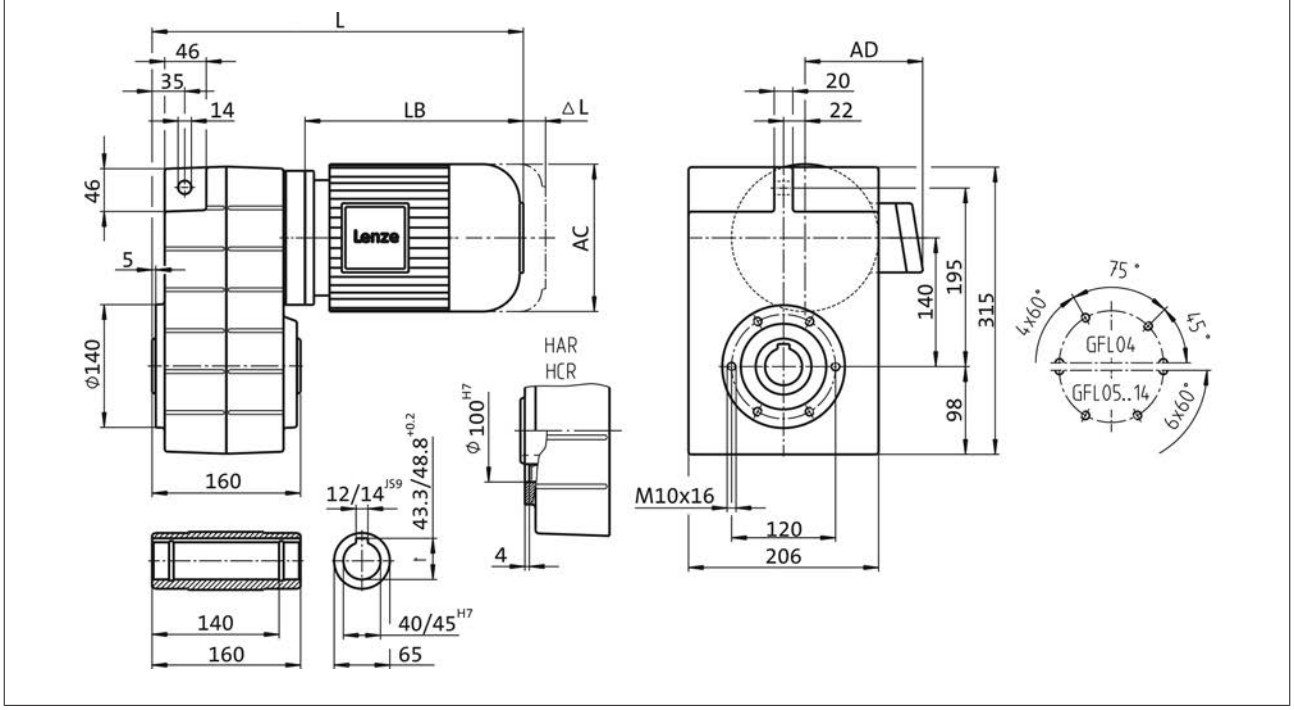
Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GFL	m500	
74	4611	2.1	7.3	2018	30	4611	74	4611	2.1				19.948	GFL14	-P225M4	67
66	5195	1.9	6.5	2274	27	5195	66	5195	1.9				22.476	GFL14	-P225M4	67
61	5653	1.8	5.9	2474	25	5653	61	5653	1.8				24.456	GFL14	-P225M4	67
54	6370	1.7	5.3	2787	22	6370	54	6370	1.7				27.556	GFL14	-P225M4	67
46	7477	1.5	4.5	3272	19	7477	46	7477	1.5				32.344	GFL14	-P225M4	67
41	8424	1.4	4.0	3686	17	8424	41	8424	1.4				36.444	GFL14	-P225M4	67



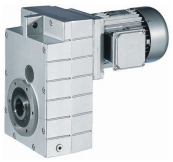
Dimensions, 4-pole motors

GFL06, 2-stage gearboxes

Dimensions with hollow shaft (HDR)
Dimensions with hollow shaft and centering (HCR)



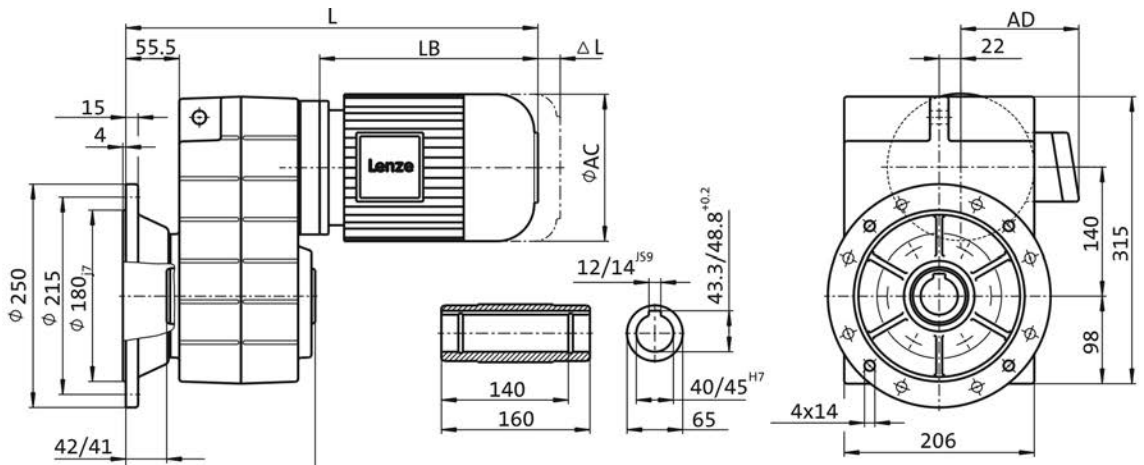
Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	622	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	



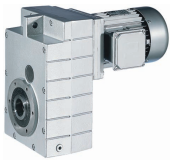
Dimensions, 4-pole motors

GFL06, 2-stage gearboxes

Dimensions with hollow shaft and flange (HCK)



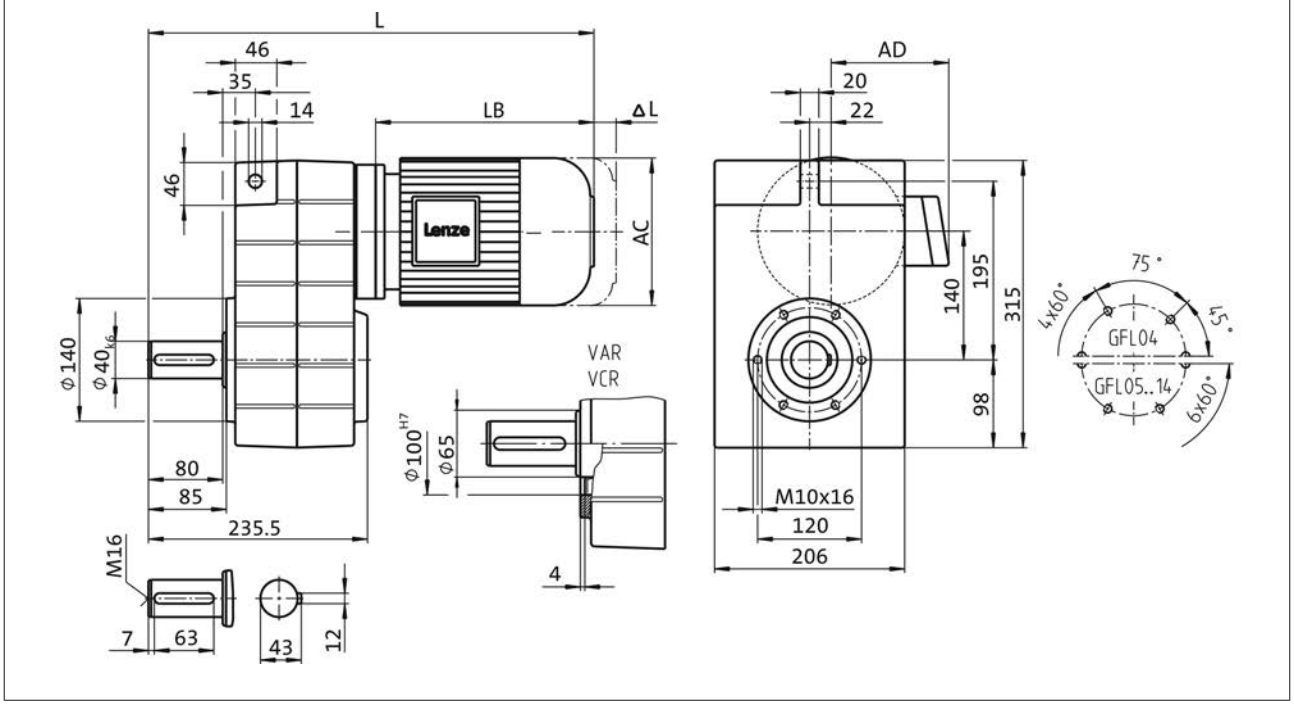
Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	663	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	



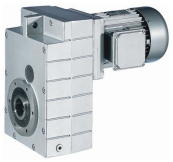
Dimensions, 4-pole motors

GFL06, 2-stage gearboxes

Dimensions with solid shaft (VDR)
Dimensions with hollow shaft and centering (VCR)



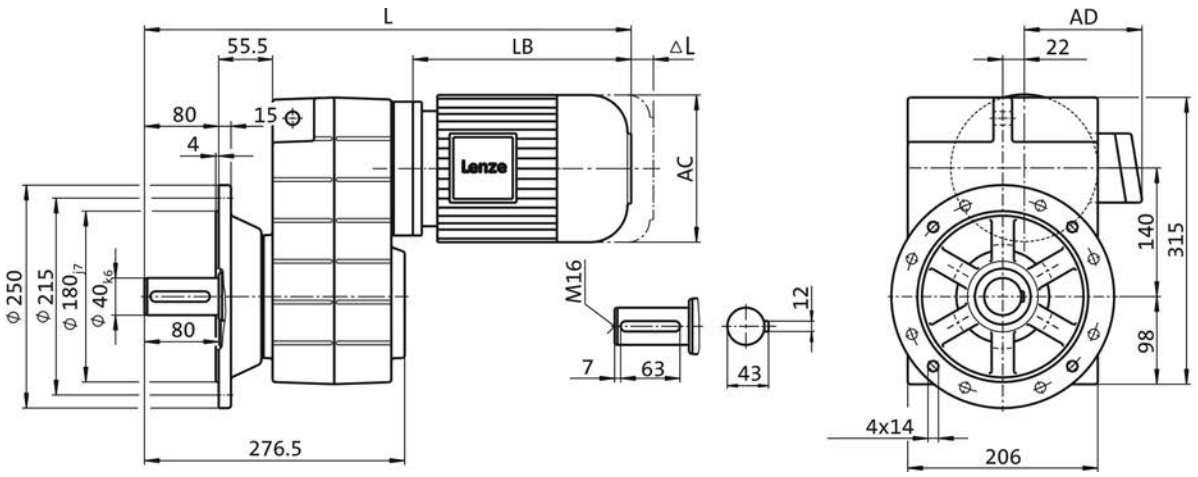
Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	702	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	



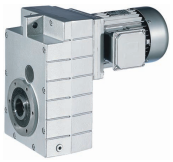
Dimensions, 4-pole motors

GFL06, 2-stage gearboxes

Dimensions with solid shaft and flange (VCK)



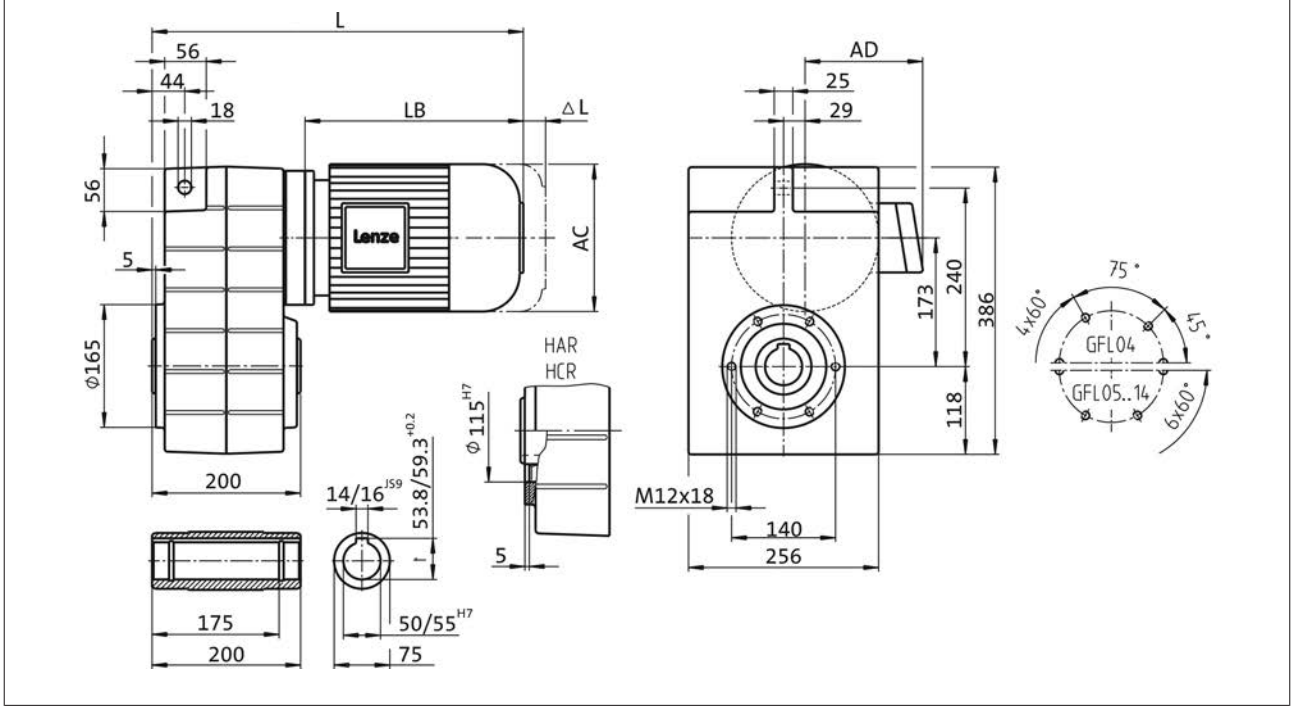
Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	743	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	



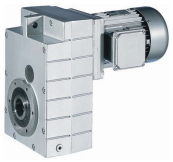
Dimensions, 4-pole motors

GFL07, 2-stage gearboxes

Dimensions with hollow shaft (HDR)
Dimensions with hollow shaft and centering (HCR)



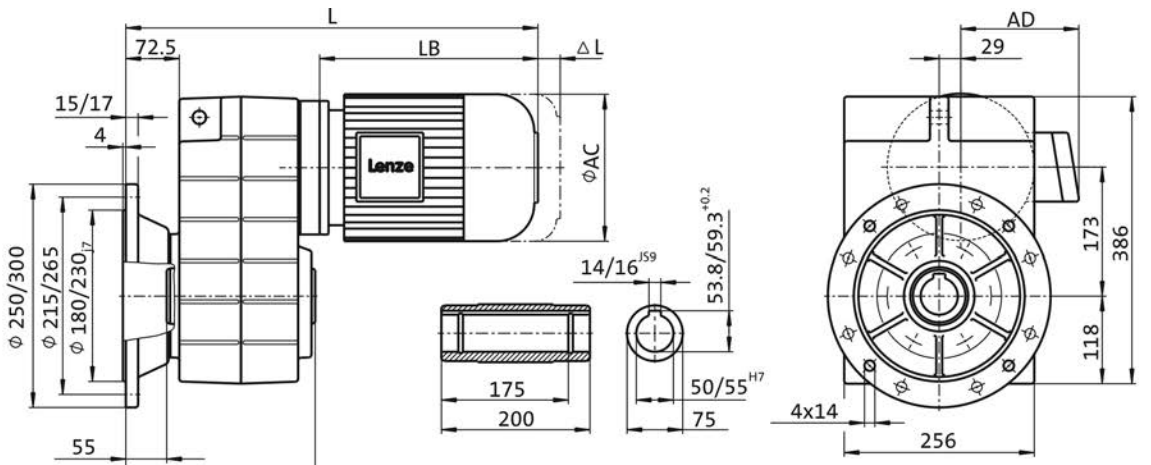
Product			m500			
			-P132L4	-P132M4	-P160L4	-P160M4
Dimensions						
Total length	**L**	**[mm]**	655		765	
Motor length	**LB**	**[mm]**	433.5		539	
Length of motor options	**Δ L**	**[mm]**	200.5		237	
Motor diameter	**AC**	**[mm]**	261		313	
Distance motor/connection	**AD**	**[mm]**	182		231	



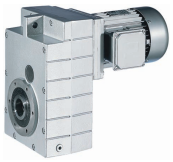
Dimensions, 4-pole motors

GFL07, 2-stage gearboxes

Dimensions with hollow shaft and flange (HCK)



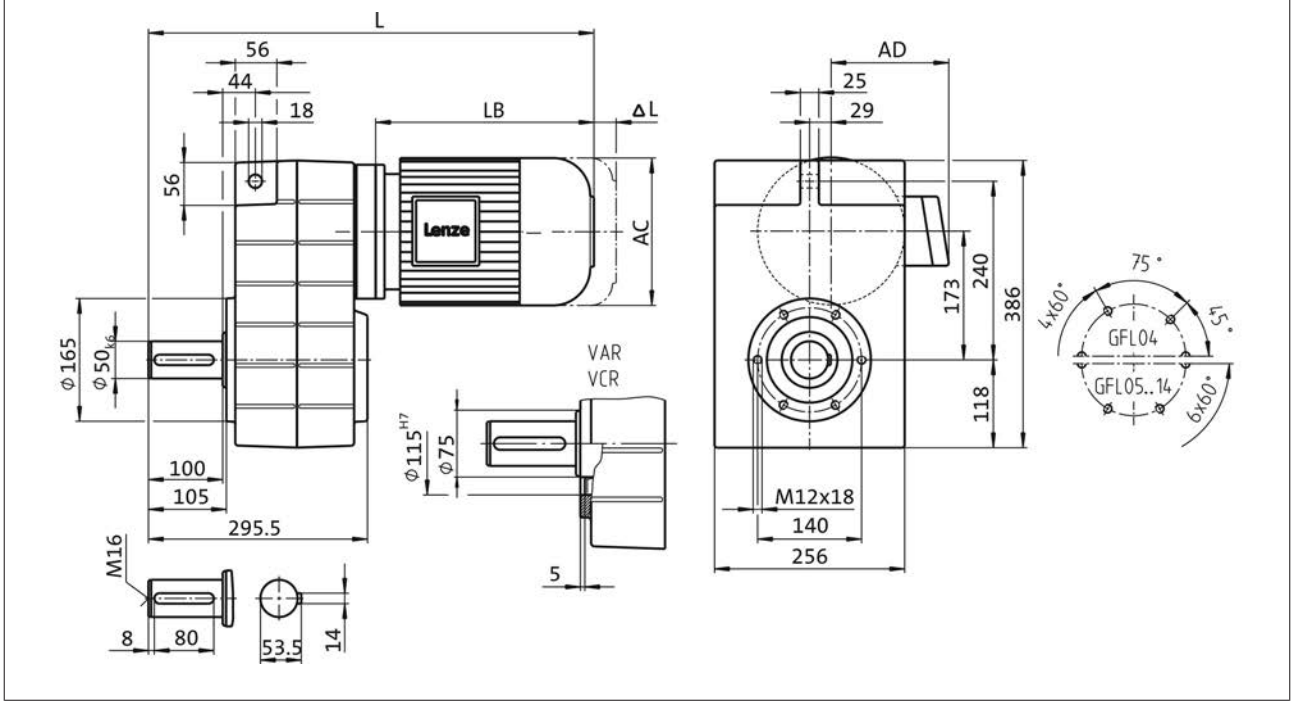
Product			m500			
			-P132L4	-P132M4	-P160L4	-P160M4
Dimensions						
Total length	**L**	**[mm]**	710		820	
Motor length	**LB**	**[mm]**	433.5		539	
Length of motor options	**Δ L**	**[mm]**	200.5		237	
Motor diameter	**AC**	**[mm]**	261		313	
Distance motor/connection	**AD**	**[mm]**	182		231	



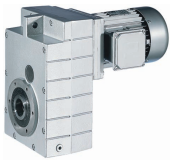
Dimensions, 4-pole motors

GFL07, 2-stage gearboxes

Dimensions with solid shaft (VDR)
Dimensions with hollow shaft and centering (VCR)



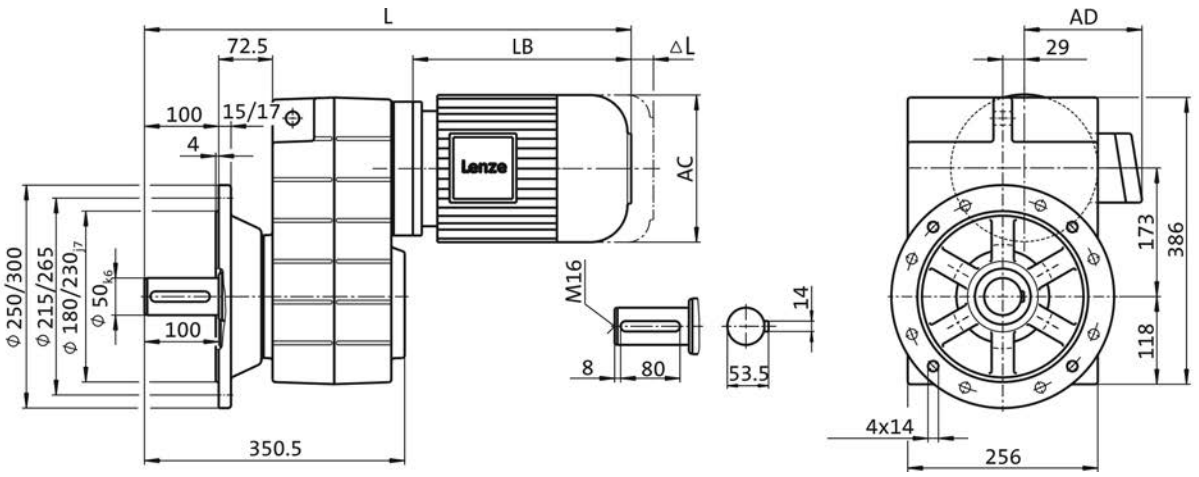
Product			m500			
			-P132L4	-P132M4	-P160L4	-P160M4
Dimensions						
Total length	**L**	**[mm]**	755		865	
Motor length	**LB**	**[mm]**	433.5		539	
Length of motor options	**Δ L**	**[mm]**	200.5		237	
Motor diameter	**AC**	**[mm]**	261		313	
Distance motor/connection	**AD**	**[mm]**	182		231	



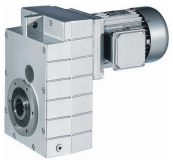
Dimensions, 4-pole motors

GFL07, 2-stage gearboxes

Dimensions with solid shaft and flange (VCK)



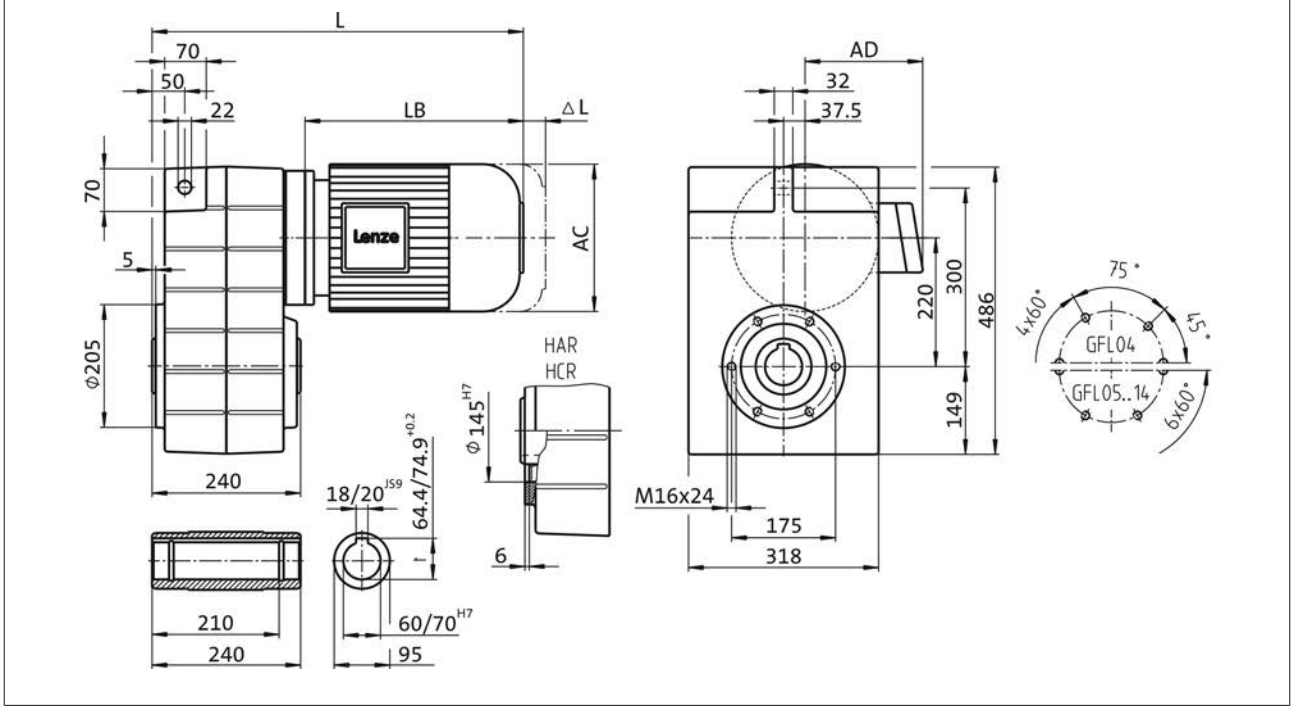
Product			m500			
			-P132L4	-P132M4	-P160L4	-P160M4
Dimensions						
Total length	**L**	**[mm]**	810		920	
Motor length	**LB**	**[mm]**	433.5		539	
Length of motor options	**Δ L**	**[mm]**	200.5		237	
Motor diameter	**AC**	**[mm]**	261		313	
Distance motor/connection	**AD**	**[mm]**	182		231	



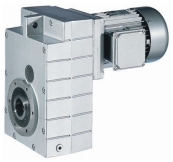
Dimensions, 4-pole motors

GFL09, 2-stage gearboxes

Dimensions with hollow shaft (HDR)
Dimensions with hollow shaft and centering (HCR)



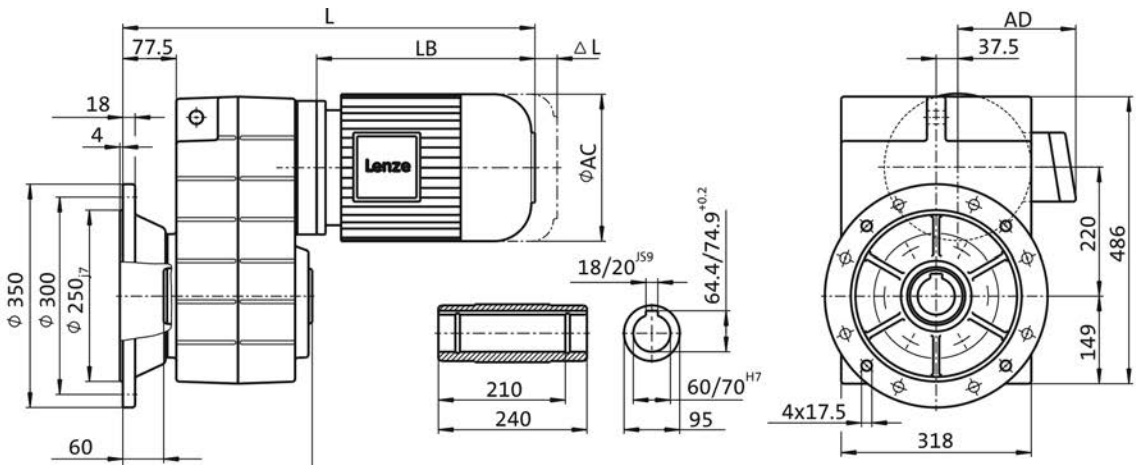
Product			m500						
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4	-P180V4
Dimensions									
Total length	**L**	**[mm]**	689		799		857		905
Motor length	**LB**	**[mm]**	433.5		539		596.5		645
Length of motor options	**Δ L**	**[mm]**	200.5		237		267		
Motor diameter	**AC**	**[mm]**	261		313		351		
Distance motor/connection	**AD**	**[mm]**	182		231		282		



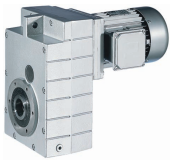
Dimensions, 4-pole motors

GFL09, 2-stage gearboxes

Dimensions with hollow shaft and flange (HCK)



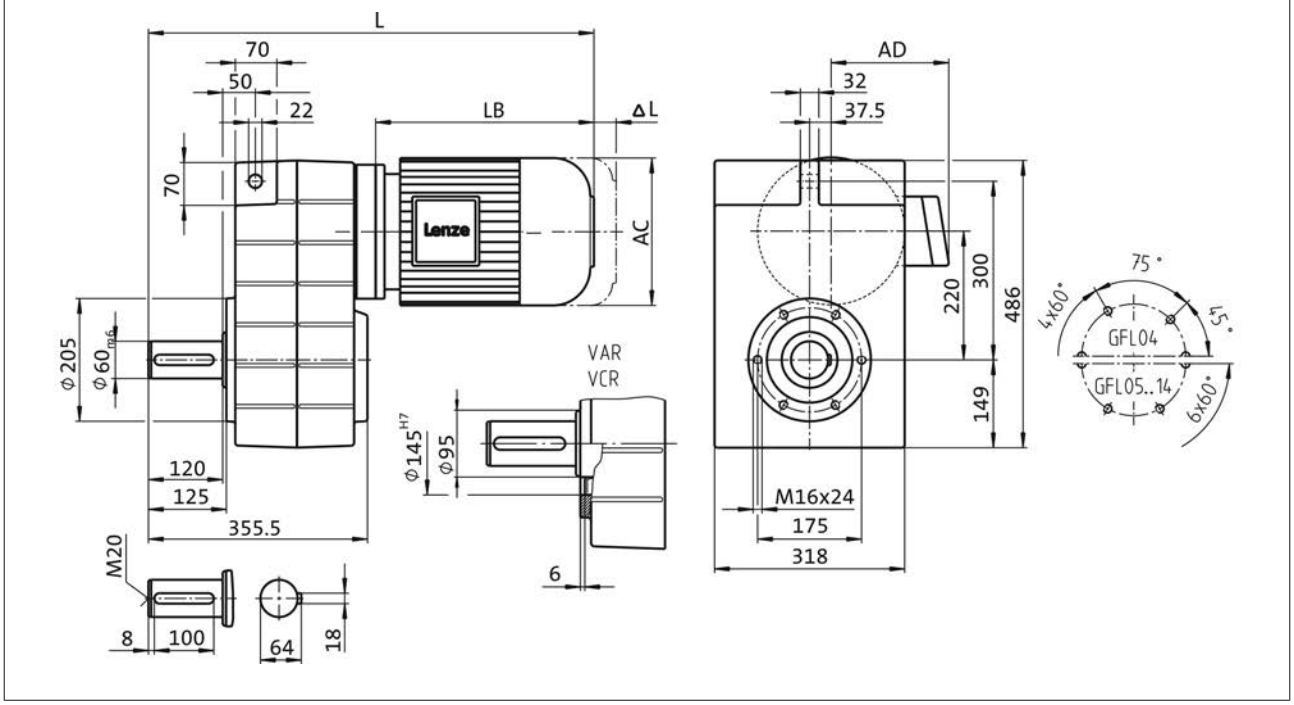
Product			m500						
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4	-P180V4
Dimensions									
Total length	**L**	**[mm]**	749		859		917		965
Motor length	**LB**	**[mm]**	433.5		539		596.5		645
Length of motor options	**Δ L**	**[mm]**	200.5		237		267		
Motor diameter	**AC**	**[mm]**	261		313		351		
Distance motor/connection	**AD**	**[mm]**	182		231		282		



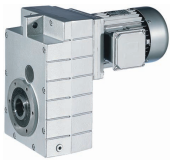
Dimensions, 4-pole motors

GFL09, 2-stage gearboxes

Dimensions with solid shaft (VDR)
Dimensions with hollow shaft and centering (VCR)



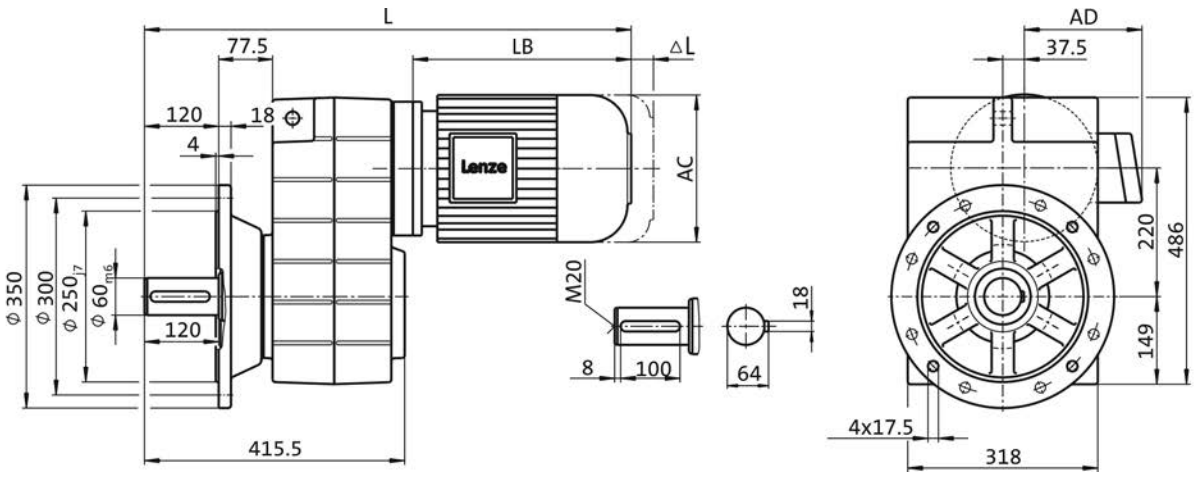
Product			m500						
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4	-P180V4
Dimensions									
Total length	**L**	**[mm]**	809		919		977		1025
Motor length	**LB**	**[mm]**	433.5		539		596.5		645
Length of motor options	**Δ L**	**[mm]**	200.5		237		267		
Motor diameter	**AC**	**[mm]**	261		313		351		
Distance motor/connection	**AD**	**[mm]**	182		231		282		



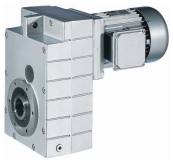
Dimensions, 4-pole motors

GFL09, 2-stage gearboxes

Dimensions with solid shaft and flange (VCK)



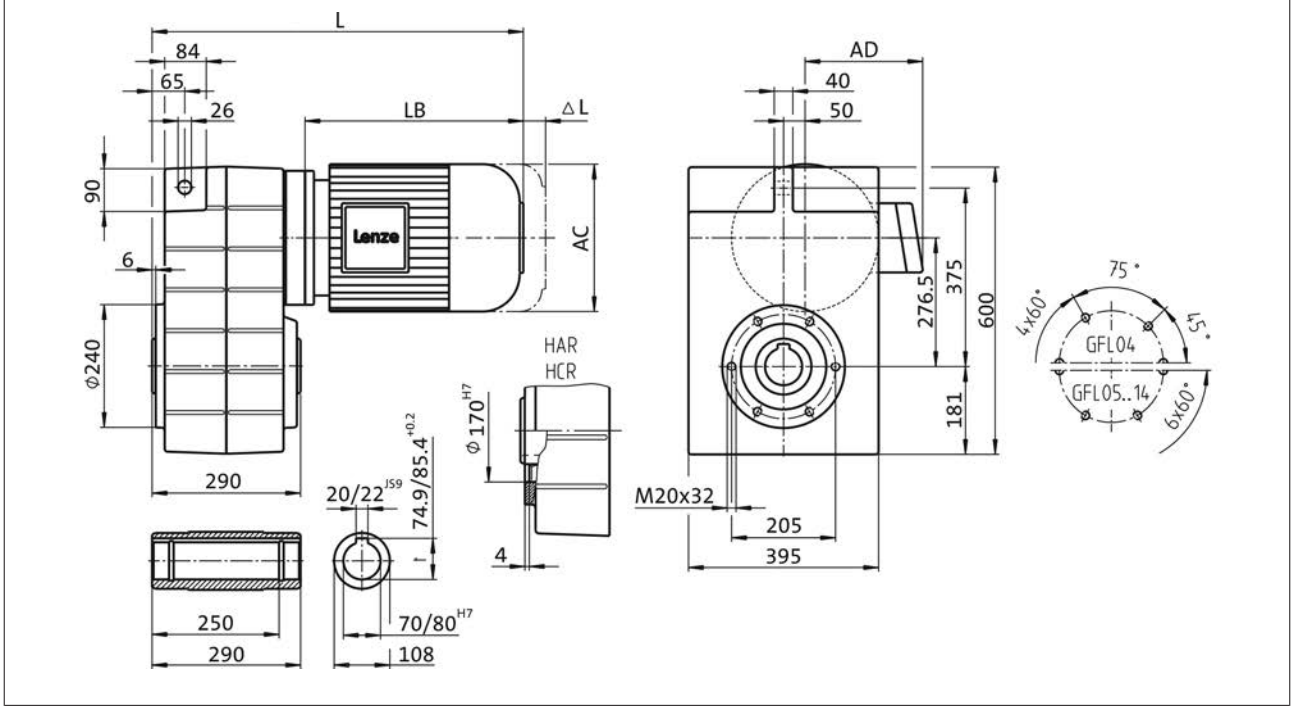
Product			m500						
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4	-P180V4
Dimensions									
Total length	**L**	**[mm]**	869		979		1037		1085
Motor length	**LB**	**[mm]**	433.5		539		596.5		645
Length of motor options	**Δ L**	**[mm]**	200.5		237		267		
Motor diameter	**AC**	**[mm]**	261		313		351		
Distance motor/connection	**AD**	**[mm]**	182		231		282		



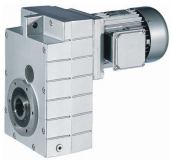
Dimensions, 4-pole motors

GFL11, 2-stage gearboxes

Dimensions with hollow shaft (HDR)
Dimensions with hollow shaft and centering (HCR)



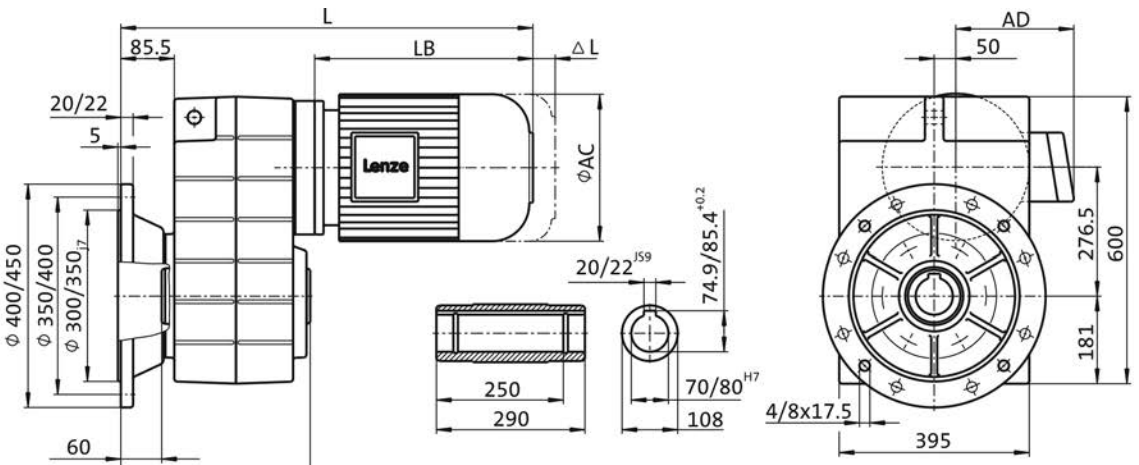
Product			m500						
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4	-P180V4
Dimensions									
Total length	**L**	**[mm]**	730		840		898		946
Motor length	**LB**	**[mm]**	433.5		539		596.5		645
Length of motor options	**Δ L**	**[mm]**	200.5		237		267		
Motor diameter	**AC**	**[mm]**	261		313		351		
Distance motor/connection	**AD**	**[mm]**	182		231		282		



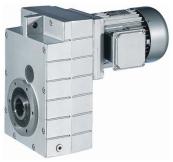
Dimensions, 4-pole motors

GFL11, 2-stage gearboxes

Dimensions with hollow shaft and flange (HCK)



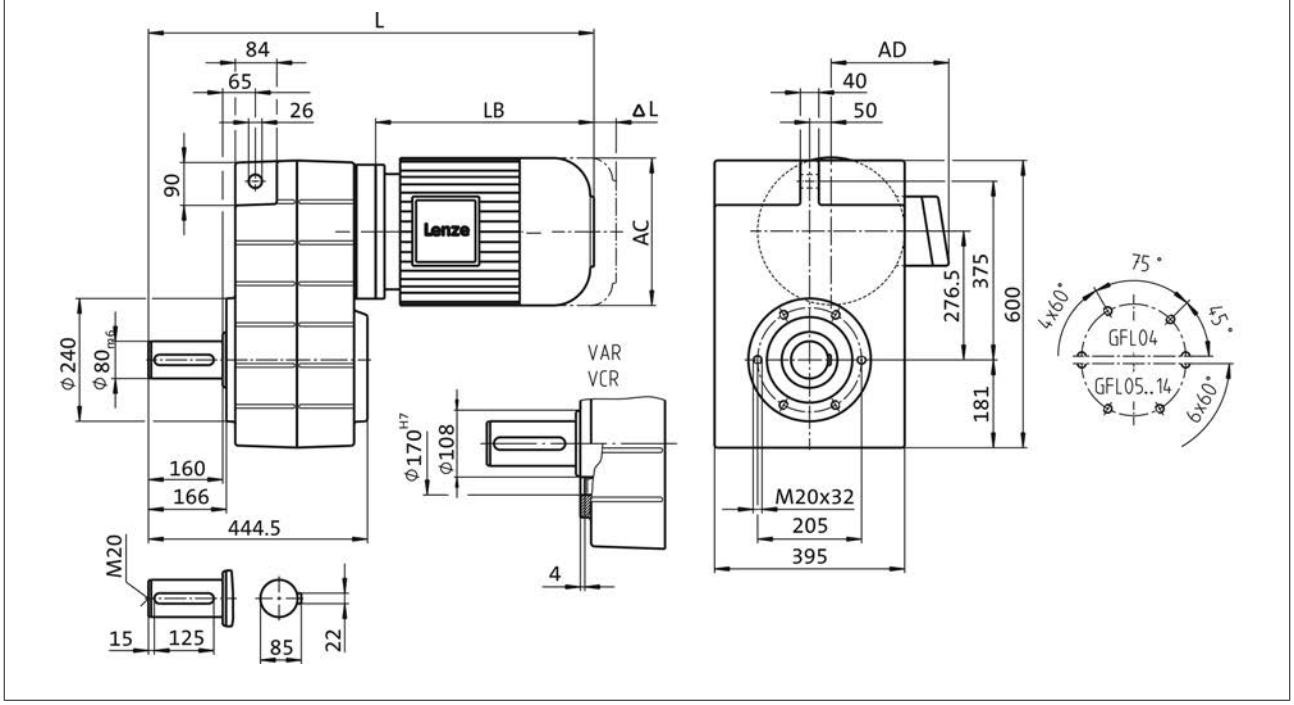
Product			m500						
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4	-P180V4
Dimensions									
Total length	**L**	**[mm]**	790		900		958		1006
Motor length	**LB**	**[mm]**	433.5		539		596.5		645
Length of motor options	**Δ L**	**[mm]**	200.5		237		267		
Motor diameter	**AC**	**[mm]**	261		313		351		
Distance motor/connection	**AD**	**[mm]**	182		231		282		



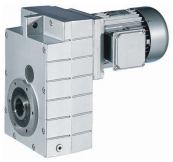
Dimensions, 4-pole motors

GFL11, 2-stage gearboxes

Dimensions with solid shaft (VDR)
Dimensions with hollow shaft and centering (VCR)



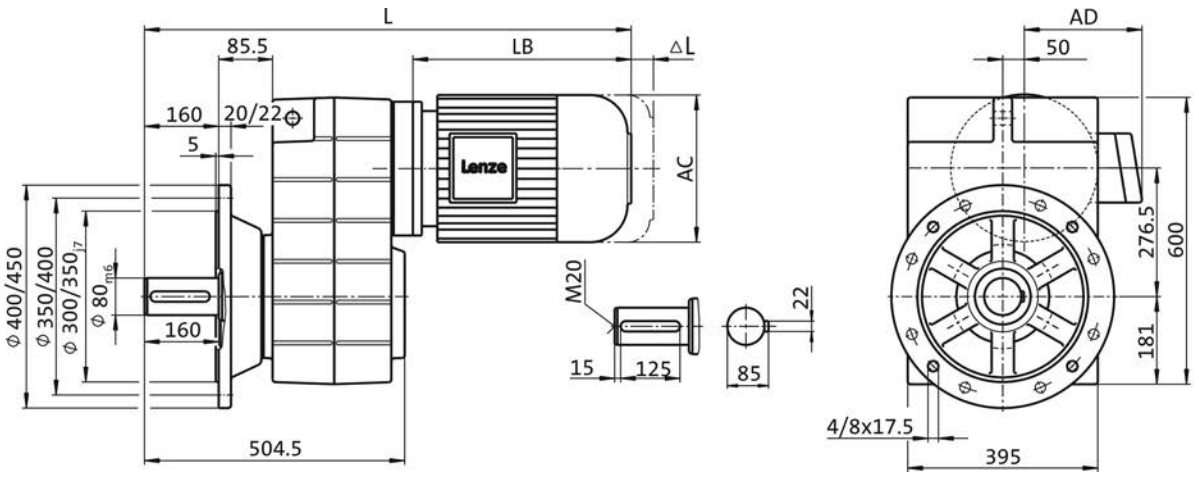
Product			m500						
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4	-P180V4
Dimensions									
Total length	**L**	**[mm]**	890		1000		1058		1106
Motor length	**LB**	**[mm]**	433.5		539		596.5		645
Length of motor options	**Δ L**	**[mm]**	200.5		237		267		
Motor diameter	**AC**	**[mm]**	261		313		351		
Distance motor/connection	**AD**	**[mm]**	182		231		282		



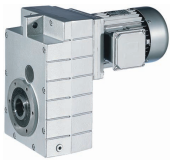
Dimensions, 4-pole motors

GFL11, 2-stage gearboxes

Dimensions with solid shaft and flange (VCK)



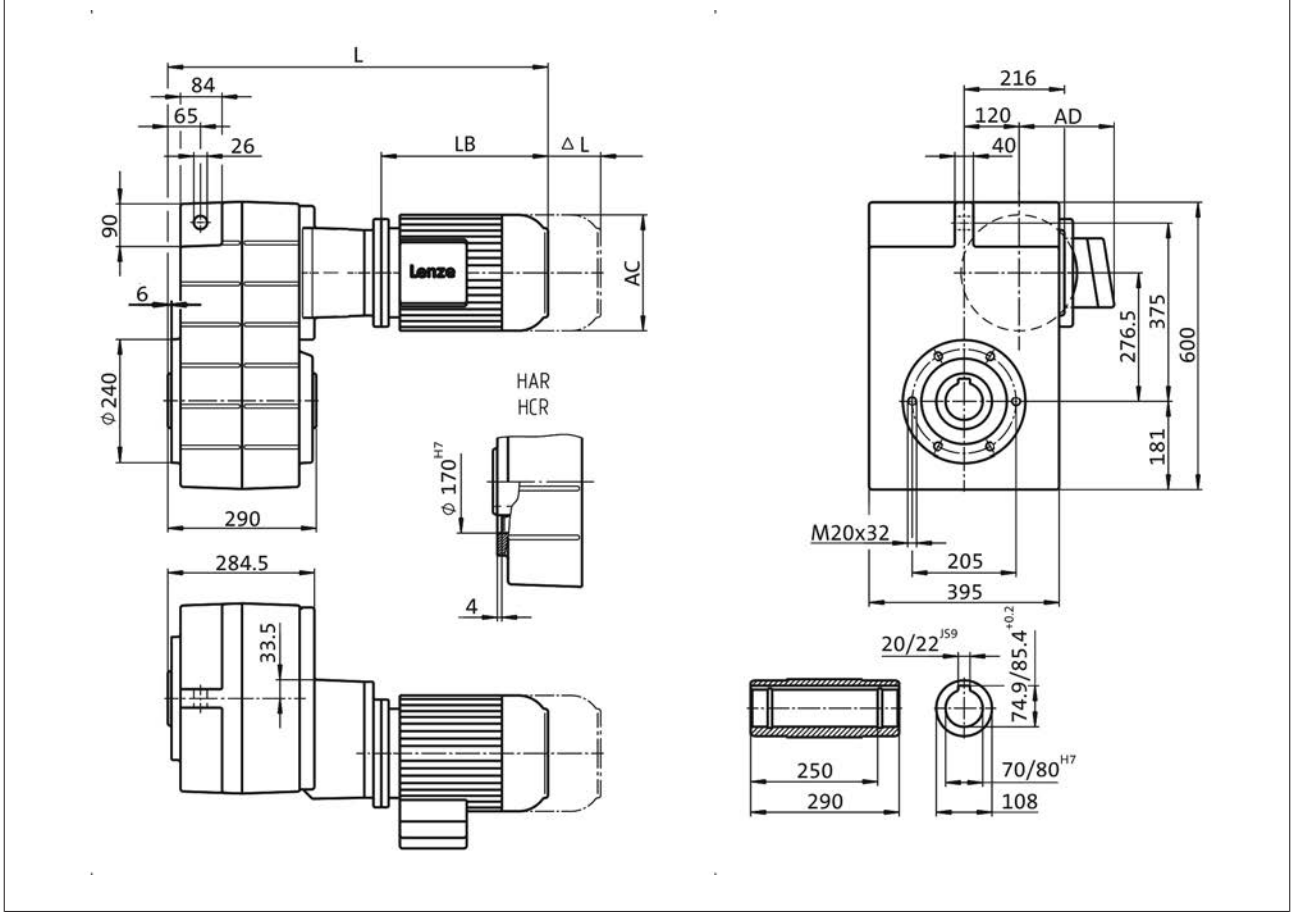
Product			m500						
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4	-P180V4
Dimensions									
Total length	**L**	**[mm]**	950		1060		1118		1166
Motor length	**LB**	**[mm]**	433.5		539		596.5		645
Length of motor options	**Δ L**	**[mm]**	200.5		237		267		
Motor diameter	**AC**	**[mm]**	261		313		351		
Distance motor/connection	**AD**	**[mm]**	182		231		282		



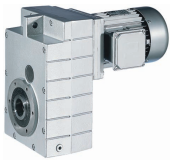
Dimensions, 4-pole motors

GFL11, 3-stage gearboxes

Dimensions with hollow shaft (HDR)
Dimensions with hollow shaft and centering (HCR)



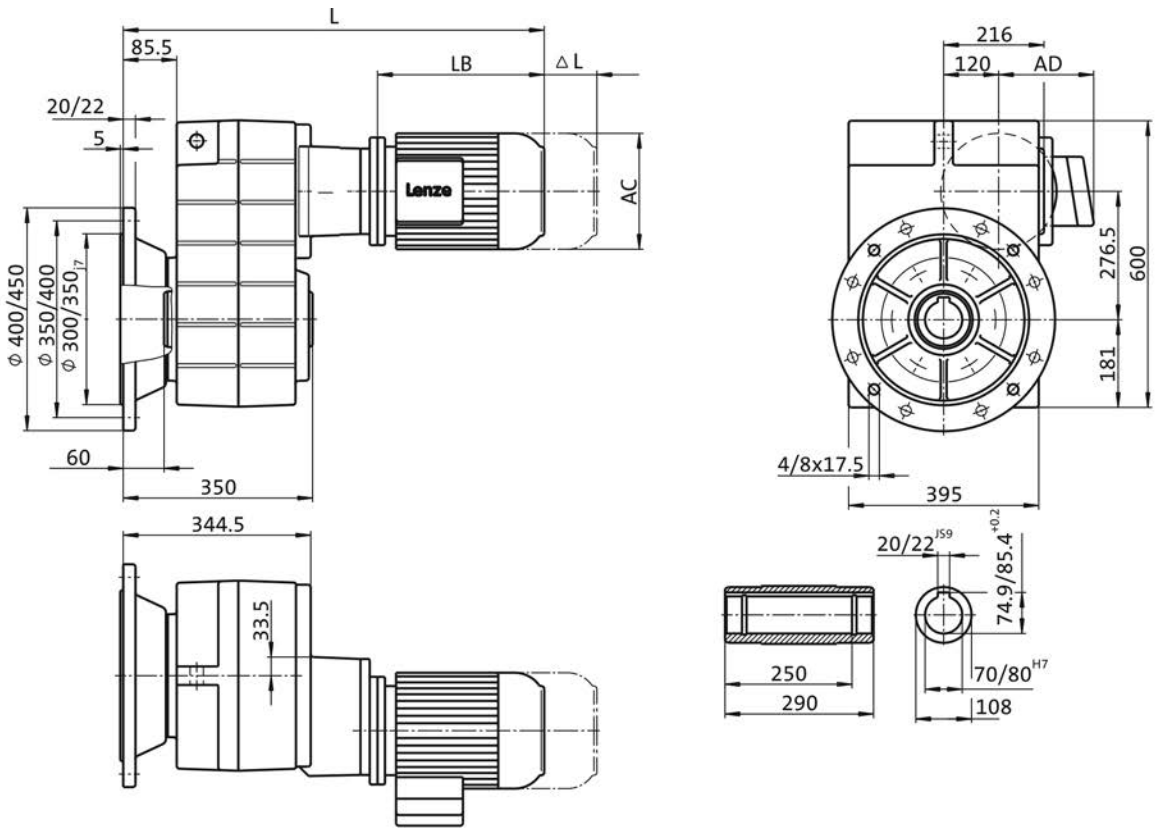
Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	871	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	



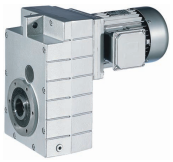
Dimensions, 4-pole motors

GFL11, 3-stage gearboxes

Dimensions with hollow shaft and flange (HCK)



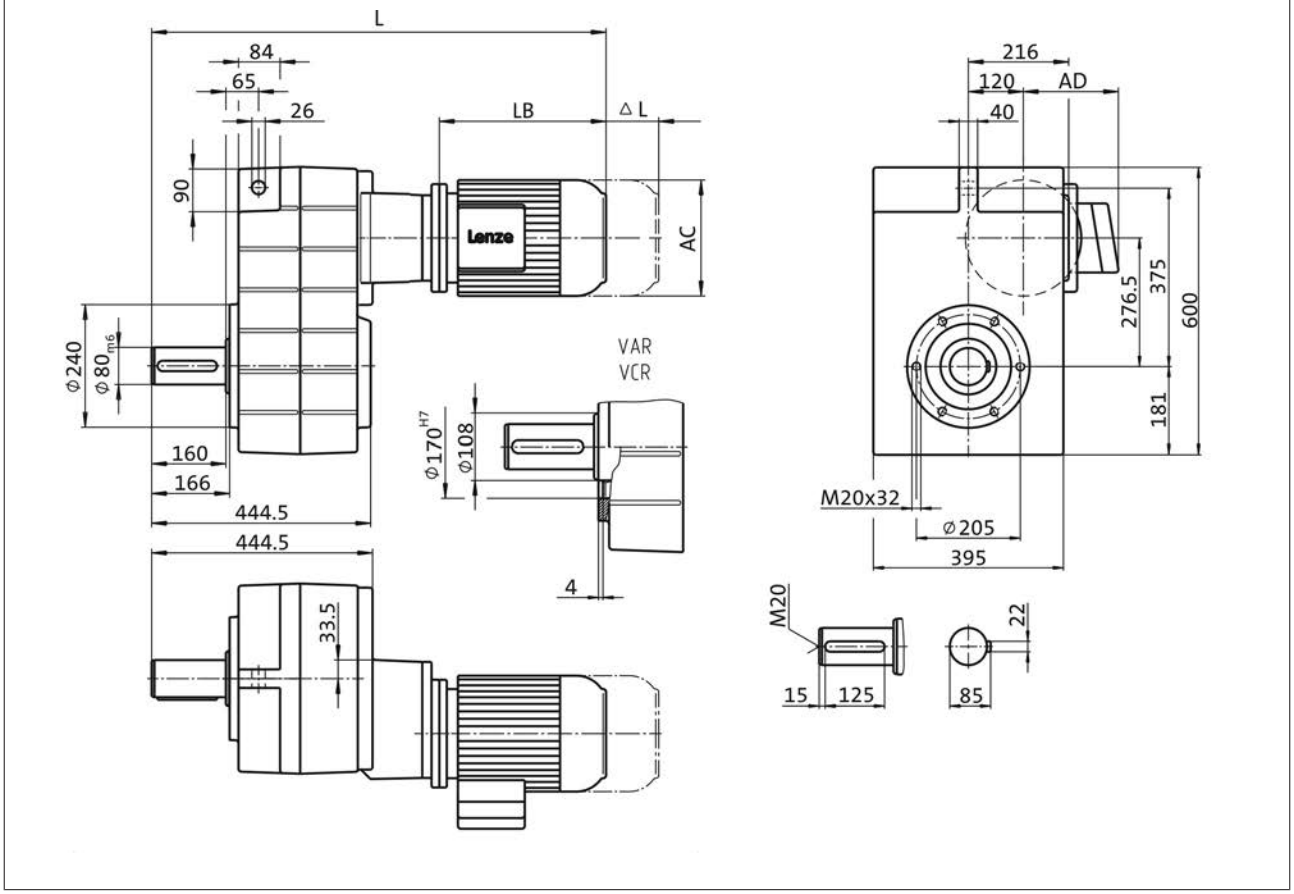
Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	931	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	



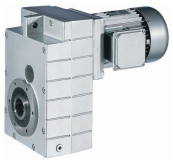
Dimensions, 4-pole motors

GFL11, 3-stage gearboxes

Dimensions with solid shaft (VDR)
Dimensions with hollow shaft and centering (VCR)



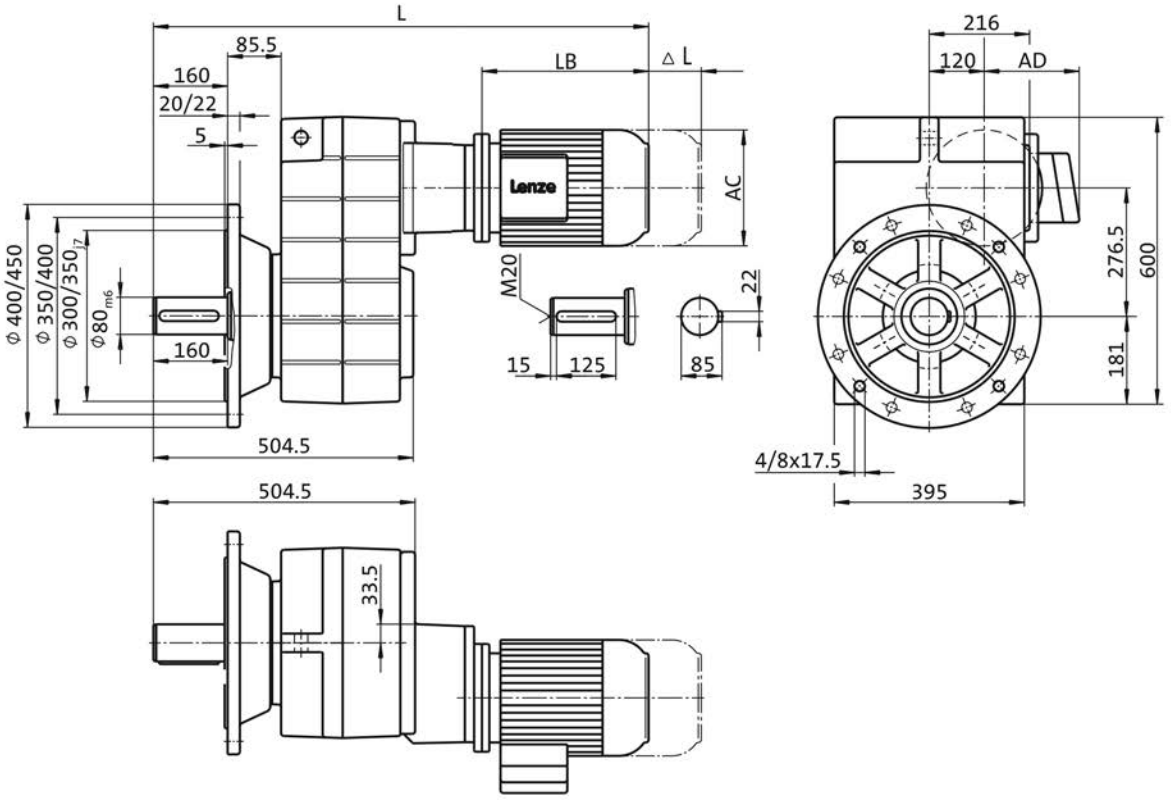
Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	1031	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	



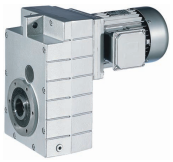
Dimensions, 4-pole motors

GFL11, 3-stage gearboxes

Dimensions with solid shaft and flange (VCK)



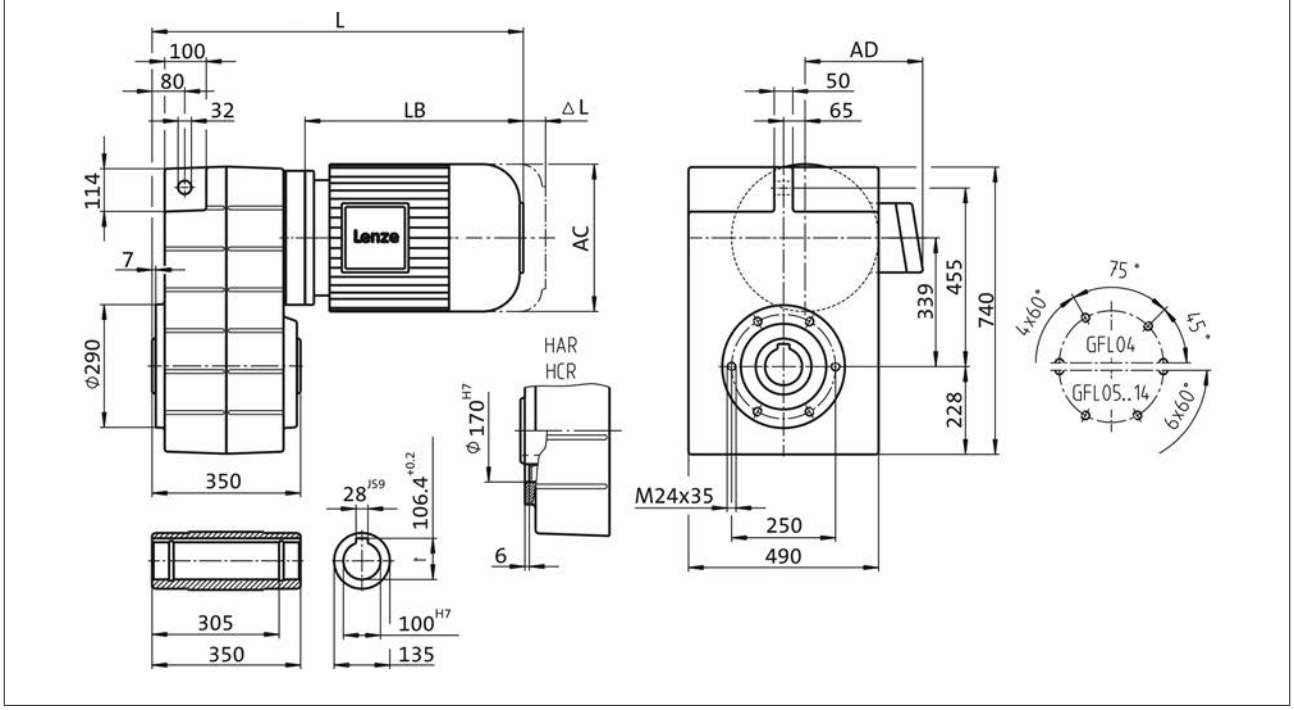
Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	1091	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	



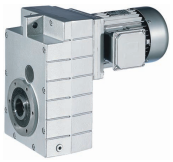
Dimensions, 4-pole motors

GFL14, 2-stage gearboxes

Dimensions with hollow shaft (HDR)
Dimensions with hollow shaft and centering (HCR)



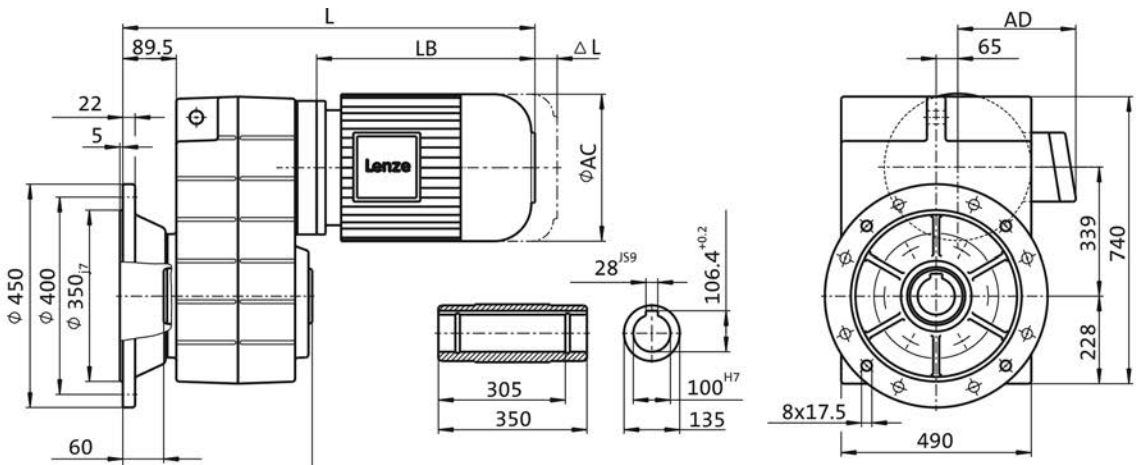
Product			m500							
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4	-P180V4	-P225M4
Dimensions										
Total length	**L**	**[mm]**	775		885		943		991	1113
Motor length	**LB**	**[mm]**	433.5		539		596.5		645	767
Length of motor options	**Δ L**	**[mm]**	200.5		237		267			213
Motor diameter	**AC**	**[mm]**	261		313		351			456
Distance motor/connection	**AD**	**[mm]**	182		231		282			330



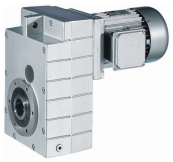
Dimensions, 4-pole motors

GFL14, 2-stage gearboxes

Dimensions with hollow shaft and flange (HCK)



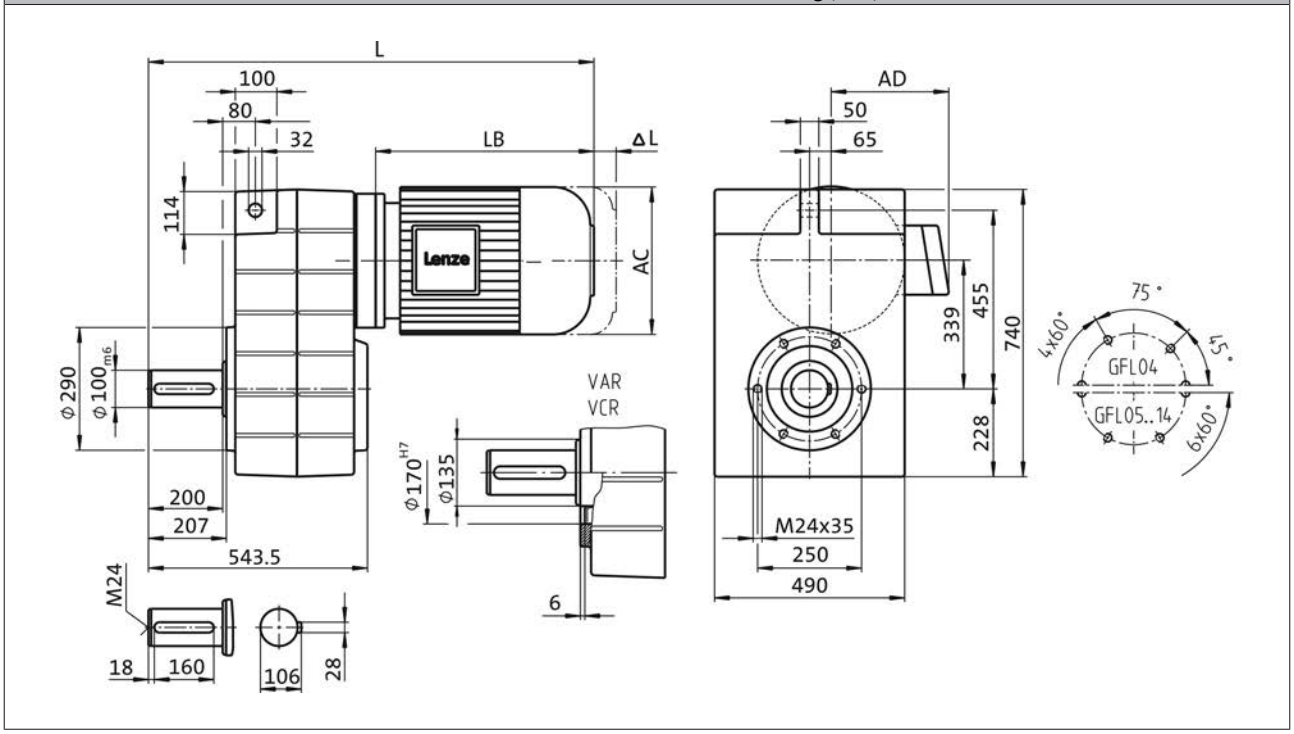
Product			m500							
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4	-P180V4	-P225M4
Dimensions										
Total length	**L**	**[mm]**	835		945		1003		1051	1173
Motor length	**LB**	**[mm]**	433.5		539		596.5		645	767
Length of motor options	**Δ L**	**[mm]**	200.5		237		267			213
Motor diameter	**AC**	**[mm]**	261		313		351			456
Distance motor/connection	**AD**	**[mm]**	182		231		282			330



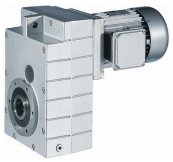
Dimensions, 4-pole motors

GFL14, 2-stage gearboxes

Dimensions with solid shaft (VDR)
Dimensions with hollow shaft and centering (VCR)



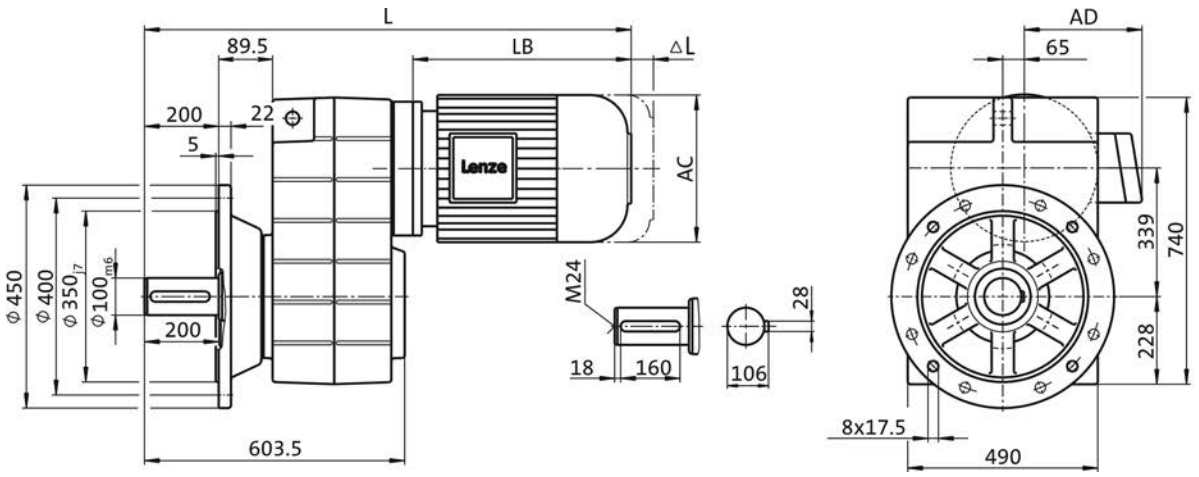
Product			m500							
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4	-P180V4	-P225M4
Dimensions										
Total length	**L**	**[mm]**	975		1085		1143		1191	1313
Motor length	**LB**	**[mm]**	433.5		539		596.5		645	767
Length of motor options	**Δ L**	**[mm]**	200.5		237		267			213
Motor diameter	**AC**	**[mm]**	261		313		351			456
Distance motor/connection	**AD**	**[mm]**	182		231		282			330



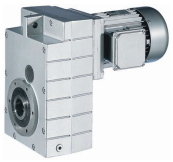
Dimensions, 4-pole motors

GFL14, 2-stage gearboxes

Dimensions with solid shaft and flange (VCK)



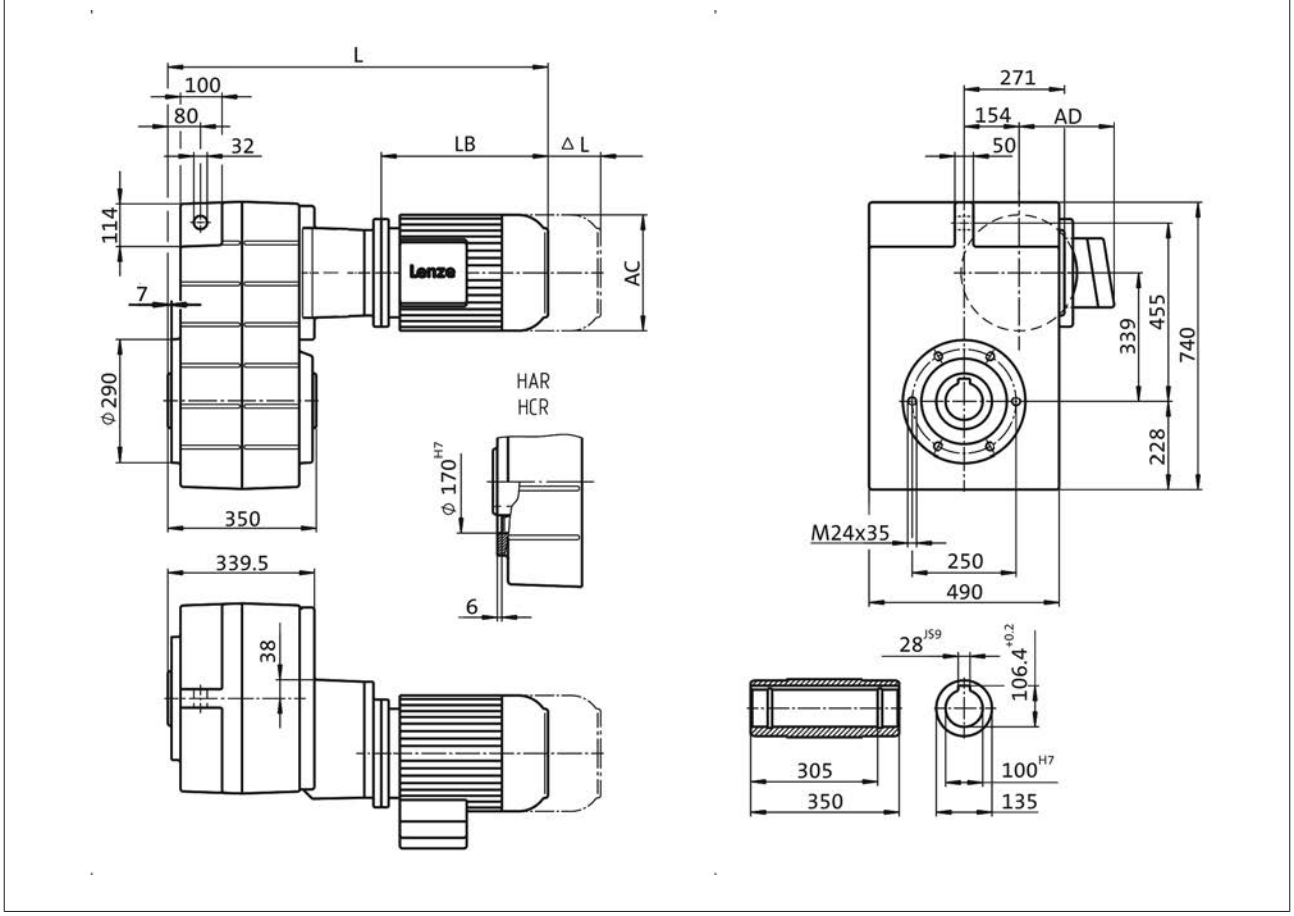
Product			m500							
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4	-P180V4	-P225M4
Dimensions										
Total length	**L**	**[mm]**	1035		1145		1203		1251	1373
Motor length	**LB**	**[mm]**	433.5		539		596.5		645	767
Length of motor options	**Δ L**	**[mm]**	200.5		237		267			213
Motor diameter	**AC**	**[mm]**	261		313		351			456
Distance motor/connection	**AD**	**[mm]**	182		231		282			330



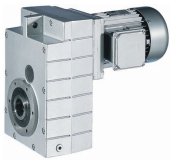
Dimensions, 4-pole motors

GFL14, 3-stage gearboxes

Dimensions with hollow shaft (HDR)
Dimensions with hollow shaft and centering (HCR)



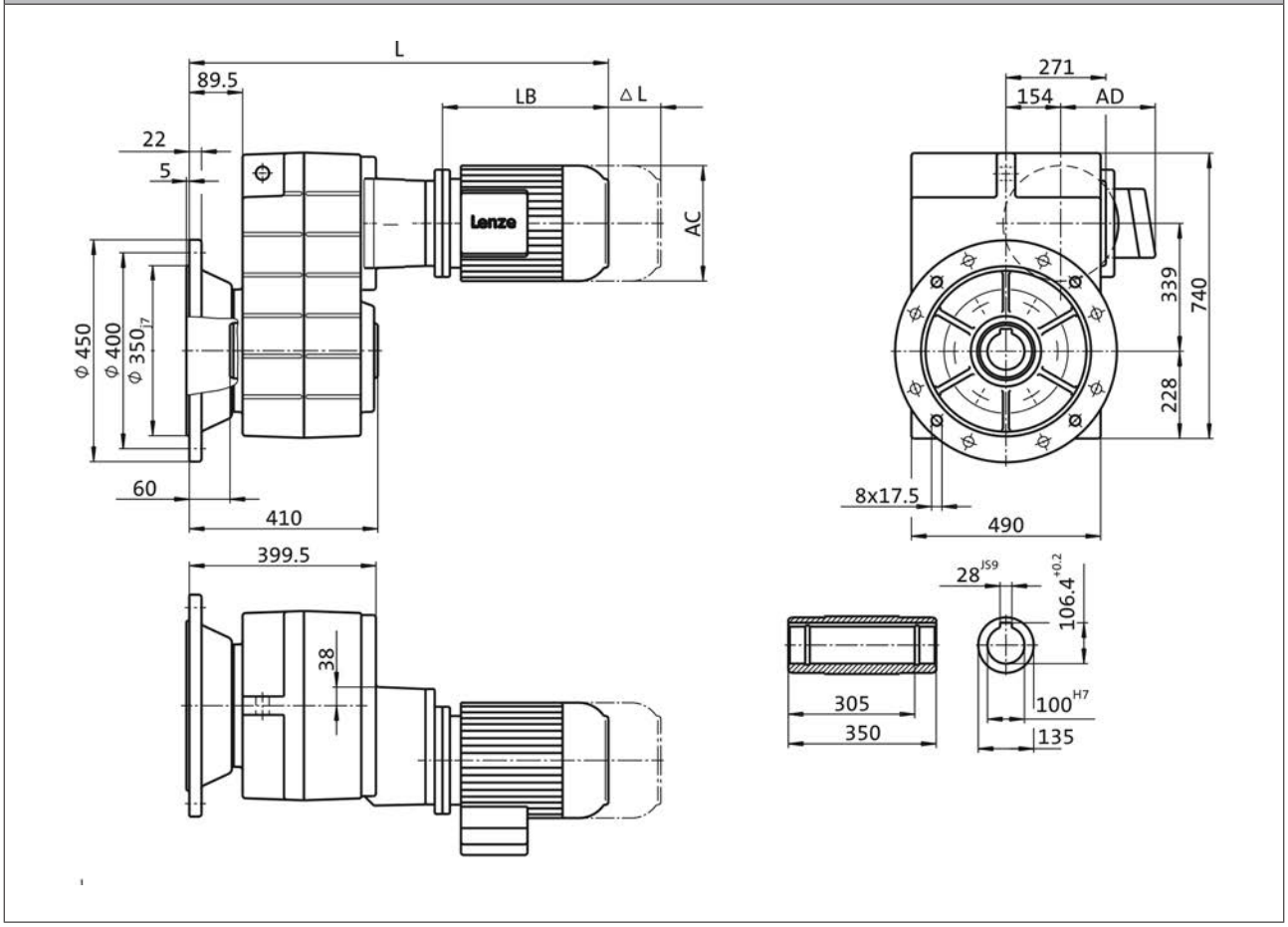
Product			m500			
			-P132L4	-P132M4	-P160L4	-P160M4
Dimensions						
Total length	**L**	**[mm]**	950		1061	
Motor length	**LB**	**[mm]**	433.5		539	
Length of motor options	**Δ L**	**[mm]**	200.5		237	
Motor diameter	**AC**	**[mm]**	261		313	
Distance motor/connection	**AD**	**[mm]**	182		231	



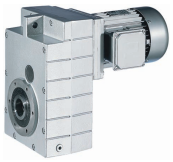
Dimensions, 4-pole motors

GFL14, 3-stage gearboxes

Dimensions with hollow shaft and flange (HCK)



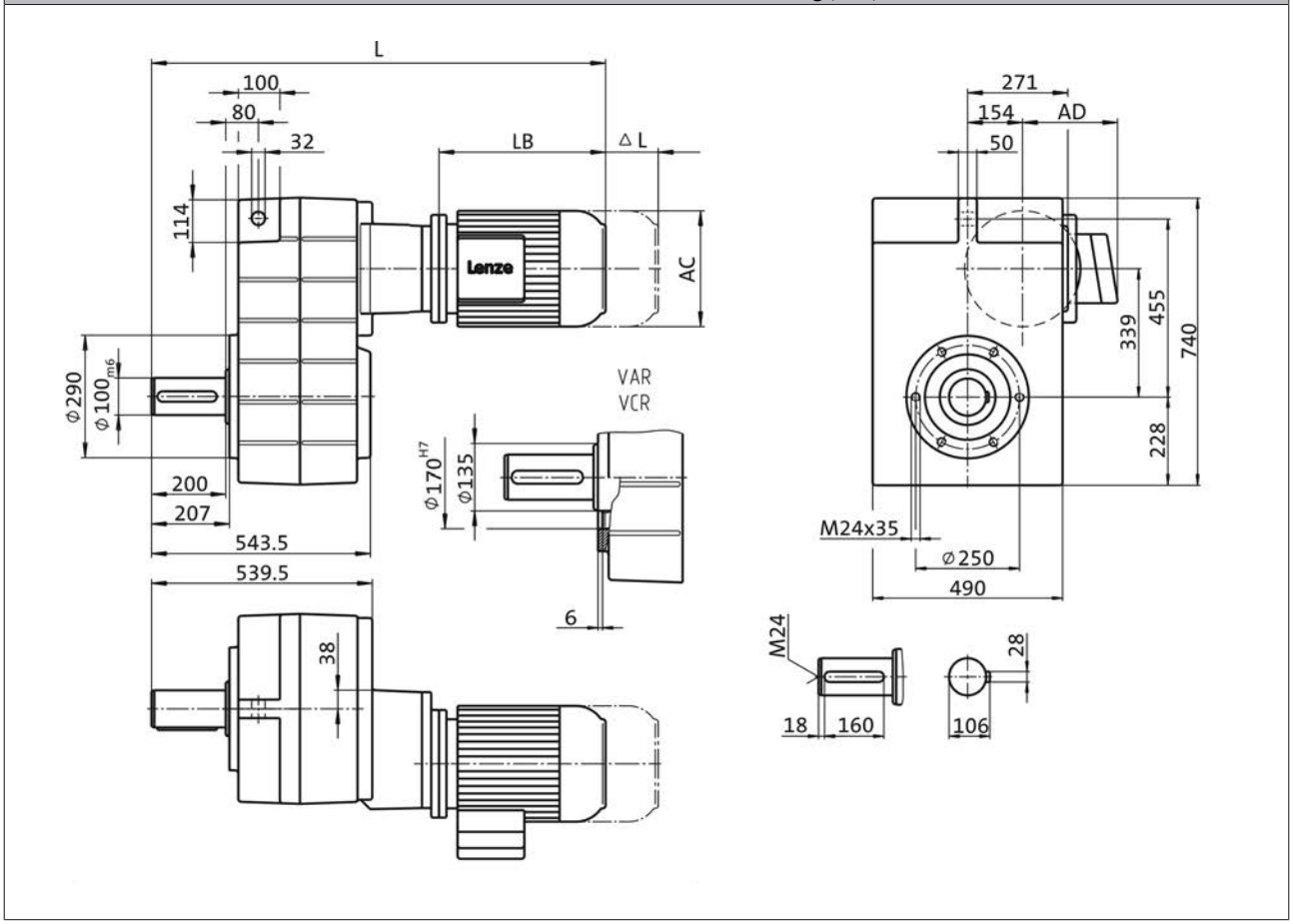
Product			m500			
			-P132L4	-P132M4	-P160L4	-P160M4
Dimensions						
Total length	**L**	**[mm]**	1010		1121	
Motor length	**LB**	**[mm]**	433.5		539	
Length of motor options	**Δ L**	**[mm]**	200.5		237	
Motor diameter	**AC**	**[mm]**	261		313	
Distance motor/connection	**AD**	**[mm]**	182		231	



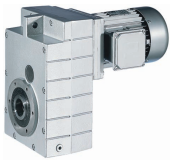
Dimensions, 4-pole motors

GFL14, 3-stage gearboxes

Dimensions with solid shaft (VDR)
Dimensions with hollow shaft and centering (VCR)



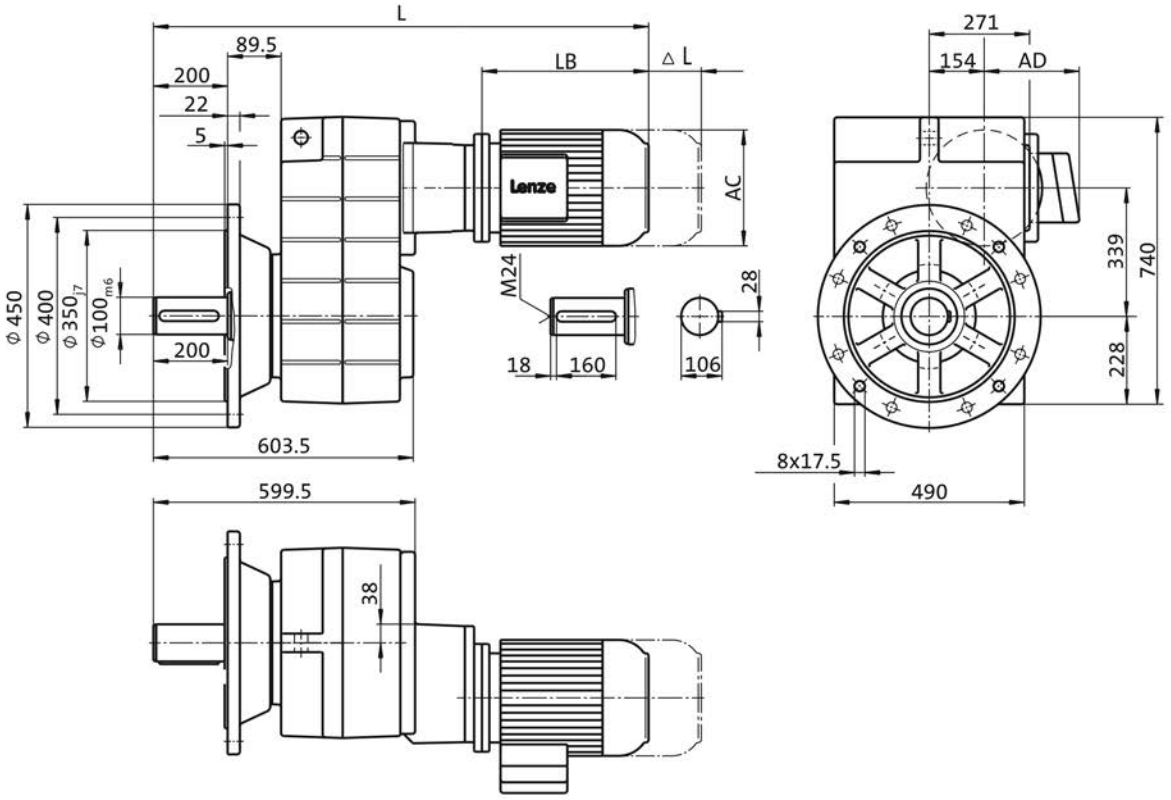
Product			m500			
			-P132L4	-P132M4	-P160L4	-P160M4
Dimensions						
Total length	**L**	**[mm]**	1150		1261	
Motor length	**LB**	**[mm]**	433.5		539	
Length of motor options	**Δ L**	**[mm]**	200.5		237	
Motor diameter	**AC**	**[mm]**	261		313	
Distance motor/connection	**AD**	**[mm]**	182		231	



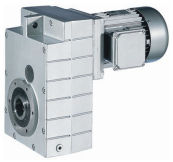
Dimensions, 4-pole motors

GFL14, 3-stage gearboxes

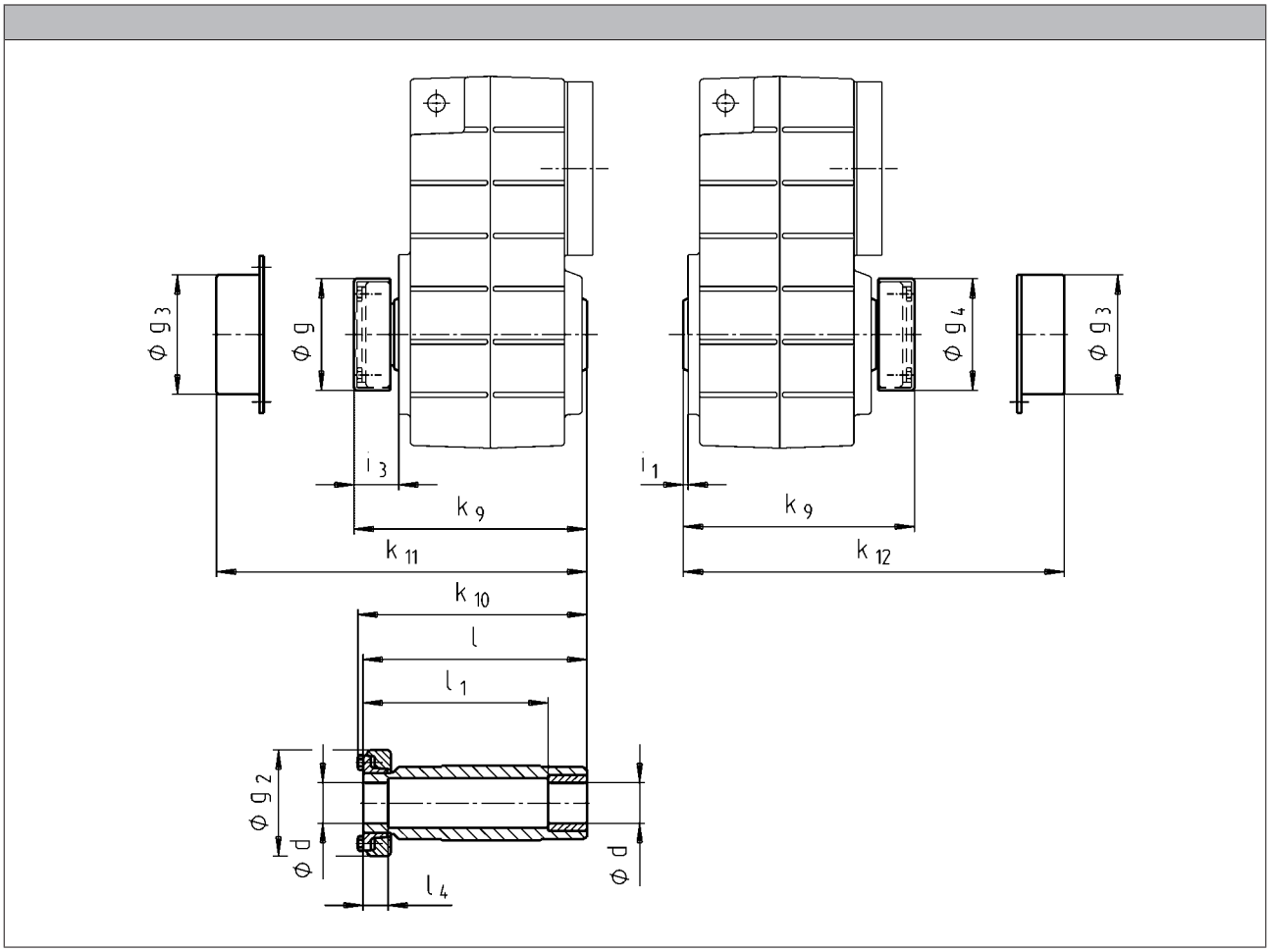
Dimensions with solid shaft and flange (VCK)



Product			m500			
			-P132L4	-P132M4	-P160L4	-P160M4
Dimensions						
Total length	**L**	**[mm]**	1210		1321	
Motor length	**LB**	**[mm]**	433.5		539	
Length of motor options	**Δ L**	**[mm]**	200.5		237	
Motor diameter	**AC**	**[mm]**	261		313	
Distance motor/connection	**AD**	**[mm]**	182		231	



Hollow shaft with shrink disc

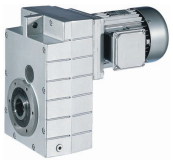


	d [1]	g_2	g_3	g_4	i_1	k_9	k_{10}	k_{11}	k_{12}	l	l_1	l_4
	h6											
GFL04	25 30	72	79	76	2.5	150	148	154	154	142	122	26
GFL04	25 30	72	79	76	2.5	150	148	154	154	142	122	26
GFL05	35	80	90	84	4.0	176	174	179	180	168	148	28
GFL06	40	90	100	94	5.0	202	200	204	205	194	164	30
GFL07	50	110	124	116	5.0	241	238	244	245	232	192	26
GFL09	65	141	159	147	5.0	288	285	287	288	278	228	30
GFL11	80	170	191	176	6.0	347	344	349	350	338	238	42
GFL14	100	215	253	221	7.0	418	415	421	422	407	307	55

[1] Machine shaft design.

► Output flange and hollow shaft with shrink disc (design S□K) is only possible with shrink disc in position 1.

► Not suitable for through machine shaft at motor end:
GFL04-2M S□□ 080□□□; d=30
GFL05-2M S□□ 100□□□; d=35
GFL06-2M S□□ 132□□□; d=40
GFL07-2M S□□ 160□□□; d=50
GFL11-2M S□□ 225□□□; d=80



Hollow shaft with shrink disc

► Ensure that the strength of the machine shaft material is adequate in shrink disc designs.
When using typical steels, e.g. C45, 42CrMo4, the torques listed in the selection tables can be used without restriction.
Please consult us if you wish to use material that is considerably weaker. Medium surface roughness Rz must not exceed 15 µm (turning is sufficient).

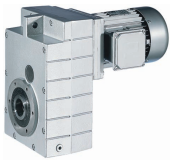
Combination options with shrink disc in position 1 (drive end)

GFL□□-2M

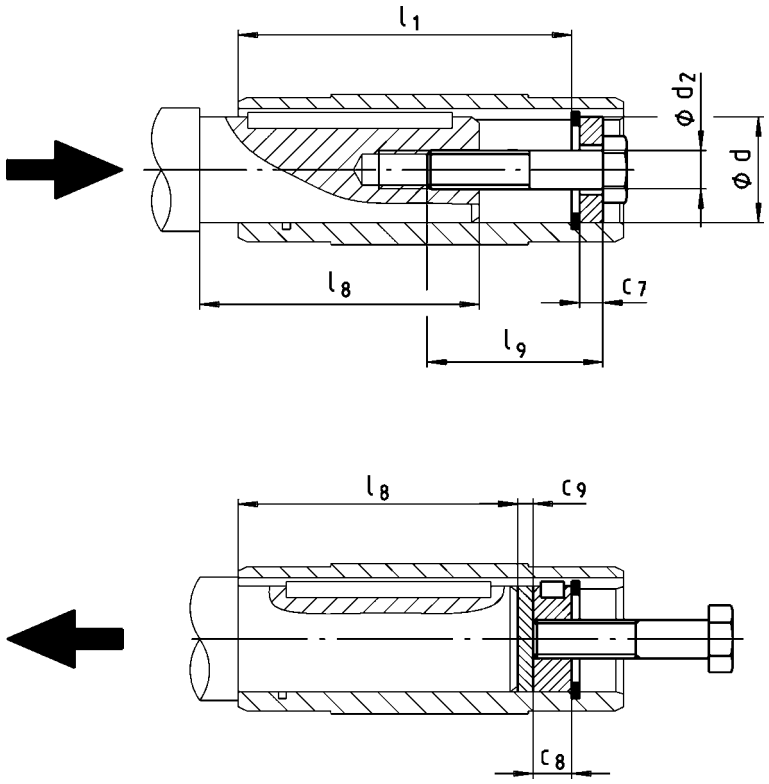
Gearbox	Motor frame size
GFL04	
GFL05	063 [1)] 071 [1)]
GFL06	063 071 080 090 [1)] 100 [1)]
GFL07	080 090 100 112 [1)]
GFL09	090 100 112 132
GFL11	100 112 132 160 180 225
GFL14	112 132 160 180 225

[1)] Only possible without cover

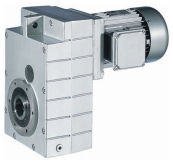
► For geared motors GFL□□-2M/E S... with shrink disc position 1: terminal box position / motec position 4 not possible!



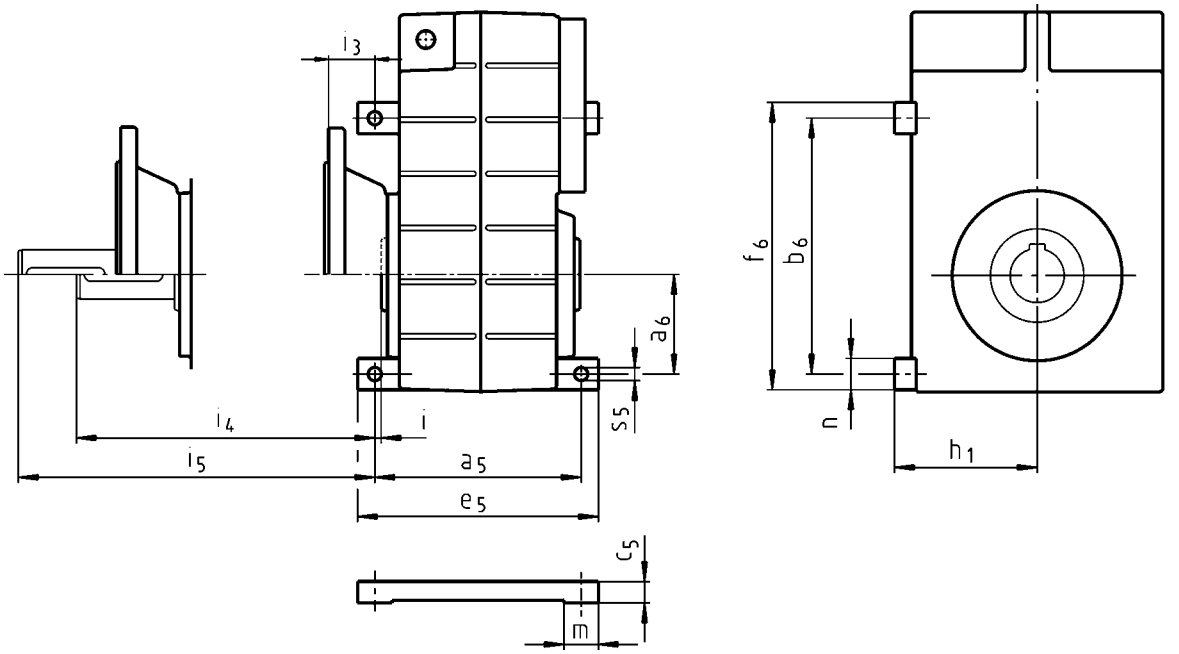
Mounting set for hollow shaft circlip:
Proposed design for auxiliary tools



	d	l_1	d_2	l_9	c_7	c_8	c_9	$l_{8,\,max}$
	H7							
GFL04	25 30	100	M10	40	5	10	3	85
					6			
GFL05	30 35	124						107
			M12	50	7	12		
GFL06	40 45	140	M16	60	8	16	4	118
					9			
GFL07	50 55	175			10		5	148
			M20	80	11	20		
GFL09	60 70	210			13			182
					14			
GFL11	70 80	250					6	221
					16			
GFL14	100	305	M24	100	20	24	8	270

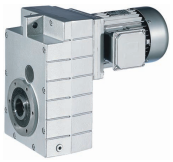


Foot mounting in position 3

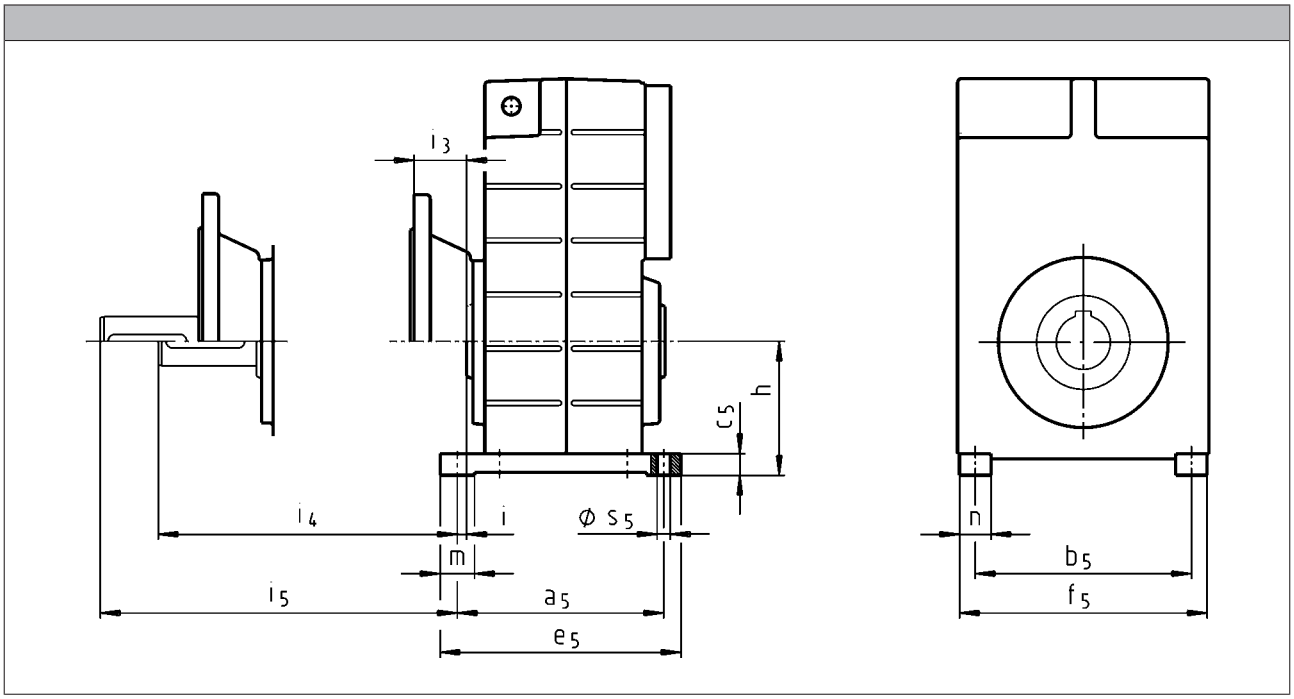


	a_5	a_6	b_6	c_5	e_5	f_6	h_1	i	i_3	i_4	i_5	m	n	s_5
GFL04	130	47	115	18	152	140	90	4.5	28.5	45.5	78.5	22	25	6.6
GFL05	160	65	167	21	185	192	100	2.0	31.0	58.0	91.0	25		9.0
GFL06	175	80	205	27	205	233	125		39.0	78.0	119	30	28	11.0
GFL07	220	100	260	31	255	292	155	3.0	52.0	97.0	152	35	32	13.5
GFL09	260	125	335	36	300	375	190		57.0	117	177	40	40	17.5
GFL11	315	155	435	48	365	485	240			157	217	50	50	22.0
GFL14	375	200	540	57	430	600	295			197	257	55	60	26.0

Foot design is not available for the following combinations:
- GFL04: Motor frame size 090
- GFL05: Motor frame size 090
- GFL05: Motor frame size 100
- GFL06: Motor frame size 112
- GFL06: Motor frame size 132
- GFL07: Motor frame size 160

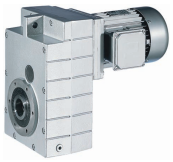


Foot mounting in position 4

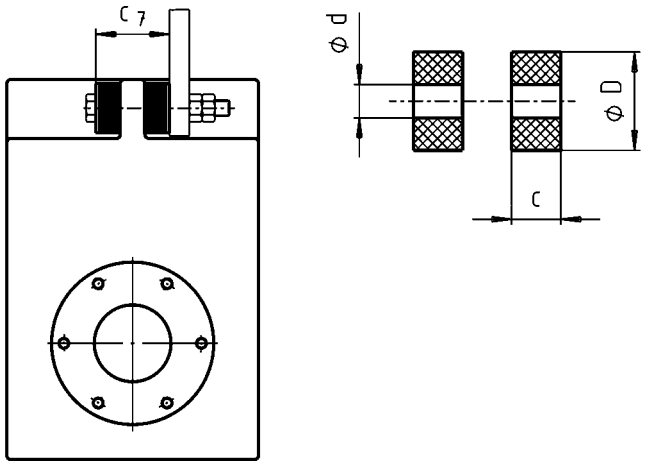


	a_5	b_5	c_5	e_5	f_5	h	i	i_3	i_4	i_5	m	n	s_5
GFL04	130	108	18	152	133.0	85	4.5	28.5	45.5	78.5	22	25	6.6
GFL05	160	140	21	185	165.0	95	2.0	31.0	58.0	91.0	25		9.0
GFL06	175	175	27	205	203.0	120		39.0	78.0	119	30	28	11.0
GFL07	220	220	31	255	252.0	145	3.0	52.0	97.0	152	35	32	13.5
GFL09	260	275	36	300	315.0	180		57.0	117	177	40	40	17.5
GFL11	315	340	48	365	390.0	224			157	217	50	50	22.0
GFL14	375	425	57	430	485.0	278			197	257	55	60	26.0

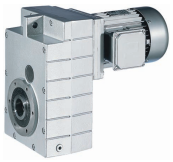
► In mounting positions E and F, the oil check bore hole/oil-sight glass are located between the feet in position 4!



Rubber buffer for torque plate



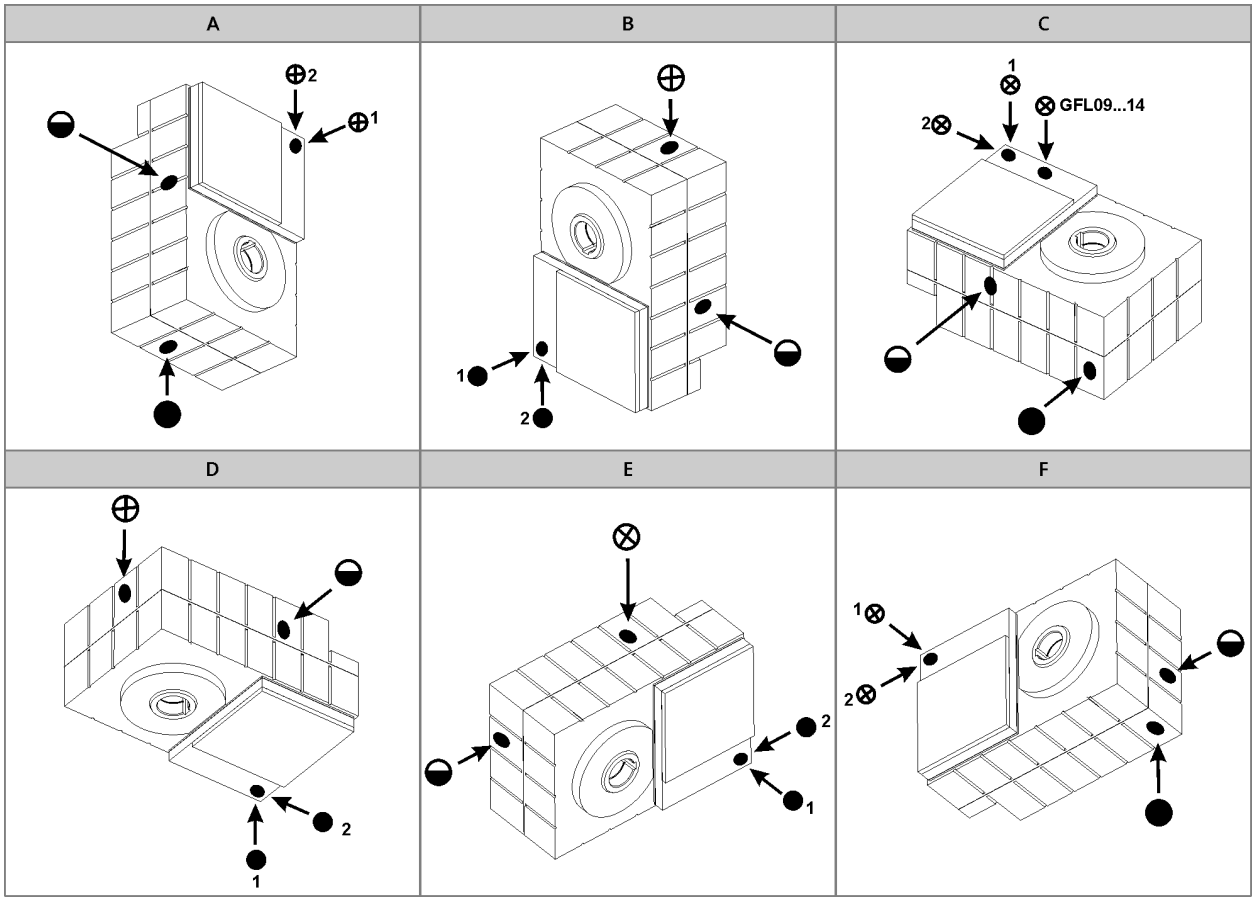
	d	D	c	c_7
GFL04	11	30	14.5	43
GFL05	11	30	14.5	45
GFL06	13	40	15.0	50
GFL07	17	50	27.0	79
GFL09	21	60	28.0	88
GFL11	26	72	29.0	98
GFL14	33	92	30.0	110



Ventilations

Position of ventilation, sealing elements and oil level check

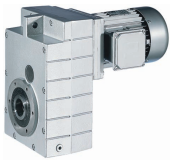
GFL05...14-2



A to F Mounting position
⊗ Ventilation / Oil filler plug
● Oil drain plug
◒ Oil control plug
* On both sides
** On opposite side

Pos.1 standard
Pos.2 only for:
- GFL05-2M □□□ 090□□□
- GFL05-2M □□□ 100□□□
- GFL06-2M □□□ 112□□□
- GFL07-2M □□□ 160□□□

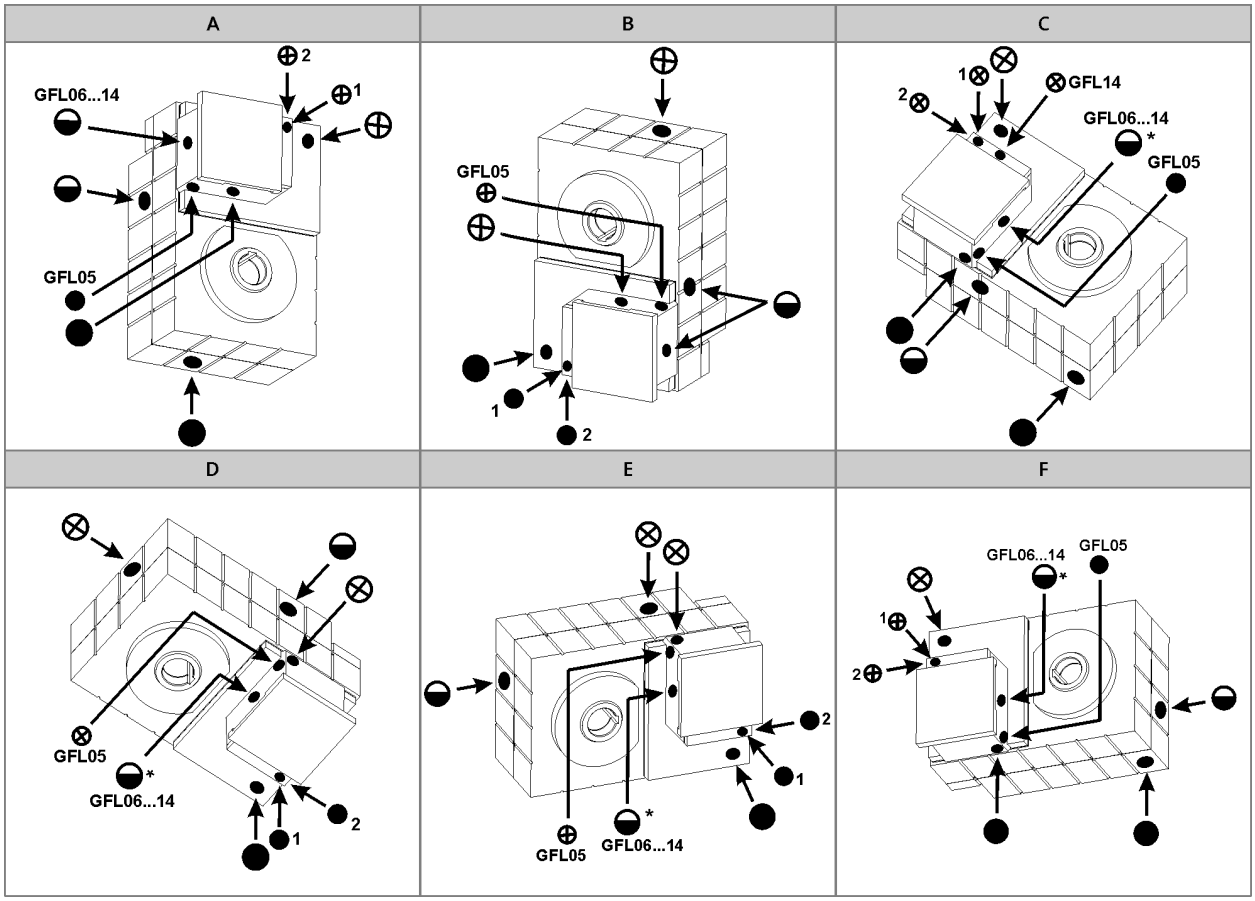
6.2



Ventilations

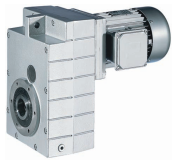
Position of ventilation, sealing elements and oil level check

GFL05...14-3



A to F Mounting position
⊗ Ventilation / Oil filler plug
● Oil drain plug
◒ Oil control plug
* On both sides
** On opposite side

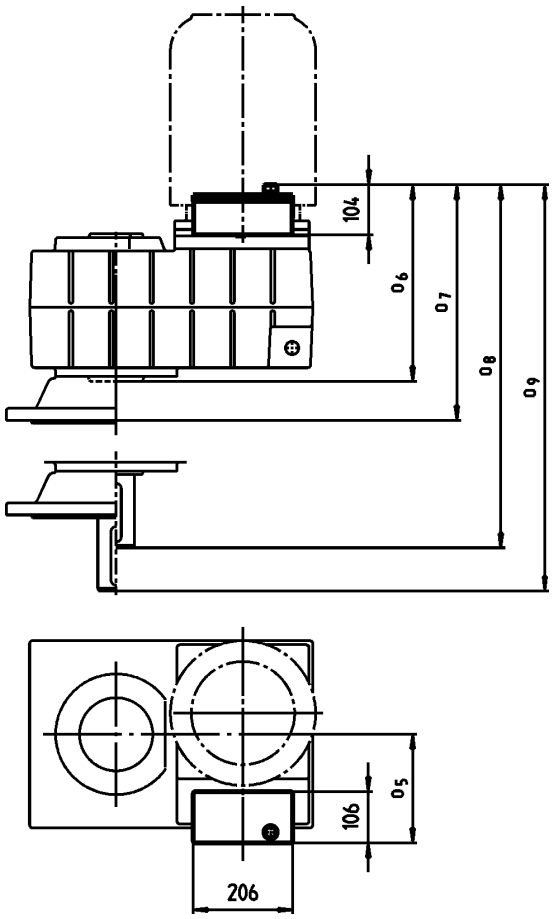
Pos.1 standard
Pos.2 only for:
- GFL07-3M □□□ 090□□□
- GFL07-3M □□□ 100□□□
- GFL09-3M □□□ 112□□□



Ventilations

Compensation reservoir for mounting position C

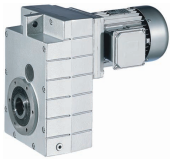
GFL□□-2



Motor	090 100					112				
	o_5	o_6	o_7	o_8	o_9	o_5	o_6	o_7	o_8	o_9
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
GFL09	165	344	405	464	525	187	344	405	464	525
GFL11	154	387	448	547	608	176	391	452	551	612
GFL14						181	446	507	646	707

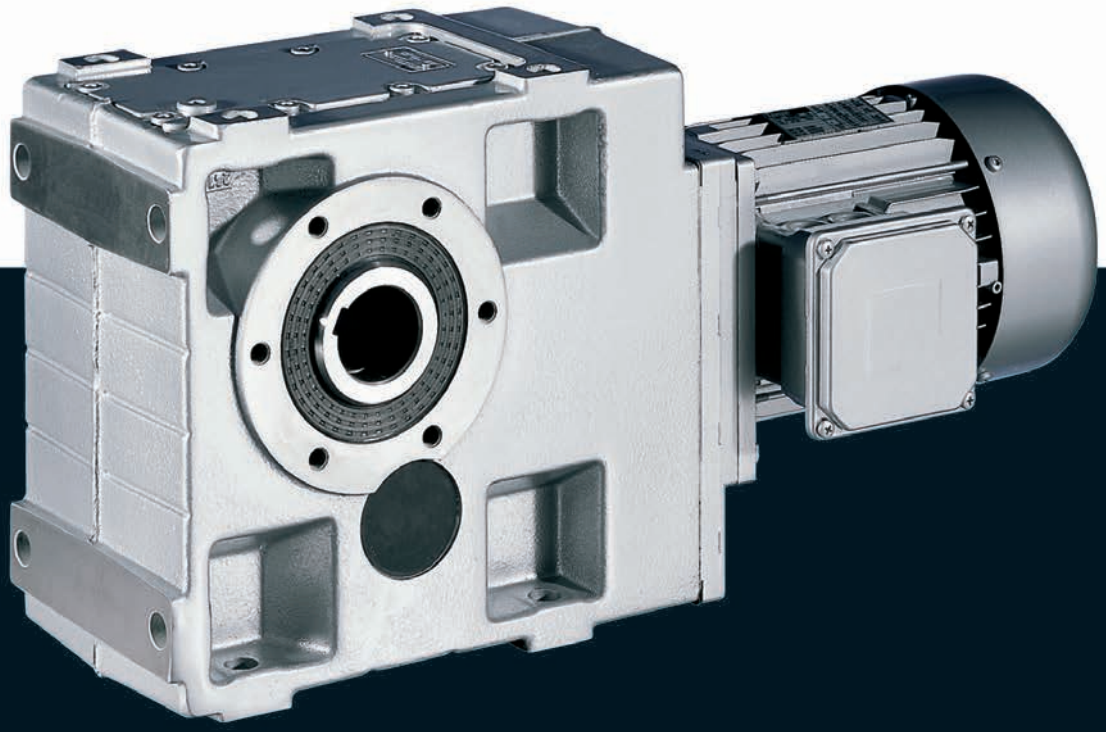
Motor	132					160 180 225				
	o_5	o_6	o_7	o_8	o_9	o_5	o_6	o_7	o_8	o_9
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
GFL09	204	344	405	464	525	219	344	405	464	525
GFL11	200	391	452	551	612	214	391	452	551	612
GFL14	211	446	507	646	707	211	446	507	646	707

- Terminal box position 3 not permitted.
- Foot in position 3 not permitted.



GKS helical-bevel gearboxes

Inverter operation
5.5 ... 45 kW (efficiency class IE3)



GKS helical-bevel gearbox

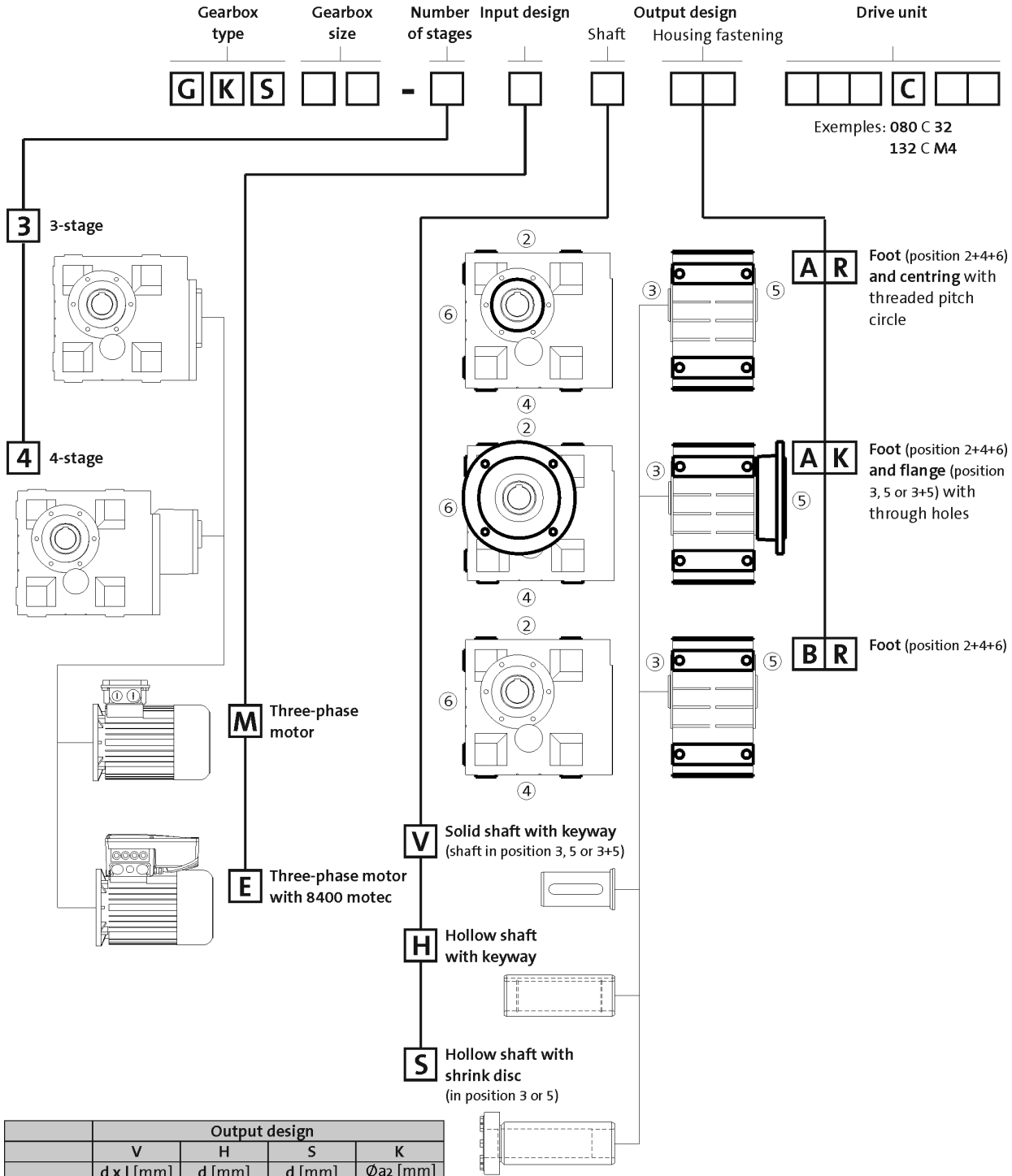
Contents

List of abbreviations

$\eta_{c=1}$		Efficiency
c		Load capacity
f_N	[Hz]	Rated frequency
$F_{ax,max}$	[N]	Max. axial force
$F_{rad,max}$	[N]	Max. radial force
H_{max}	[m]	Site altitude
i		Ratio
J	[kgcm²]	Moment of inertia
m	[kg]	Mass
M_2	[Nm]	Output torque
n_2	[r/min]	Output speed
n_N	[r/min]	Rated speed
P_N	[kW]	Rated power
$S_{hü}$	[1/h]	Transition operating frequency
$T_{opr,max}$	[°C]	Max. ambient operating temperature
$T_{opr,min}$	[°C]	Min. ambient operating temperature
$U_{N,\Delta}$	[V]	Rated voltage
$U_{N,Y}$	[V]	Rated voltage

CE	Communauté Européenne
CSA	Canadian Standards Association
DIN	Deutsches Institut für Normung e.V.
EMC	Electromagnetic compatibility
EN	European standard
IEC	International Electrotechnical Commission
IM	International Mounting Code
IP	International Protection Code
NEMA	National Electrical Manufacturers Association
UL	Underwriters Laboratory Listed Product
UR	Underwriters Laboratory Recognized Product
VDE	Verband deutscher Elektrotechniker (Association of German Electrical Engineers)
CCC	China Compulsory Certificate
GOST	Certificate for Russian Federation
cURus	Combined certification marks of UL for the USA and Canada
UkrSEPRO	Certificate for Ukraine

Product key

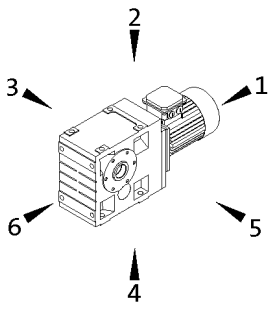
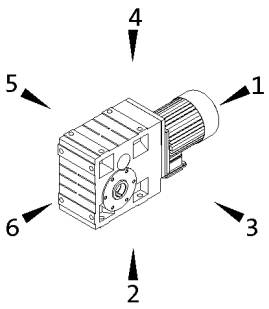
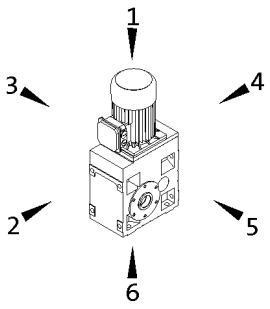
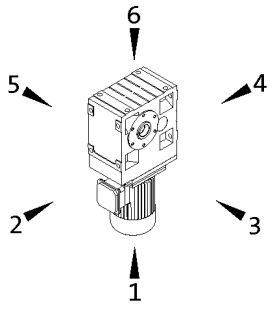
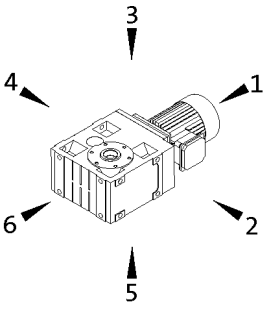
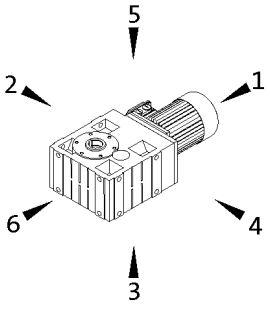


	Output design			
	V	H	S	K
	d x l [mm]	d [mm]	d [mm]	Øa2 [mm]
GKS04-3	25x50	25/30	25/30	160
GKS05-3/4	30x60	30/35	35	200
GKS06-3/4	40x80	40/45	40	200[1]/250
GKS07-3/4	50x100	50/55	50	250/300
GKS09-3/4	60x120	60/70	65	350
GKS11-3/4	80x160	70/80	80	400/450
GKS14-3/4	100x200	100	100	450

[1] Only in the case of H and S type of output

Product key

Mounting position (A to F) and position of system blocks (1 to 6)

A	B	C
		
D	**E**	**F**
		

Hollow shaft: 0
Solid shaft: 3, 5, 8 (3+5)
Hollow shaft with shrink disc: 3, 5

Without flange: 0
Flange: 3, 5, 8 (3+5)
Terminal box / motec: 2, 3, 4, 5

Gearbox designs

Basic versions	
Motor efficiency	Standard efficiency Increased efficiency (IE2) Premium efficiency (IE3)
Surface and corrosion protection	OKS-G (primer: grey) OKS-S (paint: RAL 7012)
Lubricant	CLP 460 (mineral)
Ventilation	Oil control plugs for GKS05 to 14 Breather elements for GKS06 ... 14

Options	
Surface and corrosion protection	OKS-S (special paint according to RAL) OKS-M (special paint according to RAL) OKS-L (special paint according to RAL)
Lubricant	CLP HC 320 (synthetic) CLP HC 220 USDA H1 (synthetic)
Shaft sealing rings	Driven shaft: Viton
Ventilation	Breather elements for GKS05 Compensation reservoir for GKS09 to 14-3 in mounting position C
Accessories	Torque plate on threaded pitch circle Housing foot torque plate 2nd output shaft end Shrink disc cover Hoseproof hollow shaft cover Mounting set for hollow shaft circlip
Nameplate	Metal nameplate (supplied loose) Adhesive nameplate (supplied loose)

Product information

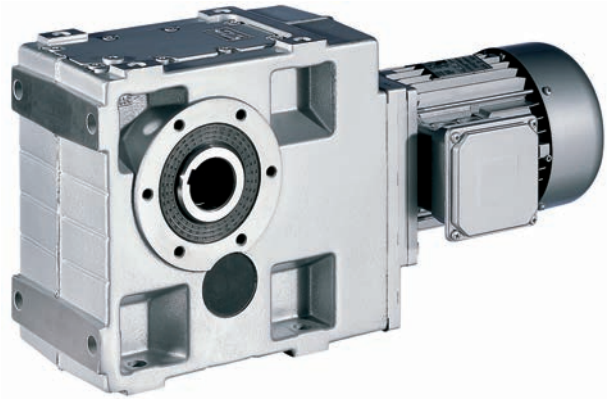
Lenze provides a geared motor construction kit, which covers a wide range of requirements. Numerous drive-side and output-side options enable precise adaptation of the drive to the specific application. This is the basis for versatile applications and functional scalability of our gearboxes and geared motors.
The modular concept and high power density make extremely compact sizes possible. Optimised teeth profiles and ground gears ensure low-noise operation and low backlash. The gearboxes are of compact and hence space-saving construction.

Types

- 3- and 4-stage gearboxes
- Hollow shaft with keyway or shrink disc
- Solid shaft with keyway
- Foot or flange mounting
- Torque plate, including rubber buffer
- With m500 three-phase AC motors (efficiency class IE3) in the power range 5.5 ... 45 kW

For maximum precision

Helical-bevel gearboxes have the major benefit of enabling extremely precise and reproducible positioning movements owing to their high torsional stiffness and low backlash. Our helical-bevel gearboxes can be combined with three-phase AC motors and servo motors to form a compact unit. They are available in 3- and 4-stage versions with a torque of up to 11,639 Nm and a ratio of up to i=1,936.



Functions and features

Gearbox type	GKS
Housing	
Design	Cuboid
Material	Aluminium / cast iron
Solid shaft	
Design	with keyway to DIN 6885
Tolerance	k6 (d ≤ 50 mm) m6 (d > 50 mm)
Material	Tempered steel C45 or 42CrMo4
Hollow shaft	
Design	H: with keyway S: smooth
Tolerance	Bore H7
Material	Tempered steel C45
Toothed parts	
Design	Ground tooth flanks Optimised tooth flank geometry
Material	Case-hardened steel
Shaft-hub joint	
	1st stage/prestage/helical (bevel) gearbox: Friction-type connection Output stage (= 2nd, 3rd or 4th stage): Friction-type or positive-fit connection
Shaft sealing rings	
Design	With dust lip
Material	NB / FP
Bearing	
Design	Ball bearing / tapered-roller bearing depending on size and design
Lubricants	
Standard	DIN 51502
Quantities	corresponding to mounting position (see operating instructions)
Mechanical efficiency	
1-stage gearboxes [$\eta_{c=1}$]	
2-stage gearboxes [$\eta_{c=1}$]	
3-stage gearboxes [$\eta_{c=1}$]	0.95
4-stage gearboxes [$\eta_{c=1}$]	0.93
Notes	

Functions and features

Lubricants

Lenze gearboxes and geared motors are ready for operation on delivery and are filled with lubricants specific to both the drive and the design. The mounting position and design specified in the order are key factors in choosing the volume of lubricant.

The lubricants listed in the lubricant table are approved for use in Lenze drives.

Lubricant table

Mode	CLP 460	CLP HC 320	CLP HC 220 USDA H1
Ambient temperature [°C]	0 ... +40	-25 ... +50	-20 ... +40
Specification	Mineral based oil with additives	Synthetic-based oil (synthetic hydrocarbon / poly-alpha-olefin oil)	
Note			For food processing industry
Changing interval	16000 operating hours not later than after three years (oil temperature 70 to 80 °C)	25000 operating hours not later than after three years (oil temperature 70 to 80 °C)	16000 operating hours not later than after three years (oil temperature 70 to 80 °C)
Fuchs	Fuchs Renolin CLP 460	Fuchs Renolin Unisyn CLP 320	bremer & leguil Cassida Fluid GL 220
Klüber	Klüberoil GEM1-460 N	Klübersynth GEM4-320 N	Klüberoil 4 UH1-220 N
Shell	Shell Omala S2 G 460	Shell Omala S4 GX HD 320	

► Please contact your Lenze sales office if you are operating at ambient temperatures in areas up to< -20 °C bzw. > or up to +40°C.

Functions and features

Surface and corrosion protection

For optimum protection of geared motors against ambient conditions, the surface and corrosion protection system (OKS) offers tailor-made solutions.

Various surface coatings combined with other protective measures ensure that the geared motors operate reliably even at high air humidity, in outdoor installations or in the presence of atmospheric impurities. Any colour from the RAL Classic collection can be chosen for the top coat. The geared motors are also available unpainted (no surface and corrosion protection).

Surface and corrosion protection system	Applications	Measures
	Catalogue text	Catalogue text
OKS-G (primed)	• Dependent on subsequent top coat applied	• 2K PUR priming coat (grey) • Zinc-coated screws • Rust-free breather elements Optional measures • Stainless steel nameplate
OKS-S (small)	• Standard applications • Internal installation in heated buildings • Air humidity up to 90%	• Surface coating as per corrosivity category C1 (in line with EN 12944-2) • Zinc-coated screws • Rust-free breather elements Optional measures • Stainless steel nameplate
OKS-M (medium)	• Internal installation in non-heated buildings • Covered, protected external installation • Air humidity up to 95%	• Surface coating as per corrosivity category C2 (in line with EN 12944-2) • Zinc-coated screws • Rust-free breather elements Optional measures • Stainless steel shaft • Stainless steel nameplate • Rust-free shrink disc (on request)
OKS-L (high)	• External installation • Air humidity above 95% • Chemical industry plants • Food industry	• Surface coating as per corrosivity category C3 (in line with EN 12944-2) • Blower cover and B end shield additionally primed • Cable glands with gaskets • Corrosion-resistant brake with cover ring, stainless friction plate, and chrome-plated armature plate (on request) • All screws/screw plugs zinc-coated • Stainless breather elements • Threaded holes that are not used are closed by means of plastic plugs Optional measures • Sealed recesses on motor (on request) • Stainless steel shaft • Stainless steel nameplate • Rust-free shrink disc (on request) • Additional priming coat on cast iron fan • Oil expansion tank and torque plates painted separately and supplied loose

Functions and features

Structure of surface coating

Surface and corrosion protection system	Corrosivity category	Surface coating	Colour
	DIN EN ISO 12944-2	Structure	
Without OKS (uncoated)		Dipping primed gearbox	
OKS-G (primed)		Dipping primed gearbox 2K PUR priming coat	
OKS-S (small)	Comparable to C1	Dipping primed gearbox 2K-PUR top coat	Standard: RAL 7012 Optional: RAL Classic
OKS-M (medium)	Comparable to C2	Dipping primed gearbox 2K PUR priming coat 2K-PUR top coat	Standard: RAL 7012 Optional: RAL Classic
OKS-L (high)	Comparable to C3	Dipping primed gearbox 2K PUR priming coat 2K-PUR top coat	Standard: RAL 7012 Optional: RAL Classic

Functions and features

Ventilation

Non-ventilated gearboxes
No ventilation is required for gearbox GKS04.

Gearboxes that may optionally be equipped with ventilation
Special measures are not usually required when using the GST05 gearbox. In borderline cases, e.g. at input speeds > 2000 r/min, we recommend the use of breather elements, which we can supply if required.

Ventilated gearboxes
Gearboxes GKS06 to 14 are supplied with breather elements as standard.

Special measures for mounting position C (motor on top)
We recommend that an oil compensation reservoir is always used with gearbox sizes G□□09 to 14 in this mounting position. This reservoir can be purchased as an option. For illustrations and measures, please refer to the Accessories chapter.

This is not required at higher ratios or low input speeds. Please contact Lenze for confirmation in this case.

Dimensioning

General information about the data provided in this catalogue

The powers, torques and speeds specified in this catalogue are rounded values and are valid under the following conditions:

- Operating time/day = 8 h (100% OT)
- Duty class I for up to 10 switching operations/h
- Mounting positions and designs in this catalogue
- Standard lubricant
- T_{amb} = 20 °C for gearboxes,
  T_{amb} = 40 °C for motors (in accordance with EN 60034)
- Site altitude < = 1000 m amsl
- The selection tables provide the permissible mechanical powers and torques. For notes on the thermal power limit, see chapter drive dimensioning.
- The rated power specified for motors and geared motors applies to operating mode S1 (in accordance with EN 60034).

Under different operating conditions, the values obtained may vary from those listed here.
In the case of extreme operating conditions, please consult your Lenze sales office.

Dimensioning

Thermal power limit

The thermal power limit, defined by the heat balance, limits the permissible gearbox continuous power. It may be less than the mechanical power ratings listed in the selection tables.

The thermal power limit 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
- the ambient conditions: temperature, air circulation, input or dissipation via shafts and the foundation

Please consult your Lenze sales office
- if the following input speeds n_1 are exceeded on a continuous basis (continuous is defined as more than 8 h/day):

Motor frame size	Mounting position A, B, E, F	Mounting position C, D
063 ... 100	3000 r/min	3000 r/min
112 ... 132	3000 r/min	1500 r/min
160 ... 225	2000 r/min	1500 r/min

- if the following input speeds n_1 are exceeded:

Motor frame size	Mounting position A, B, E, F	Mounting position C, D
063 ... 100	4000 r/min	3000 r/min
112 ... 132	4000 r/min	2000 r/min
160 ... 225	3000 r/min	1500 r/min

- or if you are using the following gearbox type, size and ratio combinations at an input speed of n_1 > 1500 r/min:

Gearbox type	Gearbox size	Ratio i
GKS helical-bevel gearbox	07, 09, 11, 14	≤ 25

Possible ways of extending the application area

- synthetic lubricant (option)
- shaft sealing rings made from FP material/Viton (option)
- reduction in lubricant quantity
- cooling of the geared motor by means of air convection on the machine/system

Dimensioning

Load capacity and application factor

Load capacity c of gearbox
Rated value for the load capacity of Lenze geared motors.
- c is the ratio of the permissible rated torque of the gearbox to the rated torque supplied by the drive component (e.g. the built-in Lenze motor).
- The value of c must always be greater than the value of the application factor k calculated for the application.

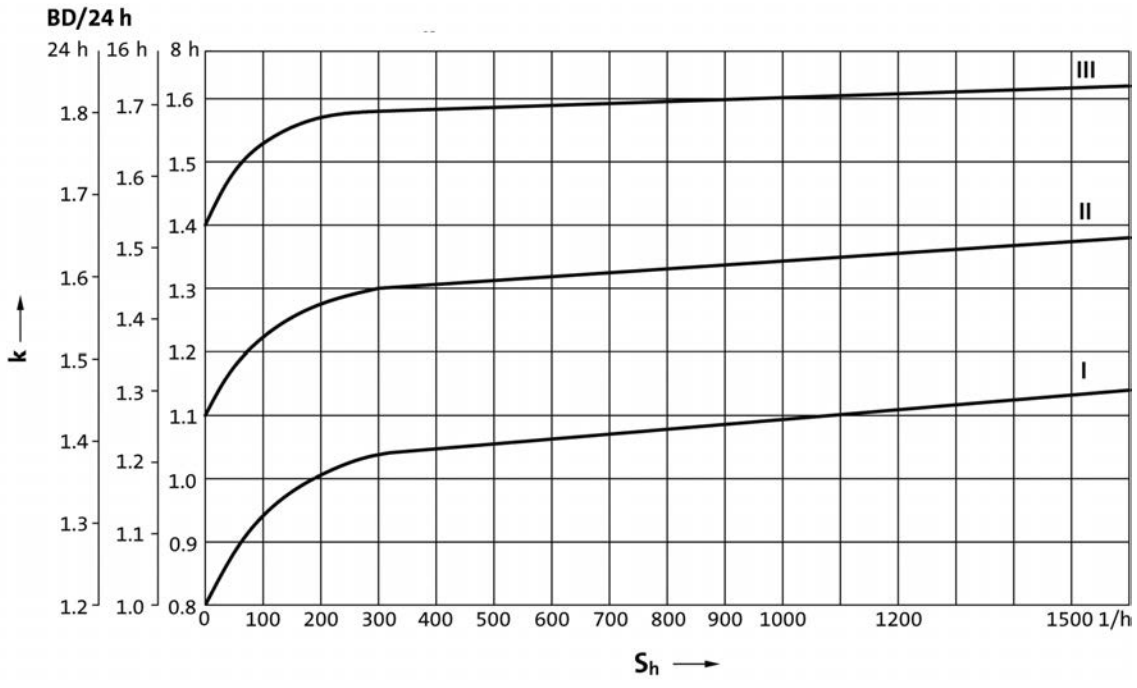
Requierement: c ≥ k

Application factor k (according to DIN 3990)
Takes into account the influence of temporally variable loads which are actually present during the anticipated operating time of gearboxes and geared motors.
k is determined by:
- the type of load
- the load intensity
- temporal influences

Duty class	Load type	Intensity	
I	Smooth operation, small or light jolts	$F_I \leq 1.25$	$F_I = \frac{\frac{J_L}{i^2} + J_M + J_B + J_Z}{J_M + J_B + J_Z}$
II	Uneven operation, average jolts	$1.25 < F_I \leq 4$	
III	Uneven operation, severe jolts and/or alternating load	$F_I > 4$	

J_L= moment of inertia of the load
i = gearbox ratio
J_M= moment of inertia of the motor
J_B= moment of inertia of the motor brake
J_Z= moment of inertia of additional built-on motor accessories

Application factor (inverter operation)



S_h= switching operations/hour

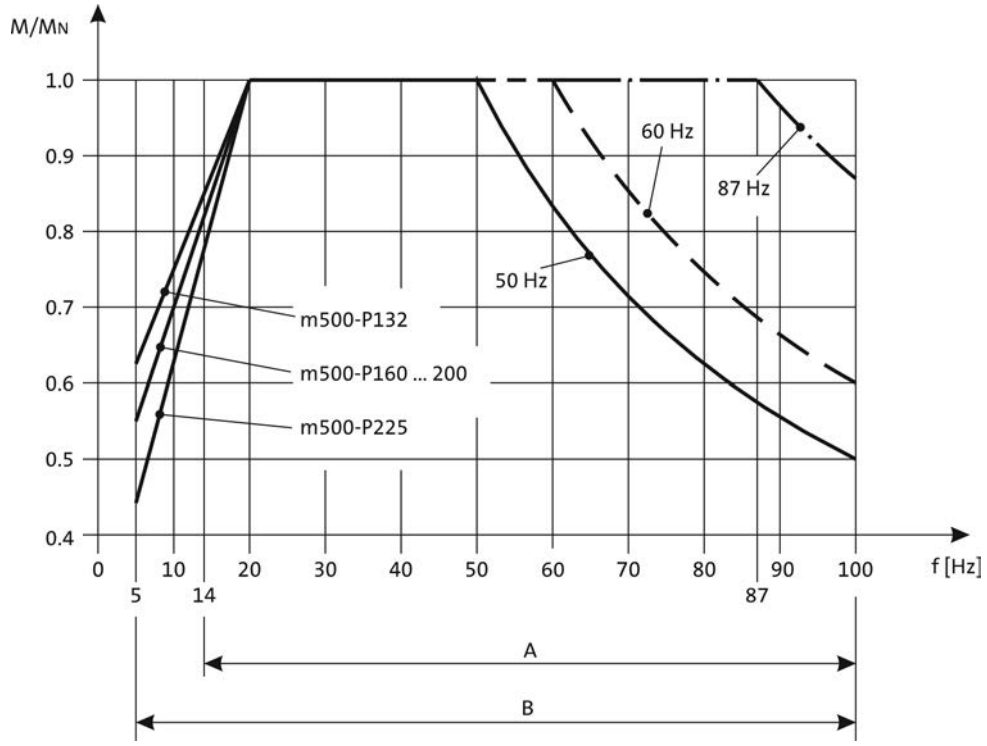
Dimensioning

Torque derating at low motor frequencies

During operation with the rated torque at low speeds (< 20 Hz), the integral fan does not rotate fast enough anymore to ensure sufficient cooling of the motor. In order to prevent overheating, operation without a blower requires a torque reduction of the motor.
The blower cools the motor steadily and irrespective of the motor speed. A torque reduction is not required and the motor can be actuated with its rated torque from 5 Hz to the rated frequency.

The diagram shows the motor frame size-dependent torque reduction for self-ventilated motors, taking the thermal behaviour during actuation of the inverter into consideration.

Torque characteristics



A = Operation with integral fan and brake
B = Operation with integral fan and brake control "Holding current reduction"

You can use the Drive Solution Designer for precise drive dimensioning.

6.4

The Drive Solution Designer helps you to carry out a fast and high-quality drive dimensioning.
The software includes well-founded and proven knowledge on drive applications and electro-mechanical drive components.

Please contact your Lenze sales office.

Dimensioning

Notes on the selection tables

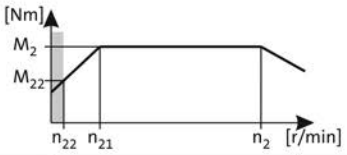
The selection tables show the available combinations of gearbox type, number of stages, ratio and motor. They are used only to provide basic orientation.
The following legend indicates the structure of the selection tables.

Rated power Prated of the drive motor depending on the rated frequency

50 Hz: P_N = 5.5 kW
87 Hz: P_N = 9.6 kW

3-stufige Getriebe ← **Number of the gear stage of the gearbox**

Torque diagram



Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GKS	m500	
245	204	2.3	24	126	101	204	245	204	2.3				5.955	GKS07	-P132M4	53
225	222	1.2	22	137	93	222	225	222	1.2	390	224	1.0	6.485	GKS06	-P132M4	49

Product Gearbox
Product Motor
Ratio i
Page number for dimensions

Load capacity c of the gearbox
c is the ratio between the permissible rated torque of the gearbox and the rated torque of the three-phase AC motor (converted to the driven shaft).
c must be always higher than the service factor **k** determined for the application **k**.

$$c = \frac{M_{2,zul}}{M_{1N} \cdot i \cdot \eta_{Getr}} > k$$

Mains operation
Output speed **n2**
Output torque **M2**

Inverter operation
The speed and torque data are valid for self-ventilated and forced ventilated drives. Forced ventilated drives can always output the torque **M2** in the entire setting ranges. In the case of self-ventilated drives, a reduction to **M22** is required in the lower speed range.

The following applies to self-ventilated geared motors:
n22 is the minimum speed where the torque **M22** is permissible, from **n21** to **n2**, the maximum torque is **M2**
The following applies to forced ventilated geared motors:
From the minimum speed **n22** to **n2**, the maximum torque is **M2**

Motor voltages

The power values and torques indicated in the selection tables refer to the following motor voltages:
- 50 Hz : Δ 230 V / Y 400 V
- 87 Hz : 400 V

Notes on ordering

We want to be sure that you receive the correct products in good time.

To allow us to achieve this we need:
- your address and your company data
- our product key for the individual products in this catalogue
- your delivery date and delivery address

Ordering procedure
Please use the ordering information checklist to ensure that you provide all the ordering information required for the various products.

The ordering information checklist, the product key, the basic versions, options, mounting position and position of the system blocks will be found in the General – Product key section.

A list of Lenze's worldwide sales offices can be found on the Internet: www.Lenze.com.

Ordering details checklist

☐ **Offer**

Page __ of __

☐ **Order**

Customer No.

Job No.

Fax No. _____

Sender

Company _____ Made out by (name) _____

Street/P.O. Box _____ Department _____

P.O. Box, City _____ Telephone No. _____

Date _____ Signature _____

Delivery address (if different)

Street/P.O. Box _____ Desired delivery date _____

P.O. Box, City _____ Dispatching notes _____

Invoice recipient (if different)

Street/P.O. Box _____

Postal code, City _____

6.4

Ordering details checklist

Customer No. ☐☐☐☐☐☐☐☐

Job No. ☐☐☐☐☐☐☐☐☐☐

Page __

Quantity ☐☐☐☐

Efficiency class ☐ High efficiency (IE3)

Rated frequency ☐ 50 Hz ☐ 60 Hz ☐ 87 Hz

Ratio i ☐☐☐☐

GKS ☐☐ – ☐ 3 / 4 ☐ M / E ☐ V / H / S ☐ A / B ☐ R / K

Motor frame size ☐☐☐C☐☐

Hollow shaft d = ☐☐☐ mm

Flange a_2 = ☐☐☐ mm

Mounting position A ☐ B ☐ C ☐ D ☐ E ☐ F ☐

Position of system blocks

Shaft/shrink disc				Flange				Terminal box			
0	3	4	8	0	3	5	8	2	3	4	5
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Surface and corrosion protection ☐ OKS-S colour: RAL 7012 ☐ OKS-G (primed)

Options

Special lubricants ☐ CLP HC 320 (synthetic) ☐ CLP HC 220 USDA H1 (for the food industry)

Surface and corrosion protection ☐ OKS-S (small) ☐ OKS-M (medium) RAL ☐☐☐☐ ☐ OKS-L (high) ☐ OKS-G (primed)

Accessories ☐ Torque support for housing foot ☐ Torque support for threaded pitch circle ☐ 2nd output shaft end ☐ Mounting set for hollow-shaft circlip ☐ Shrink disc cover ☐ Hollow shaft cover, hoseproof

Shaft sealing rings ☐ Viton

Breathing ☐ Breather elements for GKS05 ☐ Compensation reservoir in mounting position for GKS09 ... 14-3

Ordering details checklist

Three-phase AC motors options

Customer No. ☐☐☐☐☐☐☐☐

Job No. ☐☐☐☐☐☐☐☐☐☐

Page __

Motor connection

Terminal box
- ☐ with plug-in connector ICN 6-pin. Adhere to permissible rated motor current 20 A!
- ☐ with plug-in connector ICN 8-pin. Adhere to permissible rated motor current 20 A!
- ☐ with plug-in connector HAN10E. Adhere to permissible rated current 16 A!
- ☐ with plug-in connector HAN-Modular. Adhere to permissible rated current 16 / 40 A!

Cable entry — in position 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

Blower

☐ 1~ ☐ 3~

☐ Terminal box with plug-in connector ICN

Terminal box position 2 ☐ 3 ☐ 4 ☐ 5 ☐

Spring-applied brake

Brake version ☐ Standard

Brake size ☐

Characteristic torque ☐ Nm

Rated voltage AC ☐ DC ☐ ☐ V

Rectifier — Only in the case of AC supply voltage

- ☐ Half-wave rectifier
- ☐ Bridge rectifier
- ☐ Bridge/half-wave rectifier (overexcitation)
- ☐ Bridge/half-wave rectifier (holding current reduction)

Brake options — Manual release lever in position 2 ☐ 3 ☐ 4 ☐ 5 ☐

☐ Low-noise version (Standard in the case of brake with speed/position encoder)

6.4

Ordering details checklist

Three-phase AC motors options

Customer No. ☐☐☐☐☐☐☐☐

Job No. ☐☐☐☐☐☐☐☐☐☐

Page __

Speed/position encoder

Resolver ☐ RS1

Incremental encoder HTL ☐ IG128-24V-H ☐ IG512-24V-H ☐ IG1024-24V-H ☐ IG2048-24V-H

Incremental encoder TTL ☐ IG512-5V-T ☐ IG1024-5V-T ☐ IG2048-5V-T

Feedback with ICN connector ☐ IG128-24V-H not possible with plug-in connector!

Motor protection

☐ TKO ☐ KTY 83-110 ☐ KTY 84-130

☐ PTC

Further options

☐ 2nd nameplate (adhesive nameplate/metal nameplate)

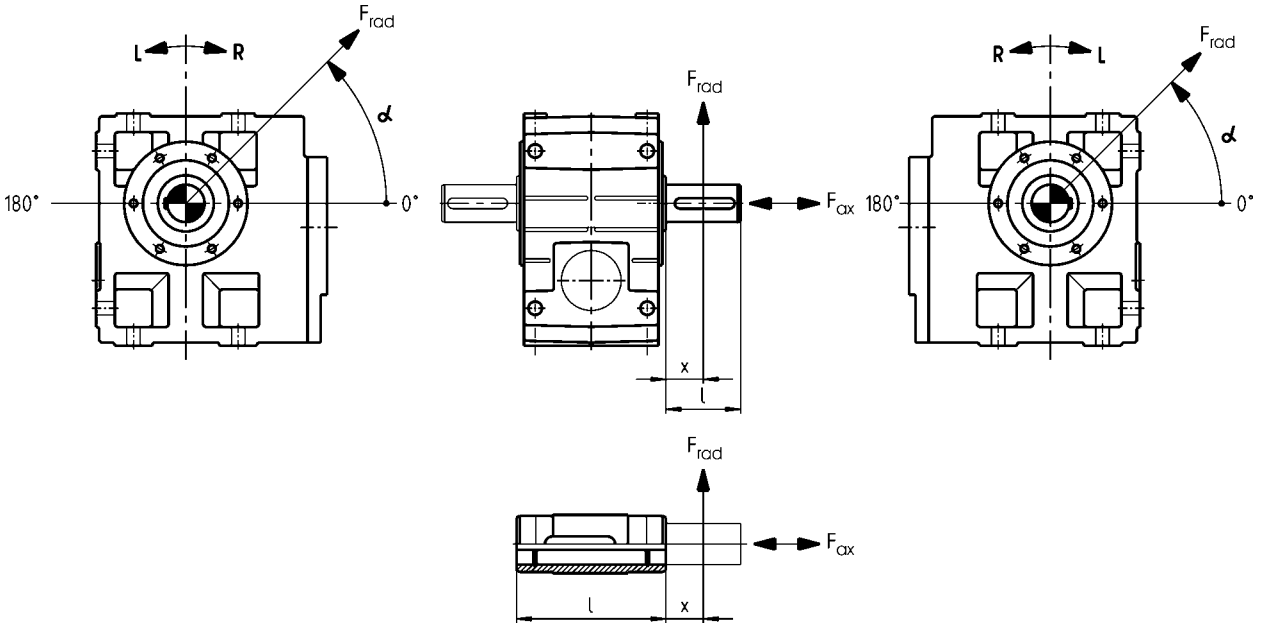
Permissible radial and axial forces at output

Permissible radial force
$F_{rad,per} = \min(f_w \times f_\alpha \times F_{rad,max}$; $f_w \times F_{rad,max}$ at $n_2 \leq 16$ r/min)

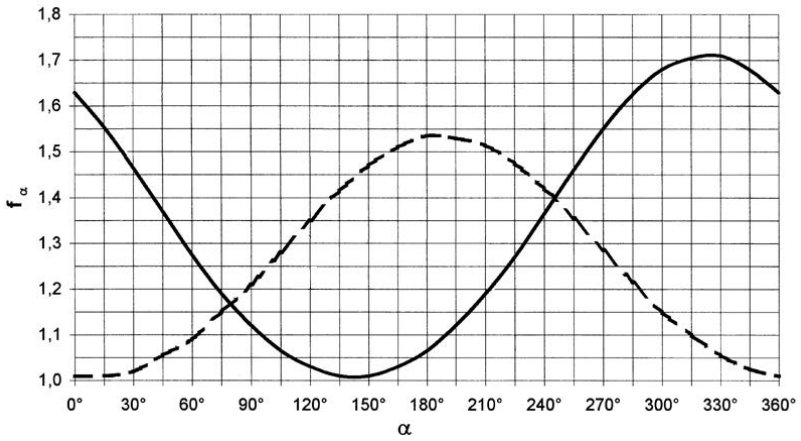
Permissible axial force
$F_{ax,per} = F_{ax,max}$ if $F_{rad} = 0$

If F_{rad} **and** $F_{ax} \neq 0$, please contact your Lenze sales office.

Application of forces



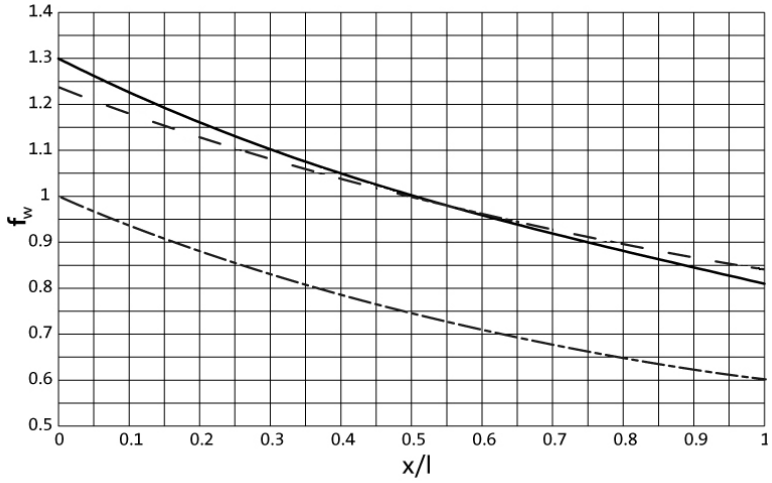
Effective direction factor f_α at output shaft



——— Direction of rotation R
— — — Direction of rotation L

Permissible radial and axial forces at output

Additional load factor f_w at output shaft



——— Solid shaft (V□□)
— · — Hollow shaft (H□□)
— — — Solid shaft with flange (V□K)

GKS□□-3/4□ H□□

Size	n_2 [r/min]								
Gearbox	630	400	250	160	100	63	40	25	≤16

	Max. radial force, Hollow shaft								
	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GKS04	3100	3900	4500	5100	5900	6800	7000	7000	7000
GKS05	2400	3500	4200	4630	5000	6200	7300	7300	7300
GKS06	3000	4600	5600	6400	7000	8200	10400	12000	12000
GKS07		5400	6300	7400	8700	10500	12500	15100	16000
GKS09		7500	8200	9400	10600	12200	15500	21000	24000
GKS11		9000	10000	11000	14000	16000	18500	25000	30000
GKS14		15000	15500	16500	17500	18500	21000	28000	40000

	Max. axial force, Hollow shaft								
	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GKS04	3300	4200	5000	5500	5500	5500	5500	5500	5500
GKS05	2800	3500	4240	5090	6160	6600	6600	6600	6600
GKS06	3500	4440	5580	6930	8710	10000	10000	10000	10000
GKS07		4900	6230	7820	9940	12600	14000	14000	14000
GKS09		6500	7400	8000	10500	13000	17000	21000	21000
GKS11		7000	8000	9200	12000	14500	18500	27000	27000
GKS14		6000	8000	10000	13000	16000	20000	28000	35000

- Application of force F_{rad}: at hollow shaft end face (x = 0)
- $F_{ax,max}$ only valid with F_{rad} = 0
- Neither radial nor axial forces are permissible for the hollow shaft with shrink disc (S□□).

Permissible radial and axial forces at output

GKS□□-3/4□ V□R

Size	n_2 [r/min]								
Gearbox	630	400	250	160	100	63	40	25	≤16

	Max. radial force, Solid shaft without flange								
	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GKS04	2400	3000	3400	3600	3600	3600	3600	3600	3600
GKS05	2200	2800	3200	3600	4100	4900	5800	5800	5800
GKS06	2700	3700	4300	4900	5300	6200	7900	9000	9000
GKS07		4000	4900	5800	6600	8000	9600	12000	12000
GKS09 [1]		6200	6400	7100	8400	9500	11800	16000	18000
GKS11 [1]		7100	7500	8200	10000	11200	13000	19000	23000
GKS14		57900	61000	64100	65000	65000	65000	65000	65000

	Max. axial force, Solid shaft without flange								
	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GKS04	3300	4200	5000	5500	5500	5500	5500	5500	5500
GKS05	2800	3500	4240	5090	6160	6600	6600	6600	6600
GKS06	3500	4440	5580	6930	8710	10000	10000	10000	10000
GKS07		4900	6230	7820	9940	12600	14000	14000	14000
GKS09 [1]		6500	7400	8000	10500	13000	17000	21000	21000
GKS11 [1]		7000	8000	9200	12000	14500	18500	27000	27000
GKS14		35000	35000	35000	35000	35000	35000	35000	35000

[1] Reinforced output shaft bearings are available on request for V□R versions.

- Application of force F_{rad}: centre of shaft journal (x = l/2)
- $F_{ax,max}$ only valid with F_{rad} = 0

Permissible radial and axial forces at output

GKS□□-3/4□ V□K

Size	n_2 [r/min]								
Gearbox	630	400	250	160	100	63	40	25	≤16

	Max. radial force, Solid shaft with flange								
	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$	$F_{rad,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GKS04	3100	3800	4300	4600	4600	4600	4600	4600	4600
GKS05	3800	4640	5420	6280	7000	7000	7000	7000	7000
GKS06	4700	6400	7500	8800	9800	10000	10000	10000	10000
GKS07		7000	8250	9630	11000	13000	14000	14000	14000
GKS09		9900	10500	12000	14000	15000	15000	15000	15000
GKS11		14500	16000	17600	21000	24500	28000	30000	30000
GKS14		20500	23700	27200	31300	35000	41000	43000	43000

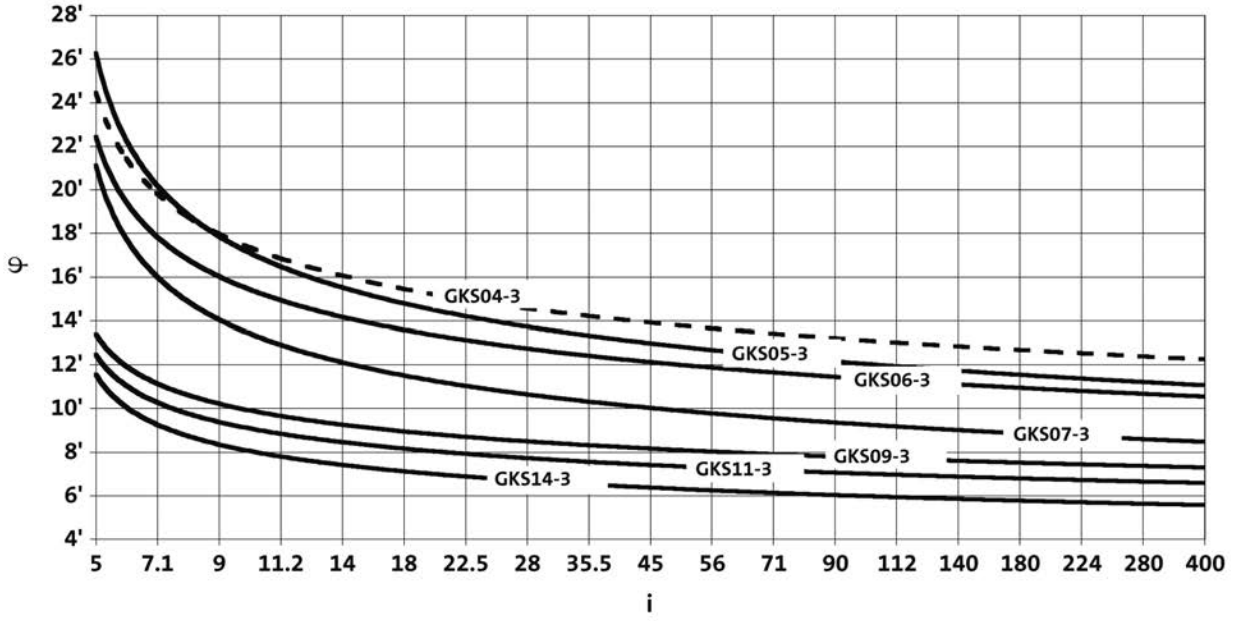
	Max. axial force, Solid shaft with flange								
	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GKS04	3300	4200	4400	4400	4400	4400	4400	4400	4400
GKS05	2900	3630	4440	5420	6600	6600	6600	6600	6600
GKS06	3700	4660	5880	7320	9230	10000	10000	10000	10000
GKS07		5700	7000	8500	10400	11500	11500	11500	11500
GKS09		6000	6600	7600	10000	12000	15000	17000	17000
GKS11		7000	7500	8500	10500	13000	17500	27000	27000
GKS14		8400	10000	11500	13000	15000	19000	28000	35000

- Application of force F_{rad}: centre of shaft journal (x = l/2)
- $F_{ax,max}$ only valid with F_{rad} = 0

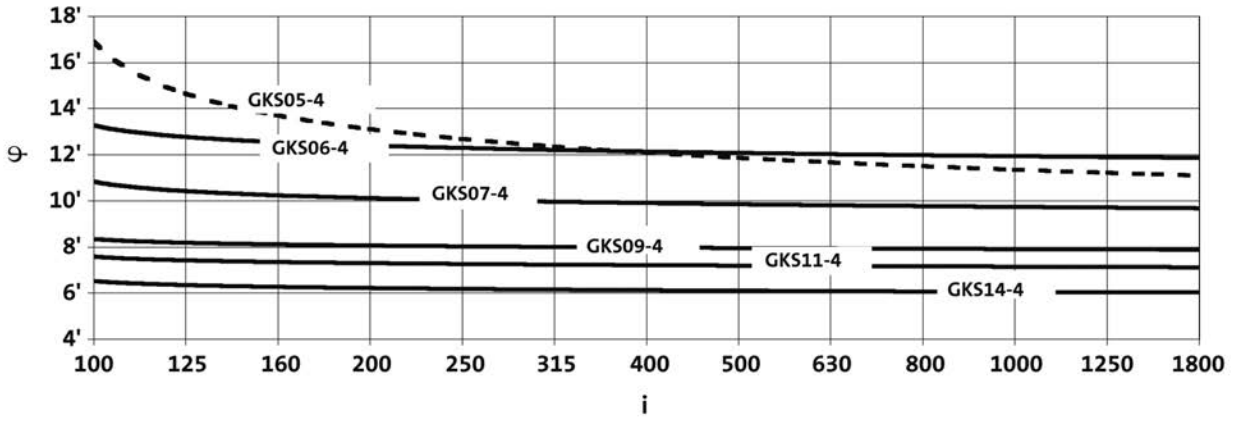
Output backlash in angular minutes

► Backlash ϕ depending on ratio i

GKS04 to 14-3



GKS05 to 14-4



6.4

Moments of inertia

GKS□□-3

► Moment of inertia (J) depending on ratio i

Gearbox			GKS04
5.123	J	[kgcm²]	1.170
7.025	J	[kgcm²]	0.676
8.167	J	[kgcm²]	0.863
8.991	J	[kgcm²]	0.444
11.730	J	[kgcm²]	0.729
13.067	J	[kgcm²]	0.701
14.333	J	[kgcm²]	0.346
16.087	J	[kgcm²]	0.443
17.920	J	[kgcm²]	0.428
20.588	J	[kgcm²]	0.302
22.522	J	[kgcm²]	0.262
25.088	J	[kgcm²]	0.254
28.727	J	[kgcm²]	0.182
32.000	J	[kgcm²]	0.177
35.191	J	[kgcm²]	0.136
39.200	J	[kgcm²]	0.132
44.240	J	[kgcm²]	0.090
50.943	J	[kgcm²]	0.181
56.976	J	[kgcm²]	0.061
64.978	J	[kgcm²]	0.132
72.210	J	[kgcm²]	0.040
79.598	J	[kgcm²]	0.103
90.491	J	[kgcm²]	0.027
100.067	J	[kgcm²]	0.069
111.467	J	[kgcm²]	0.069
128.874	J	[kgcm²]	0.048
143.556	J	[kgcm²]	0.048
163.332	J	[kgcm²]	0.032
181.939	J	[kgcm²]	0.032
204.682	J	[kgcm²]	0.022
228.000	J	[kgcm²]	0.022
269.660	J	[kgcm²]	0.014
300.381	J	[kgcm²]	0.014

Gearbox			GKS05
6.863	J	[kgcm²]	1.900
9.412	J	[kgcm²]	1.170
10.569	J	[kgcm²]	1.600
11.667	J	[kgcm²]	1.647
13.176	J	[kgcm²]	0.711
14.494	J	[kgcm²]	1.045
16.000	J	[kgcm²]	1.040
17.054	J	[kgcm²]	1.505
19.216	J	[kgcm²]	1.474
23.388	J	[kgcm²]	0.964
26.353	J	[kgcm²]	0.948
29.931	J	[kgcm²]	0.674
32.744	J	[kgcm²]	0.584
36.894	J	[kgcm²]	0.576
41.765	J	[kgcm²]	0.419
47.059	J	[kgcm²]	0.414
51.162	J	[kgcm²]	0.321
57.647	J	[kgcm²]	0.317
66.592	J	[kgcm²]	0.200
75.033	J	[kgcm²]	0.198
82.833	J	[kgcm²]	0.145
93.333	J	[kgcm²]	0.144
107.196	J	[kgcm²]	0.091
120.784	J	[kgcm²]	0.091
130.097	J	[kgcm²]	0.067
146.588	J	[kgcm²]	0.066
166.276	J	[kgcm²]	0.043
187.353	J	[kgcm²]	0.042
211.200	J	[kgcm²]	0.081
227.484	J	[kgcm²]	0.060
256.320	J	[kgcm²]	0.060
290.745	J	[kgcm²]	0.038
327.600	J	[kgcm²]	0.038

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.

Moments of inertia

GKS□□-3

► Moment of inertia (J) depending on ratio i

Gearbox			GKS06
6.485	J	[kgcm²]	5.870
9.196	J	[kgcm²]	5.048
10.147	J	[kgcm²]	4.858
11.382	J	[kgcm²]	2.492
12.612	J	[kgcm²]	3.199
14.824	J	[kgcm²]	4.287
16.699	J	[kgcm²]	4.163
17.809	J	[kgcm²]	2.126
20.329	J	[kgcm²]	2.794
22.902	J	[kgcm²]	2.729
26.017	J	[kgcm²]	1.941
28.461	J	[kgcm²]	1.666
32.063	J	[kgcm²]	1.632
36.303	J	[kgcm²]	1.183
41.472	J	[kgcm²]	2.110
44.471	J	[kgcm²]	0.900
53.074	J	[kgcm²]	1.523
57.882	J	[kgcm²]	0.578
65.207	J	[kgcm²]	0.570
72.000	J	[kgcm²]	0.422
81.111	J	[kgcm²]	0.416
93.176	J	[kgcm²]	0.257
104.967	J	[kgcm²]	0.254
113.082	J	[kgcm²]	0.189
127.392	J	[kgcm²]	0.186
142.941	J	[kgcm²]	0.122
161.029	J	[kgcm²]	0.121
190.080	J	[kgcm²]	0.227
214.133	J	[kgcm²]	0.226
230.688	J	[kgcm²]	0.168
259.880	J	[kgcm²]	0.167
291.600	J	[kgcm²]	0.109
328.500	J	[kgcm²]	0.109

Gearbox			GKS07
5.955	J	[kgcm²]	19.300
8.254	J	[kgcm²]	11.800
9.171	J	[kgcm²]	16.000
10.124	J	[kgcm²]	15.882
11.378	J	[kgcm²]	7.019
12.711	J	[kgcm²]	10.164
14.798	J	[kgcm²]	14.306
16.674	J	[kgcm²]	13.965
17.270	J	[kgcm²]	7.258
20.511	J	[kgcm²]	9.084
23.111	J	[kgcm²]	8.906
25.244	J	[kgcm²]	6.716
28.274	J	[kgcm²]	5.567
31.858	J	[kgcm²]	5.473
36.063	J	[kgcm²]	3.650
40.906	J	[kgcm²]	6.934
44.178	J	[kgcm²]	2.779
50.345	J	[kgcm²]	5.298
57.501	J	[kgcm²]	1.748
64.790	J	[kgcm²]	1.725
70.474	J	[kgcm²]	1.295
79.407	J	[kgcm²]	1.280
92.563	J	[kgcm²]	0.808
104.296	J	[kgcm²]	0.799
112.338	J	[kgcm²]	0.592
126.578	J	[kgcm²]	0.586
140.548	J	[kgcm²]	1.113
158.364	J	[kgcm²]	1.113
184.600	J	[kgcm²]	0.687
208.000	J	[kgcm²]	0.685
224.037	J	[kgcm²]	0.510
252.436	J	[kgcm²]	0.509
283.193	J	[kgcm²]	0.330
319.091	J	[kgcm²]	0.329

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.

Moments of inertia

GKS□□-3

► Moment of inertia (J) depending on ratio i

Gearbox			GKS09
12.283	J	[kgcm²]	34.200
13.360	J	[kgcm²]	33.400
16.122	J	[kgcm²]	22.600
17.536	J	[kgcm²]	22.200
19.541	J	[kgcm²]	30.600
22.022	J	[kgcm²]	29.900
25.649	J	[kgcm²]	20.500
29.228	J	[kgcm²]	15.900
32.940	J	[kgcm²]	15.600
35.193	J	[kgcm²]	12.200
39.662	J	[kgcm²]	12.000
43.146	J	[kgcm²]	9.000
48.625	J	[kgcm²]	8.870
58.456	J	[kgcm²]	5.540
65.879	J	[kgcm²]	5.470
70.982	J	[kgcm²]	4.140
79.996	J	[kgcm²]	4.100
91.860	J	[kgcm²]	2.630
103.524	J	[kgcm²]	2.610
111.484	J	[kgcm²]	1.920
125.641	J	[kgcm²]	1.900
140.921	J	[kgcm²]	1.260
158.816	J	[kgcm²]	1.250
182.000	J	[kgcm²]	2.250
205.111	J	[kgcm²]	2.240
220.882	J	[kgcm²]	1.660
248.930	J	[kgcm²]	1.650
279.205	J	[kgcm²]	1.100
314.659	J	[kgcm²]	1.100

Gearbox			GKS11
12.094	J	[kgcm²]	104.000
13.154	J	[kgcm²]	101.000
15.874	J	[kgcm²]	68.000
17.265	J	[kgcm²]	66.500
19.515	J	[kgcm²]	90.300
21.989	J	[kgcm²]	90.400
25.615	J	[kgcm²]	61.200
28.021	J	[kgcm²]	52.200
31.573	J	[kgcm²]	51.300
35.741	J	[kgcm²]	36.800
40.272	J	[kgcm²]	36.200
43.783	J	[kgcm²]	27.900
49.333	J	[kgcm²]	27.500
57.683	J	[kgcm²]	17.700
64.995	J	[kgcm²]	17.500
70.887	J	[kgcm²]	13.000
79.873	J	[kgcm²]	12.900
91.737	J	[kgcm²]	8.300
103.365	J	[kgcm²]	8.210
111.335	J	[kgcm²]	6.050
125.448	J	[kgcm²]	5.990
140.732	J	[kgcm²]	3.960
158.571	J	[kgcm²]	3.930
186.572	J	[kgcm²]	7.070
210.222	J	[kgcm²]	7.050
226.431	J	[kgcm²]	5.210
255.133	J	[kgcm²]	5.200
286.219	J	[kgcm²]	3.440
322.500	J	[kgcm²]	3.430

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.

Moments of inertia

GKS□□-3

► Moment of inertia (J) depending on ratio i

Gearbox			GKS14
12.435	J	[kgcm²]	283.000
13.525	J	[kgcm²]	275.000
16.646	J	[kgcm²]	198.000
18.311	J	[kgcm²]	173.000
20.065	J	[kgcm²]	249.000
22.609	J	[kgcm²]	243.000
24.696	J	[kgcm²]	183.000
27.165	J	[kgcm²]	159.000
30.609	J	[kgcm²]	156.000
34.692	J	[kgcm²]	111.000
39.089	J	[kgcm²]	109.000
42.531	J	[kgcm²]	82.400
47.923	J	[kgcm²]	81.100
56.251	J	[kgcm²]	54.200
63.382	J	[kgcm²]	53.500
68.942	J	[kgcm²]	38.900
77.681	J	[kgcm²]	38.400
90.551	J	[kgcm²]	25.100
102.029	J	[kgcm²]	24.900
109.896	J	[kgcm²]	18.300
123.826	J	[kgcm²]	18.100
138.913	J	[kgcm²]	12.000
156.522	J	[kgcm²]	11.900
186.572	J	[kgcm²]	21.600
210.222	J	[kgcm²]	21.500
226.431	J	[kgcm²]	15.900
255.133	J	[kgcm²]	15.800
286.219	J	[kgcm²]	10.500
322.500	J	[kgcm²]	10.500

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.

Moments of inertia

GKS□□-4

► Moment of inertia (J) depending on ratio i

Gearbox			GKS05
95.238	J	[kgcm²]	0.143
114.987	J	[kgcm²]	0.196
126.933	J	[kgcm²]	0.196
146.667	J	[kgcm²]	0.142
161.905	J	[kgcm²]	0.141
185.547	J	[kgcm²]	0.195
209.067	J	[kgcm²]	0.195
225.867	J	[kgcm²]	0.073
236.667	J	[kgcm²]	0.141
289.917	J	[kgcm²]	0.108
326.667	J	[kgcm²]	0.108
364.467	J	[kgcm²]	0.073
410.667	J	[kgcm²]	0.073
469.389	J	[kgcm²]	0.050
510.000	J	[kgcm²]	0.023
528.889	J	[kgcm²]	0.050
594.894	J	[kgcm²]	0.033
670.303	J	[kgcm²]	0.033
820.760	J	[kgcm²]	0.050
924.800	J	[kgcm²]	0.050
1040.215	J	[kgcm²]	0.033
1172.073	J	[kgcm²]	0.033
1303.560	J	[kgcm²]	0.023
1468.800	J	[kgcm²]	0.023
1717.389	J	[kgcm²]	0.014
1935.086	J	[kgcm²]	0.014

Gearbox			GKS06
103.721	J	[kgcm²]	0.300
113.205	J	[kgcm²]	0.234
127.059	J	[kgcm²]	0.264
140.816	J	[kgcm²]	0.213
155.647	J	[kgcm²]	0.191
174.336	J	[kgcm²]	0.112
202.588	J	[kgcm²]	0.168
224.524	J	[kgcm²]	0.074
252.000	J	[kgcm²]	0.155
279.286	J	[kgcm²]	0.069
316.800	J	[kgcm²]	0.102
361.429	J	[kgcm²]	0.064
408.000	J	[kgcm²]	0.068
458.067	J	[kgcm²]	0.042
517.091	J	[kgcm²]	0.044
555.927	J	[kgcm²]	0.041
640.800	J	[kgcm²]	0.062
696.668	J	[kgcm²]	0.028
812.137	J	[kgcm²]	0.040
914.907	J	[kgcm²]	0.040
1017.741	J	[kgcm²]	0.028
1146.529	J	[kgcm²]	0.028
1340.834	J	[kgcm²]	0.017
1510.507	J	[kgcm²]	0.017

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.

Moments of inertia

GKS□□-4

► Moment of inertia (J) depending on ratio i

Gearbox			GKS07
103.039	J	[kgcm²]	0.837
112.391	J	[kgcm²]	0.632
126.222	J	[kgcm²]	0.729
137.748	J	[kgcm²]	0.571
154.622	J	[kgcm²]	0.527
179.201	J	[kgcm²]	0.283
201.254	J	[kgcm²]	0.454
222.909	J	[kgcm²]	0.199
246.659	J	[kgcm²]	0.417
273.199	J	[kgcm²]	0.184
321.049	J	[kgcm²]	0.256
358.829	J	[kgcm²]	0.169
399.353	J	[kgcm²]	0.182
464.367	J	[kgcm²]	0.106
516.810	J	[kgcm²]	0.113
563.572	J	[kgcm²]	0.101
636.581	J	[kgcm²]	0.161
683.972	J	[kgcm²]	0.074
823.810	J	[kgcm²]	0.101
928.237	J	[kgcm²]	0.101
999.806	J	[kgcm²]	0.073
1126.542	J	[kgcm²]	0.073
1277.842	J	[kgcm²]	0.047
1439.822	J	[kgcm²]	0.047

Gearbox			GKS09
100.551	J	[kgcm²]	2.480
113.320	J	[kgcm²]	2.456
123.275	J	[kgcm²]	2.107
138.929	J	[kgcm²]	2.091
151.012	J	[kgcm²]	1.516
170.188	J	[kgcm²]	1.505
204.596	J	[kgcm²]	1.244
230.577	J	[kgcm²]	1.239
248.439	J	[kgcm²]	1.128
279.986	J	[kgcm²]	1.125
323.365	J	[kgcm²]	0.713
364.427	J	[kgcm²]	0.710
402.234	J	[kgcm²]	0.509
453.311	J	[kgcm²]	0.507
520.538	J	[kgcm²]	0.466
586.638	J	[kgcm²]	0.465
631.744	J	[kgcm²]	0.443
711.965	J	[kgcm²]	0.443
817.551	J	[kgcm²]	0.276
921.367	J	[kgcm²]	0.276
992.209	J	[kgcm²]	0.201
1118.204	J	[kgcm²]	0.201
1254.197	J	[kgcm²]	0.130
1413.461	J	[kgcm²]	0.130

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.

Moments of inertia

GKS□□-4

► Moment of inertia (J) depending on ratio i

Gearbox			GKS11
102.119	J	[kgcm²]	7.276
115.063	J	[kgcm²]	7.205
125.095	J	[kgcm²]	6.233
140.952	J	[kgcm²]	6.186
153.242	J	[kgcm²]	4.500
172.667	J	[kgcm²]	4.469
201.890	J	[kgcm²]	3.735
227.481	J	[kgcm²]	3.717
248.106	J	[kgcm²]	3.355
279.556	J	[kgcm²]	3.343
322.931	J	[kgcm²]	2.088
363.866	J	[kgcm²]	2.081
395.787	J	[kgcm²]	1.521
445.958	J	[kgcm²]	1.517
512.196	J	[kgcm²]	1.385
577.122	J	[kgcm²]	1.382
621.619	J	[kgcm²]	1.314
700.416	J	[kgcm²]	1.312
816.455	J	[kgcm²]	0.819
919.949	J	[kgcm²]	0.818
990.879	J	[kgcm²]	0.600
1116.484	J	[kgcm²]	0.599
1252.516	J	[kgcm²]	0.386
1411.286	J	[kgcm²]	0.385

Gearbox			GKS14
97.467	J	[kgcm²]	23.471
109.822	J	[kgcm²]	23.232
119.493	J	[kgcm²]	19.936
134.640	J	[kgcm²]	19.777
158.039	J	[kgcm²]	16.438
178.072	J	[kgcm²]	16.348
193.754	J	[kgcm²]	12.076
218.315	J	[kgcm²]	12.016
237.467	J	[kgcm²]	10.871
267.568	J	[kgcm²]	10.830
321.729	J	[kgcm²]	6.420
362.512	J	[kgcm²]	6.398
390.671	J	[kgcm²]	4.749
440.193	J	[kgcm²]	4.734
513.121	J	[kgcm²]	4.330
578.164	J	[kgcm²]	4.322
622.742	J	[kgcm²]	4.122
701.681	J	[kgcm²]	4.116
805.901	J	[kgcm²]	2.620
908.058	J	[kgcm²]	2.617
978.071	J	[kgcm²]	1.912
1102.052	J	[kgcm²]	1.909
1236.326	J	[kgcm²]	1.259
1393.043	J	[kgcm²]	1.258

► The moments of inertia relate to the drive shaft of the gearbox.
► The total moment of inertia is calculated by adding the values of the gearbox, motor and accessories.

Weights, 4-pole motors

3-stage gearboxes

				m500					
				-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4
GKS	GKS06	m	[kg]		97				
	GKS07	m	[kg]	135	123				
	GKS09	m	[kg]	184	172		223		
	GKS11	m	[kg]	282	270	332	321		370
	GKS14	m	[kg]	450	438	500	489	538	

4-stage gearboxes

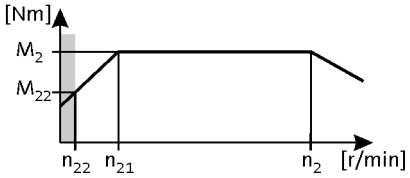
				m500				
				-P132L4	-P132M4	-P160L4	-P160M4	-P180M4
GKS	GKS09	m	[kg]	196	184			
	GKS11	m	[kg]	304	292			
	GKS14	m	[kg]	490	478	540	529	578

► Weights with oil filling for mounting position A; all values are approximate.
The weights relate to the basic version. Bear in mind that additional weights may be needed, e.g. for motor options.

Additional weights for gearboxes

Product	Mass		
	Solid shaft	Shrink disc	Flange
	m	m	m
	[kg]	[kg]	[kg]
GKS06	2.50	1.00	7.00
GKS07	5.00	1.50	11.0
GKS09	8.00	3.00	16.0
GKS11	16.0	5.00	24.0
GKS14	33.0	11.0	33.0

Selection tables, 4-pole motors

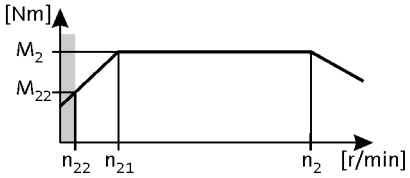


50 Hz: P_N = 5.5 kW
87 Hz: P_N = 9.6 kW

3-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GKS	m500	
245	203	2.3	24	126	101	203	245	203	2.3				5.955	GKS07	-P132M4	50
225	222	1.2	22	137	93	222	225	222	1.2	396	220	1.0	6.485	GKS06	-P132M4	46
177	282	1.9	18	175	73	282	177	282	1.9				8.254	GKS07	-P132M4	50
159	313	2.3	16	194	65	313	159	313	2.3				9.171	GKS07	-P132M4	50
159	314	1.2	16	195	65	314	159	314	1.2				9.196	GKS06	-P132M4	46
144	346	2.3	14	215	59	346	144	346	2.3				10.124	GKS07	-P132M4	50
144	347	1.2	14	215	59	347	144	347	1.2				10.147	GKS06	-P132M4	46
128	389	1.6	13	241	53	389	128	389	1.6				11.378	GKS07	-P132M4	50
115	434	1.9	11	269	47	434	115	434	1.9				12.711	GKS07	-P132M4	50
99	506	2.1	9.8	314	41	506	99	506	2.1				14.798	GKS07	-P132M4	50
99	507	1.2	9.8	314	41	507	99	507	1.2				14.824	GKS06	-P132M4	46
88	570	1.9	8.7	353	36	570	88	570	1.9				16.674	GKS07	-P132M4	50
87	571	1.1	8.7	354	36	571	87	571	1.1				16.699	GKS06	-P132M4	46
85	590	1.7	8.4	366	35	590	85	590	1.7				17.270	GKS07	-P132M4	50
71	701	1.6	7.1	435	29	701	71	701	1.6				20.511	GKS07	-P132M4	50
63	790	1.5	6.3	490	26	790	63	790	1.5				23.111	GKS07	-P132M4	50
58	863	1.4	5.7	535	24	863	58	863	1.4				25.244	GKS07	-P132M4	50
52	966	1.2	5.1	599	21	966	52	966	1.2				28.274	GKS07	-P132M4	50
50	999	2.9	5.0	620	21	999	50	999	2.9				29.228	GKS09	-P132M4	54
46	1089	1.1	4.6	675	19	1089	46	1089	1.1				31.858	GKS07	-P132M4	50
44	1126	2.7	4.4	698	18	1126	44	1126	2.7				32.940	GKS09	-P132M4	54
42	1203	2.5	4.1	746	17	1203	42	1203	2.5				35.193	GKS09	-P132M4	54
41	1232	1.1	4.0	764	17	1232	41	1232	1.1				36.063	GKS07	-P132M4	50
37	1355	2.2	3.7	841	15	1355	37	1355	2.2				39.662	GKS09	-P132M4	54
34	1474	2.1	3.4	914	14	1474	34	1474	2.1				43.146	GKS09	-P132M4	54
30	1662	1.8	3.0	1031	12	1662	30	1662	1.8				48.625	GKS09	-P132M4	54
25	1971	3.0	2.5	1223	10	1971	25	1971	3.0				57.683	GKS11	-P132M4	62
25	1997	1.5	2.5	1239	10	1997	25	1997	1.5				58.456	GKS09	-P132M4	54
23	2221	2.7	2.2	1378	9.2	2221	23	2221	2.7				64.995	GKS11	-P132M4	62
22	2251	1.4	2.2	1396	9.1	2251	22	2251	1.4				65.879	GKS09	-P132M4	54
21	2422	2.5	2.0	1502	8.5	2422	21	2422	2.5				70.887	GKS11	-P132M4	62
21	2425	1.3	2.0	1504	8.5	2425	21	2425	1.3				70.982	GKS09	-P132M4	54
18	2729	2.2	1.8	1693	7.5	2729	18	2729	2.2				79.873	GKS11	-P132M4	62
18	2733	1.1	1.8	1695	7.5	2733	18	2733	1.1				79.996	GKS09	-P132M4	54
16	3135	1.9	1.6	1944	6.5	3135	16	3135	1.9				91.737	GKS11	-P132M4	62

Selection tables, 4-pole motors



50 Hz: P_N = 5.5 kW
87 Hz: P_N = 9.6 kW

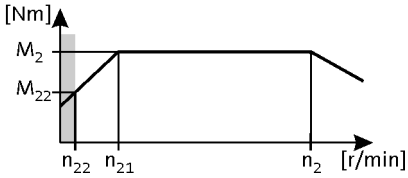
3-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GKS	m500	
14	3532	1.7	1.4	2191	5.8	3532	14	3532	1.7				103.365	GKS11	-P132M4	62
13	3755	3.1	1.3	2329	5.5	3755	13	3755	3.1				109.896	GKS14	-P132M4	70
13	3804	1.6	1.3	2360	5.4	3804	13	3804	1.6				111.335	GKS11	-P132M4	62
12	4231	2.8	1.2	2624	4.8	4231	12	4231	2.8				123.826	GKS14	-P132M4	70
12	4287	1.4	1.2	2659	4.8	4287	12	4287	1.4				125.448	GKS11	-P132M4	62
11	4747	2.5	1.0	2944	4.3	4747	11	4747	2.5				138.913	GKS14	-P132M4	70
9.3	5348	2.2	0.9	3317	3.8	5348	9.3	5348	2.2				156.522	GKS14	-P132M4	70
7.8	6375	1.8	0.8	3954	3.2	6375	7.8	6375	1.8				186.572	GKS14	-P132M4	70
6.9	7183	1.6	0.7	4455	2.9	7183	6.9	7183	1.6				210.222	GKS14	-P132M4	70
6.4	7737	1.5	0.6	4799	2.6	7737	6.4	7737	1.5				226.431	GKS14	-P132M4	70
5.7	8718	1.3	0.6	5407	2.4	8718	5.7	8718	1.3				255.133	GKS14	-P132M4	70
5.1	9780	1.2	0.5	6066	2.1	9780	5.1	9780	1.2				286.219	GKS14	-P132M4	70
4.5	11020	1.1	0.4	6835	1.9	11020	4.5	11020	1.1				322.500	GKS14	-P132M4	70

4-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GKS	m500	
15	3274	3.1	1.5	2031	6.2	3274	15	3274	3.1				97.467	GKS14	-P132M4	74
14	3430	1.7	1.4	2128	5.9	3430	14	3430	1.7				102.119	GKS11	-P132M4	66
13	3689	3.0	1.3	2288	5.5	3689	13	3689	3.0				109.822	GKS14	-P132M4	74
13	3865	1.5	1.3	2397	5.2	3865	13	3865	1.5				115.063	GKS11	-P132M4	66
12	4014	2.7	1.2	2490	5.0	4014	12	4014	2.7				119.493	GKS14	-P132M4	74
12	4202	1.4	1.2	2606	4.8	4202	12	4202	1.4				125.095	GKS11	-P132M4	66
11	4522	2.5	1.1	2805	4.5	4522	11	4522	2.5				134.640	GKS14	-P132M4	74
10	4734	1.3	1.0	2937	4.3	4734	10	4734	1.3				140.952	GKS11	-P132M4	66
9.5	5147	1.1	0.9	3193	3.9	5147	9.5	5147	1.1				153.242	GKS11	-P132M4	66
9.2	5308	2.2	0.9	3293	3.8	5308	9.2	5308	2.2				158.039	GKS14	-P132M4	74
8.5	5800	1.0	0.8	3597	3.5	5800	8.5	5800	1.0				172.667	GKS11	-P132M4	66
8.2	5981	1.9	0.8	3710	3.4	5981	8.2	5981	1.9				178.072	GKS14	-P132M4	74
7.5	6508	1.8	0.7	4037	3.1	6508	7.5	6508	1.8				193.754	GKS14	-P132M4	74
6.7	7333	1.6	0.7	4548	2.7	7333	6.7	7333	1.6				218.315	GKS14	-P132M4	74
6.1	7976	1.4	0.6	4947	2.5	7976	6.1	7976	1.4				237.467	GKS14	-P132M4	74
5.5	8987	1.3	0.5	5574	2.2	8987	5.5	8987	1.3				267.568	GKS14	-P132M4	74
4.5	10807	1.1	0.5	6703	1.9	10807	4.5	10807	1.1				321.729	GKS14	-P132M4	74

Selection tables, 4-pole motors

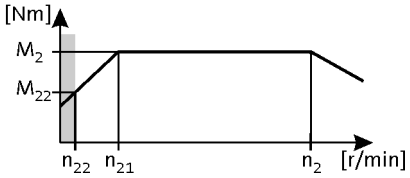


50 Hz: P_N = 7.5 kW
87 Hz: P_N = 13.1 kW

3-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GKS	m500	
248	274	1.7	24	174	101	274	248	274	1.7				5.955	GKS07	-P132L4	50
179	380	1.4	18	241	73	380	179	380	1.4				8.254	GKS07	-P132L4	50
161	422	1.7	16	267	65	422	161	422	1.7				9.171	GKS07	-P132L4	50
146	466	1.7	14	295	59	466	146	466	1.7				10.124	GKS07	-P132L4	50
130	524	1.2	13	332	53	524	130	524	1.2				11.378	GKS07	-P132L4	50
120	566	2.9	12	358	49	566	120	566	2.9				12.283	GKS09	-P132L4	54
116	585	1.4	11	371	47	585	116	585	1.4				12.711	GKS07	-P132L4	50
111	615	2.9	11	389	45	615	111	615	2.9				13.360	GKS09	-P132L4	54
100	682	1.5	9.8	431	41	682	100	682	1.5				14.798	GKS07	-P132L4	50
92	743	2.4	9.0	470	37	743	92	743	2.4				16.122	GKS09	-P132L4	54
86	795	1.3	8.4	503	35	795	86	795	1.3				17.270	GKS07	-P132L4	50
84	808	2.4	8.3	511	34	808	84	808	2.4				17.536	GKS09	-P132L4	54
76	900	2.9	7.4	570	31	900	76	900	2.9				19.541	GKS09	-P132L4	54
72	945	1.2	7.1	598	29	945	72	945	1.2				20.511	GKS07	-P132L4	50
67	1014	2.6	6.6	642	27	1014	67	1014	2.6				22.022	GKS09	-P132L4	54
64	1064	1.1	6.3	674	26	1064	64	1064	1.1				23.111	GKS07	-P132L4	50
59	1163	1.0	5.7	736	24	1163	59	1163	1.0				25.244	GKS07	-P132L4	50
58	1181	2.4	5.7	748	23	1181	58	1181	2.4				25.649	GKS09	-P132L4	54
51	1346	2.2	5.0	852	21	1346	51	1346	2.2				29.228	GKS09	-P132L4	54
45	1517	2.0	4.4	960	18	1517	45	1517	2.0				32.940	GKS09	-P132L4	54
42	1621	1.9	4.1	1026	17	1621	42	1621	1.9				35.193	GKS09	-P132L4	54
37	1827	1.6	3.7	1156	15	1827	37	1827	1.6				39.662	GKS09	-P132L4	54
37	1855	3.2	3.6	1174	15	1855	37	1855	3.2				40.272	GKS11	-P132L4	62
34	1987	1.5	3.4	1258	14	1987	34	1987	1.5				43.146	GKS09	-P132L4	54
34	2017	2.9	3.3	1276	14	2017	34	2017	2.9				43.783	GKS11	-P132L4	62
30	2240	1.4	3.0	1417	12	2240	30	2240	1.4				48.625	GKS09	-P132L4	54
30	2272	2.6	2.9	1438	12	2272	30	2272	2.6				49.333	GKS11	-P132L4	62
26	2657	2.3	2.5	1681	10	2657	26	2657	2.3				57.683	GKS11	-P132L4	62
25	2692	1.1	2.5	1704	10	2692	25	2692	1.1				58.456	GKS09	-P132L4	54
23	2994	2.0	2.2	1895	9.2	2994	23	2994	2.0				64.995	GKS11	-P132L4	62
22	3034	1.0	2.2	1920	9.1	3034	22	3034	1.0				65.879	GKS09	-P132L4	54
21	3265	1.8	2.0	2066	8.5	3265	21	3265	1.8				70.887	GKS11	-P132L4	62
19	3578	3.2	1.9	2264	7.7	3578	19	3578	3.2				77.681	GKS14	-P132L4	70
19	3679	1.6	1.8	2328	7.5	3679	19	3679	1.6				79.873	GKS11	-P132L4	62
16	4171	2.8	1.6	2640	6.6	4171	16	4171	2.8				90.551	GKS14	-P132L4	70

Selection tables, 4-pole motors



50 Hz: P_N = 7.5 kW
87 Hz: P_N = 13.1 kW

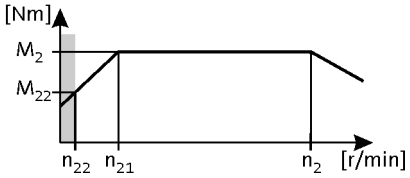
3-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GKS	m500	
16	4225	1.4	1.6	2674	6.5	4225	16	4225	1.4				91.737	GKS11	-P132L4	62
15	4699	2.5	1.4	2974	5.9	4699	15	4699	2.5				102.029	GKS14	-P132L4	70
14	4761	1.3	1.4	3013	5.8	4761	14	4761	1.3				103.365	GKS11	-P132L4	62
13	5062	2.3	1.3	3203	5.5	5062	13	5062	2.3				109.896	GKS14	-P132L4	70
13	5128	1.2	1.3	3245	5.4	5128	13	5128	1.2				111.335	GKS11	-P132L4	62
12	5703	2.0	1.2	3609	4.8	5703	12	5703	2.0				123.826	GKS14	-P132L4	70
12	5778	1.1	1.2	3657	4.8	5778	12	5778	1.1				125.448	GKS11	-P132L4	62
7.9	8593	1.4	0.8	5438	3.2	8593	7.9	8593	1.4				186.572	GKS14	-P132L4	70
7.0	9683	1.2	0.7	6128	2.9	9683	7.0	9683	1.2				210.222	GKS14	-P132L4	70
6.5	10429	1.1	0.6	6600	2.6	10429	6.5	10429	1.1				226.431	GKS14	-P132L4	70

4-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GKS	m500	
15	4413	2.3	1.5	2793	6.2	4413	15	4413	2.3				97.467	GKS14	-P132L4	74
15	4624	1.2	1.4	2926	5.9	4624	15	4624	1.2				102.119	GKS11	-P132L4	66
13	4972	2.2	1.3	3147	5.5	4972	13	4972	2.2				109.822	GKS14	-P132L4	74
13	5210	1.1	1.3	3297	5.2	5210	13	5210	1.1				115.063	GKS11	-P132L4	66
12	5410	2.0	1.2	3424	5.0	5410	12	5410	2.0				119.493	GKS14	-P132L4	74
12	5664	1.0	1.2	3584	4.8	5664	12	5664	1.0				125.095	GKS11	-P132L4	66
11	6096	1.9	1.1	3858	4.5	6096	11	6096	1.9				134.640	GKS14	-P132L4	74
9.3	7155	1.6	0.9	4528	3.8	7155	9.3	7155	1.6				158.039	GKS14	-P132L4	74
8.3	8062	1.4	0.8	5102	3.4	8062	8.3	8062	1.4				178.072	GKS14	-P132L4	74
7.6	8772	1.3	0.7	5552	3.1	8772	7.6	8772	1.3				193.754	GKS14	-P132L4	74
6.8	9884	1.2	0.7	6255	2.7	9884	6.8	9884	1.2				218.315	GKS14	-P132L4	74
6.2	10752	1.1	0.6	6804	2.5	10752	6.2	10752	1.1				237.467	GKS14	-P132L4	74

Selection tables, 4-pole motors

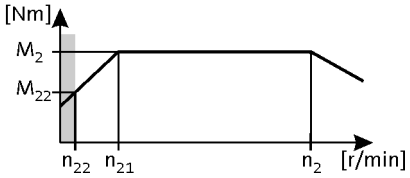


50 Hz: P_N = 11.0 kW
87 Hz: P_N = 19.2 kW

3-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GKS	m500	
120	829	2.0	12	459	49	829	120	829	2.0				12.283	GKS09	-P160M4	54
111	902	2.0	11	499	45	902	111	902	2.0				13.360	GKS09	-P160M4	54
93	1072	2.9	9.1	593	38	1072	93	1072	2.9				15.874	GKS11	-P160M4	62
92	1088	1.7	9.0	602	37	1088	92	1088	1.7				16.122	GKS09	-P160M4	54
86	1166	2.9	8.4	645	35	1166	86	1166	2.9				17.265	GKS11	-P160M4	62
84	1184	1.7	8.3	655	34	1184	84	1184	1.7				17.536	GKS09	-P160M4	54
76	1319	2.0	7.4	730	31	1319	76	1319	2.0				19.541	GKS09	-P160M4	54
67	1487	1.8	6.6	823	27	1487	67	1487	1.8				22.022	GKS09	-P160M4	54
58	1729	2.9	5.7	957	23	1729	58	1729	2.9				25.615	GKS11	-P160M4	62
58	1732	1.7	5.7	958	23	1732	58	1732	1.7				25.649	GKS09	-P160M4	54
53	1892	2.7	5.2	1047	21	1892	53	1892	2.7				28.021	GKS11	-P160M4	62
51	1973	1.5	5.0	1092	21	1973	51	1973	1.5				29.228	GKS09	-P160M4	54
47	2131	2.6	4.6	1179	19	2131	47	2131	2.6				31.573	GKS11	-P160M4	62
45	2224	1.3	4.4	1230	18	2224	45	2224	1.3				32.940	GKS09	-P160M4	54
42	2376	1.3	4.1	1315	17	2376	42	2376	1.3				35.193	GKS09	-P160M4	54
41	2413	2.3	4.1	1335	17	2413	41	2413	2.3				35.741	GKS11	-P160M4	62
37	2677	1.1	3.7	1482	15	2677	37	2677	1.1				39.662	GKS09	-P160M4	54
37	2719	2.2	3.6	1504	15	2719	37	2719	2.2				40.272	GKS11	-P160M4	62
34	2913	1.0	3.4	1612	14	2913	34	2913	1.0				43.146	GKS09	-P160M4	54
34	2956	2.0	3.3	1636	14	2956	34	2956	2.0				43.783	GKS11	-P160M4	62
30	3330	1.8	2.9	1843	12	3330	30	3330	1.8				49.333	GKS11	-P160M4	62
26	3797	3.0	2.6	2101	11	3797	26	3797	3.0				56.251	GKS14	-P160M4	70
26	3894	1.5	2.5	2155	10	3894	26	3894	1.5				57.683	GKS11	-P160M4	62
23	4279	2.7	2.3	2368	9.5	4279	23	4279	2.7				63.382	GKS14	-P160M4	70
23	4388	1.4	2.2	2428	9.2	4388	23	4388	1.4				64.995	GKS11	-P160M4	62
21	4654	2.5	2.1	2575	8.7	4654	21	4654	2.5				68.942	GKS14	-P160M4	70
21	4785	1.3	2.0	2648	8.5	4785	21	4785	1.3				70.887	GKS11	-P160M4	62
19	5244	2.2	1.9	2902	7.7	5244	19	5244	2.2				77.681	GKS14	-P160M4	70
19	5392	1.1	1.8	2984	7.5	5392	19	5392	1.1				79.873	GKS11	-P160M4	62
16	6113	1.9	1.6	3382	6.6	6113	16	6113	1.9				90.551	GKS14	-P160M4	70
15	6888	1.7	1.4	3811	5.9	6888	15	6888	1.7				102.029	GKS14	-P160M4	70
13	7419	1.6	1.3	4105	5.5	7419	13	7419	1.6				109.896	GKS14	-P160M4	70
12	8359	1.4	1.2	4625	4.8	8359	12	8359	1.4				123.826	GKS14	-P160M4	70

Selection tables, 4-pole motors

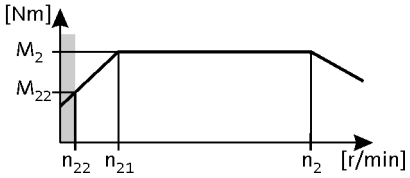


50 Hz: P_N = 11.0 kW
87 Hz: P_N = 19.2 kW

4-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GKS	m500	
15	6468	1.6	1.5	3579	6.2	6468	15	6468	1.6				97.467	GKS14	-P160M4	74
14	7288	1.5	1.3	4033	5.5	7288	14	7288	1.5				109.822	GKS14	-P160M4	74
12	7930	1.4	1.2	4388	5.0	7930	12	7930	1.4				119.493	GKS14	-P160M4	74
11	8935	1.3	1.1	4944	4.5	8935	11	8935	1.3				134.640	GKS14	-P160M4	74
9.4	10487	1.1	0.9	5803	3.8	10487	9.4	10487	1.1				158.039	GKS14	-P160M4	74

Selection tables, 4-pole motors



50 Hz: P_N = 15.0 kW
87 Hz: P_N = 26.3 kW

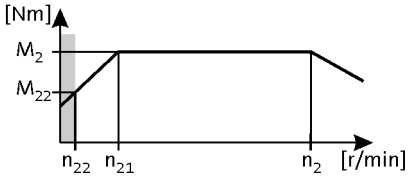
3-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GKS	m500	
93	1469	2.1	9.1	808	38	1469	93	1469	2.1				15.874	GKS11	-P160L4	62
85	1598	2.1	8.4	879	35	1598	85	1598	2.1				17.265	GKS11	-P160L4	62
57	2371	2.1	5.7	1303	23	2371	57	2371	2.1				25.615	GKS11	-P160L4	62
53	2594	2.0	5.2	1426	21	2594	53	2594	2.0				28.021	GKS11	-P160L4	62
47	2922	1.9	4.6	1607	19	2922	47	2922	1.9				31.573	GKS11	-P160L4	62
42	3211	3.1	4.2	1765	17	3211	42	3211	3.1				34.692	GKS14	-P160L4	70
41	3308	1.7	4.1	1819	17	3308	41	3308	1.7				35.741	GKS11	-P160L4	62
38	3618	3.0	3.7	1989	15	3618	38	3618	3.0				39.089	GKS14	-P160L4	70
37	3727	1.6	3.6	2049	15	3727	37	3727	1.6				40.272	GKS11	-P160L4	62
35	3937	2.7	3.4	2164	14	3937	35	3937	2.7				42.531	GKS14	-P160L4	70
34	4052	1.4	3.3	2228	14	4052	34	4052	1.4				43.783	GKS11	-P160L4	62
31	4436	2.5	3.0	2439	13	4436	31	4436	2.5				47.923	GKS14	-P160L4	70
30	4566	1.3	2.9	2510	12	4566	30	4566	1.3				49.333	GKS11	-P160L4	62
26	5206	2.2	2.6	2862	11	5206	26	5206	2.2				56.251	GKS14	-P160L4	70
26	5339	1.1	2.5	2935	10	5339	26	5339	1.1				57.683	GKS11	-P160L4	62
23	5866	2.0	2.3	3225	9.5	5866	23	5866	2.0				63.382	GKS14	-P160L4	70
23	6016	1.0	2.2	3307	9.2	6016	23	6016	1.0				64.995	GKS11	-P160L4	62
21	6381	1.8	2.1	3508	8.7	6381	21	6381	1.8				68.942	GKS14	-P160L4	70
19	7190	1.6	1.9	3953	7.7	7190	19	7190	1.6				77.681	GKS14	-P160L4	70
16	8381	1.4	1.6	4608	6.6	8381	16	8381	1.4				90.551	GKS14	-P160L4	70
14	9443	1.2	1.4	5192	5.9	9443	14	9443	1.2				102.029	GKS14	-P160L4	70

4-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GKS	m500	
15	8868	1.1	1.5	4875	6.2	8868	15	8868	1.1				97.467	GKS14	-P160L4	74
13	9992	1.1	1.3	5493	5.5	9992	13	9992	1.1				109.822	GKS14	-P160L4	74
9.3	14379	0.8	0.9	7905	3.8	14379	9.3	14379	0.8				158.039	GKS14	-P160L4	74

Selection tables, 4-pole motors

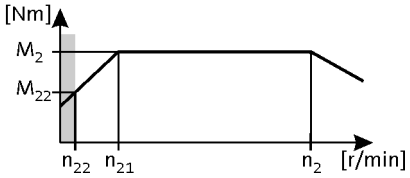


50 Hz: P_N = 18.5 kW
87 Hz: P_N = 32.2 kW

3-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GKS	m500	
81	2072	3.0	7.9	1146	33	2072	81	2072	3.0				18.311	GKS14	-P180M4	70
55	3074	3.0	5.3	1700	22	3074	55	3074	3.0				27.165	GKS14	-P180M4	70
49	3463	2.9	4.7	1916	20	3463	49	3463	2.9				30.609	GKS14	-P180M4	70
43	3925	2.6	4.2	2171	17	3925	43	3925	2.6				34.692	GKS14	-P180M4	70
42	4044	1.4	4.1	2237	17	4044	42	4044	1.4				35.741	GKS11	-P180M4	62
38	4423	2.5	3.7	2446	15	4423	38	4423	2.5				39.089	GKS14	-P180M4	70
37	4557	1.3	3.6	2521	15	4557	37	4557	1.3				40.272	GKS11	-P180M4	62
35	4813	2.2	3.4	2662	14	4813	35	4813	2.2				42.531	GKS14	-P180M4	70
34	4954	1.2	3.3	2740	14	4954	34	4954	1.2				43.783	GKS11	-P180M4	62
31	5423	2.1	3.0	2999	13	5423	31	5423	2.1				47.923	GKS14	-P180M4	70
30	5582	1.1	2.9	3088	12	5582	30	5582	1.1				49.333	GKS11	-P180M4	62
26	6365	1.8	2.6	3521	11	6365	26	6365	1.8				56.251	GKS14	-P180M4	70
23	7172	1.6	2.3	3967	9.5	7172	23	7172	1.6				63.382	GKS14	-P180M4	70
22	7801	1.5	2.1	4315	8.7	7801	22	7801	1.5				68.942	GKS14	-P180M4	70
19	8790	1.3	1.9	4862	7.7	8790	19	8790	1.3				77.681	GKS14	-P180M4	70
16	10246	1.1	1.6	5667	6.6	10246	16	10246	1.1				90.551	GKS14	-P180M4	70
15	11545	1.0	1.4	6386	5.9	11545	15	11545	1.0				102.029	GKS14	-P180M4	70

Selection tables, 4-pole motors



50 Hz: P_N = 22.0 kW
87 Hz: P_N = 38.5 kW

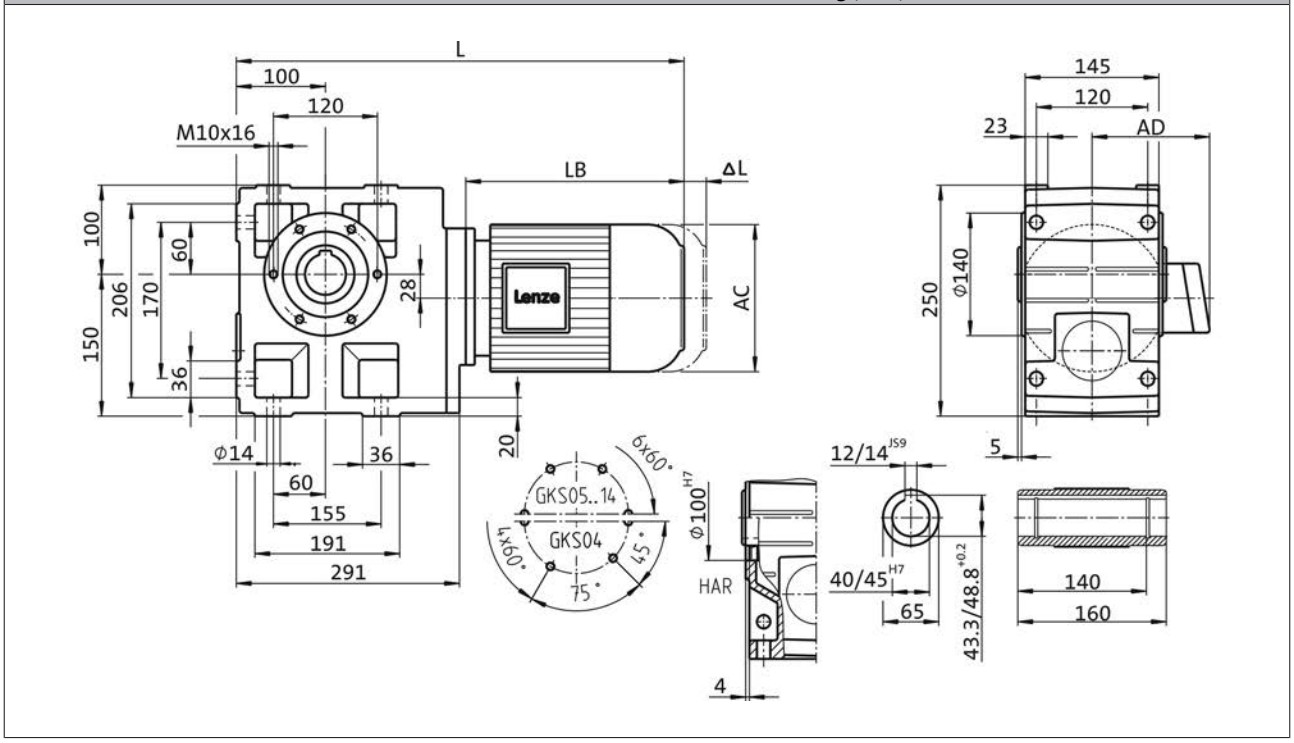
3-stage gearboxes

Mains operation 400 V, 50 Hz			Inverter operation 5 Hz -		- 20 Hz		- 50 Hz (1:10)			- 87 Hz (1:17.4)			i	Product		
n_2 [r/min]	M_2 [Nm]	c	n_{22} [r/min]	M_{22} [Nm]	n_{21} [r/min]	M_2 [Nm]	n_2 [r/min]	M_2 [Nm]	c	n_2 [r/min]	M_2 [Nm]	c		GKS	m500	
43	4678	2.1	4.2	2590	17	4678	43	4678	2.1				34.692	GKS14	-P180L4	70
38	5270	2.1	3.7	2918	15	5270	38	5270	2.1				39.089	GKS14	-P180L4	70
35	5735	1.9	3.4	3175	14	5735	35	5735	1.9				42.531	GKS14	-P180L4	70
31	6462	1.7	3.0	3578	13	6462	31	6462	1.7				47.923	GKS14	-P180L4	70
26	7584	1.5	2.6	4199	11	7584	26	7584	1.5				56.251	GKS14	-P180L4	70
23	8546	1.3	2.3	4732	9.5	8546	23	8546	1.3				63.382	GKS14	-P180L4	70
22	9296	1.2	2.1	5147	8.7	9296	22	9296	1.2				68.942	GKS14	-P180L4	70
19	10474	1.1	1.9	5799	7.7	10474	19	10474	1.1				77.681	GKS14	-P180L4	70

Dimensions, 4-pole motors

GKS06, 3-stage gearboxes

Dimensions with hollow shaft and foot (HBR)
Dimensions with hollow shaft and foot, centering (HAR)

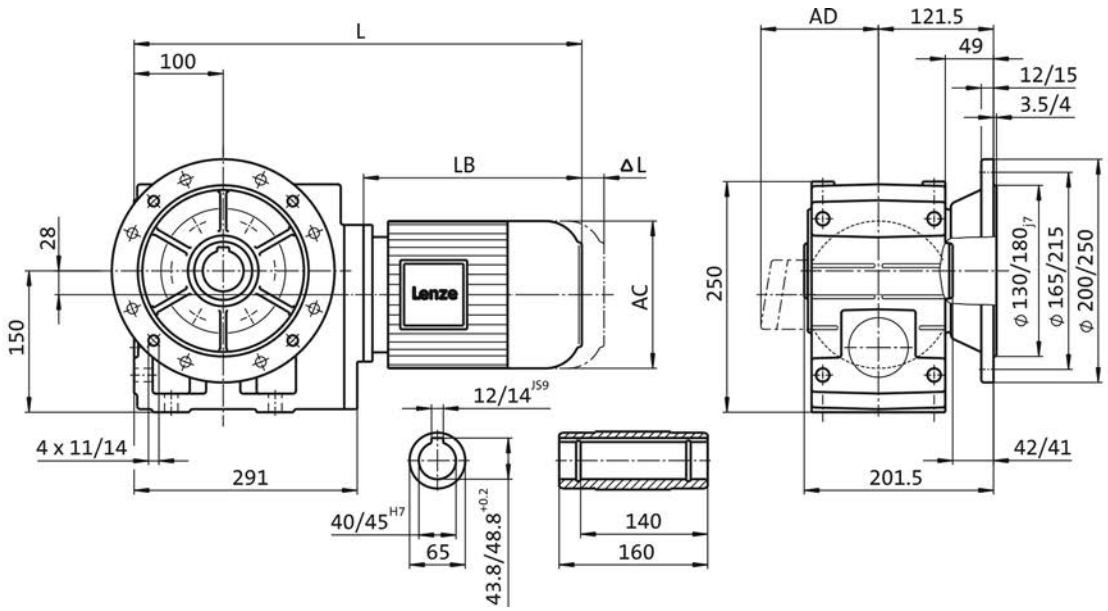


Product			m500
			-P132M4
Dimensions			
Total length	**L**	**[mm]**	750
Motor length	**LB**	**[mm]**	433.5
Length of motor options	**Δ L**	**[mm]**	200.5
Motor diameter	**AC**	**[mm]**	261
Distance motor/connection	**AD**	**[mm]**	182

Dimensions, 4-pole motors

GKS06, 3-stage gearboxes

Dimensions with hollow shaft and foot, flange (HAK)

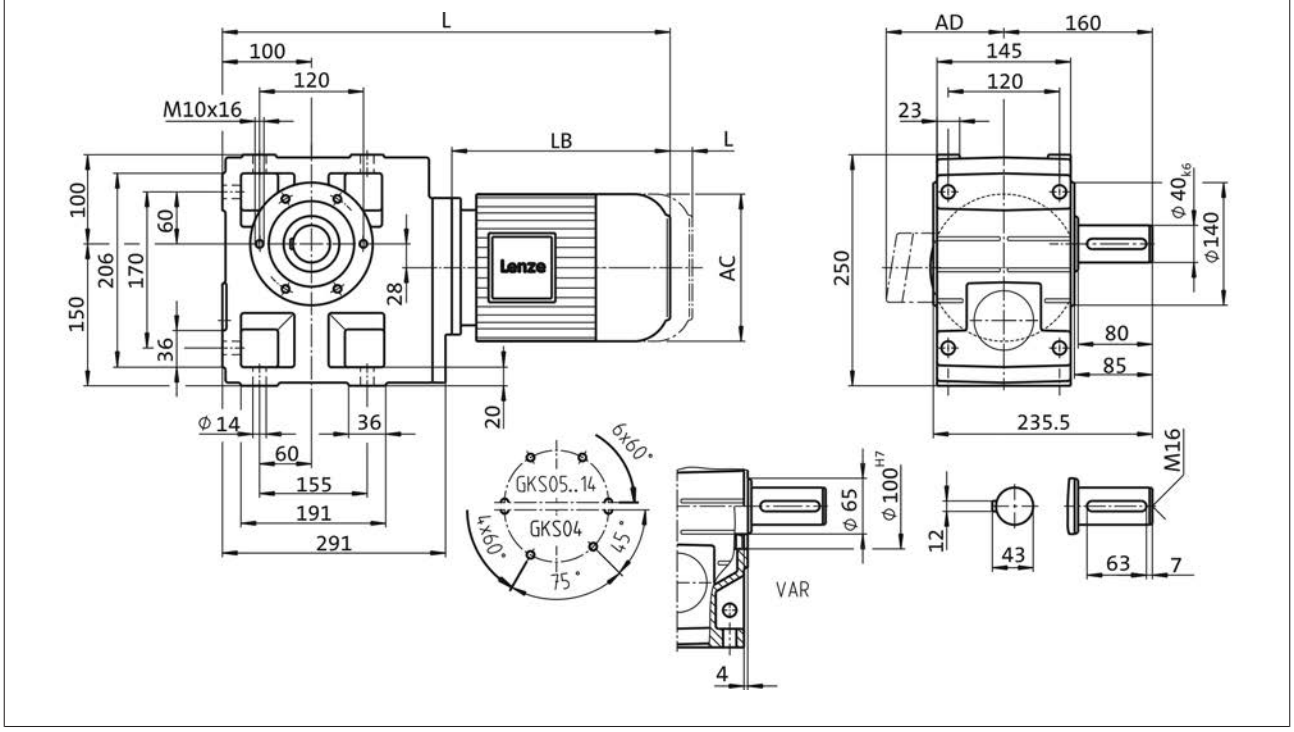


Product			m500
			-P132M4
Dimensions			
Total length	**L**	**[mm]**	750
Motor length	**LB**	**[mm]**	433.5
Length of motor options	**Δ L**	**[mm]**	200.5
Motor diameter	**AC**	**[mm]**	261
Distance motor/connection	**AD**	**[mm]**	182

Dimensions, 4-pole motors

GKS06, 3-stage gearboxes

Dimensions with solid shaft and foot (VBR)
Dimensions with solid shaft and foot, centering (VAR)

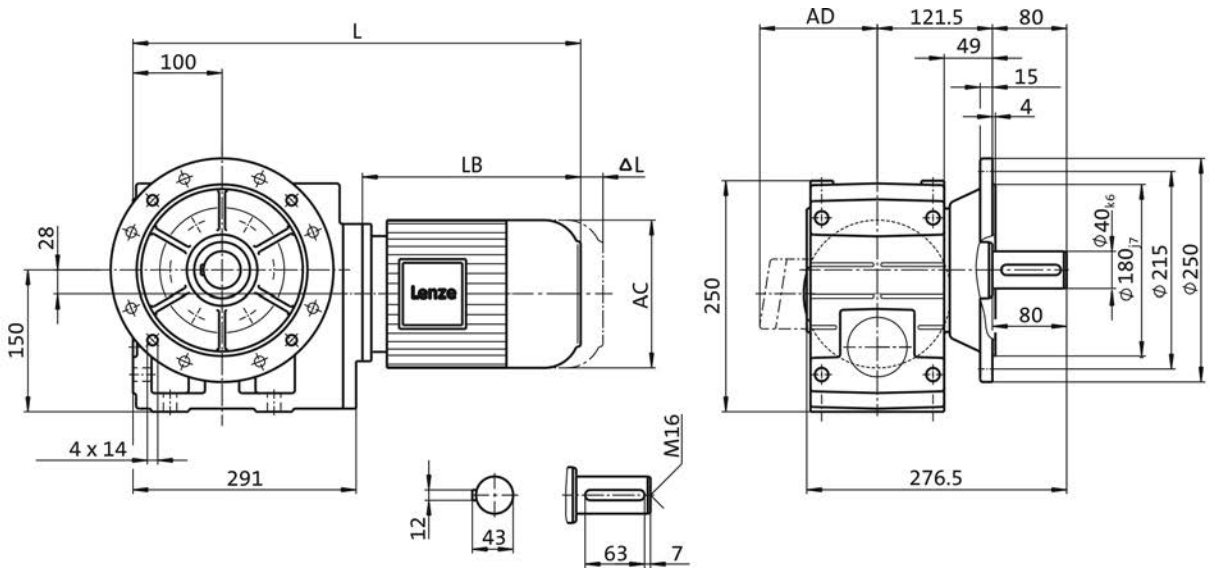


Product			m500
			-P132M4
Dimensions			
Total length	**L**	**[mm]**	750
Motor length	**LB**	**[mm]**	433.5
Length of motor options	**Δ L**	**[mm]**	200.5
Motor diameter	**AC**	**[mm]**	261
Distance motor/connection	**AD**	**[mm]**	182

Dimensions, 4-pole motors

GKS06, 3-stage gearboxes

Dimensions with solid shaft and foot, flange (VAK)

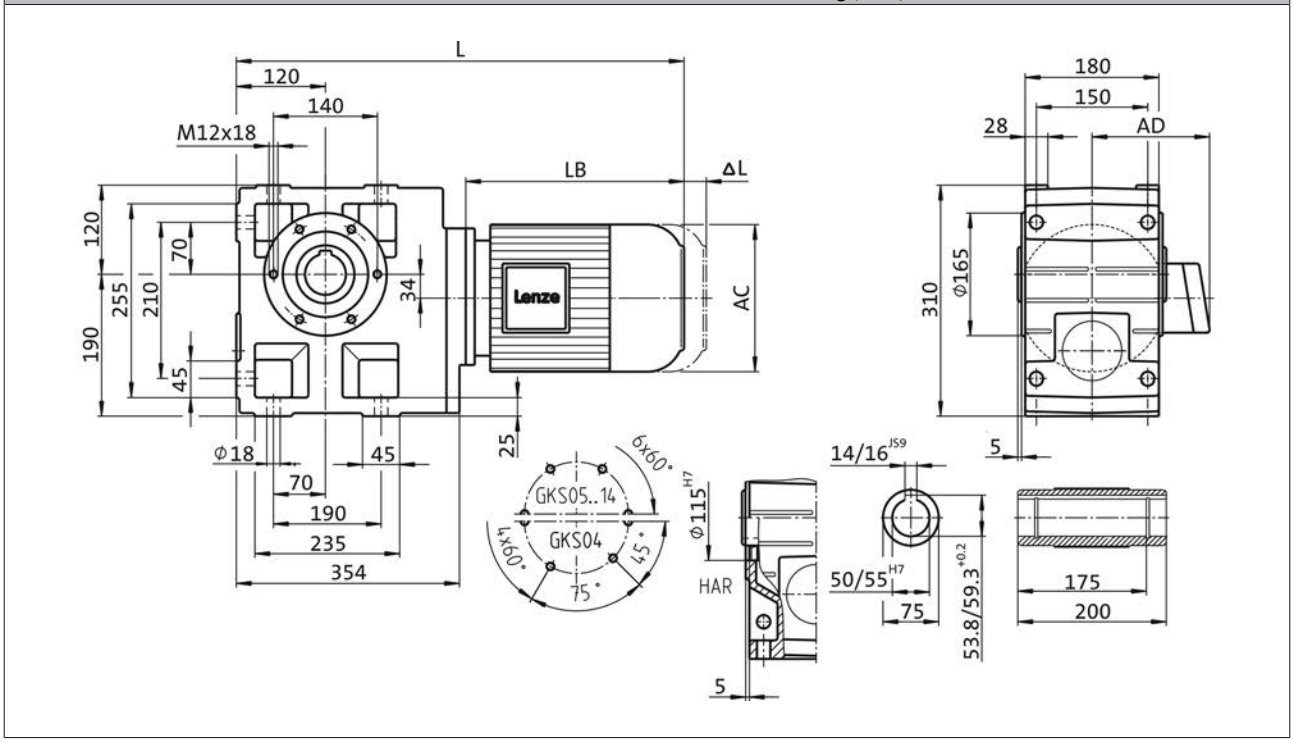


Product			m500
			-P132M4
Dimensions			
Total length	**L**	**[mm]**	750
Motor length	**LB**	**[mm]**	433.5
Length of motor options	**Δ L**	**[mm]**	200.5
Motor diameter	**AC**	**[mm]**	261
Distance motor/connection	**AD**	**[mm]**	182

Dimensions, 4-pole motors

GKS07, 3-stage gearboxes

Dimensions with hollow shaft and foot (HBR)
Dimensions with hollow shaft and foot, centering (HAR)

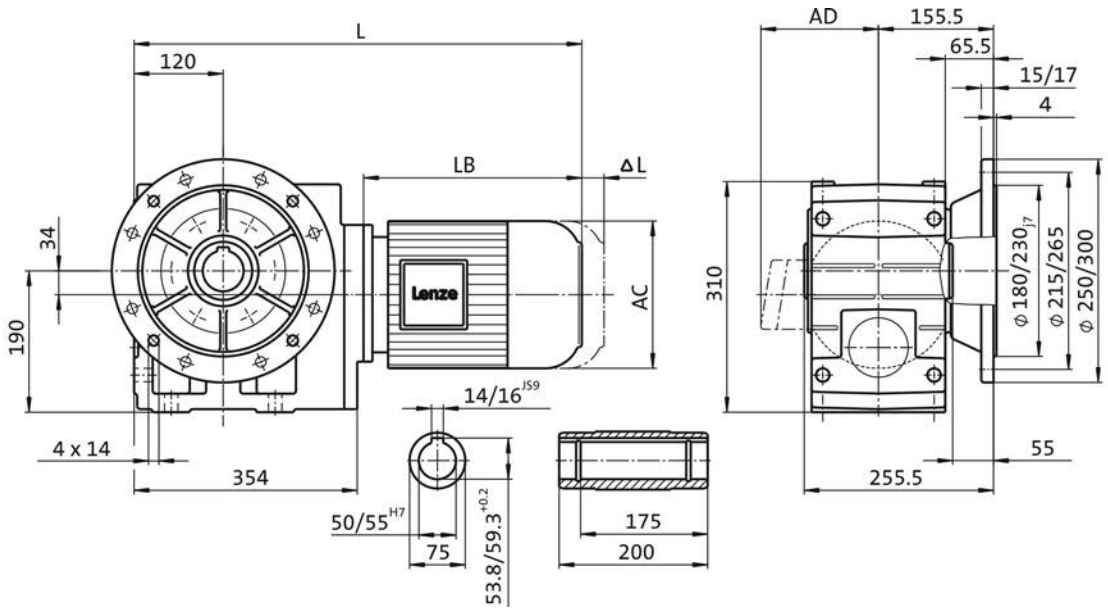


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	806	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GKS07, 3-stage gearboxes

Dimensions with hollow shaft and foot, flange (HAK)

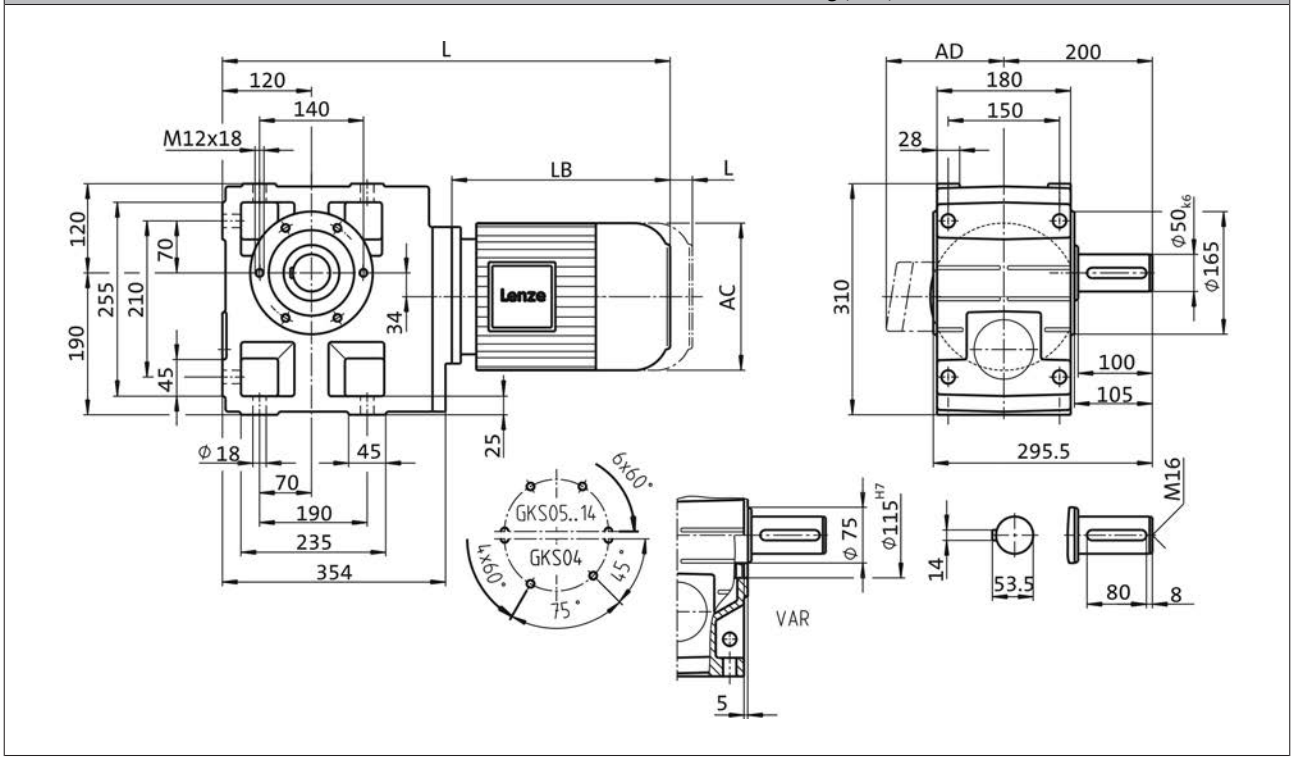


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	806	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GKS07, 3-stage gearboxes

Dimensions with solid shaft and foot (VBR)
Dimensions with solid shaft and foot, centering (VAR)

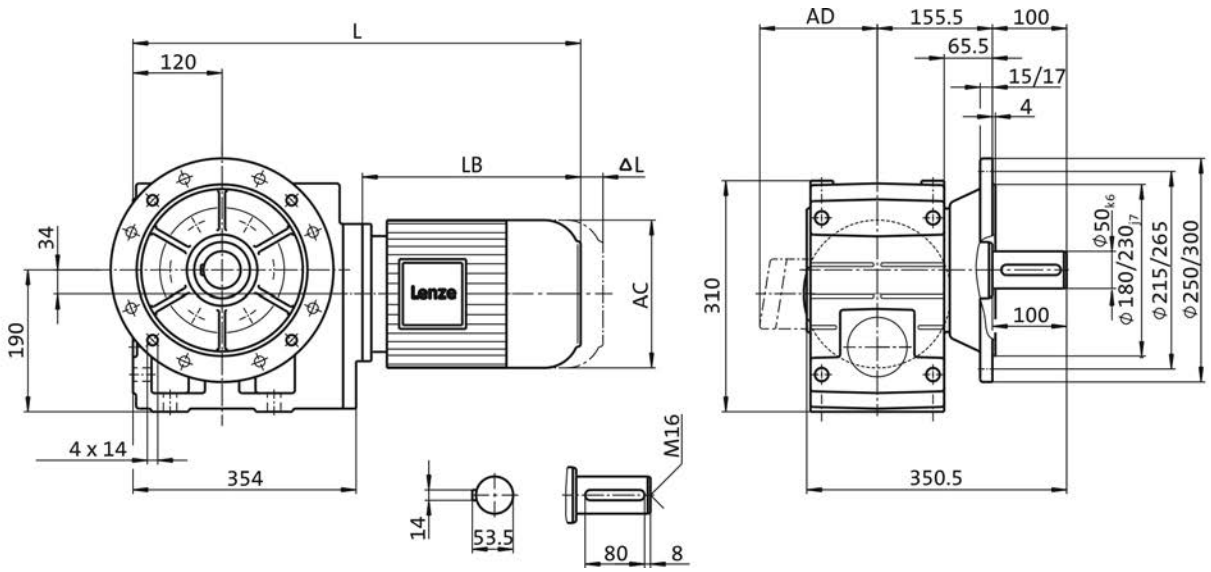


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	806	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GKS07, 3-stage gearboxes

Dimensions with solid shaft and foot, flange (VAK)

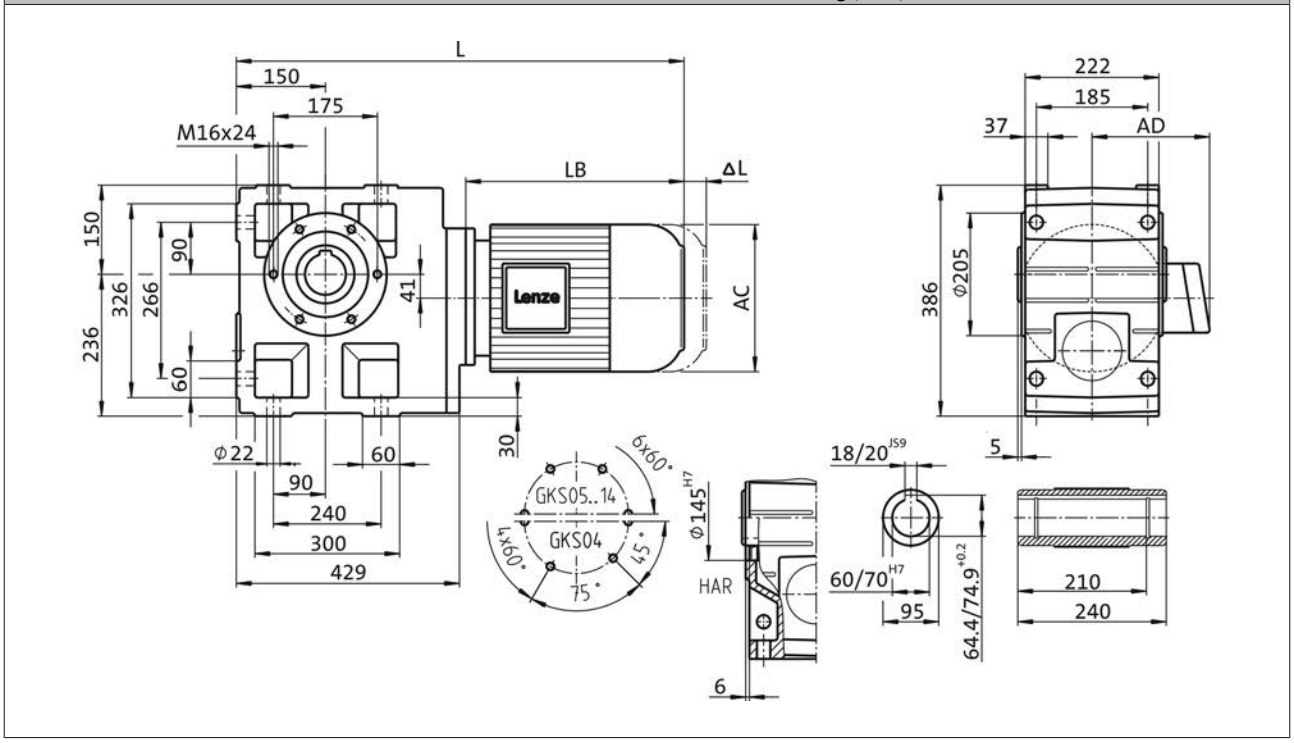


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	806	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GKS09, 3-stage gearboxes

Dimensions with hollow shaft and foot (HBR)
Dimensions with hollow shaft and foot, centering (HAR)

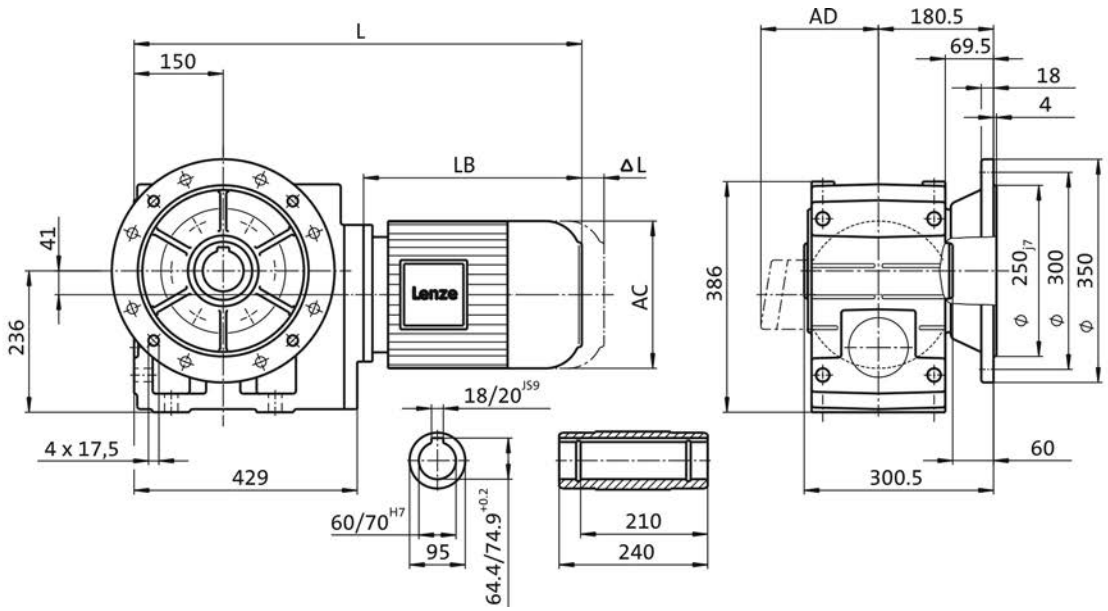


Product			m500		
			-P132L4	-P132M4	-P160M4
Dimensions					
Total length	**L**	**[mm]**	877		988
Motor length	**LB**	**[mm]**	433.5		539
Length of motor options	**Δ L**	**[mm]**	200.5		237
Motor diameter	**AC**	**[mm]**	261		313
Distance motor/connection	**AD**	**[mm]**	182		231

Dimensions, 4-pole motors

GKS09, 3-stage gearboxes

Dimensions with hollow shaft and foot, flange (HAK)

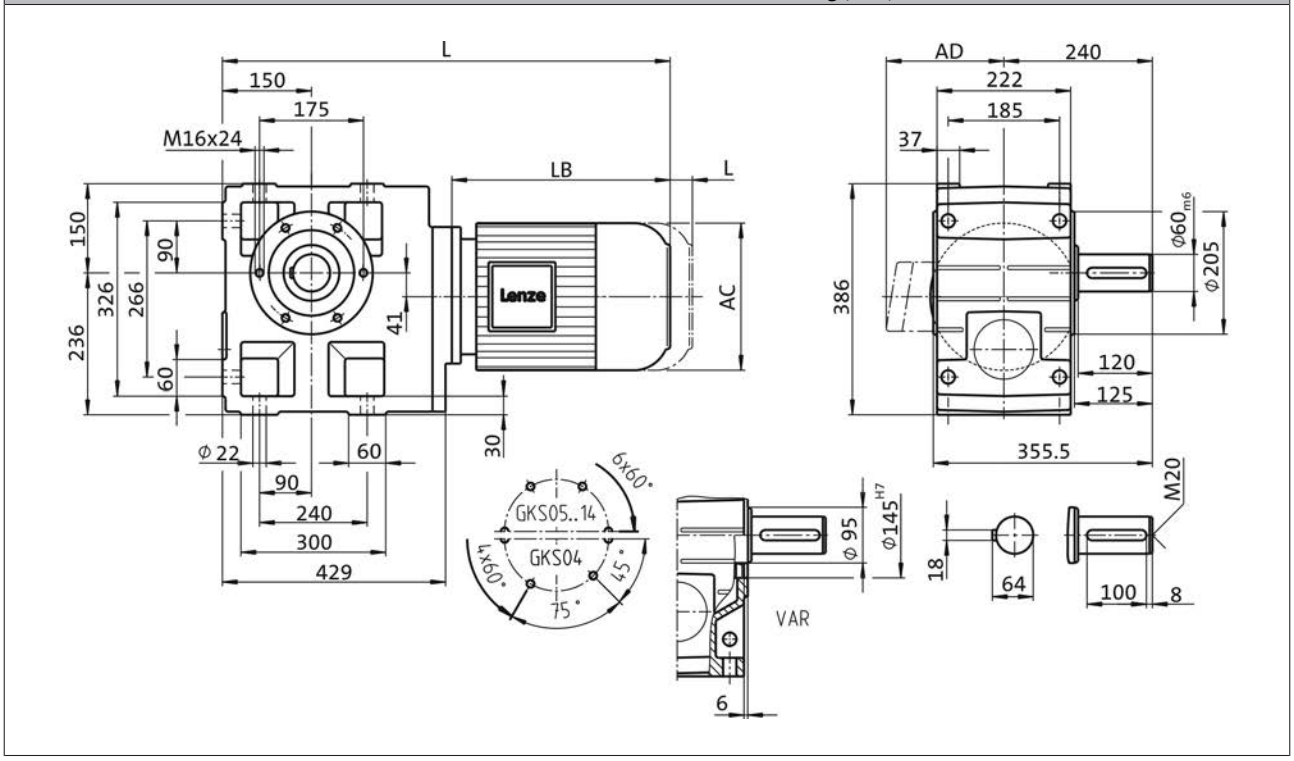


Product			m500		
			-P132L4	-P132M4	-P160M4
Dimensions					
Total length	**L**	**[mm]**	877		988
Motor length	**LB**	**[mm]**	433.5		539
Length of motor options	**Δ L**	**[mm]**	200.5		237
Motor diameter	**AC**	**[mm]**	261		313
Distance motor/connection	**AD**	**[mm]**	182		231

Dimensions, 4-pole motors

GKS09, 3-stage gearboxes

Dimensions with solid shaft and foot (VBR)
Dimensions with solid shaft and foot, centering (VAR)

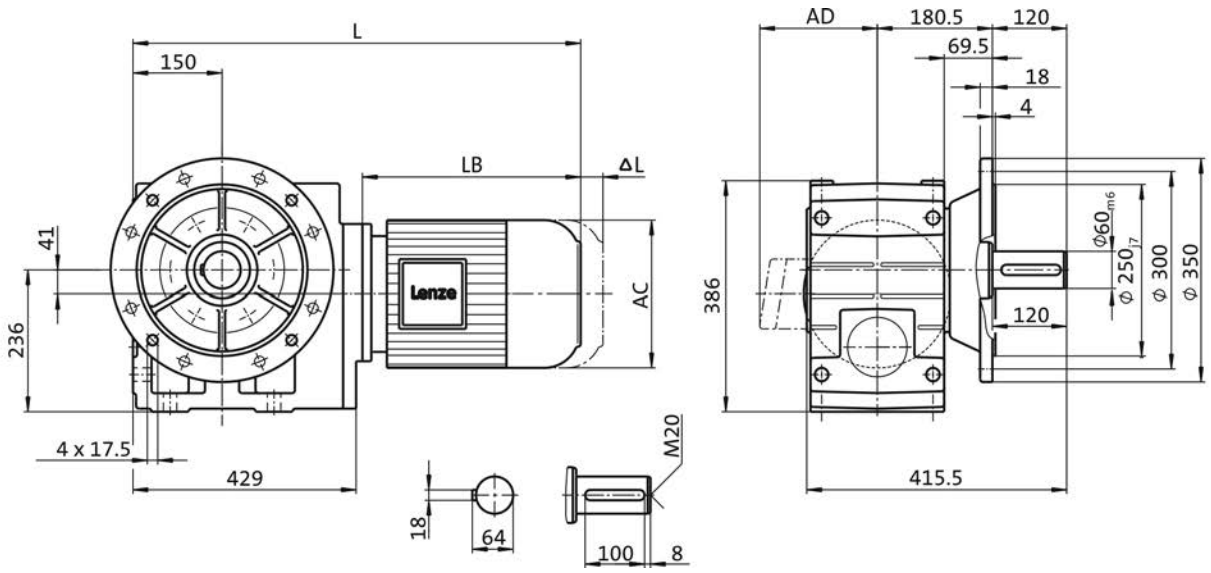


Product			m500		
			-P132L4	-P132M4	-P160M4
Dimensions					
Total length	**L**	**[mm]**	877		988
Motor length	**LB**	**[mm]**	433.5		539
Length of motor options	**Δ L**	**[mm]**	200.5		237
Motor diameter	**AC**	**[mm]**	261		313
Distance motor/connection	**AD**	**[mm]**	182		231

Dimensions, 4-pole motors

GKS09, 3-stage gearboxes

Dimensions with solid shaft and foot, flange (VAK)

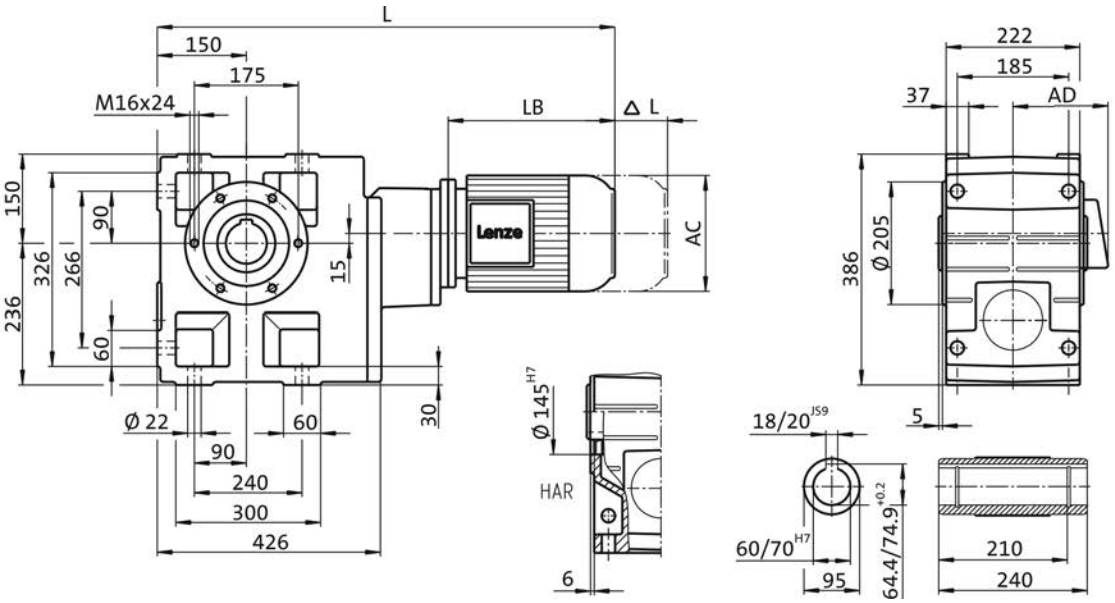


Product			m500		
			-P132L4	-P132M4	-P160M4
Dimensions					
Total length	**L**	**[mm]**	877		988
Motor length	**LB**	**[mm]**	433.5		539
Length of motor options	**Δ L**	**[mm]**	200.5		237
Motor diameter	**AC**	**[mm]**	261		313
Distance motor/connection	**AD**	**[mm]**	182		231

Dimensions, 4-pole motors

GKS09, 4-stage gearboxes

Dimensions with hollow shaft and foot (HBR)
Dimensions with hollow shaft and foot, centering (HAR)

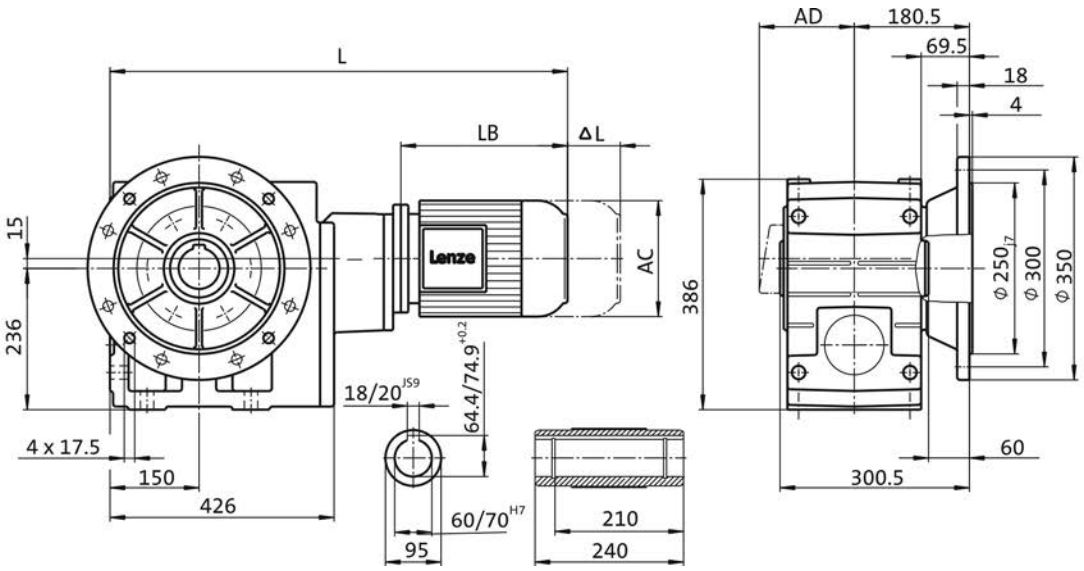


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	1000	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GKS09, 4-stage gearboxes

Dimensions with hollow shaft and foot, flange (HAK)

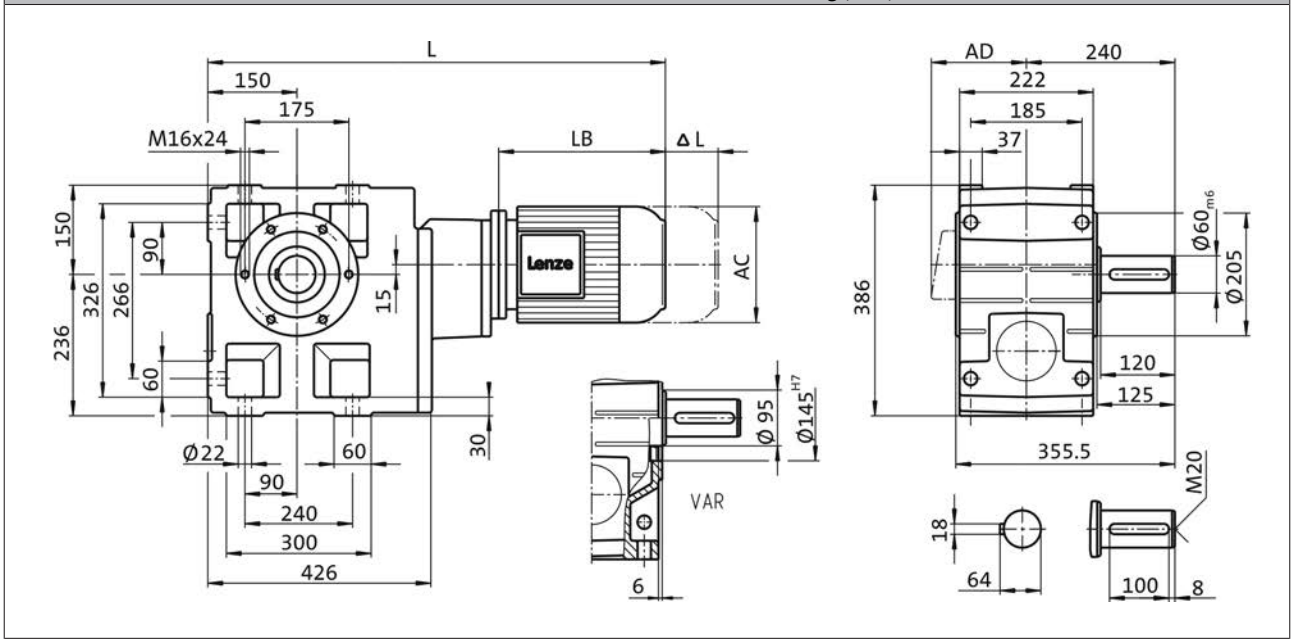


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	1000	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GKS09, 4-stage gearboxes

Dimensions with solid shaft and foot (VBR)
Dimensions with solid shaft and foot, centering (VAR)

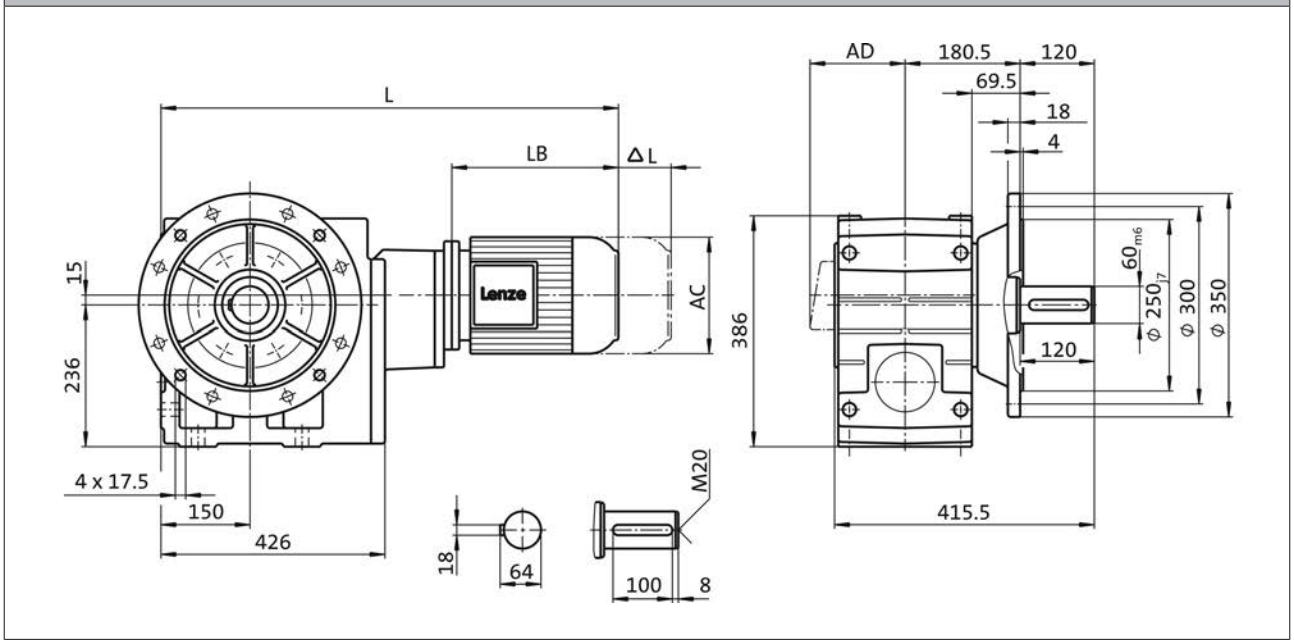


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	1000	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GKS09, 4-stage gearboxes

Dimensions with solid shaft and foot, flange (VAK)

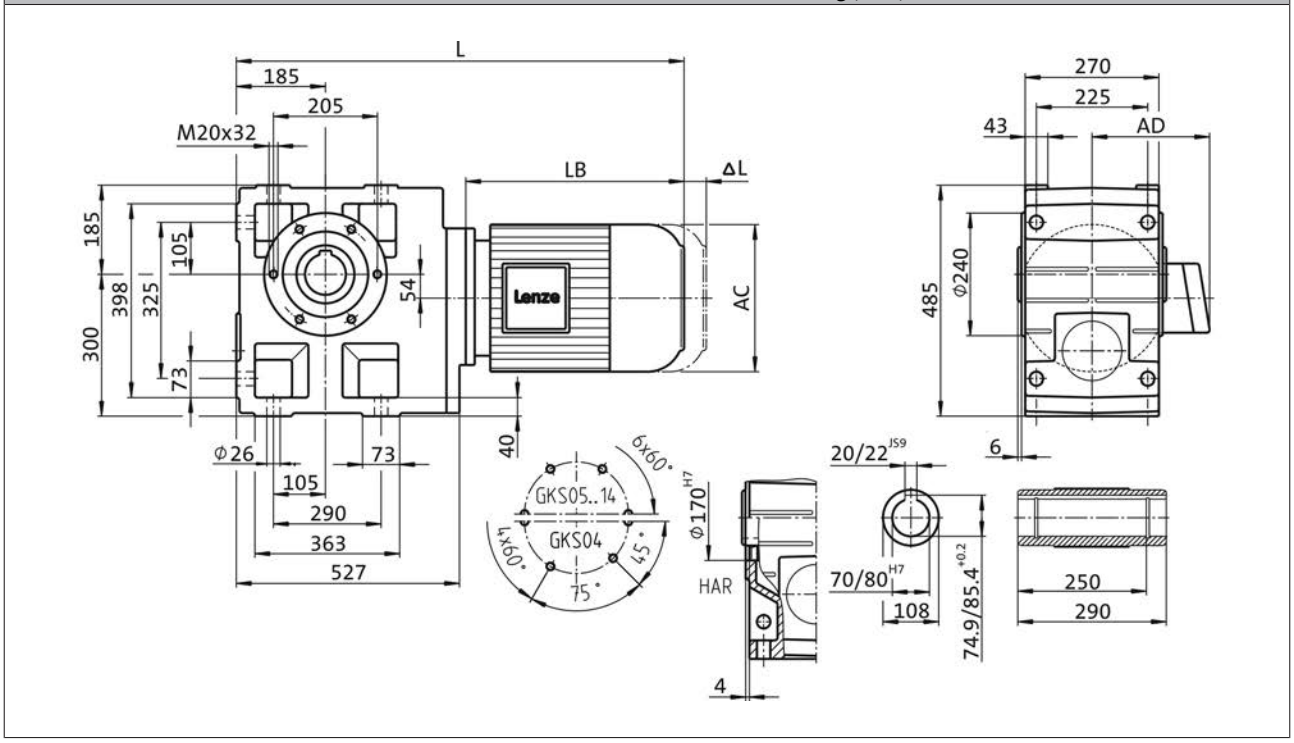


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	1000	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GKS11, 3-stage gearboxes

Dimensions with hollow shaft and foot (HBR)
Dimensions with hollow shaft and foot, centering (HAR)

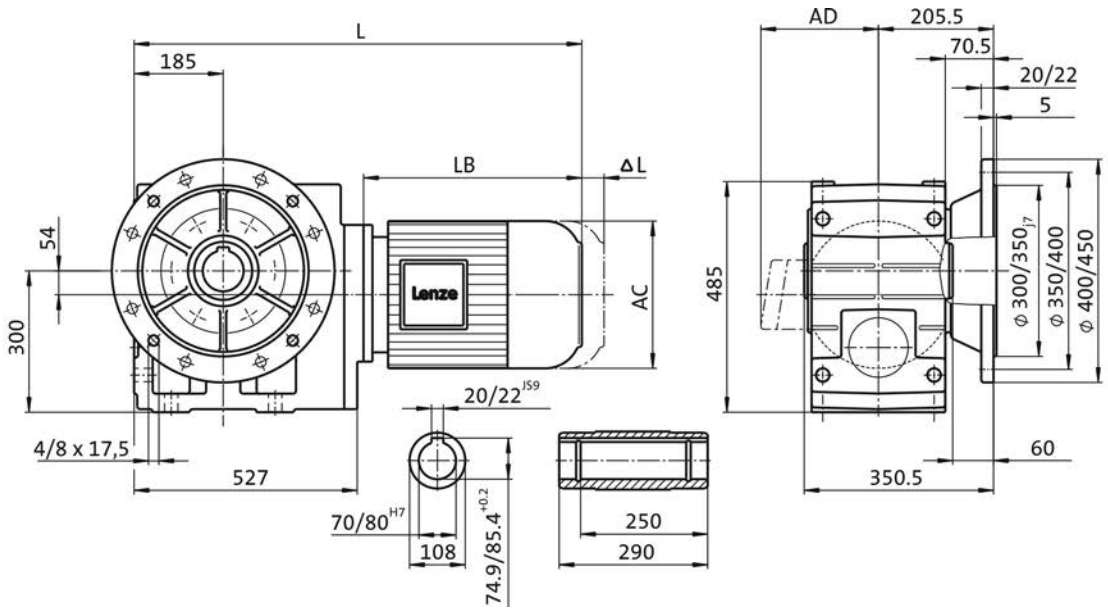


Product			m500				
			-P132L4	-P132M4	-P160L4	-P160M4	-P180M4
Dimensions							
Total length	**L**	**[mm]**	968		1079		1136
Motor length	**LB**	**[mm]**	433.5		539		596.5
Length of motor options	**Δ L**	**[mm]**	200.5		237		267
Motor diameter	**AC**	**[mm]**	261		313		351
Distance motor/connection	**AD**	**[mm]**	182		231		282

Dimensions, 4-pole motors

GKS11, 3-stage gearboxes

Dimensions with hollow shaft and foot, flange (HAK)

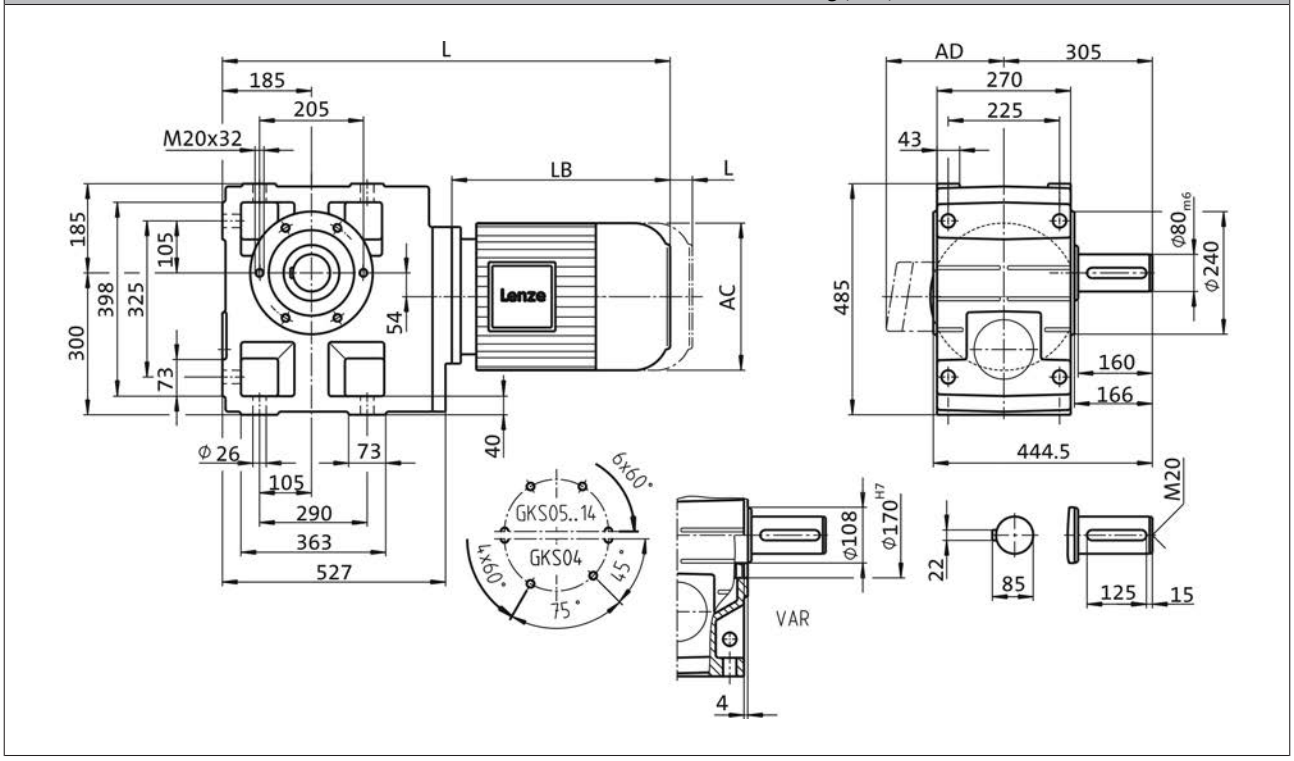


Product			m500				
			-P132L4	-P132M4	-P160L4	-P160M4	-P180M4
Dimensions							
Total length	**L**	**[mm]**	968		1079		1136
Motor length	**LB**	**[mm]**	433.5		539		596.5
Length of motor options	**Δ L**	**[mm]**	200.5		237		267
Motor diameter	**AC**	**[mm]**	261		313		351
Distance motor/connection	**AD**	**[mm]**	182		231		282

Dimensions, 4-pole motors

GKS11, 3-stage gearboxes

Dimensions with solid shaft and foot (VBR)
Dimensions with solid shaft and foot, centering (VAR)

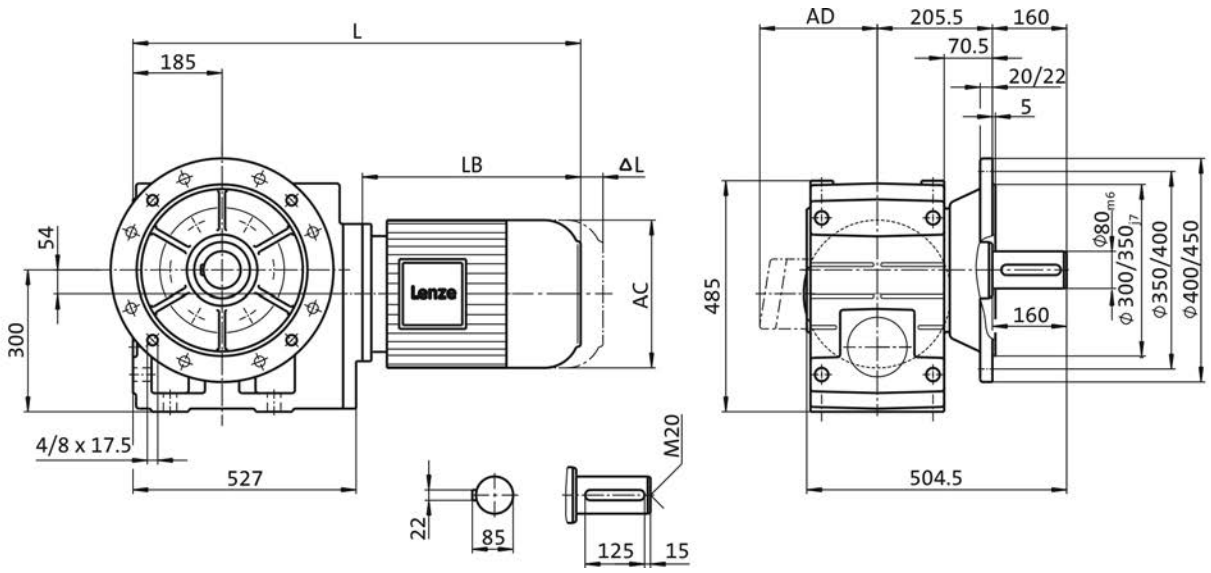


Product			m500				
			-P132L4	-P132M4	-P160L4	-P160M4	-P180M4
Dimensions							
Total length	**L**	**[mm]**	968		1079		1136
Motor length	**LB**	**[mm]**	433.5		539		596.5
Length of motor options	**Δ L**	**[mm]**	200.5		237		267
Motor diameter	**AC**	**[mm]**	261		313		351
Distance motor/connection	**AD**	**[mm]**	182		231		282

Dimensions, 4-pole motors

GKS11, 3-stage gearboxes

Dimensions with solid shaft and foot, flange (VAK)

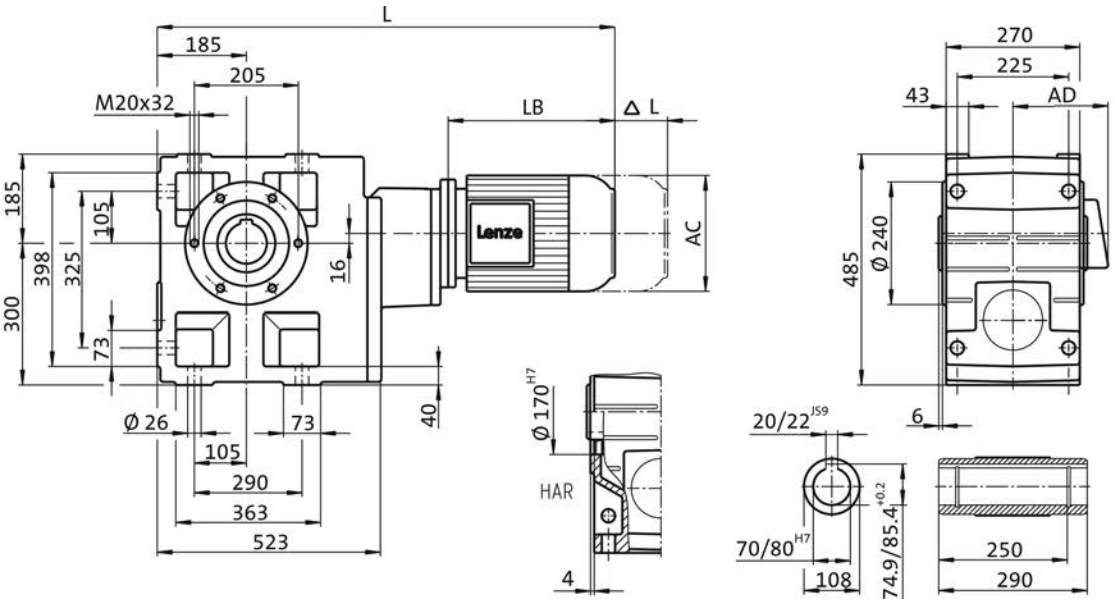


Product			m500				
			-P132L4	-P132M4	-P160L4	-P160M4	-P180M4
Dimensions							
Total length	**L**	**[mm]**	968		1079		1136
Motor length	**LB**	**[mm]**	433.5		539		596.5
Length of motor options	**Δ L**	**[mm]**	200.5		237		267
Motor diameter	**AC**	**[mm]**	261		313		351
Distance motor/connection	**AD**	**[mm]**	182		231		282

Dimensions, 4-pole motors

GKS11, 4-stage gearboxes

Dimensions with hollow shaft and foot (HBR)
Dimensions with hollow shaft and foot, centering (HAR)

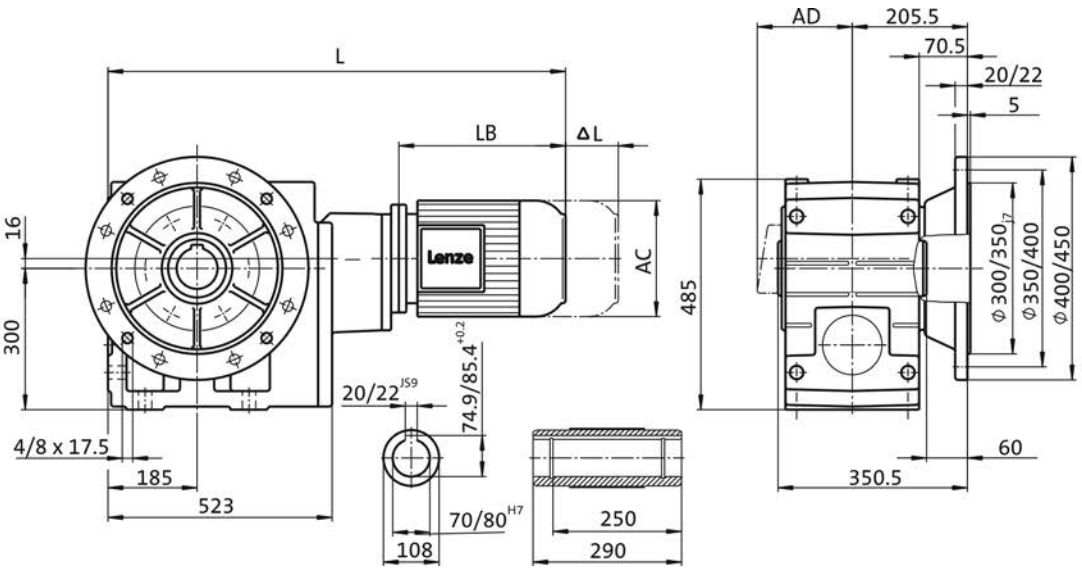


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	1110	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GKS11, 4-stage gearboxes

Dimensions with hollow shaft and foot, flange (HAK)

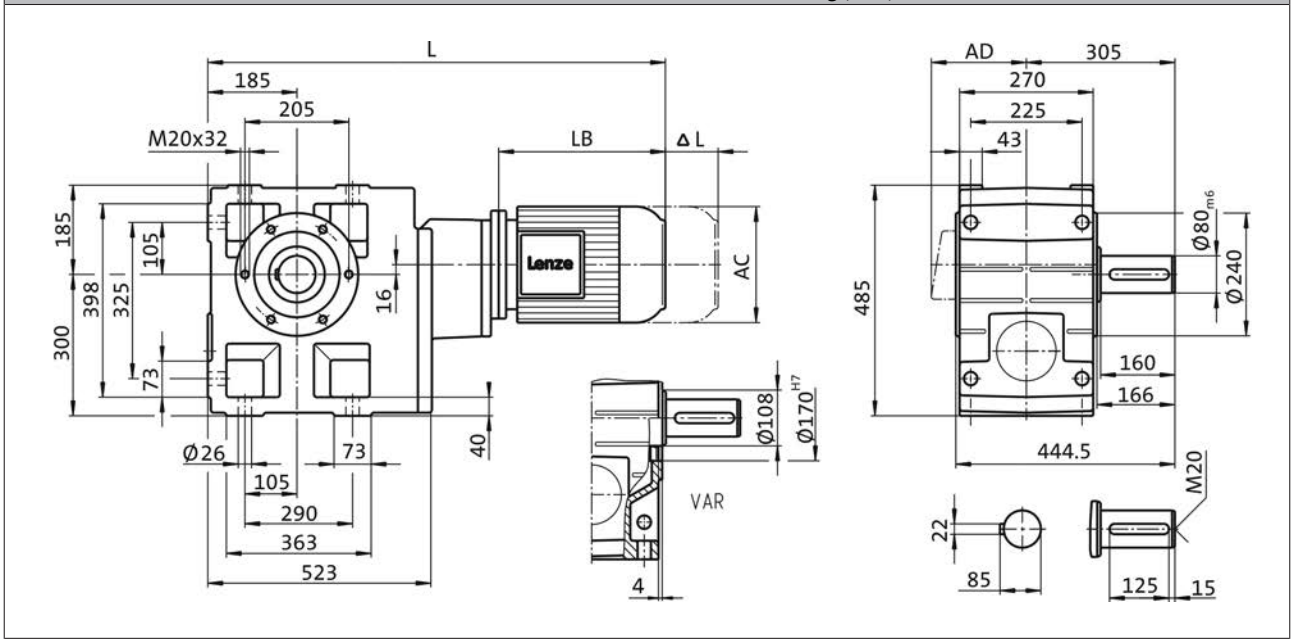


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	1110	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GKS11, 4-stage gearboxes

Dimensions with solid shaft and foot (VBR)
Dimensions with solid shaft and foot, centering (VAR)

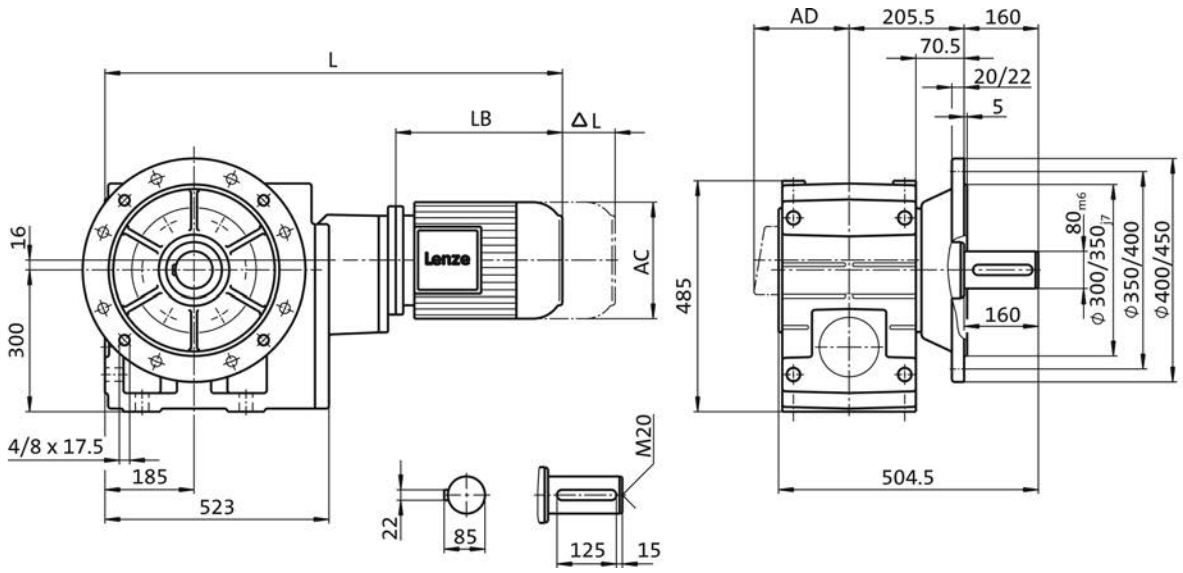


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	1110	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GKS11, 4-stage gearboxes

Dimensions with solid shaft and foot, flange (VAK)

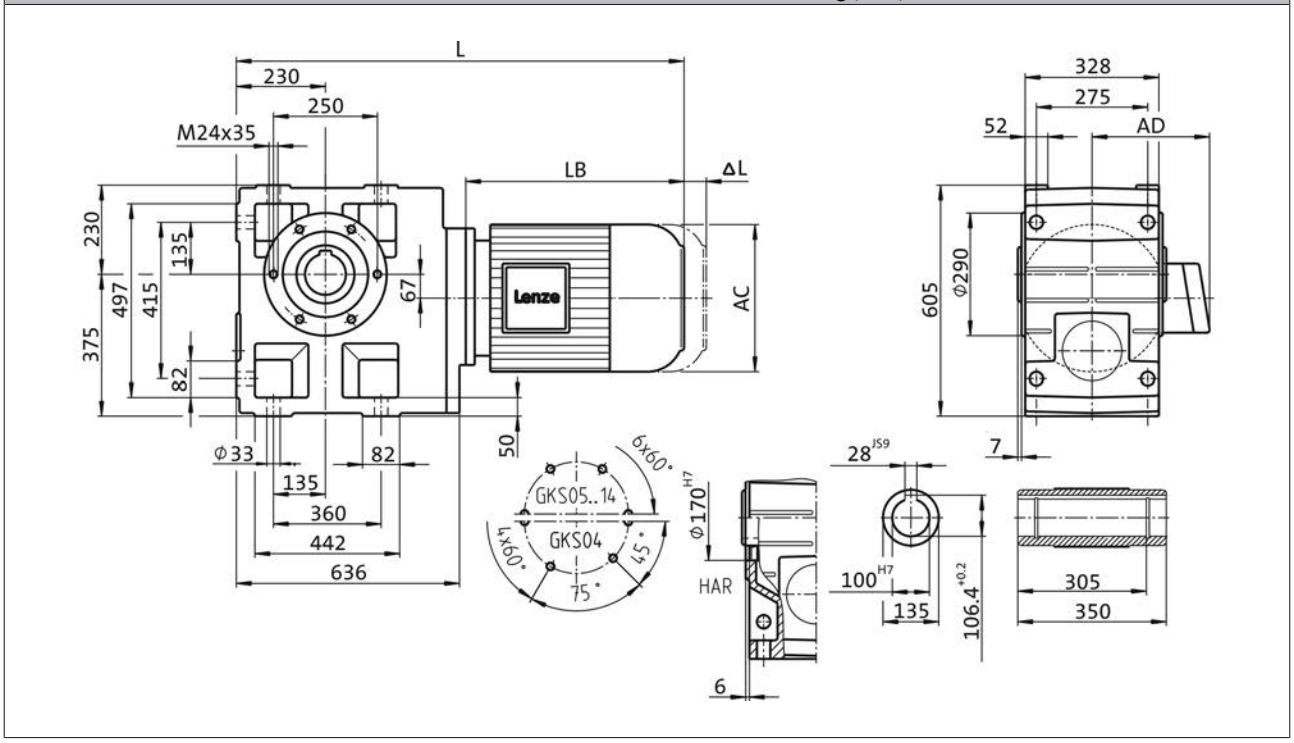


Product			m500	
			-P132L4	-P132M4
Dimensions				
Total length	**L**	**[mm]**	1110	
Motor length	**LB**	**[mm]**	433.5	
Length of motor options	**Δ L**	**[mm]**	200.5	
Motor diameter	**AC**	**[mm]**	261	
Distance motor/connection	**AD**	**[mm]**	182	

Dimensions, 4-pole motors

GKS14, 3-stage gearboxes

Dimensions with hollow shaft and foot (HBR)
Dimensions with hollow shaft and foot, centering (HAR)

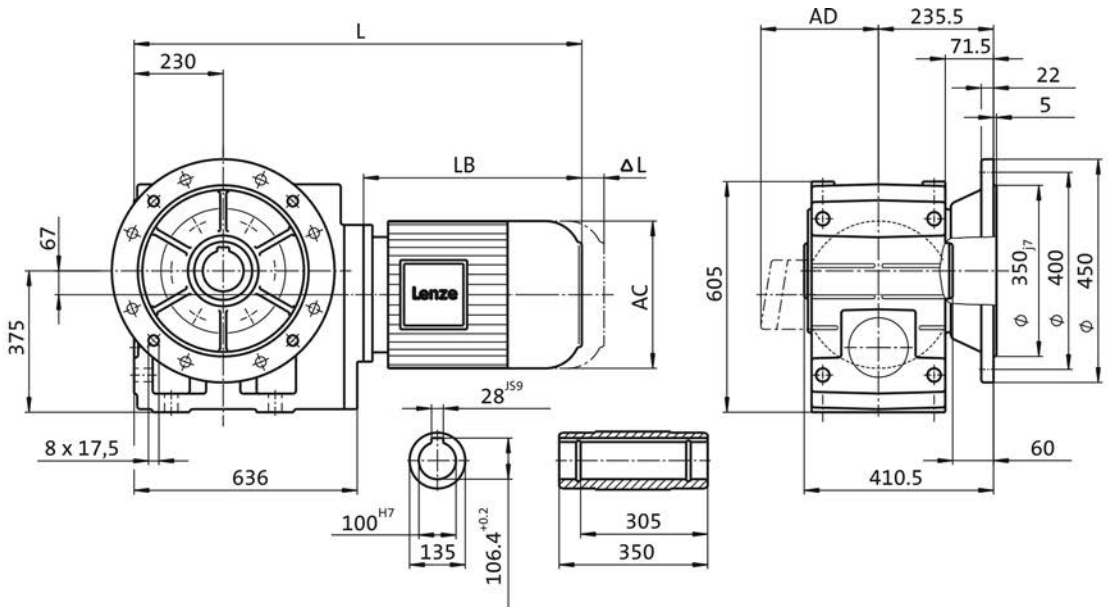


Product			m500					
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4
Dimensions								
Total length	**L**	**[mm]**	1067		1178		1235	
Motor length	**LB**	**[mm]**	433.5		539		596.5	
Length of motor options	**Δ L**	**[mm]**	200.5		237		267	
Motor diameter	**AC**	**[mm]**	261		313		351	
Distance motor/connection	**AD**	**[mm]**	182		231		282	

Dimensions, 4-pole motors

GKS14, 3-stage gearboxes

Dimensions with hollow shaft and foot, flange (HAK)

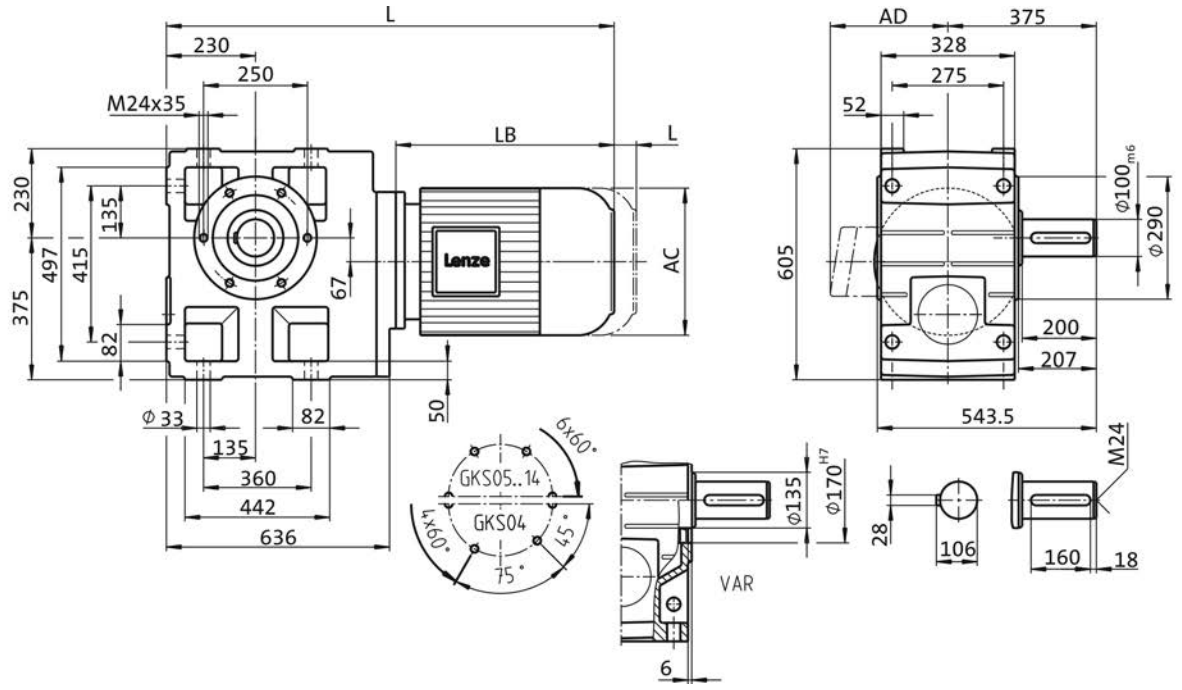


Product			m500					
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4
Dimensions								
Total length	**L**	**[mm]**	1067		1178		1235	
Motor length	**LB**	**[mm]**	433.5		539		596.5	
Length of motor options	**Δ L**	**[mm]**	200.5		237		267	
Motor diameter	**AC**	**[mm]**	261		313		351	
Distance motor/connection	**AD**	**[mm]**	182		231		282	

Dimensions, 4-pole motors

GKS14, 3-stage gearboxes

Dimensions with solid shaft and foot (VBR)
Dimensions with solid shaft and foot, centering (VAR)

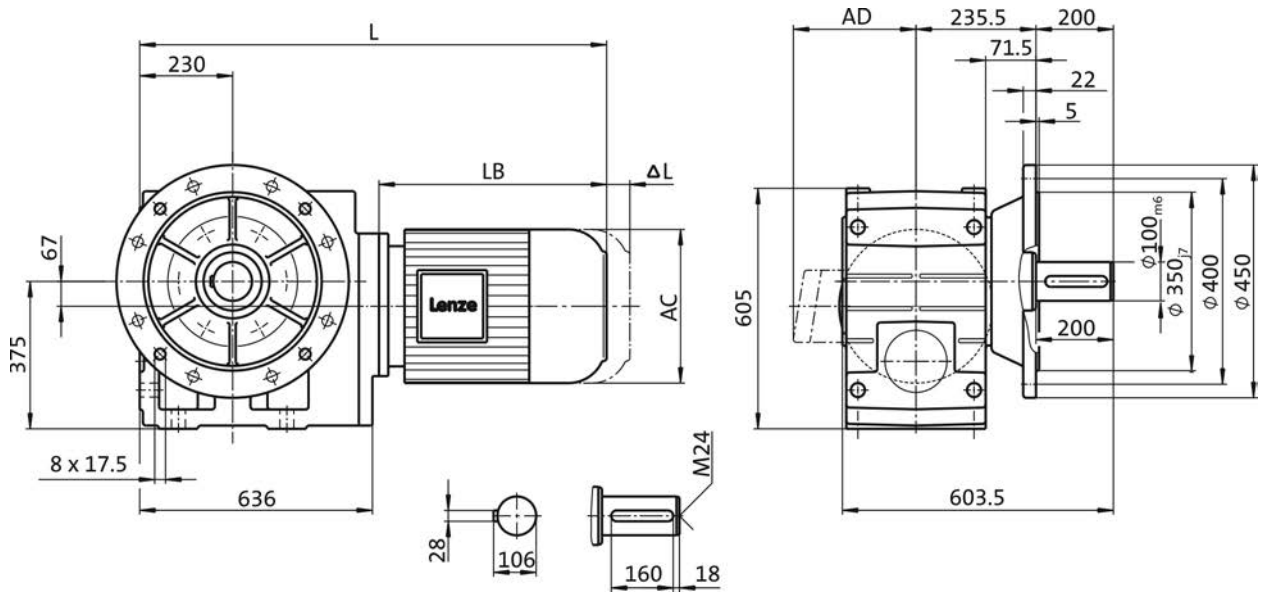


Product			m500					
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4
Dimensions								
Total length	**L**	**[mm]**	1067		1178		1235	
Motor length	**LB**	**[mm]**	433.5		539		596.5	
Length of motor options	**Δ L**	**[mm]**	200.5		237		267	
Motor diameter	**AC**	**[mm]**	261		313		351	
Distance motor/connection	**AD**	**[mm]**	182		231		282	

Dimensions, 4-pole motors

GKS14, 3-stage gearboxes

Dimensions with solid shaft and foot, flange (VAK)

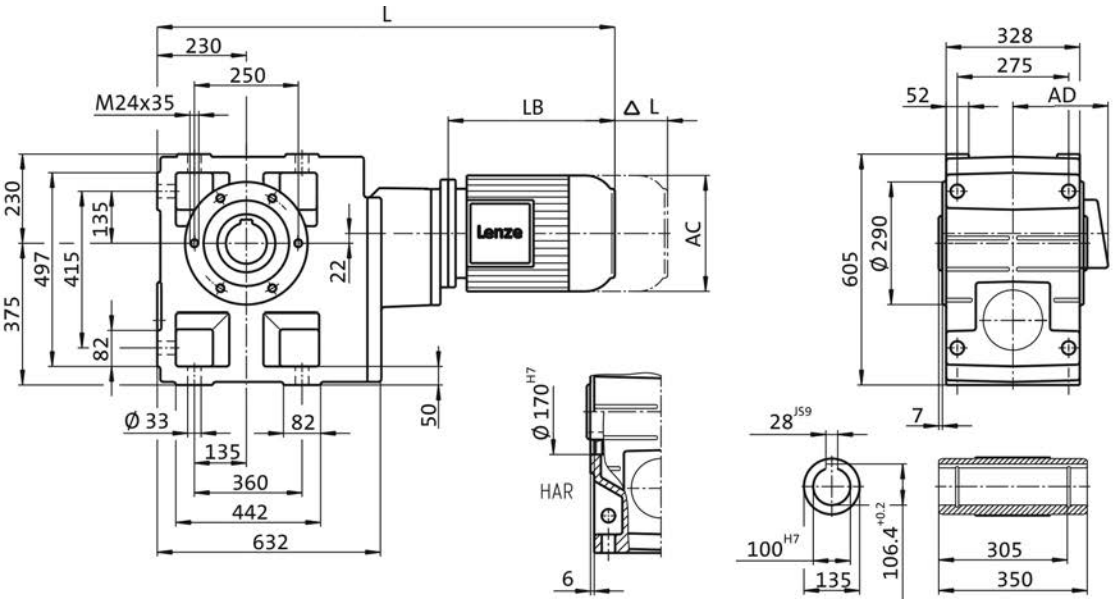


Product			m500					
			-P132L4	-P132M4	-P160L4	-P160M4	-P180L4	-P180M4
Dimensions								
Total length	**L**	**[mm]**	1067		1178		1235	
Motor length	**LB**	**[mm]**	433.5		539		596.5	
Length of motor options	**Δ L**	**[mm]**	200.5		237		267	
Motor diameter	**AC**	**[mm]**	261		313		351	
Distance motor/connection	**AD**	**[mm]**	182		231		282	

Dimensions, 4-pole motors

GKS14, 4-stage gearboxes

Dimensions with hollow shaft and foot (HBR)
Dimensions with hollow shaft and foot, centering (HAR)

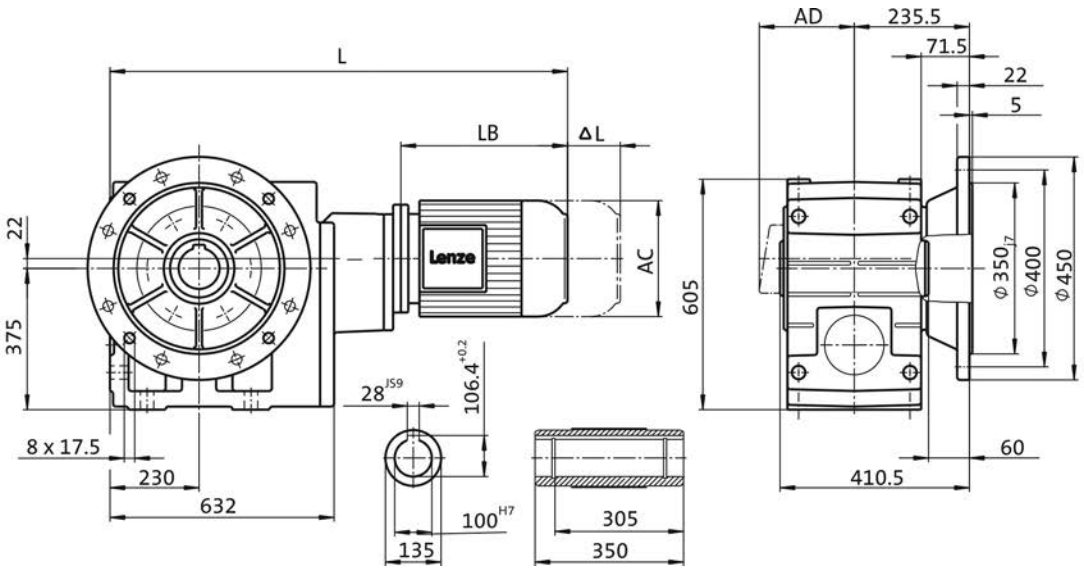


Product			m500				
			-P132L4	-P132M4	-P160L4	-P160M4	-P180M4
Dimensions							
Total length	**L**	**[mm]**	1243		1353		1411
Motor length	**LB**	**[mm]**	433.5		539		596.5
Length of motor options	**Δ L**	**[mm]**	200.5		237		267
Motor diameter	**AC**	**[mm]**	261		313		351
Distance motor/connection	**AD**	**[mm]**	182		231		282

Dimensions, 4-pole motors

GKS14, 4-stage gearboxes

Dimensions with hollow shaft and foot, flange (HAK)

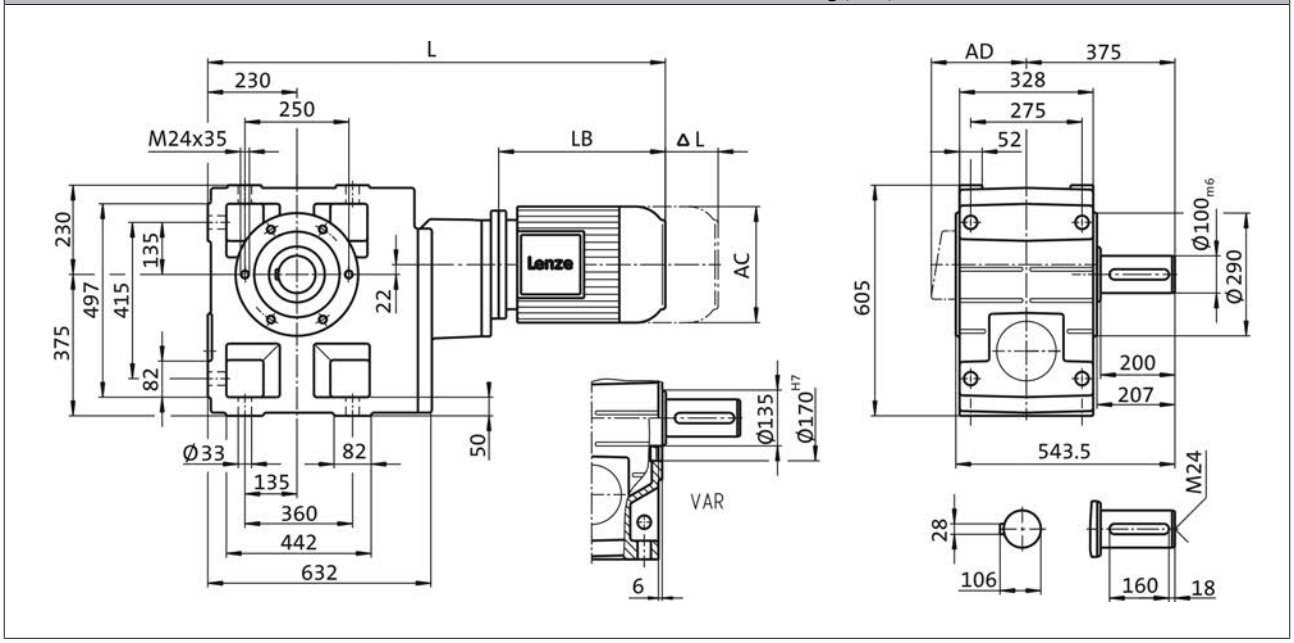


Product			m500				
			-P132L4	-P132M4	-P160L4	-P160M4	-P180M4
Dimensions							
Total length	**L**	**[mm]**	1243		1353		1411
Motor length	**LB**	**[mm]**	433.5		539		596.5
Length of motor options	**Δ L**	**[mm]**	200.5		237		267
Motor diameter	**AC**	**[mm]**	261		313		351
Distance motor/connection	**AD**	**[mm]**	182		231		282

Dimensions, 4-pole motors

GKS14, 4-stage gearboxes

Dimensions with solid shaft and foot (VBR)
Dimensions with solid shaft and foot, centering (VAR)

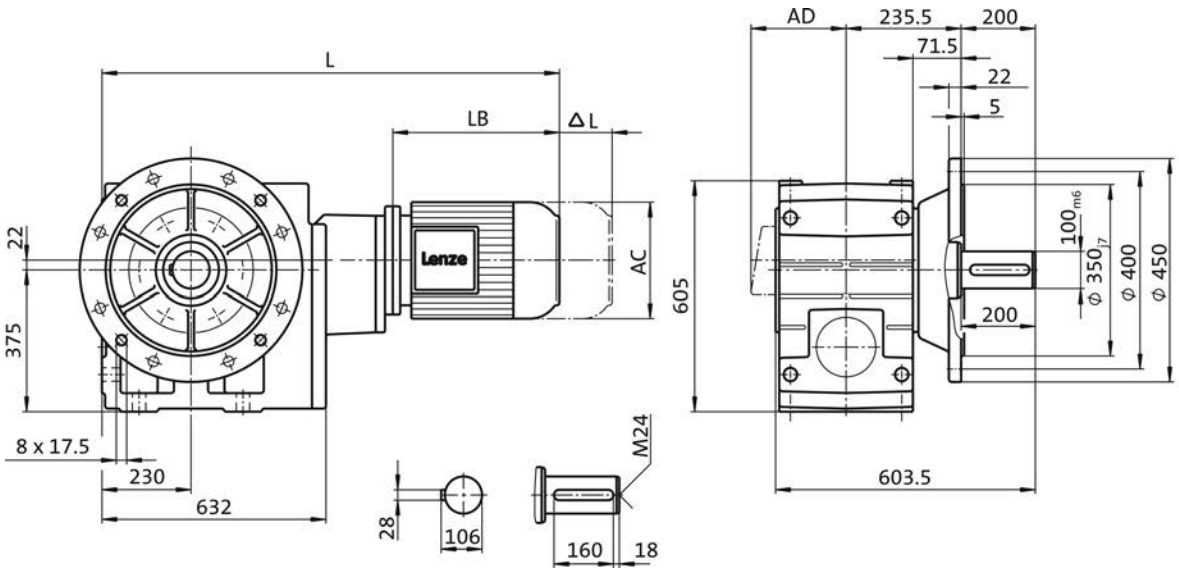


Product			m500				
			-P132L4	-P132M4	-P160L4	-P160M4	-P180M4
Dimensions							
Total length	**L**	**[mm]**	1243		1353		1411
Motor length	**LB**	**[mm]**	433.5		539		596.5
Length of motor options	**Δ L**	**[mm]**	200.5		237		267
Motor diameter	**AC**	**[mm]**	261		313		351
Distance motor/connection	**AD**	**[mm]**	182		231		282

Dimensions, 4-pole motors

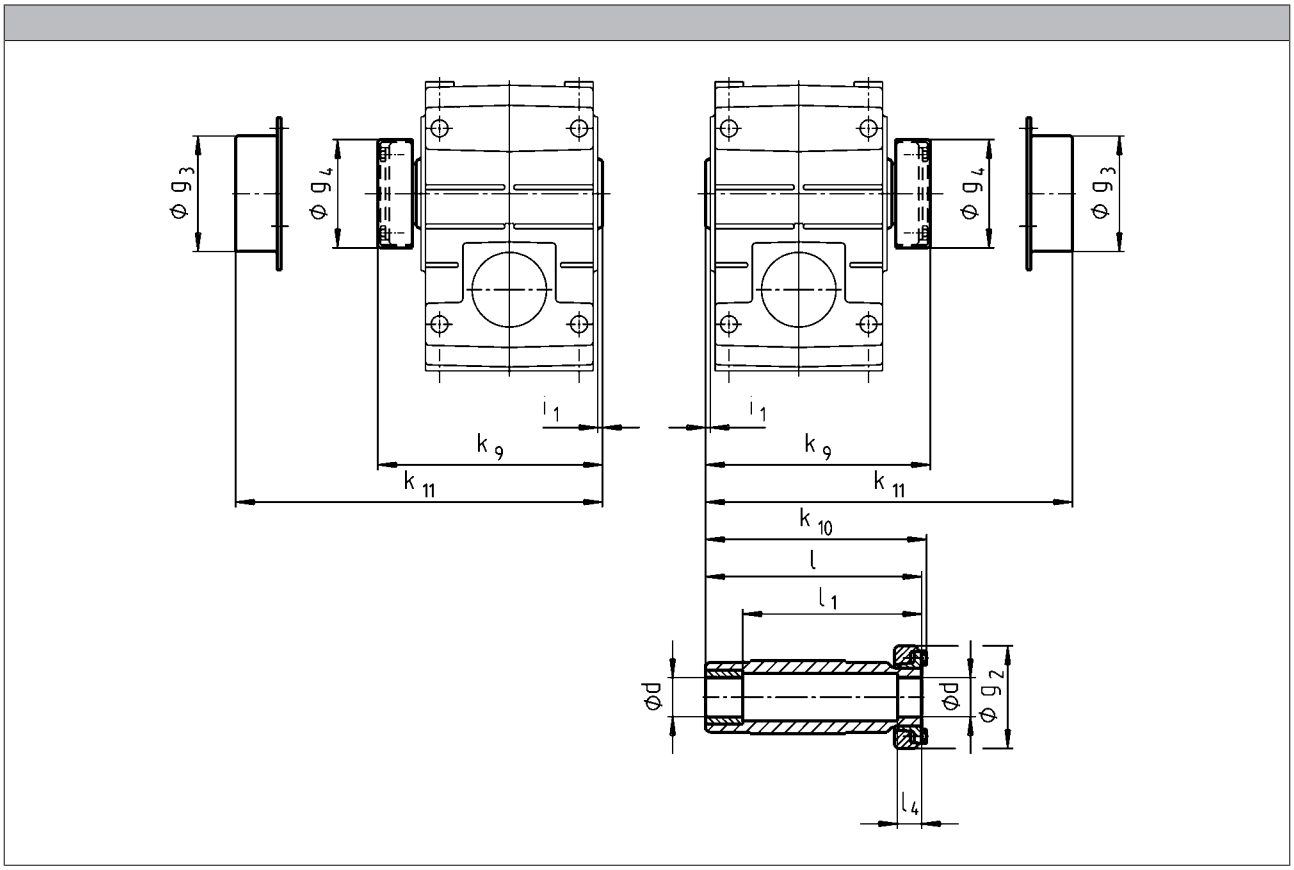
GKS14, 4-stage gearboxes

Dimensions with solid shaft and foot, flange (VAK)



Product			m500				
			-P132L4	-P132M4	-P160L4	-P160M4	-P180M4
Dimensions							
Total length	**L**	**[mm]**	1243		1353		1411
Motor length	**LB**	**[mm]**	433.5		539		596.5
Length of motor options	**Δ L**	**[mm]**	200.5		237		267
Motor diameter	**AC**	**[mm]**	261		313		351
Distance motor/connection	**AD**	**[mm]**	182		231		282

Hollow shaft with shrink disc

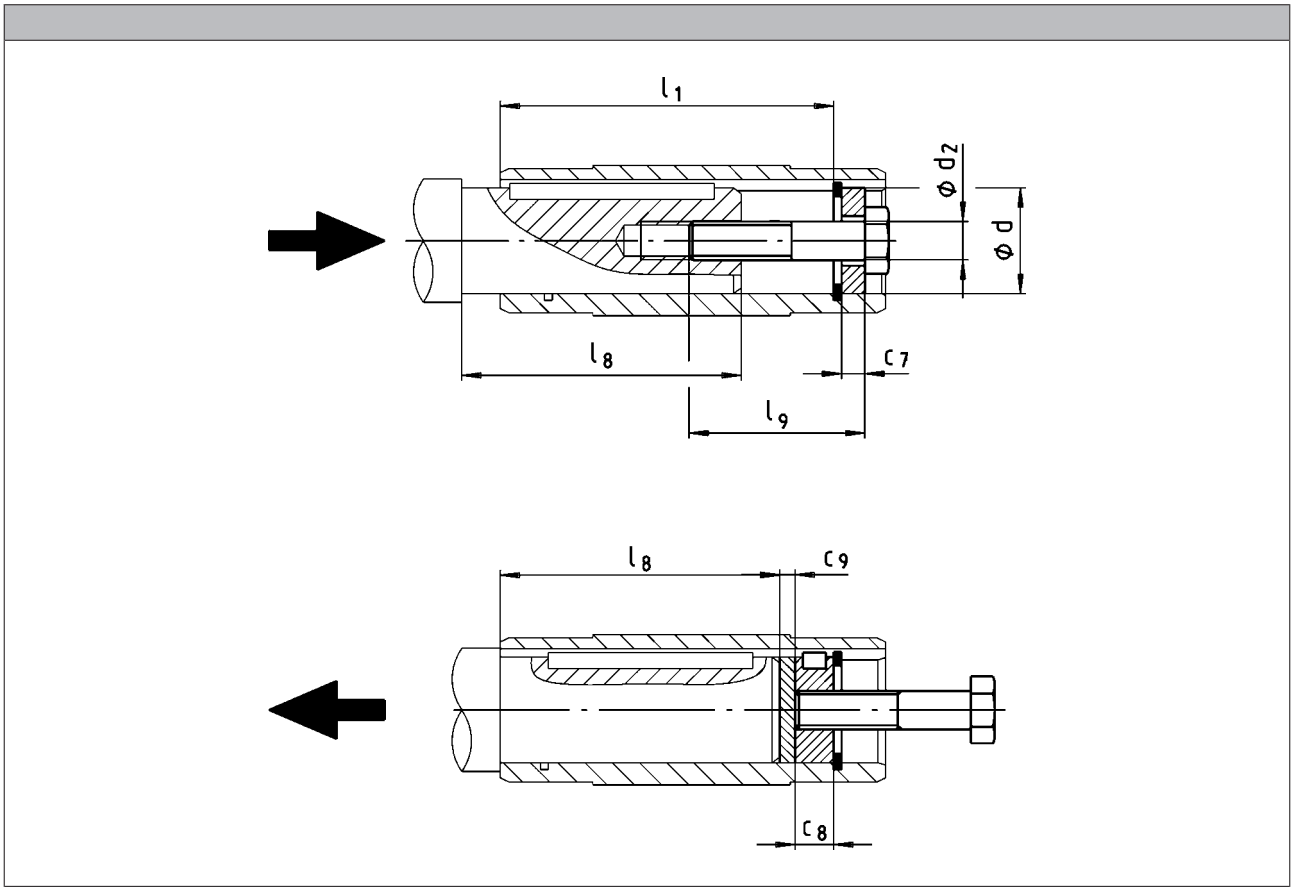


	d	g_2	g_3	g_4	i_1	k_9	k_{10}	k_{11}	l	l_1	l_4
	h6										
GKS04	25 30	72	79	76	2.5	150	148	154	142	122	26
GKS05	35	80	90	84	4.0	176	174	179	168	148	28
GKS06	40	90	100	94		202	200	204	194	164	30
GKS07	50	110	124	116	5.0	241	238	244	232	192	26
GKS09	65	141	159	147		288	285	287	278	228	30
GKS11	80	170	191	176	6.0	347	344	349	338	238	42
GKS14	100	215	253	221	7.0	418	415	421	407	307	55

► Output flange and hollow shaft with shrink disc (output version SAK) are not possible in the same location. For additional dimensions see output version H□□.

► Ensure that the strength of the machine shaft material is adequate in shrink disc designs.
When using typical steels, e.g. C45, 42CrMo4, the torques listed in the selection tables can be used without restriction.
Please consult us if you wish to use material that is considerably weaker. Medium surface roughness Rz must not exceed 15 µm (turning is sufficient).

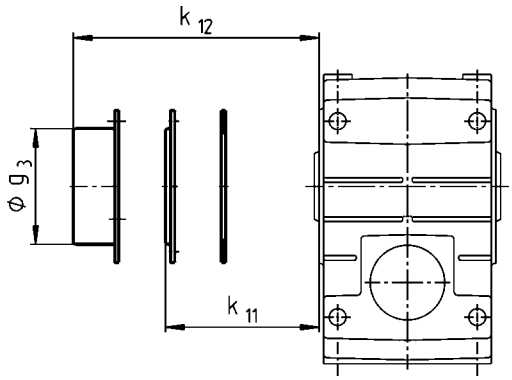
Mounting set for hollow shaft circlip:
Proposed design for auxiliary tools



	d	l_1	d_2	l_9	c_7	c_8	c_9	$l_{8,\,max}$
	H7							
GKS04	25 30	100	M10	40	5	10	3	85
					6			
GKS05	30 35	124						107
			M12	50	7	12		
GKS06	40 45	140	M16	60	8	16	4	118
					9			
GKS07	50 55	175			10		5	148
			M20	80	11	20		
GKS09	60 70	210			13			182
					14			
GKS11	70 80	250					6	221
					16			
GKS14	100	305	M24	100	20	24	8	270

6.4

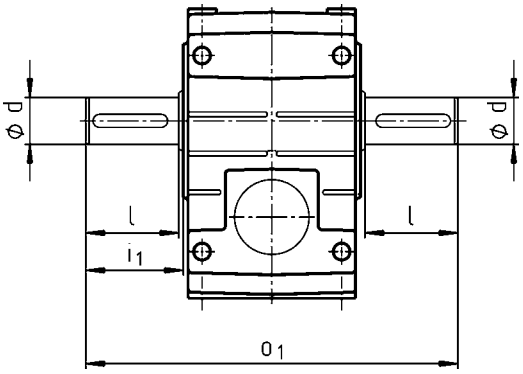
Hoseproof hollow shaft cover



► Cover including gasket

	k_{11}	k_{12}	g_3
GKS04	9		
GKS05	10		
GKS06	11		
GKS07			
GKS09		54	159
GKS11		67	191
GKS14		80	253

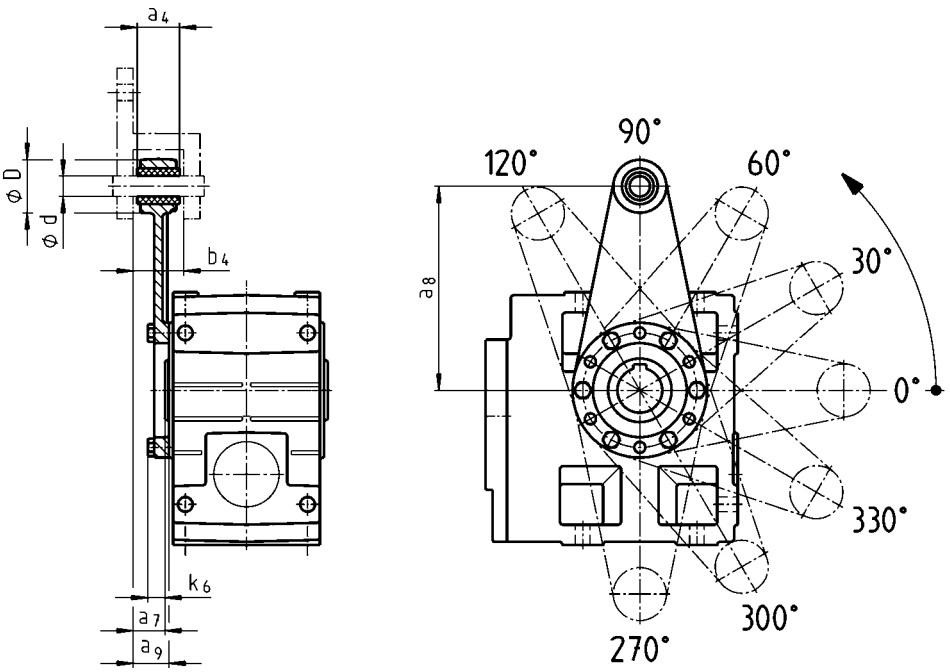
Gearboxes with 2nd output shaft end



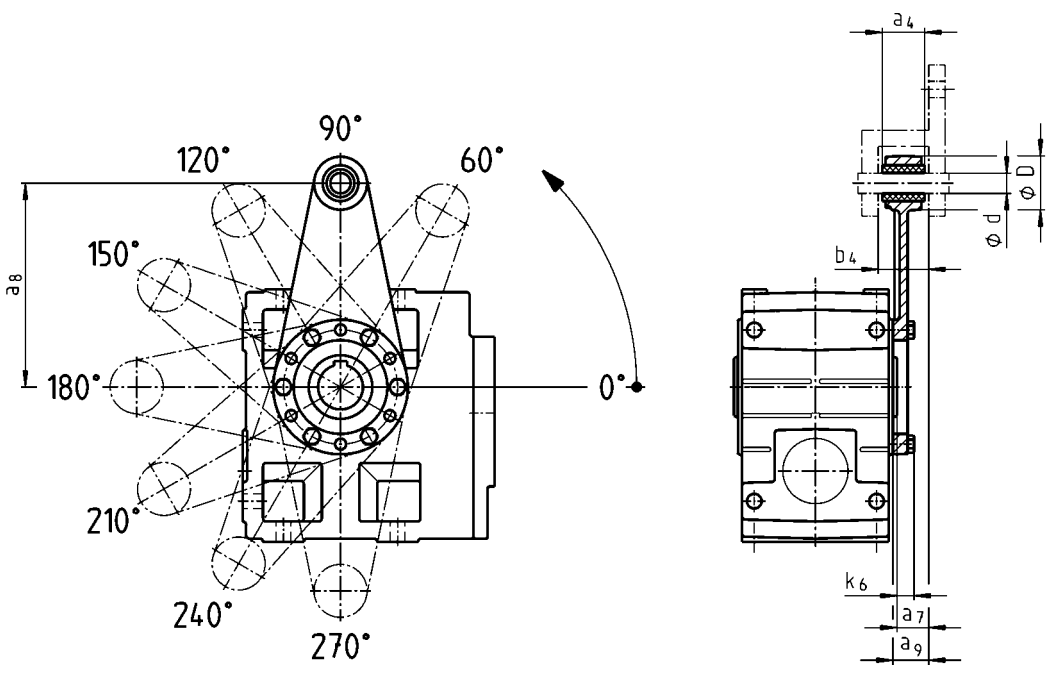
	d	d	l	i_1	o_1
	k6	m6			
GKS04	25		50	52.5	215
GKS05	30		60	64.0	260
GKS06	40		80	85.0	320
GKS07	50		100	105.0	400
GKS09		60	120	125.0	480
GKS11		80	160	166.0	610
GKS14		100	200	207.0	750

Torque plate on threaded pitch circle

In position 3



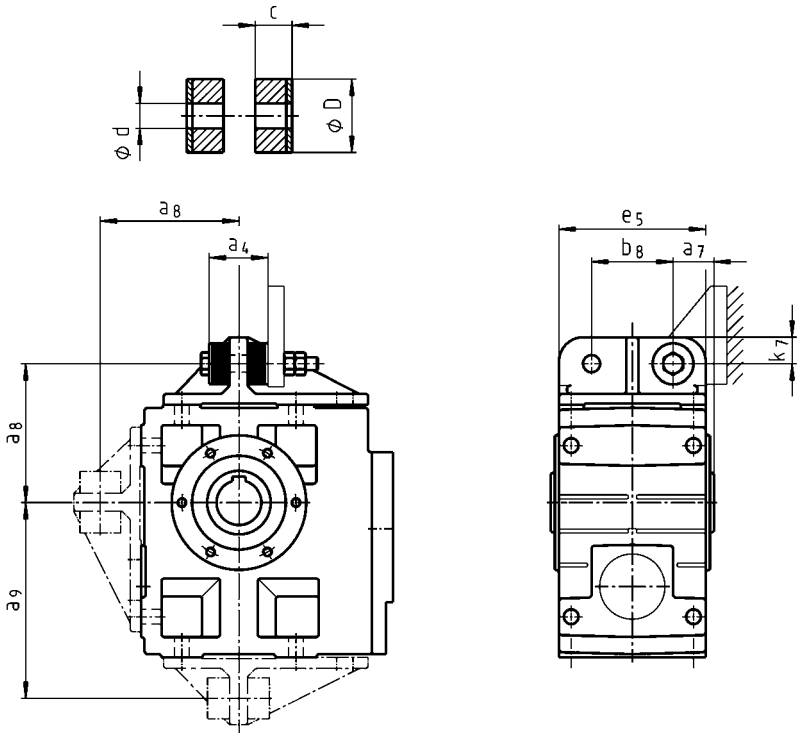
In position 5



	a_4	a_7	a_8	a_9	b_4	d	D	k_6
GKS04	30	24.0	130	26.5	34.5	12	35	16
GKS05	34	23.5	160	27.5	38.5	16	45	15
GKS06	40	28.0	200	33.0	44.5	20	50	18
GKS07	46	32.5	250	37.5	50.5	25	65	21

Torque plate at housing foot

In position 2, 4 or 6

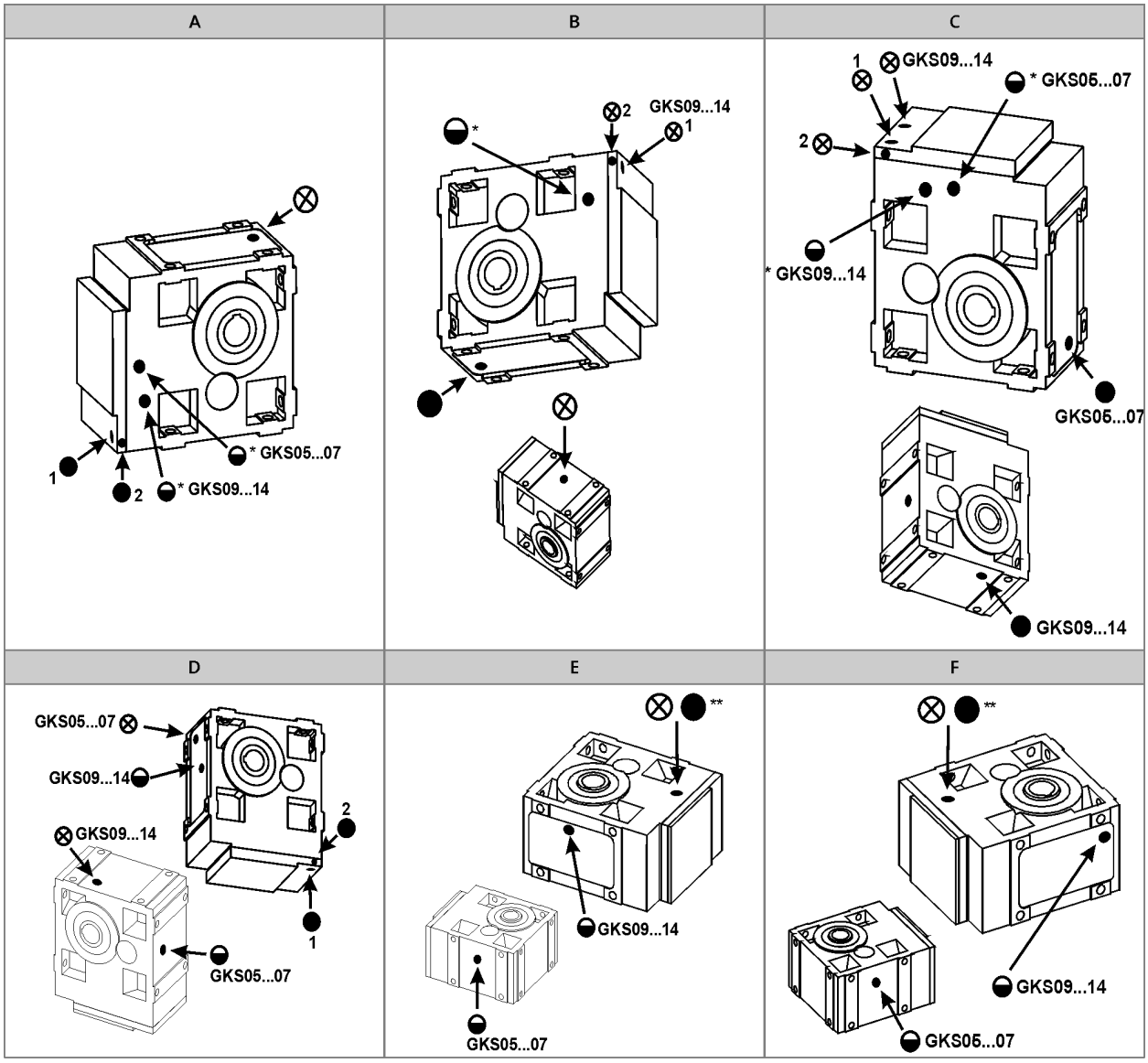


	a_4	a_7	a_8	a_9	b_8	c	d	D	e_5	k_7
GKS04	41	27.5	106	135.0	60	14.5	11	30	100	20
GKS05	45	35.0	115	160.0	70	15.0	13	40	127	25
GKS06	72	40.0	145	195.0	80	27.0	17	50	145	28
GKS07	78	50.0	170	240.0	100	28.0	21	60	180	35
GKS09	86	60.0	214	300.0	120	29.0	26	72	222	46
GKS11	94	72.5	260	375.0	145	30.0	31	92	270	55
GKS14	100	85.0	320	465.0	180		39	110	328	70

Ventilations

Position of ventilation, sealing elements and oil level check

GKS05...14-3



A to F Mounting position
⊗ Ventilation / Oil filler plug
● Oil drain plug
◒ Oil control plug
* On both sides
** On opposite side

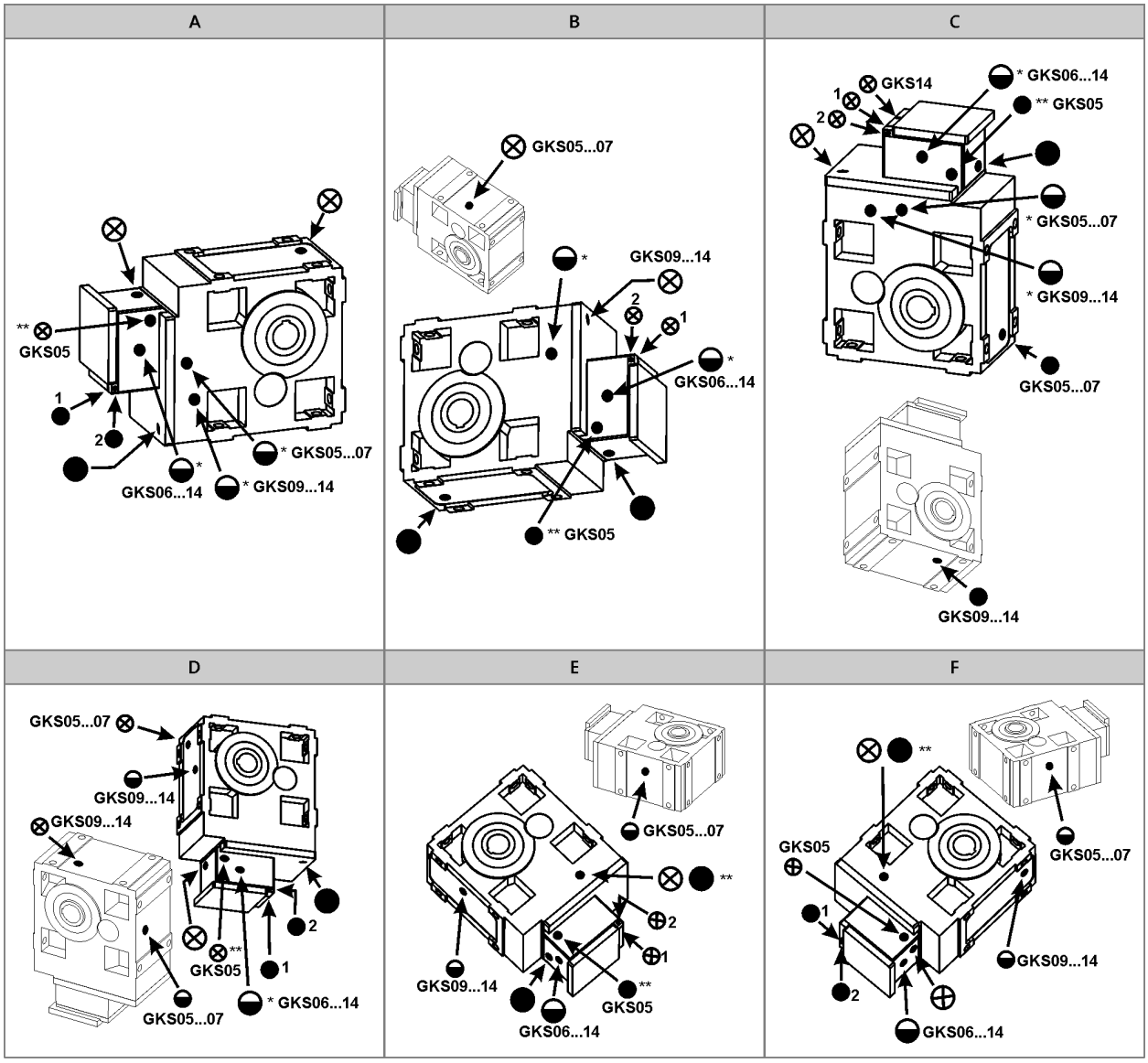
Pos.1 standard
Pos.2 only for:
- GKS05-3M □□□ 090□□□
- GKS05-3M □□□ 100□□□
- GKS06-3M □□□ 112□□□
- GKS07-3M □□□ 160□□□

6.4

Ventilations

Position of ventilation, sealing elements and oil level check

GKS05...14-4



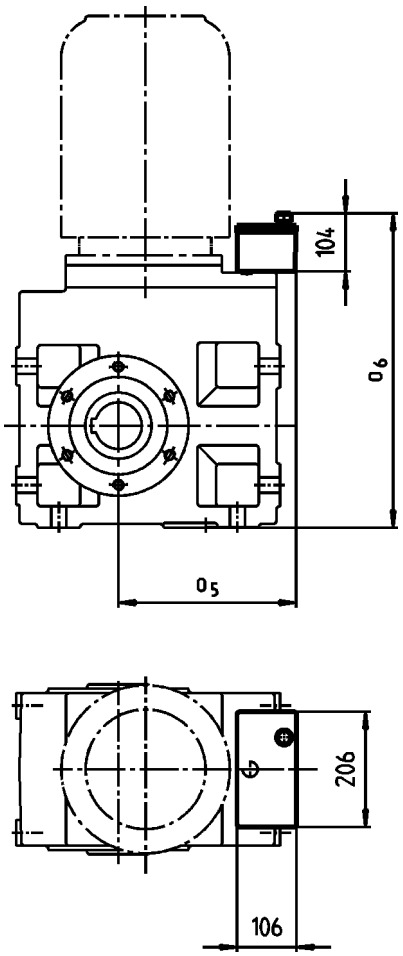
A to F Mounting position
⊗ Ventilation / Oil filler plug
● Oil drain plug
◒ Oil control plug
* On both sides
** On opposite side

Pos.1 standard
Pos.2 only for:
- GKS07-4M □□□ 090□□□
- GKS07-4M □□□ 100□□□
- GKS09-4M □□□ 112□□□

Ventilations

Compensation reservoir for mounting position C

GKS□□-3

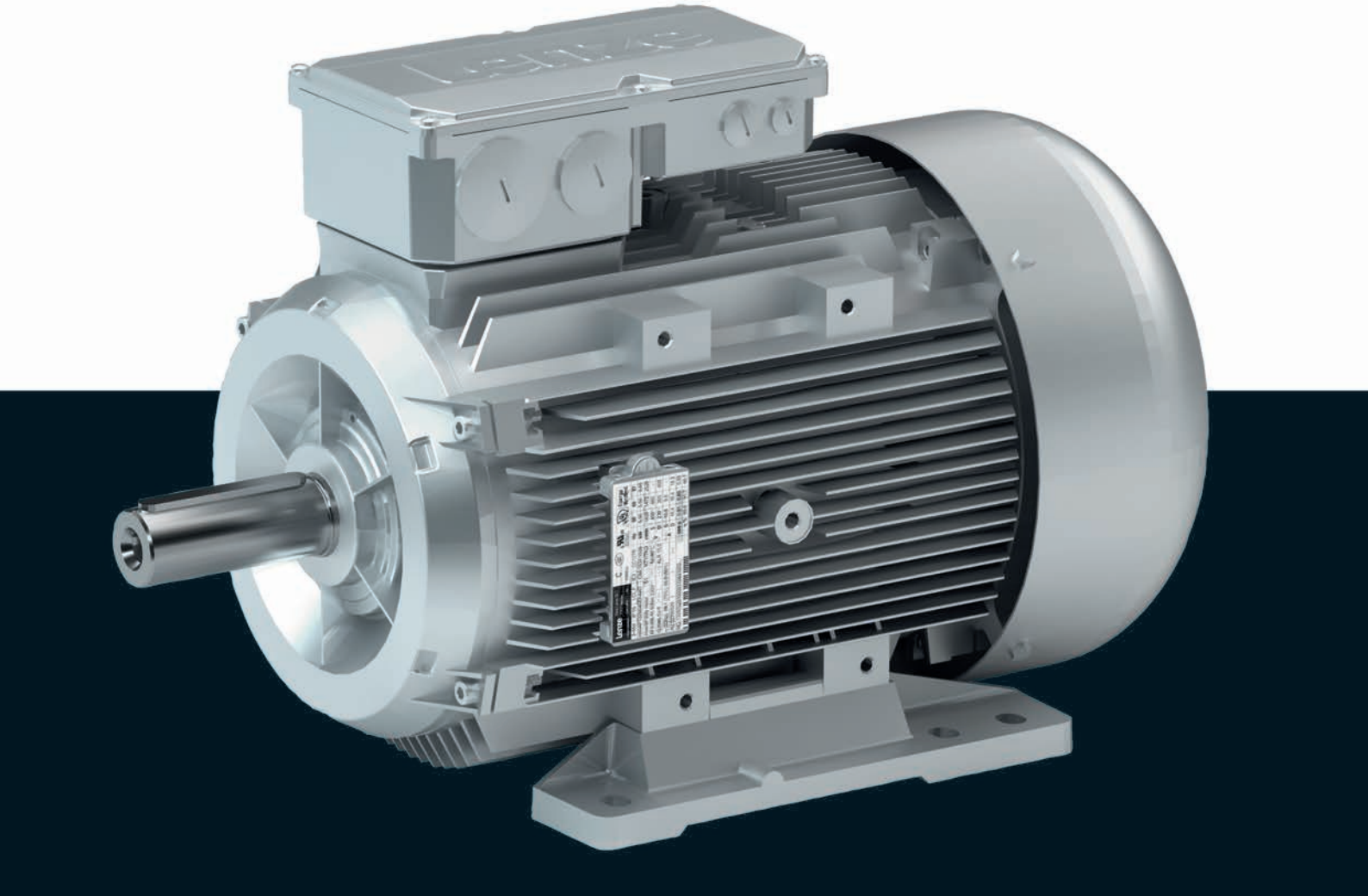


Motor	090 100		112		132		160 180 225	
	o_5 [mm]	o_6 [mm]	o_5 [mm]	o_6 [mm]	o_5 [mm]	o_6 [mm]	o_5 [mm]	o_6 [mm]
GKS09	243	533	265	533	282	533	297	533
GKS11	258	626	280	630	304	630	318	630
GKS14			313	739	343	739	343	739

► Terminal box position 4 not permitted.

IE3 three-phase AC motors m500

Inverter operation 5.5 ... 45 kW



IE3 three-phase AC motors m500

Contents

List of abbreviations

$\eta_{100\,\%}$	[%]	Efficiency
$\eta_{75\,\%}$	[%]	Efficiency
$\eta_{50\,\%}$	[%]	Efficiency
cos ϕ		Power factor
I_N	[A]	Rated current
I_{max}	[A]	Max. current consumption
J	[kgcm²]	Moment of inertia
m	[kg]	Mass
M_a	[Nm]	Starting torque
M_b	[Nm]	Stalling torque
M_{max}	[Nm]	Max. torque
M_N	[Nm]	Rated torque
n_N	[r/min]	Rated speed
P_N	[kW]	Rated power
P_{max}	[kW]	Max. power input

CE	Communauté Européenne
CSA	Canadian Standards Association
DIN	Deutsches Institut für Normung e.V.
EMC	Electromagnetic compatibility
EN	European standard
IEC	International Electrotechnical Commission
IM	International Mounting Code
IP	International Protection Code
NEMA	National Electrical Manufacturers Association
UL	Underwriters Laboratory Listed Product
UR	Underwriters Laboratory Recognized Product
VDE	Verband deutscher Elektrotechniker (Association of German Electrical Engineers)
CCC	China Compulsory Certificate
EAC	Customs union Russia / Belarus / Kazakhstan certificate
cURus	Combined certification marks of UL for the USA and Canada
UkrSEPRO	Certificate for Ukraine

U_{max}	[V]	Max. mains voltage
U_{min}	[V]	Min. mains voltage
$U_{N,\Delta}$	[V]	Rated voltage
$U_{N,Y}$	[V]	Rated voltage

Inverter-operated motors

In a power range of 0.12 to 45 KW, Lenze offers inverter-driven three-phase AC motors for comprehensive tasks.

They differ with regard to the efficiency class and can be used for the types required for open-loop or closed-loop controlled inverter operation.

Customer benefit

- Different efficiency classes for the greatest economic benefit
- Saving of space by compact direct mounting to Lenze gearboxes
- Market-oriented modular system enables the ubiquitous use for extensive machine tasks
- Connectors that are currently used on the market allow for a quick connection also if service tasks are to be carried out

Motor	Efficiency class	Power range	Supply voltage
MD three-phase AC motor	IE1 motor	0.12 ... 22 kW	230/400 and 460 V
MH three-phase AC motor	IE2 motor	0.75 ... 45 kW	230/400 and 460 V
MF three-phase AC motor		0.55 ... 22 KW	230/400 V
m500-P three-phase AC motor	IE3 motor	5.5 ... 45 kW	230/400 and 460 V

Product information

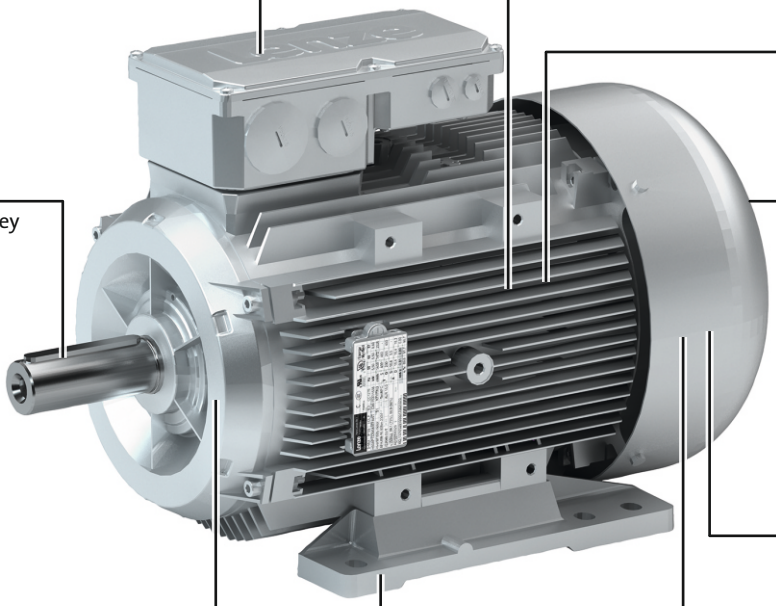
The product name

Operational performance	Product range		Design	Peak height	Motor length	Number of poles	Product
Inverter operation	m500	-	P	132	M	4	m500-P132M4
					L		m500-P132L4
				160	M		m500-P160M4
					L		m500-P160L4
				180	M		m500-P180M4
					L		m500-P180L4
					V		m500-P180V4
				200	M		m500-P200M4
				225			m500-P225M4
					L		m500-P225L4

Equipment

Overview

The equipment includes all the options available as standard and all the built-on accessories of the product.



Motor connection
Terminal box
Connector ICN
Connector HAN

Output shaft
Solid shaft with feather key

Motor design
Flange (B5)with through holes

Motor design
Foot (B3)

Number of poles
4-pole, 5.5 ... 45 kW

Temperature monitoring
Thermal contact TKO
pTC thermistor
Thermal detector KTY

Cooling
Integral fan
Blower

Feedback
No
Resolver
Incremental encoder
Absolute value encoder

Spring-applied brake
No
Standard
Option manual release lever

The modular motor system

Motor details

Product	m500-P132M4	m500-P132L4	m500-P160M4	m500-P160L4	m500-P180M4	m500-P180L4
Technical data						
Rated power	5.5 kW	7,5 kW	11 kW	15 kW	18.5 kW	22 kW
Supply voltage	230/400 V; 460 V					
Operating mode	S1					
Motor design	B3 B5-FF265		B3 B5-FF300			
Motor shaft	38 x 80 mm		42 x 110 mm		48 x 110 mm	
Colour	Primed Paint in various corrosion-protection designs in accordance with RAL colours					
Surface and corrosion protection	Without OKS(uncoated) OKS-G (primed) OKS-S (small) OKS-M (medium) OKS-L (large) OKS-XL (extra Large)					
Connection type	Terminal box ICN connector HAN-Modular connector		Terminal box HAN-Modular connector		Terminal box	
Spring-applied brake						
Rated torque [Nm]	60 80		80 150		150 260	
Brake voltage [V]	DC 24 AC 230 AC 400 AC 460					
Brake design	Standard					
	Standard Overexcited Cold Brake					
Options	Manual release lever Low noise					
Feedback	With absolute value encoder With incremental encoder With resolver					
Cooling	Integral fan Blower					
Temperature monitoring	TKO thermal contact PTC thermistor KTY83-110 thermal detector KTY84-130 thermal detector Thermal TCO contact + PTC thermistor Thermal contact TCO + thermal detector KTY83-110 Thermal TCO contact + thermal detector KTY84-130					
Approval	cURus [1)]					
Enclosure	IP55					

[1)] In preparation.

The modular motor system

Motor details

Product	m500-P180V4 [1]	m500-P200M4	m500-P225M4	m500-P225L4
Technical data				
Rated power	30 kW		37 kW	45 kW
Supply voltage	230/400 V; 460 V			
Operating mode	S1			
Motor design		B3 B5-FF350	B3 B5-FF400	
Motor shaft		55 x 110 mm	60 x 140 mm	
Colour	Primed Paint in various corrosion-protection designs in accordance with RAL colours			
Surface and corrosion protection	Without OKS(uncoated) OKS-G (primed) OKS-S (small) OKS-M (medium) OKS-L (large) OKS-XL (extra Large)			
Connection type	Terminal box			
Spring-applied brake				
Rated torque [Nm]	150 260		400	
Brake voltage [V]	DC 24 AC 230 AC 400 AC 460			
Brake design	Standard			
	Standard Overexcited Cold Brake			
Options	Manual release lever Low noise			
Feedback	With absolute value encoder With incremental encoder With resolver			
Cooling	Integral fan Blower			
Temperature monitoring	TKO thermal contact PTC thermistor KTY83-110 thermal detector KTY84-130 thermal detector Thermal TCO contact + PTC thermistor Thermal contact TCO + thermal detector KTY83-110 Thermal TCO contact + thermal detector KTY84-130			
Approval	cURus [2]			
Enclosure	IP55			

[1] This motor is intended for direct mounting to a gearbox and is not available in motor design B3 or B5.
[2] In preparation.

The modular motor system

Motor details

Design

B3 (with foot)

B5 (with flange)

Connection type

Terminal box

ICN connector

HAN connector

Cooling: integral fan

Without built-on accessories

With spring-applied brake
With or without manual release lever

With feedback
With feedback and spring-applied brake

Cooling: blower

Without built-on accessories

With spring-applied brake
With or without manual release lever

With feedback
With feedback and spring-applied brake

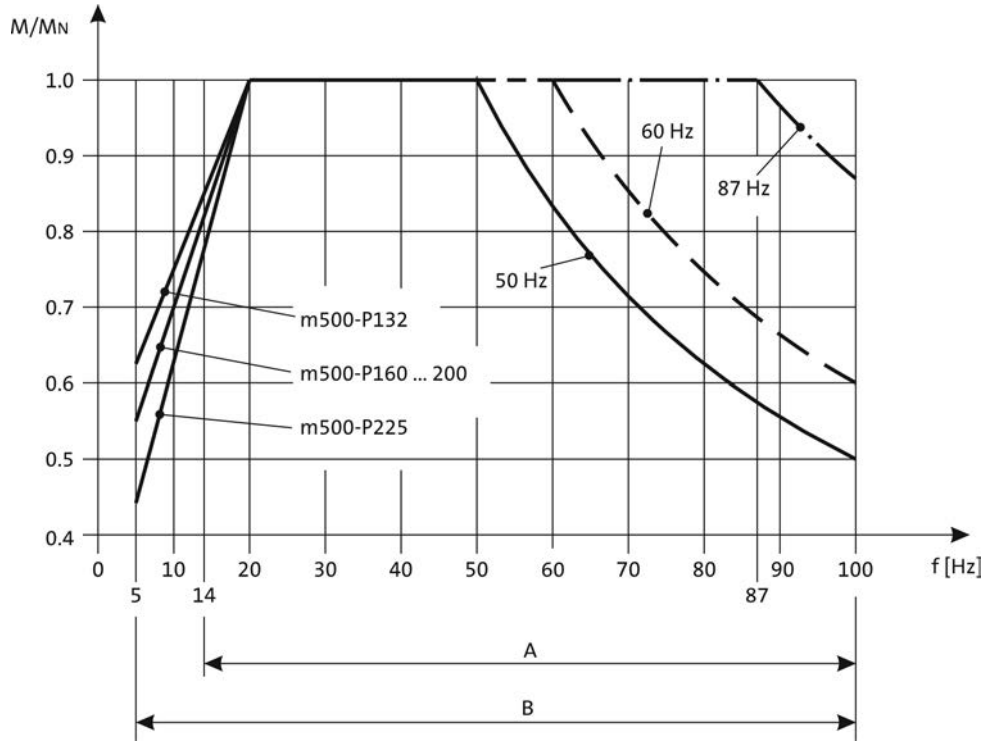
Dimensioning

Torque derating at low motor frequencies

During operation with the rated torque at low speeds (< 20 Hz), the integral fan does not rotate fast enough anymore to ensure sufficient cooling of the motor. In order to prevent overheating, operation without a blower requires a torque reduction of the motor.
The blower cools the motor steadily and irrespective of the motor speed. A torque reduction is not required and the motor can be actuated with its rated torque from 5 Hz to the rated frequency.

The diagram shows the motor frame size-dependent torque reduction for self-ventilated motors, taking the thermal behaviour during actuation of the inverter into consideration.

Torque characteristics



A = Operation with integral fan and brake
B = Operation with integral fan and brake control "Holding current reduction"

► The motor specifications stated in this catalogue for inverter operation apply to operation with a Lenze inverter. If you are uncertain, get in touch with the manufacturer of the inverter to ask whether the device is capable of driving the motor with the stated specifications (e.g. setting range, base frequency).

6.6

You can use the Drive Solution Designer for precise drive dimensioning.

The Drive Solution Designer helps you to carry out a fast and high-quality drive dimensioning.
The software includes well-founded and proven knowledge on drive applications and electro-mechanical drive components.

Please contact your Lenze sales office.

Standards and operating conditions

Overview

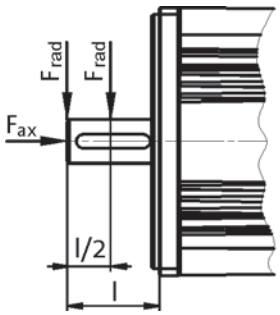
Enclosure			
EN 60529			IP55
Energy efficiency class			
IEC 60034-30			IE3
IEC 60034-2-1			Methodology for measuring efficiency
Conformity			
CE			Low-Voltage Directive
			-
Temperature class			
IEC/EN 60034-1; utilisation			B
IEC/EN 60034-1; insulation system (enamel-insulated wire)			F
Vibrational severity			
IEC/EN 60034-14			A
Climatic conditions			
Transport (EN 60721-3-2)			2K3 (temperature: -20 °C ... +70 °C)
Storage (EN 60721-3-1)			1K3 (temperature: -20 °C ... +60 °C)
Storage (EN 60721-3-1) > 3 months			1K3 (Temperature: -20 °C ... +40 °C)
Operation (EN 60721-3-3)			3K3 (temperature: -20 °C ... +40 °C)
Operation (EN 60721-3-3) with brake			3K3 (temperature : -10 °C ... +40 °C)
Operation (EN 60721-3-3) with blower			3K3 (Temperature: -15 °C ... +40 °C)
Max. ambient temperature for operation			
With power reduction	$T_{opr,max}$	[°C]	60
Site altitude			
Amsl	H_{max}	[m]	4000

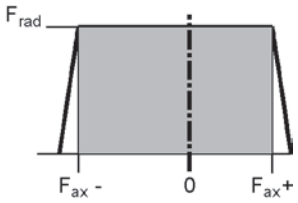
[1)] Types with deviating degrees of protection:
IP55 with brake (IP54 with manual release lever).

► In the European Union, the ErP Directive stipulates minimum efficiency levels for three-phase AC motors. Geared three-phase AC motors that do not conform with this Directive do not meet CE requirements and must not be marketed in the European Economic Area. For further information about the ErP Directive and the Lenze products to which it relates, please refer to the brochure entitled "International efficiency directives for three-phase AC motors".

Permissible radial and axial forces

Application of forces





Application of force at l/2

► Forces at medium speed 2000 r/min.

Bearing service life L_{10}												
	10000 h			20000 h			30000 h			50000 h		
	F_{rad} [N]	$F_{ax,-}$ [N]	$F_{ax,+}$ [N]	F_{rad} [N]	$F_{ax,-}$ [N]	$F_{ax,+}$ [N]	F_{rad} [N]	$F_{ax,-}$ [N]	$F_{ax,+}$ [N]	F_{rad} [N]	$F_{ax,-}$ [N]	$F_{ax,+}$ [N]
m500-P132M4	2323	-653	1253	1863	-422	1022	1639	-313	913	1357	-201	801
m500-P132L4	2323	-653	1253	1863	-422	1022	1639	-313	913	1357	-201	801
m500-P160M4	4074	-1407	2067	3264	-984	1644	2871	-787	1447	2444	-583	1243
m500-P160L4	4074	-1407	2067	3264	-984	1644	2871	-787	1447	2444	-583	1243
m500-P180M4	4943	-1580	2480	3969	-1088	1988	3496	-854	1754	2983	-594	1494
m500-P180L4	4943	-1580	2480	3969	-1088	1988	3496	-854	1754	2983	-594	1494
m500-P200M4	6666	-2202	3122	5359	-1555	2475	4724	-1251	2171	4036	-942	1862
m500-P225M4	7386	-2527	3477	5956	-1800	2750	5260	-1460	2410	4508	-1111	2061
m500-P225L4	7386	-2527	3477	5956	-1800	2750	5260	-1460	2410	4508	-1111	2061

► The values for the bearing service life L_{10} refer to an average speed of 2000 r/min. Depending on the ambient temperatures, the service life of the bearings is also reduced by the grease lifetime.
► Data for axial forces relate to the maximum radial force with the corresponding bearing service life.

Permissible radial and axial forces

Application of force at l

► Forces at medium speed 2000 r/min.

Bearing service life L_{10}												
	10000 h			20000 h			30000 h			50000 h		
	F_{rad} [N]	$F_{ax,-}$ [N]	$F_{ax,+}$ [N]	F_{rad} [N]	$F_{ax,-}$ [N]	$F_{ax,+}$ [N]	F_{rad} [N]	$F_{ax,-}$ [N]	$F_{ax,+}$ [N]	F_{rad} [N]	$F_{ax,-}$ [N]	$F_{ax,+}$ [N]
m500-P132M4	2091	-653	1253	1677	-422	1022	1475	-313	913	1257	-201	801
m500-P132L4	2091	-653	1253	1677	-422	1022	1475	-313	913	1257	-201	801
m500-P160M4	3610	-1407	2067	2892	-984	1644	2543	-787	1447	2166	-583	1243
m500-P160L4	3610	-1407	2067	2892	-984	1644	2543	-787	1447	2166	-583	1243
m500-P180M4	4462	-1580	2480	3583	-1088	1988	3156	-854	1754	2693	-594	1494
m500-P180L4	4462	-1580	2480	3583	-1088	1988	3156	-854	1754	2693	-594	1494
m500-P200M4	6069	-2202	3122	4880	-1555	2475	4301	-1251	2171	3675	-942	1862
m500-P225M4	6588	-2527	3477	5313	-1800	2750	4692	-1460	2410	4021	-1111	2061
m500-P225L4	6588	-2527	3477	5313	-1800	2750	4692	-1460	2410	4021	-1111	2061

► The values for the bearing service life L_{10} refer to an average speed of 2000 r/min. Depending on the ambient temperatures, the service life of the bearings is also reduced by the grease life-time.
► Data for axial forces relate to the maximum radial force with the corresponding bearing service life.

Rated data for 50 Hz

4-pole motors

	P_N	n_N	$U_{N,\Delta}$	$I_{N,\Delta}$	$U_{N,Y}$	$I_{N,Y}$	I_a/I_N
			± 5 %		± 5 %		
	[kW]	[r/min]	[V]	[A]	[V]	[A]	
m500-P132M4	5.50	1460	230	18.4	400	10.6	8.50
m500-P132L4	7.50	1477	230	25.5	400	14.7	7.30
m500-P160M4	11.0	1478	230	39.5	400	22.8	9.40
m500-P160L4	15.0	1470	230	53.0	400	30.6	9.30
m500-P180M4	18.5	1483	230	58.4	400	33.7	9.10
m500-P180L4	22.0	1480	230	69.6	400	40.2	8.20
m500-P180V4 [1)]	30.0	1478	230	96.0	400	55.4	11.2
m500-P200M4	30.0	1478	230	96.0	400	55.4	11.2
m500-P225M4	37.0	1483	230	120	400	69.3	10.7
m500-P225L4	45.0	1482	230	146	400	84.3	9.40

	M_N	M_a	M_b	cos ϕ	$\eta_{50\,\%}$	$\eta_{75\,\%}$	$\eta_{100\,\%}$	J [2)]	m [2)]
	[Nm]	[Nm]	[Nm]		[%]	[%]	[%]	[kgcm²]	[kg]
m500-P132M4	36.0	119	137	0.84	88.6	90.3	89.6	300	57.0
m500-P132L4	48.5	155	213	0.83	89.7	90.5	90.4	340	69.0
m500-P160M4	71.1	249	320	0.76	89.8	91.2	91.4	770	108
m500-P160L4	97.4	321	419	0.77	90.9	91.9	92.1	810	119
m500-P180M4	119	357	429	0.85	93.0	93.2	92.6	1730	157
m500-P180L4	142	369	440	0.85	92.9	93.2	93.0	1730	157
m500-P180V4 [1)]	194	736	853	0.84	93.4	93.7	93.6	2150	185
m500-P200M4	194	736	853	0.84	93.4	93.7	93.6	2150	185
m500-P225M4	238	929	1072	0.81	93.4	94.2	93.9	4350	280
m500-P225L4	290	1218	1450	0.82	93.1	93.9	94.2	4350	280

[1)] This motor is intended for direct mounting to a gearbox and is not available in motor design B3 or B5.
[2)] Without accessories

Rated data for 60 Hz

4-pole motors

	P_N	n_N	$U_{N,Y}$	$I_{N,Y}$	I_a/I_N
			± 5 %		
	[kW]	[r/min]	[V]	[A]	
m500-P132M4	5.50	1765	460	9.40	9.90
m500-P132L4	7.50	1779	460	12.6	7.90
m500-P160M4	11.0	1780	460	20.3	10.5
m500-P160L4	15.0	1775	460	26.9	9.90
m500-P180M4	18.5	1783	460	29.5	10.1
m500-P180L4	22.0	1783	460	35.1	9.10
m500-P180V4 [1)]	30.0	1779	460	48.0	12.4
m500-P200M4	30.0	1779	460	48.0	12.4
m500-P225M4	37.0	1785	460	61.2	11.4
m500-P225L4	45.0	1783	460	73.9	10.2

	M_N	M_a	M_b	cos ϕ	$\eta_{50\,\%}$	$\eta_{75\,\%}$	$\eta_{100\,\%}$	J [2)]	m [2)]
	[Nm]	[Nm]	[Nm]		[%]	[%]	[%]	[kgcm²]	[kg]
m500-P132M4	29.8	104	128	0.82	89.5	91.1	91.7	300	57.0
m500-P132L4	40.3	145	181	0.82	89.6	91.2	91.7	340	69.0
m500-P160M4	59.0	212	301	0.75	89.5	91.4	92.4	770	108
m500-P160L4	80.7	291	363	0.75	91.1	92.4	93.0	810	119
m500-P180M4	99.1	317	406	0.84	92.3	93.4	93.6	1730	157
m500-P180L4	118	318	401	0.84	92.7	93.6	93.6	1730	157
m500-P180V4 [1)]	161	660	805	0.84	93.2	94.0	94.1	2150	185
m500-P200M4	161	660	805	0.84	93.2	94.0	94.1	2150	185
m500-P225M4	198	831	970	0.80	93.1	94.2	94.5	4350	280
m500-P225L4	241	1109	1205	0.81	93.4	94.5	95.0	4350	280

[1)] This motor is intended for direct mounting to a gearbox and is not available in motor design B3 or B5.
[2)] Without accessories

Rated data for 87 Hz

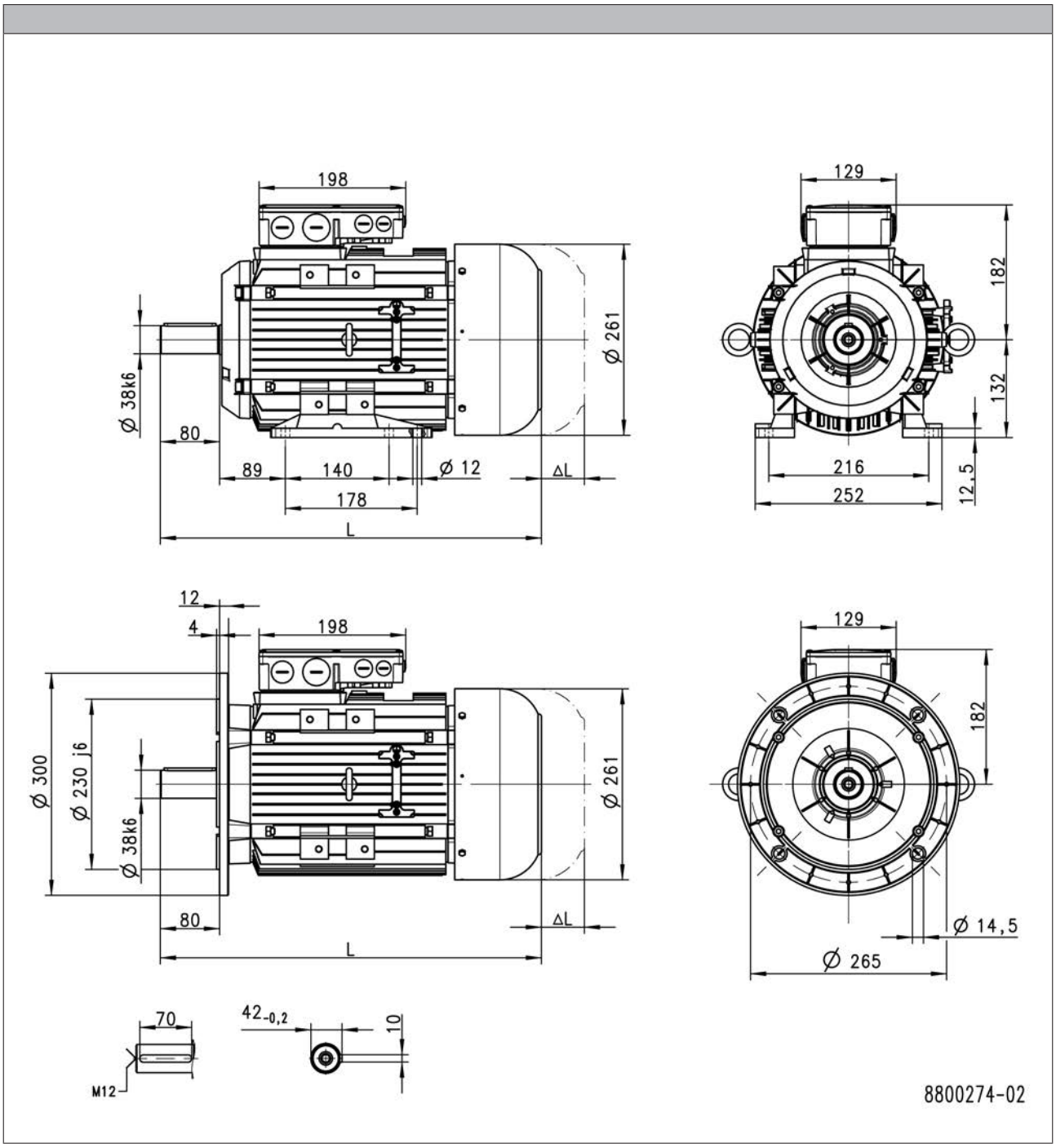
4-pole motors

	P_N	n_N	M_N	M_{max}	$U_{N,\Delta}$	$I_{N,\Delta}$	cos ϕ	$\eta_{50\,\%}$	$\eta_{75\,\%}$	$\eta_{100\,\%}$	J [2]	m [2]
					± 5 %							
	[kW]	[r/min]	[Nm]	[Nm]	[V]	[A]		[%]	[%]	[%]	[kgcm²]	[kg]
m500-P132M4	9.60	2570	36.0	144	400	19.9	0.78	88.0	90.0	89.6	300	57.0
m500-P132L4	13.1	2587	48.5	194	400	25.5	0.82	88.4	90.4	90.4	340	69.0
m500-P160M4	19.2	2588	71.1	284	400	39.9	0.76	90.5	92.0	91.4	770	108
m500-P160L4	26.3	2580	97.4	390	400	51.3	0.81	91.5	92.5	92.1	810	119
m500-P180M4	32.2	2593	119	476	400	58.4	0.86	91.8	93.3	92.6	1730	157
m500-P180L4	38.5	2590	142	568	400	70.1	0.86	92.3	93.5	93.0	1730	157
m500-P180V4 [1]	52.5	2588	194	775	400	96.0	0.84	92.9	93.7	93.6	2150	185
m500-P200M4	52.5	2588	194	775	400	96.0	0.84	92.9	93.7	93.6	2150	185
m500-P225M4	64.8	2593	238	953	400	122	0.81	91.1	93.0	93.9	4350	280
m500-P225L4	78.7	2592	290	1160	400	150	0.80	92.0	93.4	94.2	4350	280

[1] This motor is intended for direct mounting to a gearbox and is not available in motor design B3 or B5.
[2] Without accessories

Dimensions, self-ventilated (4-pole)

m500-P132



Product			m500-P132M4	m500-P132L4
Dimensions				
Motor length	L	[mm]	515	
Length of motor options	Δ L	[mm]	124	

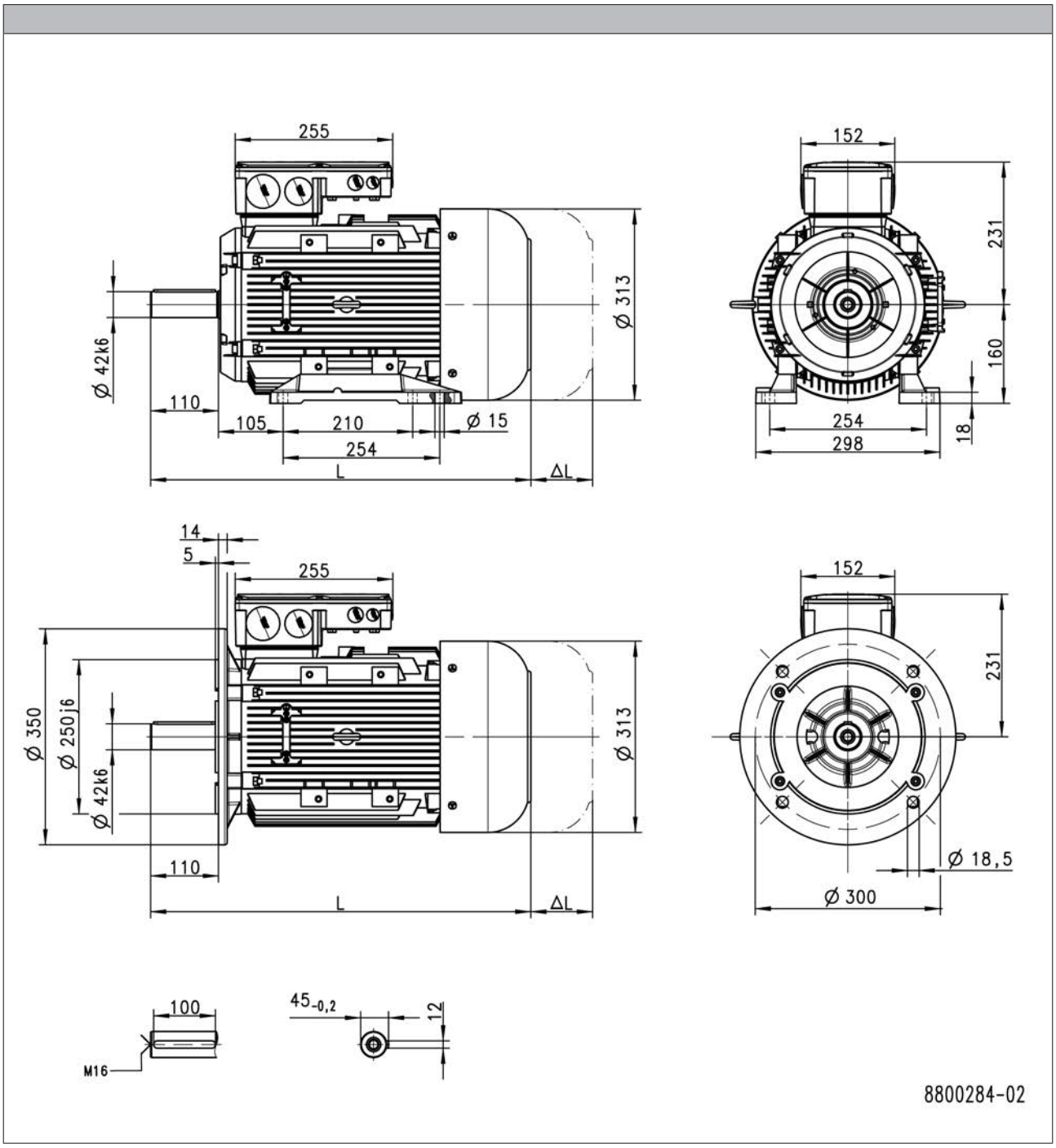
L = length of the motor without built-on accessories
ΔL = additional length of the built-on accessories (longest type)

27 - Additional length of the built-on accessories

6.6

Dimensions, self-ventilated (4-pole)

m500-P160



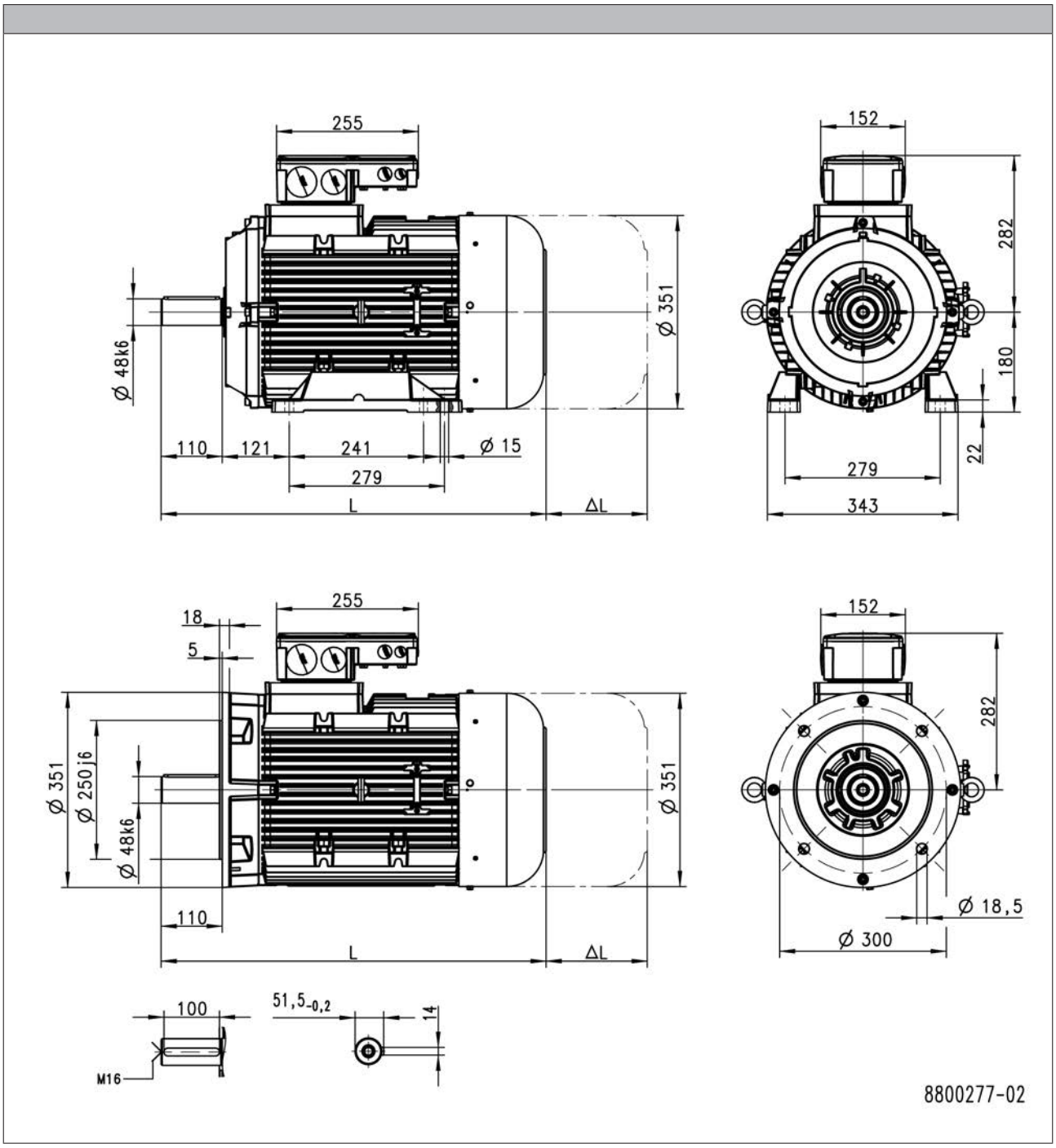
Product			m500-P160M4	m500-P160L4
Dimensions				
Motor length	L	[mm]	616	
Length of motor options	Δ L	[mm]	191	

L = length of the motor without built-on accessories
ΔL = additional length of the built-on accessories (longest type)

27 - Additional length of the built-on accessories

Dimensions, self-ventilated (4-pole)

m500-P180



Product			m500-P180M4	m500-P180L4
Dimensions				
Motor length	L	[mm]	693	
Length of motor options	Δ L	[mm]	182	

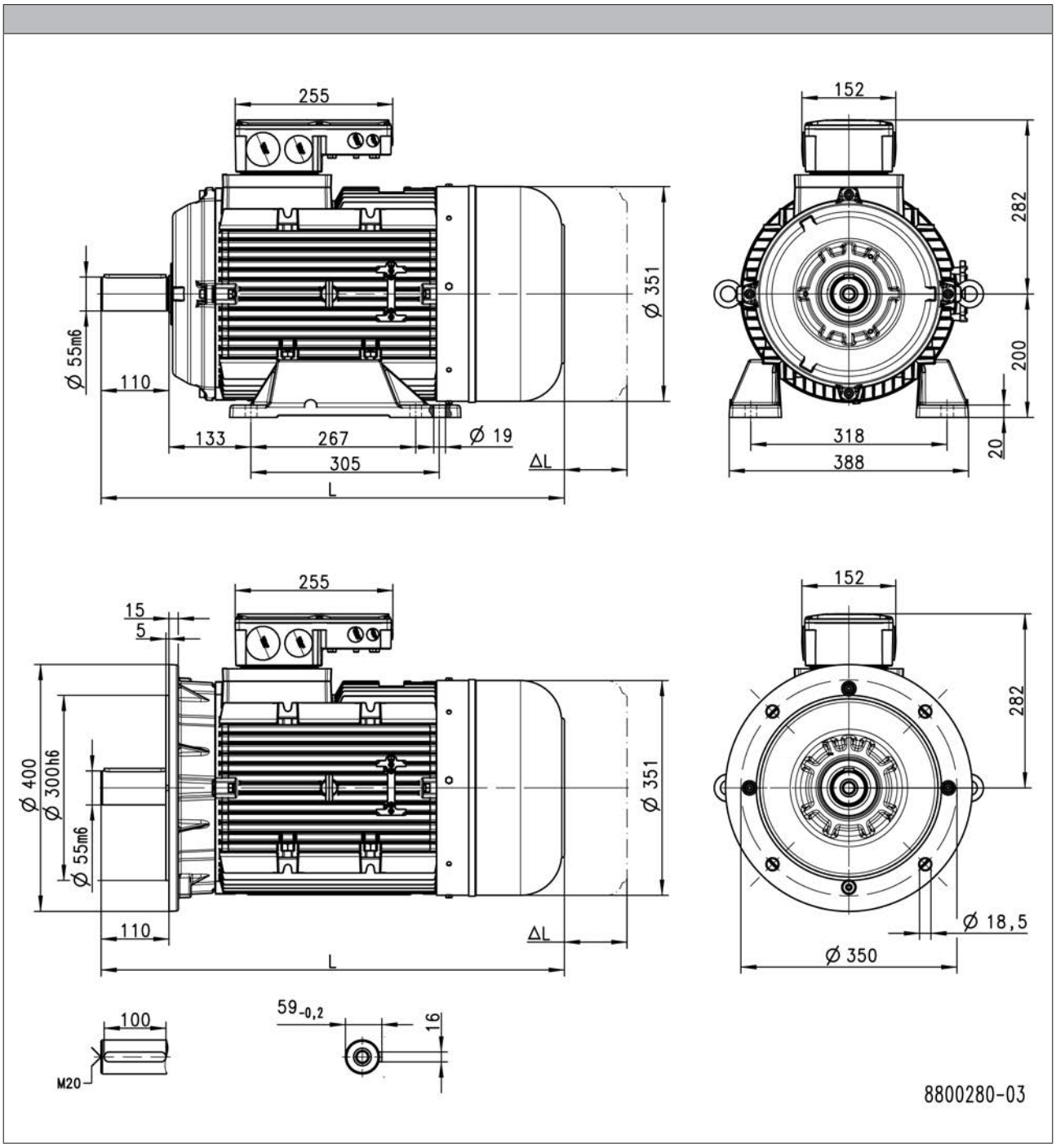
L = length of the motor without built-on accessories
ΔL = additional length of the built-on accessories (longest type)

27 - Additional length of the built-on accessories

6.6

Dimensions, self-ventilated (4-pole)

m500-P200



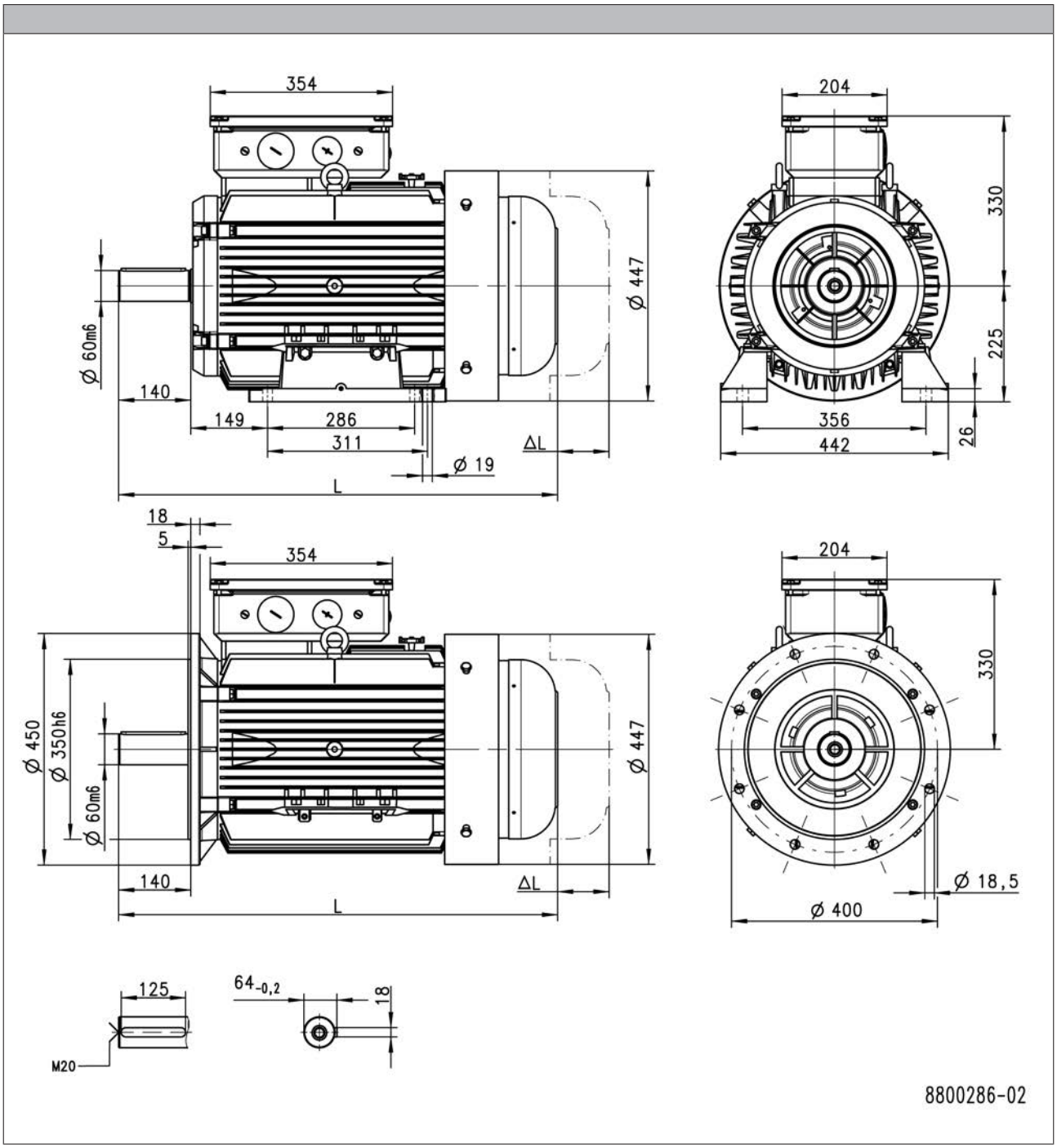
Product			m500-P200M4
Dimensions			
Motor length	L	[mm]	751
Length of motor options	Δ L	[mm]	191

L = length of the motor without built-on accessories
ΔL = additional length of the built-on accessories (longest type)

27 - Additional length of the built-on accessories

Dimensions, self-ventilated (4-pole)

m500-P225



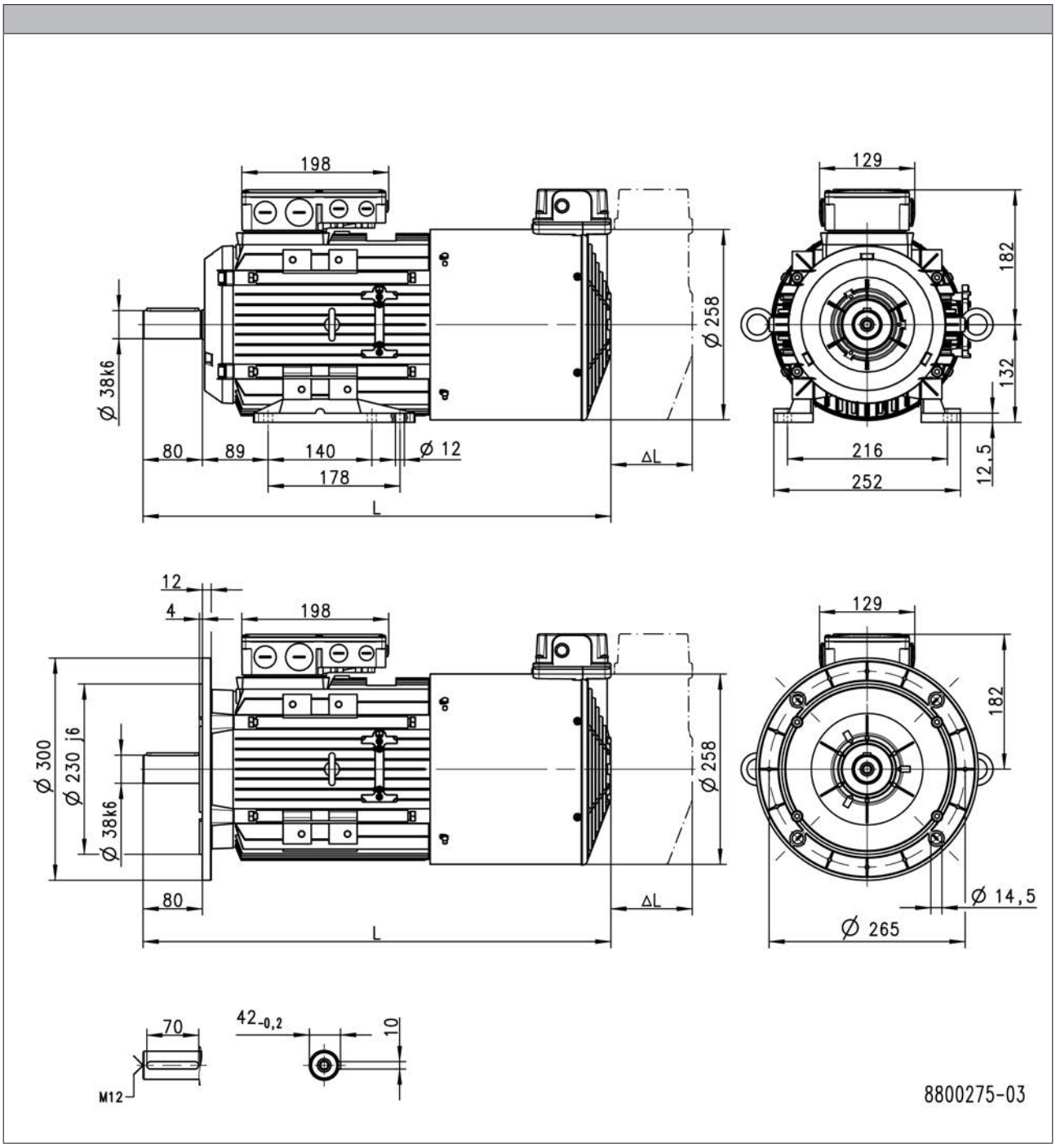
Product			m500-P225M4	m500-P225L4
Dimensions				
Motor length	L	[mm]	853	
Length of motor options	Δ L	[mm]	192	

L = length of the motor without built-on accessories
ΔL = additional length of the built-on accessories (longest type)

27 - Additional length of the built-on accessories

Dimensions, forced ventilated (4-pole)

m500-P132



Product			m500-P132M4	m500-P132L4
Dimensions				
Motor length	L	[mm]	636	
Length of motor options	Δ L	[mm]	80.0	

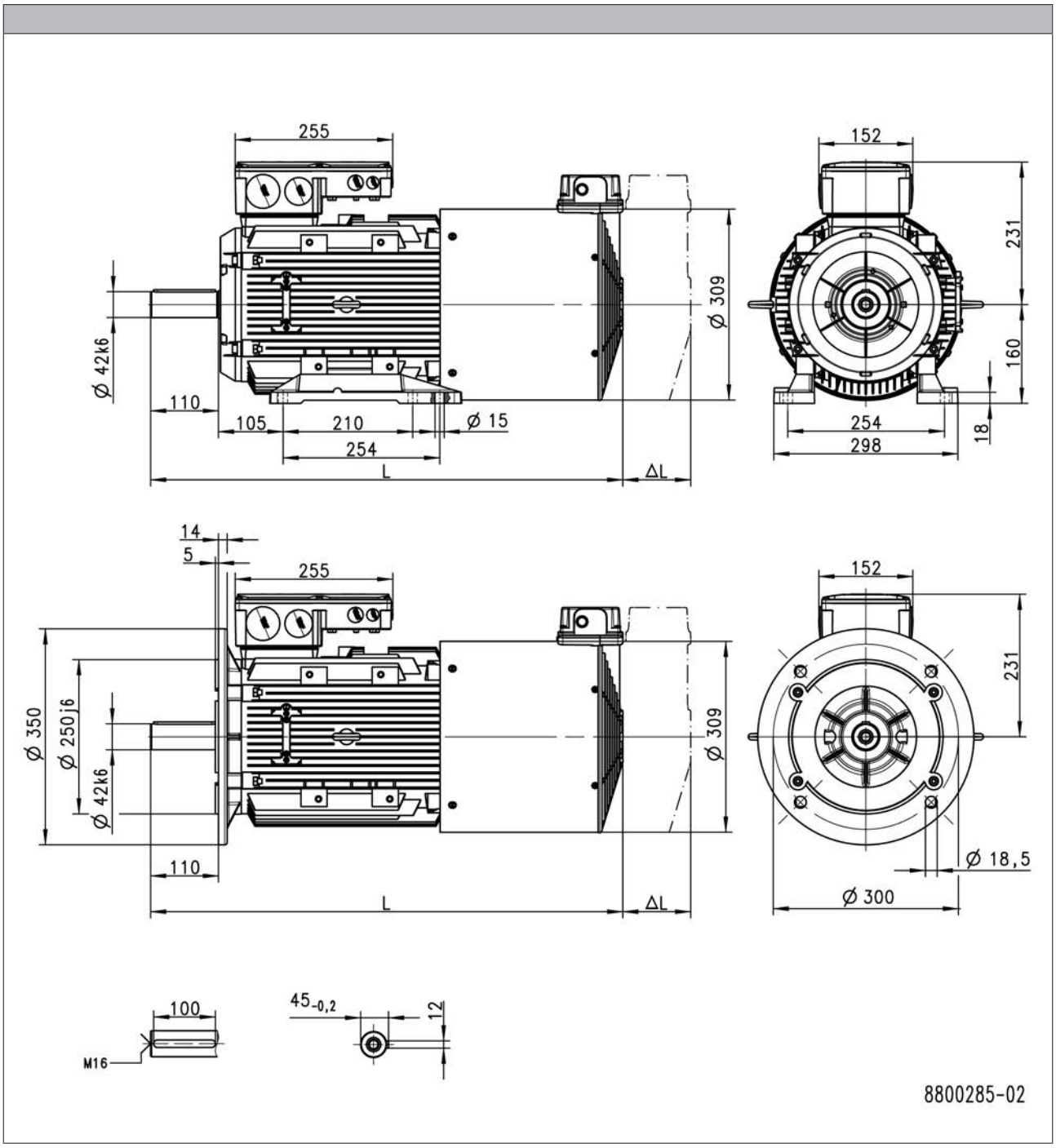
L = length of the motor without built-on accessories
ΔL = additional length of the built-on accessories (longest type)

27 - Additional length of the built-on accessories

6.6

Dimensions, forced ventilated (4-pole)

m500-P160



Product			m500-P160M4	m500-P160L4
Dimensions				
Motor length	L	[mm]	765	
Length of motor options	Δ L	[mm]	88.0	

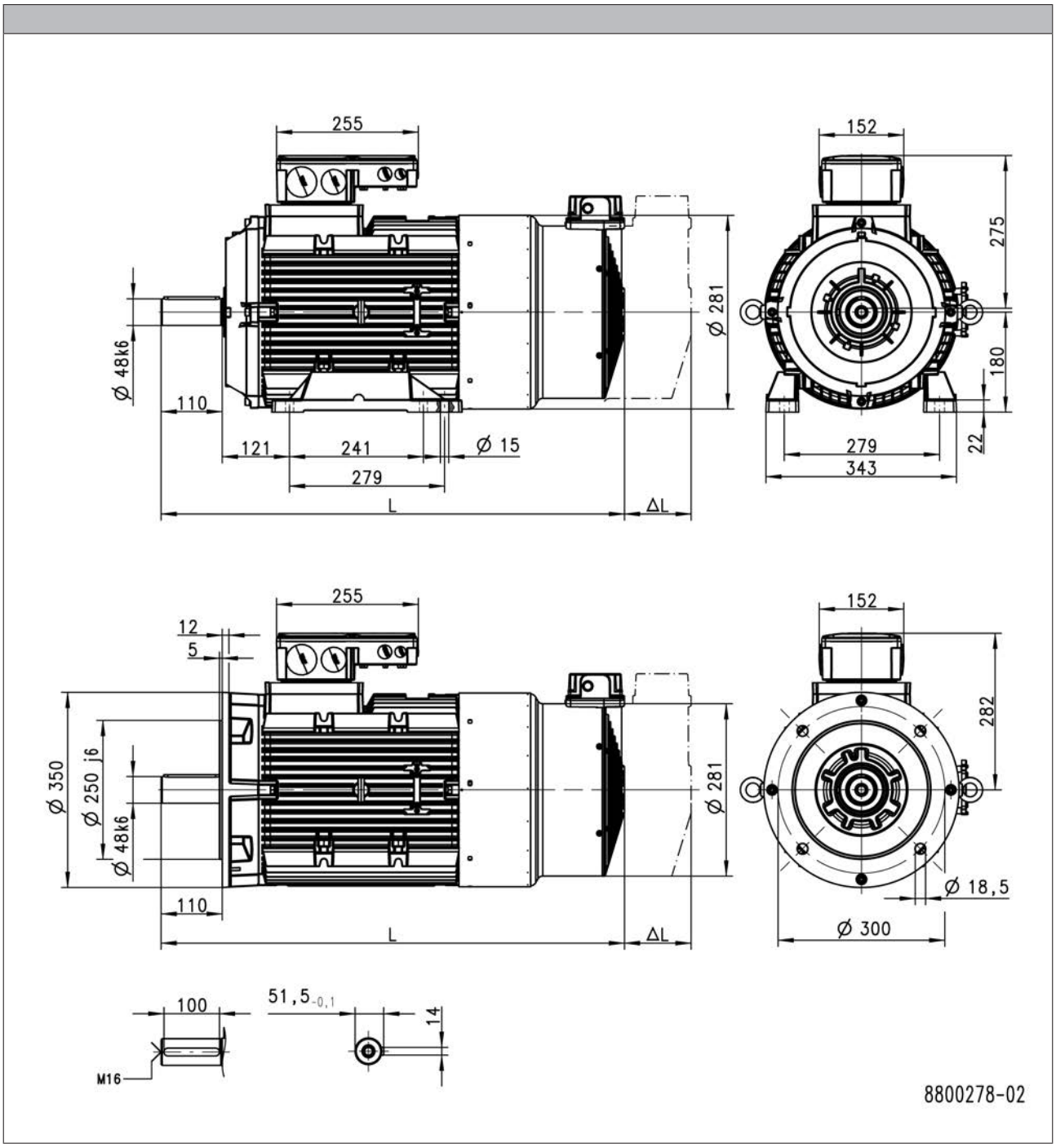
L = length of the motor without built-on accessories
ΔL = additional length of the built-on accessories (longest type)

27 - Additional length of the built-on accessories

6.6

Dimensions, forced ventilated (4-pole)

m500-P180



Product			m500-P180M4	m500-P180L4
Dimensions				
Motor length	L	[mm]	834	
Length of motor options	Δ L	[mm]	126	

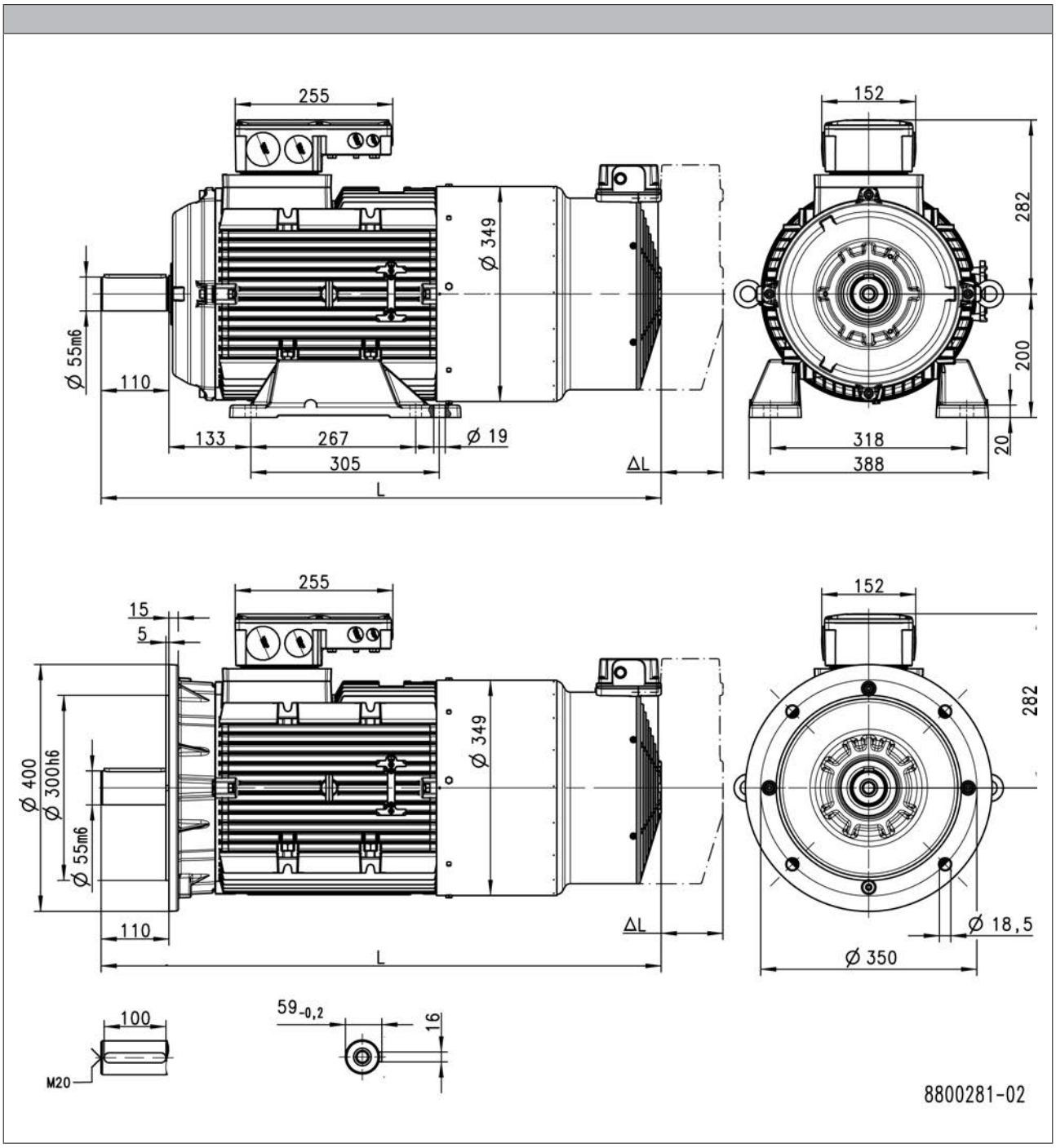
L = length of the motor without built-on accessories
ΔL = additional length of the built-on accessories (longest type)

27 - Additional length of the built-on accessories

6.6

Dimensions, forced ventilated (4-pole)

m500-P200



Product			m500-P200M4
Dimensions			
Motor length	L	[mm]	908
Length of motor options	Δ L	[mm]	105

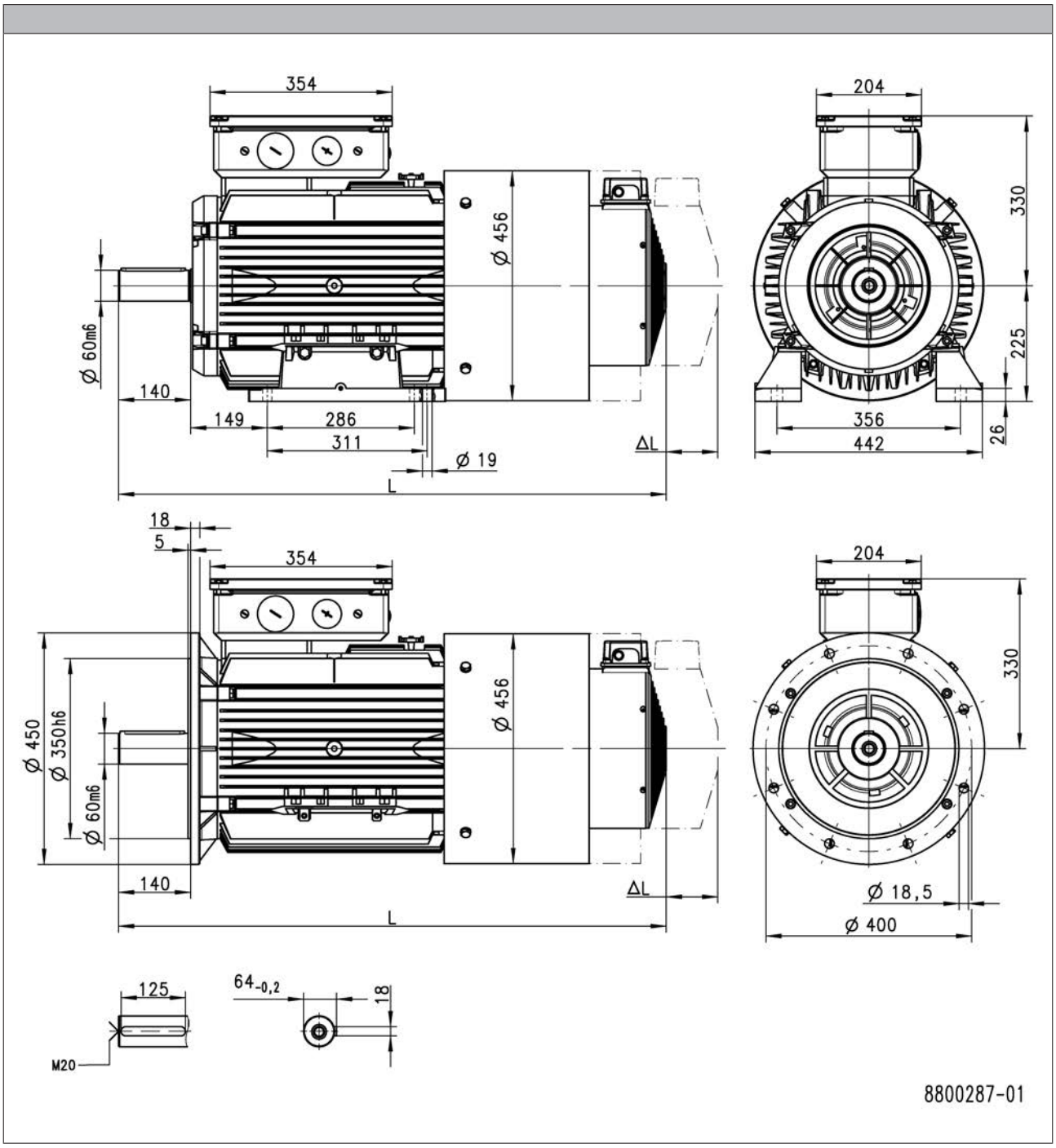
L = length of the motor without built-on accessories
ΔL = additional length of the built-on accessories (longest type)

27 - Additional length of the built-on accessories

6.6

Dimensions, forced ventilated (4-pole)

m500-P225



Product			m500-P225M4	m500-P225L4
Dimensions				
Motor length	L	[mm]	1066	
Length of motor options	Δ L	[mm]	0.000	

L = length of the motor without built-on accessories
ΔL = additional length of the built-on accessories (longest type)

27 - Additional length of the built-on accessories

6.6

Additional length of the built-on accessories

► The additional lengths specified also apply to geared motors.

Dimensions, self-ventilated (4-pole)

Product			m500-P132M4 m500-P132L4	m500-P160M4 m500-P160L4	m500-P180M4 m500-P180L4 m500-P180V4	m500-P200M4	m500-P225M4 m500-P225L4
			With brake				
Length of motor options	Δ L	[mm]	79.0	105	103	113	
			With feedback				
Length of motor options	Δ L	[mm]	102	105	79.0	78.0	79.0
			With brake + feedback				
Length of motor options	Δ L	[mm]	124	191	182	191	192

Dimensions, forced ventilated (4-pole)

Product			m500-P132M4 m500-P132L4	m500-P160M4 m500-P160L4	m500-P180M4 m500-P180L4 m500-P180V4	m500-P200M4	m500-P225M4 m500-P225L4
			With brake				
Length of motor options	Δ L	[mm]	80.0	30.0	66.0	60.0	0.000
			With feedback				
Length of motor options	Δ L	[mm]	80.0	88.0	66.0	60.0	0.000
			With brake + feedback				
Length of motor options	Δ L	[mm]	80.0	88.0	126	105	0.000

Surface and corrosion protection

For optimum protection of three-phase AC motors against ambient conditions, the surface and corrosion protection system (OKS) offers tailor-made solutions.

Various surface coatings ensure that the motors operate reliably even at high air humidity, in outdoor installation or in the presence of atmospheric impurities. Any colour from the RAL Classic collection can be chosen for the top coat. The three-phase AC motors are also available unpainted (no surface and corrosion protection).

Surface and corrosion protection system	Applications	Measures
OKS-G (primed)	• Dependent on subsequent top coat applied	• 2K PUR priming coat (grey)
OKS-S (small)	• Standard applications • Internal installation in heated buildings • Air humidity up to 90%	• Surface coating corresponding to corrosivity category C1 (subject to EN 12944-2)
OKS-M (medium)	• Internal installation in non-heated buildings • Covered, protected external installation • Air humidity up to 95%	• Surface coating corresponding to corrosivity category C2 (subject to EN 12944-2)
OKS-L (high) OKS-XL (extra Large)	• External installation • Air humidity above 95% • Chemical industry plants • Food industry	• Surface coating corresponding to corrosivity category C3 (subject to EN 12944-2) • Blower cover and B end shield additionally primed • Screws zinc-coated • Cable glands with gaskets • Corrosion-resistant brake with cover ring, stainless friction plate, and chrome-plated armature plate (on request) Optional measures: • Motor recesses sealed off (on request)

Structure of surface coating

Surface and corrosion protection system	Corrosivity category	Surface coating	Colour
	DIN EN ISO 12944-2	Structure	
Without OKS (uncoated)			
OKS-G (primed)		2K PUR priming coat	
OKS-S (small)	Comparable to C1	2K-PUR top coat	Standard: RAL 7012 Optional: RAL Classic
OKS-M (medium)	Comparable to C2	2K PUR priming coat 2K-PUR top coat	
OKS-L (high) OKS-XL (extra Large)	Comparable to C3		

Motor connection

The IE3 three-phase AC motors m500 are intended for inverter operation; mains operation, however, is also possible.
For 50 Hz operation, the motors are to be actuated in Δ connection with 230 V or in star/delta connection with 400 V.
For 60 Hz operation, the motors are to be actuated in star/delta connection with 460 V.
For inverter operation at 87 Hz, a rated voltage of 400 V in Δ connection has been defined.

The standard connection is implemented via a terminal box. Furthermore ICN and HAN connectors are provided to quickly carry out commissioning or maintenance operations.

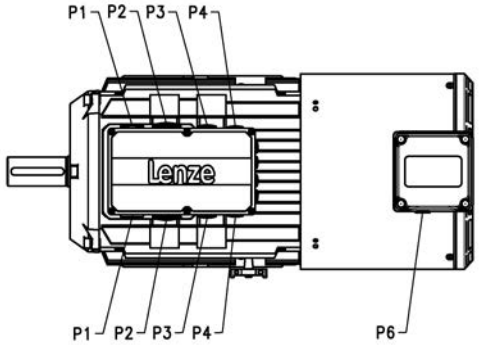
Overview of the connection options

Product	m500-P132M4 m500-P132L4	m500-P160M4 m500-P160L4	m500-P180M4 m500-P180L4 m500-P180V4	m500-P200M4	m500-P225M4 m500-P225L4
Power connection/brake connection					
Terminal box	●	●	●	●	●
ICN connector	●				
HAN modular connector	●	●			
Feedback connection					
Terminal box	●	●	●	●	●
ICN connector	●	●	●	●	●
Blower connection					
Terminal box	●	●	●	●	●
ICN connector	●	●	●	●	●
Temperature sensor connection					
Terminal box	●	●	●	●	●
ICN connector	●	●			
HAN modular connector	●	●			

Connection via terminal box

The connection in the terminal box is implemented by means of conventional cable glands.

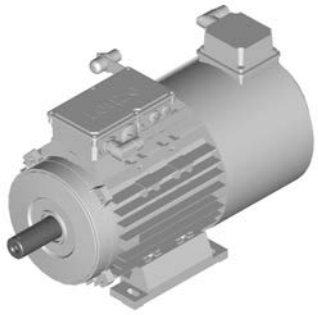
Cable entries



Product	Dimensions				
	P_1	P_2	P_3	P_4	P_6
	[mm]	[mm]	[mm]	[mm]	[mm]
m500-P132M4	M25x1.5	M32x1.5	M20x1.5	M16x1.5	M16x1.5
m500-P132L4					
m500-P160M4	M50x1.5	M40x1.5			
m500-P160L4					
m500-P180M4					
m500-P180L4					
m500-P180V4					
m500-P200M4					
m500-P225M4	M12x1.5	M63x1.5	M50x1.5	M12x1.5	
m500-P225L4					

Connections via ICN connectors

A connector is used for the power connection, connection of the brake, and the temperature monitoring connection.
The feedback and blower connections are implemented via a separate connector in each case.

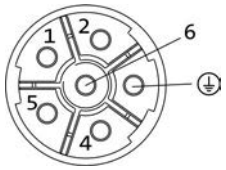


Connection for power, brake and temperature monitoring

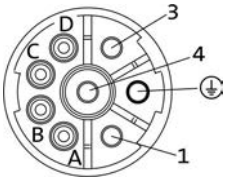
For the power connection of the connector, a max. rated motor current of 16 A is permissible.
The connectors can be rotated by 270° and are equipped with a bayonet catch for SpeedTec connectors. As the connector fixing is also compatible with conventional box nuts, existing mating connectors can still be used without difficulty. The motor connection is determined in the terminal box.

► ICN 6-pole

No connection of temperature monitoring possible!

Pin assignment			
Contact	Designation	Meaning	
1	BD1 / BA1	Brake +/AC	
2	BD2 / BA2	Brake -/AC	
PE	PE	PE conductor	
4	U	Phase U power	
5	V	Phase V power	
6	W	Phase W power	

► ICN 8-pole

Pin assignment			
Contact	Designation	Meaning	
1	U	Phase U power	
PE	PE	PE conductor	
3	W	Phase W power	
4	V	Phase V power	
A	TB1 / TP1 / R1	Thermal sensor: TKO/PTC/ +KTY	
B	TB2 / TP2 / R2	Thermal sensor: TKO/PTC/-KTY	
C	BD1 / BA1	Brake +/AC	
D	BD2 / BA2	Brake -/AC	

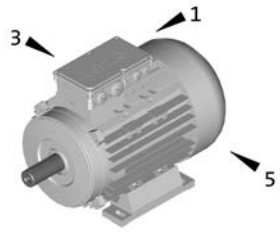
Connections via ICN connectors

Connection for power, brake and temperature monitoring

For IEC standard motors, the position of the connector can be selected.

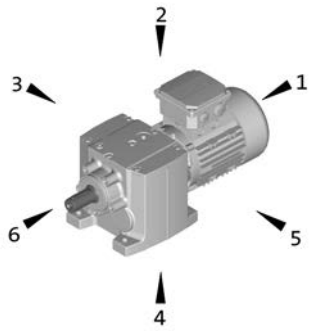
For geared motors, the position of the connector must be selected as a function of the terminal box position.

Position of the connector for IEC standard motors



Possible connection position	3/5*

Position of the connector for geared motors



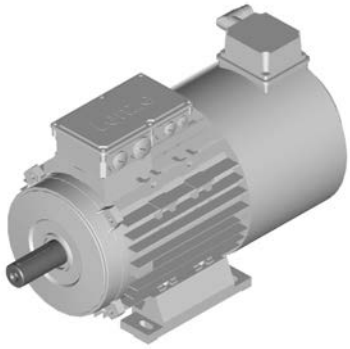
Terminal box position	2	3	4	5
Possible connection position	3/5*	2*/4	3*/5	2/4*

► If preferred positions are not specified in the order, the connector will be positioned as indicated by * on the diagram below.

Connections via ICN connectors

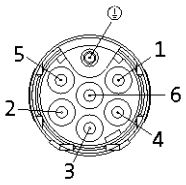
Blower connection

The blower is also optionally available with an ICN connector fixed to the terminal box of the blower for exceptionally fast commissioning. The connectors are fitted with a bayonet fixing, which is also compatible with conventional union nuts. Existing counter plugs can therefore continue to be used without difficulty.

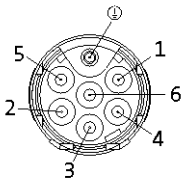


For the blower, the terminal box cover including the connector can be rotated by 90 ° step by step, if required.

► Blower 1-ph

Pin assignment			
Contact	Designation	Meaning	
PE	PE	PE conductor	
1	U1	Fan	
2	U2		
3		Not assigned	
4			
5			
6			

► Blower 3-ph

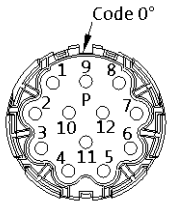
Pin assignment			
Contact	Designation	Meaning	
PE	PE	PE conductor	
1	U	Phase U power	
2		Not assigned	
3	V	Phase V power	
4		Not assigned	
5			
6	W	Phase W power	

Connections via ICN connectors

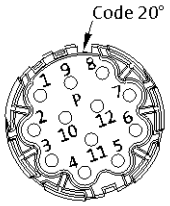
Feedback connection

All encoder systems (apart from IG128-24V-H) are also available with an ICN connector fixed to the motor terminal box for exceptionally fast commissioning. The connectors are fitted with a bayonet fixing, which is also compatible with conventional union nuts. Existing mating connectors can therefore continue to be used without difficulty.
The feedback connector is located on the terminal box side opposite to the power connection

► Resolver

Pin assignment			
Contact	Designation	Meaning	
1	+Ref	Transformer windings	
2	-Ref		
3	+VCC ETS	Supply: Electronic nameplate	
4	+COS	Cosine stator windings	
5	-COS		
6	+SIN	Sine stator windings	
7	-SIN		
8		Not assigned	
9			
10			
11	+KTY	KTY temperature sensor	
12	-KTY		

► Hiperface incremental encoder and SinCos absolute value encoder

Pin assignment			
Contact	Designation	Meaning	
1	B	Track B/+SIN	
2	A^-	Track A inverse/-COS	
3	A	Track A/+COS	
4	$+U_B$	Supply +	
5	GND	Mass	
6	Z^-	Zero track inverse/-RS485	
7	Z	Zero track/+RS485	
8		Not assigned	
9	B^-	Track B inverse/-SIN	
10		Not assigned	
11	+KTY	KTY temperature sensor	
12	-KTY		

Connection via M12 connector

IG128-24V-H incremental encoder connection

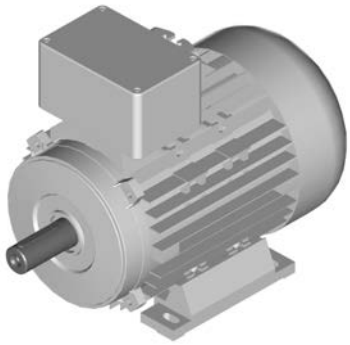
As a standard this incremental encoder is equipped with a connection cable of about 0.5 m length and with a common industry standard M12 connector at its end.

Pin assignment			
Contact	Designation	Meaning	
1	$+U_B$	Supply +	
2	B	Track B	
3	GND	Mass	
4	A	Track A	

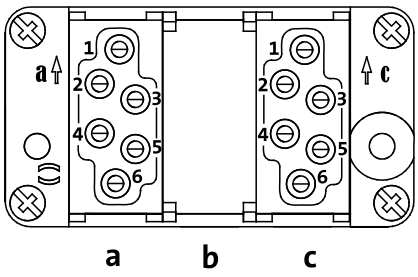
Connections via HAN connectors

HAN modular

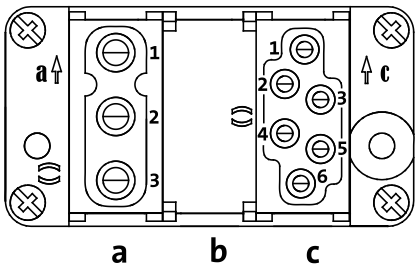
The connector is available with two different power modules (16 A or 40 A), depending on the rated motor current. The motor connection is determined in the terminal box and must be checked before commissioning.



► HAN modular 16 A

Pin assignment			
Module	Contact	Meaning	
A	1	Terminal board: U1	
	2	Terminal board: V1	
	3	Terminal board: W1	
B		Dummy module	
C	1	Thermal sensor: +KTY/PTC/TKO	
	2	Brake +/AC	
	3	Brake -/AC	
	4	Rectifier: Switching contact	
	5		
	6	Thermal sensor: KTY/PTC/TKO	

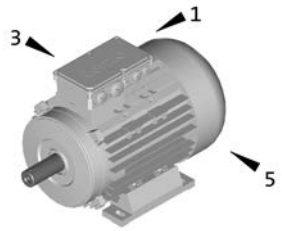
► HAN modular 40 A

Pin assignment			
Module	Contact	Meaning	
A	1	Terminal board: U1	
	2	Terminal board: V1	
	3	Terminal board: W1	
B		Dummy module	
C	1	Thermal sensor: +KTY/PTC/TKO	
	2	Brake +/AC	
	3	Brake -/AC	
	4	Rectifier: Switching contact	
	5		
	6	Thermal sensor: KTY/PTC/TKO	

Connections via HAN connectors

For IEC standard motors, the position of the cable entry can be selected.

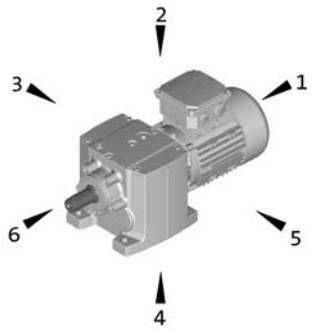
Position of the cable entry for IEC standard motors



Possible cable entry position	1*/3/5

For geared motors, the position of the cable entry must be selected as a function of the terminal box position.

Position of the cable entry for geared motors



Terminal box position	2	3	4	5
Possible cable entry position	1*/3/5	1*/2/4	1*/3/5	1*/2/4

► If preferred positions are not specified in the order, the cable entry will be positioned as indicated by * on the diagram below.

Spring-applied brake

The three-phase AC motors can be equipped with a spring-applied brake which is active when the supply voltage has been switched off (closed-circuit principle). In the deenergised state, the brake is applied. This prevents possible movement of the motor shaft with regard to the load after switch-off or in the event of a power failure.
For optimum adaptation of the brake motor to the application, several brake sizes and control variants are provided for each motor.

Types
- **Standard**
  - 1 x 10^6 repeating switching cycles
  - 1 x 10^6 reversing switching cycles

Control
- DC supply
- AC supply via rectifiers in the terminal box

Degree of protection
- Without manual release IP55
- With manual release IP54

Friction lining
- Asbestos-free, low-wear

Options
- Manual release
- Low noise

Braking torques

In addition to the standard braking torque, depending on the brake size, the possibility of choosing between a reduced and an increased braking torque is provided.
- When the braking torque is reduced, great wear reserves can be attained. This is enabled by a reduction of the spring rate.
- In order to obtain a greater braking torque, the spring rate is increased. This is practical, for instance, for hoists, since here the gravity acts as an additional acceleration in the negative direction.

Manual release

By using the manual release lever, the brake can be released manually in deenergised operating state. The manual release makes positioning and maintenance work easier.

Spring-applied brake

Direct connection without rectifier

If the brake is activated directly without a rectifier, a freewheeling diode or a spark suppressor is required for protection against induction peaks.

- Supply voltages
  DC 24 V

Connection via mains voltage with brake rectifier

If the brake is not directly supplied with DC voltage, a rectifier is required. This is included in the scope of supply and is located in the terminal box of the motor. The rectifier converts the AC voltage of the connection into DC voltage. The following rectifiers are available:

Half-wave rectifier, 6-pole

- Supply voltage / brake coil voltage ratio = 2.22
- Approved by UL / CSA
- Supply voltages
  AC 400 V
  AC 460 V

Bridge rectifier, 6-pole

- Ratio of supply voltage to brake coil voltage = 1.11
- Supply voltage
  AC 230 V

Bridge/half-wave rectifier, 6-pole

- Supply voltage / brake coil voltage ratio
  up to the overexcitation time = 1.11
  From the overexcitation time = 2.22
- Supply voltages
  AC 230 V
  AC 400 V

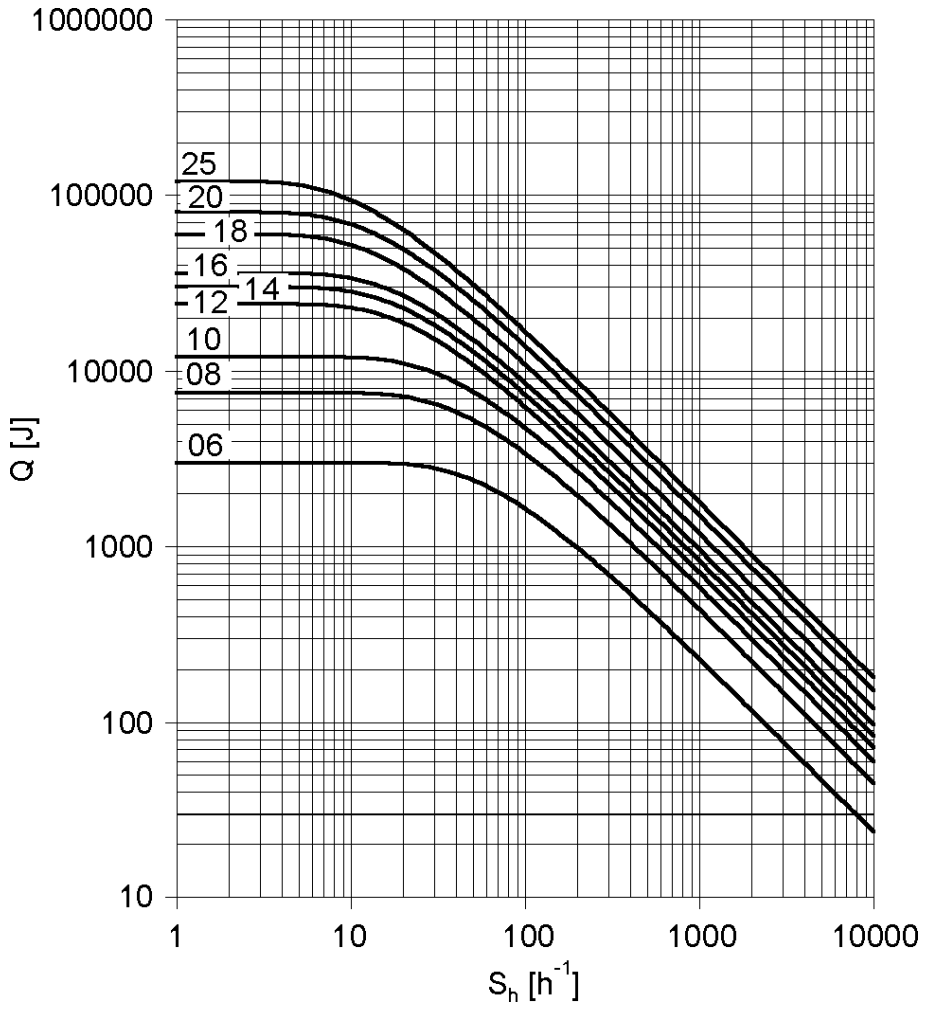
Spring-applied brake

Assignment of 4-pole motors and brakes

Product	Size	Rated torque
	Brake	
		M_k
		[Nm]
m500-P132M4	14 14 16 16	35.0 60.0 60.0 80.0
m500-P132L4	14 14 16 16 16	35.0 60.0 60.0 80.0 100
m500-P160M4	16 16 18 18	60.0 80.0 80.0 150
m500-P160L4	18 18 18	80.0 150 200
m500-P180M4	18 18 20 20	80.0 150 145 260
m500-P180L4	18 18 20 20 20	80.0 150 145 260 315
m500-P180V4	18 18 20 20 20 20	80.0 150 145 260 315 400
m500-P200M4	18 18 20 20 20 20	80.0 150 145 260 315 400
m500-P225M4	25 25 25	265 400 490
m500-P225L4	25 25 25 25	265 400 490 600

Spring-applied brake

Permissible friction energy



Q =Switching energy per switching cycle
S_h =Operating frequency
Brake size = 06 to 25

Spring-applied brake

Rated data with reduced braking torque

► Please enquire for braking torques and maximum switching work values not listed here.

Size			06	08	10	12	14	16	18	20	25
Power input											
	P_{in}	[kW]	0.020	0.025	0.030	0.040	0.050	0.055	0.085	0.10	0.11
Braking torque											
100	M_B	[Nm]	2.50	3.50	7.00	14.0	35.0	60.0	80.0	145	265
1000	M_B	[Nm]	2.30	3.10	6.10	12.0	30.0	50.0	65.0	115	203
1200	M_B	[Nm]	2.30	3.10	6.00	12.0	29.0	48.0	63.0	112	199
1500	M_B	[Nm]	2.20	3.00	5.80	11.0	28.0	47.0	61.0	109 [1)]	193 [1)]
1800	M_B	[Nm]	2.10	2.90	5.70	11.0	28.0	46.0	60.0 [1)]		
3000	M_B	[Nm]	2.00	2.80	5.30	10.0	26.0 [1)]	43.0 [1)]			
3600	M_B	[Nm]	2.00	2.70	5.20	10.0 [1)]					
Maximum switching energy											
100	Q_E	[KJ]	3.00	7.50	12.0	24.0	30.0	36.0	60.0	80.0	120
1000	Q_E	[KJ]	3.00	7.50	12.0	24.0	30.0	36.0	60.0	80.0	120
1200	Q_E	[KJ]	3.00	7.50	12.0	24.0	30.0	36.0	60.0	80.0	120
1500	Q_E	[KJ]	3.00	7.50	12.0	24.0	30.0	36.0	60.0	24.0 [1)]	36.0 [1)]
1800	Q_E	[KJ]	3.00	7.50	12.0	24.0	30.0	36.0	36.0 [1)]		
3000	Q_E	[KJ]	3.00	7.50	12.0	24.0	18.0 [1)]	11.0 [1)]			
3600	Q_E	[KJ]	3.00	7.50	12.0	7.00 [1)]					
Transition operating frequency											
	$S_{hü}$	[1/h]	79.0	50.0	40.0	30.0	28.0	27.0	20.0	19.0	15.0
Moment of inertia											
	J	[kgcm²]	0.015	0.061	0.20	0.45	0.63	1.50	2.90	7.30	20.0
Mass											
	m	[kg]	0.90	1.50	2.60	4.20	5.80	8.70	12.6	19.5	31.0

[1)] In the region of the load limit the value for friction energy Q_{BW} can be reduced to 40 %.

Spring-applied brake

Rated data with reduced braking torque

► Activation via half-wave or bridge rectifier

Size										
			06	08	10	12	14	16	18	20	25
Friction energy											
	Q_{BW}	[MJ]	113	210	264	706	761	966	1542	2322	3522
Delay time											
Engaging	t_{11}	[ms]	11.0	14.0	20.0	21.0	37.0	53.0	32.0	47.0	264
Rise time											
Braking torque	t_{12}	[ms]	13.0	10.0	17.0	19.0	22.0	30.0	20.0	100	120
Engagement time											
	t_1	[ms]	24.0		37.0	40.0	59.0	83.0	52.0	147	384
Disengagement time											
	t_2	[ms]	35.0	37.0	57.0	65.0	148	169	230	207	269

► Activation via bridge/half-wave rectifier

Design										
			Holding current reduction (cold brake)								
Size										
			06	08	10	12	14	16	18	20	25
Friction energy											
	Q_{BW}	[MJ]	113	210	264	706	761	966	1542	2322	3522
Overexcitation time											
	$t_{ü}$	[ms]	300				1300				
Min. rest time											
	t	[ms]	900				3900				
Delay time											
Engaging	t_{11}	[ms]	12.0	22.0	35.0	49.0	61.0	114	83.0	126	304
Rise time											
Braking torque	t_{12}	[ms]	14.0	16.0	30.0	45.0	37.0	65.0	52.0	269	138
Engagement time											
	t_1	[ms]	26.0	38.0	66.0	93.0	97.0	180	134	395	443
Disengagement time											
	t_2	[ms]	35.0	37.0	57.0	65.0	148	169	230	207	269

► The brake response and application times are guide values. The engagement time is 10 times longer with AC-side switching. With the maximum air gap the disengagement time t_2 – depending on the brake and control – is up to 4 times longer than the disengagement time with the rated air gap.

Spring-applied brake

Rated data with standard braking torque

► Please enquire for braking torques and maximum switching work values not listed here.

Size			06	08	10	12	14	16	18	20	25
Power input											
	P_{in}	[kW]	0.020	0.025	0.030	0.040	0.050	0.055	0.085	0.10	0.11
Braking torque											
100	M_B	[Nm]	4.00	8.00	16.0	32.0	60.0	80.0	150	260	400
1000	M_B	[Nm]	3.70	7.20	14.0	27.0	51.0	66.0	121	206	307
1200	M_B	[Nm]	3.60	7.00	14.0	27.0	50.0	65.0	118	201	300
1500	M_B	[Nm]	3.50	6.80	13.0	26.0	48.0	63.0	115	195 [1)]	291 [1)]
1800	M_B	[Nm]	3.40	6.70	13.0	26.0	47.0	61.0	112 [1)]		
3000	M_B	[Nm]	3.20	6.30	12.0	24.0	44.0 [1)]	57.0 [1)]			
3600	M_B	[Nm]	3.20	6.10	12.0	23.0 [1)]					
Maximum switching energy											
100	Q_E	[KJ]	3.00	7.50	12.0	24.0	30.0	36.0	60.0	80.0	120
1000	Q_E	[KJ]	3.00	7.50	12.0	24.0	30.0	36.0	60.0	80.0	120
1200	Q_E	[KJ]	3.00	7.50	12.0	24.0	30.0	36.0	60.0	80.0	120
1500	Q_E	[KJ]	3.00	7.50	12.0	24.0	30.0	36.0	60.0	24.0 [1)]	36.0 [1)]
1800	Q_E	[KJ]	3.00	7.50	12.0	24.0	30.0	36.0	36.0 [1)]		
3000	Q_E	[KJ]	3.00	7.50	12.0	24.0	18.0 [1)]	11.0 [1)]			
3600	Q_E	[KJ]	3.00	7.50	12.0	7.00 [1)]					
Transition operating frequency											
	$S_{hü}$	[1/h]	79.0	50.0	40.0	30.0	28.0	27.0	20.0	19.0	15.0
Moment of inertia											
	J	[kgcm²]	0.015	0.061	0.20	0.45	0.63	1.50	2.90	7.30	20.0
Mass											
	m	[kg]	0.90	1.50	2.60	4.20	5.80	8.70	12.6	19.5	31.0

[1)] In the region of the load limit the value for friction energy Q_{BW} can be reduced to 40 %.

Spring-applied brake

Rated data with standard braking torque

► Activation via half-wave or bridge rectifier

Size			06	08	10	12	14	16	18	20	25
Friction energy											
	Q_{BW}	[MJ]	85.0	158	264	530	571	966	1542	2322	3522
Delay time											
Engaging	t_{11}	[ms]	15.0		28.0		17.0	27.0	33.0	65.0	110
Rise time											
Braking torque	t_{12}	[ms]	13.0	16.0	19.0	25.0		30.0	45.0	100	120
Engagement time											
	t_1	[ms]	28.0	31.0	47.0	53.0	42.0	57.0	78.0	165	230
Disengagement time											
	t_2	[ms]	45.0	57.0	76.0	115	210	220	270	340	390

► Activation via bridge/half-wave rectifier

Design			Holding current reduction (cold brake)								
Size			06	08	10	12	14	16	18	20	25
Friction energy											
	Q_{BW}	[MJ]	85.0	158	264	530	571	966	1542	2322	3522
Overexcitation time											
	$t_{ü}$	[ms]	300				1300				
Min. rest time											
	t	[ms]	900				3900				
Delay time											
Engaging	t_{11}	[ms]	16.0	25.0	31.0	48.0	33.0	58.0	80.0	102	154
Rise time											
Braking torque	t_{12}	[ms]	14.0	27.0	21.0	43.0	49.0	64.0	109	157	168
Engagement time											
	t_1	[ms]	30.0	52.0		90.0	82.0	122	189	259	322
Disengagement time											
	t_2	[ms]	45.0	57.0	76.0	115	210	220	270	340	390

► The brake response and application times are guide values. The engagement time is 10 times longer with AC-side switching. With the maximum air gap the disengagement time t_2 – depending on the brake and control – is up to 4 times longer than the disengagement time with the rated air gap.

Spring-applied brake

Rated data with increased braking torque

► Please enquire for braking torques and maximum switching work values not listed here.

Size			10	12	14	16	16	18	20	20	25	25
Power input												
	P_{in}	[kW]	0.030	0.040	0.050	0.055	0.055	0.085	0.10	0.10	0.11	0.11
Braking torque												
100	M_B	[Nm]	23.0	46.0	75.0	100	125	200	315	400	490	600
1000	M_B	[Nm]	20.0	39.0	64.0	83.0	103	162	249	317	376	461
1200	M_B	[Nm]	20.0	39.0	62.0	81.0	101	158	244	309	367	449
1500	M_B	[Nm]	19.0	38.0	60.0	78.0	98.0	153	237 [1]	300 [1]	356 [1]	436 [1]
1800	M_B	[Nm]	19.0	37.0	59.0	77.0	96.0	150 [1]				
3000	M_B	[Nm]	17.0	34.0	55.0 [1]	71.0 [1]	89.0 [1]					
3600	M_B	[Nm]	17.0	33.0 [1]								
Maximum switching energy												
100	Q_E	[KJ]	12.0	24.0	30.0	36.0	36.0	60.0	80.0	80.0	120	120
1000	Q_E	[KJ]	12.0	24.0	30.0	36.0	36.0	60.0	80.0	80.0	120	120
1200	Q_E	[KJ]	12.0	24.0	30.0	36.0	36.0	60.0	80.0	80.0	120	120
1500	Q_E	[KJ]	12.0	24.0	30.0	36.0	36.0	60.0	24.0 [1]	24.0 [1]	36.0 [1]	36.0 [1]
1800	Q_E	[KJ]	12.0	24.0	30.0	36.0	36.0	36.0 [1]				
3000	Q_E	[KJ]	12.0	24.0	18.0 [1]	11.0 [1]	11.0 [1]					
3600	Q_E	[KJ]	12.0	7.00 [1]								
Transition operating frequency												
	$S_{hü}$	[1/h]	40.0	30.0	28.0	27.0	27.0	20.0	19.0	19.0	15.0	15.0
Moment of inertia												
	J	[kgcm²]	0.20	0.45	0.63	1.50	1.50	2.90	7.30	7.30	20.0	20.0
Mass												
	m	[kg]	2.60	4.20	5.80	8.70	8.70	12.6	19.5	19.5	31.0	31.0

[1] In the region of the load limit the value for friction energy Q_{BW} can be reduced to 40 %.

► Activation via half-wave or bridge rectifier

Size			10	12	14	16		18	20		25	
Friction energy												
	Q_{BW}	[MJ]	198	353	253	563	241	578	1596	580	2465	1409
Delay time												
Engaging	t_{11}	[ms]	10.0	16.0	11.0	22.0	17.0	24.0	46.0	17.0	77.0	38.0
Rise time												
Braking torque	t_{12}	[ms]	19.0	25.0		30.0		45.0	100		120	
Engagement time												
	t_1	[ms]	29.0	41.0	36.0	52.0	47.0	69.0	146	117	197	158
Disengagement time												
	t_2	[ms]	109	193	308	297	435	356	378	470	451	532

Spring-applied brake

Rated data with increased braking torque

► Activation via bridge/half-wave rectifier

Design			Holding current reduction (cold brake)									
Size			10	12	14	16		18	20		25	
Friction energy	Q_{BW}	[MJ]	198	353	253	563	241	578	1596	580	2465	1409
Overexcitation time	$t_{ü}$	[ms]	300			1300						
Min. rest time	t	[ms]	900			3900						
Delay time												
Engaging	t_{11}	[ms]	24.0	27.0	17.0	41.0	21.0	60.0	69.0	17.0	123	85.0
Rise time												
Braking torque	t_{12}	[ms]	44.0	43.0	37.0	55.0	37.0	113	148	100	190	270
Engagement time	t_1	[ms]	68.0	70.0	54.0	97.0	57.0	173	217	334	313	355
Disengagement time	t_2	[ms]	109	193	308	297	435	356	378	470	451	532

Design			Over-excitation									
Size			10	12	14	16		18	20		25	
Friction energy	Q_{BW}	[MJ]	264	706	761	966		1542	2322		3522	
Overexcitation time	$t_{ü}$	[ms]	300			1300						
Min. rest time	t	[ms]	900			3900						
Delay time												
Engaging	t_{11}	[ms]	29.0	54.0	31.0	70.0	46.0	86.0	103	55.0	171	135
Rise time												
Braking torque	t_{12}	[ms]	53.0	87.0	68.0	93.0	83.0	160	222	319	266	430
Engagement time	t_1	[ms]	82.0	141	99.0	163	129	246	325	374	437	565
Disengagement time	t_2	[ms]	53.0	81.0	117	141	168	151	160	167	184	204

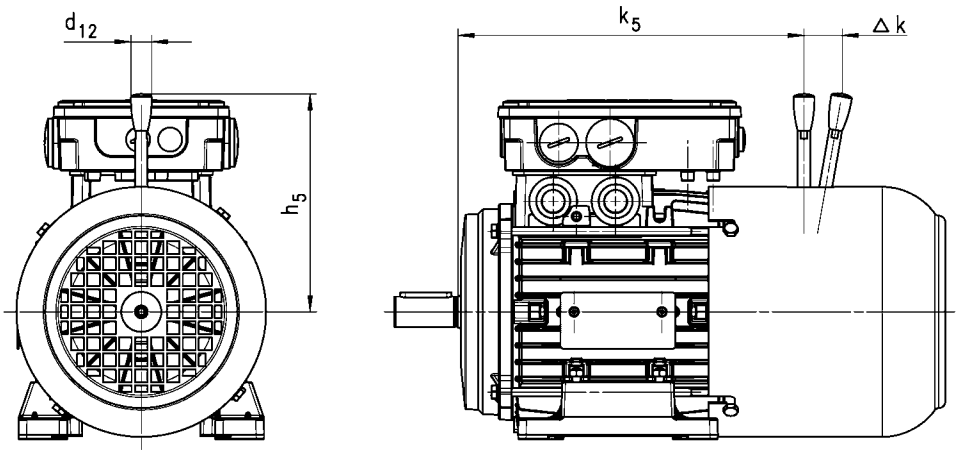
► The brake response and application times are guide values. The engagement time is 10 times longer with AC-side switching. With the maximum air gap the disengagement time t_2 – depending on the brake and control – is up to 4 times longer than the disengagement time with the rated air gap.

Spring-applied brake

Manual release

By using the manual release lever, the brake can be released manually in deenergised operating state. The manual release makes positioning and maintenance work easier.

Manual release lever for IEC motors



	Size	Dimensions			
	Brake				
		k_5	Δ k	h_5	d_{12}
		[mm]	[mm]	[mm]	[mm]
m500-P132M4	14 16	405 407	41 55	195 240	24.0 24.0
m500-P132L4	14 16	405 407	41 55	195 240	24.0 24.0
m500-P160M4	16 18	479 484	55 59	240 279	24.0 24.0
m500-P160L4	18	484	59	279	24.0
m500-P180M4	18 20	552 559	59 74	279 319	24.0 24.0
m500-P180L4	18 20	552 559	59 74	279 319	24.0 24.0
m500-P200M4	18 20	620 626	59 74	279 319	24.0 24.0
m500-P225M4	25	650	103	445	24.0
m500-P225L4	25	650	103	445	24.0

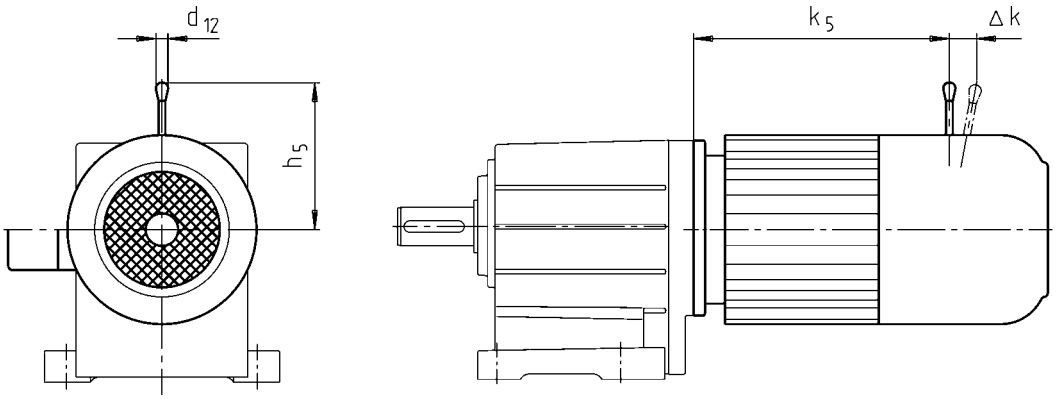
6.6

The following combinations with manual release lever and motor connection in the same position are not possible:
- HAN connector with connection in position 1

Spring-applied brake

Manual release

Manual release lever for geared motors



	Size	Dimensions			
	Brake				
		k_5	Δ k	h_5	d_{12}
		[mm]	[mm]	[mm]	[mm]
m500-P132M4	14 16	403 406	41 55	195 240	24.0 24.0
m500-P132L4	14 16	403 406	41 55	195 240	24.0 24.0
m500-P160M4	16 18	512 517	55 59	240 279	24.0 24.0
m500-P160L4	18	517	59	279	24.0
m500-P180M4	18 20	574 581	59 74	279 319	24.0 24.0
m500-P180L4	18 20	574 581	59 74	279 319	24.0 24.0
m500-P180V4	18 20	624 630	59 74	279 319	24.0 24.0
m500-P225M4	25	704	103	445	24.0
m500-P225L4	25	704	103	445	24.0

The following combinations with manual release lever and motor connection in the same position are not possible:
- HAN connector with connection in position 1

Temperature monitoring

To protect the motor against overheating, the following thermal sensors are provided.
The thermal sensors are integrated into the windings. We recommend using an additional motor protection switch.

TKO thermal contacts

The TCO thermal contact (thermal NC contact) is a bimetallic-element switch. The TCO monitors the motor winding temperature; at too high temperatures, the motor relay switches. The motor is disconnected from the mains.

Function	Operating temperature	Min. reset temperature	Max. reset temperature	Max. input current	Max. input voltage
					AC
	T	T_{min}	T_{max}	$I_{in,max}$	$U_{in,max}$
	-5 ... 5				
	[°C]	[°C]	[°C]	[A]	[V]
NC contact	150	90.0	135	2.50	250

PTC thermistor

The PTC thermistor is actuated in connection with a tripping unit. If the motor gets too hot, the motor can be switched off by means of a contactor. In contrast to the thermal contact, quick restart is possible.

Function	Operating temperature	Rated resistance			Standard
		155 °C	-20 °C	140 °C	
	T	R_N	R_N	R_N	
	-5 ... 5				
	[°C]	[Ω]	[Ω]	[Ω]	
Sudden change in resistance	150	550	30.0	250	DIN 44080 DIN VDE 0660 Part 303

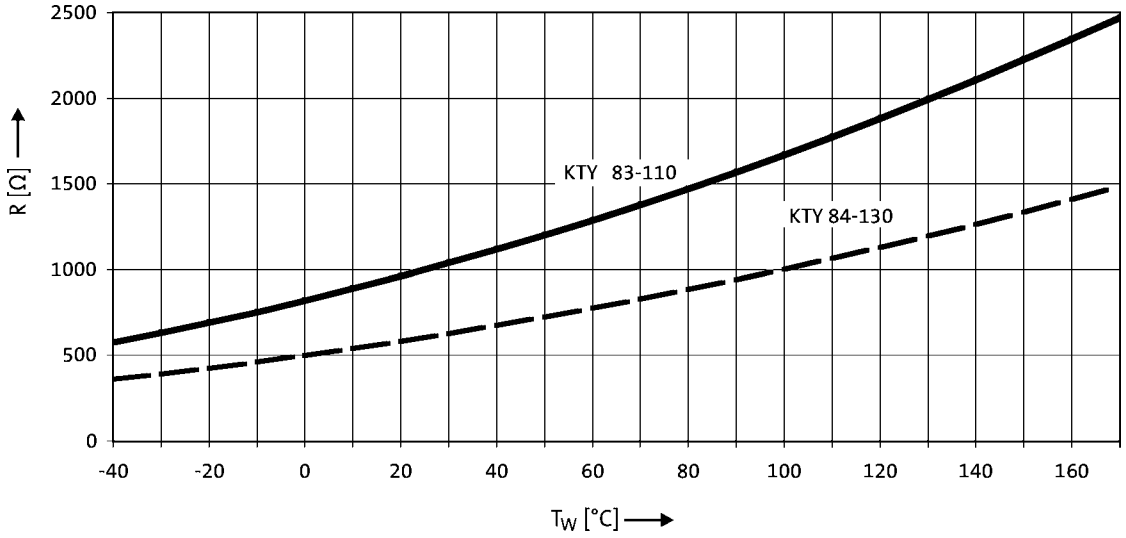
Temperature monitoring

KTY temperature sensor

The KTY thermal detectors work as continuously variable resistors, showing a similar tendency as PTC thermistors. However, with an increasing temperature, the resistance only increases comparatively slowly, enabling the controller to determine the temperature at regular intervals and to already perform a process evaluation at an early stage. In this way, the motor can already be switched off before it is overheated.

	Function	Rated resistance			Max. input current	
		25 °C	150 °C	170 °C	25 °C	170 °C
		R_N	R_N	R_N	$I_{in,max}$	$I_{in,max}$
		[Ω]	[Ω]	[Ω]	[A]	[A]
KTY83-110	Continuous resistance change	1000	2225	2471	0.010	0.002
KTY84-130	Continuous resistance change	603	1334	1482	0.010	0.002

Variation of resistance



► If the thermal sensor is supplied with a measurement current of 1 mA, the above relationship between the temperature and the resistance applies.

Blower

During operation with the rated torque at low speeds (< 20 Hz), the integral fan does not rotate fast enough anymore to ensure sufficient cooling of the motor. In order to prevent overheating, operation without a blower requires a torque reduction of the motor.
The blower cools the motor steadily and irrespective of the motor speed. A torque reduction is not required and the motor can be actuated with its rated torque from 5 Hz to the rated frequency.

Rated data for 50 Hz

Product	Number of phases	Connection method				
			$U_{N, AC}$	P_N	I_N	m
			[V]	[kW]	[A]	[kg]
m500-P132L4 m500-P132M4	1		230	0.095	0.42	5.00
	3	Δ		0.091	0.33	
		Y	400		0.19	
m500-P160M4 m500-P160L4	1		230	0.22	0.97	7.30
	3	Δ		0.21	0.68	
		Y	400		0.39	
m500-P180M4 m500-P180L4 m500-P180V4	1		230	0.22	0.97	10.3
	3	Δ		0.21	0.68	
		Y	400		0.39	
m500-P200M4	1		230	0.22	0.97	
	3	Δ		0.21	0.68	
		Y	400		0.39	
m500-P225L4 m500-P225M4	1		230	0.23	0.94	15.0
	3	Δ		0.20	0.63	
		Y	400		0.37	

Rated data for 60 Hz

Product	Number of phases	Connection method				
			$U_{N, AC}$	P_N	I_N	m
			[V]	[kW]	[A]	[kg]
m500-P132L4 m500-P132M4	3	Y	460	0.13	0.21	5.00
m500-P160M4 m500-P160L4				0.33	0.47	7.30
m500-P180M4 m500-P180L4 m500-P180V4						10.3
m500-P200M4						
m500-P225L4 m500-P225M4				0.35	0.48	15.0

Feedback

Depending on the application, the following resolvers, incremental encoders or absolute value encoders are provided for speed and position detection.

Resolver

The stator-supplied resolver with two stator windings shifted by 90° and a rotor winding with transformer winding can detect both the speed and the rotor position. The rotor position is retained in the event of a voltage failure.

► The three-phase AC motors with resolver cannot be used for speed-dependent safety functions in connection with the SM 301 safety module.

Product key				
				RS1
Accuracy				
			[']	-10 ... 10
Absolute positioning				
				1 revolution
Max. input voltage				
DC	$U_{in,max}$		[V]	10.0
Max. input frequency				
	$f_{in,max}$		[kHz]	4.00
Ratio				
Stator / rotor		± 5 %		0.30
Rotor impedance				
	Z_{ro}		[Ω]	51 + j90
Stator impedance				
	Z_{so}		[Ω]	102 + j150
Impedance				
	Z_{rs}		[Ω]	44 + j76
Min. insulation resistance				
At DC 500 V	R		[MΩ]	10.0
Number of pole pairs				
				1

Feedback

Incremental encoder and SinCos absolute value encoder

Incremental encoders can only be used for speed measurement, but not for speed control. Homing is required in order to enable positioning later.

Absolute value encoders can detect the speed, the rotor position, and the machine position with a very high resolution. They are used for the positioning of dynamic applications and do not require homing.

► The three-phase AC motors with incremental encoders or SinCos absolute value encoders cannot be used for speed-dependent safety functions in connection with the SM 301 safety module.

Encoder type			HTL incremental				TTL incremental			SinCos absolute value
Product key			IG128-24V-H	IG512-24V-H	IG1024-24V-H	IG2048-24V-H	IG512-5V-T	IG1024-5V-T	IG2048-5V-T	AM1024-8V-H
Encoder type										Multi-turn
Pulses			128	512	1024	2048	512	1024	2048	1024
Output signals			HTL				TTL			1 Vss
Interfaces			A, B track	A, B, N track and inverted						Hiperface
Absolute revolutions			0							4096
Accuracy		[']	-22.5 ... 22.5	-2 ... 2						-0.8 ... 0.8
Min. input voltage										
DC	$U_{in,min}$	[V]	8.00				4.75			7.00
Max. input voltage										
DC	$U_{in,max}$	[V]	26.0	30.0			5.25			12.0
Max. current consumption										
	I_{max}	[A]	0.040	0.15						0.080
Limit frequency										
	f_{max}	[kHz]	30.0	160			300			200
Inverter assignment			E84AVSC E84AVHC	E84AVHC			E84AVTC E94A ECS EVS93			

Inverters
- Inverter Drives 8400 StateLine (E84AVSC)
- Inverter Drives 8400 HighLine (E84AVHC)
- Inverter Drives 8400 TopLine (E84AVTC)

Servo-Inverters
- Servo Drives 9400 (E94A)
- 9300 servo inverters (EVS93)
- Servo Drives ECS

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