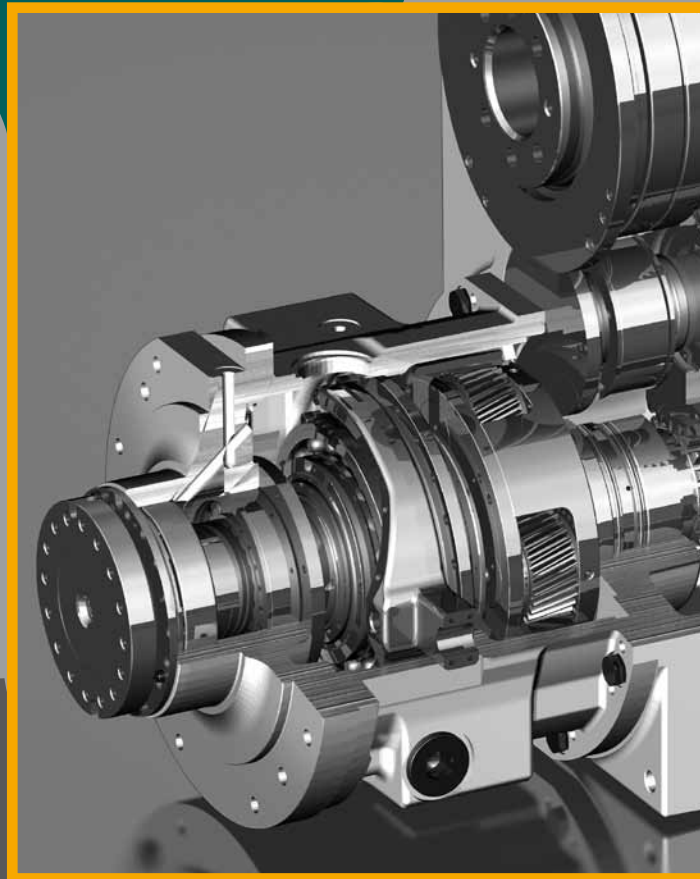


# “Shift up” to the Future

## Gearboxes for Machine Tools

2&g



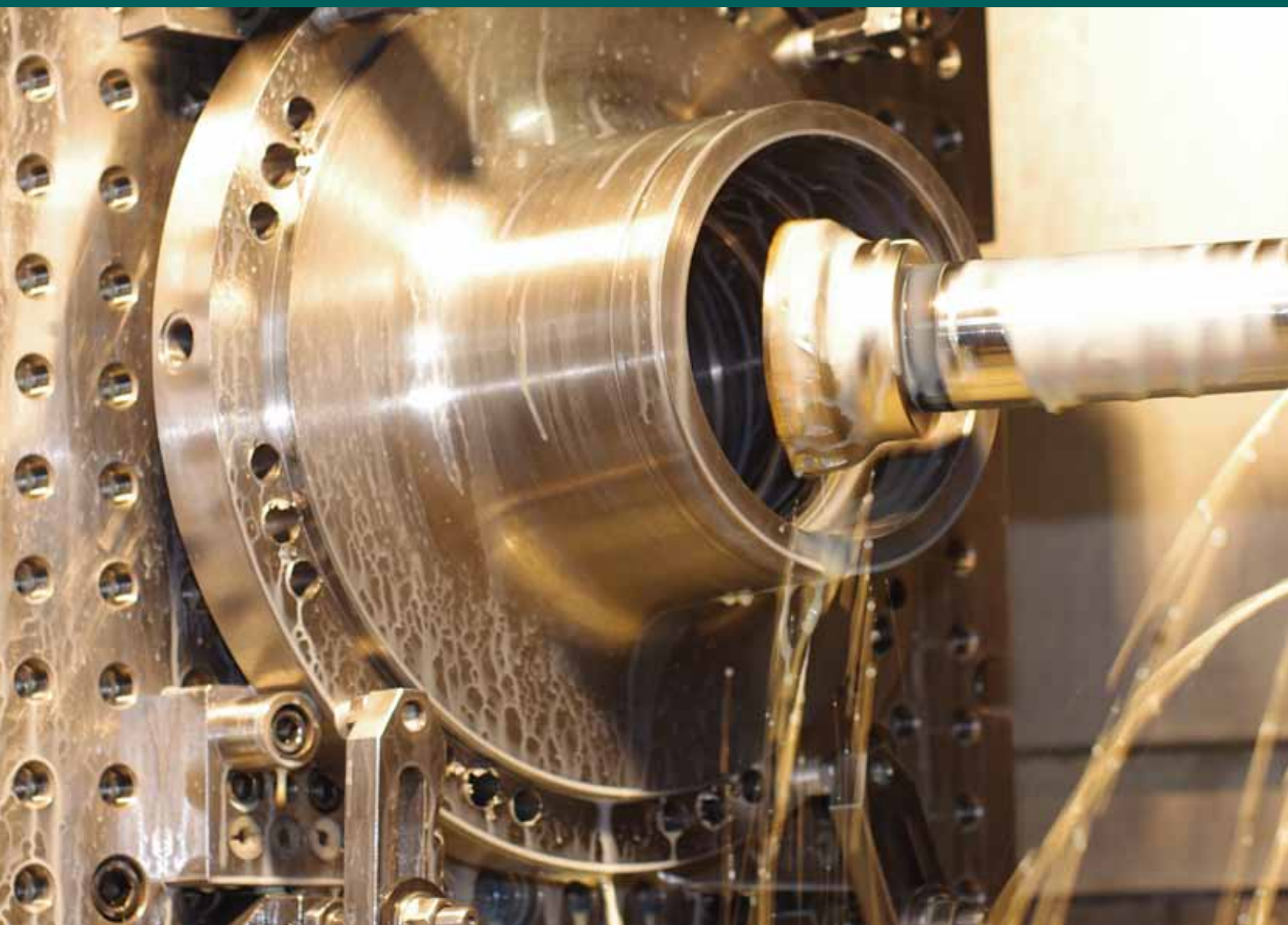
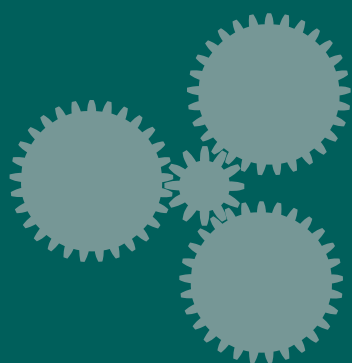
 **HEYNAU**  
GearsProductionService

Shifting Gearboxes  
Hollow Shaft Gearboxes  
Motor-Gearbox-Combinations

## “Shift up” to the Future

According to a well proven and tested principle torques are transmitted by two gear-wheels – already for more than 100 years. However, nowadays modern and highly precise applications of machine tools raised the demand for exactly manufactured, powerful gearboxes with minimized backlash.

Our two-speed gearboxes embody the modern shift up to the future in a very extraordinary and dynamic way: We remain attentive to the present development in machine tools industries, take care of the flexible adaptation of our products to recent customers’ demands and design our whole gearbox portfolio as a modular system. Thus we are able to offer our products according to customers’ individual design requests and cover multifaceted applications.



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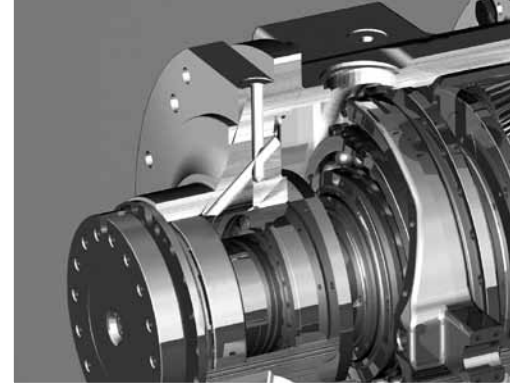
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# Two-Speed Gearboxes for Machine Tools



## Application

Two-speed-gearboxes are the very centerpiece of modern machine tools. As they all can be fully variably integrated into the machine – horizontally, vertically, with or without integrated motor – they can be applied in very different versions and designs of machine tools.

**Entirely new are our gearboxes with their yet unequalled low backlash – even in both ratios (< 2 arcmin)!**

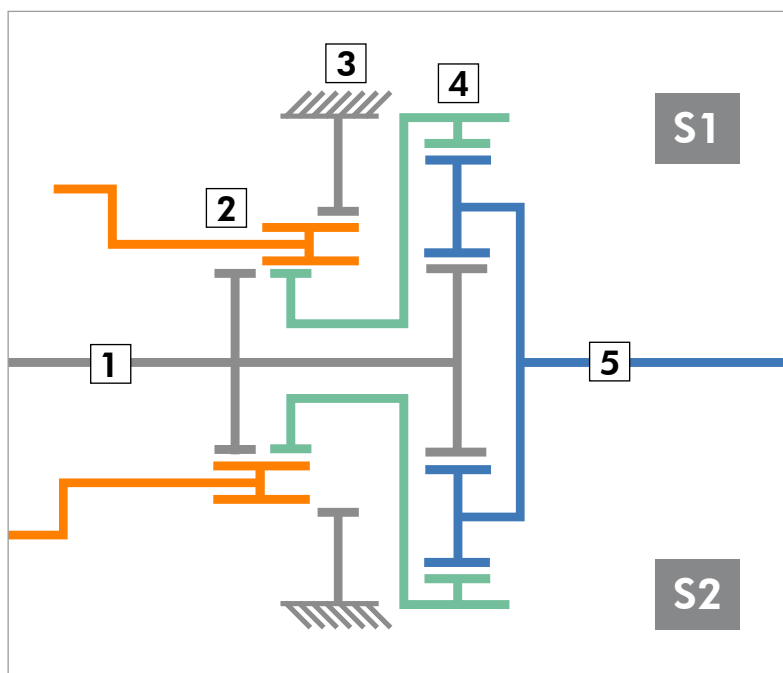
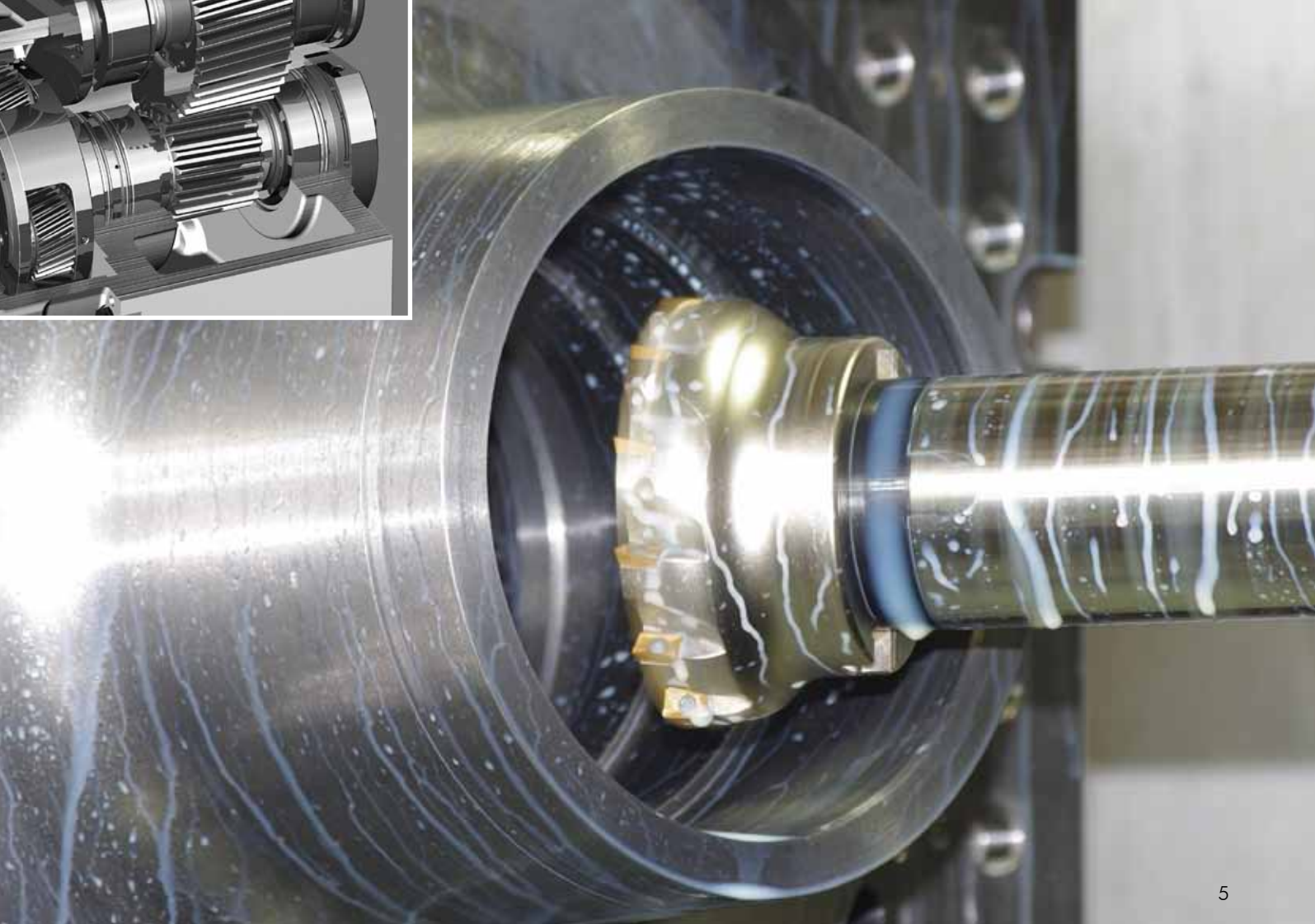
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## General Functionality of the Two Speed Gearboxes

Our two-speed gearboxes are single-stage shiftable planetary gearboxes with two gear steps. These gearboxes are particularly suitable for machine tools requiring a supremely smooth driving and a powerful output torque. A maximum torque of up to 20,000 Nm can be permitted, which is reached by the planetary gearbox and its two gear steps, regardless of its small design size. Compared to a conventionally used spur gear stage the planetary gearbox captivates by the striking advantage of the division of power to several planetary gears. Thus a very compact and highly space-saving design is possible. By the application of helical gearing a higher tooth ground safety factor and a lower noise running are reached.

We offer our two-speed gearboxes as standard in ratio 1:1 and 1:4. Other ratios are possible, too, depending on the gearbox size, e.g., 1:3.17, 1:5.0, 1:5.5 or 1:5.8. All gearboxes are provided with a neutral position in the gearshift.

The integration of the gearbox into the machine can be done by different types of input and output options.



- 1 Input shaft
- 2 Sliding sleeve
- 3 Housing
- 4 Ring gear
- 5 Output shaft

Gearbox diagram example SG 5000

## Features and Advantages

- Thanks to the modular setup of the different components of the complete series, our two speed gearbox can be applied universally in many different ways.
- Highest performance in limited space conditions: Up to 5 planetary gears per gear stage optimize the performance of the gearbox even in minimized space.
- Upkeep of the high rotation speed of the motor ( $i = 1:1$ ); increase of the input torque of the motor by the gearbox ratio (e.g., up to  $i = 1:4$ ); decrease of the speed by the same factor.
- High efficiency and constant cutting performance over a wide speed range.
- High speed in the upper ranges and high torque in the lower speed ranges, according to the adjustment range of the motor. Power and cutting performance of the respective machine are maintained during these operations.
- Low noise running regardless of high speed ranges by planetary gears with helical gearing and simultaneous gear meshing.
- Input: standard adjustment of the motor-gearbox-unit by standardized fixings at the housing of the gearbox.
- Output: Flexible usage due to various output bearings with wider bearing base and multiple options (flange, shaft, etc.).
- All versions are available with additional centring connection at the bearing housing.

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## Sizes

Generally our two-speed gearboxes are subdivided into 5 sizes and thus cover a torque range from 1 000 to 20 000 Nm at the output. The modular design of the gearboxes allows a high degree of standardization due to the repetitive use of single components and gear stages.

Additional and special sizes can be done in accordance to customers individual requests even for small volumes



## Lubrication

Depending on torque and type of application our gearboxes require different kinds of lubrication. Gearboxes of the SG series require splash lubrication, circular lubrication, circular lubrication with cooling or dry sump lubrication – depending on the installation position, torque, speed and/or application of the gearbox.

The necessary details are to be defined with the customer within the respective project to avoid damages or unnecessary cost involved.

Gearboxes of the SGH/SGR series as well as gearboxes of the SGM series always require circular lubrication with cooling.

All necessary details – e.g. the quantity of oil, the connection type etc. – are taken into consideration during the technical discussion of the actual project.

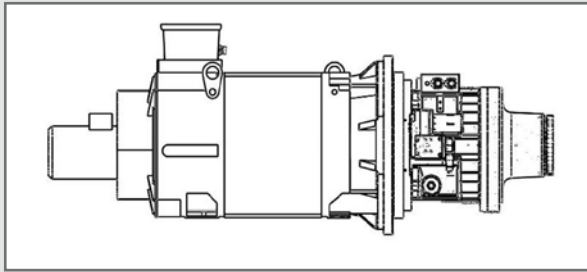
The size of the respective cooling devices for oil and water can also be managed by us with our portfolio of water and oil coolers (see p. 25).



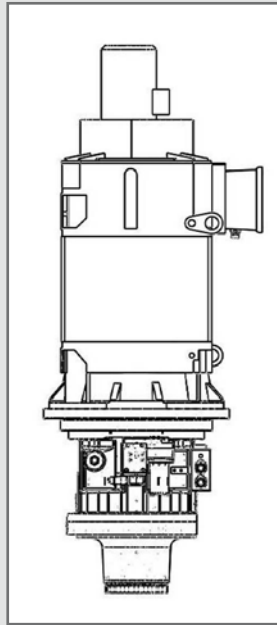
## Bearing

Under application of the permitted lateral and axial forces the lifetime of the standard bearings is 36 000 h at input and output. In case these forces are exceeded, the resulting bearing lifetime can be calculated accordingly to individual customers' application demands. Other, reinforced bearings can be supplied on request.

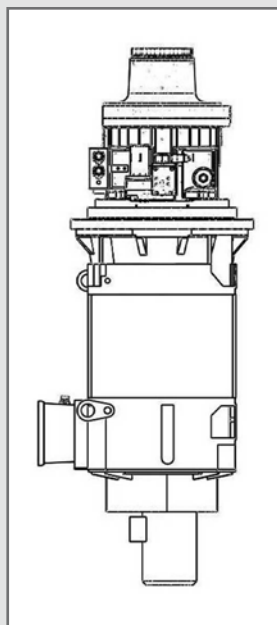
## Installation Positions



Position B5 – Horizontal



Position V1 – Vertical



Position V3 – Vertical

The gearbox have been designed for the installation positions V1, V3 and B5, so that labyrinth sealing can be applied (not in V3). The aim is to keep the heat generation as low as possible by avoiding additional friction components (radial shaft seals) and thus to reach a best possible efficiency.



# Two Speed Gearboxes SG Series

## Our Classical All-Rounder:

Nowadays, the SG-series embodies the standardized gearbox solution by its universal and reliable application in machine tools. Supreme features of the SG are its flexible modular build, the effectively minimized torsional backlash and shifting by a failsafe electromechanical worm gear unit.

High stiffness, flexible, modular design and a reliable shifting by a failsafe electromagnetic worm gear unit are supreme features of our SG series

Our gearbox stiffness is exceeded, which today is more important in modern machine tool than ever and which was a deciding factor in the concept and design of our gearboxes (exact values see under "technical data" page 14).

The shifting of the gear steps is done by an electromotor driven mechanical worm gear unit.

## The Benefits are Not Hidden in Details

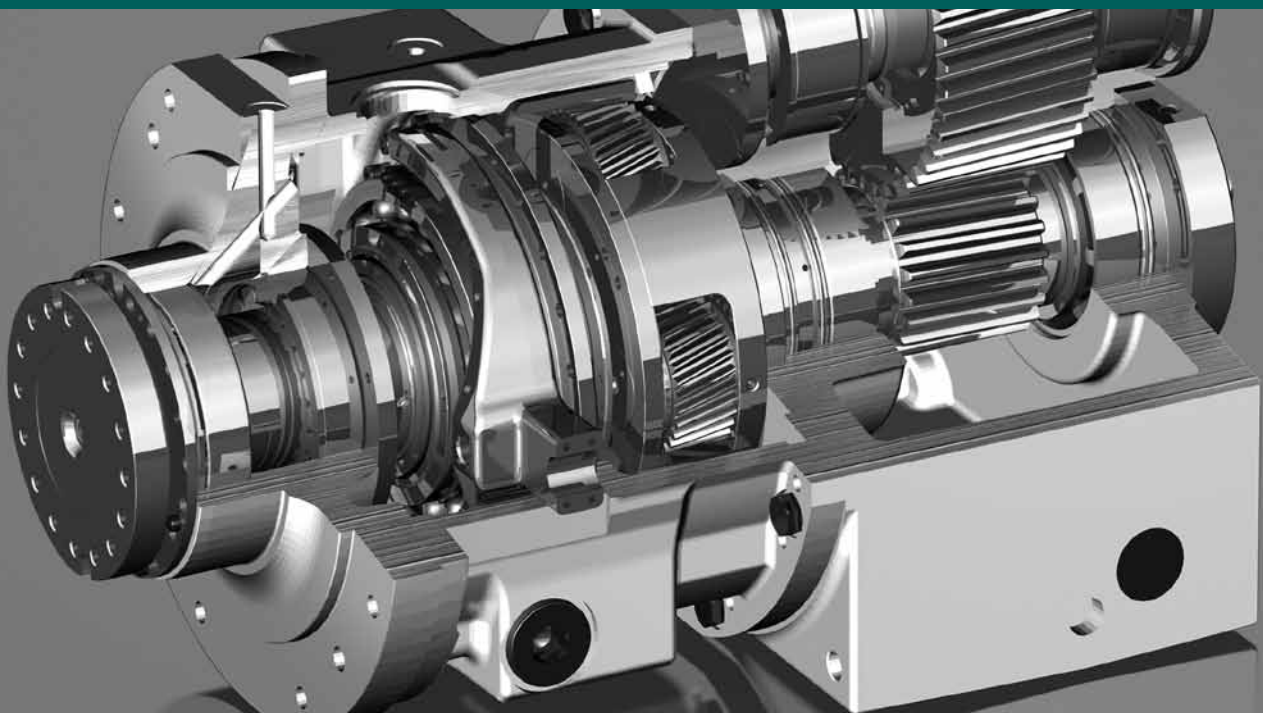
Two fixed ratios within narrowest space: The SG-series realize it!

Both torque and speed transmission are enormous under these limited space conditions. This is realized by a single-step planetary gearbox. In order to provide a smooth drive even at a very high speed, the parts have been produced according to high quality standards – providing a safe, failure-free and low-maintenance operation.

The standard series contains two ratios: 1:1, neutral position and a standard ratio 1:4 as shifted gear ratio. Further ratios can be provided, depending on the size of the respective gearbox.

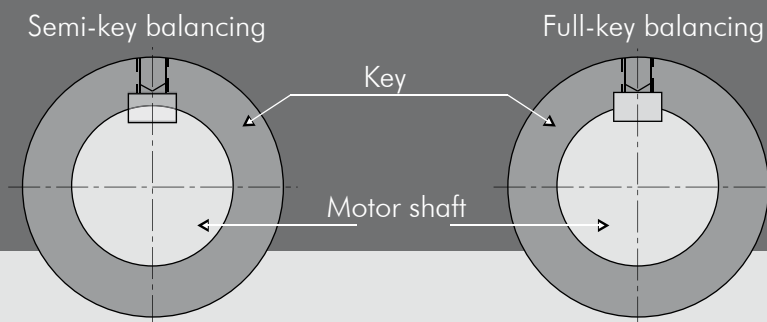
To connect the gearbox to your machine without any problems, we provide numerous connections as well for the input as for the output side. For example, you may drive the gearbox directly by a motor or by a belt pulley. The unit gearbox-motor is usually by foot mounting fixed to the base of the machine. Additionally, a fixation with centering at the housing of the bearings is available (all series).

The output can be realized in a very flexible way, too, and thus creates a broad basis and a flexible choice of different bearings for an optimal solution of any application (belt output, shaft output, with or without keyway or open (with connection by geared shaft Acc Din 5480)



## Motor Connection

- The hubs are equipped with keyway as standard  
Note: Hubs have to be balanced in accordance to the balancing of the motor.
- Full-key balancing (standard): the motor shaft is balanced with a fitted key – the hub not.
- Semi-key balancing: Please note in your order the motor details, including dimensions and balancing type, since semi-key balancing involves the filling of the keyway with a balance compensator and therefore the shape, the length and the position of the keyway have to be optimally adjusted. After the assembly the device should be rebalanced due to a tolerance-related residual imbalance.
- Straight motor shafts: Connection via a keyless hub with ring clamping elements. Please make sure that the motor shaft is provided with a centring bore and thread, according to DIN 332-2.
- Special Solutions: In case the motor cannot be mounted directly to the SG due to its connection dimensions, an adapter plate or an adapter ring may be applied.
- Note: When connecting the motor to the gearbox please follow the manufacturer's instructions by all means, since no preload support on motor B-side is permitted.



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## Input Versions

### Open version, without hub bearing and without shaft seal:

The so-called 'open version' describes a gearbox with or without adapter flange. The sealing is located at the motor output shaft and is realized by O-rings between gearbox housing and motor.

### Closed version, with shaft seal or labyrinth seal, without hub bearing

The so-called 'closed version' includes an intermediate flange and a labyrinth seal or a shaft seal ring, so that the gearbox forms a compact and closed unit.

### Closed version, with shaft seal or labyrinth seal, with hub bearing

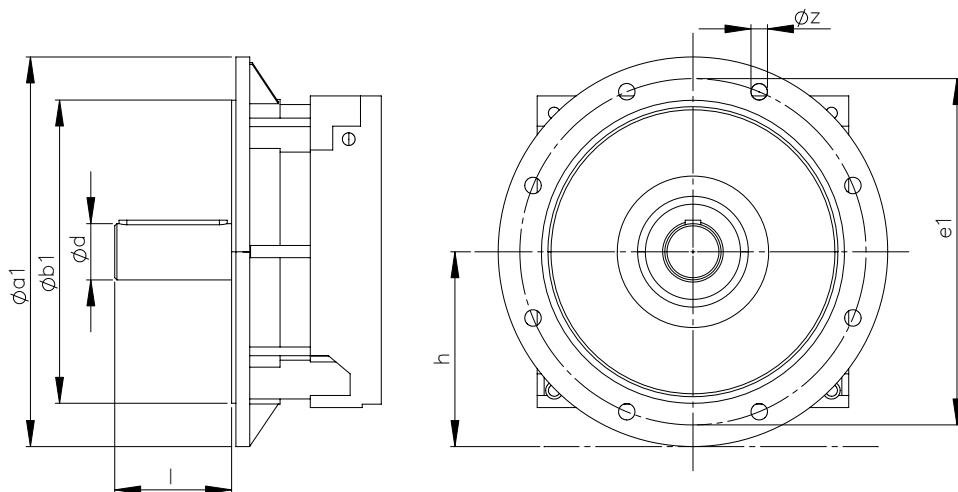
For certain motor types a special version with ball bearings is available. The hub is additionally supported in order to avoid axial movements of the hub, respectively in order to compensate axial forces resulting from the helical gearing to the motor shaft.

**Individually designed versions on request!**

## Dimensions for Standard Motor Connections

	SG 1200	SG 1500	SG 2000	SG 5000			SG 15000		
Motor frame size*	132	160	160/180	180	200	225	225	280	355
Standard motor dimension	EN 50347: 2001								
h	132	160	160/180	180	200	225	225	280	355
d	Ø 42	Ø 55	Ø 55/60	Ø 60	Ø 65	Ø 75	Ø 75	Ø 90	Ø 130
l	110-0.2	110-0.2	110-0.2	140±0.2	140±0.2	140±0.2	140±0.2	170±0.2	180±0.2
b1	Ø 250	Ø 300	Ø 300	Ø 300	Ø 350	Ø 450	Ø 450	Ø 550	Ø 680
e1	Ø 300	Ø 350	Ø 350	Ø 350	Ø 400	Ø 500	Ø 500	Ø 600	Ø 740
a1	-	-	-/400	Ø 400	Ø 450	Ø 550	Ø 550	Ø 660	Ø 800
z	Ø 18	Ø 18	Ø 18/19	Ø 19	Ø 19	Ø 19	Ø 19	Ø 24	Ø 24

\* Further sizes are available on request. Generally any motor can be connected under usage of the according connecting flange.



## Motor Shafts

	Shaft diameter (mm)	Keyway b x h (mm)	Length of keyway (mm)
SG 1 200	Ø 42	12 × 8	90
	Ø 48	14 × 9	90
	Ø 55	16 × 10	90
SG 1 500	Ø 42	12 × 8	90
	Ø 48	14 × 9	90
	Ø 55	16 × 10	90
	Ø 60	18 × 11	110
SG 2 000	Ø 60	18 × 11	125
	Ø 65	18 × 11	125
	Ø 80	22 × 14	125
	Ø 90	25 × 14	125
SG 5 000	Ø 60	18 × 11	125
	Ø 65	18 × 11	125
	Ø 65	20 × 12	125
	Ø 80	22 × 14	125
	Ø 90	25 × 14	125
	Ø 95	25 × 14	125
	Ø 100	28 × 16	125
SG 15 000	Ø 90	25 × 14	125
	Ø 95	25 × 14	125
	Ø 100	28 × 16	125
	Ø 130	32 × 18	125

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Further connections on request.



## Output Types

### Output via Flange:

As standard version the output is with flanges with cylindrical roller bearings, which allows supporting high radial forces due to the broad design of these bearings. Optionally we can provide even output with wider bearing base.

### Output via Shaft:

Alternatively the output of the gearboxes can be realized by a shaft (smooth shaft, shaft with one key, shaft with two keys). Special shaft sizes can be manufactured on request, even for small order quantities (diameter, length etc.).

### Open Output:

In order to connect the gearbox to following gear stages or to integrate the gearbox into the machine itself, we offer our gearboxes as well in so-called 'open output version'. Please note that for this version the customer has to have a bearing in his machine or part to support the hub of the gearbox. Relevant data can be submitted during design stage with customer.

### Output via Spur Gearbox

Our gearboxes can also be supplied with already mounted spur gearbox according to customers specification. A lot of variants are already available as standard. Please ask us.

### Individually designed versions on request!

Outputflange	SG 1200	SG 1500	SG 2000	SG 5000	SG 15000
Ø 118	✓	✓			
Ø 130	✓	✓			
Ø 140			✓		
Ø 150			✓		
Ø 180				✓	
Ø 200					✓

Output shaft*	SG 1200	SG 1500	SG 2000	SG 5000	SG 15000
Ø 42	✓	✓			
Ø 55	✓	✓			
Ø 60		✓	✓		
Ø 65			✓	✓	
Ø 75			✓	✓	
Ø 80			✓	✓	✓
Ø 90					✓

\* smooth shaft, shaft with one key, shaft with two keys

Individually designed versions on request!

### The SG-Series in Application

Our complete gearbox series captivate by their highly minimized backlash. Therefore any field of application, whether turning, milling or thread-cutting, go off without a hitch.

**Even the backlash of our standard series allow a very broad usage of the gearboxes, since the low backlashes pave the way for extremely precise applications (e.g. SG 5000 < 2 arcmin in every gearshift)! Thus our gearboxes compete successfully in the market with their yet unequalled features for your individual applications.**

## Technical Data SG-Series

The data mentioned below refer to the respective basic gearbox.

	Measure	i	SG 1 200	SG 1 500	SG 2 000	SG 5 000	SG 15 000
<b>Nominal Data</b>							
Motor frame size			132	160	180	200 / 225	225 / 280 355
Nominal power	[kW]		40	47	78	130	250
Nominal speed	[min-1]		1500	1500	1200	1200	800
Nominal input torque (continuous operation S1)	[Nm]		255	300	620	1080	3000
Output torque	[Nm]	1.0	255	300	620	1080	3000
	[Nm]	3.17	808	951	-	-	-
	[Nm]	3.19	-	-	-	3445	-
	[Nm]	4.0	1020	1200	2480	4320	12000
	[Nm]	5.0	-	-	3100	5400	15000
	[Nm]	5.5	1400	1650	-	-	-
	[Nm]	5.8	-	-	-	6264	-
<b>Maximum Data</b>							
Maximum input torque in Nm (short time operation S6)	[Nm]		400	400	795	1200	4000
Maximum input torque in Nm (short time operation S6)	[Nm]	1.0	400	400	795	1200	4000
	[Nm]	3.17	1268	1268	-	-	-
	[Nm]	3.19				3828	
	[Nm]	4.0	1600	1600	3180	4828	16000
	[Nm]	5.0	-	-	3975	6035	20000
	[Nm]	5.5	2200	2200			-
	[Nm]	5.8	-	-	-	7000	-
Max. perm. input speed**							
In reduction ratio $i \neq 1$	[min-1]		6300	6300	6500	5500	3250
for direct drive $i = 1$	[min-1]		10000	10000	6500	5500	3250
Vibration value*	[mm/s]		1.4	1.4	1.4	2.8	3.0
Reduced vibration value*	[mm/s]		1.1	1.1	1.2	1.4	1.4
Torsional rigidity	[Nm/arcmin]		2400	2550	4800	14000	20000
Backlash	< 30	[arcmin]	✓	✓	✓	✓	✓
	< 15	[arcmin]	✓	✓	✓	✓	✓
	< 2	[arcmin]	-	-	✓	✓	-
<b>Weight</b>							
Standard	[app. kg]		65	73	110	200	700
<b>Shifting: electro drive with electromechanical worm gear (2 shifting stages and neutral position) 24 V DC</b>							

\* at nominal speed

\*\* with oil cooling and/or labyrinth seal depending on the shifting ratio

# Two-Speed Gearbox for Ram Installation: SGR/SGH

## A Well-Rounded Affair:

The SGR/SGH captivates by its feature of being thoroughly integrated into the RAM – with or without hollow shaft. The gearbox can be connected to all conventional motors, regardless of the chosen shaft.

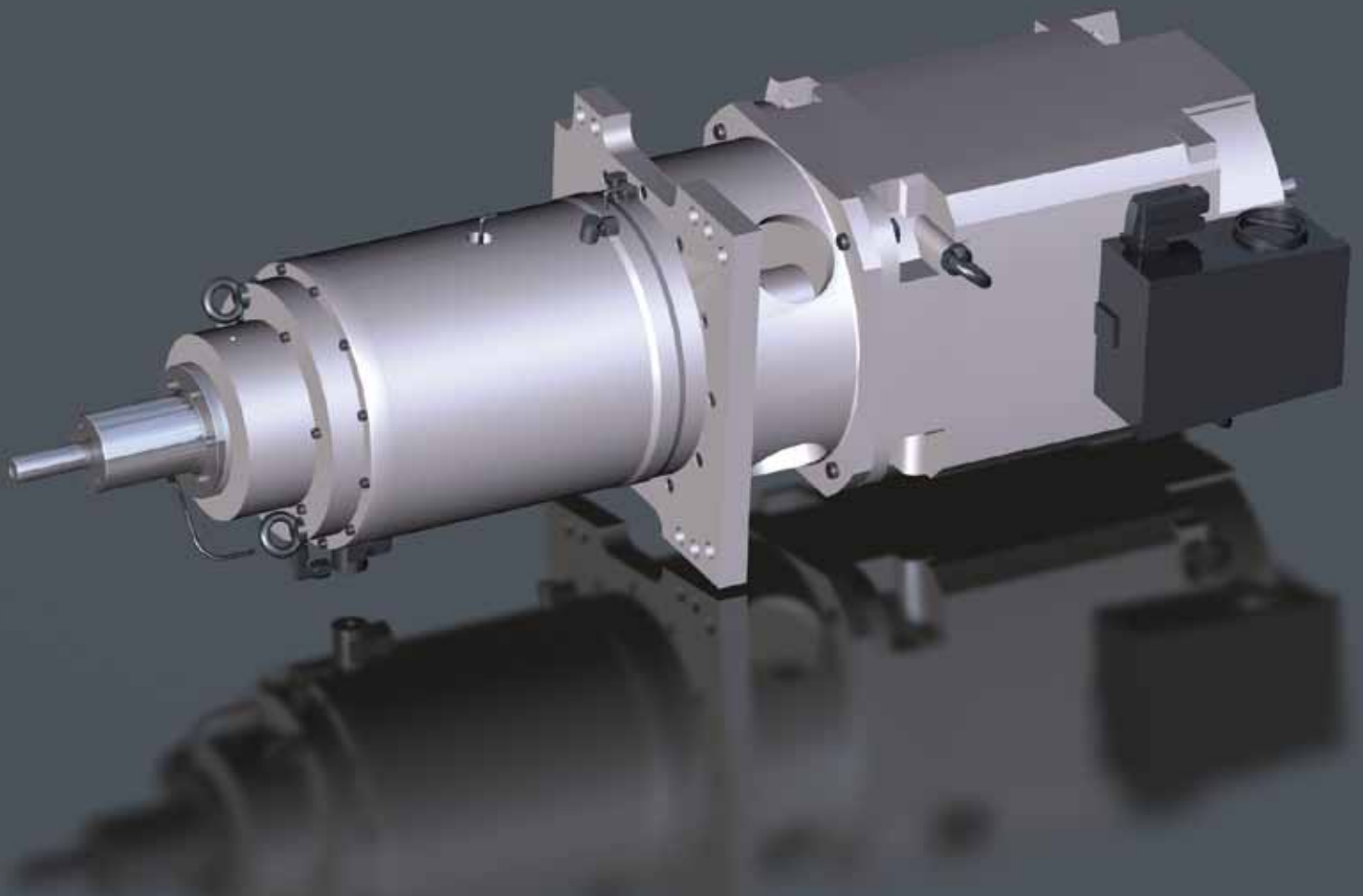
In addition to the standard motor with hollow shaft we can supply popular motors with additional or extended hollow shaft for basically all sizes and power.

**The gearboxes of the SGR-series are in general available with hollow shaft (SGH): In accordance with our customers' requests we can supply these gearboxes as well with a coolant tube, rotary union or other options.**

The RAM installation offers advantages as smaller moments of inertia, a more compact design, higher control dynamics as well as faster positioning, acceleration and braking operations. Thus vibrations are reduced and the work piece can be processed in a much more efficient way. Thanks to these trend-setting development superfluous components can be dispensed with, e.g. parts that are usually necessary when connecting the gearbox outside the RAM (belts, gear trains, other additional attachment parts).

High torques up to 20 000 Nm are possible.

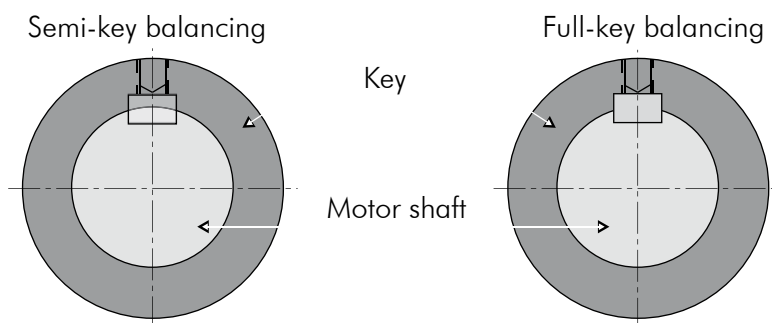
All gearboxes of the SGR/SGH series are also available with pre- or secondary stage to create a higher basic ratio and torque in the same size of gearbox.



## Motor Connection

Important: Using the series of SGH, we assume that the motor always has straight shaft (due to hollow shaft motor)

- The hubs are equipped with keyway as standard  
Note: Hubs have to be balanced in accordance to the balancing of the motor
- Full-key balancing (standard): the motor shaft is balanced with a fitted key – the hub not.
- Semi-key balancing: Please note in your order the motor details, including dimensions and balancing type, since semi-key balancing involves the filling of the keyway with a balance compensator and therefore the shape, the length and the position of the keyway have to be optimally adjusted. After the assembly the device should be rebalanced due to a tolerance-related residual imbalance.
- Straight motor shafts: Connection via a keyless hub with ring clamping elements. Please make sure that the motor shaft is provided with a centring bore and thread, according to DIN 332-2.
- Special Solutions: In case the motor cannot be mounted directly to the SG due to its connection dimensions, an adapter plate or an adapter ring may be applied.
- Note: When connecting the motor to the gearbox please follow the manufacturer's instructions by all means, since no preload support on motor B-side is permitted.



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## Input Versions

### Open version, without hub bearing and without shaft seal:

The so-called 'open version' describes a gearbox with or without adapter flange. The sealing is located at the motor output shaft and is realized by O-rings between gearbox housing and motor.

### Closed version, with shaft seal or labyrinth seal, without hub bearing

The so-called 'closed version' includes an intermediate flange and a labyrinth seal or a shaft seal ring, so that the gearbox forms a compact and closed unit.

### Closed version, with shaft seal or labyrinth seal, with hub bearing

For certain motor types a special version with ball bearings is available. The hub is additionally supported in order to avoid axial movements of the hub, respectively in order to compensate axial forces resulting from the helical gearing to the motor shaft.

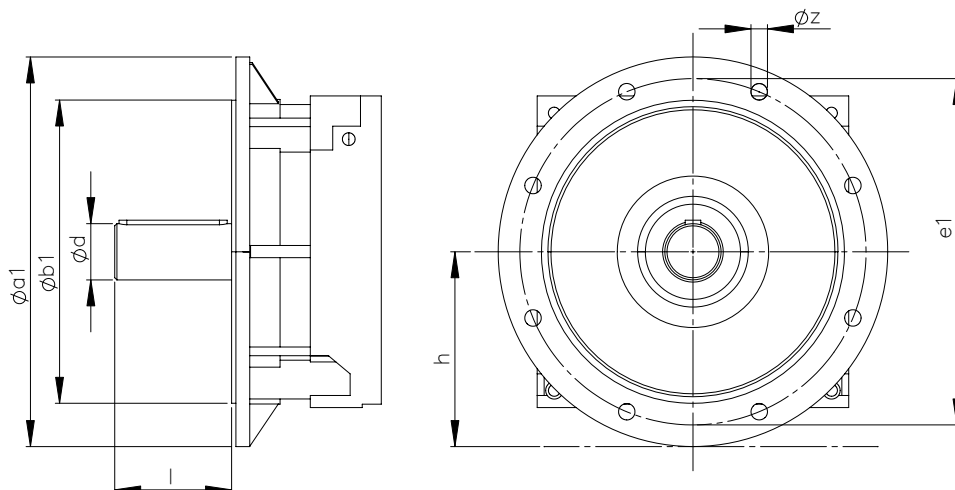
**Individually designed versions on request!**



## Dimensions for Standard Motor Connection

	SGR/SGH 1 500	SGR/SGH 2 000		SGR/SGH 5 000		
Motor frame size:*	160	180	200	180	200	225
Standard motor dimension	EN 50347: 2001					
Axis height	160	180	200	180	200	225
d – Motor shaft	55	65	75	65	75	75
l – Motor shaft length	110-0.2	140-0.2	140±0.2	140±0.2	140±0.2	140±0.2
b1	300	300	450	350	450	450
e1	350	400	500	400	500	500
a1	-	450	550	450	550	550
z	18	18	19	19	19	19

\* Further sizes are available on request. Generally any motor can be connected under usage of the according connecting flange.



## Output Types

### Output via Shaft:

The output of the gearboxes is realized by a shaft (smooth shaft, shaft with one key, shaft with teething ). Special shaft sizes can be manufactured on request, even for small volumes (diameter, length etc.).

Further details will be submitted during design stage of the relevant project.

	SGR/SGH 1 500	SGR/SGH 2 000	SGR/SGH 5 000
Shaft, smooth, Ø outside	75g6 80g6	75g6 80g6	110g6
Shaft, smooth, 1 key	22 × 14	22 × 14	28 × 16
Shaft acc. to DIN 5480, outside toothing	W75×2×30×24 W80×2×30×25	W75×2×30×24 W80×2×30×25	W110×2×30×35

Further diameters are available on request.

### The SGR/SGH –Series in Application

Additionally to the advantages mentioned already above our gearboxes for RAM installation are equipped with central oil lubrication with internal splash oil supply in order to reduce the amount of oil respectively the gearbox temperatures. Optionally the gearboxes can be supplied with oil or water cooling jacket, so that hardly any heat is emitted within the RAM.



## Technical Data SGR/SGH-Series

The data mentioned below refer to the respective basic gearbox

		measu- re	i	SGR 1 500	SGH 1 500	SGR 2 000	SGH 2 000	SGR 5 000	SGH 5 000
<b>Nominal Data</b>									
Motor frame size				132/160	132/160	160/183	160/183	180/200 225	180/200 225
Nominal power		[kW]		47	47	78	78	130	130
Hollow shaft diameter*		[mm]		-	35	-	35	-	40
Nominal speed		[min <sup>-1</sup> ]		1500	1500	1200	1200	1200	1200
Nominal input torque (con- tinuous operation S1)		[Nm]		300	300	620	620	820	820
Output torques at standard ratios		[Nm]	1.0	300	300	620	620	820	820
		[Nm]	4.0	1200	1200	2480	2480	3280	3280
		[Nm]	5.0	1500	1500	3100	3100	4100	4100
		[Nm]	7.0	-	-	-	-	5740	5740
Output torques at primary/secondary gear stage with basic ratio i = 5 **		[Nm]	1.5	2250	2250	4650	4650	8610	8610
		[Nm]	2.0	3000	3000	6200	6200	11480	11480
		[Nm]	3.0	4500	4500	9300	9300	17220	17220
<b>Maximum Data</b>									
Maximum input torque in Nm (short time operation S6)		[Nm]		400	400	795	795	1098	1098
Output torques (max. accelerating torque)		[Nm]	1.0	400	400	795	795	1098	1098
		[Nm]	4.0	1600	1600	3180	3180	4392	4392
		[Nm]	5.0	2000	2000	3975	3975	4590	4590
		[Nm]	7.0	-	-	-	-	-	-
Output torques at primary/secondary gear stage with basic ratio i = 5**		[Nm]	1.5	3000	3000	5963	5963	11529	11529
		[Nm]	2.0	4000	4000	7950	7950	15372	15372
		[Nm]	3.0	6000	6000	11925	11925	23058	23058
Max. perm. input speed		[min <sup>-1</sup> ]		8000	8000	8000	8000	5500	5500
Vibration value***		[mm/s]		1.8	1.8	1.8	1.8	2.8	2.8
Reduced vibration value***		[mm/s]		1.0	1.0	1.0	1.0	1.4	1.4
Torsional resistance/rigidity		[Nm/arcmin]		2550	2550	4800	4800	14000	14000
∅ outside	with cooling jacket	[mm]		322	322	322	322	410	410
	without cooling jacket	[mm]		282h6	282h6	282h6	282h6	370	370
<b>Weight</b>									
Standard		[app. kg]		150	150	150	150	250	250
<b>Shifting: hydraulic</b>									

\* Due to motor dimensions the resulting diameter of the hollow shaft of the gearbox might differ

\*\* for SG 5000 i = 7; other primary or secondary ratios on request

\*\*\* at nominal speed

## Two-Speed Gearbox with Built-in Motor: SGM

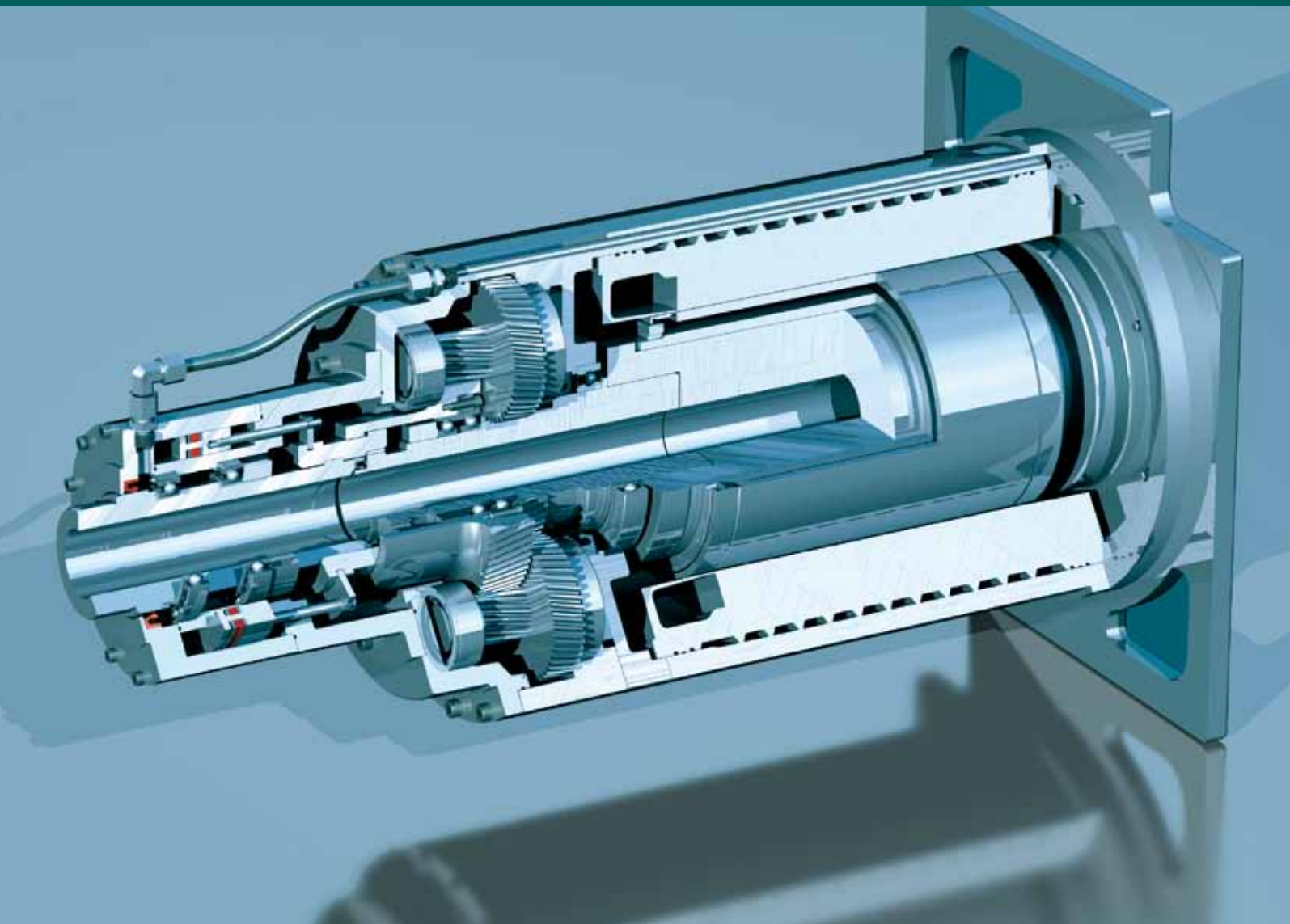
### All-in-One:

If you require a supremely space-saving, dynamic and fast solution! The SGM-series with built-in motor sovereignty meets the challenges of a modern tool machine by reducing the complete drive to a spatially minimum while maintaining its full power and flexibility at the same time.

This solution cuts down mass moments of inertia to a minimum. All coupling components between motor and gearbox become redundant so that the machine can be used optimally with regard to acceleration, speed and torque.

The gearboxes of the SGM-series not only cover all the advantages and the performance features of the SGR/SGH-series. They – moreover – captivate by their maximal hollow shaft size thanks to the integrated motor we use. The diameters, listed in our technical data, are merely standard sizes: generally, any required hollow shaft diameter can be realized.

The design of the SGM-series allows maximizing the hollow shaft diameter and thus offers the advantage that not only different kind of media (liquid, air) can be integrated into the gearbox, but as well mechanical clamping systems.





## Output

	<b>SGM 1 500</b>	<b>SGM 2 000</b>	<b>SGM 5 000</b>
Shaft, smooth, Ø outside	75g6 80g6	75g6 80g6	110g6
Shaft, smooth, 1 key	22 × 14	22 × 14	28 × 16
Shaft acc. to DIN 5480, outside tothing	W75×2×30×24 W80×2×30×25	W75×2×30×24 W80×2×30×25	W110×2×30×35

Other diameters are available on request.

## Technical Data SGM-Series

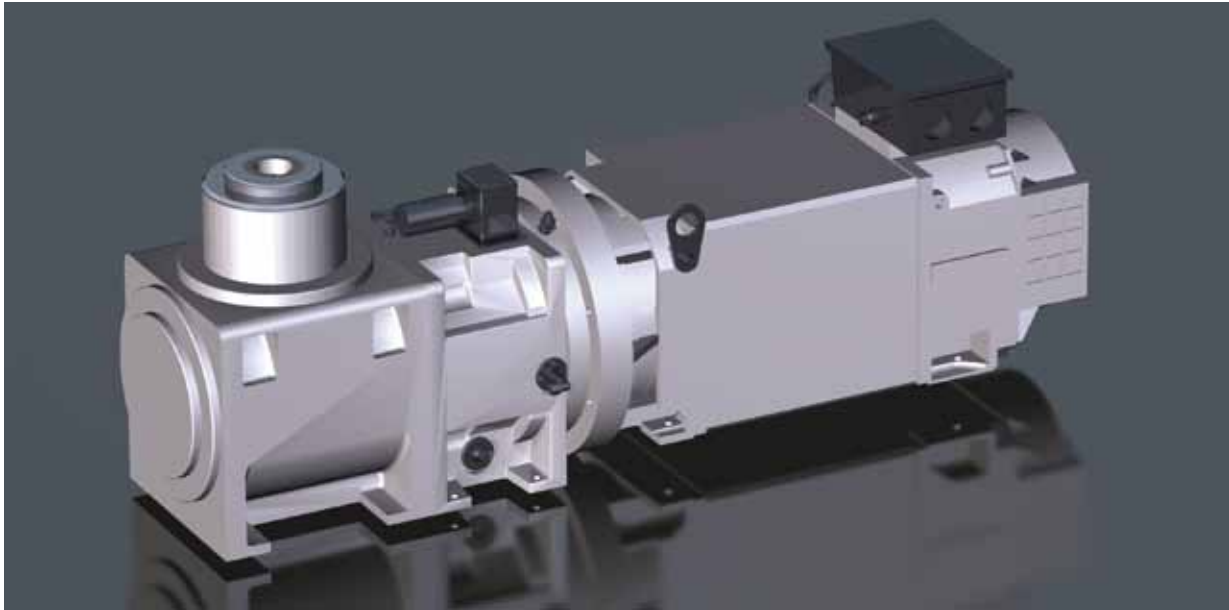
	Measure	i	SGM 1 500	SGM 2 000	SGM 5 000
<b>Nominal Data</b>					
Nominal Power	[kW]		47	78	103
Hollow shaft diameter	[mm]		35	35	40
Nominal speed	[min <sup>-1</sup> ]		1500	1200	1200
Max input speed	[min <sup>-1</sup> ]		7000	6500	5500
Output torques in standard ratio	[Nm]	1.0	300	620	820
	[Nm]	4.0	1200	2480	3280
	[Nm]	5.0	1500	3100	4100
	[Nm]	7.0	-	-	5740
Output torques with primary / secondary stage based on i= 5 at the shifting gearbox**	[Nm]	1.5	2250	4650	8610
	[Nm]	2.0	3000	6100	11480
	[Nm]	3.0	4500	9300	17220
<b>Maximum Data</b>					
Output torque (max. accelerating torque)	[Nm]	1.0	400	795	1098
	[Nm]	4.0	1600	3180	4392
	[Nm]	5.0	2000	3975	5490
	[Nm]	7.0	-	-	7686
Output torques with primary / secondary stage based on i= 5 at the shifting gearbox**	[Nm]	1.5	3000	5963	11529
	[Nm]	2.0	4000	7950	15372
	[Nm]	3.0	6000	11925	23058
Max. vibration value*	[mm/s]		1.8	1.8	2.8
Reduced vibration value*	[mm/s]		1.0	1.0	1.4
Torsional resistance/rigidity	[Nm/arcmin]		850	1400	2000
Ø outside	with cooling jacket	[mm]	322	322	410
	ohne Kühlmantel	[mm]	282h6	282h6	370
Ø outside diameter of motor	[mm]		282	340	390
<b>Weight app</b>					
Standard	[ca. kg]		350	450	800
<b>Shifting: hydraulic</b>					

\* at nominal speed

\*\* other primary/secondary ratios on request

## Application Examples and Individual Solutions

### Table Drive Units



Complete table drive units for e.g. vertical lathe from 30 to 250 kW with integrated bevel gearbox, ratios of the shifting gearbox ranging from 1:1 and 1:4 up to 5/5.5/5.8 and bevel gearbox ratio with 1:1/1.5/2/3/4.

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### Multispeed Gearboxes



All our gearboxes are also available as Multispeed Gearboxes (Three-Speed or Four-Speed) for applications in boring machines, vertical lathes or other machines with maximum ratio of up to more than 25 in high gear and output torques of more than 20 000 Nm (Example ratio: 1:1/1:3.2/1:5/1:16).

## Application Examples and special solutions

### Drives for Lathe



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Lathe drive with integrated transfer gear stage for power up to 250 kW and torque of more than 20 000 Nm.

Ratio in shifting gearbox 1:1 and 1:4 ( 5/5,5/5,8) and transferbox ratio 2(3/4)

### **Customer Specific Solutions**

**Even for low quantities we offer variations of our series products or complete new development according to customer demand.**

**Simply ask us.**



## Product Range

Oil coolers

Water coolers

Heat exchangers

Cabinet coolers

Coolers for special purposes



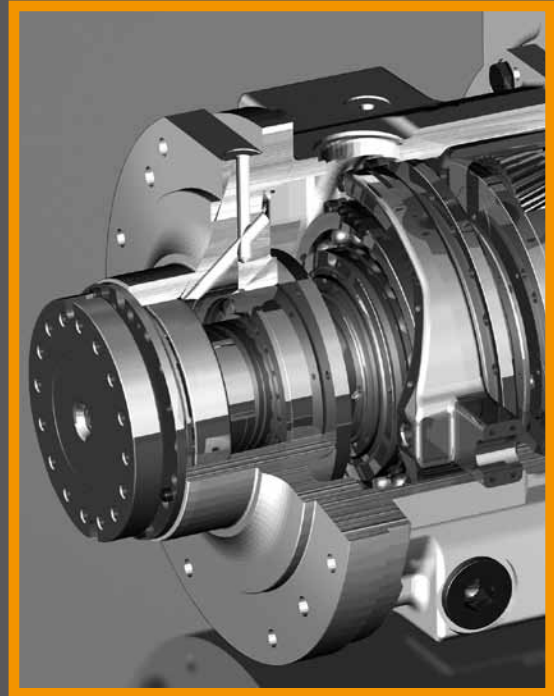
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Small goods with

**Great Performance**

## Service

Machine tool gearboxes and drives  
SG, SGR, SGH, SGHM and  
Two Speed Gearboxes of other makers  
Spindle motors and servomotors  
Oil and water coolers



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- Directly on-site at the customers or at our location.
- Thermography testing of machine tools and complete lines, including entire analysis and interpretation.
- Correct assembly of motor and gearbox including test run. Adaptation of the motor and the gearbox by means of vibration monitoring, noise measurement, acceptance test runs, test reports and FIC (First Installation Check).
- Assembly support at the machine.
- Professional repair of gearboxes and motors with original spare parts.
- New and rebuild gearboxes and coolers, mostly available from stock.
- 24-hour and weekend services.

# Gearboxes for Machine Tools

Order Codes SG 1200/1500

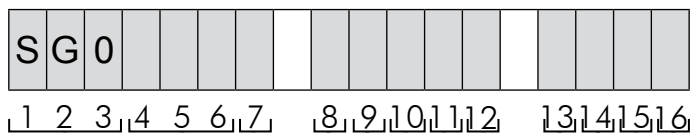


<b>Two Speed Gearboxes of SG-Series</b>		
<b>Size</b>		
SG 1200	<b>012</b>	
SG 1500	<b>015</b>	
<b>Motor balancing</b>		
Full key	<b>1</b>	
Half Key	<b>2</b>	
Smooth shaft	<b>3</b>	
<b>Gearbox adaption</b>		
Closed, hub, and sealing	<b>1</b>	
Closed, hub, bearing and sealing	<b>2</b>	
Input flange 118 mm	<b>3</b>	
Input flange 130 mm	<b>4</b>	
Open with hub	<b>5</b>	
Special	A-Z	
<b>Motorsize</b>		
132/ centering 250 mm	<b>1</b>	
160/ centering 300 mm	<b>2</b>	
Special	A-Z	
<b>Ratio</b>		
3,17	<b>1</b>	
4,0	<b>2</b>	
5,5	<b>3</b>	
Special ratio	A-Z	
<b>Output</b>		
Without	<b>1</b>	
Shaft smooth Ø 42 mm	<b>2</b>	
Shaft smooth keyway Ø 42 mm	<b>3</b>	
Shaft smooth Ø 55 mm	<b>4</b>	
Shaft smooth keyway Ø 55 mm	<b>5</b>	
Flange 118 mm	<b>6</b>	
Flange 130 mm	<b>7</b>	
Special Ø	A-Z	
<b>Installation position</b>		
B5	<b>1</b>	
V1	<b>2</b>	
V3	<b>3</b>	
<b>Motor shaft diameter</b>		
42 mm	<b>1</b>	
48 mm	<b>2</b>	
55 mm	<b>3</b>	
60 mm	<b>4</b>	
Special	A-Z	
<b>Backlash</b>		
< 30 arcmin	<b>1</b>	
< 15 arcmin	<b>2</b>	
<b>Vibration</b>		
Standard vibration value	<b>1</b>	
Reduced vibration value	<b>2</b>	
<b>Layout</b>		
Standard	<b>1</b>	
Special	A-Z	

Standard = **Bold type**

# Gearboxes for Machine Tools

Order Codes SG 2000/5000/15000



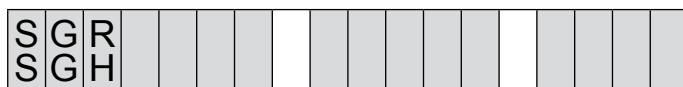
<b>Two Speed Gearboxes of SG-Series</b>	
<b>Size</b>	
SG 2000	<b>020</b>
SG 5000	<b>050</b>
SG 15000	<b>150</b>
<b>Motor balancing</b>	
Full key	<b>1</b>
Half Key	<b>2</b>
Smooth shaft	<b>3</b>
<b>Gearbox adaption</b>	
Closed, hub and sealing	<b>1</b>
Closed, hub, bearing and sealing	<b>2</b>
Input flange 150 mm	<b>3</b>
Input flange 180 mm	<b>4</b>
Input flange 200 mm	<b>5</b>
Open with hub	<b>6</b>
Special	A-Z
<b>Motorsize</b>	
160/ centering 300 mm	<b>1</b>
180/ centering 300 mm	<b>2</b>
200/ centering 350 mm	<b>3</b>
225/ centering 450 mm	<b>4</b>
280/ centering 550 mm	<b>5</b>
Special	A-Z
<b>Ratio</b>	
3,19	<b>1</b>
4,0	<b>2</b>
5,0	<b>3</b>
5,5	<b>4</b>
5,8	<b>5</b>
Special ratio	A-Z
<b>Output</b>	
Without	<b>1</b>
Shaft smooth Ø 60 mm	<b>2</b>
Shaft smooth keyway Ø 60 mm	<b>3</b>
Shaft smooth Ø 70 mm	<b>4</b>
Shaft smooth keyway Ø 70 mm	<b>5</b>
Flange 140 mm	<b>6</b>
Flange 150 mm	<b>7</b>
Flange 180 mm	<b>8</b>
Flange 200 mm	<b>9</b>
Special Ø	A-Z
<b>Installation position</b>	
B5	<b>1</b>
V1	<b>2</b>
V3	<b>3</b>
<b>Motor shaft diameter</b>	
55 mm	<b>1</b>
60 mm	<b>2</b>
65 mm	<b>3</b>
70 mm	<b>4</b>
75 mm	<b>5</b>
80 mm	<b>6</b>
90 mm	<b>7</b>
95 mm	<b>8</b>
100 mm	<b>9</b>
Special motor shaft diameter	A-Z
<b>Backlash</b>	
< 30 arcmin	<b>1</b>
< 15 arcmin	<b>2</b>
< 2 arcmin	<b>3</b>
<b>Vibration</b>	
Standard vibration value	<b>1</b>
Reduced vibration value	<b>2</b>
<b>Ausführung</b>	
Standard	<b>1</b>
Special	A-Z

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Standard = **Bold type**

# Gearboxes for Machine Tools

Order Codes SGR, SGH

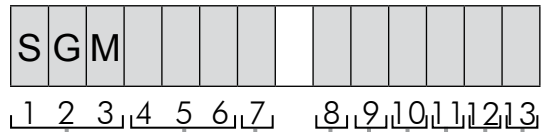


<b>Two Speed Gearboxes of SGR/SGH-Series</b>		
<b>Size</b>		
SGR/SGH 1500	<b>015</b>	
SGR/SGH 2000	<b>020</b>	
SGR/SGH 5000	<b>050</b>	
Special size	0X0	
<b>Ratio</b>		
4	<b>1</b>	
5	<b>2</b>	
7	<b>3</b>	
Special	A-Z	
<b>Pre or Secondary stage ratio</b>		
Without	<b>1</b>	
Pre stage ratio	<b>2</b>	
Secondary stage ratio	<b>3</b>	
<b>Pre or Secondary stage ratio i</b>		
1,5	<b>1</b>	
2,0	<b>2</b>	
3,0	<b>3</b>	
Without	<b>4</b>	
Special	A-Z	
<b>Cooling jacket for gearbox</b>		
Without Standard	<b>1</b>	
With	<b>2</b>	
<b>Output</b>		
Shaft smooth Ø 75	<b>1</b>	
Shaft smooth Ø 80	<b>2</b>	
Shaft smooth Ø 110	<b>3</b>	
Shaft keyway Ø 75	<b>4</b>	
Shaft keyway Ø 80	<b>5</b>	
Shaft keyway Ø 110	<b>6</b>	
Shaft DIN 5480 tothing Ø 75	<b>7</b>	
Shaft DIN 5480 tothing Ø 80	<b>8</b>	
Shaft DIN 5480 tothing Ø 110	<b>9</b>	
Special Ø	A-Z	
<b>Motorsize</b>		
Frame 132	<b>1</b>	
Frame 160	<b>2</b>	
Frame 180	<b>3</b>	
Frame 220	<b>4</b>	
Frame 280	<b>5</b>	
Special	A-Z	
<b>Gearbox adaption</b>		
Open with hub	<b>1</b>	
Closed with hub, bearing, sealing	<b>2</b>	
Closed with hub, bearing, labyrinth	<b>3</b>	
<b>Motor balancing</b>		
Smooth shaft	<b>1</b>	
Full key	<b>2</b>	
Half key	<b>3</b>	
<b>Installation position</b>		
B5	<b>1</b>	
V1	<b>2</b>	
V3	<b>3</b>	
<b>Vibration</b>		
Standard vibration value	<b>1</b>	
Reduced vibration value	<b>2</b>	
<b>Layout</b>		
Standard	<b>1</b>	
Special	A-Z	

Standard = **Bold type**

# Gearboxes for Machine Tools

Order Codes SGM



## Two Speed Gearboxes of SGM-Series

Size	
SGM 1500	<b>015</b>
SGM 2000	<b>020</b>
SGM 5000	<b>050</b>
Special	0X0

Ratio	
4	<b>4</b>
5	<b>5</b>
7	<b>7</b>
Special	A-Z

Pre or Secondary stage ratio	
Without	<b>1</b>
Pre stage ratio	<b>2</b>
Secondary stage ratio	<b>3</b>

Pre or Secondary stage ratio i	
1,5	<b>1</b>
2,0	<b>2</b>
3,0	<b>3</b>
Without	<b>4</b>
Special	A-Z

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Cooling jacket for gearbox	
Without standard	<b>1</b>
With	<b>2</b>

Abtrieb	
Shaft smooth Ø 75	<b>1</b>
Shaft smooth Ø 80	<b>2</b>
Shaft smooth Ø 110	<b>3</b>
Shaft keyway Ø 75	<b>4</b>
Shaft keyway Ø 80	<b>5</b>
Shaft keyway Ø 110	<b>6</b>
Shaft DIN 5480 outside toothing Ø 75	<b>7</b>
Shaft DIN 5480 outside toothing Ø 80	<b>8</b>
Shaft DIN 5480 outside toothing Ø 110	<b>9</b>
Special output Ø	A-Z

Vibration	
Standard vibration value	<b>1</b>
Reduced vibration value	<b>2</b>

Layout	
Standard	<b>1</b>
Special	A-Z

Standard = **Bold type**

## Offer?

Order template: Save time by using our fax sheet

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Fax: +49 (0) 75 55 / 92 78 80 1

E-mail: info@aundg.com

For a precise layout of your order according to your individual requests we kindly ask you to specify your technical data as exactly as possible:

Applied machine:

With or without RAM integration:

Power (kW):

Gearbox:  SG  SGR  SGH  SGM

### For gearboxes of SG, SGR/SGH-series

Motor brand:

Type:

Size:

Motor specification:

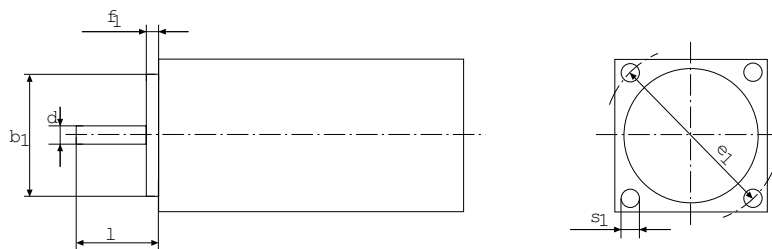
Diameter of motor shaft and length, with/without hub key and balancing type  
(half-key or full-key)  $d / l$ :

Centering diameter and width  $b_1 / f_1$ :

Bold circle diameter  $e_1$ :

Hole diameter  $s_1$ :

Motor with/without Radial seal:



Gearbox size  SG 1200  SG 1500  SG 2000  SG 5000  SG 15000  
 SGR 1500  SGR 2000  SGR 5000  
 SGH 1200  SGH 1500  SGH 2000

Ratio (see technical data in catalogue)

Installation position:

Input (bearing, shaft, flange, etc.):

Lubrication (pls. note max. torque):

Backlash (see technical data in catalogue):

Time Schedule, quantity .... (pls. describe your project briefly):

### For gearboxes of SGM-series

Power:

Output torque:

Max. possible diameter (RAM size):

Required diameter of the hollow shaft:

Required ratio:

Max. output torque of the spindle:

Time Schedule, quantity .... (pls. describe your project briefly):



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