L-force
Geared motors

Efficient and precisely tailored

NEW

With IE2 high efficiency motors to IEC 60034-30

Lenze

This is what we stand for.
You want to implement your machine and plant concepts efficiently and easily or optimise existing concepts to reduce costs? Then, Lenze is the partner you are looking for. For more than 60 years, drive and automation systems have been our core competence.

Drive and automation technology from Lenze keep things moving – for example in the areas of materials handling, robotics and component handling as well as in packaging facilities for the intralogistics and automotive sectors and the food and beverage industries.

Lenze | about us

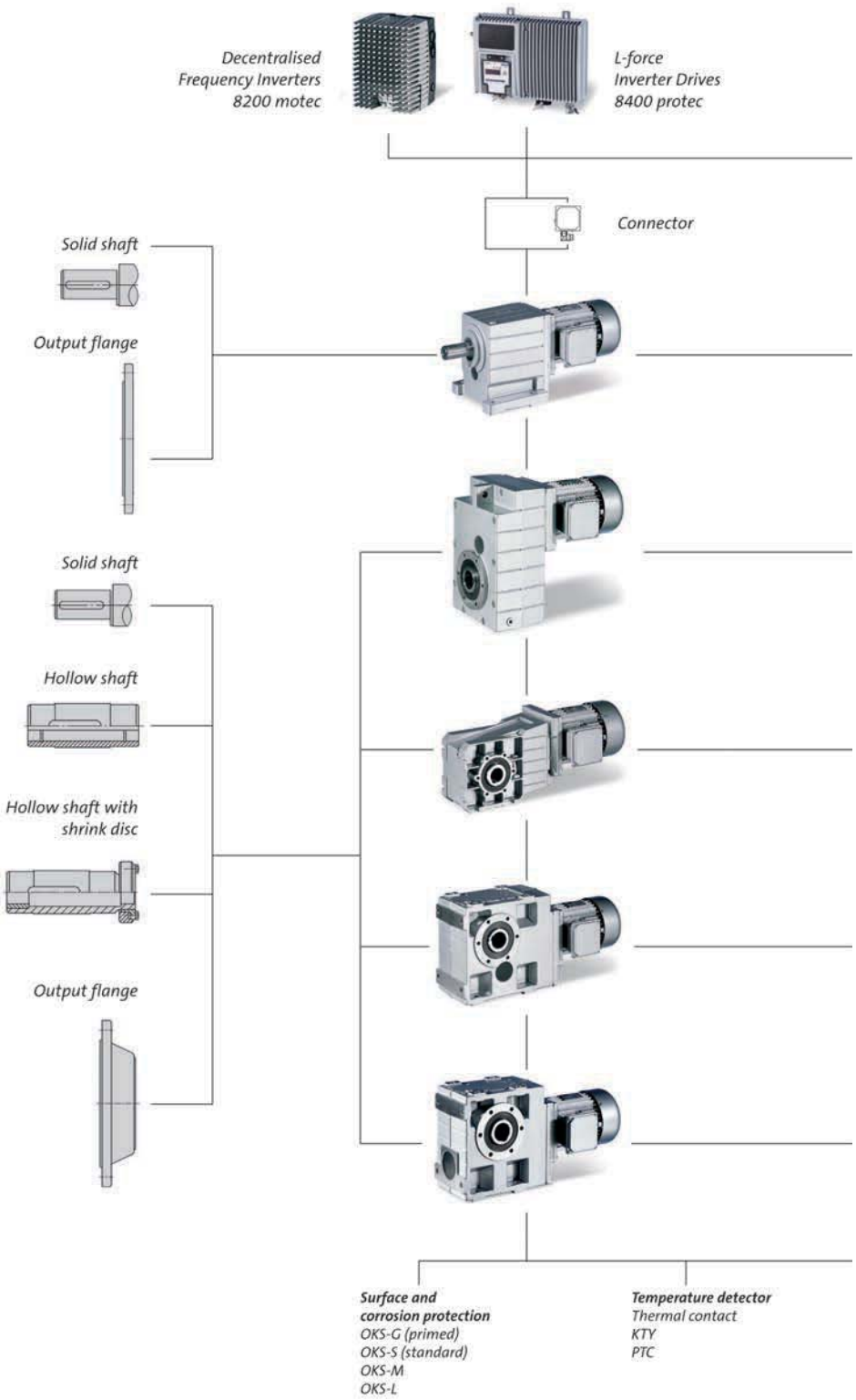
We can offer you automation solutions including control, visualisation and drive technology from a single source. Our drive systems will improve the performance of your machines. From project planning to commissioning, we have the know-how, whilst our international sales and service network can provide you with expert help and advice at any time.

Cut your process costs and increase your ability to compete. Let us analyse your drive technology tasks and support you with made-to-measure solutions. We can take an integrated approach to projects thanks to the scalability of our products and the scope of the overall portfolio. We can get the best from your machines and systems.

At your side all over the world – with thorough and professional support from our motivated team.

System overview

L-force geared motors



L-force
Inverter Drives 8400

Mains operation

Helical geared motors
GST
0.6 to 45 kW
Parallel-axial solid shaft geared motors in foot and flange mounting.

Shaft-mounted helical geared motors
GFL
0.12 to 45 kW
Particularly compact with hollow shaft, can be used as shaft-mounted gearbox.

Bevel geared motors
GKR
0.06 to 7.5 kW
Highly efficient right-angle geared motors with wear-free bevel gear toothing.

Helical-bevel geared motors
GKS
0.12 to 45 kW
Solid shaft or hollow shaft right-angle geared motor with high level of efficiency.

Helical-worm geared motors
GSS
0.12 to 15 kW
Value for money right-angle worm geared motors with high power density.

Spring-applied brake

Speed/ position encoder

Integral fan

Integral fan + handwheel

Integral fan with increased inertia

Blower

Integral fan

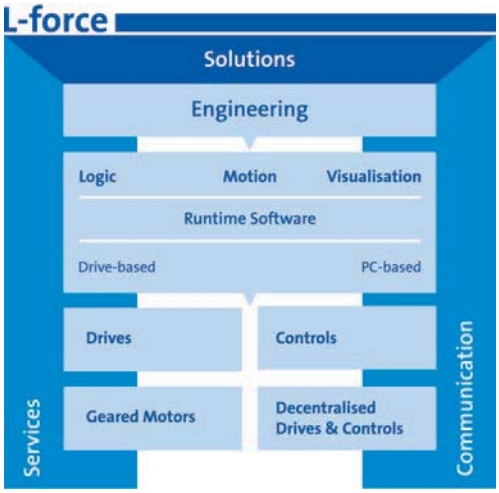
Blower

Efficiency classes
Standard efficiency (IE1)
High efficiency (IE2)

Approvals
CE
cULus
EAC
GOST
UkrSepro

L-force | Your future is our drive

Demands are increasing all the time. In future, key challenges will lie in the areas of cost efficiency, time-saving and quality improvements. Faster project planning and commissioning, improved performance and increased flexibility in production are expected. New ideas are therefore needed for the machines of the future.
Lenze has risen to this challenge and, with L-force, we can now not only offer you an innovative family of drive and automation products, but also a new, comprehensive portfolio of solutions.



Driven by innovation – new ideas that open up new opportunities
Always on the lookout. Our idea of innovation is striving for better solutions for our customers every single day.

Driven by flexibility – High degree of scalability for individual solutions
Scalability is an important aspect of the **L-force** philosophy. Performance, scope of functions, software, service provisions and aftersales care – Lenze will provide you with exactly the combination you require.

Driven by usability – Simple solutions, even for complex applications
We always focus on the user. Therefore, when we developed **L-force**, we made sure that people with sufficient practical experience were involved, right from the start.

Driven by compatibility – Universal products and solutions
There is no need to waste time looking for suitable components and the right interfaces. With **L-force**, every element is perfectly matched.

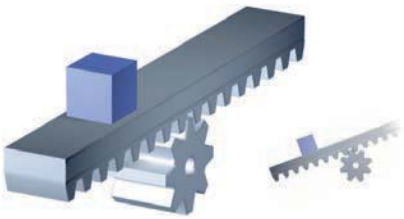
Our drive is "rightsized" – the perfect solution for your application
We call it Rightsizing: Optimise your processes with Lenze geared motors and increase your added value.

Overview

L-force geared motors

Contents | L-force geared motors

General information



Drive dimensioning

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GST Helical geared motor

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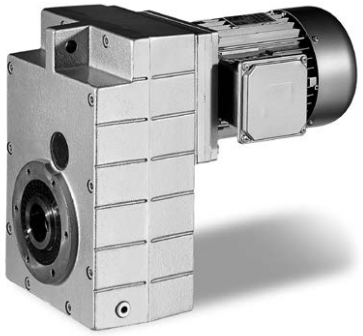
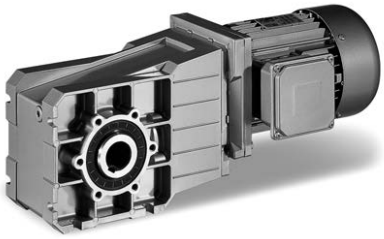


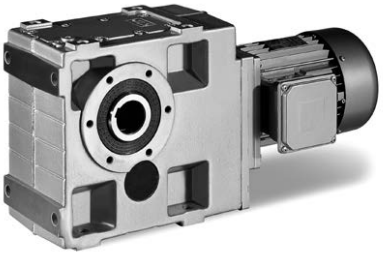
GFL Shaft-mounted helical geared motors

Contents L-force geared motors



Bevel geared motor GKR

Contents | L-force geared motors



GKS Helical-bevel geared motor

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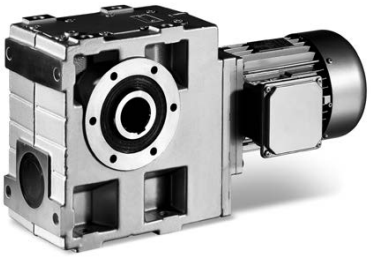

GSS Helical-worm geared motors

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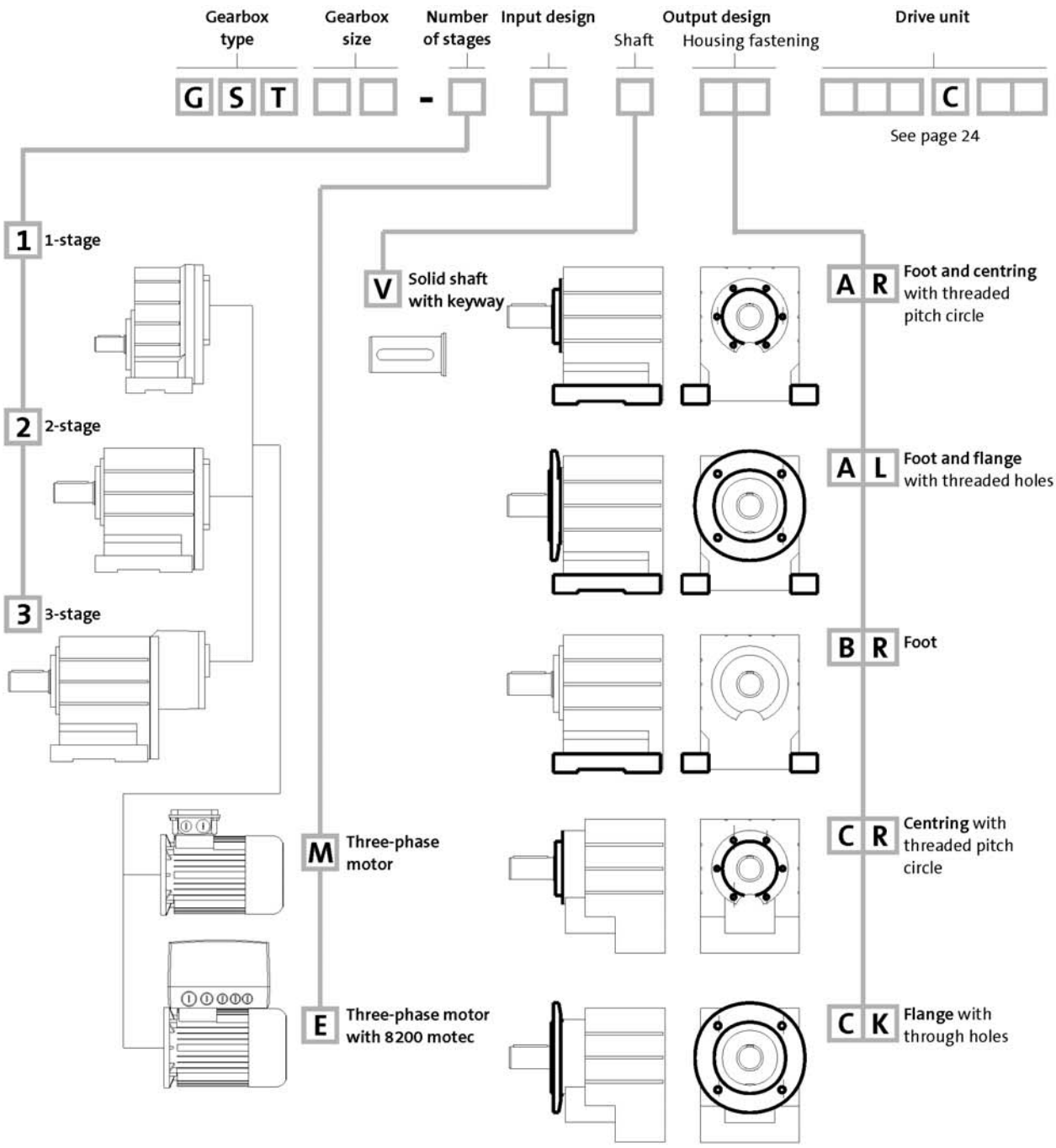
Three-phase AC motors

Contents | L-force geared motors

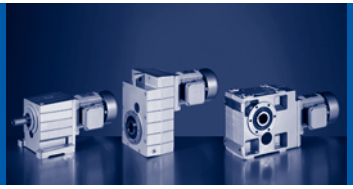
Three-phase AC motors

Helical geared motors

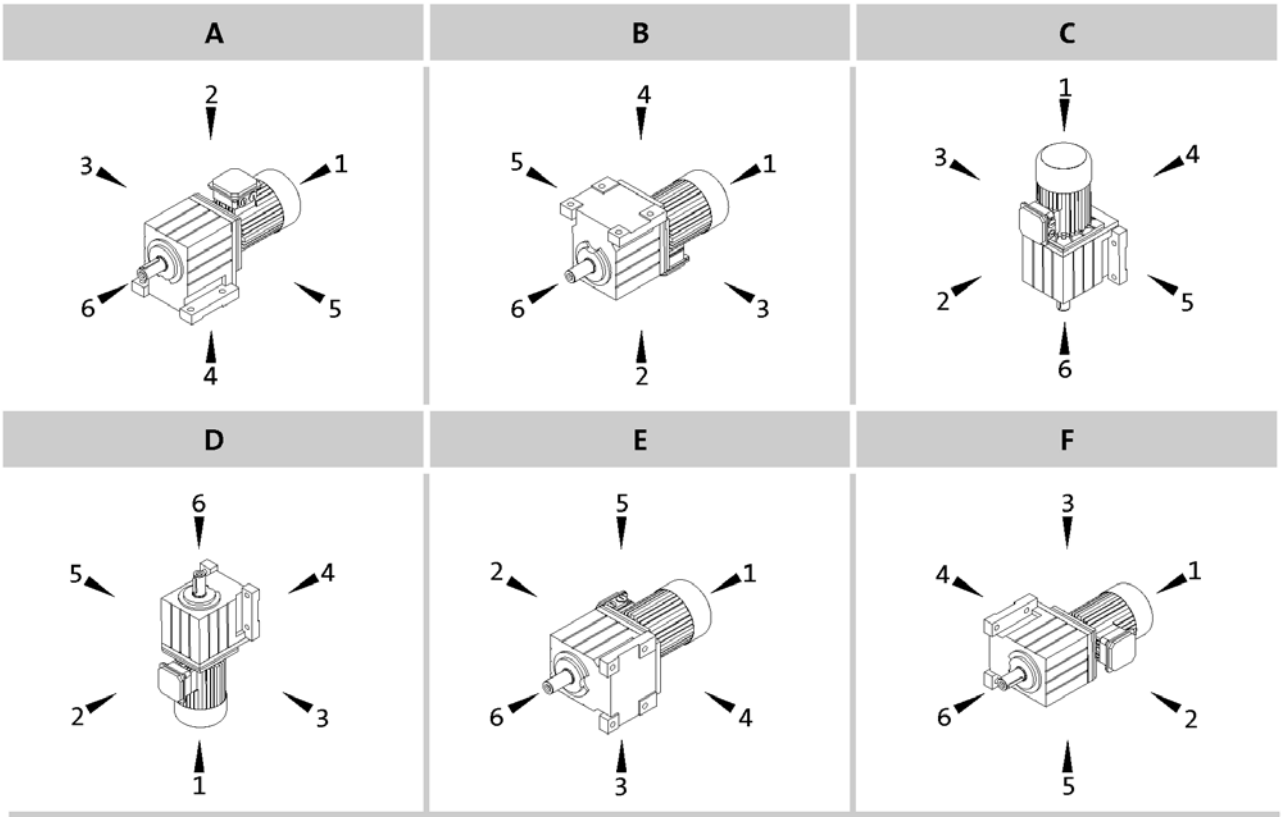


	Output design		
	V	K	L
	d x l [mm]	Øa2 [mm]	Øa2 [mm]
GST03-2	14x28	120/140/160	
	20x40	120/140/160	
GST04-1	16x32	120/140/160	
GST04-2	20x40	120/140/160	120/140
GST05-1	20x40	120/140/160/200	
GST05-2/3	25x50	120/140/160/200	120/140/160
GST06-1	25x50	160/200	

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



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



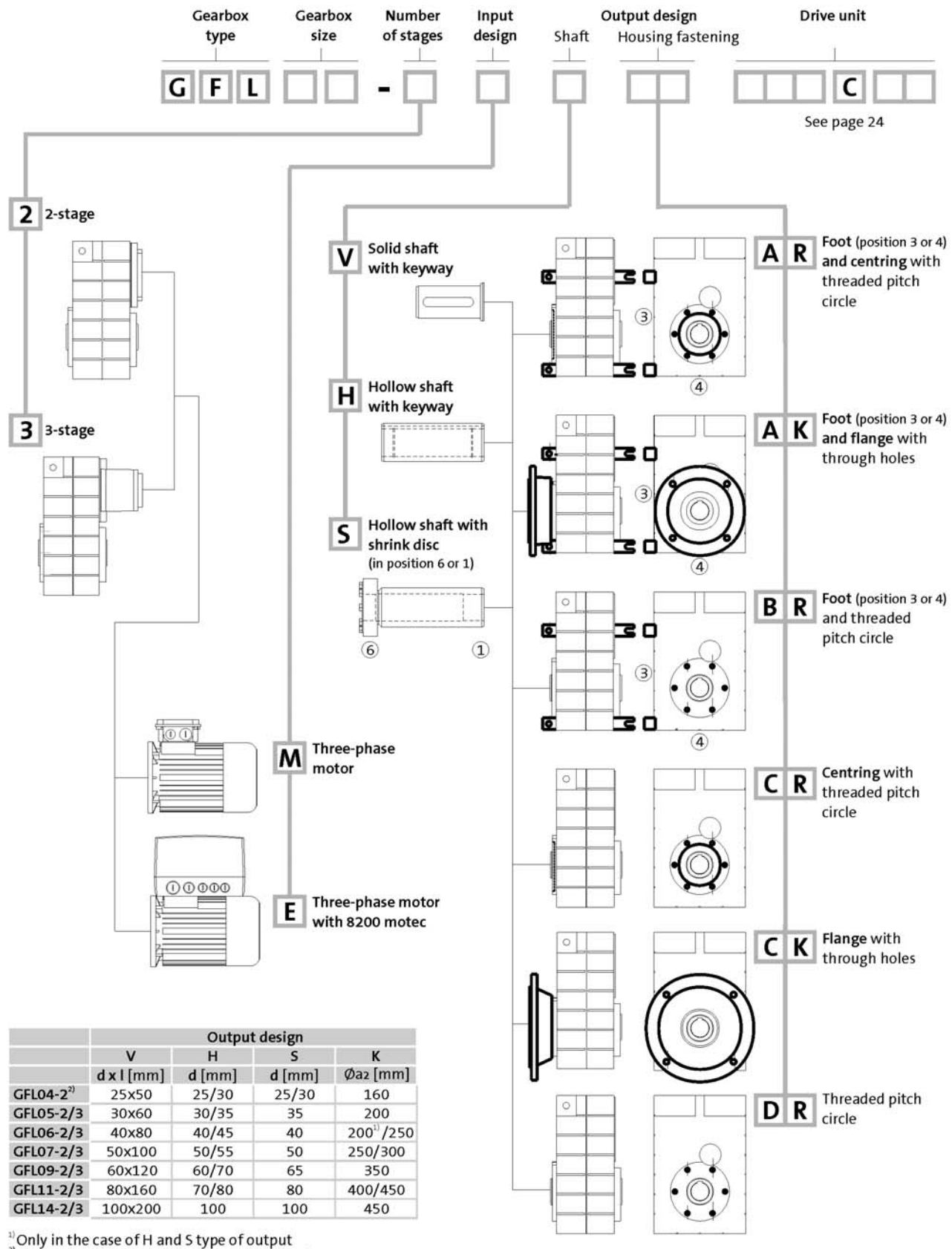
Terminal box / motec: 2, 3, 4, 5

Gearbox designs

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

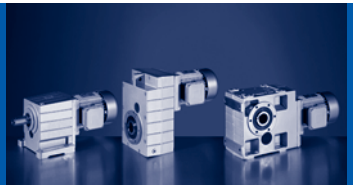
Options	
Surface and corrosion protection	OKS-G (primer: grey) for GST03-2 OKS-S (special paint according to RAL) OKS-M (special paint according to RAL) OKS-L (special paint according to RAL)
Lubricant	CLP HC 320 (synthetic) CLP HC 220 USDA H1 (synthetic)
Shaft sealing rings	Driven shaft: Viton
Bearings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

Shaft-mounted helical geared motors

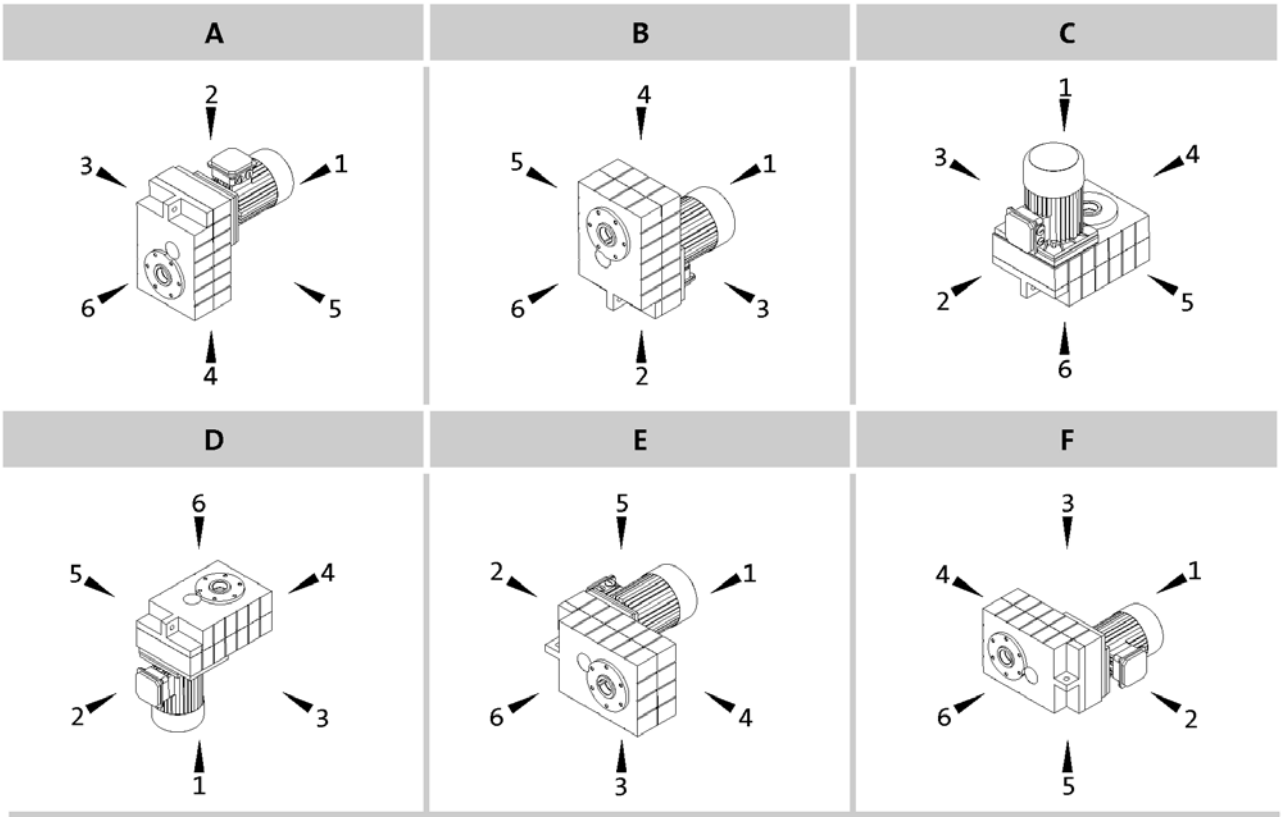


	Output design			
	V	H	S	K
	d x l [mm]	d [mm]	d [mm]	Øa2 [mm]
GFL04-2[2]	25x50	25/30	25/30	160
GFL05-2/3	30x60	30/35	35	200
GFL06-2/3	40x80	40/45	40	200[1]/250
GFL07-2/3	50x100	50/55	50	250/300
GFL09-2/3	60x120	60/70	65	350
GFL11-2/3	80x160	70/80	80	400/450
GFL14-2/3	100x200	100	100	450

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



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



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

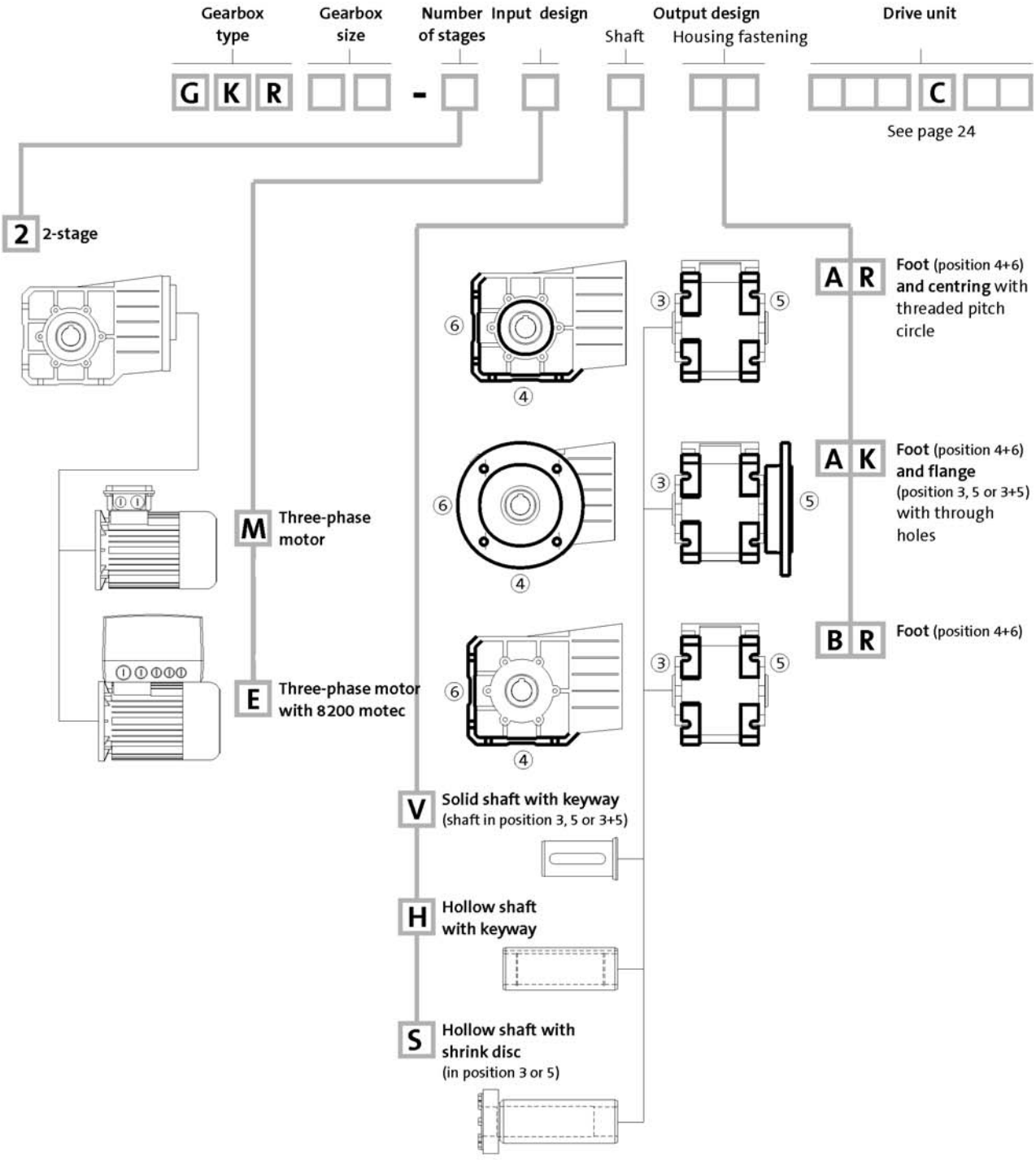
Without foot: 0
Foot: 3, 4
Terminal box / motec: 2, 3, 4, 5

Gearbox designs

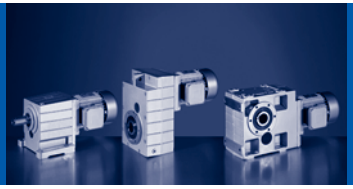
Basic versions	
Motor efficiency	Standard efficiency Increased efficiency (IE2)
Surface and corrosion protection	OKS-G (primer: grey) OKS-S (paint: RAL 7012)
Lubricant	CLP 460 (mineral)
Ventilation	Oil control plugs for GFL05 ... 14 Breather elements for GFL06 ... 14

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

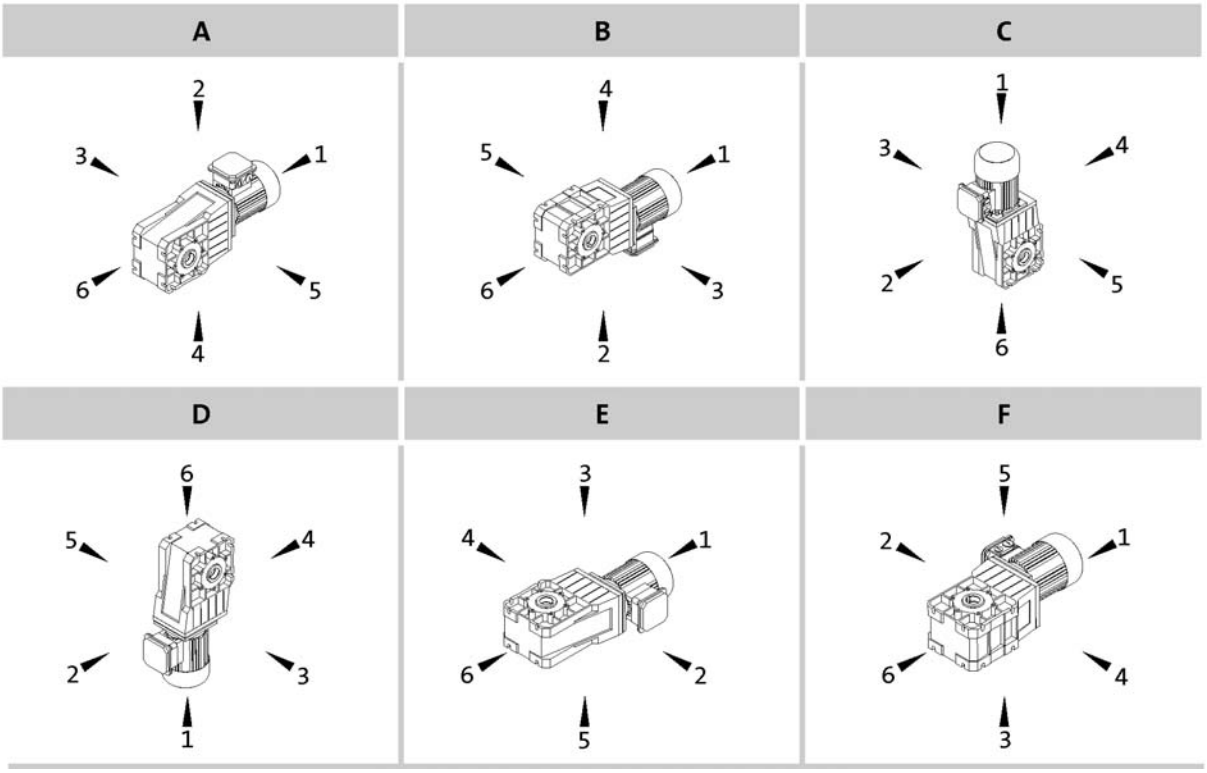
Bevel geared motors



	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



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



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

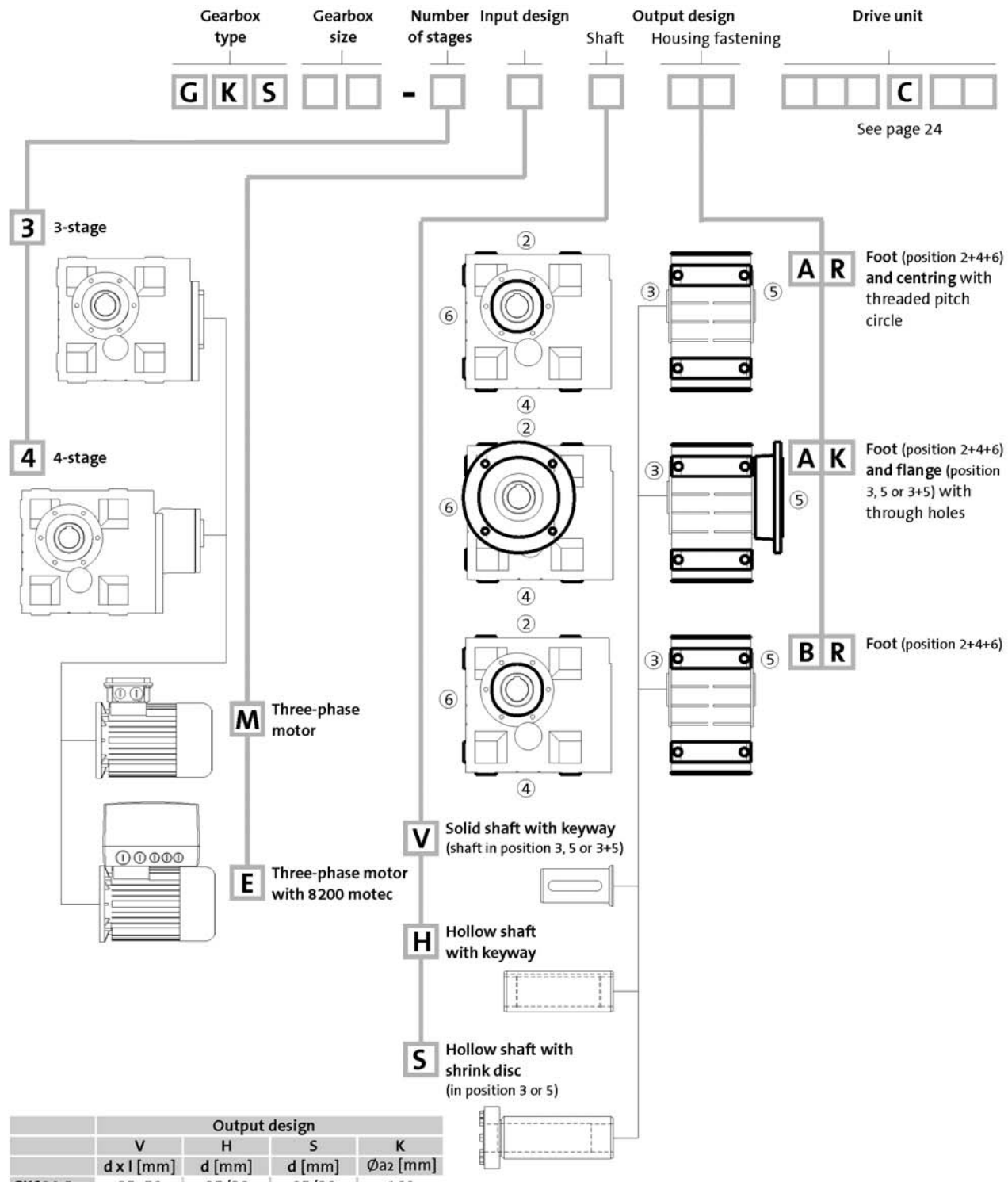
Without flange: 0
Flange: 3, 5, 8 (3+5)
Terminal box / motec: 2, 3, 4, 5

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

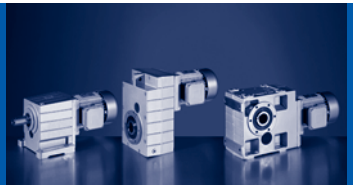
Options	
Surface and corrosion protection	OKS-G (primer: grey) OKS-S (special paint according to RAL) OKS-M (special paint according to RAL) OKS-L (special paint according to RAL)
Lubricant	CLP HC 320 (synthetic) CLP HC 220 USDA H1 (synthetic)
Shaft sealing rings	Driven shaft: Viton
Accessories	Rubber 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)

Helical-bevel geared motors

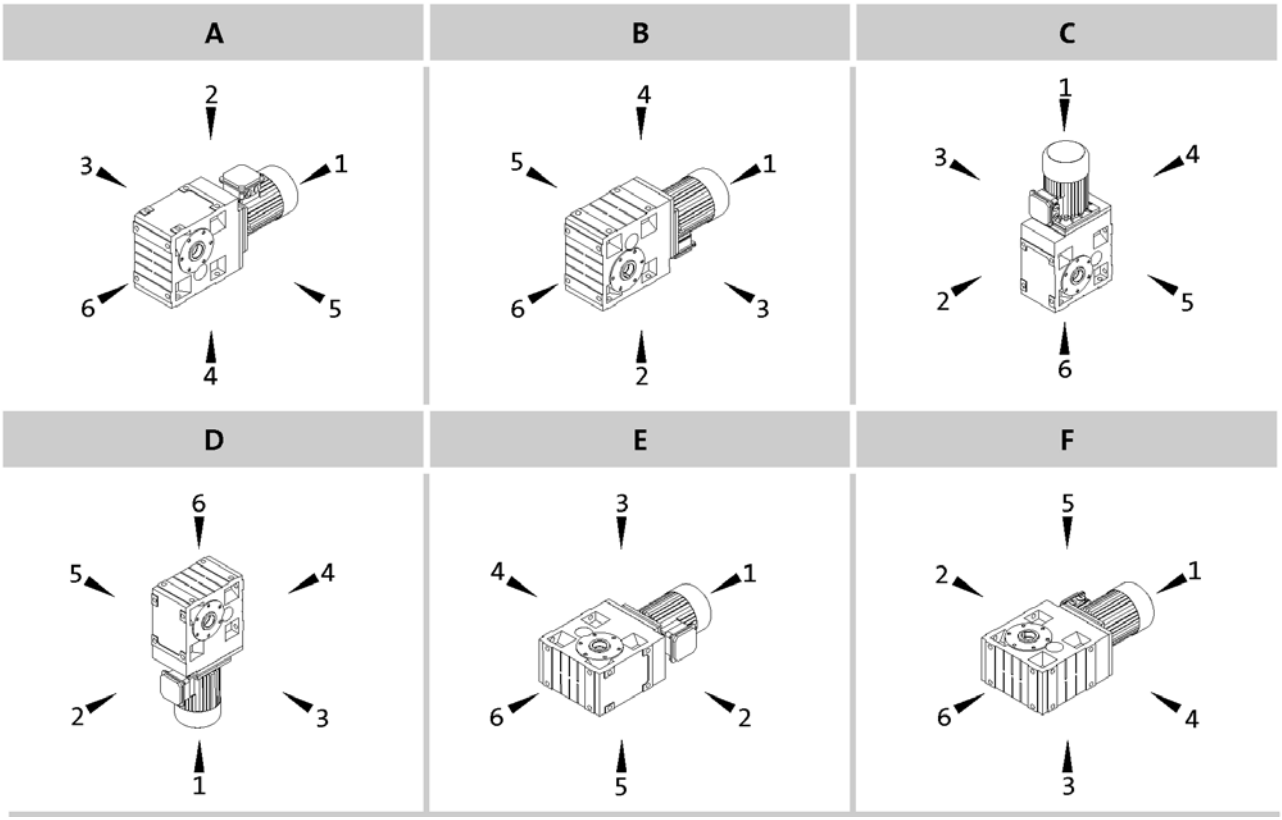


	Output design			
	V	H	S	K
	d x l [mm]	d [mm]	d [mm]	Øa_2 [mm]
GKS04-3	25x50	25/30	25/30	160
GKS05-3/4	30x60	30/35	35	200
GKS06-3/4	40x80	40/45	40	200[1]/250
GKS07-3/4	50x100	50/55	50	250/300
GKS09-3/4	60x120	60/70	65	350
GKS11-3/4	80x160	70/80	80	400/450
GKS14-3/4	100x200	100	100	450

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



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



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

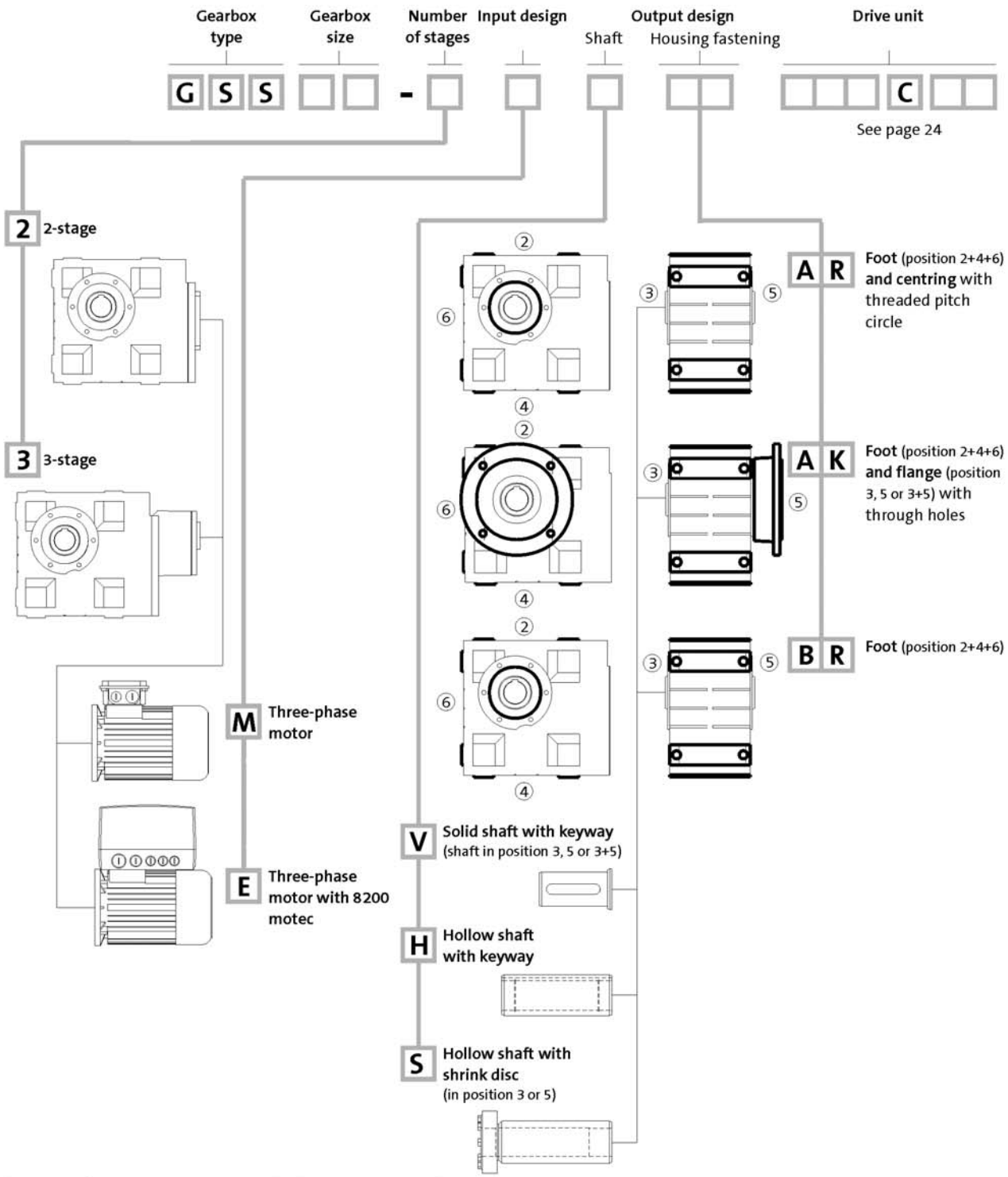
Without flange: 0
Flange: 3, 5, 8 (3+5)
Terminal box / motec: 2, 3, 4, 5

Gearbox designs

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

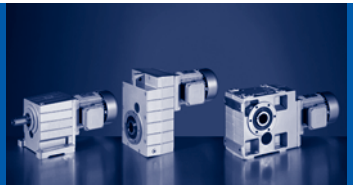
Options	
Surface and corrosion protection	OKS-S (special paint according to RAL) OKS-M (special paint according to RAL) OKS-L (special paint according to RAL)
Lubricant	CLP HC 320 (synthetic) CLP HC 220 USDA H1 (synthetic)
Shaft sealing rings	Driven shaft: Viton
Ventilation	Breather elements for GKS05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

Helical-worm geared motors

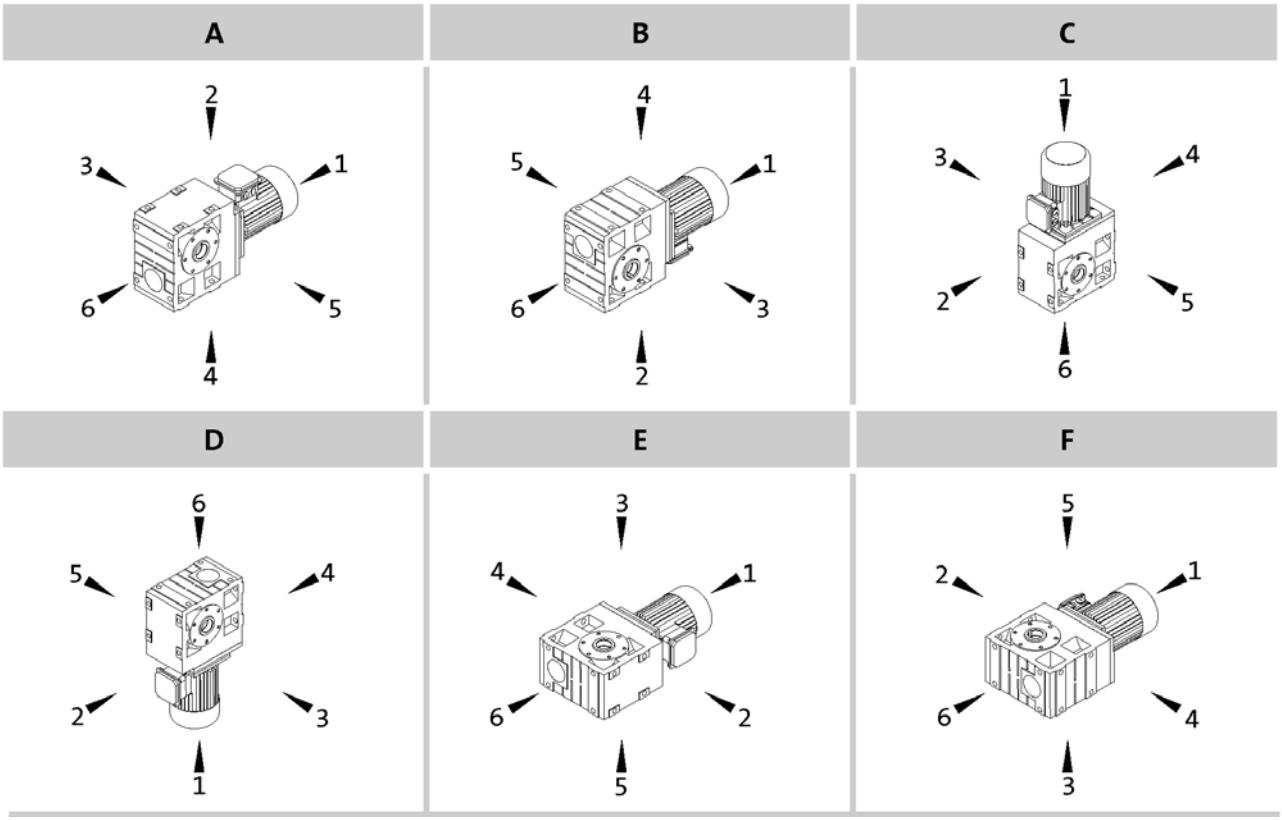


	Output design			
	V	H	S	K
	d x l [mm]	d [mm]	d [mm]	Øa2 [mm]
GSS04-2	25x50	25/30	25/30	160
GSS05-2/3	30x60	30/35	35	200
GSS06-2/3	40x80	40/45	40	200[1] /250
GSS07-2/3	50x100	50/55	50	250/300

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



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



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

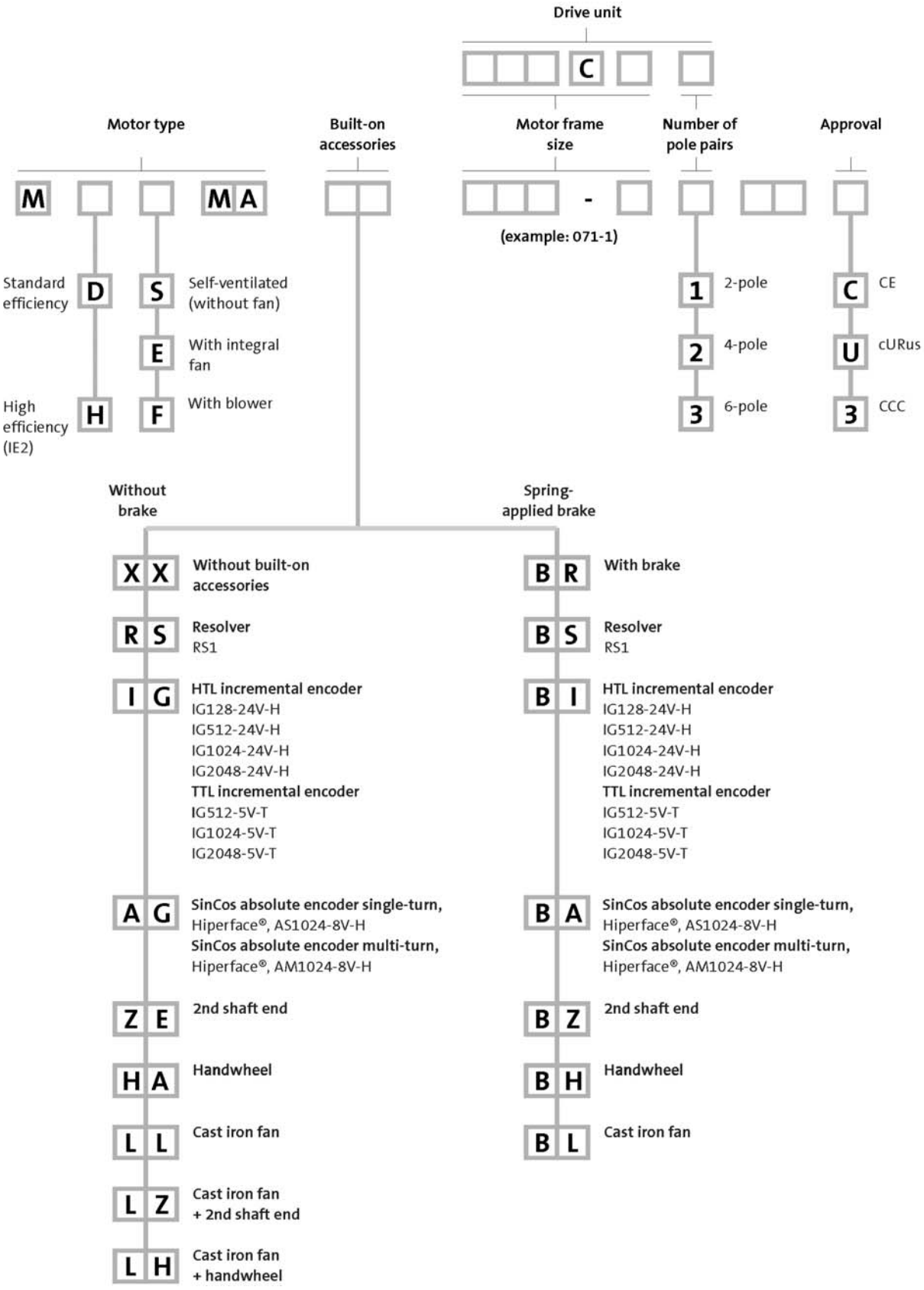
Without flange: 0
Flange: 3, 5, 8 (3+5)
Terminal box / motec: 2, 3, 4, 5

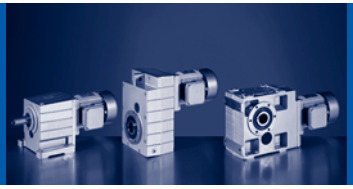
Gearbox designs

Basic versions	
Motor efficiency	Standard efficiency Increased efficiency (IE2)
Surface and corrosion protection	OKS-G (primer: grey) OKS-S (paint: RAL 7012)
Lubricant	CLP PG 460 (synthetic)
Ventilation	Oil control plugs for GSS05 ... 07 Breather elements for GSS05 ... 07

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

Three-phase AC motors





Geared motors

Our quality standards in terms of development, material selection, production and assembly satisfy the strict requirements of a durable drive system. The distinctive design – cubic and compact – integrates seamlessly into the modern industrial landscape.

Geared motor power range
Lenze geared motors are available in a power range from 0.06 to 45 kW.
In the power range from 0.75 to 45 kW the geared motors are also available with the increased motor efficiency of efficiency class IE2.

Operational reliability for use in industrial applications
Even under harsh operating conditions, the reliability of the motors is ensured by
- insulation class F
- IP55
- Scalable packages of measures for surface and corrosion protection

Motor options
- Spring-applied brake
- Blower
- Thermal contact variants
- Connectors
- Feedback systems
- Increased centrifugal mass
- Handwheel
- Second shaft end
- Protection cover
- UL/CSA approval: cURus
- CCC approval

Drive controller compatibility
The double-enamelled wire winding with additional phase insulation provides extremely high dielectric strength and has excellent mechanical resistance.
For decentralised applications, the geared motors are available with a frequency inverter directly mounted on the motor.

Compact
The modular concept and the high power density due to ground gears with optimised teeth profiles make extremely compact designs possible.

Adaptable and compatible
Lenze geared motors can be adapted to almost any drive task, thanks to the variety of input- and output-end designs that are available.

Easy to integrate
Highly functional housings enable Lenze gearboxes to be integrated into the machine environment easily.

Quiet
Optimised geometry of the gear teeth minimises noise generation.

Closely stepped output speed
The large ratio ranges of the gearboxes combined with the small ratio step φ = 1.12 enable the required output speed to be selected with precision.

Reduced backlash
The two-stage basic concept (three-stage helical-bevel gearboxes), low-backlash connections and the high quality of the teeth (due to precision manufacturing) result in reduced output backlash in comparison with similar gearboxes.

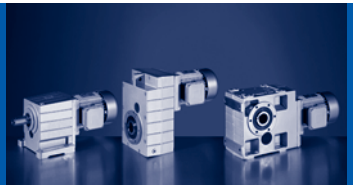
Efficient
The comparatively high efficiency of the gearboxes, in conjunction with the efficient three-phase motors of efficiency class IE2, ensure a uniformly efficient drive system. In this way, all the energy saving potential is exploited.

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.



$\eta_{100\,\%}$	[%]	Efficiency
$\eta_{75\,\%}$	[%]	Efficiency
η_a		Efficiency
$\eta_{c=1}$		Efficiency
cos φ		Power factor
f_N	[Hz]	Rated frequency
$f_{in,max}$	[Hz]	Max. input frequency
f_{max}	[kHz]	Limit frequency
f_{max}	[kHz]	Max. switching frequency
$F_{ax,max}$	[N]	Max. axial force
$F_{rad,max}$	[N]	Max. radial force
H_{max}	[m]	Site altitude
$I_{in,max}$	[A]	Max. input current
I_{max}	[A]	Max. current
$I_{N,\Delta}$	[A]	Rated current
$I_{N,Y}$	[A]	Rated current
I_a / I_N		Starting current
J	[kgcm²]	Moment of inertia
m	[kg]	Mass
M_2	[Nm]	Output torque
M_a	[Nm]	Starting torque
M_B	[Nm]	Braking torque
M_b	[Nm]	Stalling torque
M_k	[Nm]	Rated torque
M_{max}	[Nm]	Max. torque
M_N	[Nm]	Rated torque
n_2	[r/min]	Output speed
n_{max}	[r/min]	Max. speed
n_N	[r/min]	Rated speed

P_{in}	[kW]	Coil power
P_{max}	[kW]	Max. power input
P_N	[kW]	Rated power
Q_{BW}	[MJ]	Friction energy
Q_E	[KJ]	Maximum switching energy
R	[Ω]	Insulation resistance
$S_{hü}$	[1/h]	Transition operating frequency
T	[°C]	Operating temperature
t_1	[ms]	Engagement time
t_{11}	[ms]	Delay time
t_{12}	[ms]	Rise time
t_2	[ms]	Disengagement time
T_{max}	[°C]	Max. reset temperature
T_{min}	[°C]	Min. reset temperature
$T_{opr,max}$	[°C]	Max. ambient operating temperature
$T_{opr,min}$	[°C]	Min. ambient operating temperature
$t_ü$	[ms]	Overexcitation time
$U_{in,max}$	[V]	Max. input voltage
U_{max}	[V]	Max. mains voltage
U_{min}	[V]	Min. mains voltage
$U_{N,\Delta}$	[V]	Rated voltage
$U_{N,Y}$	[V]	Rated voltage
Z_{ro}	[Ω]	Rotor impedance
Z_{rs}	[Ω]	Impedance
Z_{so}	[Ω]	Stator impedance

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

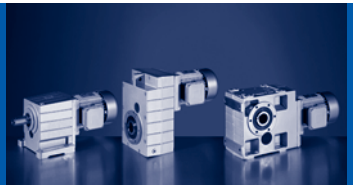
We want to be sure that you receive the correct products in good time.

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 data such as delivery date and delivery address

Ordering procedure
Please use the ordering information checklist to ensure that you provide all the order 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 sales offices can be found at the end of this catalogue.



☐ **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

Helical geared motors

Customer No. ☐☐☐☐☐☐☐☐

Job No. ☐☐☐☐☐☐☐☐☐☐

Page __

Quantity ☐☐☐

1

Efficiency class ☐ Standard efficiency ☐ High efficiency (IE2)

Rated frequency ☐ 50 Hz ☐ 60 Hz ☐ 87 Hz

Ratio i ☐☐☐

GST ☐☐ – ☐ 1 / 2 / 3 ☐ M / E ☐ V

Solid shaft d = (only with GST03) ☐☐ mm

☐ A / B / C ☐ R / K / L

Flange a_2 = ☐☐ mm

Motor frame size ☐☐☐C☐☐

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

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

Surface and corrosion protection

GST03 ☐ Without OKS (unpainted)

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

Options

Special lubricants

☐ CLP HC 320 (synthetic)

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

Surface and corrosion protection

☐ OKS-S (small)

☐ OKS-M (medium) RAL ☐☐☐☐

☐ OKS-L (high)

☐ OKS-G (primed) only with GST03

Output shaft bearing

☐ Reinforced bearing for GST04 ... 09-2

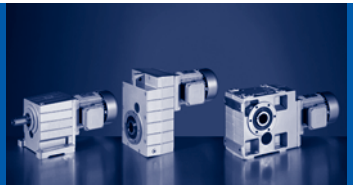
Shaft sealing rings

☐ Viton

Breathing

☐ Breather elements for GST05

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



Shaft-mounted helical geared motors

Customer No. ☐☐☐☐☐☐☐☐

Job No. ☐☐☐☐☐☐☐☐☐☐

Page __

Quantity ☐☐☐

Efficiency class ☐ Standard efficiency ☐ High efficiency (IE2)

Rated frequency ☐ 50 Hz ☐ 60 Hz ☐ 87 Hz

Ratio i ☐☐☐

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

Motor frame size ☐☐☐C☐☐

Hollow shaft d = ☐☐ mm

Flange a_2 = ☐☐ mm

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

Position of system blocks

Shaft/shrink disc 0 ☐ 6 ☐ 1 ☐

Foot 0 ☐ 3 ☐ 4 ☐

Terminal box 2 ☐ 3 ☐ 4 ☐ 5 ☐

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

Options

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

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

Accessories ☐ Rubber buffer for torque support ☐ Mounting set for hollow-shaft circlip ☐ Hollow shaft cover, hoseproof

Shaft sealing rings ☐ Viton

Breathing ☐ Breather elements for GFL05 ☐ Compensation reservoir in mounting position for GFL09 ... 14-2

Bevel geared motors

Customer No. ☐☐☐☐☐☐☐☐

Job No. ☐☐☐☐☐☐☐☐☐☐

Page __

Quantity ☐☐☐

1

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)

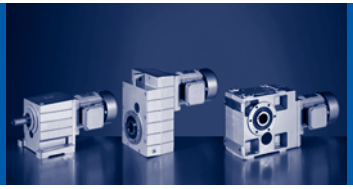
Options

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)
RAL ☐☐☐☐
☐ OKS-L (high)
☐ OKS-G (primed)

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



Helical-bevel geared motors

Customer No. ☐☐☐☐☐☐☐☐

Job No. ☐☐☐☐☐☐☐☐☐☐

Page __

Quantity ☐☐☐

Efficiency class ☐ Standard efficiency ☐ High efficiency (IE2)

Rated frequency ☐ 50 Hz ☐ 60 Hz ☐ 87 Hz

Ratio i ☐☐☐

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

Motor frame size ☐☐☐C☐☐

Hollow shaft d = ☐☐ mm

Flange a_2 = ☐☐ mm

Mounting position ☐A ☐B ☐C ☐D ☐E ☐F

Position of system blocks

Shaft/shrink disc: ☐0 ☐3 ☐4 ☐8

Flange: ☐0 ☐3 ☐5 ☐8

Terminal box: ☐2 ☐3 ☐4 ☐5

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

Options

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

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

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

Shaft sealing rings ☐ Viton

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

Helical-worm geared motors

Customer No. ☐☐☐☐☐☐☐☐

Job No. ☐☐☐☐☐☐☐☐☐☐

Page __

Quantity ☐

1

Efficiency class ☐ Standard efficiency ☐ High efficiency (IE2)

Rated frequency ☐ 50 Hz ☐ 60 Hz ☐ 87 Hz

Ratio i ☐

GSS ☐☐ – 2 / 3 M / E V / H / S A / B R / K

Motor frame size ☐☐☐C☐☐

Hollow shaft d = ☐ mm

Flange a_2 = ☐ mm

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

Position of system blocks

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

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

Options

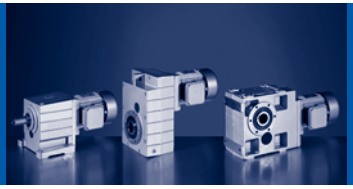
Special lubricants ☐ CLP HC 220 USDA H1 (for the food industry)

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

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

Shaft sealing rings ☐ Viton

Breathing ☐ Breather elements for GSS05



Three-phase AC motors options

Customer No. ☐☐☐☐☐☐☐☐

Job No. ☐☐☐☐☐☐☐☐☐☐

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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)

Customer No. ☐☐☐☐☐☐☐☐

Job No. ☐☐☐☐☐☐☐☐☐☐

Page __

1

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 180C32

☐ Δ; 400V-50Hz; 480V-60Hz ☐ Y/Δ; 400/230V-50Hz; 480/277V-60Hz (-/400V-87Hz possible in operation with frequency inverter)

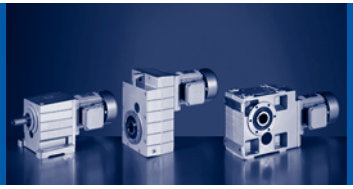
☐ Protection cover

☐ 2nd shaft end

☐ Handwheel

☐ Increased centrifugal mass

☐ 2nd nameplate (adhesive nameplate/metal nameplate)



The selection tables shown the available combinations of gearbox type, number of stages, ratio and motor. The following legend indicates the structure of the selection tables.

Gearbox type
Helical gearbox GST
Shaft-mounted helical gearbox GFL
Bevel gearbox GKR
Helical-bevel gearbox GKS
Helical-worm gearbox GSS

Efficiency class of the motor MD□MA (IE1) : Standard efficiency MH□MA (IE2) : High efficiency

GST
GST [Nm] - MD□MA (IE1)

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

50 Hz: P_N=0.12 kW
60 Hz: P_N=0.145 kW
87 Hz: P_N=0.21 kW

Rated speed n_N of the drive motor

Product key of geared motor

n_N	1425 r/min		1725 r/min		2535 r/min		M_2 [Nm]	i		
f_N	50 Hz		60 Hz		87 Hz					
P_N	0.12 kW		0.145 kW		0.21 kW					
	n_2 [r/min]	c	n_2 [r/min]	c	n_2 [r/min]	c				
	636	5.4	770	5.1	1132	4.5	2	2.240	GST04-1M□□□063C12	216
	499	5	604	4.8	887	4.2	2	2.857	GST04-1M□□□063C12	216

Output speed n_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

Output torque M_2 (constant for all listed frequencies)

Ratio i

Page number for dimensions

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

Motor voltages

The power values and torques indicated in the selection tables relate to the following motor voltages:

- 50 Hz : Δ 230 V / Y 400 V
- 60 Hz : Δ 277 V / Y 480 V
- 87 Hz : Δ 400 V

Operation at 87 Hz

During 87 Hz operation, the three-phase motor, which is designed for a voltage of Δ 230 V / Y 400 V at 50 Hz, is operated connected to a frequency inverter with a rated voltage of 400 V in a delta connection. Please note that the inverter must be designed for 87 Hz operation.
The advantages compared to operation at 50 Hz are as follows:

- The setting range of the motor is increased by a factor of 1.73.
- Power which is higher by a factor of approximately 1.73 can be obtained from the motor. As a result, a smaller, less expensive motor can, where appropriate, be chosen for the application.
- The efficiency of the motor is also improved.

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

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

Gearbox type	Gearbox size	Ratio i
GST helical gearbox	07, 09, 11, 14	≤ 10
GFL shaft-mounted helical gearbox	07, 09, 11, 14	≤ 16
GKS helical-bevel gearbox	07, 09, 11, 14	≤ 25

Possible ways of extending the application area

- Synthetic lubricant (option)
- Shaft sealing rings made from FP material/Viton (option)
- Reduction in lubricant quantity
- Cooling of the geared motor by means of air convection on the machine/system

Load capacity and application factor

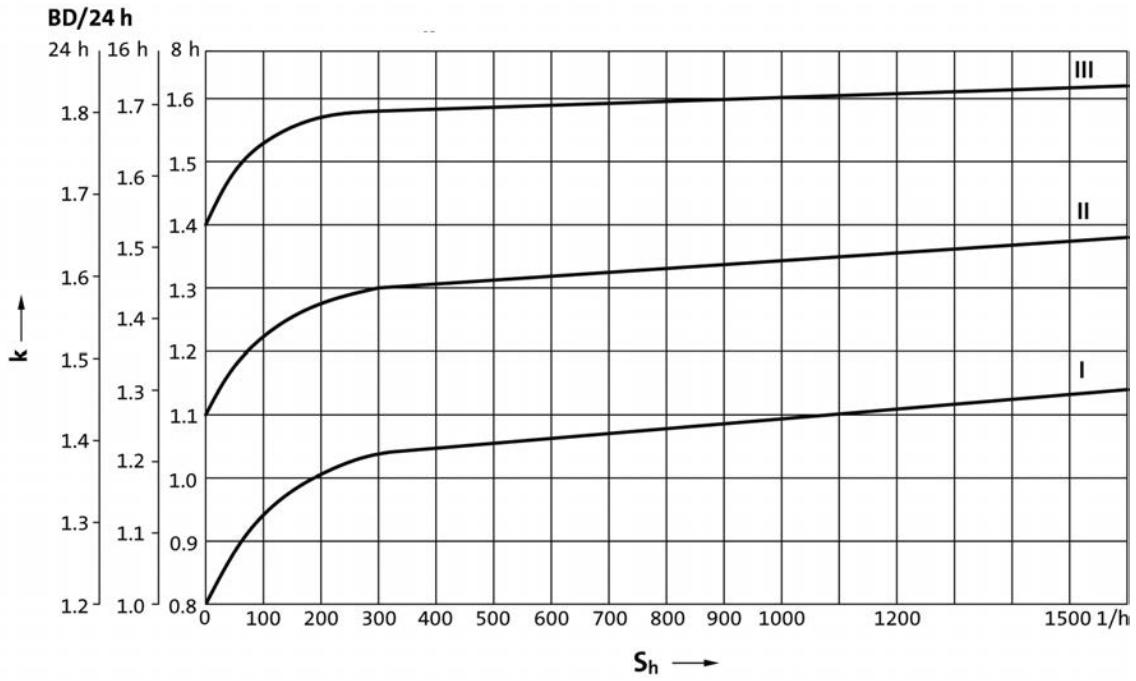
Load capacity c of gearbox
Rated value for the load capacity of Lenze geared motors.

- 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:

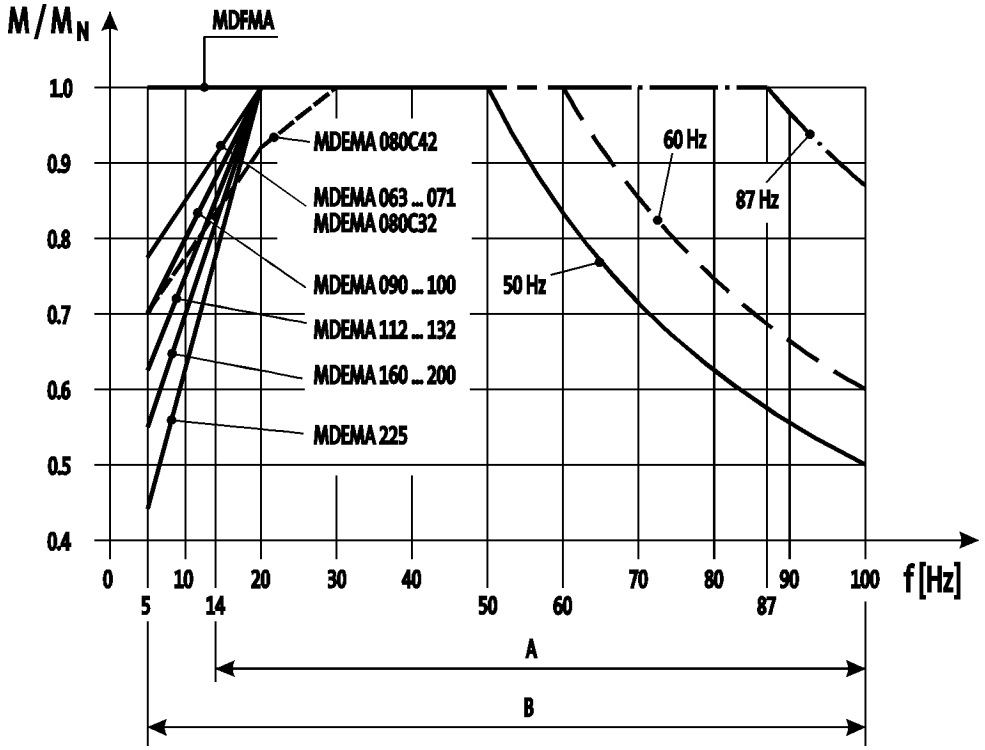
- The type of load
- The load intensity
- Temporal influences

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



Torque derating at low motor frequencies

Torque reduction depending on motor frame size taking into account the thermal behaviour when operated with a frequency inverter.



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

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

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.

General data

Gearbox type	GST	GFL	GKR	GKS	GSS
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				Case-hardened steel, bronze (worm gear only)
Shaft-hub joint	1st stage/prestage/helical (bevel) gearbox: Friction-type connection Output stage (= 2nd, 3rd or 4th stage): Friction-type or positive-fit connection				
Shaft sealing rings					
Design	With dust lip				
Material	NB / FP				
Bearing					
Design	Ball bearing / tapered-roller bearing depending on size and design				
Lubricants					
Standard	DIN 51502				
Quantities	corresponding to mounting position (see operating instructions)				
Mechanical efficiency					
1-stage gearboxes [$\eta_{c=1}$]	0.98				
2-stage gearboxes [$\eta_{c=1}$]		0.97	0.96		0.62 ... 0.92 [1]
3-stage gearboxes [$\eta_{c=1}$]		0.95		0.95	0.64 ... 0.92 [1]
4-stage gearboxes [$\eta_{c=1}$]				0.93	
Notes					▶ Dependent on transmission ratio ▶ Housing at operating temperature and teeth run in

[1] → 714 - Efficiencies depending on ratio

Ventilation

Gearboxes without ventilation
No ventilation measures are required for the following gearboxes:

- GST03 / 04
- GFL04
- GKR03...05
- GKS04
- GSS04

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

- GST05
- GFL05
- GKS05

Gearboxes with ventilation
The following gearboxes are supplied with breather elements as standard:

- GST06...14
- GFL06...14
- GKR06
- GKS06...14
- GSS05...07

Special measures for mounting position C (motor on top)
We recommend that an oil compensation reservoir is always used with gearbox sizes G□□09...14 in this mounting position. This reservoir can be purchased as an option. For illustrations and measures according to gearbox type see under Ventilation G□□ [⊗].

It is not required at higher ratios or low input speeds. Please contact Lenze in this event.

Lubricants

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

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

Lubricant table

Designation	CLP 460	CLP PG 460	CLP HC 320	CLP HC 220 USDA H1
Gearbox type	GST / GFL / GKR / GKS	GSS	GST / GFL / GKR / GKS	GST / GFL / GKR / GKS / GSS
Ambient temperature [°C]	0 ... +40	-20 ... +40	-25 ... +50	-20 ... +40
Specification	Mineral based oil with additives	Synthetic-based oil (polyglycol)	Synthetic-based oil (synthetic hydrocarbon / poly-alpha-olefin oil)	
Note		Cannot be mixed with other oil types.		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 GH 6-460	Klübersynth GEM4-320 N	Klüberoil 4 UH1-220 N
Shell	Shell Omala 460	Shell Tivela S 460	Shell Omala Oil HD 320	

- Please contact your Lenze office if you are operating in areas with < -20 °C bzw. >ambient temperatures +40°C.
- Caution: when using the lubricant CLP HC 220 on the GSS helical-worm gearbox, the torque M_2 must be reduced to 80 % of the values stated in the catalogue!

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 installation 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).

OKS-G (primed)

Applications
- Dependent on subsequent top coat applied

Measures
- 1K primer (grey)
- Screws zinc-coated
- Stainless breather elements

Optional measures
- Stainless steel rating plate

OKS-S

Applications
- Standard applications
- Indoor installation in heated buildings
- Air humidity up to 90%

Measures
- Surface coating in accordance with corrosivity category C1 (in accordance with EN 12944-2)
- Screws zinc-coated
- Stainless breather elements

Optional measures
- Stainless steel rating plate

OKS-M

Applications
- Indoor installation in unheated buildings
- Outdoor installation in covered, protected area
- Air humidity up to 95 %

Measures
- Surface coating in accordance with corrosivity category C2 (in accordance with EN 12944-2)
- Screws zinc-coated
- Stainless breather elements

Optional measures
- Stainless steel shaft
- Stainless steel rating plate
- Rust-free shrink disc (on request)

OKS-L

Applications
- Outdoor installation
- Air humidity over 95%
- Chemical industrial plants
- Food industry

Measures
- Surface coating in accordance with corrosivity category C3 (in accordance with EN 12944-2)
- Fan 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 rating plate
- Rust-free shrink disc (on request)
- Additional priming coat on cast iron fan
- Oil expansion tank and torque plates painted separately and supplied loose

A blower cannot be used in combination with OKS-L.

Structure of surface coating

Surface and corrosion protection system	Without	OKS-G	OKS-S	OKS-M	OKS-L
Corrosivity category according to DIN EN ISO 12944-2			C1	C2	C3
Structure of the surface coating					
Dipping primer					
1K primer					
2K-EP primer					
2K-PUR top coat					
Colour		Grey	Standard: RAL 7012 Optional: According to RAL Classic		

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

Standards and operating conditions

Enclosure EN 60529			IP55
Energy efficiency class IEC 60034-30 IEC 60034-2-1			IE1 IE2 Methodology for measuring efficiency
Approval Class			CCC UkrSepro [1)] cURus GOST-R
Temperature class IEC/EN 60034-1; utilisation IEC/EN 60034-1; insulation system (enamel-insulated wire)			B F
Min. ambient operating temperature	$T_{opr,min}$	[°C]	-20
Max. ambient temperature for operation With power reduction	$T_{opr,max}$ $T_{opr,max}$	[°C] [°C]	40 60
Site altitude Amsl	H_{max}	[m]	4000

[1)] Motor frame size 225 in preparation.

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

Options

	MDSMA□□063-02 MDSMA□□063-22	MD□MA□□063-11 MD□MA□□063-12 MD□MA□□063-31 MD□MA□□063-32 MD□MA□□063-42	MD□MA□□071-11 MD□MA□□071-13 MD□MA□□071-31 MD□MA□□071-32 MD□MA□□071-33 MD□MA□□071-42
Cooling type	Naturally ventilated	Integral fan Blower	
Spring-applied brake Design	Standard or LongLife design Reduced or standard braking torque With rectifier With manual release lever Low noise		
Feedback Design	Resolver [1] Incremental encoder [1] Absolute value encoder (multi-turn) [1]		
Thermal sensor Thermal contact	TKO		
Thermal detector	KTY83-110 KTY84-130		
PTC thermistor	PTC		
Motor connection Power connection	Terminal box HAN modular connector HAN10E connector Connector ICN		
Brake connection	Terminal box HAN modular connector HAN10E connector Connector ICN		
Blower connection		Terminal box Connector ICN	
Feedback connection	Terminal box Connector ICN		
Temperature sensor connection	KTY at connector in the feedback connection Terminal box TKO or PTC at connector in the power connection		
Shaft bearings Position of the locating bearing	Non-drive end		
Bearing type	Deep-groove ball bearing with high-temperature resistant grease, 2 sealing discs or cover plates		
Colour	Primed Not coated Paint in various corrosion-protection designs in accordance with RAL colours		
Further options	Protection cover		Increased centrifugal mass Protection cover 2nd shaft end Handwheel [1]

[1] With 2-pole motors not available.

	MD□MA□□080-11 MD□MA□□080-13 MD□MA□□080-31 M□□MA□□080-32 M□□MA□□080-42 MD□MA□□080-33	MD□MA□□090-11 M□□MA□□090-12 MD□MA□□090-31 M□□MA□□090-32	M□□MA□□100-12 MD□MA□□100-31 M□□MA□□100-32 MD□MA□□100-41
Cooling type	Integral fan Blower		
Spring-applied brake Design	Standard or LongLife design Reduced, standard or increased braking torque With rectifier With manual release lever Low noise		
Feedback Design	Resolver [1] Incremental encoder [1] Absolute value encoder (multi-turn) [1]		
Thermal sensor Thermal contact Thermal detector PTC thermistor	 TKO KTY83-110 KTY84-130 PTC		
Motor connection Power connection Brake connection Blower connection Feedback connection Temperature sensor connection	 Terminal box HAN modular connector HAN10E connector Connector ICN Terminal box HAN modular connector HAN10E connector Connector ICN Terminal box Connector ICN Terminal box Connector ICN KTY at connector in the feedback connection Terminal box TKO or PTC at connector in the power connection		
Shaft bearings Position of the locating bearing Bearing type	 Non-drive end Deep-groove ball bearing with high-temperature resistant grease, 2 sealing discs or cover plates		
Colour	Primed Not coated Paint in various corrosion-protection designs in accordance with RAL colours		
Further options	Increased centrifugal mass Protection cover 2nd shaft end Handwheel [1]		

[1] With 2-pole motors not available.

	M□□MA□□112-22 MD□MA□□112-31 M□□MA□□112-32 MD□MA□□112-41	M□□MA□□132-12 MD□MA□□132-21 M□□MA□□132-22 M□□MA□□132-32
Cooling type	Integral fan Blower	
Spring-applied brake Design	Standard design Reduced, standard or increased braking torque With rectifier With manual release lever Low noise	
Feedback Design	Resolver [1] Incremental encoder [1] Absolute value encoder (multi-turn) [1]	
Thermal sensor Thermal contact	TKO	
Thermal detector	KTY83-110 KTY84-130 KTY	
PTC thermistor	PTC	
Motor connection Power connection	Terminal box HAN modular connector HAN10E connector Connector ICN	Terminal box HAN modular connector Connector ICN
Brake connection	Terminal box HAN modular connector HAN10E connector Connector ICN	Terminal box HAN modular connector Connector ICN
Blower connection		
Feedback connection	Terminal box Connector ICN	
Temperature sensor connection	KTY at connector in the feedback connection Terminal box TKO or PTC at connector in the power connection	
Shaft bearings Position of the locating bearing	Non-drive end	
Bearing type	Deep-groove ball bearing with high-temperature resistant grease, 2 sealing discs or cover plates	
Colour	Primed Not coated Paint in various corrosion-protection designs in accordance with RAL colours	
Further options	Increased centrifugal mass Protection cover 2nd shaft end Handwheel [1]	

[1] With 2-pole motors not available.

	M□□MA□□160-22 M□□MA□□160-32	M□□MA□□180-12 M□□MA□□180-32 M□□MA□□180-42	M□□MA□□225-12 M□□MA□□225-22
Cooling type	Integral fan Blower		
Spring-applied brake Design	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 HAN modular connector		Terminal box
Brake connection	Terminal box HAN modular connector		Terminal box
Blower connection	Terminal box Connector ICN		
Feedback connection	Terminal box Connector ICN		
Temperature sensor connection	KTY at connector in the feedback connection Terminal box TKO or PTC at connector in the power connection		Terminal box
Shaft bearings Position of the locating bearing	Drive end		
Bearing type	Deep-groove ball bearing with high-temperature resistant grease, 2 sealing discs or cover plates		
Colour	Primed Not coated Paint in various corrosion-protection designs in accordance with RAL colours		
Further options	Protection cover		