L-force catalogue

Automation systems
Drive solutions

Controls
Inverters
Motors
Gearboxes
Engineering Tools

Motors: MF three-phase AC motors

Gearboxes: GKR bevel gearboxes

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 simple principle to meet the ever more specialised customer requirements in the field of mechanical 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.

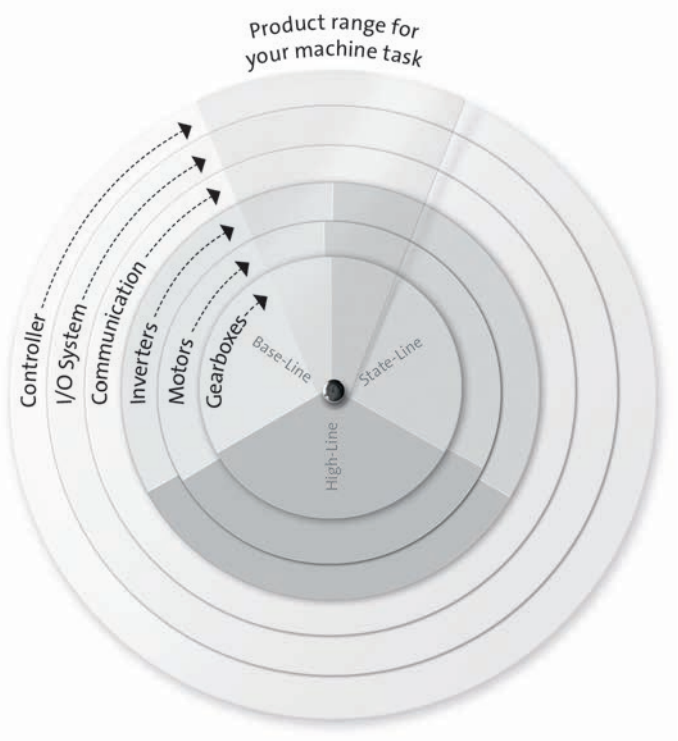
A matter of principle: the right products for every application.

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.

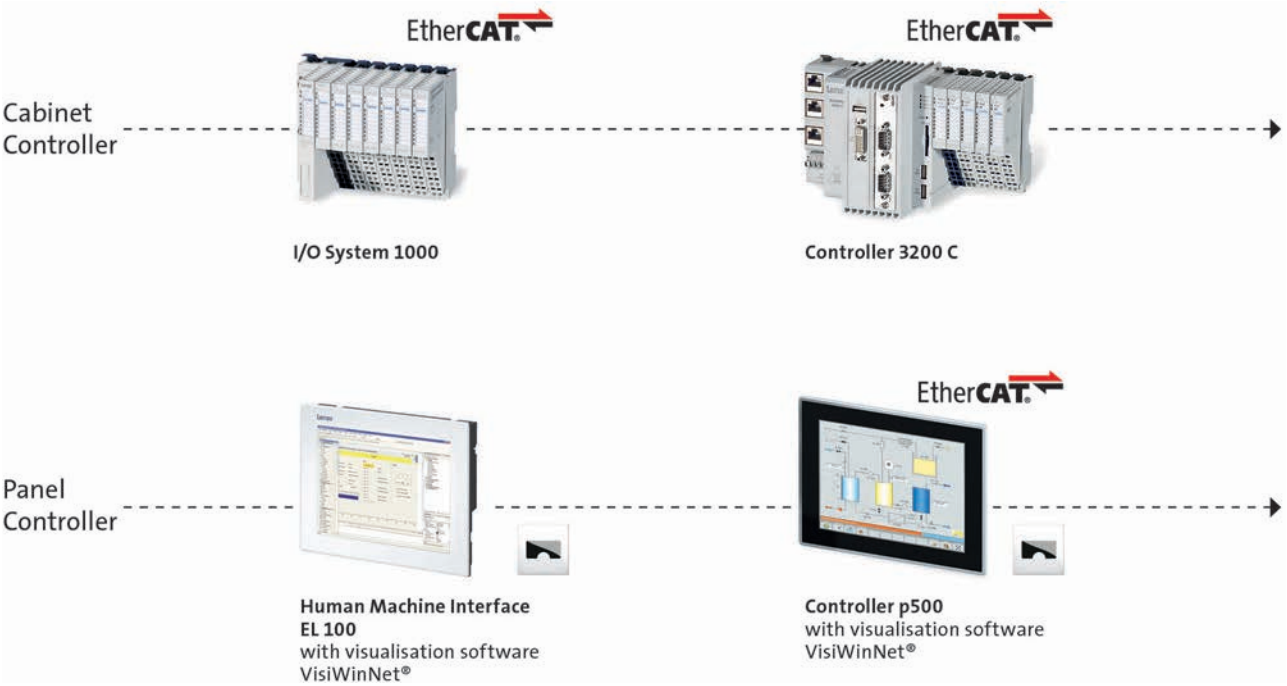
Powerful products with a major impact:
- Easy handling
- High quality and durability
- Reliable technologies in tune with the latest developments

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!

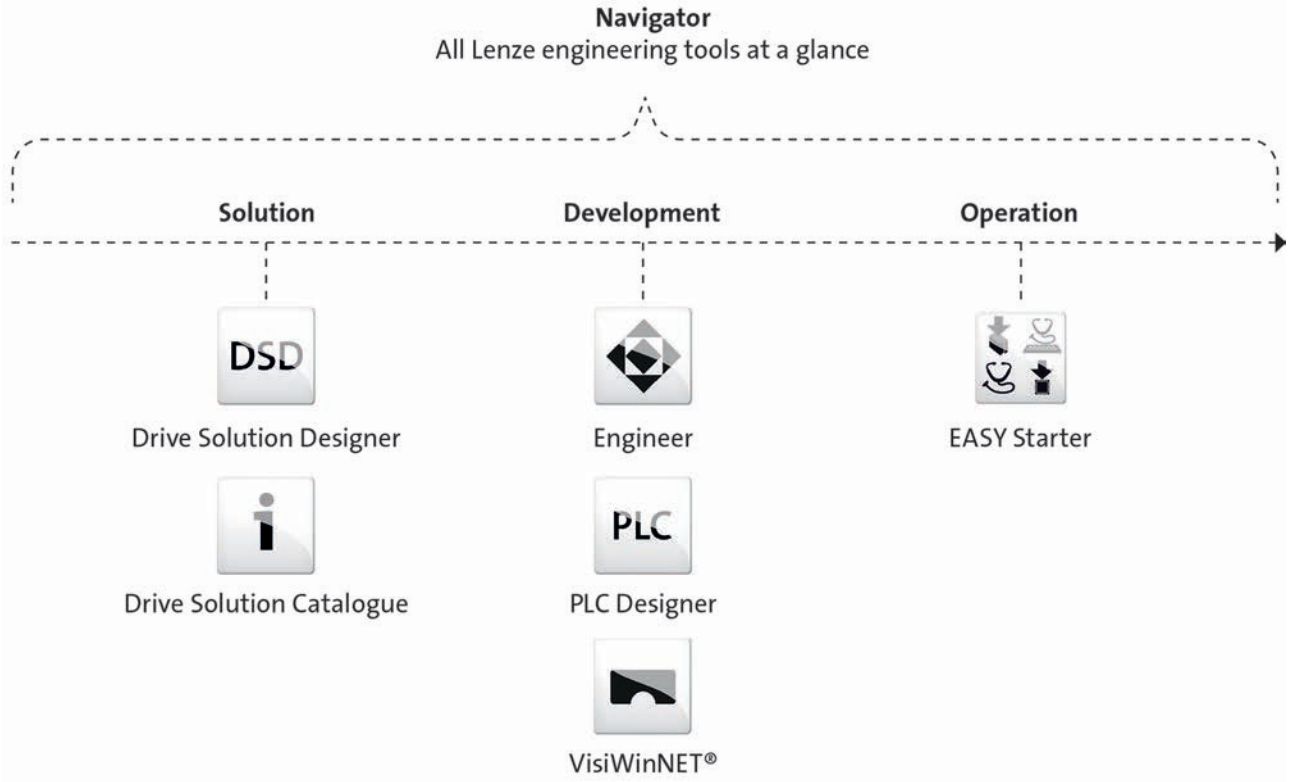


L-force product portfolio

Controls

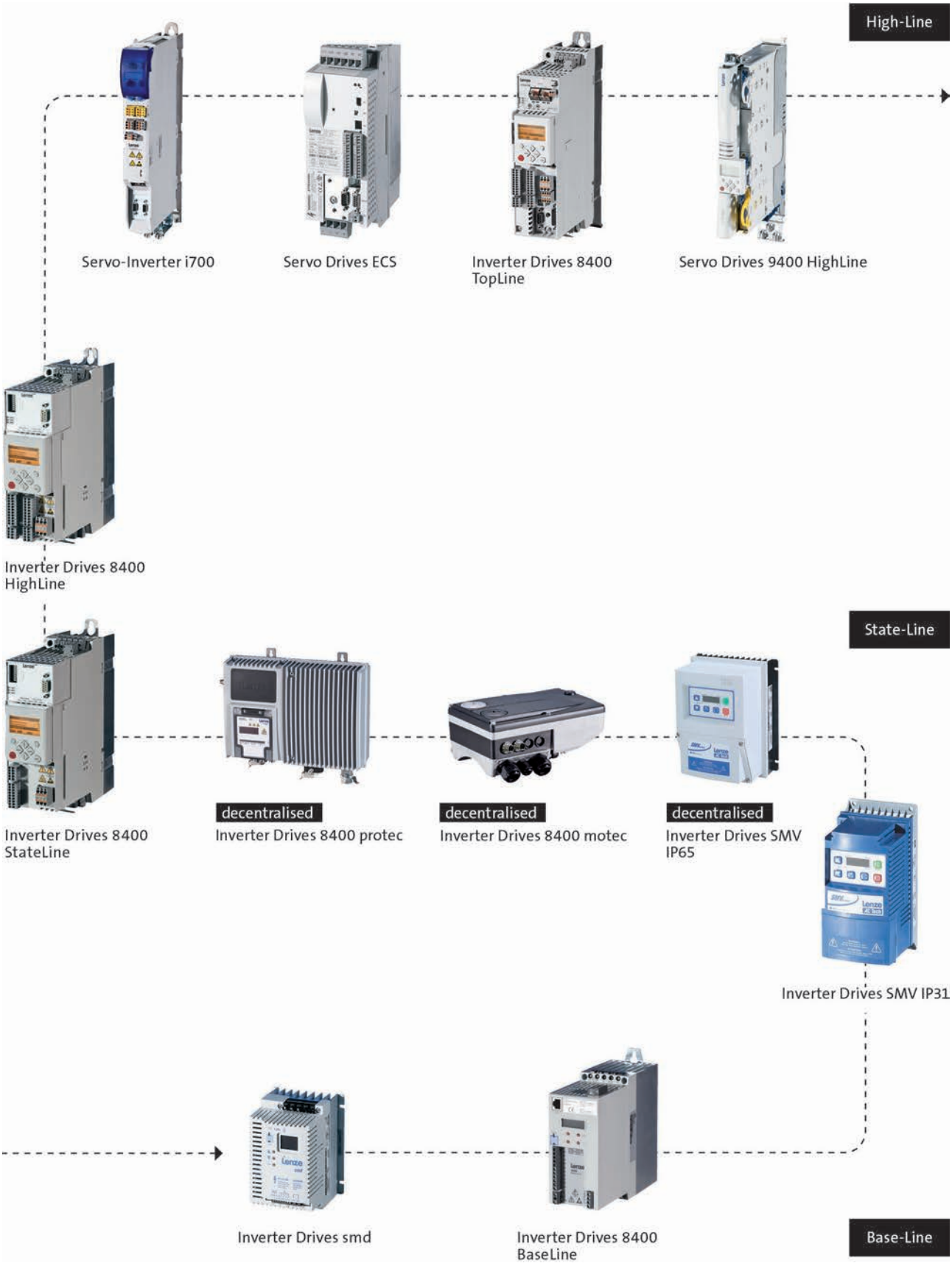


Engineering Tools



L-force product portfolio

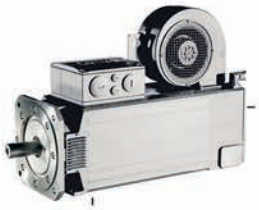
Inverters



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

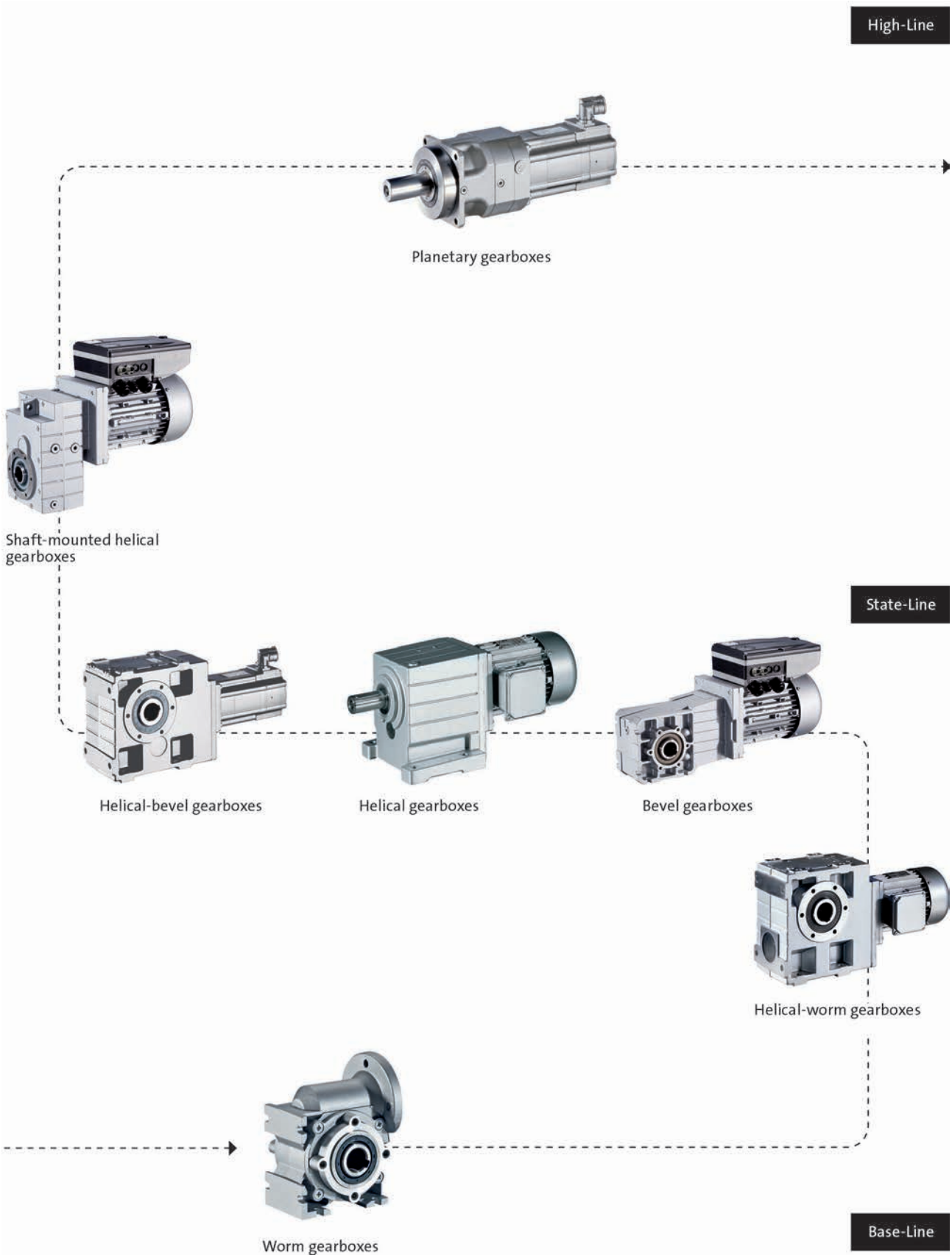
MD three-phase AC motors

Basic MD/MH three-phase AC motors

Base-Line

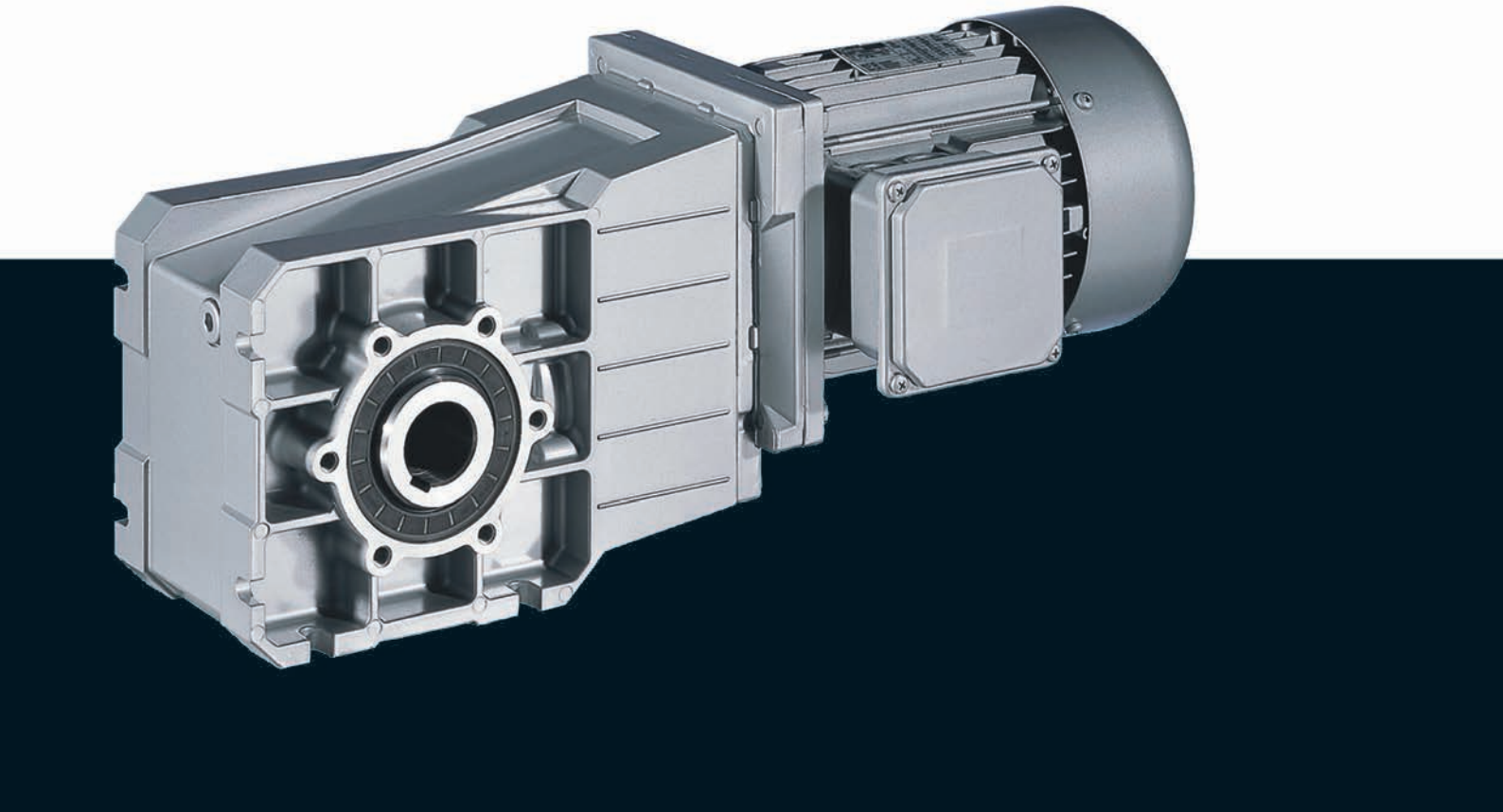
L-force product portfolio

Gearboxes



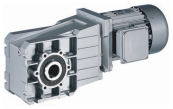
GKR bevel gearboxes

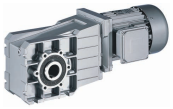
0.55 ... 11 kW



GKR bevel gearboxes

Contents

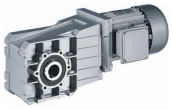




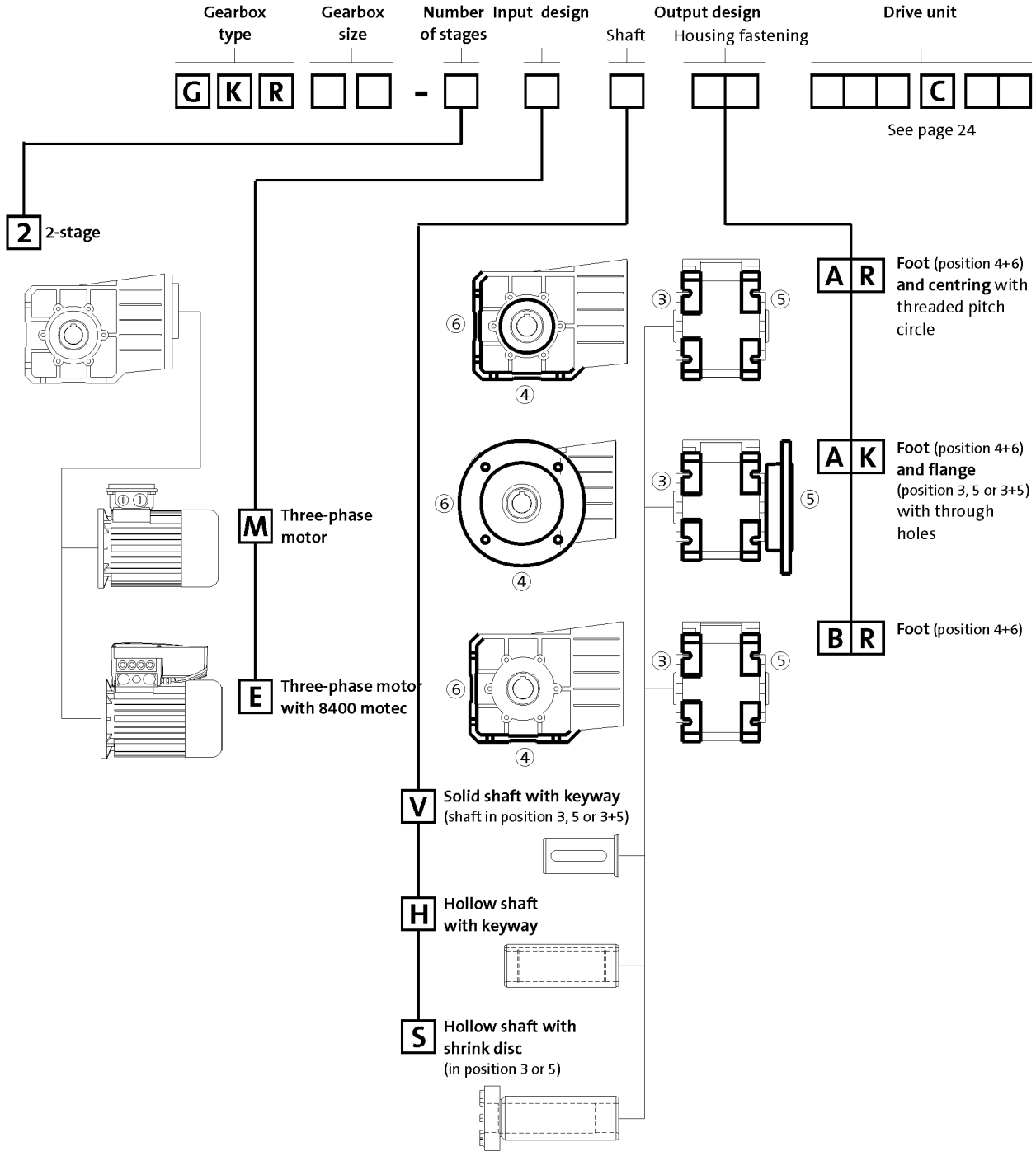
List of abbreviations

$\eta_{c=1}$		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



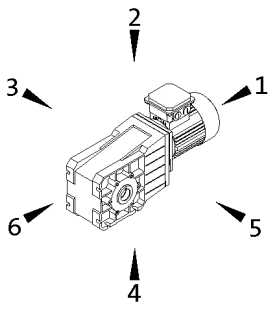
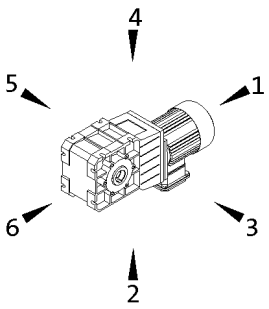
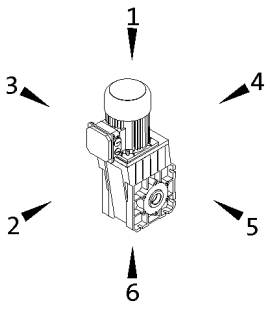
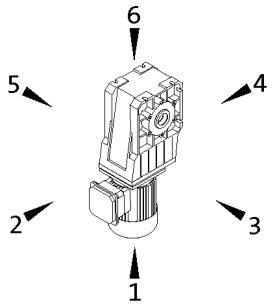
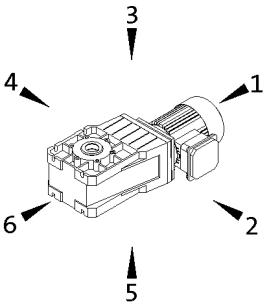
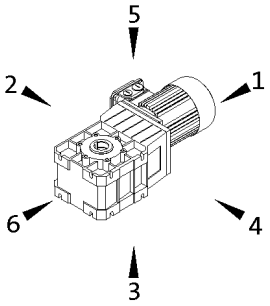
Product key



	Output design			
	V	H	S	K
	d x l [mm]	d [mm]	d [mm]	Øa2 [mm]
GKR03-2	20x40	18/20	20	110/120
GKR04-2	20x40	20/25	20	120/160
GKR05-2	30x60	30/35	30/35	160/200
GKR06-2	35x70	40/45	40	200/250

Product key

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

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

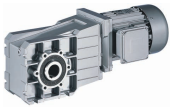
Hollow shaft: 0
Solid shaft: 3, 5, 8 (3+5)
Hollow shaft with shrink disc: 3, 5

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)
Surface and corrosion protection	No OKS (unpainted, aluminium housing) OKS-S (paint: RAL 7012)
Lubricant	CLP 460 (mineral)
Ventilation	Breather elements for GKR06

Options	
Surface and corrosion protection	OKS-G (primer: grey) 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
Accessories	Rubber buffer for torque plate (GKR 03/04 only) Torque plate on threaded pitch circle Housing foot torque plate (GKR05/06 only) 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.

For maximum efficiency

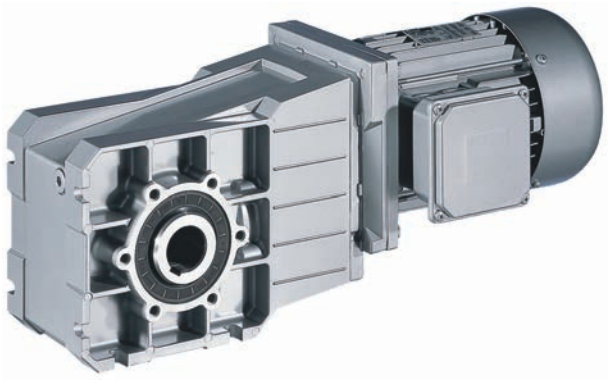
Our bevel gearboxes are a showpiece for lightweight engineering. They are also highly efficient and are equipped with wear free teeth. Together with three-phase AC motors and servo motors, they form and efficient and compact drive unit. They are available as a 2-stage version with a torque of up to 450 Nm and a ratio of up to i=76.

Inverters for motor-proximity installation

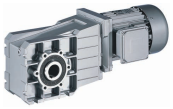
The Drive Package with decentralised Inverter Drives 8400 motec covers a power range up to 7.5 kW.

Designs

- 2-stage and -stage gearboxes
- Hollow shaft with keyway or shrink disc
- Solid shaft with keyway
- Foot or flange mounting
- Torque plate, including rubber buffer
- With MF three-phase AC motors (inverter-optimised) power range 0.55 ... 7.5 kW

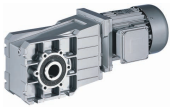


Bevel geared motor GKR05-2M HBR 090-32



Functions and features

Gearbox type	GKR
Housing	
Design	Cuboid
Material	Aluminium / cast iron
Solid shaft	
Design	with keyway to DIN 6885
Tolerance	m6 (d > 50 mm) k6 (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	Optimised tooth flanks and profile geometry Ground tooth flanks
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 [$\eta_{c=1}$]	0.96
3-stage gearboxes [$\eta_{c=1}$]	
4-stage gearboxes [$\eta_{c=1}$]	
Notes	



Functions and features

Lubricants

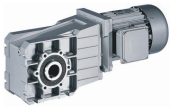
Lenze gearboxes and geared motors are ready for operation on delivery and are filled with lubricants specific to both the drive and the design. The mounting position and design specified in the order are key factors in choosing the volume of lubricant.

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...80 °C)	25000 operating hours not later than after three years (oil temperature 70...80 °C)	16000 operating hours not later than after three years (oil temperature 70...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 460	Shell Omala Oil HD 320	

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



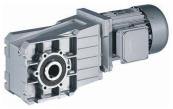
Functions and features

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	• 1K 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

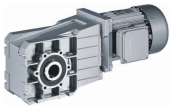


Functions and features

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 1K priming coat	
OKS-S (small)	C1	Dipping primed gearbox 2K-PUR top coat	Standard: RAL 7012 Optional: RAL Classic
OKS-M (medium)	C2	Dipping primed gearbox 1K priming coat 2K-PUR top coat	Standard: RAL 7012 Optional: RAL Classic
OKS-L (high)	C3	Dipping primed gearbox 2K-EP priming coat 2K-PUR top coat	Standard: RAL 7012 Optional: RAL Classic

► The gearboxes GKR 03 ... 06 have an aluminium housing, therefore a dipping primer is dispensed with in the case of these gearboxes.

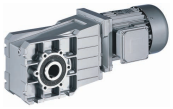


Functions and features

Ventilation

Gearboxes without ventilation
No ventilation is required for gearboxes GKR03 ... 05.

Gearboxes with ventilation
Gearbox GKR06 is supplied with a breather element as standard.

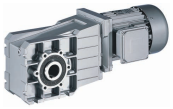


Dimensioning

General information about the data provided in this catalogue

Powers, torques and speeds
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 wheels
- the load and the speed
- the ambient conditions: temperature, air circulation, input or dissipation via shafts and the foundation

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

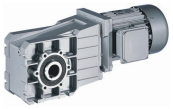
Motor frame size	Mounting position A, B, E, F	Mounting position C, D
063 ... 100	3000 r/min	3000 r/min
112 ... 132	3000 r/min	1500 r/min
160 ... 225	2000 r/min	1500 r/min

- 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

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

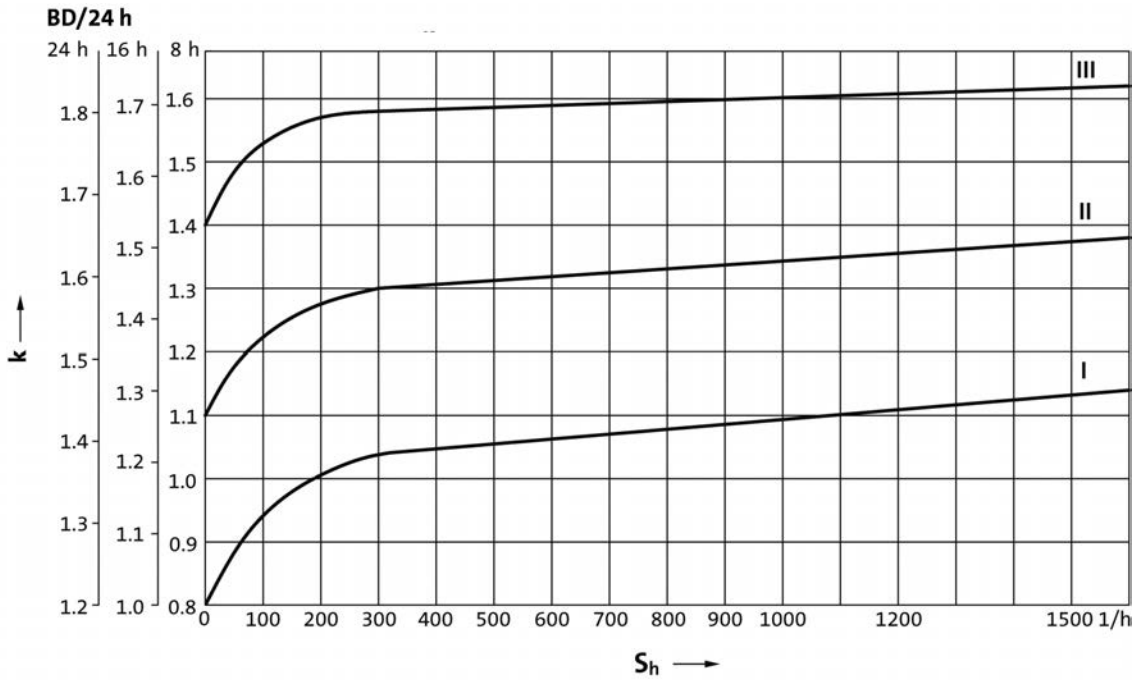
Load capacity and application factor

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.

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
I	Smooth operation, small or light jolts
II	Uneven operation, average jolts
III	Uneven operation, severe jolts and/or alternating load

Application factor k

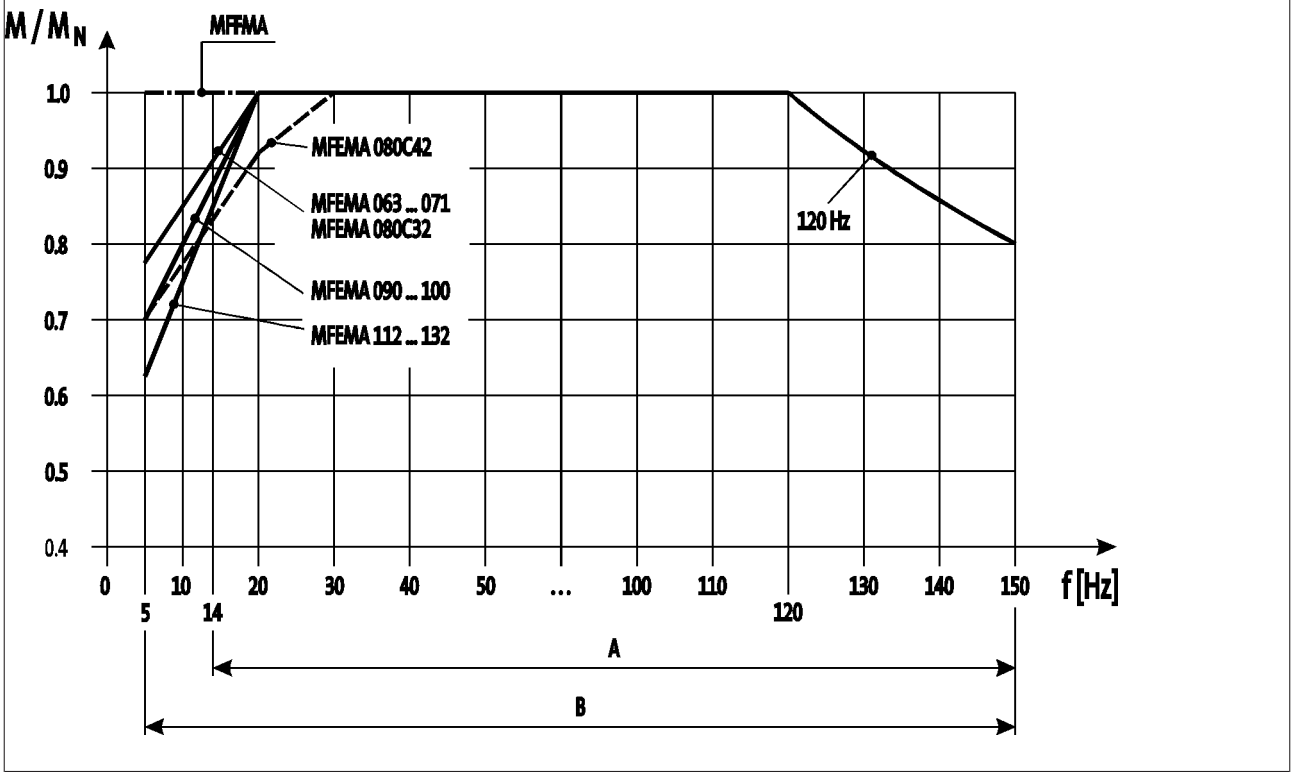


Dimensioning

Torque derating at low motor frequencies

Motor size-dependent torque reduction, taking into account the thermal response during operation on the inverter.

Torque characteristics



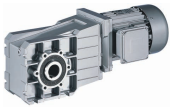
A = Operation with integral fan and brake
B = Operation with integral fan and brake control "Holding current reduction"

► 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).

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. The following legend indicates the structure of the selection tables.

Gearbox type

GST helical gearbox

Technical data

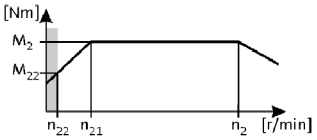
Selection tables

Rated power P_N of the drive motor in relation to the rated frequency

► 120 Hz: P_N = 0.55 kW

Speed setting range n_{22}/n_2 = 1 ... 24.0

Speed range of the drive motor n_1 = 143.3 ... 3440 r/min



n_{22} [r/min]	n_{21} [r/min]		n_2 [r/min]	M_{22} [Nm]	M_2 [Nm]	c	i			
70	293	-	1680	2.3	3.0	4.5	2.048	GST04-1M□□□063C32	E84AV□□□5514□□0	79
64	268	-	1536	2.6	3.0	3.9	2.240	GST05-1M□□□063C32	E84AV□□□5514□□0	79

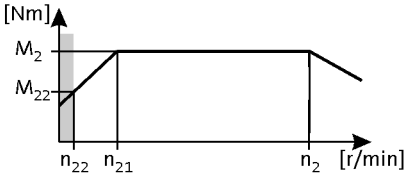
Product key of geared motor

Product key of inverter

Ratio i

Page number for dimensions

Speed and torque information
The speed and torque information applies to self-ventilated and forced-ventilated drives. Externally cooled drives can always output the torque M_2 in all the setting ranges. In the case of self-ventilated drives, a reduction to M_{22} is necessary in the lower speed range.

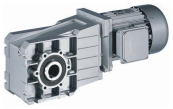


The following applies to self-ventilated geared motors: n_{22} is the minimum speed at which the torque M_{22} is permissible. From n_{21} to n_2, the maximum torque is M_2. The following applies to forced-ventilated geared motors: From the minimum speed n_{22} to n_2, the maximum torque is M_2

The load capacity c of the gearbox c is the ratio of the gearbox's rated torque to the rated torque of the three-phase motor (calculated in respect of its application to the output shaft). c must always be greater than the application factor k determined for the application.

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

6.8



Notes on ordering

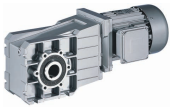
We want to be sure that you receive the correct products in good time.

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

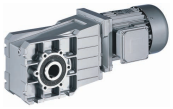
P.O. Box, City

Dispatching notes

Invoice recipient (if different)

Street/P.O. Box

Postal code, City



Ordering details checklist

Customer No.

Job No.

Page __

Quantity

Efficiency class ☐ Standard efficiency ☐ High efficiency (IE2)

Rated frequency ☐ 50 Hz ☐ 60 Hz ☐ 87 Hz

Ratio i

GKR ☐☐ – 2 ☐ 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: 0 3 4 8

Flange: 0 3 5 8

Terminal box: 2 3 4 5

Surface and corrosion protection ☐ Without OKS (unpainted)

Options

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

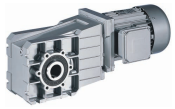
Surface and corrosion protection ☐ OKS-S small) ☐ OKS-M (medium) ☐ OKS-L (high) ☐ OKS-G (primed) ☐

6.8

Accessories

- ☐ Rubber buffer for torque support (only GKR03/04)
- ☐ Torque support for housing foot (only GKR05/06)
- ☐ 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



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: only with M□□MAXX/LL063 ... 132 or terminal box with plug-in connector 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 ☐ Longlife

Brake size ☐

Characteristic torque ☐ Nm

Rated voltage AC ☐ DC ☐ ☐ V

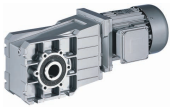
Rectifier: Only in the case of AC supply voltage

- ☐ 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)

6.8



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

☐ PTC ☐ KTY 83-110 ☐ KTY 84-130

Approval

☐ UL/CSA approval: cURus ☐ CCC ☐ China Energy Label

Further options

Indication of supply voltage only for motor frame sizes 112C32 to 225C22

☐ Δ; 400V-50Hz; 460V-60Hz

☐ Y/Δ; 400/230V-50Hz; 460/265V-60Hz (-/400V-87Hz possible in operation with frequency inverter)

☐ Protection cover

☐ 2nd shaft end

☐ Handwheel

☐ Increased centrifugal mass

☐ 2nd nameplate (adhesive nameplate/metal nameplate)

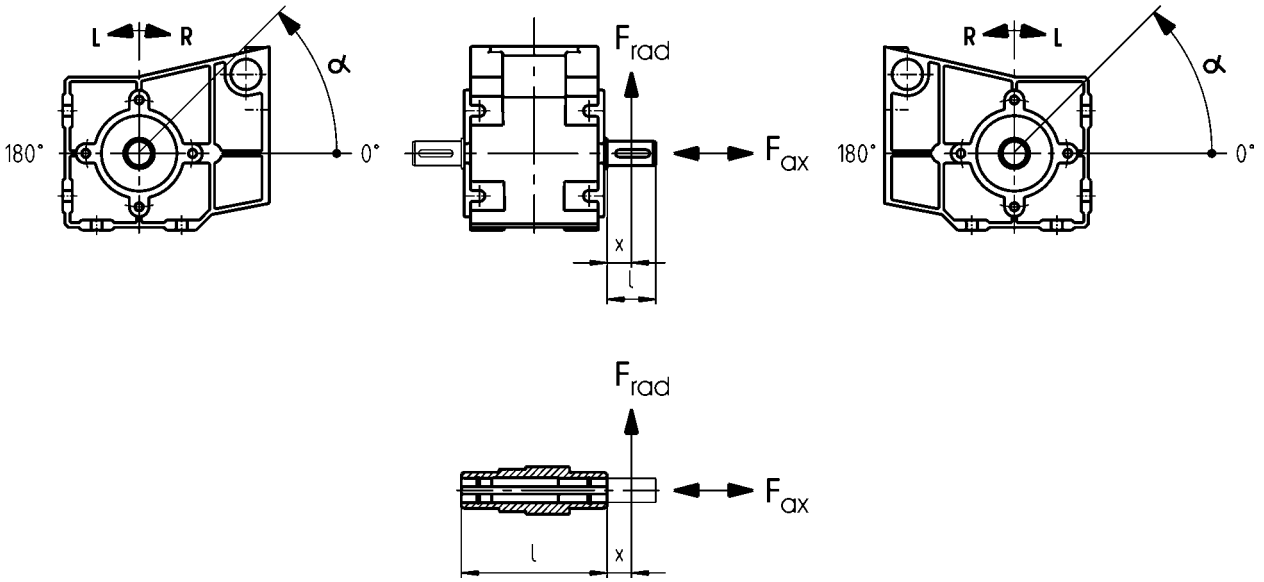
Permissible radial and axial forces at output

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)

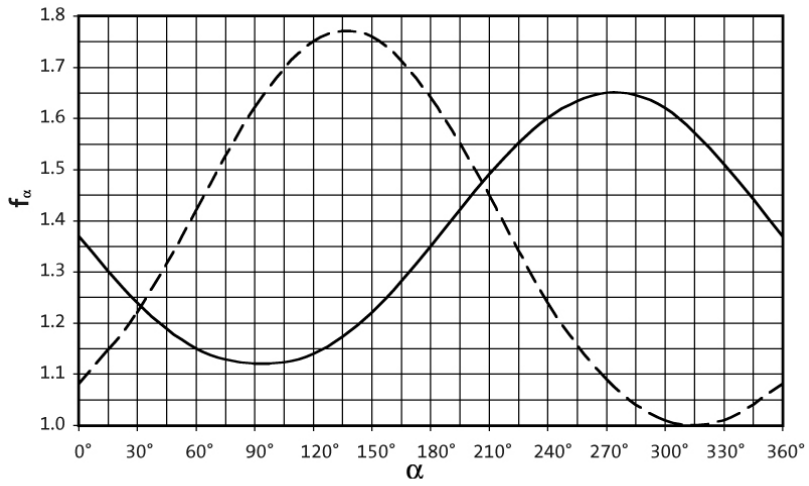
Permissible axial force
$F_{ax,per} = F_{ax,max}$ if $F_{rad} = 0$

If F_{rad} **and** $F_{ax} \neq 0$; please contact Lenze.

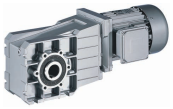
Application of forces



Effective direction factor f_α at output shaft

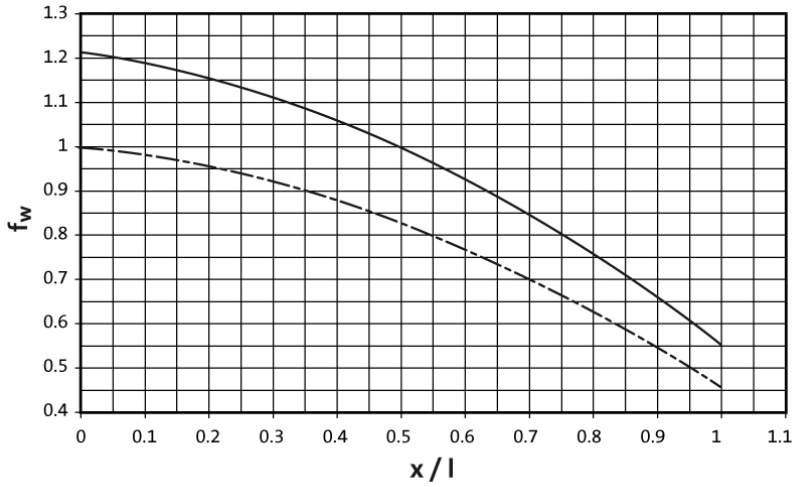


——— Direction of rotation L
— — — Direction of rotation R



Permissible radial and axial forces at output

Additional load factor f_w at output shaft



——— Solid shaft (V□□) — · — Hollow shaft (H□□)

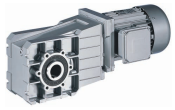
GKR□□-2□ H□□

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]
GKR03	900	1200	2200	2500	2800	3000	3000	3000	3000	3000
GKR04	1000	2200	2550	3000	3300	3600	3600	3600	3600	3600
GKR05	1500	2250	3800	4500	5100	6200	7400	7800	7800	7800
GKR06	3000	3800	5000	5200	5500	7000	9000	10000	10000	10000

	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]
GKR03	600	800	1000	1100	1250	1400	1400	1400	1400	1400
GKR04	700	1000	1275	1500	1650	1800	1800	1800	1800	1800
GKR05	1100	1500	1900	2200	2500	3100	3700	3900	3900	3900
GKR06	1500	2000	2500	2600	2750	3500	4500	5000	5000	5000

- 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

GKR□□-2□ 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]
GKR03	900	1200	1800	2100	2400	2800	3000	3000	3000	3000
GKR04	1000	1800	2100	2500	2700	3000	3000	3000	3000	3000
GKR05	1500	2350	3000	3600	4500	5000	6000	6500	6500	6500
GKR06	2000	2800	4000	4200	4500	5600	7300	8600	9000	9000

	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]
GKR03	600	800	1000	1100	1250	1400	1400	1400	1400	1400
GKR04	700	1000	1275	1500	1650	1800	1800	1800	1800	1800
GKR05	1100	1520	1900	2200	2500	3100	3700	3900	3900	3900
GKR06	1500	2000	2500	2600	2750	3500	4500	5000	5000	5000

GKR□□-2□ 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]
GKR03	900	1200	1800	2100	2400	2800	3000	3000	3000	3000
GKR04	1000	1800	2100	2500	2700	3000	3000	3000	3000	3000
GKR05	2400	3600	5200	6000	6500	6500	6500	6500	6500	6500
GKR06	3000	4000	5500	6200	7000	9000	9000	9000	9000	9000

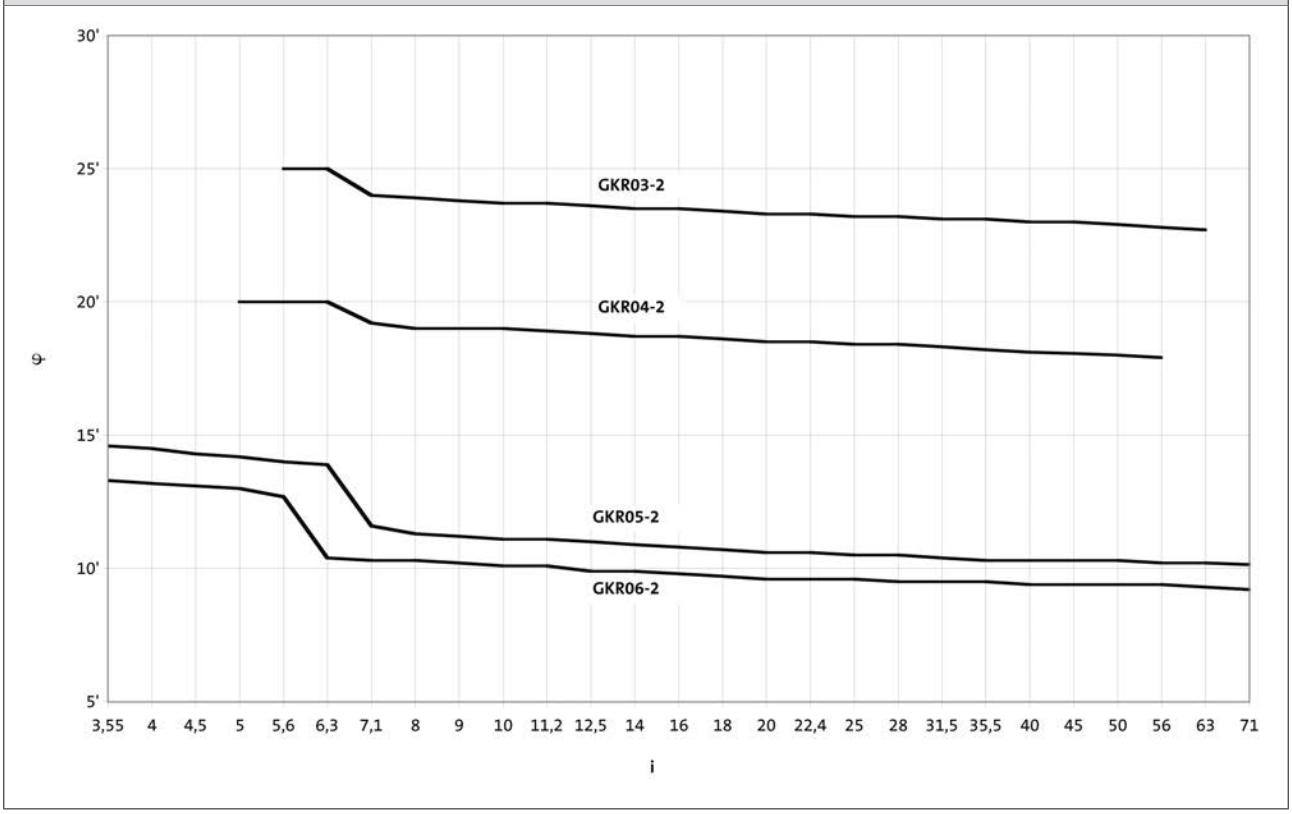
	Max. axial force, Solid shaft with flange									
	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$	$F_{ax,max}$
	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]
GKR03	600	800	1000	1100	1250	1400	1400	1400	1400	1400
GKR04	700	1000	1275	1500	1650	1800	1800	1800	1800	1800
GKR05	1100	1500	1900	2200	2500	3100	3700	3900	3900	3900
GKR06	1500	2000	2500	2600	2750	3500	4500	5000	5000	5000

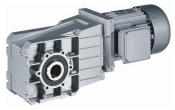
► Application of force F_{rad}: centre of shaft journal (x = l/2)
► $F_{ax,max}$ only valid with F_{rad} = 0

Output backlash in angular minutes

► Backlash ϕ depending on ratio i

GKR03...06-2





Moments of inertia

GKR□□-2

► Moment of inertia (J) depending on ratio i

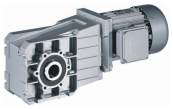
Gearbox			GKR03
5.411	J	[kgcm²]	0.307
6.222	J	[kgcm²]	0.276
7.111	J	[kgcm²]	0.196
8.178	J	[kgcm²]	0.178
9.101	J	[kgcm²]	0.134
10.466	J	[kgcm²]	0.123
11.640	J	[kgcm²]	0.086
13.386	J	[kgcm²]	0.079
15.111	J	[kgcm²]	0.059
17.378	J	[kgcm²]	0.055
19.365	J	[kgcm²]	0.038
22.270	J	[kgcm²]	0.054
25.051	J	[kgcm²]	0.025
28.808	J	[kgcm²]	0.023
32.593	J	[kgcm²]	0.016
37.481	J	[kgcm²]	0.015
42.222	J	[kgcm²]	0.010
48.556	J	[kgcm²]	0.009
53.889	J	[kgcm²]	0.006
61.972	J	[kgcm²]	0.006

Gearbox			GKR04
5.185	J	[kgcm²]	0.813
5.963	J	[kgcm²]	0.723
7.111	J	[kgcm²]	0.446
8.178	J	[kgcm²]	0.410
9.101	J	[kgcm²]	3.270
10.466	J	[kgcm²]	0.300
11.449	J	[kgcm²]	0.260
12.698	J	[kgcm²]	1.990
14.603	J	[kgcm²]	0.181
15.556	J	[kgcm²]	1.470
17.889	J	[kgcm²]	0.135
19.556	J	[kgcm²]	0.096
22.489	J	[kgcm²]	0.090
25.185	J	[kgcm²]	0.065
28.963	J	[kgcm²]	0.060
31.919	J	[kgcm²]	0.042
36.707	J	[kgcm²]	0.040
40.000	J	[kgcm²]	0.029
46.000	J	[kgcm²]	0.027
52.698	J	[kgcm²]	0.017
60.603	J	[kgcm²]	0.017

Gearbox			GKR05
3.565	J	[kgcm²]	4.950
4.889	J	[kgcm²]	2.793
6.257	J	[kgcm²]	1.791
6.883	J	[kgcm²]	2.572
7.817	J	[kgcm²]	2.316
9.440	J	[kgcm²]	1.531
10.720	J	[kgcm²]	1.396
12.081	J	[kgcm²]	1.021
13.216	J	[kgcm²]	0.874
13.719	J	[kgcm²]	0.938
15.008	J	[kgcm²]	0.805
16.857	J	[kgcm²]	0.597
19.143	J	[kgcm²]	0.554
20.650	J	[kgcm²]	0.439
23.450	J	[kgcm²]	0.411
26.878	J	[kgcm²]	0.270
30.522	J	[kgcm²]	0.253
33.433	J	[kgcm²]	0.191
37.967	J	[kgcm²]	0.180
43.267	J	[kgcm²]	0.118
49.133	J	[kgcm²]	0.112
52.510	J	[kgcm²]	0.085
59.630	J	[kgcm²]	0.081
67.113	J	[kgcm²]	0.054
76.213	J	[kgcm²]	0.051

Gearbox			GKR06
3.431	J	[kgcm²]	9.576
4.706	J	[kgcm²]	5.607
6.022	J	[kgcm²]	3.658
6.481	J	[kgcm²]	5.112
7.146	J	[kgcm²]	4.539
8.889	J	[kgcm²]	3.233
9.800	J	[kgcm²]	2.929
11.376	J	[kgcm²]	2.209
12.444	J	[kgcm²]	1.890
13.720	J	[kgcm²]	1.734
15.873	J	[kgcm²]	1.321
17.500	J	[kgcm²]	1.225
19.444	J	[kgcm²]	0.991
21.438	J	[kgcm²]	0.928
25.309	J	[kgcm²]	0.632
27.903	J	[kgcm²]	0.594
31.481	J	[kgcm²]	0.457
34.708	J	[kgcm²]	0.432
40.741	J	[kgcm²]	0.284
44.917	J	[kgcm²]	0.270
49.444	J	[kgcm²]	0.207
54.513	J	[kgcm²]	0.197
62.500	J	[kgcm²]	0.134
68.906	J	[kgcm²]	0.127

► 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

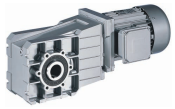
GKR□□-2M HAR / HBR

			063C32 063C42	071C32 071C42	080C32	080C42	090C32	100C12 100C32	112C22
GKR03	m	[kg]	7						
GKR04	m	[kg]	9	11	16				
GKR05	m	[kg]	14	16	21		28	37	
GKR06	m	[kg]	22	24	29		37	45	58

GKR□□-2M HAK

			063C32 063C42	071C32 071C42	080C32	080C42	090C32	100C12 100C32	112C22
GKR03	m	[kg]	7						
GKR04	m	[kg]	10	12	17				
GKR05	m	[kg]	15	17	22		29	38	
GKR06	m	[kg]	23	25	30		38	46	59

► 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.



Weights

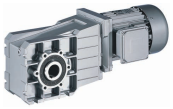
GKR□□-2M VAR / VBR

			063C32 063C42	071C32 071C42	080C32	080C42	090C32	100C12 100C32	112C22
GKR03	m	[kg]	7						
GKR04	m	[kg]	10	12	17				
GKR05	m	[kg]	15	17	22		29	38	
GKR06	m	[kg]	24	26	30		39	47	60

GKR□□-2M VAK

			063C32 063C42	071C32 071C42	080C32	080C42	090C32	100C12 100C32	112C22
GKR03	m	[kg]	8						
GKR04	m	[kg]	10	12	17				
GKR05	m	[kg]	16	18	23		30	39	
GKR06	m	[kg]	25	27	31		40	48	61

► 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.



Weights

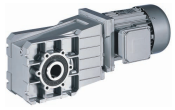
GKR□□-2M SAR / SBR

	063C32 063C42	071C32 071C42	080C32	080C42	090C32	100C12 100C32	112C22
GKR03 m [kg]	7						
GKR04 m [kg]	10	12	17				
GKR05 m [kg]	14	17	21		29	38	
GKR06 m [kg]	23	25	30		38	46	59

GKR□□-2M SAK

	063C32 063C42	071C32 071C42	080C32	080C42	090C32	100C12 100C32	112C22
GKR03 m [kg]	8						
GKR04 m [kg]	10	12	17				
GKR05 m [kg]	15	18	22		30	39	
GKR06 m [kg]	24	26	31		39	47	60

► 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.

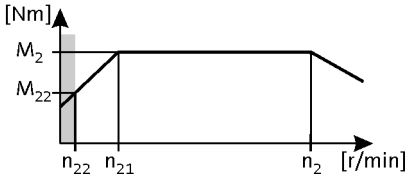


Selection tables

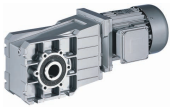
► 120 Hz: P_N = 0.55 kW

n_{22}/n_2 = 1 ... 24.0

n_1 = 143.3 ... 3440 r/min



n_{22}	n_{21}		n_2	M_{22}	M_2	c	i			
[r/min]	[r/min]		[r/min]	[Nm]	[Nm]					
16	66	-	378	10.0	13	2.6	9.101	GKR03-2M□□□063C32	E84AV□□□5514□□0	42
16	66	-	378	10.0	13	4.5	9.101	GKR04-2M□□□063C32	E84AV□□□5514□□0	42
14	57	-	329	12	15	2.2	10.466	GKR03-2M□□□063C32	E84AV□□□5514□□0	42
14	57	-	329	12	15	4.4	10.466	GKR04-2M□□□063C32	E84AV□□□5514□□0	42
13	52	-	301	13	17	4.1	11.449	GKR04-2M□□□063C32	E84AV□□□5514□□0	42
12	52	-	296	13	17	2.0	11.640	GKR03-2M□□□063C32	E84AV□□□5514□□0	42
11	47	-	271	14	18	3.7	12.698	GKR04-2M□□□063C32	E84AV□□□5514□□0	42
11	45	-	260	15	19	3.9	13.216	GKR05-2M□□□063C32	E84AV□□□5514□□0	42
11	45	-	257	15	19	1.8	13.386	GKR03-2M□□□063C32	E84AV□□□5514□□0	42
9.8	41	-	236	16	21	3.2	14.603	GKR04-2M□□□063C32	E84AV□□□5514□□0	42
9.6	40	-	229	17	22	3.9	15.008	GKR05-2M□□□063C32	E84AV□□□5514□□0	42
9.5	40	-	228	17	22	1.6	15.111	GKR03-2M□□□063C32	E84AV□□□5514□□0	42
9.2	39	-	221	17	23	3.0	15.556	GKR04-2M□□□063C32	E84AV□□□5514□□0	42
8.3	35	-	198	19	25	1.4	17.378	GKR03-2M□□□063C32	E84AV□□□5514□□0	42
8.0	34	-	192	20	26	2.6	17.889	GKR04-2M□□□063C32	E84AV□□□5514□□0	42
7.4	31	-	178	21	28	1.2	19.365	GKR03-2M□□□063C32	E84AV□□□5514□□0	42
7.3	31	-	176	22	28	2.4	19.556	GKR04-2M□□□063C32	E84AV□□□5514□□0	42
6.4	27	-	155	24	32	1.1	22.270	GKR03-2M□□□063C32	E84AV□□□5514□□0	42
6.4	27	-	153	25	33	2.1	22.489	GKR04-2M□□□063C32	E84AV□□□5514□□0	42
5.7	24	-	137	28	36	1.1	25.051	GKR03-2M□□□063C32	E84AV□□□5514□□0	42
5.7	24	-	137	28	37	2.1	25.185	GKR04-2M□□□063C32	E84AV□□□5514□□0	42
5.0	21	-	119	32	42	0.9	28.808	GKR03-2M□□□063C32	E84AV□□□5514□□0	42
5.0	21	-	119	32	42	1.8	28.963	GKR04-2M□□□063C32	E84AV□□□5514□□0	42
4.7	20	-	113	34	44	4.2	30.522	GKR05-2M□□□063C32	E84AV□□□5514□□0	42
4.5	19	-	108	35	46	1.7	31.919	GKR04-2M□□□063C32	E84AV□□□5514□□0	42
3.9	16	-	94	40	53	1.5	36.707	GKR04-2M□□□063C32	E84AV□□□5514□□0	42
3.6	15	-	86	44	58	1.2	40.000	GKR04-2M□□□063C32	E84AV□□□5514□□0	42
3.1	13	-	75	51	67	1.3	46.000	GKR04-2M□□□063C32	E84AV□□□5514□□0	42
2.9	12	-	70	54	71	3.2	49.133	GKR05-2M□□□063C32	E84AV□□□5514□□0	42
2.7	11	-	66	58	76	3.0	52.510	GKR05-2M□□□063C32	E84AV□□□5514□□0	42
2.6	11	-	63	60	79	3.5	54.513	GKR06-2M□□□063C32	E84AV□□□5514□□0	42
2.4	10	-	58	66	87	2.7	59.630	GKR05-2M□□□063C32	E84AV□□□5514□□0	42
2.3	9.6	-	55	69	91	2.8	62.500	GKR06-2M□□□063C32	E84AV□□□5514□□0	42
2.1	8.9	-	51	74	97	1.5	67.113	GKR05-2M□□□063C32	E84AV□□□5514□□0	42
2.1	8.7	-	50	76	100	2.8	68.906	GKR06-2M□□□063C32	E84AV□□□5514□□0	42
1.9	7.9	-	45	84	111	1.5	76.213	GKR05-2M□□□063C32	E84AV□□□5514□□0	42

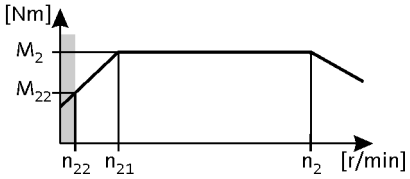


Selection tables

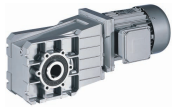
► 120 Hz: P_N = 0.75 kW

n_{22}/n_2 = 1 ... 24.0

n_1 = 141.7 ... 3400 r/min



n_{22}	n_{21}		n_2	M_{22}	M_2	c	i			
[r/min]	[r/min]		[r/min]	[Nm]	[Nm]					
16	66	-	374	14	18	1.9	9.101	GKR03-2M□□□063C42	E84AV□□□7514□□0	42
16	66	-	374	14	18	3.3	9.101	GKR04-2M□□□063C42	E84AV□□□7514□□0	42
14	57	-	325	16	21	1.6	10.466	GKR03-2M□□□063C42	E84AV□□□7514□□0	42
14	57	-	325	16	21	3.2	10.466	GKR04-2M□□□063C42	E84AV□□□7514□□0	42
12	52	-	297	17	23	3.0	11.449	GKR04-2M□□□063C42	E84AV□□□7514□□0	42
12	52	-	292	17	23	1.5	11.640	GKR03-2M□□□063C42	E84AV□□□7514□□0	42
11	47	-	268	19	25	2.7	12.698	GKR04-2M□□□063C42	E84AV□□□7514□□0	42
11	45	-	257	20	26	2.9	13.216	GKR05-2M□□□063C42	E84AV□□□7514□□0	42
11	45	-	254	20	27	1.3	13.386	GKR03-2M□□□063C42	E84AV□□□7514□□0	42
9.7	41	-	233	22	29	2.3	14.603	GKR04-2M□□□063C42	E84AV□□□7514□□0	42
9.4	40	-	227	23	30	2.9	15.008	GKR05-2M□□□063C42	E84AV□□□7514□□0	42
9.4	40	-	225	23	30	1.1	15.111	GKR03-2M□□□063C42	E84AV□□□7514□□0	42
9.1	39	-	219	23	31	2.2	15.556	GKR04-2M□□□063C42	E84AV□□□7514□□0	42
8.2	35	-	196	26	35	1.0	17.378	GKR03-2M□□□063C42	E84AV□□□7514□□0	42
7.9	34	-	190	27	36	1.9	17.889	GKR04-2M□□□063C42	E84AV□□□7514□□0	42
7.2	31	-	174	29	39	1.8	19.556	GKR04-2M□□□063C42	E84AV□□□7514□□0	42
6.3	27	-	151	34	45	1.5	22.489	GKR04-2M□□□063C42	E84AV□□□7514□□0	42
5.6	24	-	135	38	50	1.5	25.185	GKR04-2M□□□063C42	E84AV□□□7514□□0	42
5.3	22	-	127	40	54	3.1	26.878	GKR05-2M□□□063C42	E84AV□□□7514□□0	42
4.9	21	-	117	43	58	1.3	28.963	GKR04-2M□□□063C42	E84AV□□□7514□□0	42
4.6	20	-	111	46	61	3.1	30.522	GKR05-2M□□□063C42	E84AV□□□7514□□0	42
4.4	19	-	107	48	64	1.2	31.919	GKR04-2M□□□063C42	E84AV□□□7514□□0	42
4.2	18	-	102	50	67	2.6	33.433	GKR05-2M□□□063C42	E84AV□□□7514□□0	42
3.9	16	-	93	55	74	1.1	36.707	GKR04-2M□□□063C42	E84AV□□□7514□□0	42
3.7	16	-	90	57	76	2.6	37.967	GKR05-2M□□□063C42	E84AV□□□7514□□0	42
3.5	15	-	84	61	82	2.9	40.741	GKR06-2M□□□063C42	E84AV□□□7514□□0	42
3.3	14	-	79	65	87	2.6	43.267	GKR05-2M□□□063C42	E84AV□□□7514□□0	42
3.2	13	-	76	67	90	2.9	44.917	GKR06-2M□□□063C42	E84AV□□□7514□□0	42
3.1	13	-	74	69	92	0.9	46.000	GKR04-2M□□□063C42	E84AV□□□7514□□0	42
2.9	12	-	69	74	98	2.3	49.133	GKR05-2M□□□063C42	E84AV□□□7514□□0	42
2.9	12	-	69	74	99	2.5	49.444	GKR06-2M□□□063C42	E84AV□□□7514□□0	42
2.7	11	-	65	79	105	2.2	52.510	GKR05-2M□□□063C42	E84AV□□□7514□□0	42
2.6	11	-	62	82	109	2.5	54.513	GKR06-2M□□□063C42	E84AV□□□7514□□0	42
2.4	10	-	57	89	119	1.9	59.630	GKR05-2M□□□063C42	E84AV□□□7514□□0	42
2.3	9.6	-	54	94	125	2.0	62.500	GKR06-2M□□□063C42	E84AV□□□7514□□0	42
2.1	8.9	-	51	101	134	1.1	67.113	GKR05-2M□□□063C42	E84AV□□□7514□□0	42
2.1	8.7	-	49	103	138	2.0	68.906	GKR06-2M□□□063C42	E84AV□□□7514□□0	42
1.9	7.9	-	45	114	153	1.1	76.213	GKR05-2M□□□063C42	E84AV□□□7514□□0	42

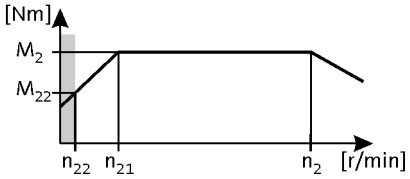


Selection tables

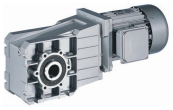
► 120 Hz: P_N = 1.10 kW

n_{22}/n_2 = 1 ... 24.0

n_1 = 145.4 ... 3490 r/min



n_{22} [r/min]	n_{21} [r/min]		n_2 [r/min]	M_{22} [Nm]	M_2 [Nm]	c	i			
23	96	-	558	14	18	4.2	6.257	GKR05-2M□□□071C32	E84AV□□□1124□□0	42
16	66	-	384	20	26	2.4	9.101	GKR04-2M□□□071C32	E84AV□□□1124□□0	42
14	57	-	334	23	30	2.2	10.466	GKR04-2M□□□071C32	E84AV□□□1124□□0	42
13	52	-	305	25	33	2.1	11.449	GKR04-2M□□□071C32	E84AV□□□1124□□0	42
12	47	-	275	28	36	1.9	12.698	GKR04-2M□□□071C32	E84AV□□□1124□□0	42
11	45	-	264	29	38	4.2	13.216	GKR05-2M□□□071C32	E84AV□□□1124□□0	42
10	41	-	239	32	42	1.6	14.603	GKR04-2M□□□071C32	E84AV□□□1124□□0	42
9.7	40	-	233	33	43	3.9	15.008	GKR05-2M□□□071C32	E84AV□□□1124□□0	42
9.4	39	-	224	34	45	1.5	15.556	GKR04-2M□□□071C32	E84AV□□□1124□□0	42
8.1	34	-	195	39	51	1.3	17.889	GKR04-2M□□□071C32	E84AV□□□1124□□0	42
7.4	31	-	179	43	56	1.2	19.556	GKR04-2M□□□071C32	E84AV□□□1124□□0	42
7.0	29	-	169	45	59	3.1	20.650	GKR05-2M□□□071C32	E84AV□□□1124□□0	42
6.5	27	-	155	49	64	1.1	22.489	GKR04-2M□□□071C32	E84AV□□□1124□□0	42
6.2	26	-	149	52	67	2.7	23.450	GKR05-2M□□□071C32	E84AV□□□1124□□0	42
5.8	24	-	139	55	72	1.1	25.185	GKR04-2M□□□071C32	E84AV□□□1124□□0	42
5.4	22	-	130	59	77	2.7	26.878	GKR05-2M□□□071C32	E84AV□□□1124□□0	42
5.0	21	-	121	64	83	0.9	28.963	GKR04-2M□□□071C32	E84AV□□□1124□□0	42
4.8	20	-	114	67	87	2.4	30.522	GKR05-2M□□□071C32	E84AV□□□1124□□0	42
4.6	19	-	111	69	90	3.4	31.481	GKR06-2M□□□071C32	E84AV□□□1124□□0	42
4.4	18	-	104	73	96	2.2	33.433	GKR05-2M□□□071C32	E84AV□□□1124□□0	42
3.8	16	-	92	83	109	1.9	37.967	GKR05-2M□□□071C32	E84AV□□□1124□□0	42
3.4	14	-	81	95	124	1.8	43.267	GKR05-2M□□□071C32	E84AV□□□1124□□0	42
3.0	12	-	71	108	141	1.6	49.133	GKR05-2M□□□071C32	E84AV□□□1124□□0	42
2.9	12	-	71	109	141	2.8	49.444	GKR06-2M□□□071C32	E84AV□□□1124□□0	42
2.8	11	-	67	115	150	1.5	52.510	GKR05-2M□□□071C32	E84AV□□□1124□□0	42
2.7	11	-	64	120	156	2.7	54.513	GKR06-2M□□□071C32	E84AV□□□1124□□0	42
2.4	10	-	59	131	171	1.3	59.630	GKR05-2M□□□071C32	E84AV□□□1124□□0	42
2.3	9.6	-	56	137	179	1.6	62.500	GKR06-2M□□□071C32	E84AV□□□1124□□0	42
2.1	8.7	-	51	151	197	1.6	68.906	GKR06-2M□□□071C32	E84AV□□□1124□□0	42

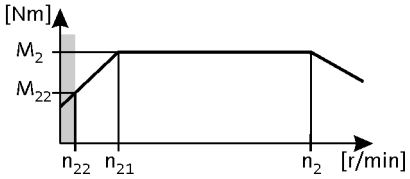


Selection tables

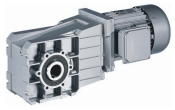
► 120 Hz: P_N = 1.50 kW

n_{22}/n_2 = 1 ... 24.0

n_1 = 143.8 ... 3450 r/min



n_{22}	n_{21}		n_2	M_{22}	M_2	c	i			
[r/min]	[r/min]		[r/min]	[Nm]	[Nm]					
23	96	-	551	19	25	3.1	6.257	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
16	66	-	379	27	36	1.8	9.101	GKR04-2M□□□071C42	E84AV□□□1524□□0	42
14	57	-	330	31	41	1.6	10.466	GKR04-2M□□□071C42	E84AV□□□1524□□0	42
13	52	-	301	34	45	1.5	11.449	GKR04-2M□□□071C42	E84AV□□□1524□□0	42
12	50	-	286	36	48	3.1	12.081	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
11	47	-	272	38	50	1.4	12.698	GKR04-2M□□□071C42	E84AV□□□1524□□0	42
11	45	-	261	40	52	3.1	13.216	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
11	44	-	252	41	54	3.0	13.719	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
9.8	41	-	236	44	58	1.2	14.603	GKR04-2M□□□071C42	E84AV□□□1524□□0	42
9.6	40	-	230	45	59	2.9	15.008	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
9.2	39	-	222	47	61	1.1	15.556	GKR04-2M□□□071C42	E84AV□□□1524□□0	42
9.1	38	-	217	48	63	3.1	15.873	GKR06-2M□□□071C42	E84AV□□□1524□□0	42
8.5	36	-	205	51	67	2.7	16.857	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
8.2	34	-	197	52	69	3.1	17.500	GKR06-2M□□□071C42	E84AV□□□1524□□0	42
8.0	34	-	193	54	71	1.0	17.889	GKR04-2M□□□071C42	E84AV□□□1524□□0	42
7.5	31	-	180	57	76	2.4	19.143	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
7.0	29	-	167	62	82	2.2	20.650	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
6.1	26	-	147	70	93	2.0	23.450	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
5.7	24	-	136	76	100	2.9	25.309	GKR06-2M□□□071C42	E84AV□□□1524□□0	42
5.4	22	-	128	81	106	1.9	26.878	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
5.2	22	-	124	84	110	2.9	27.903	GKR06-2M□□□071C42	E84AV□□□1524□□0	42
4.7	20	-	113	91	120	1.7	30.522	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
4.6	19	-	110	94	124	2.4	31.481	GKR06-2M□□□071C42	E84AV□□□1524□□0	42
4.3	18	-	103	100	132	1.6	33.433	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
4.1	17	-	99	104	137	2.4	34.708	GKR06-2M□□□071C42	E84AV□□□1524□□0	42
3.8	16	-	91	114	150	1.4	37.967	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
3.5	15	-	85	122	161	2.5	40.741	GKR06-2M□□□071C42	E84AV□□□1524□□0	42
3.3	14	-	80	130	171	1.3	43.267	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
3.2	13	-	77	135	177	2.4	44.917	GKR06-2M□□□071C42	E84AV□□□1524□□0	42
2.9	12	-	70	147	194	1.2	49.133	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
2.9	12	-	70	148	195	2.0	49.444	GKR06-2M□□□071C42	E84AV□□□1524□□0	42
2.7	11	-	66	157	207	1.1	52.510	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
2.6	11	-	63	163	215	2.0	54.513	GKR06-2M□□□071C42	E84AV□□□1524□□0	42
2.4	10	-	58	179	235	1.0	59.630	GKR05-2M□□□071C42	E84AV□□□1524□□0	42
2.3	9.6	-	55	187	247	1.2	62.500	GKR06-2M□□□071C42	E84AV□□□1524□□0	42
2.1	8.7	-	50	206	272	1.2	68.906	GKR06-2M□□□071C42	E84AV□□□1524□□0	42

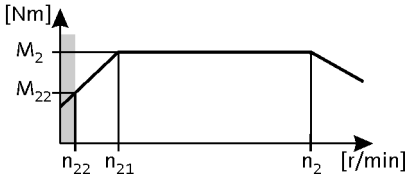


Selection tables

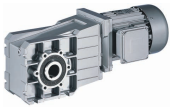
► 120 Hz: P_N = 2.20 kW

n_{22}/n_2 = 1 ... 24.0

n_1 = 145.8 ... 3500 r/min



n_{22}	n_{21}		n_2	M_{22}	M_2	c	i			
[r/min]	[r/min]		[r/min]	[Nm]	[Nm]					
23	96	-	559	27	36	3.3	6.257	GKR05-2M□□□080C32	E84AV□□□2224□□0	42
16	66	-	385	39	52	1.2	9.101	GKR04-2M□□□080C32	E84AV□□□2224□□0	42
14	57	-	334	45	60	1.1	10.466	GKR04-2M□□□080C32	E84AV□□□2224□□0	42
13	52	-	306	49	65	1.0	11.449	GKR04-2M□□□080C32	E84AV□□□2224□□0	42
12	50	-	290	52	69	2.3	12.081	GKR05-2M□□□080C32	E84AV□□□2224□□0	42
12	47	-	276	54	72	0.9	12.698	GKR04-2M□□□080C32	E84AV□□□2224□□0	42
11	45	-	265	57	75	2.1	13.216	GKR05-2M□□□080C32	E84AV□□□2224□□0	42
11	44	-	255	59	78	2.1	13.719	GKR05-2M□□□080C32	E84AV□□□2224□□0	42
9.7	40	-	233	64	86	2.0	15.008	GKR05-2M□□□080C32	E84AV□□□2224□□0	42
8.7	36	-	208	72	96	1.9	16.857	GKR05-2M□□□080C32	E84AV□□□2224□□0	42
7.6	31	-	183	82	109	1.7	19.143	GKR05-2M□□□080C32	E84AV□□□2224□□0	42
7.5	31	-	180	83	111	3.1	19.444	GKR06-2M□□□080C32	E84AV□□□2224□□0	42
7.1	29	-	170	88	118	1.5	20.650	GKR05-2M□□□080C32	E84AV□□□2224□□0	42
6.8	28	-	163	92	122	2.8	21.438	GKR06-2M□□□080C32	E84AV□□□2224□□0	42
6.2	26	-	149	100	134	1.4	23.450	GKR05-2M□□□080C32	E84AV□□□2224□□0	42
5.8	24	-	138	108	144	2.7	25.309	GKR06-2M□□□080C32	E84AV□□□2224□□0	42
5.4	22	-	130	115	153	1.3	26.878	GKR05-2M□□□080C32	E84AV□□□2224□□0	42
5.2	22	-	125	119	159	2.4	27.903	GKR06-2M□□□080C32	E84AV□□□2224□□0	42
4.8	20	-	115	131	174	1.2	30.522	GKR05-2M□□□080C32	E84AV□□□2224□□0	42
4.6	19	-	111	135	180	2.1	31.481	GKR06-2M□□□080C32	E84AV□□□2224□□0	42
4.4	18	-	105	143	191	1.1	33.433	GKR05-2M□□□080C32	E84AV□□□2224□□0	42
4.2	17	-	101	148	198	1.9	34.708	GKR06-2M□□□080C32	E84AV□□□2224□□0	42
3.8	16	-	92	162	217	0.9	37.967	GKR05-2M□□□080C32	E84AV□□□2224□□0	42
3.6	15	-	86	174	232	1.8	40.741	GKR06-2M□□□080C32	E84AV□□□2224□□0	42
3.3	13	-	78	192	256	1.7	44.917	GKR06-2M□□□080C32	E84AV□□□2224□□0	42
3.0	12	-	71	211	282	1.5	49.444	GKR06-2M□□□080C32	E84AV□□□2224□□0	42
2.7	11	-	64	233	311	1.4	54.513	GKR06-2M□□□080C32	E84AV□□□2224□□0	42

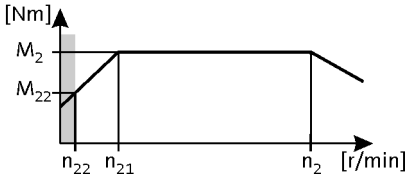


Selection tables

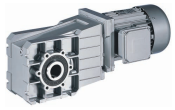
► 120 Hz: P_N = 3.00 kW

n_{22}/n_2 = 1 ... 24.0

n_1 = 145.0 ... 3480 r/min



n_{22} [r/min]	n_{21} [r/min]		n_2 [r/min]	M_{22} [Nm]	M_2 [Nm]	c	i			
24	149	-	578	35	47	3.1	6.022	GKR06-2M□□□080C42	E84AV□□□3024□□0	42
23	144	-	556	37	49	2.4	6.257	GKR05-2M□□□080C42	E84AV□□□3024□□0	42
13	79	-	306	67	89	3.1	11.376	GKR06-2M□□□080C42	E84AV□□□3024□□0	42
12	75	-	288	71	95	1.7	12.081	GKR05-2M□□□080C42	E84AV□□□3024□□0	42
12	72	-	280	73	97	3.1	12.444	GKR06-2M□□□080C42	E84AV□□□3024□□0	42
11	68	-	263	78	103	1.6	13.216	GKR05-2M□□□080C42	E84AV□□□3024□□0	42
11	66	-	254	81	107	1.5	13.719	GKR05-2M□□□080C42	E84AV□□□3024□□0	42
11	66	-	254	81	107	3.0	13.720	GKR06-2M□□□080C42	E84AV□□□3024□□0	42
9.7	60	-	232	88	117	1.4	15.008	GKR05-2M□□□080C42	E84AV□□□3024□□0	42
9.1	57	-	219	93	124	2.7	15.873	GKR06-2M□□□080C42	E84AV□□□3024□□0	42
8.6	53	-	206	99	132	1.4	16.857	GKR05-2M□□□080C42	E84AV□□□3024□□0	42
8.3	51	-	199	103	137	2.5	17.500	GKR06-2M□□□080C42	E84AV□□□3024□□0	42
7.6	47	-	182	112	150	1.2	19.143	GKR05-2M□□□080C42	E84AV□□□3024□□0	42
7.5	46	-	179	114	152	2.2	19.444	GKR06-2M□□□080C42	E84AV□□□3024□□0	42
7.0	44	-	169	121	162	1.1	20.650	GKR05-2M□□□080C42	E84AV□□□3024□□0	42
6.8	42	-	162	126	168	2.0	21.438	GKR06-2M□□□080C42	E84AV□□□3024□□0	42
6.2	38	-	148	138	183	1.0	23.450	GKR05-2M□□□080C42	E84AV□□□3024□□0	42
5.7	36	-	138	149	198	2.0	25.309	GKR06-2M□□□080C42	E84AV□□□3024□□0	42
5.4	34	-	130	158	210	1.0	26.878	GKR05-2M□□□080C42	E84AV□□□3024□□0	42
5.2	32	-	125	164	218	1.8	27.903	GKR06-2M□□□080C42	E84AV□□□3024□□0	42
4.6	29	-	111	185	246	1.6	31.481	GKR06-2M□□□080C42	E84AV□□□3024□□0	42
4.2	26	-	100	204	272	1.4	34.708	GKR06-2M□□□080C42	E84AV□□□3024□□0	42
3.6	22	-	85	239	319	1.3	40.741	GKR06-2M□□□080C42	E84AV□□□3024□□0	42
3.2	20	-	78	264	351	1.2	44.917	GKR06-2M□□□080C42	E84AV□□□3024□□0	42
2.9	18	-	70	290	387	1.1	49.444	GKR06-2M□□□080C42	E84AV□□□3024□□0	42
2.7	17	-	64	320	426	1.0	54.513	GKR06-2M□□□080C42	E84AV□□□3024□□0	42

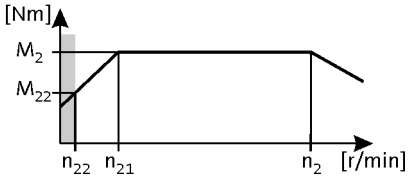


Selection tables

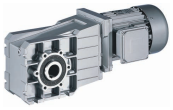
► 120 Hz: P_N = 4.00 kW

n_{22}/n_2 = 1 ... 24.0

n_1 = 145.0 ... 3480 r/min



n_{22} [r/min]	n_{21} [r/min]		n_2 [r/min]	M_{22} [Nm]	M_2 [Nm]	c	i			
24	100	-	578	44	63	2.9	6.022	GKR06-2M□□□090C32	E84AV□□□4024□□0	42
23	96	-	556	46	65	1.8	6.257	GKR05-2M□□□090C32	E84AV□□□4024□□0	42
13	53	-	306	83	119	2.8	11.376	GKR06-2M□□□090C32	E84AV□□□4024□□0	42
12	50	-	288	88	126	1.2	12.081	GKR05-2M□□□090C32	E84AV□□□4024□□0	42
12	48	-	280	91	130	2.6	12.444	GKR06-2M□□□090C32	E84AV□□□4024□□0	42
11	45	-	263	97	138	1.2	13.216	GKR05-2M□□□090C32	E84AV□□□4024□□0	42
11	44	-	254	100	143	1.1	13.719	GKR05-2M□□□090C32	E84AV□□□4024□□0	42
11	44	-	254	100	143	2.3	13.720	GKR06-2M□□□090C32	E84AV□□□4024□□0	42
9.7	40	-	232	110	157	1.1	15.008	GKR05-2M□□□090C32	E84AV□□□4024□□0	42
9.1	38	-	219	116	166	2.1	15.873	GKR06-2M□□□090C32	E84AV□□□4024□□0	42
8.6	36	-	206	123	176	1.0	16.857	GKR05-2M□□□090C32	E84AV□□□4024□□0	42
8.3	34	-	199	128	183	1.9	17.500	GKR06-2M□□□090C32	E84AV□□□4024□□0	42
7.6	31	-	182	140	200	0.9	19.143	GKR05-2M□□□090C32	E84AV□□□4024□□0	42
7.5	31	-	179	142	203	1.7	19.444	GKR06-2M□□□090C32	E84AV□□□4024□□0	42
6.8	28	-	162	157	224	1.5	21.438	GKR06-2M□□□090C32	E84AV□□□4024□□0	42
5.7	24	-	138	185	264	1.5	25.309	GKR06-2M□□□090C32	E84AV□□□4024□□0	42
5.2	22	-	125	204	291	1.3	27.903	GKR06-2M□□□090C32	E84AV□□□4024□□0	42
4.6	19	-	111	230	328	1.2	31.481	GKR06-2M□□□090C32	E84AV□□□4024□□0	42
4.2	17	-	100	253	362	1.1	34.708	GKR06-2M□□□090C32	E84AV□□□4024□□0	42
3.6	15	-	85	297	425	1.0	40.741	GKR06-2M□□□090C32	E84AV□□□4024□□0	42
3.2	13	-	78	328	468	0.9	44.917	GKR06-2M□□□090C32	E84AV□□□4024□□0	42

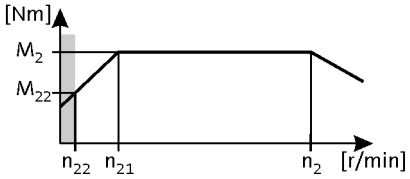


Selection tables

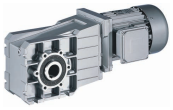
► 120 Hz: P_N = 5.50 kW

n_{22}/n_2 = 1 ... 24.0

n_1 = 146.9 ... 3525 r/min



n_{22} [r/min]	n_{21} [r/min]		n_2 [r/min]	M_{22} [Nm]	M_2 [Nm]	c	i			
24	100	-	585	60	85	2.5	6.022	GKR06-2M□□□100C12	E84AV□□□5524□□0	42
24	96	-	563	62	89	1.3	6.257	GKR05-2M□□□100C12	E84AV□□□5524□□0	42
13	53	-	310	113	161	2.0	11.376	GKR06-2M□□□100C12	E84AV□□□5524□□0	42
12	50	-	292	120	171	0.9	12.081	GKR05-2M□□□100C12	E84AV□□□5524□□0	42
12	48	-	283	123	176	1.9	12.444	GKR06-2M□□□100C12	E84AV□□□5524□□0	42
11	44	-	257	136	194	1.7	13.720	GKR06-2M□□□100C12	E84AV□□□5524□□0	42
9.3	38	-	222	157	225	1.5	15.873	GKR06-2M□□□100C12	E84AV□□□5524□□0	42
8.4	34	-	201	173	248	1.4	17.500	GKR06-2M□□□100C12	E84AV□□□5524□□0	42
7.6	31	-	181	193	275	1.2	19.444	GKR06-2M□□□100C12	E84AV□□□5524□□0	42
6.9	28	-	164	212	304	1.1	21.438	GKR06-2M□□□100C12	E84AV□□□5524□□0	42
5.8	24	-	139	251	358	1.1	25.309	GKR06-2M□□□100C12	E84AV□□□5524□□0	42
5.3	22	-	126	277	395	1.0	27.903	GKR06-2M□□□100C12	E84AV□□□5524□□0	42

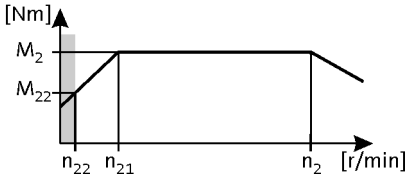


Selection tables

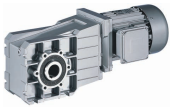
► 120 Hz: P_N = 7.50 kW

n_{22}/n_2 = 1 ... 24.0

n_1 = 146.5 ... 3515 r/min



n_{22} [r/min]	n_{21} [r/min]		n_2 [r/min]	M_{22} [Nm]	M_2 [Nm]	c	i			
24	100	-	584	82	117	1.8	6.022	GKR06-2M□□□100C32	E84AV□□□7524□□0	42
23	96	-	562	85	121	1.0	6.257	GKR05-2M□□□100C32	E84AV□□□7524□□0	42
13	53	-	309	154	220	1.5	11.376	GKR06-2M□□□100C32	E84AV□□□7524□□0	42
12	48	-	283	169	241	1.4	12.444	GKR06-2M□□□100C32	E84AV□□□7524□□0	42
11	44	-	256	186	266	1.2	13.720	GKR06-2M□□□100C32	E84AV□□□7524□□0	42
9.2	38	-	221	215	307	1.1	15.873	GKR06-2M□□□100C32	E84AV□□□7524□□0	42
8.4	34	-	201	237	339	1.0	17.500	GKR06-2M□□□100C32	E84AV□□□7524□□0	42
7.5	31	-	181	264	376	0.9	19.444	GKR06-2M□□□100C32	E84AV□□□7524□□0	42

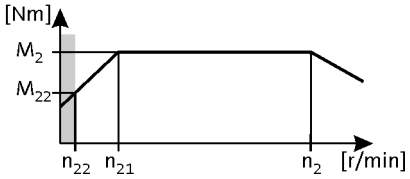


Selection tables

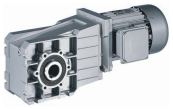
► 120 Hz: P_N = 11.00 kW

n_{22}/n_2 = 1 ... 24.0

n_1 = 147.1 ... 3530 r/min

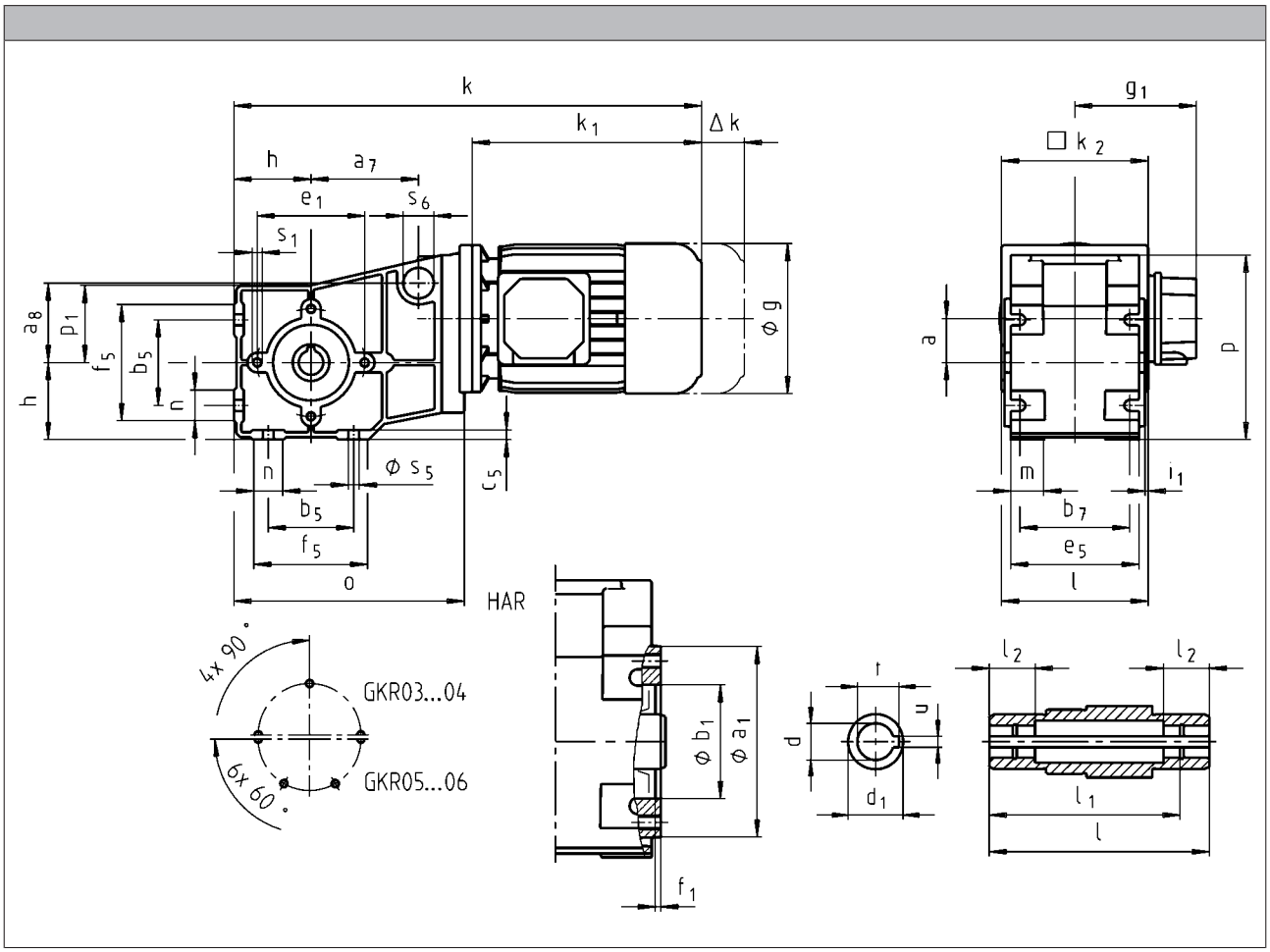


n_{22} [r/min]	n_{21} [r/min]		n_2 [r/min]	M_{22} [Nm]	M_2 [Nm]	c	i			
24	100	-	586	109	170	1.2	6.022	GKR06-2M□□□112C22	E84AV□□□1134□□0	42
13	53	-	310	206	322	1.0	11.376	GKR06-2M□□□112C22	E84AV□□□1134□□0	42
12	48	-	284	225	352	1.0	12.444	GKR06-2M□□□112C22	E84AV□□□1134□□0	42



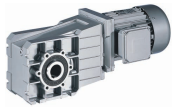
Dimensions

GKR□□-2M H□R



GKR bevel gearboxes

Technical data



		063C32 063C42	071C32 071C42	080C32	080C42	090C32	100C12 100C32	112C22
g		123	139	156		176	194	218
g_1	MFEMAXX	100	109	150		157	166	176
	MFEMABR	107	118	132		137	147	158
k_1	MFEMAXX	187	207	224.5		274	324	319
k_2		120		145		180		222
Δ k	MFEMABR	40	52	73		68	76	90
	MFFMAXX	128					109	102
	MFFMABR	170	165	183		181	170	183
		k						
	GKR03	332						
	GKR04	383	403	425				
	GKR05	436	456	479		538	588	
	GKR06	488	508	530		590	640	641

	a	a_7	a_8	h	o	p[1]	p_1	s_6
GKR03	29	66	39	50	142	117	48	25
GKR04	36	88	65	63	189	151	63	25
GKR05	40			80	250.5	181	82	
GKR06	51			100	307	226	100	

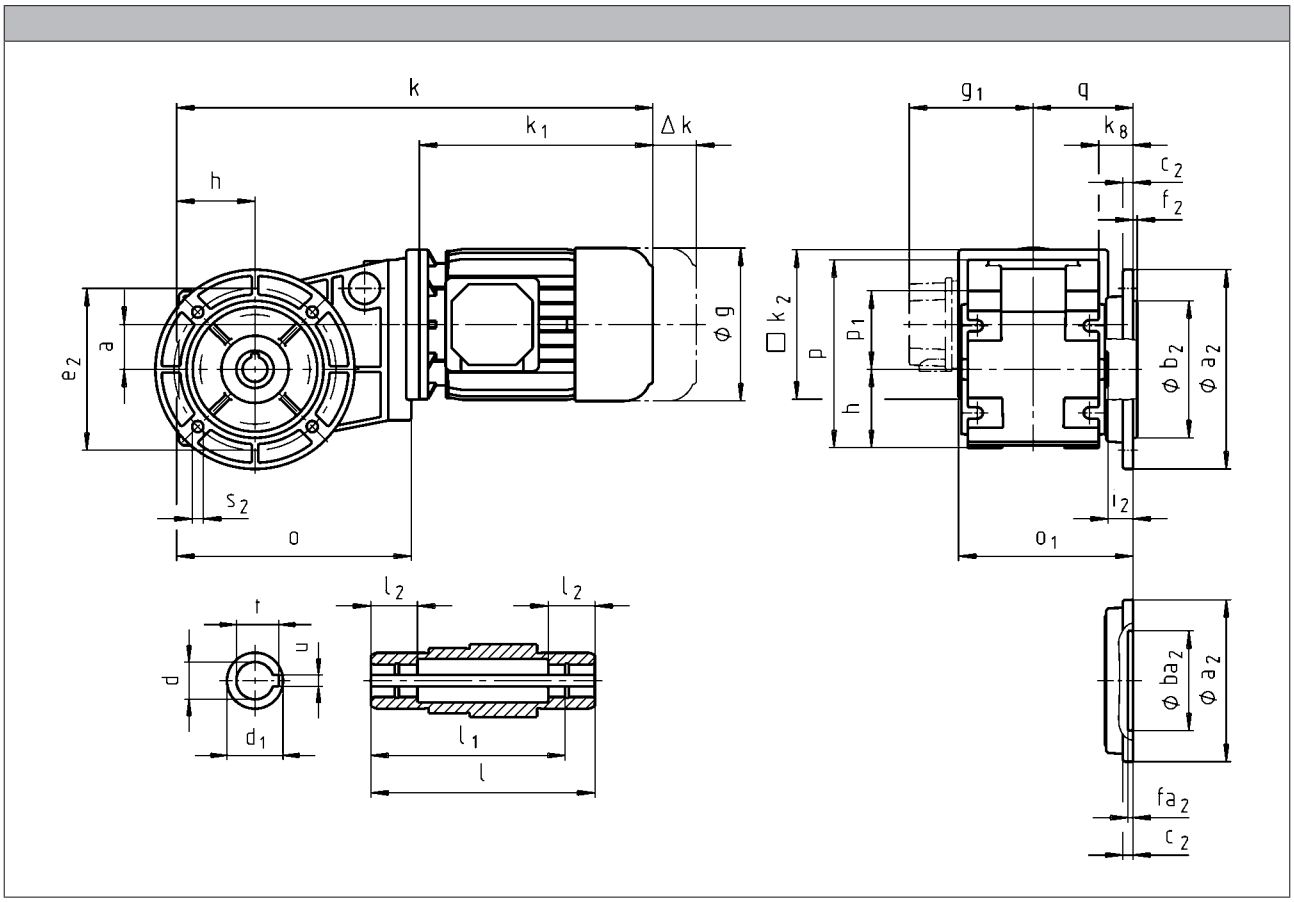
	d[2]	d_1	l[1]	l_1	l_2	u	t[3]	i_1	a_1	b_1	e_1	f_1	s_1
	H7					JS9	+0,2			J7			
GKR03	18 20	30 30	100 100	85 85	22 22	6 6	20.8 22.8	2.5 2.5	85	55	70	2.5	M6x12
GKR04	20 25	30 35	120 120	105 105	25 25	6 8	22.8 27	2.5 2.5	104	62	88	3	M8x16
GKR05	30 35	50 50	143 143	127 127	25 25	8 10	33.3 38.3	4 4	116	80	100	4	M8x15
GKR06	40 45	65 65	170 170	150 150	30 30	12 14	43.3 48.8	5 5	140	100	120	4	M10x22

	b_5	b_7	c_5	e_5	f_5	m	n	s_5
GKR03	60	75	7	90	80	22	20	6.6
GKR04	70	90	8	105	95	28	25	9
GKR05	100	100	11	115	138	27	48	9
GKR06	120	125	12	145	164	32	53	11

[1] k_2 !
[2] l_2 !
[3] d = 25 mm > DIN 6885/3

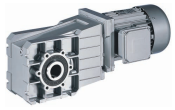
Dimensions

GKR□□-2M HAK



GKR bevel gearboxes

Technical data



		063C32 063C42	071C32 071C42	080C32	080C42	090C32	100C12 100C32	112C22
g		123	139	156		176	194	218
g_1	MFEMAXX	100	109	150		157	166	176
	MFEMABR	107	118	132		137	147	158
k_1	MFEMAXX	187	207	224.5		274	324	319
k_2		120		145		180		222
Δ k	MFEMABR	40	52	73		68	76	90
	MFFMAXX			128			109	102
	MFFMABR	170	165	183		181	170	183
		k						
GKR03		332						
GKR04		383	403	425				
GKR05		436	456	479		538	588	
GKR06		488	508	530		590	640	641

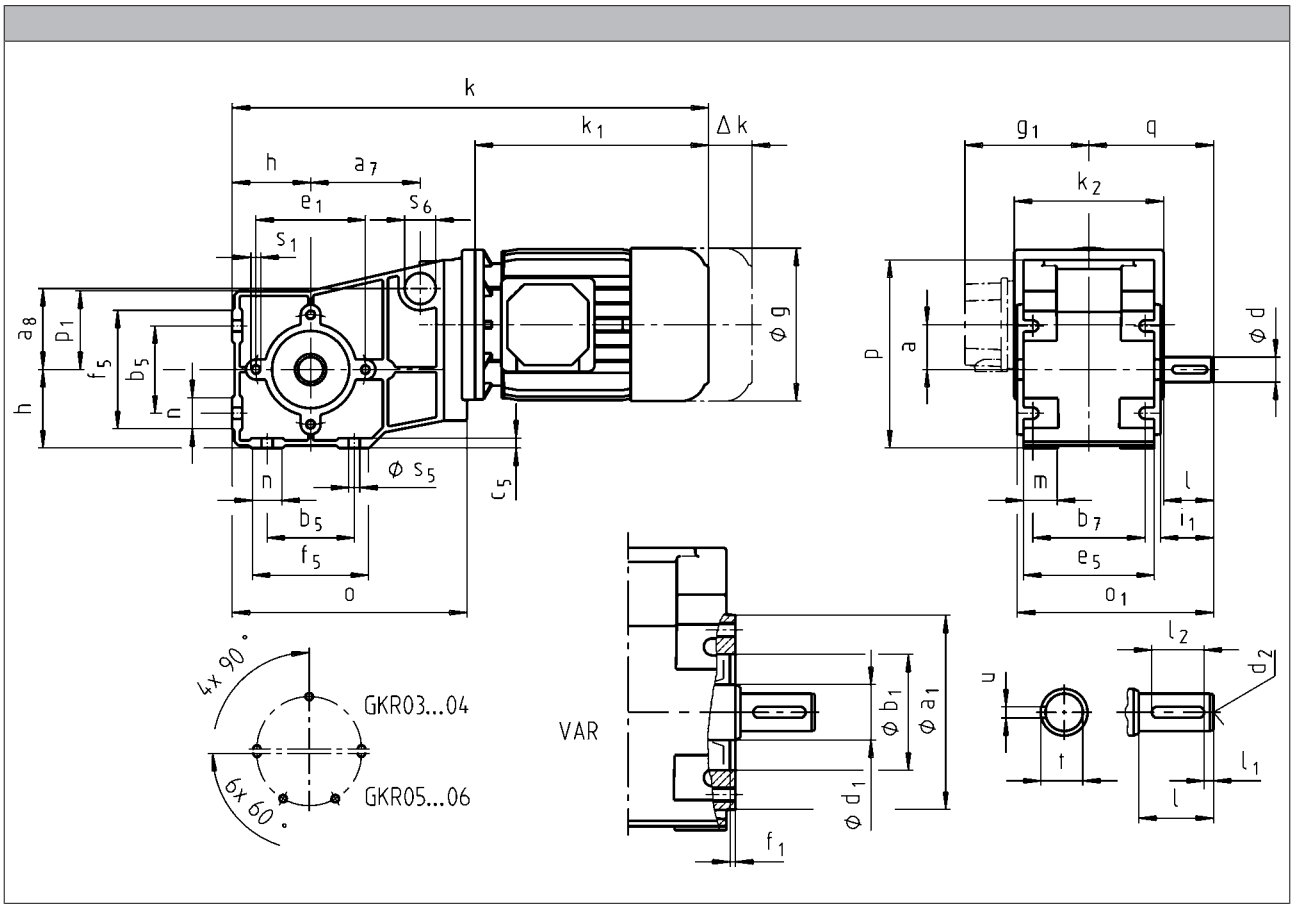
	a	h	k_8	o	p[1]	p_1	q
GKR03	29	50	35	142	117	48	80
GKR04	36	63	28	189	151	63	80
GKR05	40	80	47.5	250.5	181	82	105
GKR06	51	100	54	307	226	100	126.5

	d[2]	d_1	l	l_1	l_2	u	t[3]	i_2	o_1[1]	a_2	b_2	ba_2	c_2	e_2	f_2	fa_2	s_2
	H7					JS9	+0,2				j7	H7					
GKR03	18 20	30 30	100 100	85 85	22 22	6 6	20.8 22.8	30 30	130 130	120 110	80 -	- 60	8 8	100 87	3 -	- 4	7 9
GKR04	20 25	30 35	120 120	105 105	25 25	6 8	22.8 27	20 20	140 140	120 160	80 110		8 8	100 130	3 3.5		7 9
GKR05	30 35	50 50	143 143	127 127	25 25	8 10	33.3 38.3	33.5 33.5	176.5 176.5	160 200	110 130		12 12	130 165	3.5 3.5		9 11
GKR06	40 45	65 65	170 170	150 150	30 30	12 14	43.3 48.8	41.5 41.5	211.5 211.5	200 250	130 180		12 12	165 215	3.5 4		11 14

[1] k_2 !
[2] l_2 !
[3] d = 25 mm > DIN 6885/3

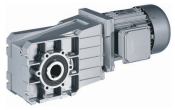
Dimensions

GKR□□-2M V□R



GKR bevel gearboxes

Technical data



		063C32 063C42	071C32 071C42	080C32	080C42	090C32	100C12 100C32	112C22
g		123	139	156		176	194	218
g_1	MFEMAXX	100	109	150		157	166	176
	MFEMABR	107	118	132		137	147	158
k_1	MFEMAXX	187	207	224.5		274	324	319
k_2		120		145		180		222
Δ k	MFEMABR	40	52	73		68	76	90
	MFFMAXX	128					109	102
	MFFMABR	170	165	183		181	170	183
		k						
GKR03		332						
GKR04		383	403	425				
GKR05		436	456	479		538	588	
GKR06		488	508	530		590	640	641

	a	a_7	a_8	h	o	p[1)]	p_1	q	s_6
GKR03	29	66	39	50	142	117	48	90	25
GKR04	36	88	65	63	189	151	63	100	25
GKR05	40			80	250.5	181	82	131.5	
GKR06	51			100	307	226	100	155	

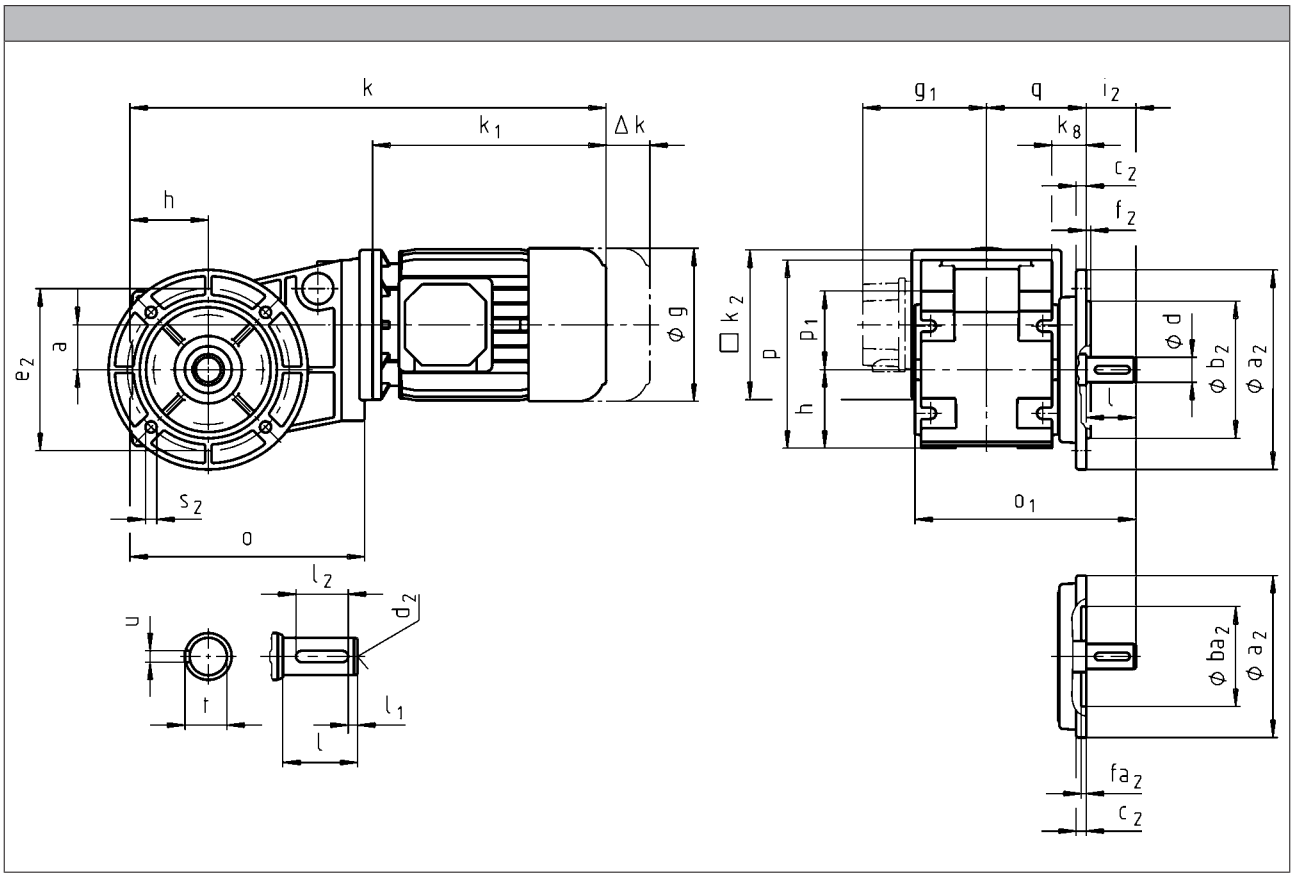
	d	d_1	d_2	l	l_1	l_2	u	t	i_1	o_1[1)]	a_1	b_1	e_1	f_1	s_1
	k6											J7			
GKR03	20	30	M6	40	5	28	6	22.5	42.5	137.5	85	55	70	2.5	M6x12
GKR04	20	30	M6	40	5	28	6	22.5	42.5	158	104	62	88	3	M8x16
GKR05	30	50	M10	60	6	45	8	33	64	199	116	80	100	4	M8x15
GKR06	35	65	M12	70	7	56	10	38	75	235	140	100	120	4	M10x22

	b_5	b_7	c_5	e_5	f_5	m	n	s_5
GKR03	60	75	7	90	80	22	20	6.6
GKR04	70	90	8	105	95	28	25	9
GKR05	100	100	11	115	138	27	48	9
GKR06	120	125	12	145	164	32	53	11

[1)] k_2 !

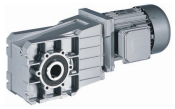
Dimensions

GKR□□-2M VAK



GKR bevel gearboxes

Technical data

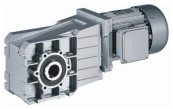


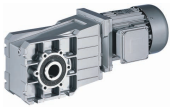
		063C32 063C42	071C32 071C42	080C32	080C42	090C32	100C12 100C32	112C22
g		123	139	156		176	194	218
g_1	MFEMAXX	100	109	150		157	166	176
	MFEMABR	107	118	132		137	147	158
k_1	MFEMAXX	187	207	224.5		274	324	319
k_2		120		145		180		222
Δ k	MFEMABR	40	52	73		68	76	90
	MFFMAXX			128			109	102
	MFFMABR	170	165	183		181	170	183
		k						
GKR03		332						
GKR04		383	403	425				
GKR05		436	456	479		538	588	
GKR06		488	508	530		590	640	641

	a	h	k_8	o	p[1)]	p_1	q
GKR03	29	50	35	142	117	48	80
GKR04	36	63	28	189	151	63	80.5
GKR05	40	80	47.5	250.5	181	82	105
GKR06	51	100	54	307	226	100	126.5

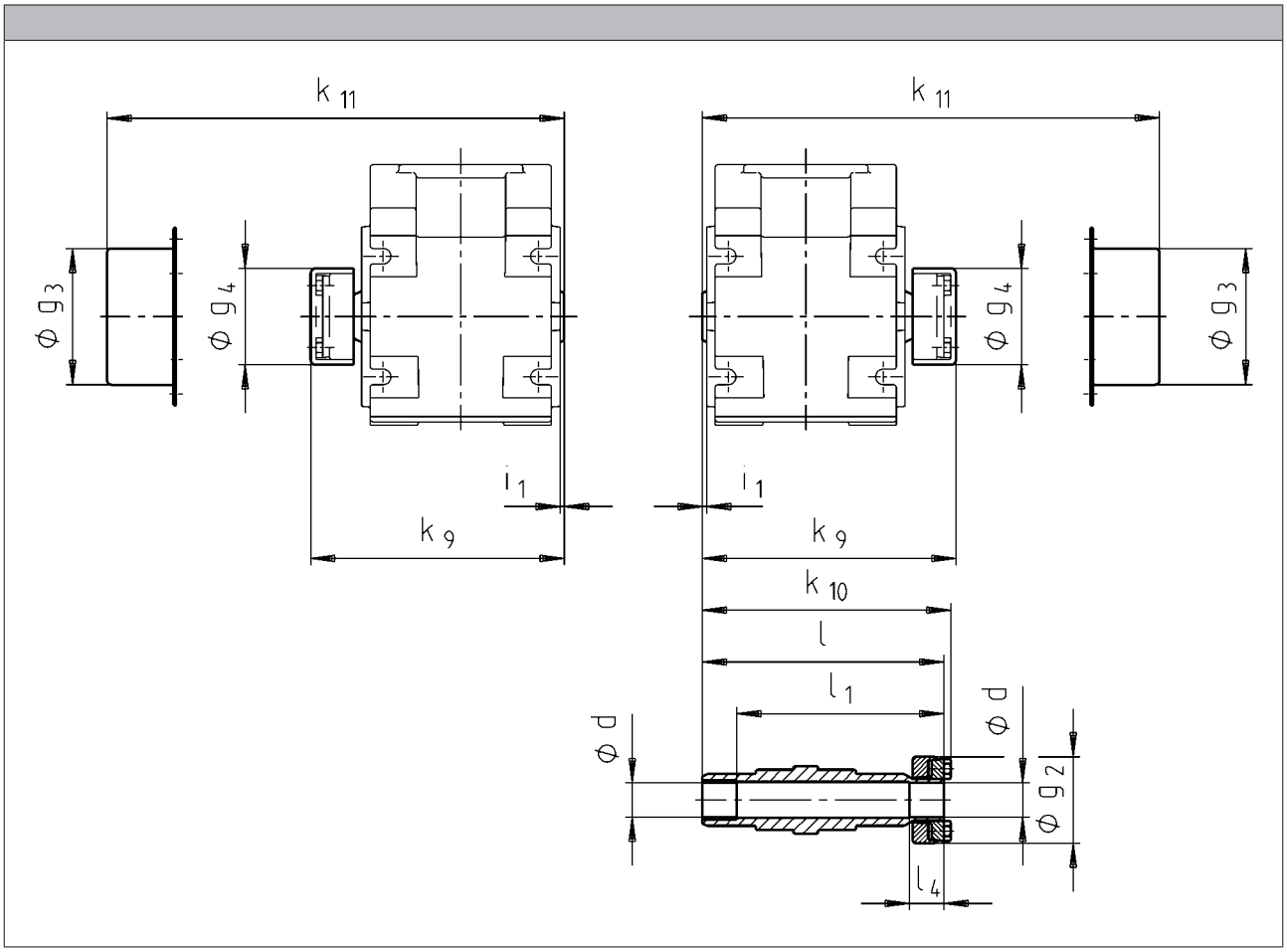
	d	d_2	l	l_1	l_2	u	t	i_2	o_1[1)]	a_2	b_2	ba_2	c_2	e_2	f_2	fa_2	s_2
	k6										j7	H7					
GKR03	20	M6	40	5	28	6	22.5	40	167.5	120 110	80 -	- 60	8 8	100 87	3 -	- 4	7 9
GKR04	20	M6	40	5	28	6	22.5	40	178	120 160	80 110		8 8	100 130	3 3.5		7 9
GKR05	30	M10	60	6	45	8	33	60	232.5	160 200	110 130		12 12	130 165	3.5 3.5		9 11
GKR06	35	M12	70	7	56	10	38	70	276.5	200 250	130 180		12 12	165 215	3.5 4		11 14

[1)] k_2 !





Hollow shaft with shrink disc

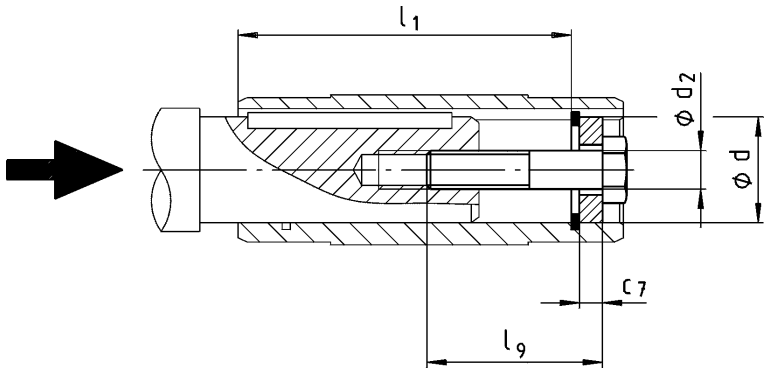


	d [1]	g_2	g_3	g_4	i_1	k_9	k_{10}	k_{11}	l	l_1	l_4
	h6										
GKR03	20	50	65	54	2.5	126	124	138	120	100	20
GKR04						146	144	158	144	120	
GKR05	30 35	80	90	84	4.0	176	177	182	171	151	28
GKR06	40	90	100	94	5.0	202	210	214	204	174	30

[1] Machine shaft design.

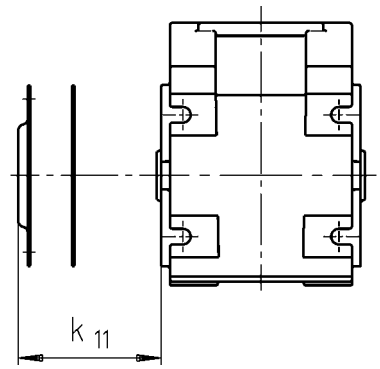
- ► Output flange and hollow shaft with shrink disc (output version SAK) are not possible in the same location. For additional dimensions see output version H□□.
- ► Ensure that the strength of the machine shaft material is adequate in shrink disc designs.
  When using typical steels, e.g. C45, 42CrMo4, 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
	H7				
GKR03	18 20	85	M6	40	4
GKR04	20 25	105			
			M10		5
GKR05	30 35	127			6
			M12	50	7
GKR06	40 45	150	M16	60	8
					9

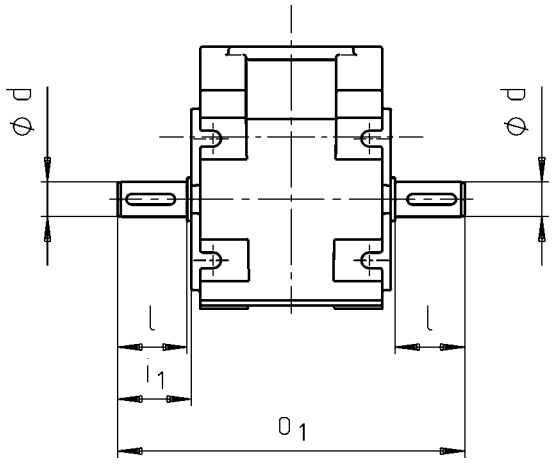
Hoseproof hollow shaft cover



► Cover including gasket

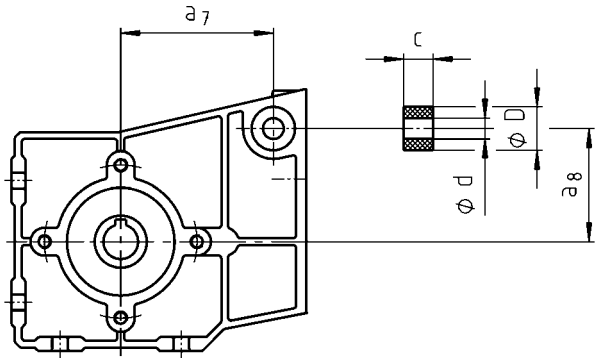
	k_{11}
	[mm]
GKR03	9
GKR04	
GKR05	10
GKR06	11

Gearboxes with 2nd output shaft end



	d	l	i_1	o_1
	k6			
	[mm]	[mm]	[mm]	[mm]
GKR03	20	40	42.5	180
GKR04				200
GKR05	30	60	64.0	263
GKR06	35	70	75.0	310

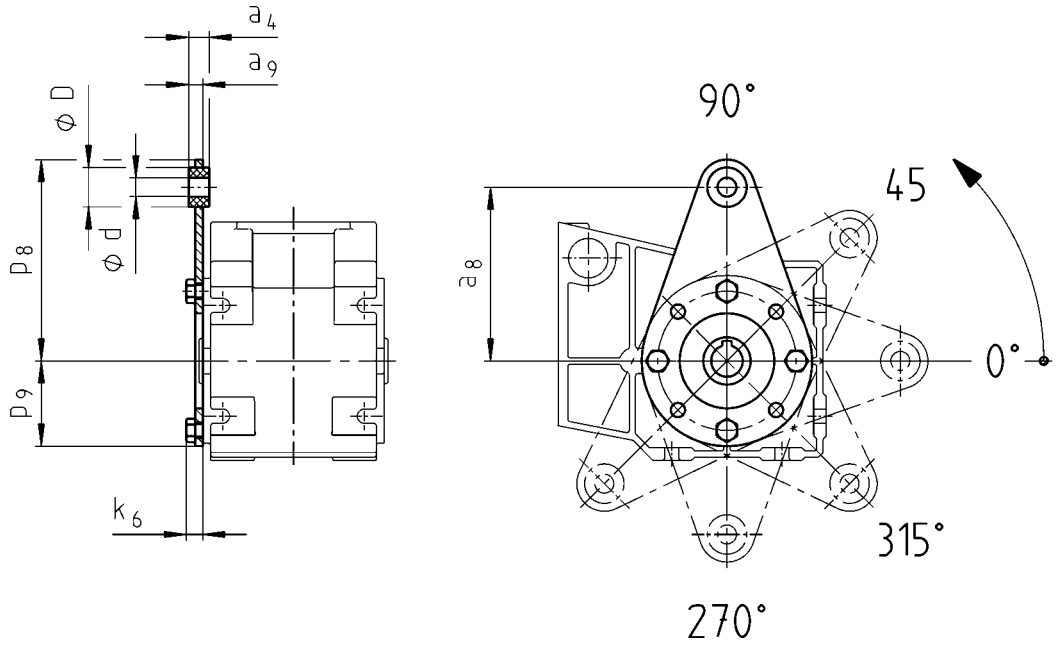
Rubber buffer for torque plate



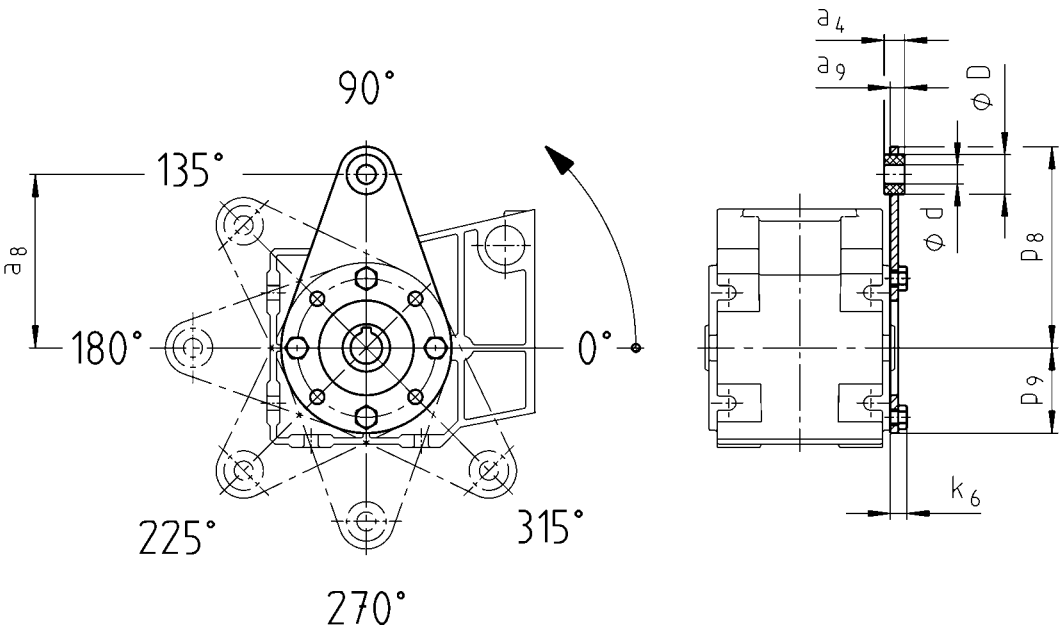
	d	D	c	a_7	a_8
GKR03	10	25	13.0	66.0	39
GKR04				88.0	65

Torque plate on threaded pitch circle

In position 3



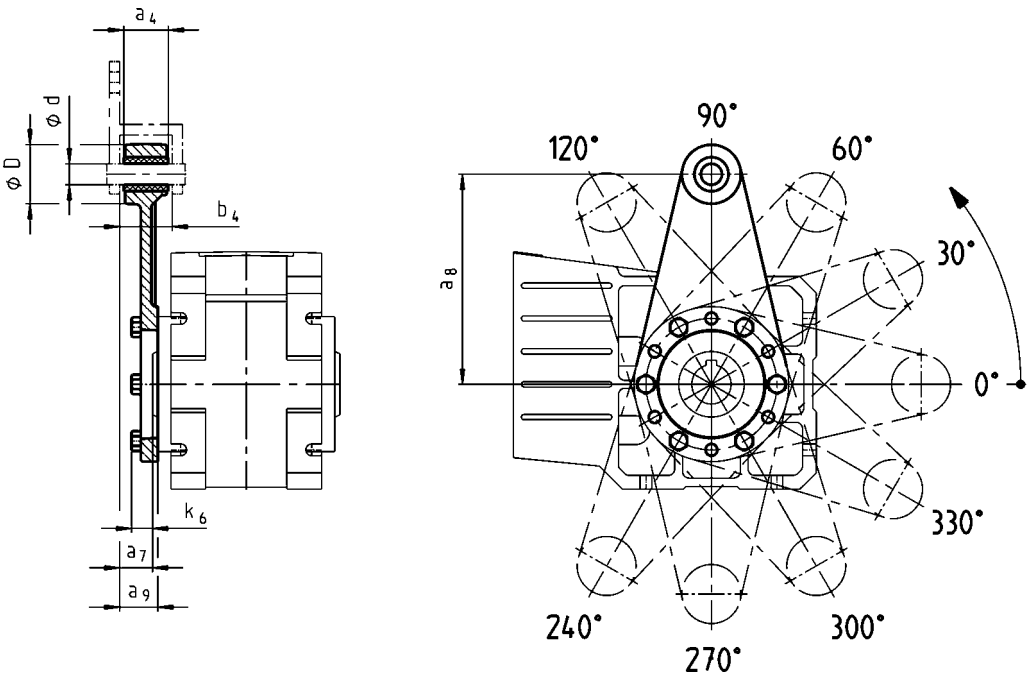
In position 5



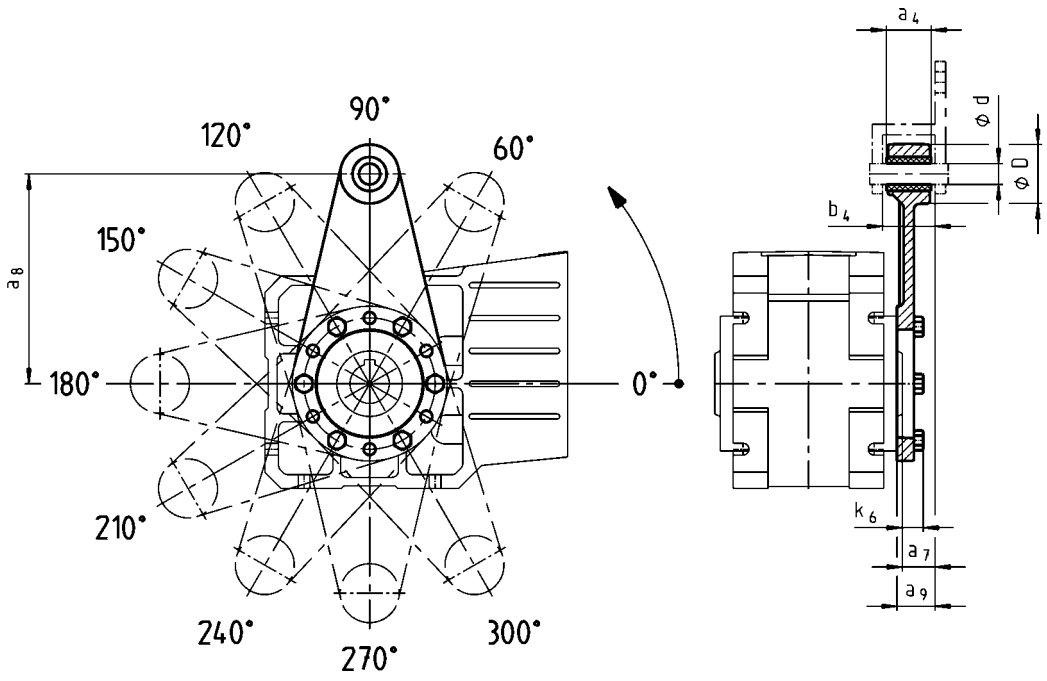
	a_4	a_8	a_9	d	D	k_6	p_8	p_9
GKR03	12	100	8.0	8	20	9	115	42
GKR04	13	110	9.0	10	25	11	128	54

Torque plate on threaded pitch circle

In position 3



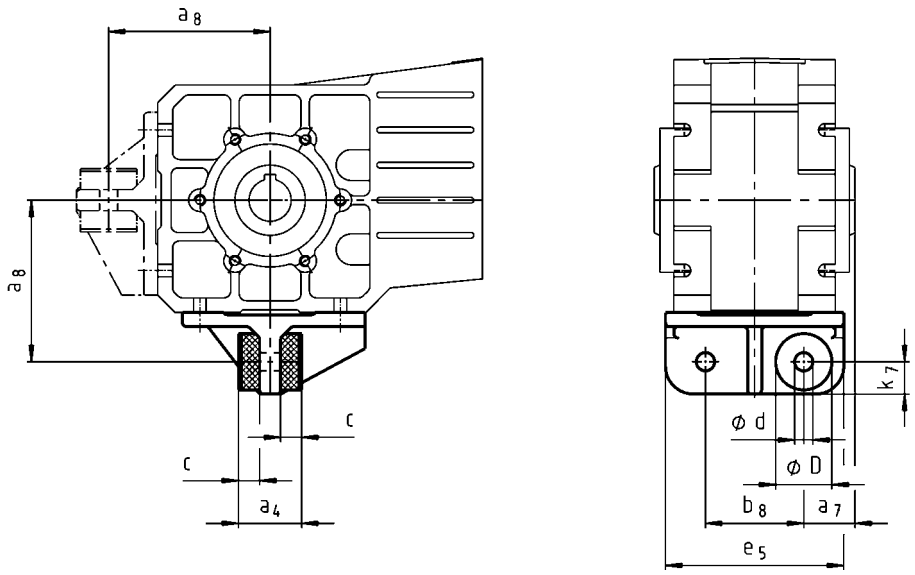
In position 5



	a_4	a_7	a_8	a_9	b_4	d	D	k_6
GKR05	34	23.5	160	27.5	38.5	16	45	15
GKR06	40	28.0	200	33.0	44.5	20	50	18

Torque plate at housing foot

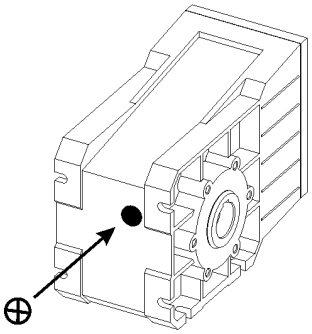
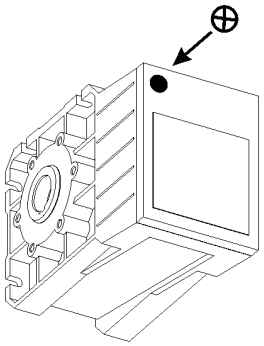
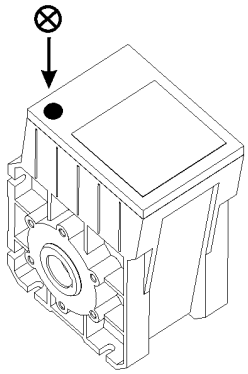
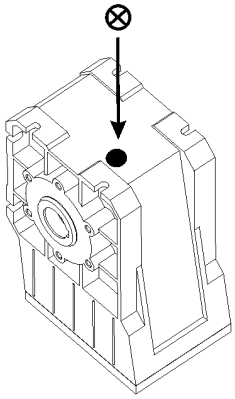
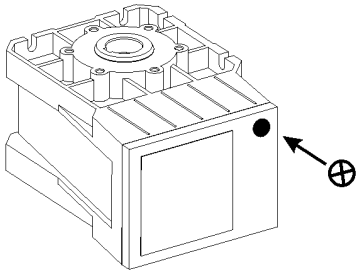
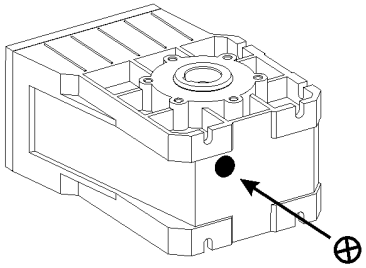
In position 4 or 6



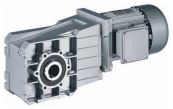
	a_4	a_7	a_8	b_8	c	d	D	e_5	k_7
GKR05	45	36.5	115	70	15.0	13	40	127	25
GKR06	72	45.0	145	80	27.0	17	50	145	30

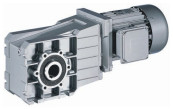
Ventilation position

GKR06

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

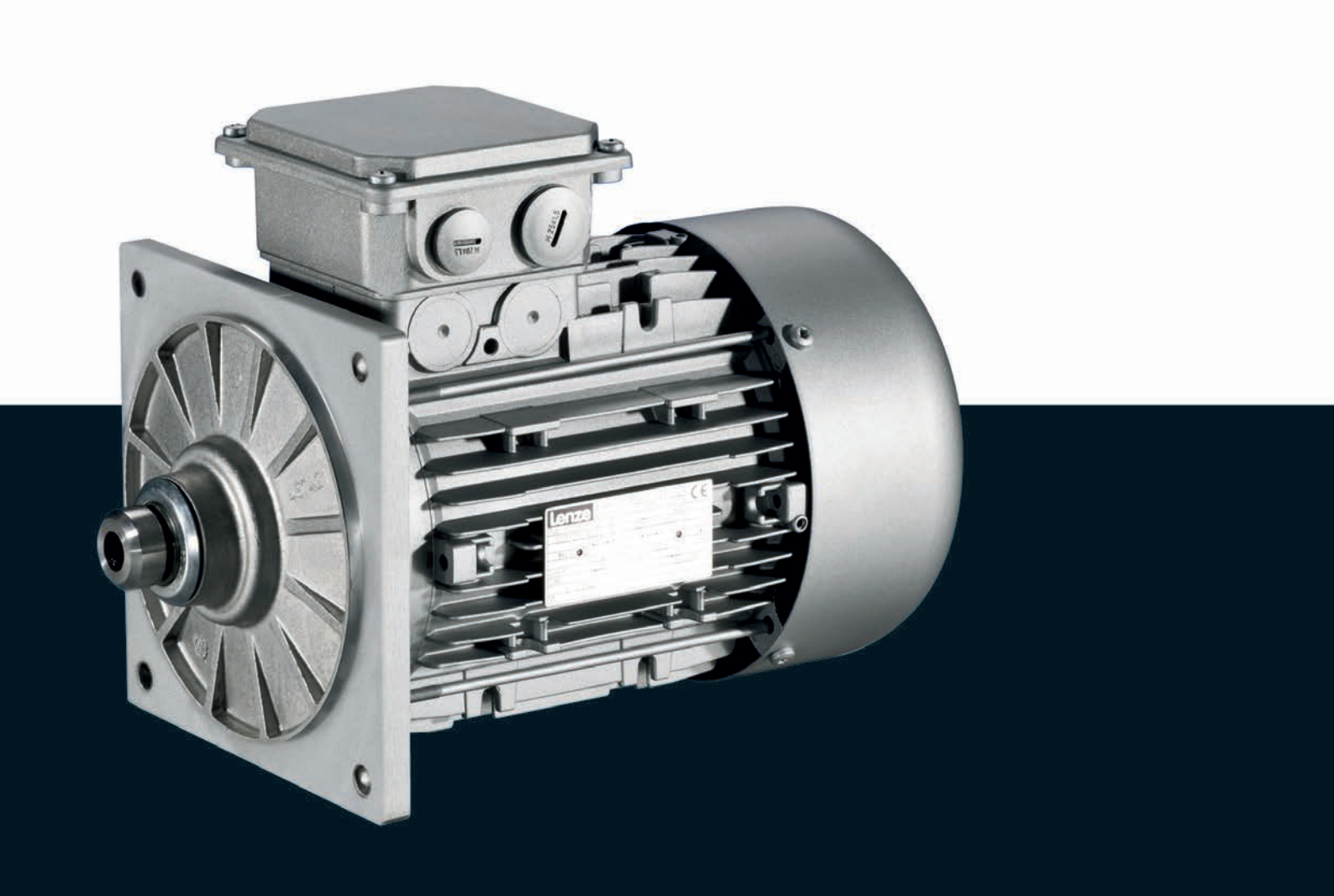
⊗ Ventilation





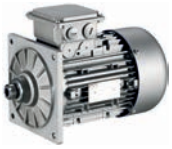
MF three-phase AC motors

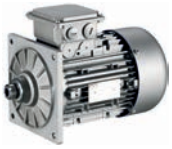
0.55 to 22 kW



MF three-phase AC motors

Contents





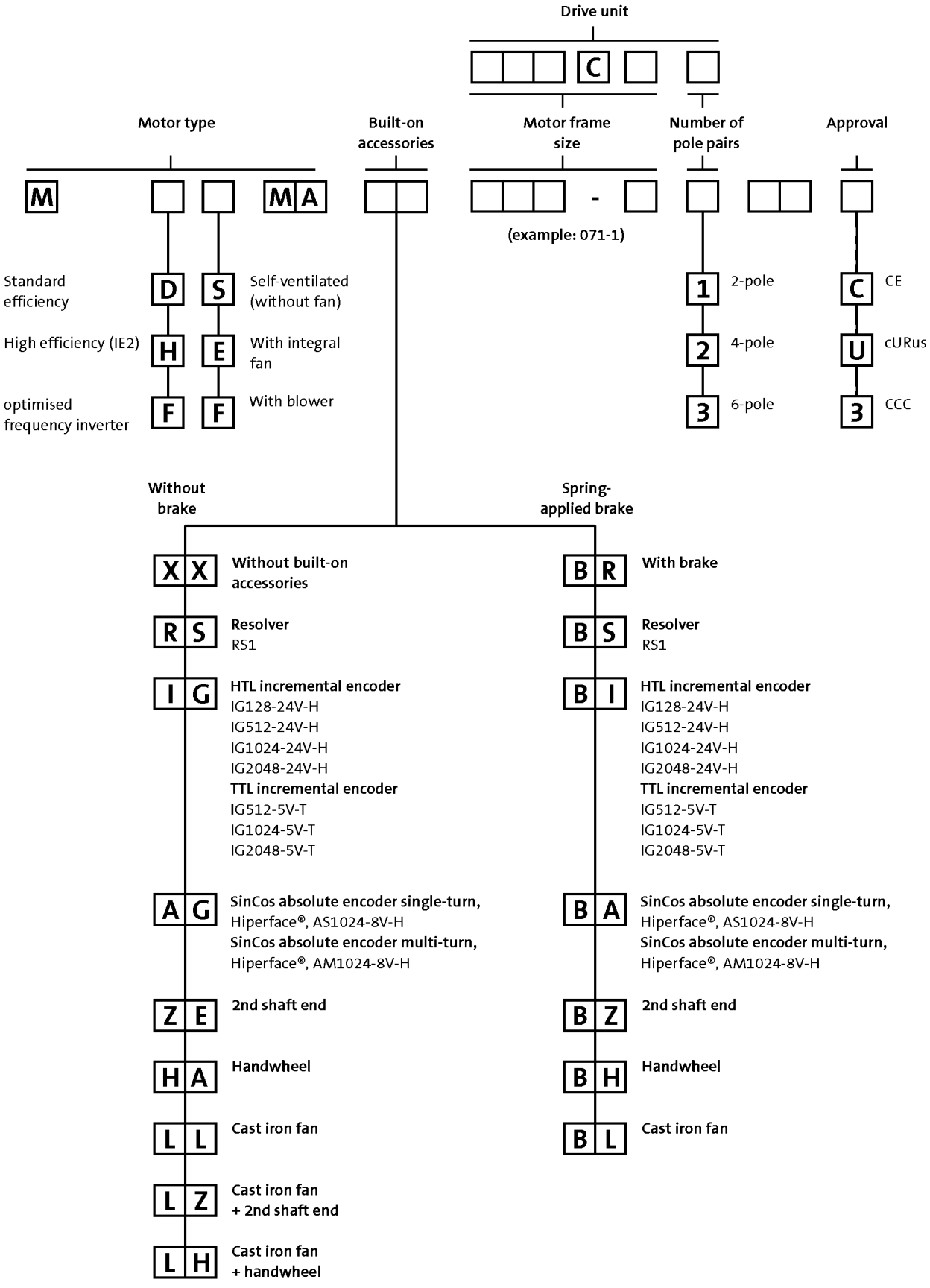
List of abbreviations

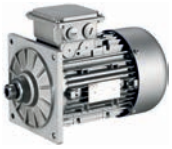
$\eta_{100\,\%}$	[%]	Efficiency
$\eta_{75\,\%}$	[%]	Efficiency
$\eta_{50\,\%}$	[%]	Efficiency
cos ϕ		Power factor
I_N	[A]	Rated current
I_{max}	[A]	Max. current consumption
J	[kgcm²]	Moment of inertia
m	[kg]	Mass
M_a	[Nm]	Starting torque
M_b	[Nm]	Stalling torque
M_{max}	[Nm]	Max. torque
M_N	[Nm]	Rated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

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

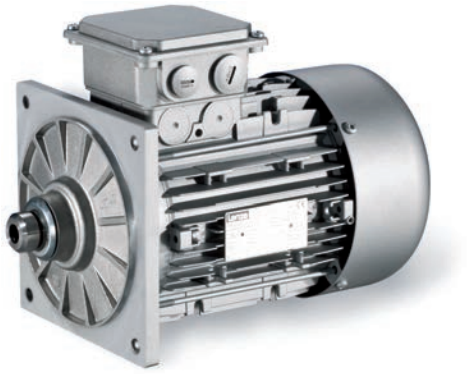

Drive unit
C
Motor type
Built-on accessories
Motor frame size
Number of pole pairs
Approval
M
M A
-
(example: 071-1)
Standard efficiency
D
S
Self-ventilated (without fan)
High efficiency (IE2)
H
E
With integral fan
optimised frequency inverter
F
F
With blower
1
2-pole
2
4-pole
3
6-pole
C
CE
U
cURus
3
CCC
Without brake
Spring-applied brake
X X
Without built-on accessories
R S
Resolver
RS1
I G
HTL incremental encoder
IG128-24V-H
IG512-24V-H
IG1024-24V-H
IG2048-24V-H
TTL incremental encoder
IG512-5V-T
IG1024-5V-T
IG2048-5V-T
A G
SinCos absolute encoder single-turn,
Hiperface®, AS1024-8V-H
SinCos absolute encoder multi-turn,
Hiperface®, AM1024-8V-H
Z E
2nd shaft end
H A
Handwheel
L L
Cast iron fan
L Z
Cast iron fan
+ 2nd shaft end
L H
Cast iron fan
+ handwheel
B R
With brake
B S
Resolver
RS1
B I
HTL incremental encoder
IG128-24V-H
IG512-24V-H
IG1024-24V-H
IG2048-24V-H
TTL incremental encoder
IG512-5V-T
IG1024-5V-T
IG2048-5V-T
B A
SinCos absolute encoder single-turn,
Hiperface®, AS1024-8V-H
SinCos absolute encoder multi-turn,
Hiperface®, AM1024-8V-H
B Z
2nd shaft end
B H
Handwheel
B L
Cast iron fan



Product information

Special motors have been designed for direct attachment to Lenze gearboxes.

These motors are attached to the gearbox without the use of a clutch. Torque transmission between the toothing and the motor shaft is friction-locked via a tapered connection here.
This motor design means that the geared motors only require a small installation space.



L-force MF three-phase AC motors are available in a power range from 0.55 to 22 kW and have been fully optimised for inverter operation.

The benefits for you:
- Up to sizes smaller than standard three-phase AC motors
- The motors exceed the minimum efficiency levels of efficiency class IE2
- Large speed setting range: 1:24 (without field weakening)
- Dynamic thanks to a low moment of inertia

Basic versions
- The thermal sensors integrated as standard allow for permanent temperature monitoring and are coordinated to the motor winding's temperature class F (155°C).
- The motors of the basic version are adapted to ambient conditions by enclosure IP55.
- In tough operating conditions, the surface and corrosion protection system is provided to reliably protect the motor from corrosive media.

Options
- Various brake sizes – each available with several braking torques – can be combined with the three-phase AC motors.
- The LongLife version of the brake can easily reach 10 x 10^6 switching cycles.
- A resolver and various incremental and absolute value encoders can be fitted for speed and position detection.
- For fast commissioning, the motors are also available with connectors for the power connection, brake, blower and feedback.
- Instead of an integral fan, the motor can optionally be equipped with a blower. No torque reduction is then necessary, even at speeds below 20 Hz.
- For drive tasks in decentralised applications, the motor can be ordered with the motec inverter connected to the terminal box.
- The motors are available with cURus, GOST-R, CCC and UkrSepro approval.
- Smooth start/braking is possible by increasing the motor's centrifugal mass with a cast iron fan.
- The motor can be equipped with a handwheel for manual setup or emergency operations.
- To protect the fan from falling objects, the fan cover can be equipped with a protection cover.
- A 2nd shaft end is available for further modifications.

Functions and features

Size				
Motor	063	071	080	090
Spring-applied brake				
Design	Standard or LongLife design Reduced or standard braking torque With rectifier With manual release lever Low noise		Standard or LongLife design Reduced, standard or increased braking torque With rectifier With manual release lever Low noise	
Feedback				
Design	Resolver Incremental encoder Absolute value encoder (multi-turn)			
Thermal sensor				
Thermal contact	TKO			
Thermal detector	KTY83-110 KTY84-130			
PTC thermistor	PTC			
Motor connection				
Power connection	Terminal box ICN connector HAN10E connector HAN modular connector			
Brake connection	Terminal box ICN connector HAN modular connector HAN10E connector			
Blower connection	Terminal box ICN connector			
Feedback connection	Terminal box ICN connector			
Temperature sensor connection	Terminal box TKO or PTC at connector in the power connection KTY at connector in the feedback connection			
Shaft bearings				
Position of the locating bearing	Standard motors (B3, B5, B14): side B Motors for gearbox direct mounting: side A			
Bearing type	Deep-groove ball bearing with high-temperature resistant grease, 2 sealing discs or cover plates			
Colour				
	Not coated Primed Paint in various corrosion-protection designs in accordance with RAL colours			
Further options				
	Protection cover	Protection cover 2nd shaft end		

Functions and features

Size			
Motor	100	112	132
Spring-applied brake			
Design	Standard or LongLife design Reduced, standard or increased braking torque With rectifier With manual release lever Low noise	Standard design Reduced, standard or increased braking torque With rectifier With manual release lever Low noise	
Feedback			
Design	Resolver Incremental encoder Absolute value encoder (multi-turn)		
Thermal sensor			
Thermal contact	TKO		
Thermal detector	KTY83-110 KTY84-130		
PTC thermistor	PTC		
Motor connection			
Power connection	Terminal box ICN connector HAN10E connector HAN modular connector	Terminal box	Terminal box HAN modular connector
Brake connection	Terminal box ICN connector HAN modular connector HAN10E connector	Terminal box	Terminal box HAN modular connector
Blower connection	Terminal box ICN connector		
Feedback connection	Terminal box ICN connector		
Temperature sensor connection	Terminal box TKO or PTC at connector in the power connection KTY at connector in the feedback connection	Terminal box KTY at connector in the feedback connection	
Shaft bearings			
Position of the locating bearing	Standard motors (B3, B5, B14): side B Motors for gearbox direct mounting: side A		
Bearing type	Deep-groove ball bearing with high-temperature resistant grease, 2 sealing discs or cover plates		
Colour			
	Not coated Primed Paint in various corrosion-protection designs in accordance with RAL colours		
Further options			
	Protection cover 2nd shaft end		

Functions and features

Surface and corrosion protection

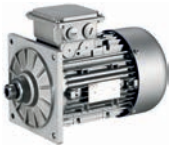
For optimum protection of three-phase AC motors against ambient conditions, the surface and corrosion protection system (OKS) offers tailor-made solutions.

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 as per corrosivity category C1 (in line with EN 12944-2)
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)
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 • 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)	C1	2K-PUR top coat	Standard: RAL 7012 Optional: RAL Classic
OKS-M (medium)	C2	2K PUR priming coat 2K-PUR top coat	
OKS-L (high)	C3		

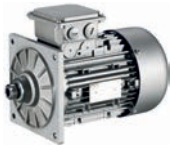


Motor – inverter assignment

Rated frequency 120 Hz

- ► Decentralised inverter 8400 motec (E84DVB)
- ► Inverter Drives 8400 (E84AV)

Rated power	Product key		
	Motor	Inverter	
P_N			
[kW]			
0.55	MF□□□□□063-32	E84DVB□5514S□□□2□	
0.75	MF□□□□□063-42	E84DVB□7514S□□□2□	
1.10	MF□□□□□071-32	E84DVB□1124S□□□2□	
1.50	MF□□□□□071-42	E84DVB□1524S□□□2□	
2.20	MF□□□□□080-32	E84DVB□2224S□□□2□	
3.00	MF□□□□□080-42	E84DVB□3024S□□□2□	
4.00	MF□□□□□090-32	E84DVB□4024S□□□2□	
5.50	MF□□□□□100-12	E84DVB□5524S□□□2□	
7.50	MF□□□□□100-32	E84DVB□7524S□□□2□	
11.0	MF□□□□□112-22		
15.0	MF□□□□□132-12		
18.5	MF□□□□□132-22		
22.0	MF□□□□□132-32		

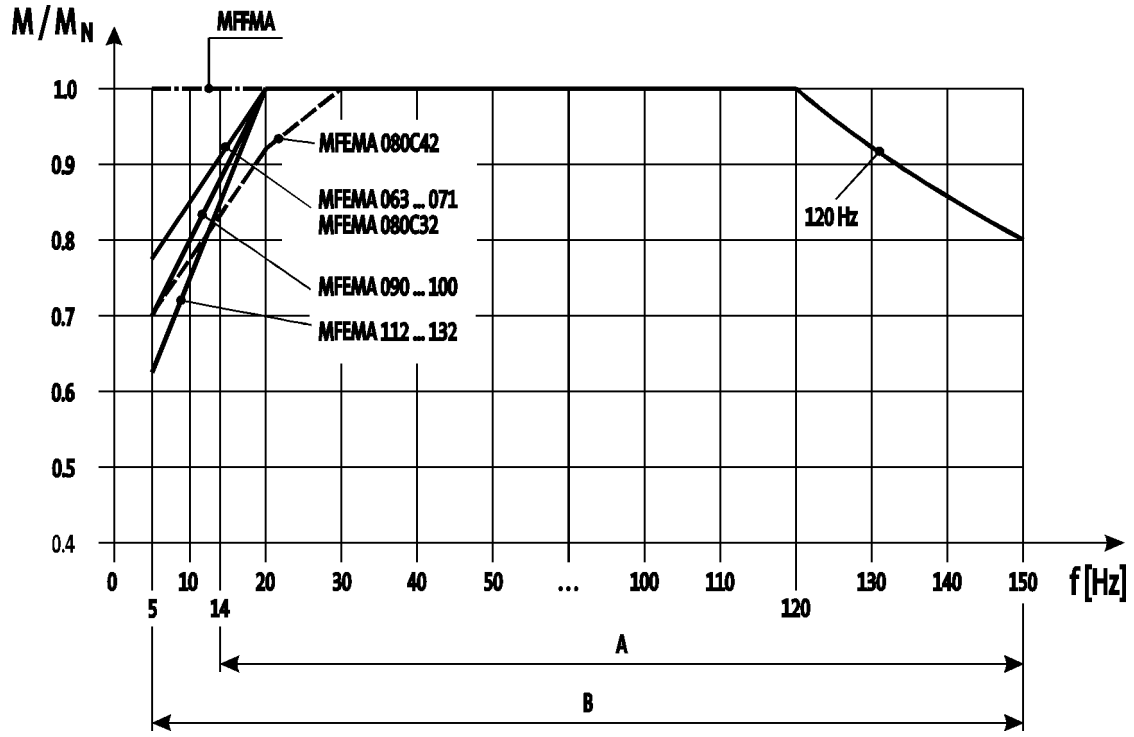


Dimensioning

Torque derating at low motor frequencies

Motor size-dependent torque reduction, taking into account the thermal response during operation on the inverter.

Torque characteristics



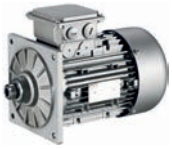
A = Operation with integral fan and brake
B = Operation with integral fan and brake control "Holding current reduction"

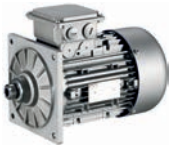
► The motor specifications stated in this catalogue for inverter operation apply to operation with a Lenze inverter. If you are uncertain, get in touch with the manufacturer of the inverter to ask whether the device is capable of driving the motor with the stated specifications (e.g. setting range, base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

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

Enclosure			
EN 60529			IP55
Approval			
Class			cURus CCC GOST-R UkrSepro
Temperature class			
IEC/EN 60034-1; utilisation			B
IEC/EN 60034-1; insulation system (enamel-insulated wire)			F
Min. ambient operating temperature			
	$T_{opr,min}$	[°C]	-20
Max. ambient operating temperature			
	$T_{opr,max}$	[°C]	40
With power reduction	$T_{opr,max}$	[°C]	60
Site altitude			
Amsl	H_{max}	[m]	4000
Max. speed			
	n_{max}	[r/min]	4500

Rated data for 120 Hz

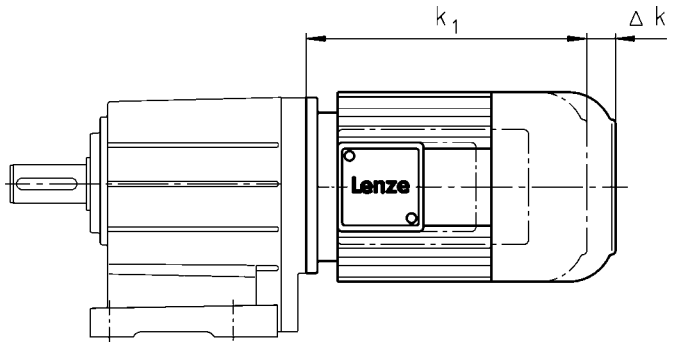
4-pole motors

	P_N	n_N	$U_{N,\Delta}$	$I_{N,\Delta}$	$U_{N,Y}$	$I_{N,Y}$
			± 10 %		± 10 %	
	[kW]	[r/min]	[V]	[A]	[V]	[A]
MF□□□□□063-32	0.55	3440	200	3.20	345	1.80
MF□□□□□063-42	0.75	3400	210	4.00	370	2.30
MF□□□□□071-32	1.10	3490	200	5.50	345	3.20
MF□□□□□071-42	1.50	3450	205	6.80	360	3.90
MF□□□□□080-32	2.20	3500	200	9.10	345	5.30
MF□□□□□080-42	3.00	3480	210	11.4	370	6.60
MF□□□□□090-32	4.00	3480			370	8.50
MF□□□□□100-12	5.50	3525			340	12.9
MF□□□□□100-32	7.50	3515			375	15.9
MF□□□□□112-22	11.0	3530			370	23.5
MF□□□□□132-12	15.0	3560			370	31.2
MF□□□□□132-22	18.5	3560			360	39.0
MF□□□□□132-32	22.0	3550			380	44.5

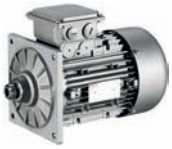
	M_N	M_{max}	cos ϕ	$\eta_{75\,\%}$	$\eta_{100\,\%}$	J [1)]	m [1)]
	[Nm]	[Nm]		[%]	[%]	[kgcm²]	[kg]
MF□□□□□063-32	1.53	6.00	0.68	75.0	75.0	3.70	4.40
MF□□□□□063-42	2.11	8.00	0.69	79.6	79.6	3.70	4.40
MF□□□□□071-32	3.01	12.0	0.77	81.4	81.4	12.8	6.40
MF□□□□□071-42	4.15	16.0	0.80	82.8	82.8	12.8	6.40
MF□□□□□080-32	6.00	24.0	0.86	84.3	84.3	28.0	11.0
MF□□□□□080-42	8.20	32.0	0.86	85.5	85.5	28.0	11.0
MF□□□□□090-32	10.9	44.0	0.85	87.0	86.6	32.0	18.0
MF□□□□□100-12	14.9	60.0	0.81	87.9	87.7	61.0	26.5
MF□□□□□100-32	20.3	80.0	0.81	88.9	88.7	61.0	26.5
MF□□□□□112-22	29.7	120	0.78	89.8	89.8	107	38.0
MF□□□□□132-12	40.3	160	0.84	88.9	90.6	336	66.0
MF□□□□□132-22	49.6	200	0.84	89.9	91.2	336	66.0
MF□□□□□132-32	59.2	240	0.83	90.5	91.6	336	66.0

[1)] Without accessories

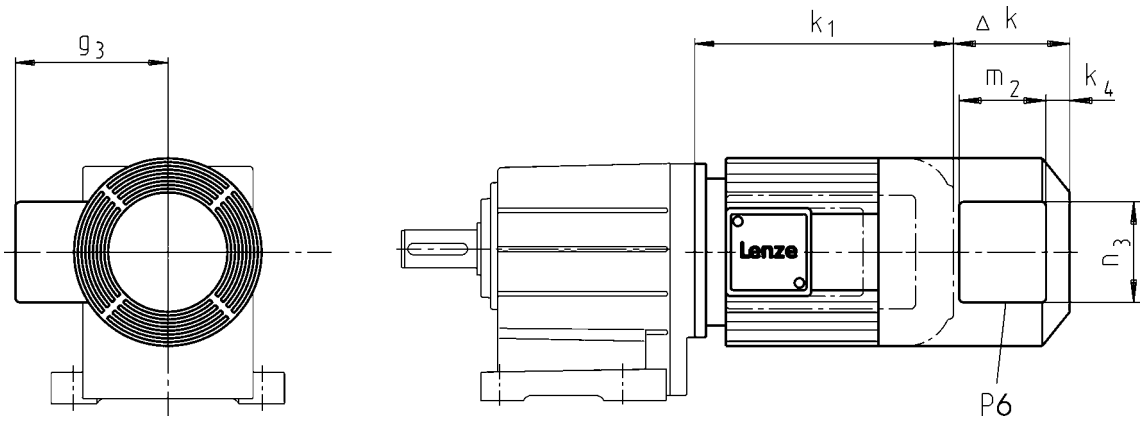
Dimensions, self-ventilated (4-pole)



	Motor type			
	MFEMAXX	MFEMABR	MFEMABS MFEMABI MFEMABA	MFEMARS MFEMAIG MFEMAAG
Motor frame size				
	Δ k	Δ k	Δ k	Δ k
	[mm]	[mm]	[mm]	[mm]
063-32 063-42	0	40	103	56
071-32 071-42		52	96	52
080-32 080-42		73	111	111
090-32		68	105	87
100-12 100-32		76	101	81
112-22		90	120	80
132-12 132-22 132-32		110	125	103



Dimensions, forced ventilated (4-pole)

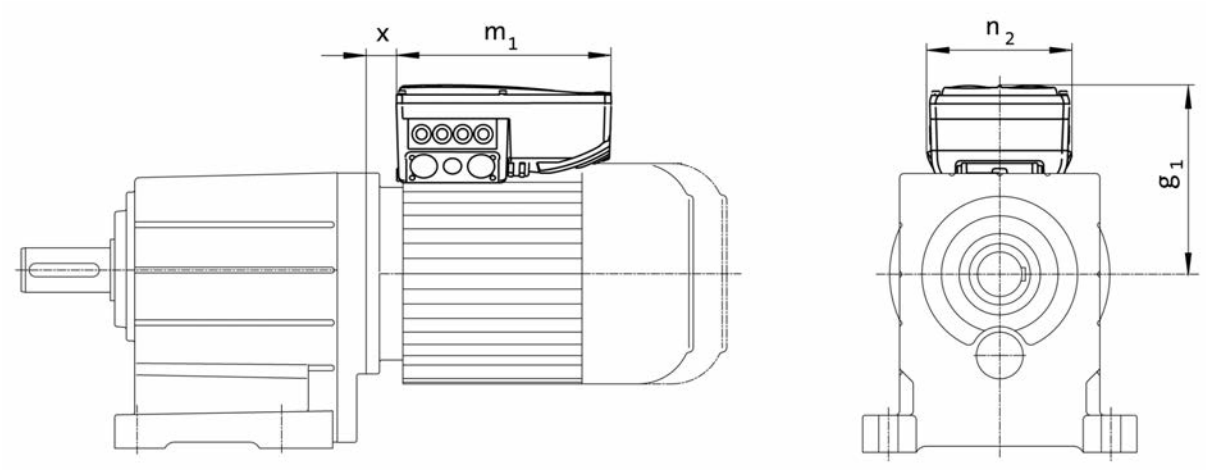


Motor type									
	MFFMAXX	MFFMABR	MFFMABS MFFMABI MFFMABA	MFFMARS MFFMAIG MFFMAAG					

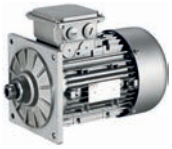
Motor frame size									
	Δ k	Δ k	Δ k	Δ k	k_4	g_3	m_2	n_3	P_6
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
063-32 063-42	128	170	170	128	12	115	95	105	1x M16x1.5
071-32 071-42		165	165			122			
080-32 080-42		183	183		13	132	96	106	
090-32		181	181		22	141	95	105	
100-12 100-32	109	170	170	109		150			
112-22	102	183	183	183		162			
132-12 132-22 132-32	115	202	202	202	32	182			

Dimensions, 8400 motec inverter

Rated frequency 120 Hz



Product key					
Motor	Inverter				
		$g_{1,\ 120Hz}$	$m_{1,\ 120Hz}$	$n_{2,\ 120Hz}$	x_{120Hz}
		[mm]	[mm]	[mm]	[mm]
MF□□□□□063-32	E84DVB□5514S□□□2□	154	241	161	18.8
MF□□□□□063-42	E84DVB□7514S□□□2□				
MF□□□□□071-32	E84DVB□1124S□□□2□	163			21.0
MF□□□□□071-42	E84DVB□1524S□□□2□				
MF□□□□□080-32	E84DVB□2224S□□□2□	201	260	176	24.5
MF□□□□□080-42	E84DVB□3024S□□□2□				
MF□□□□□090-32	E84DVB□4024S□□□2□	261	325	195	16.0
MF□□□□□100-12	E84DVB□5524S□□□2□	272			17.1
MF□□□□□100-32	E84DVB□7524S□□□2□				



Spring-applied brake

Three-phase AC motors can be fitted with a spring-applied brake. This is activated after the supply voltage is switched off (closed-circuit principle). For optimum adjustment of the brake motor to the application, a range of braking torques and control modes is available for every motor frame size. For applications with very high operating frequencies the brake is also available in a LongLife version, with reinforced mechanical brake components.

Features

Versions
- **Standard**
  - 1 x 10^6 repeating switching cycles
  - 1 x 10^6 reversing switching cycles
- **LongLife**
  - 10 x 10^6 repeating switching cycles
  - 15 x 10^6 reversing switching cycles

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

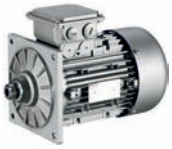
Enclosure
- Without manual release IP55
- With manual release IP54

Friction lining
- Non-asbestos, low wearing

Options
- Manual release
- UL/CSA approval
- Noise-reduced

Motor – brake assignment

Design	Standard		LongLife	
Motor frame size	**Size**	**Rated torque**	**Size**	**Rated torque**
	Brake		Brake	
		M_k		M_k
		[Nm]		[Nm]
063-32	06	2.50	06	4.00
063-42	06	4.00		
071-32	06	2.50	06	4.00
	06	4.00	08	3.50
	08	3.50		
071-42	06	2.50	06	4.00
	06	4.00	08	3.50
	08	3.50	08	8.00
	08	8.00		
080-32	08	3.50	08	8.00
	08	8.00	10	7.00
	10	7.00		
080-42	08	3.50	08	8.00
	08	8.00	10	7.00
	10	7.00	10	16.0
	10	16.0		

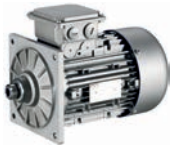


Spring-applied brake

Motor – brake assignment

Design	Standard	LongLife

Motor frame size	Size	Rated torque	Size	Rated torque
	Brake		Brake	
		M_k		M_k
		[Nm]		[Nm]
090-32	08 08 10 10 10	3.50 8.00 7.00 16.0 23.0	08 10 10	8.00 7.00 16.0
100-12	10 10 12 12	7.00 16.0 14.0 32.0	10 12 12	16.0 14.0 32.0
100-32	10 10 12 12 12	7.00 16.0 14.0 32.0 46.0		
112-22	12 12 14 14	14.0 32.0 35.0 60.0		
132-12	14 14 16 16	35.0 60.0 60.0 80.0		
132-22 132-32	14 14 16 16 16	35.0 60.0 60.0 80.0 100		



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 to protect against induction peaks.

- Supply voltages
  DC 24 V
  DC 180 V
  DC 205 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

- Ratio of supply voltage to brake coil voltage = 2.22
- Approved by UL/CSA
- Supply voltages
  AC 230 V
  AC 400 V
  AC 460 V

Bridge rectifier, 6-pole

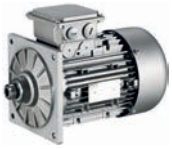
- Ratio of supply voltage to brake coil voltage = 1.11
- Supply voltage
  AC 230 V

Bridge/half-wave rectifier, 6-pole

- Ratio of supply voltage to brake coil voltage
  up to overexcitation time = 1.11
  beyond overexcitation time = 2.22

Supply voltages:

- AC 230 V
- AC 400 V



Spring-applied brake

Connection via mains voltage with brake rectifier

Bridge/half-wave rectifier, 6-pole
- Ratio of supply voltage to brake coil voltage
  up to overexcitation time = 1.11
  beyond overexcitation time = 2.22

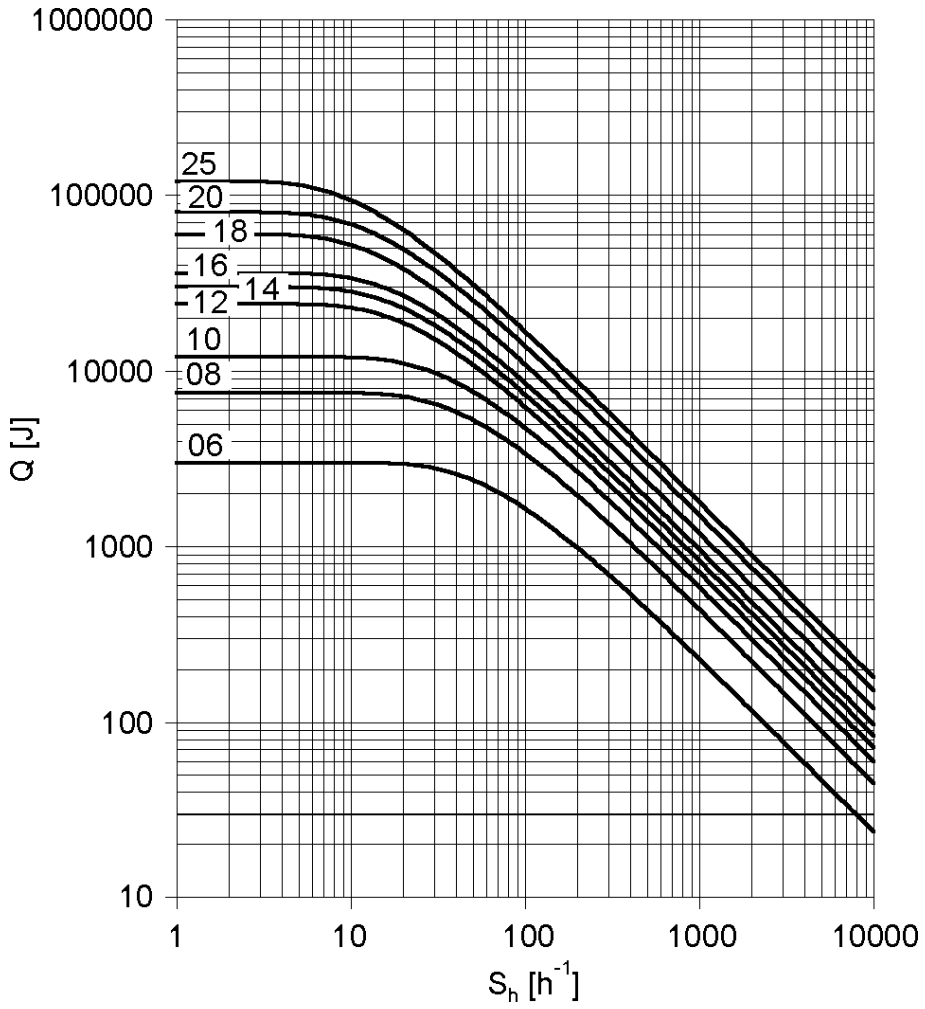
Supply voltages:
- AC 230 V
- AC 400 V

During the switching operation the bridge/half-wave rectifier functions as a bridge rectifier for the overexcitation time $t_{ü}$ and then as a half-wave rectifier. This combination optimises the performance of the brake – depending on the assignment of brake coil voltage and supply voltage:

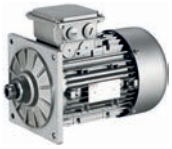
- **Short-time overexcitation of the brake coil**
  Activating the brake coil for the overexcitation time $t_{ü}$ with twice the rated voltage allows the disengagement time to be reduced. The brake opens more quickly and wear on the friction lining is reduced.
  These features make this activation version particularly suitable for lifting applications. It is therefore only available in combination with a brake with increased braking torque.
- **Holding current reduction (cold brake)**
  By reducing the holding current, the bridge/half-wave rectifier is able to reduce the power input to the open brake. As the brake heats up less, this type of activation is known as "cold brake".

Spring-applied brake

Permissible friction energy



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



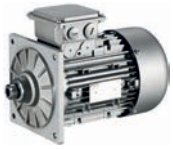
Spring-applied brake

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

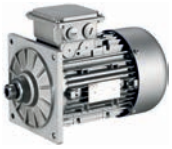
► Activation via half-wave or bridge rectifier

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.



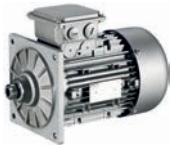
Spring-applied brake

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

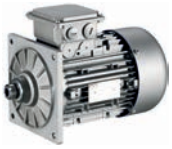
► Activation via half-wave or bridge rectifier

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

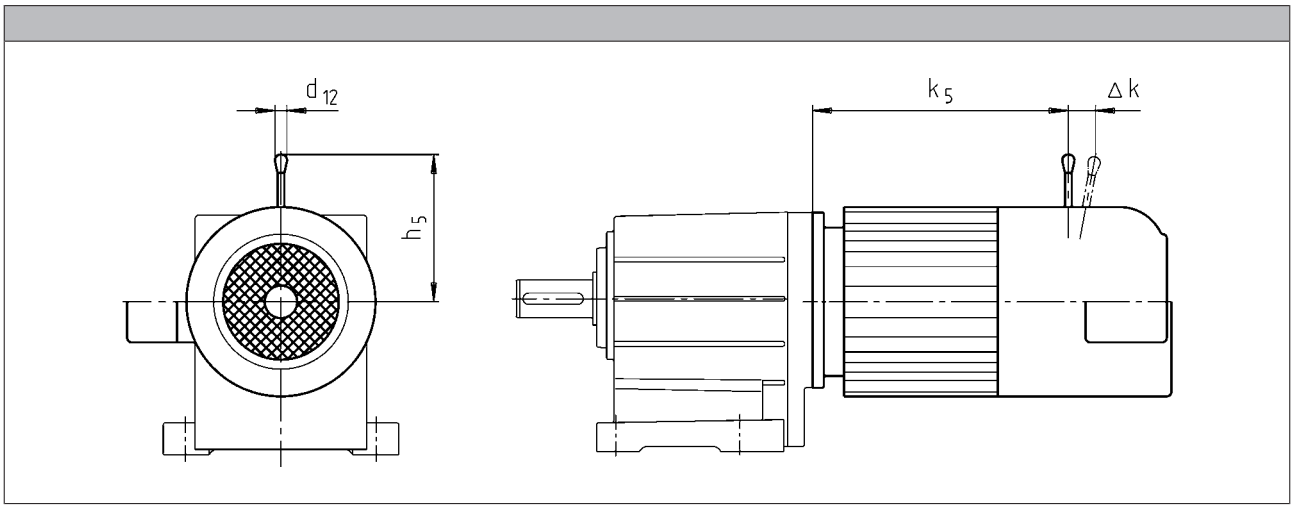
Design			Holding current reduction (cold brake)									
Size			10	12	14	16		18	20		25	
Friction energy												
	Q_{BW}	[MJ]	198	353	253	563	241	578	1596	580	2465	1409
Overexcitation time												
	$t_ü$	[ms]	300			1300						
Min. rest time												
	t	[ms]	900			3900						
Delay time												
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

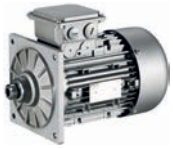
Manual release lever



Motor frame size	Size				
	Brake				
		k_5	Δ k	h_5	d_{12}
		[mm]	[mm]	[mm]	[mm]
063-32 063-42	06	173	29	107	13.0
071-32 071-42	06 08	186 187	29 27	107 116	13.0 13.0
080-32 080-42	06 08	207 218	29 27	107 116	13.0 13.0
090-32	08 10	245 256	27 28	116 132	13.0 13.0
100-12 100-32	10 12	294 296	28 37	132 161	13.0 13.0
112-22	12 14	292 296	37 41	161 195	13.0 24.0
132-12 132-22 132-32	14 16	373 373	41 55	195 240	24.0 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
- Inverter motec
- Terminal box of motor sizes 071, 080, 090 for brake and retracting (M□□MA BR/BS/BA/BI)



Resolver

Stator-fed resolver with two stator windings offset by 90° and one rotor winding with transformer winding.

► 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

Incremental encoder and SinCos absolute value encoder

► 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)

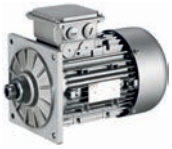
Servo-Inverters
- Servo Drives 9400 (E94A)
- 9300 servo inverters (EVS93)
- Servo Drives ECS

Blowers

► The use of a blower enables operation below 20 Hz without torque derating.

Rated data for 50 Hz

Size	Number of phases	Connection method					
Motor							
			U_{min}	U_{max}	P_{max}	I_{max}	m
			[V]	[V]	[kW]	[A]	[kg]
063	1		230	277	0.027	0.11	2.00
	3	Δ	200	303	0.028	0.12	
		Y	346	525		0.070	
071	1		230	277	0.027	0.10	2.10
	3	Δ	200	303	0.031	0.11	
		Y	346	525		0.060	
080	1		230	277	0.029	0.11	2.30
	3	Δ	200	303	0.031		
		Y	346	525		0.060	
090	1		220	277	0.065	0.29	2.70
	3	Δ	200	303	0.091	0.38	
		Y	346	525		0.22	
100	1		220	277	0.066	0.28	3.00
	3	Δ	200	303	0.091	0.37	
		Y	346	525		0.22	
112	1		220	277	0.071	0.28	3.10
	3	Δ	200	303	0.097	0.35	
		Y	346	525		0.20	
132	1		230	277	0.098	0.40	4.20
	3	Δ	200	303	0.12	0.58	
		Y	346	525		0.33	
160	1		230	277	0.25	0.97	6.20
	3	Δ	200	303		0.87	
		Y	346	525		0.50	
180	1		230	277		0.97	8.00
	3	Δ	200	303		0.87	
		Y	346	525		0.50	



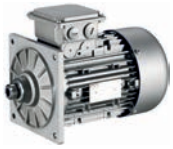
Blowers

Rated data for 50 Hz

Size	Number of phases	Connection method					
Motor							
			U_{min}	U_{max}	P_{max}	I_{max}	m
			[V]	[V]	[kW]	[A]	[kg]
200	1		230	277	0.25	0.97	8.00
	3	Δ	200	303		0.87	
		Y	346	525		0.50	
225		Δ	200	400	0.28	1.10	15.0
		Y	346	525	0.17	0.35	

Rated data for 60 Hz

Size	Number of phases	Connection method					
Motor							
			U_{min}	U_{max}	P_{max}	I_{max}	m
			[V]	[V]	[kW]	[A]	[kg]
063	1		230	277	0.032	0.12	2.00
	3	Δ	220	332	0.028	0.10	
		Y	380	575		0.060	
071	1		230	277	0.033	0.12	2.10
	3	Δ	220	332	0.029	0.10	
		Y	380	575		0.060	
080	1		230	277	0.037	0.14	2.30
	3	Δ	220	332	0.034	0.10	
		Y	380	575		0.060	
090	1		220	277	0.065	0.25	2.70
	3	Δ		332	0.077	0.33	
		Y	380	575		0.19	
100	1		220	277	0.075	0.30	3.00
	3	Δ		332	0.087	0.31	
		Y	380	575		0.18	
112	1		220	277	0.094	0.37	3.10
	3	Δ		332	0.10	0.31	
		Y	380	575		0.18	
132	1		230	277	0.15	0.57	4.20
	3	Δ	220	332		0.44	
		Y	380	575		0.25	
160		Δ	220	332	0.36	0.93	6.20
		Y	380	575		0.56	
180		Δ	220	332		0.93	8.00
		Y	380	575		0.56	
200		Δ	220	332		0.93	
		Y	380	575		0.56	
225		Δ	220	400	0.28	0.76	15.0
		Y	380	575	0.26	0.43	



Temperature monitoring

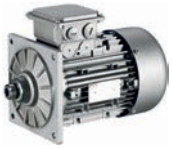
► The thermal sensors are integrated in the windings. The use of an additional motor protection switch is recommended.

TKO thermal contacts

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

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

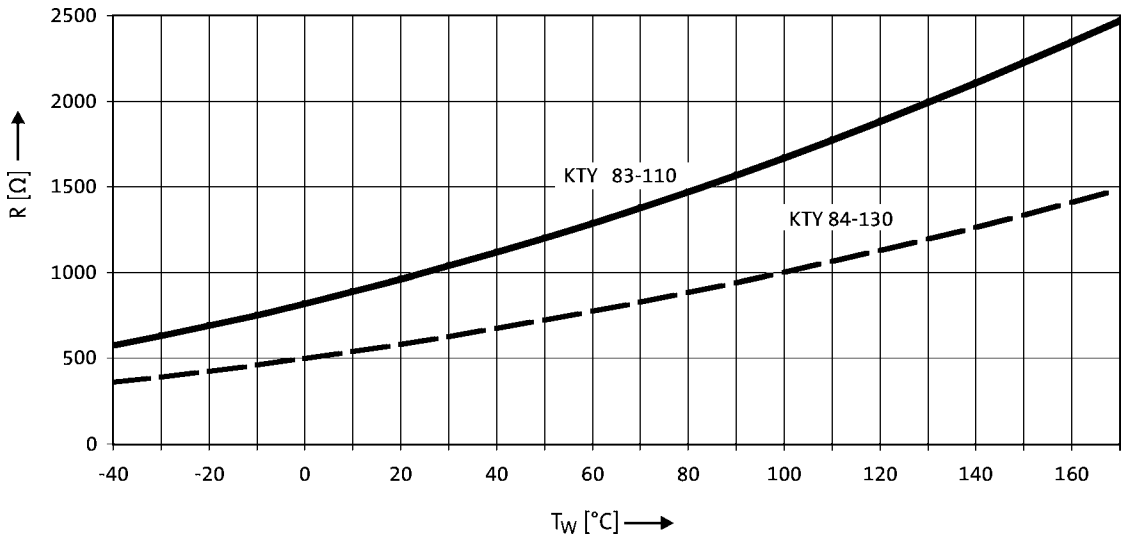


Temperature monitoring

KTY temperature sensor

	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 detector is supplied with a measured current of 1 mA, the above relationship between the temperature and the resistance applies.

Terminal box

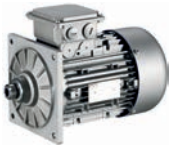
The MF three-phase AC motors are designed specifically for inverter operation. With a base frequency of 120Hz, the rated voltage has been specified at approximately 200 V in delta connection (up to 2.2 kW) and approximately 350V in star configurations.

In the standard version, the motors are connected in the terminal box. As an option, the motors are also available with the connectors described on the following pages as long as the permissible ratings are not exceeded.

Motor terminal box - built-on accessories assignment: 4-pole / 6-pole motors

Motor type	M□□MAXX	M□□MARS M□□MAIG M□□MAAG	M□□MAZE
Motor frame size			
	Terminal box		
063-32 063-42	KK1	KK2	
071-32 071-42	KK1	KK2	KK2
080-32 080-42	KK1	KK2	KK2
090-32	KK1	KK2	KK2
100-12 100-32	KK1	KK2	KK2
112-22	KK1	KK2	KK2
132-12 132-22 132-32	KK1	KK3	KK3

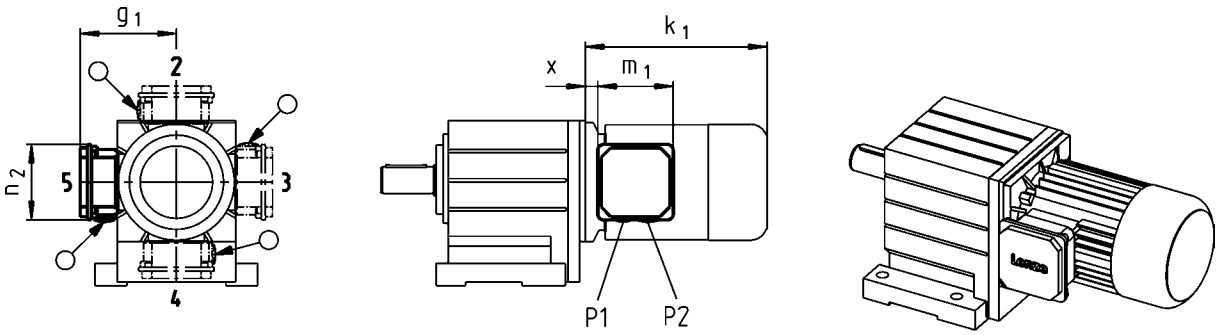
Motor type	M□□MABR	M□□MABS M□□MABI M□□MABA	M□□MABZ
Motor frame size			
	Terminal box		
063-32 063-42	KK2	KK3	
071-32 071-42	KK2	KK3	KK2
080-32 080-42	KK2	KK3	KK2
090-32	KK2	KK3	KK2
100-12 100-32	KK2	KK3	KK2
112-22	KK2	KK3	KK2
132-12 132-22 132-32	KK3	KK3	KK3



Terminal box

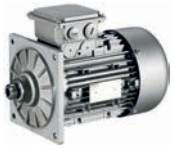
Dimensions of KK1

- ► For motors with motor terminal box KK1, the connector position can be selected in accordance with the terminal box position.
- ► If preferred positions are not specified in the order, the cable entry will be positioned as circled on the diagram below.



Size						
Motor						
	x	g_1	m_1	n_2	P_1	P_2
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
063	21 12 [1)]	100 117 [1)]	75.0 93.0 [1)]	75.0 93.0 [1)]	M16x1.5 M20x1.5 [1)]	M20x1.5 M20x1.5
071	24 15 [1)]	109 126 [1)]				
080	14	150	115	115	M20x1.5	M25x1.5
090	19	157				
100	20	166				
112	22	176				
132	33	195	122	122	M32x1.5	M32x1.5

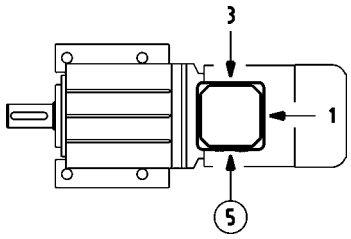
[1)] UL/CSA approval: cURus



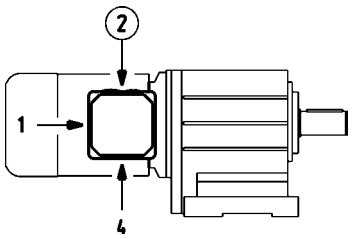
Terminal box

Cable entry position when using KK1

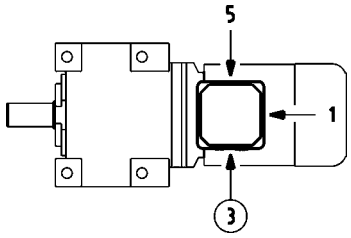
Terminal box in position 2



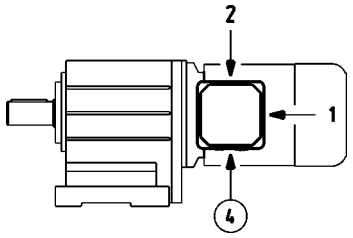
Terminal box in position 3

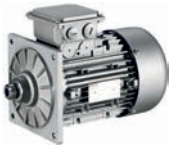


Terminal box in position 4



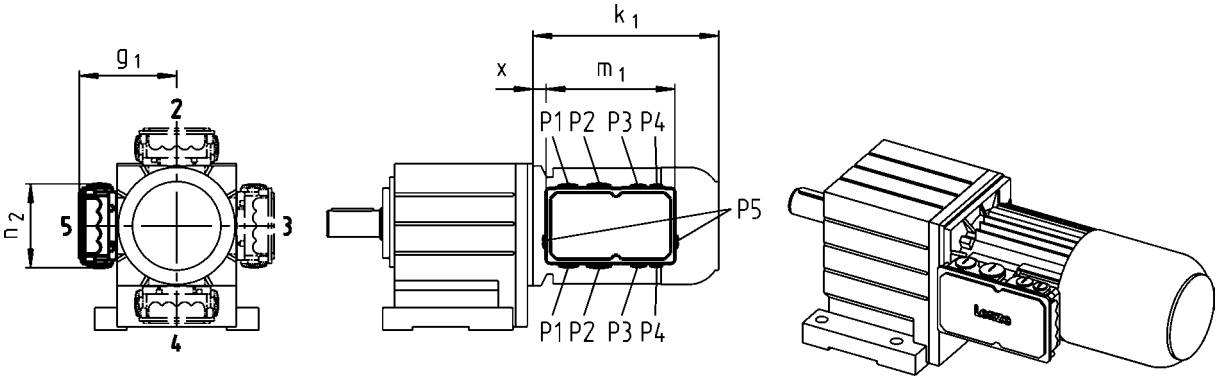
Terminal box in position 5





Terminal box

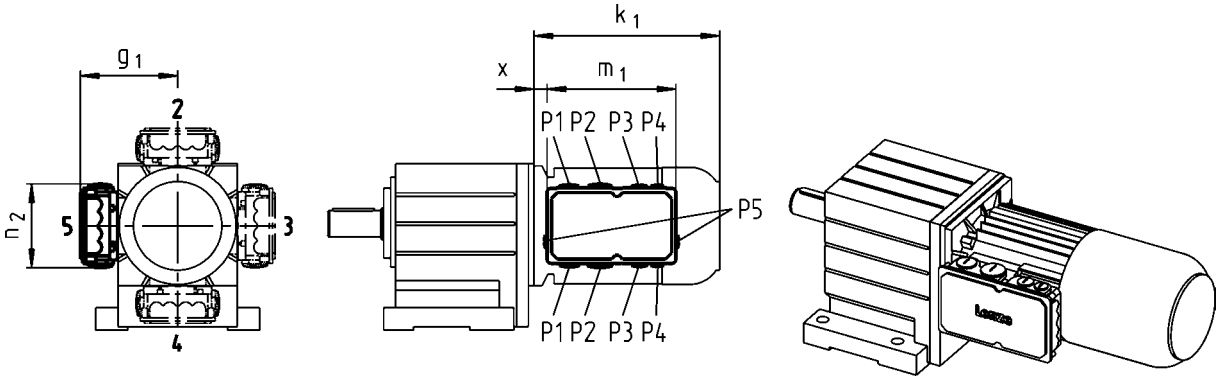
Dimensions of KK2



Size						
Motor						
	x	g_1	m_1	n_2	P_1	P_2
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
063	13	107	136	103	M16x1.5	M20x1.5
071	15	118				
080	17	132	152	121	M20x1.5	M25x1.5
090	22	137				
100	23	147				
112	25	158				

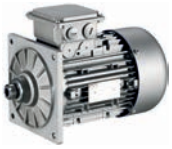
Terminal box

Dimensions of KK3



Size									
Motor									
	x	g_1	m_1	n_2	P_1	P_2	P_3	P_4	P_5
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
063	2	124	195	125	M25x1.5	M32x1.5	M20x1.5	M20x1.5	
071	5	133							
080	15	142							
090	20	147							
100	21	158							
112	23	168							
132	38	187							
160	35	210	226	127	M50x1.5	M16x1.5		M16x1.5	
180	73	230							
225	95	346	354	205		M63x1.5 [1)]	M50x1.5 [1)]		M16x1.5

[1)] Cable entry only possible at one position.
Terminal box position 2: cable entry at position 5.
Terminal box position 3: cable entry at position 2.
Terminal box position 4: cable entry at position 3.
Terminal box position 5: cable entry at position 4.

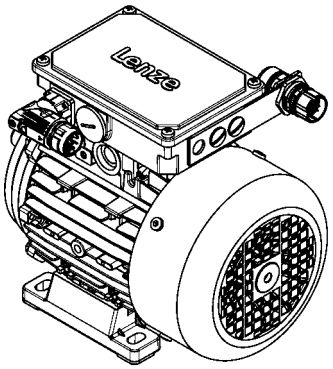


Plug connectors

ICN, HAN and M12 connectors (only for IG128-24V-H incremental encoder) are available for the three-phase AC motors.

ICN connector

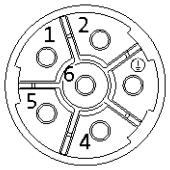
A connector is used for power, brake and temperature monitoring. The connections to the feedback system and the blower each employ a separate connector.



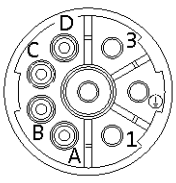
Connection for power, brake and temperature monitoring

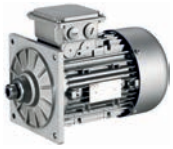
The connectors can be rotated through 270° and are fitted with a bayonet catch for SpeedTec connectors. As this connector is also compatible with conventional union nuts, existing mating connectors can continue to be used without difficulty. The motor connection is determined in the terminal box and must be checked before commissioning.

► ICN 6-pole

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

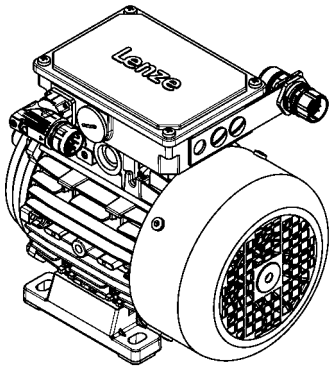
Pin assignment			
Contact	Designation	Meaning	
1	U	Phase U power	
PE	PE	PE conductor	
3	V	Phase V power	
4	W	Phase W power	
A	TB1 / TP1 / R1	Thermal sensor: TKO/PTC/ +KTY	
B	TB2 / TP2 / R2	Thermal sensor: TKO/PTC/-KTY	
C	BD1 / BA1	Brake +/AC	
D	BD2 / BA2	Brake /AC	



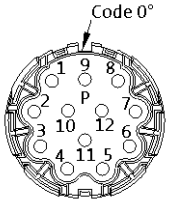
ICN connector

Feedback connection

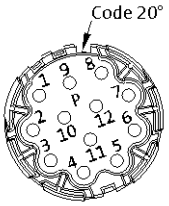
All encoder systems (apart from IG128-24V-H) are also available with an ICN connector fixed to the motor terminal box for exceptionally fast commissioning. The connectors are fitted with a bayonet fixing, which is also compatible with conventional union nuts. Existing mating connectors can therefore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

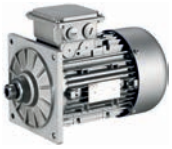


► Resolver

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		



ICN connector

Motor terminal box with ICN connectors - built-on accessories assignment: 4-pole / 6-pole motors

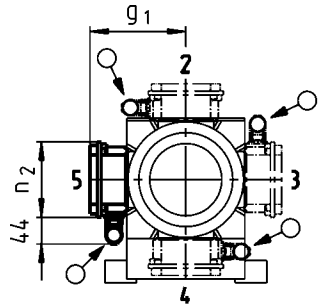
Motor type	M□□MAXX	M□□MARS M□□MAIG M□□MAAG	M□□MAZE
Motor frame size			
	Terminal box		
063-32 063-42	KK1	KK2	
071-32 071-42	KK1	KK2	KK2
080-32 080-42	KK1	KK2	KK2
090-32	KK1	KK2	KK2
100-12 100-32	KK1	KK2	KK2

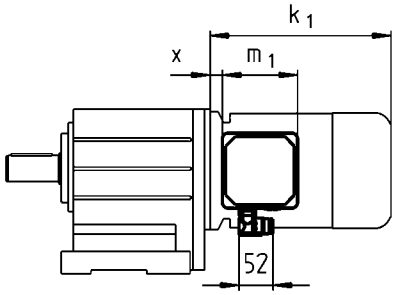
Motor type	M□□MABR	M□□MABS M□□MABI M□□MABA	M□□MABZ
Motor frame size			
	Terminal box		
063-32 063-42	KK2	KK3	
071-32 071-42	KK2	KK3	KK2
080-32 080-42	KK2	KK3	KK2
090-32	KK2	KK3	KK2
100-12 100-32	KK2	KK3	KK2

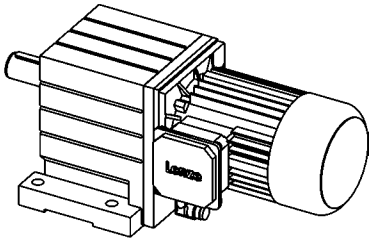
ICN connector

Dimensions of KK1

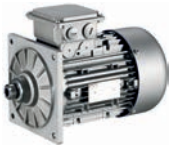
- ► For motors with connectors, the connector position can be selected in accordance with the terminal box position.
- ► If preferred positions are not specified in the order, the connector will be positioned as circled on the diagram below.







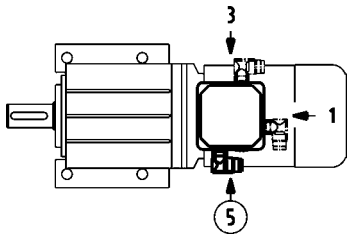
Size				
Motor				
	x	g_1	m_1	n_2
	[mm]	[mm]	[mm]	[mm]
063	12	117	93.0	93.0
071	15	126		
080	14	150	115	115
090	19	157		
100	20	166		
112	22	176		
132	33	195	122	122



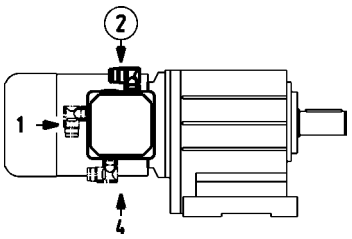
ICN connector

Connector position when using KK1

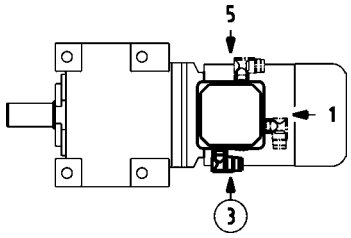
Terminal box in position 2



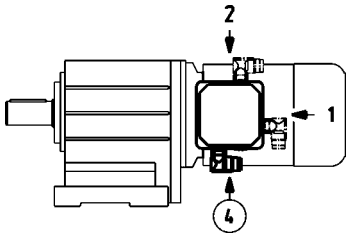
Terminal box in position 3



Terminal box in position 4



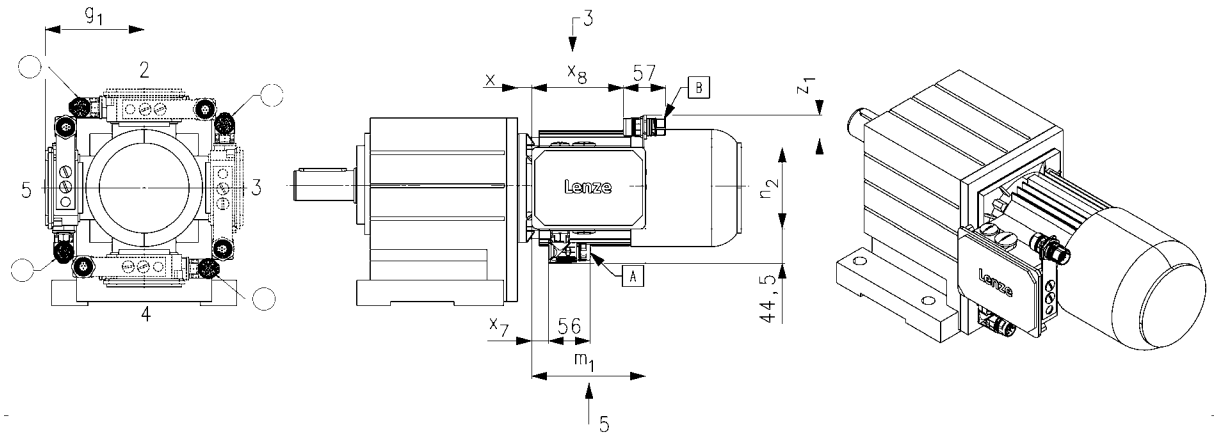
Terminal box in position 5



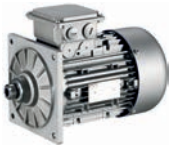
ICN connector

Dimensions of KK2/KK3

- For motors with connectors, the connector position can be selected in accordance with the terminal box position.
- If preferred positions are not specified in the order, the connector will be positioned as circled on the diagram below.



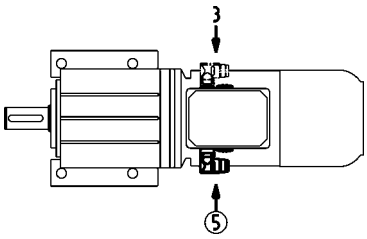
Size							
Motor							
	x	g_1	m_1	n_2	x_7	x_8	$z_{1, max}$
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
063	13	107	136	103	16	109	43
071	15	118					
080	17	132	152	121	23	125	41
090	22	137					
100	23	147					
112	25	158					
132	38	187	195	125	27	166	71



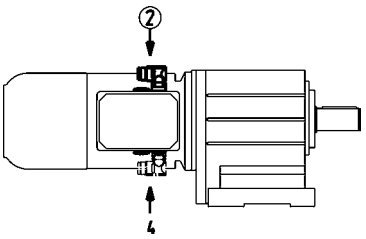
ICN connector

Connector position when using KK2/KK3

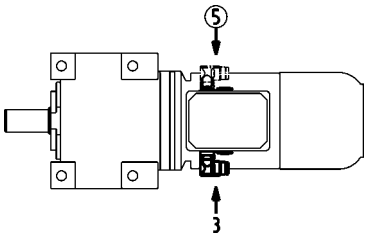
Terminal box in position 2



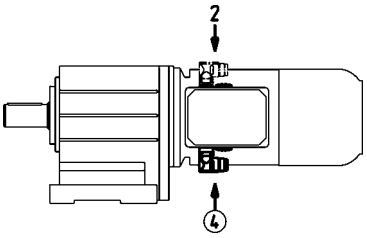
Terminal box in position 3

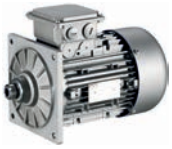


Terminal box in position 4



Terminal box in position 5

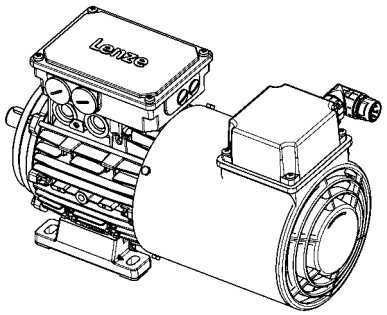




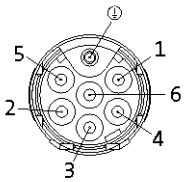
ICN connector

Blower connection

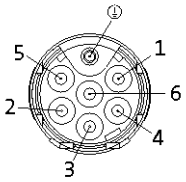
The blower is also optionally available with an ICN connector fixed to the terminal box of the blower for exceptionally fast commissioning. The connectors are fitted with a bayonet fixing, which is also compatible with conventional union nuts. Existing counter plugs can therefore continue to be used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

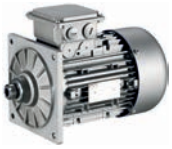


► Blower 1-ph

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

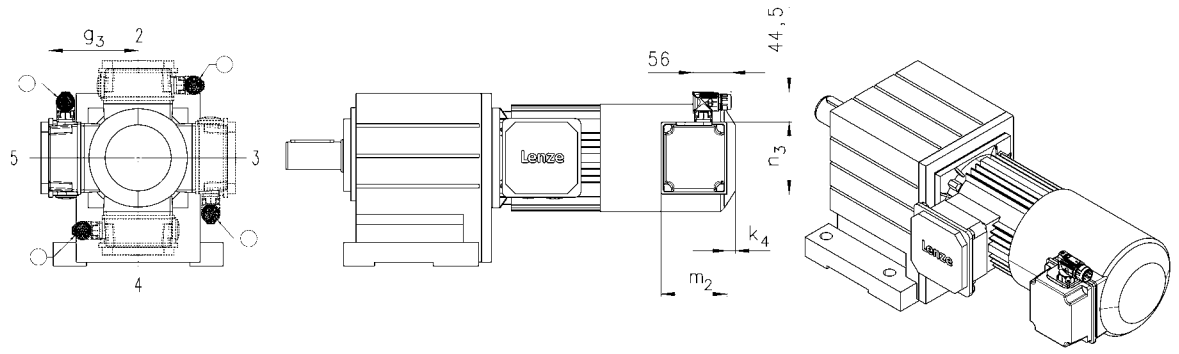
► Blower 3-ph

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	



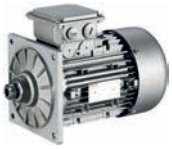
ICN connector

Dimensions of blower



Size				
Motor				
	k_4	g_3	m_2	n_3
	[mm]	[mm]	[mm]	[mm]
063	12	115	95	105
071		122		
080	13	132	96	106
090	22	141	95	105
100		150		
112		162		
132	32	182		
160	31	209	96	106
180				
225				

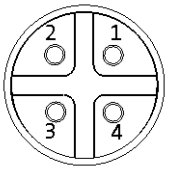
► In addition, the cover of the blower terminal box (including connectors) can be rotated progressively through 90° if necessary.

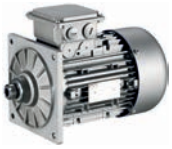


M12 connector

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.

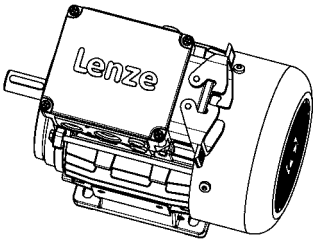
Pin assignment			
Contact	Designation	Meaning	
1	$+U_B$	Supply +	
2	B	Track B	
3	GND	Mass	
4	A	Track A	

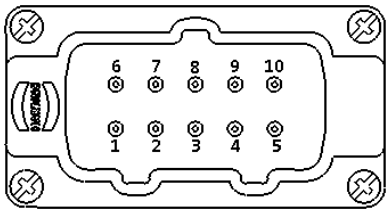


HAN connector

10E

In the case of the rectangular HAN-10E connectors, all six ends of the three winding phases are taken out to the power contacts. The motor circuit is therefore determined in the mating connector.

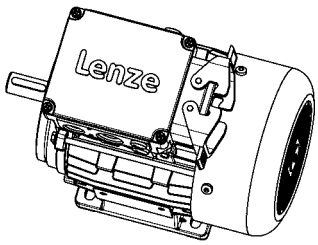


Pin assignment		
Contact	Meaning	
1	Terminal board: U1	
2	Terminal board: V1	
3	Terminal board: W1	
4	Brake +/AC	
5	Brake -/AC	
6	Terminal board: W2	
7	Terminal board: U2	
8	Terminal board: V2	
9	Thermal sensor: +KTY/PTC/TKO	
10	Thermal sensor: KTY/PTC/TKO	

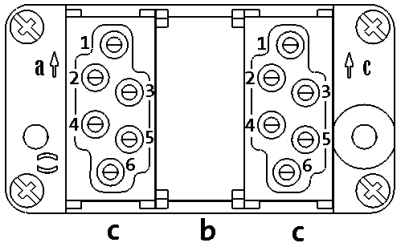
HAN connector

Modular

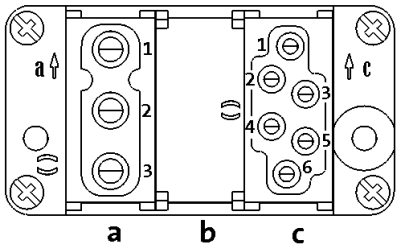
The connector is available with two different power modules (16 A or 40 A), depending on the rated motor current. The motor connection is determined in the terminal box and must be checked before commissioning.

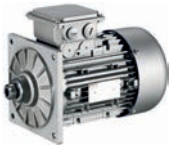


► HAN modular 16 A

Pin assignment			
Module	Contact	Meaning	
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	



HAN connector

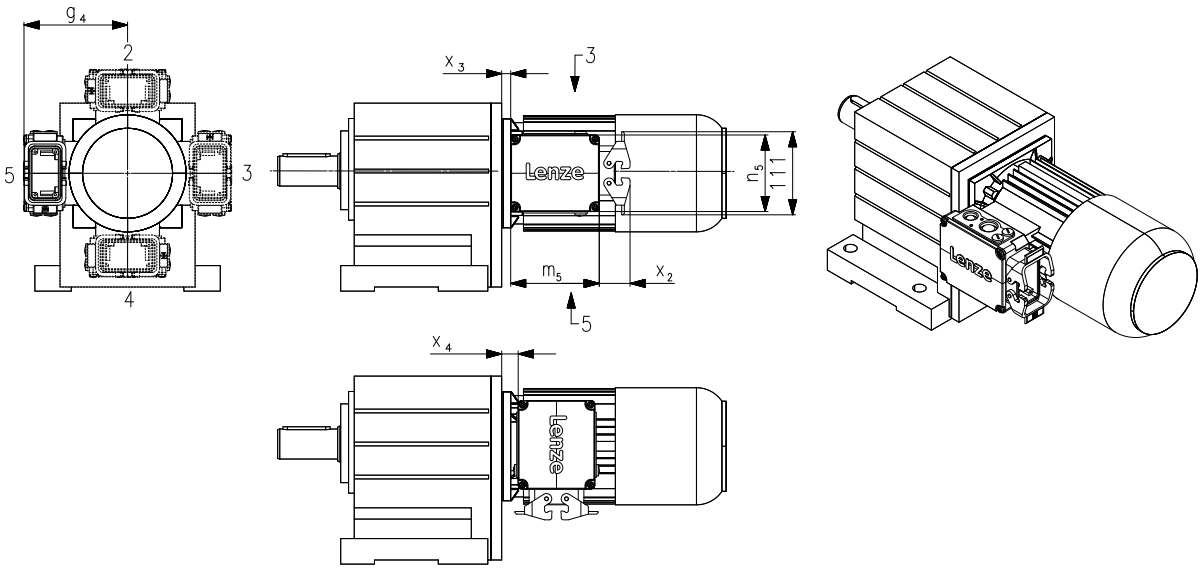
Motor type	M□□MAXX M□□MABR	M□□MAZE M□□MABZ
Motor frame size		
	Terminal box with HAN connector	
063-32 063-42	HAN-10E HAN modular	
071-32 071-42	HAN-10E HAN modular	HAN-10E HAN modular
080-32 080-42	HAN-10E HAN modular	HAN-10E HAN modular
090-32	HAN-10E HAN modular	HAN-10E HAN modular
100-12 100-32	HAN-10E HAN modular	HAN-10E HAN modular
112-22		
132-12 132-22 132-32	HAN modular	HAN modular

Motor terminal box with HAN connectors - built-on accessories assignment: 4-pole / 6-pole motors

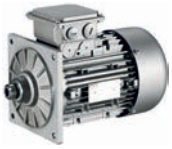
HAN connector

Dimensions

- For motors with connectors, the connector position can be selected in accordance with the terminal box position.
- Unless the connector position is specified, it will be supplied in position 1.



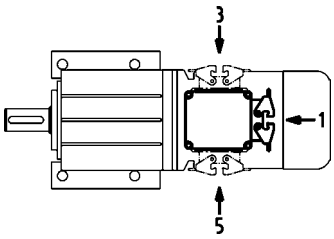
Size			
Motor			
	g_4	x_3	x_4
	[mm]	[mm]	[mm]
063	120	5.00	6.00
071	129	7.00	8.00
080	138	11.0	19.0
090	143	15.0	23.0
100	154	16.0	24.0
112	164	13.5	21.5
132	233	34.5	4.50
160	248	39.0	9.00



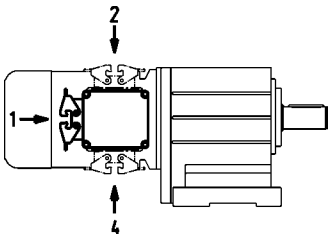
HAN connector

Position of connector

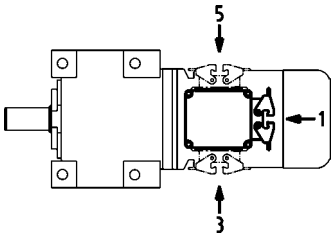
Connector in position 2



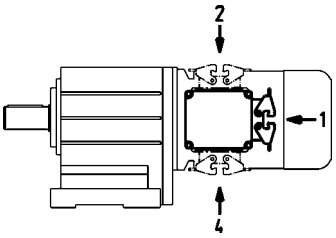
Connector in position 3



Connector in position 4

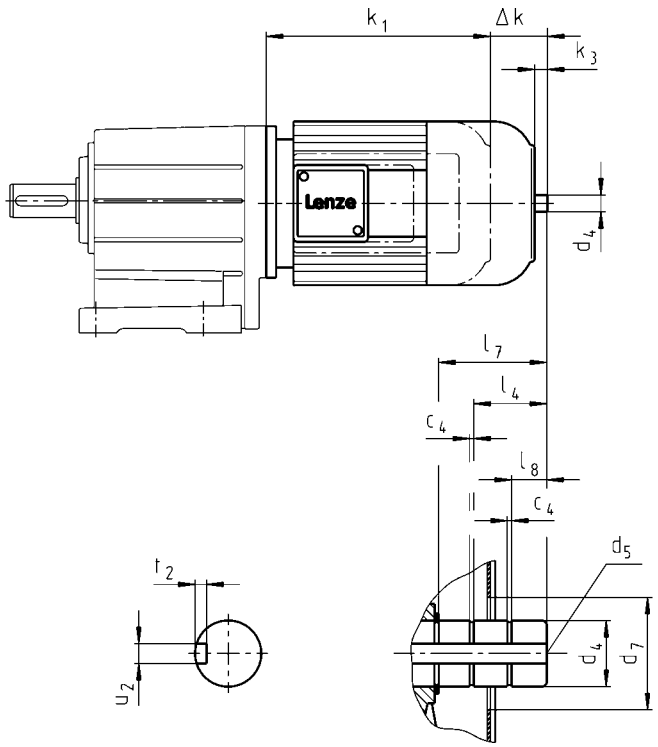


Connector in position 5



2nd shaft end

Dimensions, self-ventilated (4/6-pole)



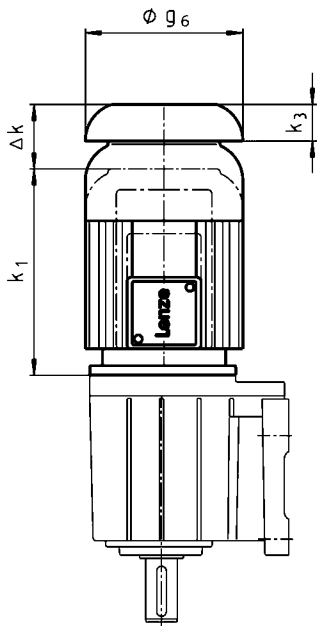
Motor type	
Built-on accessories	M□□MAZE M□□MABZ

Motor frame size												
	Δ k	k_3	c_4	d_4	d_4	d_5	d_7	l_4	l_7	l_8	u_2	t_2
				h6	j6							
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
071-32 071-42	47	11.0	1.10	14.0		M5	34.0		19.0	3.00	5.00	3.00
080-32 080-42	68	9.00	1.10	14.0		M5	34.0		19.0	4.50	5.00	3.00
090-32	57	9.00	1.10	14.0		M5	34.0		19.0	5.00	5.00	3.00
100-12 100-32	71	18.5	1.30		20.0	M6	34.0	17.0	32.5	10.5	6.00	3.50
112-22	84	16.0	1.30		20.0	M6	34.0	17.0	28.5	7.00	6.00	3.50
132-12 132-22 132-32	101	24.5	1.60		30.0	M10	46.0	24.5	42.0	8.50	8.00	4.00

[1] During operation, appropriate measures must be taken to make fan cover opening safe.

Protection cover

Dimensions, self-ventilated (4/6-pole)

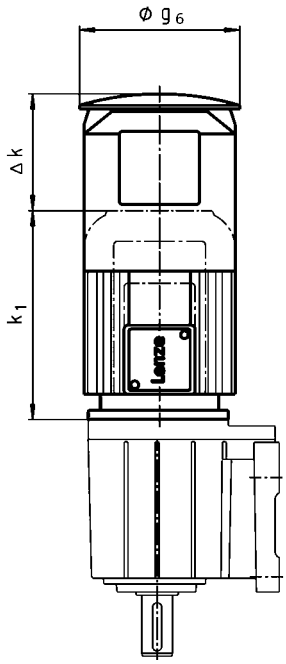


	Motor type					
	M□□MAXX	M□□MABR	M□□MABS M□□MABI M□□MABA	M□□MARS M□□MAIG M□□MAAG		

Motor frame size						
	Δ k	Δ k	Δ k	Δ k	k_3	g_6
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
063-32 063-42	26	66	129	82	11.0	123
071-32 071-42	26	78	122	78	12.0	138
080-32 080-42	26	99	137	127	16.0	156
090-32	26	94	131	113	15.0	176
100-12 100-32	31	107	132	112	17.0	194
112-22	31	121	151	111	18.0	218
132-12 132-22 132-32	31	141	156	134	20.0	257

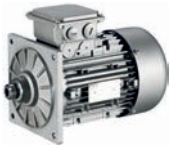
Protection cover

Dimensions, forced ventilated (4/6-pole)



	Motor type			
	M□□MAXX	M□□MABR M□□MABS M□□MABI	M□□MARS M□□MAIG M□□MAAG	

Motor frame size				
	Δ k	Δ k	Δ k	g_6
	[mm]	[mm]	[mm]	[mm]
063-32 063-42	169	209	169	133
071-32 071-42	165	202	165	150
080-32 080-42	168	224	168	170
090-32	157	210	157	188
100-12 100-32	137	198	137	210
112-22	135	216	216	249
132-12 132-22 132-32	140	226	226	300



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