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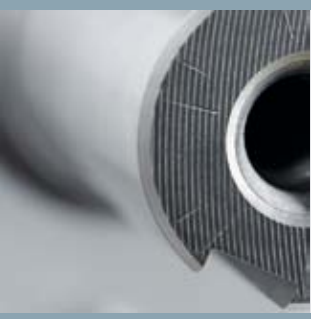

FLENDER SIP
Standard Industrial Planetary gear units

Catalog MD 31.1 · 2011

FLENDER gear units

Answers for industry.

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FLENDER gear units

FLENDER SIP Standard Industrial Planetary gear units

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Answers for industry.

Siemens Industry answers the challenges in the manufacturing and the process industry as well as in the building automation business. Our drive and automation solutions based on Totally Integrated Automation (TIA) and Totally Integrated Power (TIP) are employed in all kinds of industry. In the manufacturing and the process industry. In industrial as well as in functional buildings.

Siemens offers automation, drive, and low-voltage switching technology as well as industrial software from standard products up to entire industry solutions. The industry software enables our industry customers to optimize the entire value chain – from product design and development through manufacture and sales up to after-sales service. Our electrical and mechanical components offer integrated technologies for the entire drive train – from couplings to gear units, from motors to control and drive solutions for all engineering industries. Our technology platform TIP offers robust solutions for power distribution.

Check out the opportunities our automation and drive solutions provide. And discover how you can sustainably enhance your competitive edge with us.

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Introduction

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1

Characteristic features

Overview

Economical and reasonably constructive solutions have proved their worth under a wide range of different operating conditions.

With the FLENDER SIP planetary gear units, Siemens offers an attractive price/performance ratio for low to mid torque ranges in well-proven FLENDER quality. The finely graded product series covers the torque range from 10 000 to 80 000 Nm.

The modular design enables many basic components to be standardized, including planetary stages, housing parts as well as drive-end and non-drive-end components. The complexity is reduced, and manufacturing is possible in economical batch sizes maintaining a high standard of quality.

FLENDER SIP gear units are cost-effective with worldwide availability and short delivery times. A further advantage: The specific requirements of a wide range of different industries are already implemented in the standard gear units.

FLENDER SIP: Comprehensive product range

Select from:

- 8 gearbox sizes
- 6 transmission stages
- 2 output shafts: Output hollow shaft with shrink disk or output hollow shaft with splines in accordance with DIN 5480
- Optional shaft seal with taconite

Applications

FLENDER SIP: A specialist in many fields

The FLENDER SIP planetary gear unit is tailored to those sectors of industry that require medium gear ratios in combination with a compact design.

FLENDER SIP gear units are reliable drive components for implementation in a wide range of industrial sectors.

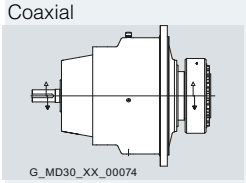
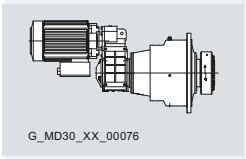
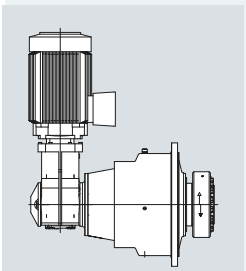
Benefits

Advantages of FLENDER SIP

- Well-proven FLENDER quality with an attractive price/performance ratio
- Short delivery times
- High availability worldwide
- High-endurance gearing and large planetary bearings for a long service life
- Energy-efficient thanks to high levels of efficiency
- Easy to combine with Siemens geared motors
- Smooth running thanks to high transverse contact ratio in the gear teeth
- Local customer support all over the world

Design

Summary of basic types

Type		O	2	R	C	50	D	33.5
Series of planetary gear units	OmniDrive	**O**						
Number of stages for SIP	2		**2**					
Gear unit designation	Round			**R**				
Shaft arrangement d_1 to d_2	Coaxial  G_MD30_XX_00074				**C**			
	Parallel, externally mounted MOTOX-N  G_MD30_XX_00076				**P**			
	Orthogonal, externally mounted MOTOX-N  G_MD30_XX_00075				**R**			
Gear unit size	30 ... 60					**50**		
Output shaft design	Hollow shaft for shrink disk						**D**	
	Hollow shaft with splines						**K**	
Nominal ratio for SIP	25 ... 45							**33.5**

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Overview

To ensure careful selection of a suitable FLENDER SIP please note the information in this catalog.

In applications where the torque is variable but the speed constant, the gear unit can be designed on the basis of the so called equivalent torque, see Page 3/3.

For specific applications, such as sporadic operation of lockgate drives, a gear unit design which is finite-life fatigue-resistant can be sufficient.

We are pleased to be of assistance in checking that the selection is correct, and in carefully calculating the service life (on the basis of accurate application factors).

Types and transmission ratios

The table on Page 1/2 shows the possible standard types and the corresponding transmission ratio ranges.

Housing

The housing parts are constructed from high-quality casting materials and are of an optimized shape.

Gear teeth

The sun pinion and planet gears have straight teeth, are case hardened, and ground. Internal gears are highly tempered and pounded.

The gear teeth are designed to be **high-endurance** for the specified nominal torques in accordance with ISO 6336.

Bearings

Only suitably dimensioned roller bearings are used for the gear wheels and shafts.

Drive end

The shaft is designed as a cylindrical shaft end with a keyway in accordance with DIN 6885-1 and suitable, for example, for the attachment of couplings.

It is also possible to use a geared motor of the MOTOX-N series at the drive end in combination, see Page 5/2.

Non-drive-end

Hollow shafts with shrink disk or hollow shafts with splines in accordance with DIN 5480 are available.

Installation options

For mounting on the driven machine, an output-side flange is available. With shaft-mounted gear units, a torque arm must be used. For details of torque arm, see Page 8/2.

Directions of rotation

The direction of rotation is determined by the front view of the output shaft d_2 (shaft end face).

Seals

The input shaft and output shaft are sealed **as standard** with radial shaft seals. For special purposes, refillable labyrinth seals (taconite) are available.

Centering

For details of centering at the shaft ends, see Page 6/2.

Greasing/oil quantities/mounting positions

The gear units use dip lubrication as standard. In case of dip lubrication, all parts to be lubricated are lying in the oil. Please refer to the Operating Instructions 7300 for details of the recommended lubricants.

The oil quantities depend on the oil level inspection devices. Further details can be found in the Operating Instructions 9300. Siemens reserves the right to make technical changes in the context of further technical development.

The gear units are designed for a horizontal mounting position. Please contact us if a different mounting position is required.

Explanation of symbols used in the dimensioned drawings:

Symbol	Explanation
	Oil dipstick
	Breather
	Oil filler
	Oil drain

Cooling

Cooling is performed via radiation and convection from the housing surface up to the thermal capacity, see Page 3/9.

Noise

The gear units are noise-optimized and can be evaluated in accordance with VDI 2159 with reference to the power rating.

The associated values are listed in Operating Instructions 9300.

Weights, dimensions

The specified weights are average values; illustrations and dimensions are not binding. Siemens reserves the right to make technical changes in the context of further technical development.

Operating conditions

Please contact us in the case of operation at ambient temperatures below -20 °C. You must consult Siemens regarding environmental influences such as saltwater, salty air, corrosive substances, dust, mud, rockfall, extreme vibration or extreme shock.

Delivery

FLENDER SIP gear units are delivered preassembled and ready to install and in accordance with standards, without oil.

Optional torque arms and shrink disks are supplied loose. The gear housings are protected against corrosion and lacquered in the color RAL 5015.

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Notes

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Technical information

2

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Shaft misalignment, mounting positions, environmental conditions, selection of oil, preservation, maintenance

Overview

Technical standards

The shafts are designed in accordance with DIN 743.

The bearing service life is calculated in accordance with ISO 281 taking into account the manufacturer's data.

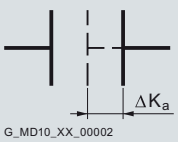
The gearing is designed to be high-endurance in accordance with ISO 6336.

Shaft misalignment

Shaft misalignment is the result of displacement during assembly and operation and, where machines constructed with 2 radial bearings each are rigidly coupled, will cause high loads being placed on the bearings. Elastic deformation of base frame, foundation and machine housing will lead to shaft misalignment which cannot be prevented, even by precise alignment. Furthermore, because individual components of the drive train heat up differently during operation, heat expansion of the machine housings causes shaft misalignment.

Poorly aligned drives are often the cause of seal or rolling bearing failure. Alignment should be carried out by specialist personnel in accordance with the Siemens operating instructions.

Depending on the direction of the effective shaft misalignment a distinction is made between:



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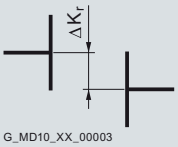
Axial misalignment



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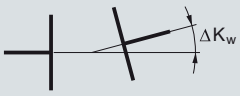
Radial misalignment



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Angular misalignment

The expected shaft misalignment must be taken into account on selecting the connection between the components and the input shaft or output shaft. Guidelines and limits for compensation of shaft misalignment can be obtained from the manufacturer.

Mounting positions

FLENDER SIP gear units are available for horizontal installation. Other mounting positions are possible on request.

Environmental conditions

FLENDER SIP gear units are designed for operation in large halls, as well as outdoors.

Explosive environments are excluded.

The range of permissible ambient temperatures is:
$-20\ °C \leq t_U \leq 50\ °C$.

Selection of oil

FLENDER SIP gear units may be filled with oils from producers authorized by Siemens AG, the oil producer or supplier being responsible for the quality of the product. For the selection of oil grade and viscosity, the limits of application given in the table are to be taken into consideration.

A minimum operating viscosity of 25 cSt must be ensured.

Viscosity ISO-VG at 40 °C in mm^2/s (cSt)	Minimum temperature limit in °C for dip lubrication	
	Mineral oil	Synthetic oil
VG 220	-15	-25
VG 320	-12	-25
VG 460	-10	-25

Dip lubrication

In the case of dip lubrication, all parts to be lubricated are lying in the oil or are adequately splash lubricated.

If the temperatures are below the values as listed in the table, the oil must be heated.

In case of dip lubrication, the oil temperature must not drop below the pour point of the selected oil.

In the case of ambient temperatures outside the permissible range, you will need to contact us.

Mineral oil of viscosity ISO-VG 220 is recommended as standard. For input speeds < 900 rpm oil of viscosity ISO-VG 460 is recommended in combination with a higher oil level.

Preservation

The internal preservation of FLENDER SIP gear units is dependent on the oil used.

For gear units with corrosion prevention, the following storage times are possible:

Standard preservation	Long-term preservation
Up to 6 months	Up to 24 months [1]
	Up to 36 months [2]

If the storage periods mentioned are exceeded, the anti-corrosive agent in the gear unit is to be renewed.

The externally protruding shaft ends and machined surfaces are also preserved.

Maintenance

Compliance with the conditions for operation and installation is essential. To prevent damage to the gear unit or failure of the drive, regular inspection and maintenance must be performed as specified in the operating instructions.

[1] Only if mineral oil or synthetic oil on PAO basis is used.

[2] Only if synthetic oil on PG basis is used.

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Selection of the gear units

3

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Constant mechanical power rating

Overview

1. Determination of gear unit type and size

1.1 Find the transmission ratio

$$i_s = \frac{n_1}{n_2}$$

1.2 Determine the nominal power rating of the gear unit

$$P_{2N} \geq P_2 \times f_1 \times f_2$$

It is not necessary to consult Siemens, if:

$$3.33 \times P_2 \geq P_{2N}$$

1.3 Check for maximum torque
e.g.: peak operating, starting or braking torque

$$P_{2N} = \frac{T_A \times n_1}{9550} \times f_3$$

Gear unit sizes and number of reduction stages are given in rating tables depending on i_N and P_{2N}.

1.4 Check whether additional forces on the output shaft are permissible; it is essential to consult Siemens!

1.5 Check whether the actual ratio i as per tables on Page 3/8 is acceptable

2. Determination of oil supply: Horizontal mounting position

All parts to be lubricated are lying in the oil or are splash lubricated.

3. Determination of required thermal capacity P_G

Data required:

- Gear unit size
- Nominal ratio
- Ambient temperature

For the calculation below, the following has been assumed:

- Gear unit with dip lubrication
- Operating cycle per hour: 100 %
- Installation in a large hall (wind velocity ≥ 1.4 m/s)
- Gear unit with mineral oil ISO-VG220

Determination of the thermal capacities:

- Without auxiliary cooling $P_G = P_{GA} \times f_4$

If $P_G \geq P_2 \rightarrow$ gear unit with selected cooling is adequate.

If $P_G < P_2 \rightarrow$ it is necessary to consult Siemens.

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Overview

For driven machines with constant speeds and variable power ratings the gear unit can be designed according to the equivalent power rating. For this a working cycle where phases I, II ... n require power P_I, P_{II} ... P_n and the respective power ratings operate for time fractions X_I, X_{II}...X_n is taken as a basis. The equivalent power rating can be calculated from these specifications with the following formula:

$$P_{2eq} = \sqrt[6.6]{P_I^{6.6} \times \frac{X_I}{100} + P_{II}^{6.6} \times \frac{X_{II}}{100} + ... P_n^{6.6} \times \frac{X_n}{100}}$$

The size of the gear unit can then be determined analogously to points 1.1 ... 1.5 and 3.

The following applies:

$$P_{2N} \geq P_{2eq} \times f_1 \times f_2$$

Then, when P_{2N} has been determined, the power and time fractions must be checked by applying the following requirements:

- The individual power fractions P_I, P_{II} … P_n must be greater than 0.4 x P_{2N}.
- The individual power fractions P_I, P_{II}... P_n must not exceed 1.4 x P_{2N}.
- If power fractions P_I, P_{II} ... P_n are greater than P_{2N}, the sum of time fractions X_I, X_{II} … X_n must not exceed 10 %.

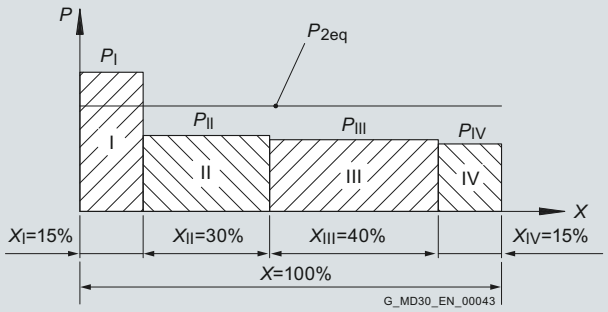
If any one of the three requirements is not met, P_{2eq} must be recalculated.

It must be borne in mind that a brief peak power rating not included in the calculation of P_{2eq} must not be greater than P_{max} = 1.5 x P_{2N}.

In applications where the torque is variable but the speed constant, the gear unit can be designed on the basis of the so called equivalent torque.

For specific applications, a gear unit design which is finite-life fatigue-resistant can be sufficient. This includes, for example, sporadic operation (e.g. lockgate drives).

Example: Service classification



In the case of a service classification, it is necessary to consult Siemens.

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Key to symbols

Overview

Key to symbols

Description	Explanation	Chapter/Page
E_D	Operating cycle per hour in % (e. g. E_D = 80 % per hour)	3/5, 3/9
f_1	Factor for driven machine	3/6
f_2	Factor for prime mover	3/7
f_3	Peak torque factor	3/7
f_4	Thermal factor	3/7
i	Actual ratio	3/8
i_N	Nominal ratio	
i_s	Required ratio	
n_1	Input speed (rpm)	3/2
n_2	Output speed (rpm)	3/2
P_G	Required thermal capacity (kW)	3/2
P_{GA}	Thermal capacity (kW) for gear units without auxiliary cooling	3/9
P_{2N}	Nominal power rating of gear unit (kW), see rating tables	3/8
$P_{req.}$	Required power rating (kW)	
P_2	Power rating of driven machine (kW)	3/2
t_U	Ambient temperature (°C)	
T_A	Max. torque occurring on input shaft, e.g.: peak operating, starting or braking torque (Nm)	3/2
T_{2N}	Nominal output torque (kNm)	3/9
T_2	Torque (Nm) of the driven machine	
P_{2eq}	Equivalent power rating (kW)	3/3
P_I, P_{II}, P_n	Fractions of power rating (kW) obtained from service classification	3/3
X_I, X_{II}, X_n	Fractions of time (%) obtained from service classification	3/3
f	Line frequency (Hz)	
T_{2req}	Required design torque	
i_{minSIP}	Minimum ratio of planetary gear unit	5/2
i_{maxSIP}	Maximum ratio of planetary gear unit	5/2
n_{minGM}	Minimum output speed of the geared motor	5/2
n_{maxGM}	Maximum output speed of the geared motor	5/2
n_{GM}	Output speed of the geared motor	
i_{actSIP}	Actual ratio of planetary gear unit	5/3
f_{max}	Maximum factor – maximum permissible overload of the drive	5/3
f_{Bk}	Breakdown factor of the electric motor	5/3
f_{St}	Starting factor of the electric motor	5/3
$f_{SactSIP}$	Actual service factor of the selected planetary gear unit	5/3

Notes and legend for tables of thermal capacities

Dimensions in mm
Weights in kg
Oil quantities in liters (l)
Fits to DIN/ISO 286-2

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Overview

Known criteria for the calculation example

Prime mover:

- Electric motor, 6-pole: P_1 = 55 kW
- Motor speed: n_1 = 1000 rpm
- Max. starting torque: T_A = 1332.5 Nm

Driven machine:

- Section mill: P_2 = 45 kW
- Speed: n_2 = 32 rpm
- Duty: 24 h/day
- Starts per hour: 15
- Operating cycle per hour: E_D = 40 %
- Ambient temperature: t_U = 50 °C
- Installation in a large hall

Gear unit design:

- Planetary gear unit
- Mounting position: horizontal
- Output shaft d_2: Hollow shaft with shrink disk
- Direction of rotation of output shaft d_2: counterclockwise, when viewing the shaft end face

The influence of additional forces on the shaft ends must be taken into account.

Required:

- Type of gear unit
- Gear unit size

1. Determination of gear unit type and size

1.1 Find the transmission ratio

$$i_s = \frac{n_1}{n_2} = \frac{1000\ \text{rpm}}{32\ \text{rpm}} = 31.25 \rightarrow i_N = 30\ \text{selected}$$

1.2 Determine the nominal power rating of the gear unit

$$P_{2N} \geq P_2 \times f_1 \times f_2 = 45\ \text{kW} \times 2.5 \times 1 = 112.5\ \text{kW}$$

From table, see Page 3/8 (nominal power rating P_{2N}) gear unit size FLENDER SIP 45 with P_{2N} = 127 kW selected.

1.3 Check the maximum loading

$$P_{max} = 45\ \text{kW} < 1.5 \times 127\ \text{kW} = 190.5\ \text{kW}$$

No load stage exceeds the permissible maximum loading.

1.4 Check for over dimensioning

$$3.33 \times P_2 \geq P_{2N} \qquad 3.33 \times 45\ \text{kW} = 149.85\ \text{kW} > P_{2N}$$

It is not necessary to consult Siemens.

1.5 Check the starting torque

$$P_{2N} \geq \frac{T_A \times n_1}{9550} \times f_3 = \frac{1332.5\ \text{Nm} \times 1000\ \text{rpm}}{9550} \times 1.26 = 175.8\ \text{kW}$$

$$P_{2N} = 127\ \text{kW} < 175.8\ \text{kW}$$

It is necessary to limit the motor torque on starting.

1.6 Check the thermal capacity P_G

Check whether $P_G \geq P_2$

$$P_G = P_{GA} \times f_4 = 42\ \text{kW} \times 0.74 = 31.08\ \text{kW}$$

Due to insufficient thermal capacity, another gear unit size, in this case FLENDER SIP 55, must be selected with:

P_G = 63 kW:

$$P_G = P_{GA} \times f_4 = 63\ \text{kW} \times 0.74 = 46.62\ \text{kW}$$

There will then be no need to limit the starting torque of the motor, because the following applies for the selected gear unit size:

$$P_{2N} = 236\ \text{kW} > 175.8\ \text{kW}$$

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Service factors

Overview

Factor for driven machines f_1

Driven machines	Effective operating period under load in hours		
	≤ 0.5	> 0.5 – 10	> 10
Waste water treatment			
• Thickeners (central drive)	–	–	1.2
• Filter presses	1.0	1.3	1.5
• Flocculation apparatus	0.8	1.0	1.3
• Aerators	–	1.8	2.0
• Raking equipment	1.0	1.2	1.3
• Combined longitudinal and rotary rakes	1.0	1.3	1.5
• Pre-thickeners	–	1.1	1.3
• Screw pumps	–	1.3	1.5
• Water turbines	–	–	2.0
Pumps			
• Centrifugal pumps	1.0	1.2	1.3
• Positive-displacement pumps			
- 1 piston	1.3	1.4	1.8
- > 1 piston	1.2	1.4	1.5
Dredgers			
• Bucket conveyors	–	1.6	1.6
• Dumping devices	–	1.3	1.5
• Caterpillar traveling gears	1.2	1.6	1.8
Bucket wheel excavators			
- as pick-up	–	1.7	1.7
- for primitive material	–	2.2	2.2
• Cutter heads	–	2.2	2.2
• Slewing gears [1]	–	1.4	1.8
Plate bending machines [1]	–	1.0	1.0
Chemical Industry			
• Extruders	–	–	1.6
• Dough mills	–	1.8	1.8
• Rubber calenders	–	1.5	1.5
• Cooling drums	–	1.3	1.4
Mixers for			
- uniform media	1.0	1.3	1.4
- non-uniform media	1.4	1.6	1.7
Agitators for media with			
- uniform density	1.0	1.3	1.5
- non-uniform density	1.2	1.4	1.6
- non-uniform gas absorption	1.4	1.6	1.8
• Toasters	1.0	1.3	1.5
• Centrifuges	1.0	1.2	1.3
Metal working mills			
• Plate tilters	1.0	1.0	1.2
• Ingot pushers	1.0	1.2	1.2
• Winding machines	–	1.6	1.6
• Cooling bed transfer frames	–	1.5	1.5
• Roller straighteners	–	1.6	1.6
Roller tables			
- continuous	–	1.5	1.5
- intermittent	–	2.0	2.0
• Reversing tube mills	–	1.8	1.8
Shears			
- continuous [1]	–	1.5	1.5
- crank type [1]	1.0	1.0	1.0
• Continuous casting drivers [1]	–	1.4	1.4
Rolls			
- Reversing blooming mills	–	2.5	2.5
- Reversing slabbing mills	–	2.5	2.5
- Reversing wire mills	–	1.8	1.8
- Reversing sheet mills	–	2.0	2.0
- Reversing plate mills	–	1.8	1.8
• Roll adjustment drives	0.9	1.0	–
Conveyors			
• Bucket conveyors	–	1.4	1.5
• Hauling winches	1.4	1.6	1.6
• Hoists	–	1.5	1.8
• Belt conveyors ≤ 150 kW	1.0	1.2	1.3
• Belt conveyors ≥ 150 kW	1.1	1.3	1.4
• Goods lifts [1]	–	1.2	1.5
• Passenger lifts [1]	–	1.5	1.8
• Apron conveyors	–	1.2	1.5
• Escalators	1.0	1.2	1.4
• Railway vehicles	–	1.5	–
Frequency converters	–	1.8	2.0
Reciprocating compressors	–	1.8	1.9
Cranes [2]			
• Slewing gears [1]	1.0	1.4	1.8
• Luffing gears	1.0	1.1	1.4
• Traveling gears	1.1	1.6	2.0
• Hoisting gears	1.0	1.1	1.4
• Derricking jib cranes	1.0	1.2	1.6
Cooling towers			
• Cooling tower fans	–	–	2.0
• Blowers (axial and radial)	–	1.4	1.5
Food industry			
Cane sugar production			
• Cane knives [1]	–	–	1.7
• Cane mills	–	–	1.7
Beet sugar production			
• Beet cossettes macerators	–	–	1.2
• Extraction plants, mechanical refrigerators, cooking appliances	–	–	1.4
• Beet washers, beet cutters	–	–	1.5
Paper machines			
• of all kinds [3]	–	1.8	2.0
• Pulper drives (on request)			
Centrifugal compressors	–	1.4	1.5
Cableways			
• Material ropeways	–	1.3	1.4
• To-and-fro system aerial ropeways	–	1.6	1.8
• T-bar lifts	–	1.3	1.4
• Continuous ropeways	–	1.4	1.6
Cement industry			
• Concrete mixers	–	1.5	1.5
• Breakers [1]	–	1.2	1.4
• Rotary kilns	–	–	2.0
• Tube mills	–	–	2.0
• Separators	–	1.6	1.6
• Roll crushers	–	–	2.0

Note: The listed load parameters are empirical values. Prerequisite for their application is that the machinery and equipment mentioned correspond to generally accepted design and load specifications. In case of deviations from standard conditions, please contact us. For driven machines which are not listed in this table, please refer to us.

Design for power rating of driven machine P_2:

[1] Designed power corresponding to max. torque

[2] Load can be exactly classified, for instance, according to FEM 1001

[3] A check for thermal capacity is absolutely essential

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Overview (continued)

Factor for prime mover f_2

Machine	Factor for prime mover f_2
Electric motors, hydraulic motors, turbines	1.0
Piston engines 4 – 6 cylinders, cyclic variation 1 : 100 to 1 : 200	1.25
Piston engines 1 – 3 cylinders cyclic variation 1 : 100	1.5

Peak torque factor f_3

Direction of load	Peak torque factor f_3			
	Load peaks per hour			
	1 – 5	6 – 30	31 – 100	> 100
Steady direction of load	0.67	0.86	0.93	1.13
Alternating direction of load	0.93	1.26	1.46	1.66

Thermal factor f_4

(Gear units without auxiliary cooling or with fan)

Ambient temperature t_U in °C	Operating cycle per hour (E_D) in %				
	100	80	60	40	20
10	1.14	1.20	1.32	1.54	2.04
20	1.00	1.06	1.16	1.35	1.79
30	0.87	0.93	1.00	1.18	1.56
40	0.71	0.75	0.82	0.96	1.27
50	0.55	0.58	0.64	0.74	0.98

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Overview tables

Actual ratio *i*
Nominal power ratings P_{2N} (kW)

Technical data

Actual ratio i

Nominal ratio	Gear unit sizes							
i_N	30	35	37	40	45	50	55	60
25	25.07	25.07	25.07	25.07	25.07	25.07	25.07	25.07
27	27.26	27.26	27.26	27.26	27.26	27.26	27.26	27.26
30	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
33.5	33.52	33.52	33.52	33.52	33.52	33.52	33.52	33.52
38	38.22	38.22	38.22	38.22	38.22	38.22	38.22	38.22
45	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80

Nominal power ratings P_{2N} (kW)

Nominal ratio	Input speed	Output speed	Gear unit sizes							
i_N	n_1 rpm	n_2 rpm	30	35	37	40	45	50	55	60
25	1800	129	78	117	157	196	274	352	509	626
	1500	72	65	98	131	163	228	294	424	522
	1200	48	52	78	104	131	183	235	339	418
	1000	40	44	65	87	109	152	196	283	348
27	1800	119	72	108	144	180	252	324	468	579
	1500	66	60	90	120	150	210	270	390	480
	1200	44	48	72	96	120	168	216	312	384
	1000	37	40	60	80	100	140	180	260	320
30	1800	108	65	98	131	164	229	294	425	523
	1500	60	55	82	109	136	191	245	354	436
	1200	40	44	65	87	109	153	196	284	349
	1000	33	36	55	73	91	127	164	236	291
33.5	1800	97	59	88	117	146	205	263	381	468
	1500	54	49	73	98	122	171	220	317	390
	1200	36	39	59	78	98	137	176	254	312
	1000	30	33	49	65	81	114	146	211	260
38	1800	85	51	77	103	128	180	231	334	411
	1500	47	43	64	86	107	150	193	278	342
	1200	31	34	51	68	86	120	154	223	274
	1000	26	29	43	57	71	100	128	185	228
45	1800	72	44	66	88	110	153	197	285	351
	1500	40	37	55	73	91	128	164	237	292
	1200	27	29	44	58	73	102	131	190	234
	1000	22	24	37	49	61	85	110	158	195

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Technical data (continued)

Nominal output torques T_{2N} (kNm)

Nominal ratio	Gear unit sizes							
i_N	30	35	37	40	45	50	55	60
25	10	15	20	25	35	45	65	80
27	10	15	20	25	35	45	65	80
30	10	15	20	25	35	45	65	80
33.5	10	15	20	25	35	45	65	80
38	10	15	20	25	35	45	65	80
45	10	15	20	25	35	45	65	80

Thermal capacity P_{GA} (kW) n_1 = 1500 rpm

Nominal ratio	Gear unit sizes							
i_N	30	35	37	40	45	50	55	60
25	13	20	26	32	42	52	63	73
27	13	20	26	32	42	52	63	73
30	13	20	26	32	42	52	63	73
33.5	13	20	26	32	42	52	63	73
38	13	20	26	32	42	52	63	73
45	13	20	26	32	42	52	63	73

The values are applicable for:

- Operating cycle per hour: 100 %,
- Installation in a large hall,
- Up to 1000 m above sea level,
- Ambient temperature t_U = 20 °C

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Notes

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Flange-mounted gear units horizontal mounting position

4

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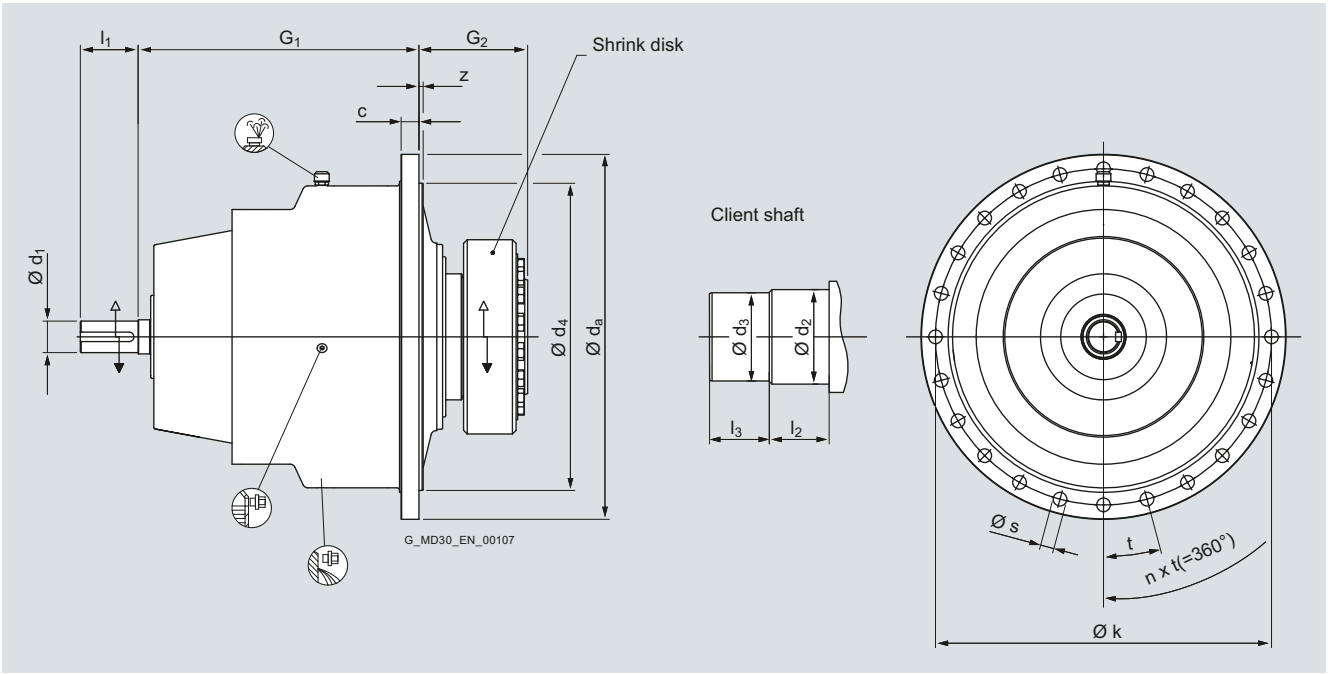
Gear unit dimensions
Two-stage gear units, coaxial

Selection and ordering data



	Dimensions in mm											
O2RC Gear unit sizes	Drive end shaft end		Flange									
	Ø d_1 [1]	l_1	c	Ø d_a	Ø d_4 f7	G_1	G_2	Ø k	z	Ø s	n	t
30	40	70	17	375	290	354	133	335	8	17.5	16	22.5°
35	40	70	17	425	340	373	138	385	8	17.5	20	18°
37	45	80	19	450	370	393	149	410	8	17.5	24	15°
40	45	80	19	480	390	399	152	435	8	22	18	20°
45	50	100	19	540	445	428	166	490	8	22	20	18°
50	50	100	24	585	495	450	167	540	8	22	24	15°
55	60	110	29	650	535	516	185	595	8	26	24	15°
60	60	110	34	695	585	535	207	640	8	26	24	15°

Output

Data position of the Order No.						1 to 6	7		8	9	10	11	12		13	14	15	16
Order No.:						**2LP069**	**0**	**-**	**0**	**E**	■	**.**	**0**	**-**	**0**	**.**	**.**	**0**
Gear unit sizes	Chamfer on d_2	Dimensions in mm Shaft of driven machine				Oil quantity	Weight [3]				For order No. supplement for 11th, 14th and 15th position, see Pages 4/4 to 4/5							
		Ø d_2 h6 [2]	Ø d_3 h6 [2]	l_2	l_3	l	kg											
30	1 x 45°	90	88	60	60	1.80	100				**A**							
35	1 x 45°	100	98	64	64	2.00	130				**B**							
37	1 x 45°	110	108	68	68	2.70	167				**C**							
40	1 x 45°	120	118	76	76	3.00	186				**D**							
45	2.5 x 45°	130	125	80	80	4.80	268				**E**							
50	2.5 x 45°	140	135	82	82	5.50	331				**F**							
55	2.5 x 45°	165	160	96	96	8.00	480				**G**							
60	2.5 x 45°	180	175	116	100	8.40	576				**H**							

[1] Shaft diameter d_1 < 100 → tolerance m6
For shaft end d_1 with parallel key in accordance with DIN 6885-1 and central holes, see Page 6/2.

[2] > 160 g6

[3] Weight with shrink disk and without oil.

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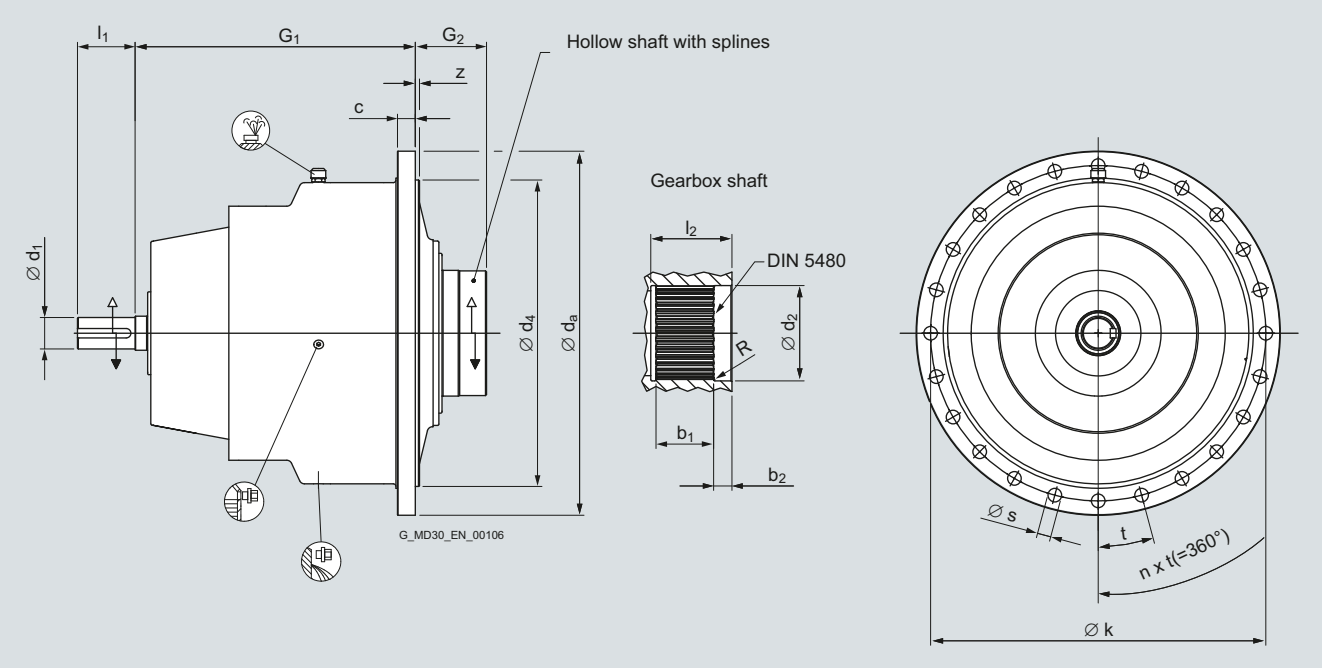
Flange-mounted gear units horizontal mounting position

Selection and ordering data (continued)



O2RC Gear unit sizes	Dimensions in mm Drive end shaft end		Flange									
	Ø d_1 [1]	l_1	c	Ø d_a	Ø d_4 f7	G_1	G_2	Ø k	z	Ø s	n	t
30	40	70	17	375	290	354	84	335	8	17.5	16	22.5°
35	40	70	17	425	340	373	82	385	8	17.5	20	18°
37	45	80	19	450	370	393	101	410	8	17.5	24	15°
40	45	80	19	480	390	399	104	435	8	22	18	20°
45	50	100	19	540	445	428	117	490	8	22	20	18°
50	50	100	24	585	495	450	114	540	8	22	24	15°
55	60	110	29	650	535	516	130	595	8	26	24	15°
60	60	110	34	695	585	535	136	640	8	26	24	15°

Output

Data position of the Order No.								1 to 6	7	8	9	10	11	12	13	14	15	16
Order No.								**2LP069**	**1**	**0**	**E**	■	-	**0**	**0**	-	-	**0**
Gear unit sizes	Dimensions in mm Shaft of driven machine					Oil quantity	Weight [3]	Shaft of driven machine with splines in accordance with DIN 5480					For order No. supplement for 11th, 14th and 15th position, see Pages 4/4 to 4/5					
	Ø d_2 h6 [2]	l_2	b_1	b_2	R	l	kg											
30	92	81	55	20	1.5	1.80	93	W 90 x 3 x 28 x 8f				**A**						
35	102	86	60	20	1.5	2.00	118	W 100 x 3 x 32 x 8f				**B**						
37	112	102	70	25	1.5	2.70	153	W 110 x 3 x 35 x 8f				**C**						
40	122	107	75	25	1.5	3.00	166	W 120 x 3 x 38 x 8f				**D**						
45	132	118	80	30	2.5	4.80	242	W 130 x 5 x 24 x 8f				**E**						
50	142	123	85	30	2.5	5.50	303	W 140 x 5 x 26 x 8f				**F**						
55	172	144	100	35	2.5	8.00	438	W 170 x 5 x 32 x 8f				**G**						
60	182	155	110	35	2.5	8.40	516	W 180 x 5 x 34 x 8f				**H**						

[1] Shaft diameter d_1 < 100 → tolerance m6
For shaft extension d_1 with parallel key in accordance with DIN 6885-1 and central holes, see Page 6/2.

[2] > 160 g6

[3] Weight without oil.

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Two-stage gear units, coaxial

Selection and ordering data (continued)

Order No. supplement 7th, 10th, 11th and 14th position

		Data position of the Order No.	1 to 6	7		8	9	10	11	12		13	14	15	16
		Order No.	**2LP069**	■	-	**0**	**E**	■	■	**0**	-	**0**	■	.	**0**
Output shaft design															
Hollow shaft for shrink disk				**0**											
Hollow shaft with splines in accordance with DIN 5480				**1**											
Gear unit size															
30								**A**							
35								**B**							
37								**C**							
40								**D**							
45								**E**							
50								**F**							
55								**G**							
60								**H**							
Sealing															
Seal on input shaft	**Seal on output shaft**														
WDR	WDR								**0**						
WDR	Taconite								**1**						
Taconite	WDR								**2**						
Taconite	Taconite								**3**						
Nominal gear ratio i_N															
25													**A**		
27													**B**		
30													**C**		
33.5													**D**		
38													**E**		
45													**F**		

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Selection and ordering data (continued)

Order No. supplement, 15th position

For motor size	Motor power P_M kW	Rated speed n_M rpm	Data position of the Order No.	1 to 6	7	8	9	10	11	12	13	14	15	16	Order code
			Order No.	**2LP069**	**.**	**-**	**0**	**E**	**.**	**.**	**0**	**-**	**0**	**.**	■	**0**	**...**
4-pole, 50 Hz															
IEC 63M	0.18	1395											**A**		–
IEC 71M	0.37	1384											**B**		–
IEC 80M	0.75	1399											**C**		–
IEC 90S	1.1	1440											**D**		–
IEC 90L	1.5	1440											**E**		–
IEC 100L	3	1420											**F**		–
IEC 112M	4	1440											**G**		–
IEC 132S	5.5	1455											**H**		–
IEC 132M	7.5	1455											**J**		–
IEC 160M	11	1460											**K**		–
IEC 160L	15	1460											**L**		–
IEC 180M	18.5	1465											**M**		–
IEC 180L	22	1465											**N**		–
IEC 200L	30	1465											**P**		–
IEC 225S	37	1475											**Q**		–
IEC 225M	45	1475											**R**		–
IEC 250M	55	1480											**S**		–
IEC 280S	75	1485											**T**		–
IEC 280M	90	1485											**U**		–
IEC 315S	110	1488											**V**		–
IEC 315M	132	1488											**W**		–
4-pole, 60 Hz															
IEC 63M	0.21	1705											**Z**		**Q1A**
IEC 71M	0.43	1725											**Z**		**Q1B**
IEC 80M	0.86	1725											**Z**		**Q1C**
IEC 90S	1.3	1755											**Z**		**Q1D**
IEC 90L	1.75	1775											**Z**		**Q1E**
IEC 100L	3.45	1704											**Z**		**Q1F**
IEC 112M	4.6	1728											**Z**		**Q1G**
IEC 132S	6.3	1746											**Z**		**Q1H**
IEC 132M	8.6	1746											**Z**		**Q1J**
IEC 160M	12.6	1752											**Z**		**Q1K**
IEC 160L	17.3	1752											**Z**		**Q1L**
IEC 180M	21.3	1758											**Z**		**Q1M**
IEC 180L	25.3	1758											**Z**		**Q1N**
IEC 200L	34.5	1758											**Z**		**Q1P**
IEC 225S	42.5	1770											**Z**		**Q1Q**
IEC 225M	52	1770											**Z**		**Q1R**
IEC 250M	63	1776											**Z**		**Q1S**
IEC 280S	86	1782											**Z**		**Q1T**
IEC 280M	104	1782											**Z**		**Q1U**
IEC 315S	127	1786											**Z**		**Q1V**
IEC 315M	152	1786											**Z**		**Q1W**
Other motor	Y23 [1]	Y20 [1]											**Z**		**Q1Y**

[1] In addition to order code Y23 and Y20, plain text is required for P_M or n_M.

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Flange-mounted gear units horizontal mounting position

Notes

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Gear unit combinations

5

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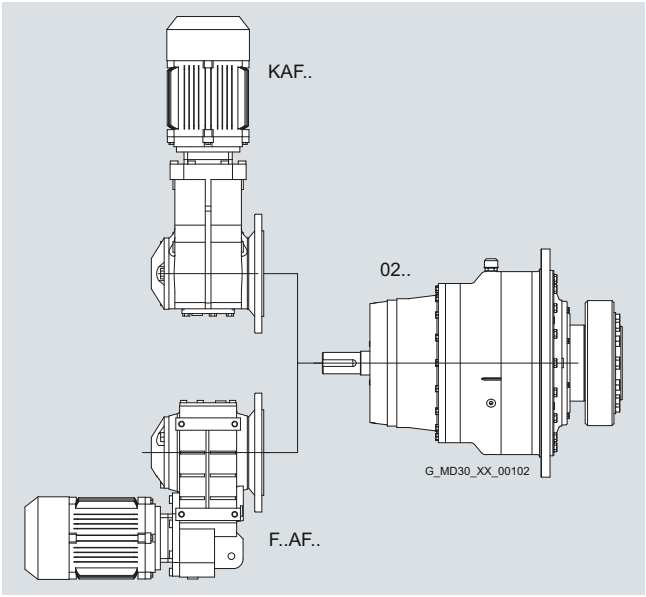
Gear unit combinations
FLENDER SIP with MOTOX-N

Overview

The planetary gear units of the FLENDER SIP series can be combined with parallel shaft and bevel helical geared motors of the MOTOX-N series.

Benefits

- Combination of the two series as standard
- Large selection of motors, such as asynchronous and servo motors
- Large range of ratios
- Orthogonal as well as parallel arrangement
- Utilization of the MOTOX-N product spectrum in the context of the Siemens DriveTrain
- Utilization of options, such as brakes, encoders and sensors



O2.. – FLENDER SIP planetary gear unit

KAF.. – Bevel helical geared motor MOTOX-N

F..AF.. – Parallel shaft geared motor MOTOX-N

Design

Standard assignment

O2..	KAF../F..AF..	Nominal size flange geared motor	Nominal diameter of hollow shaft geared motor
30	48	A200	40
35	48	A200	40
37	68	A250	45
40	68	A250	45
45	88	A300	50
50	88	A300	50
55	108	A350	60
60	108	A350	60

The gear units of the MOTOX-N series must be the flange-mounted version with hollow shaft and parallel keyway.

Configuration

Design example for belt conveyor

Prime mover:

- Electric motor, 4-pole: P_1 = 3 kW
- Line frequency: f = 50 Hz

Driven machine:

- Speed: n_2 = 0.9 rpm
- Service factor: f_1 = Page 3/6

Gear unit design:

- Mounting position: Horizontal
- Shaft arrangement: Orthogonal

1. Determination of the SIP gear unit size

$$T_2 = \frac{P_1 \times 9550}{n_2} = \frac{3\ \text{kW} \times 9550}{0.9\ \text{rpm}}$$

$$T_2 = 31833.4\ \text{Nm}$$

$$T_{2req} = T_2 \times f_1 = 31833.4\ \text{Nm} \times 1.4$$

$$T_{2req} = 44566.7\ \text{Nm}$$

$$T_{2N} \geq T_{2req}$$

$$45000\ \text{Nm} \geq 44566.7\ \text{Nm}$$

Selected gear unit size from selection table on Page 3/9: FLENDER SIP 50.

2. Determination of the associated geared motor

2.1 Calculation of the values

$$n_{minGM} = n_2 \times i_{minSIP} = 0.9\ \text{rpm} \times 25$$

$$n_{minGM} = 22.5\ \text{rpm}$$

$$n_{maxGM} = n_2 \times i_{maxSIP} = 0.9\ \text{rpm} \times 45$$

$$n_{maxGM} = 40.5\ \text{rpm}$$

Possible speed range for geared motor: 22.5 rpm… 40.5 rpm

Values for selecting the geared motor:

- Electric motor, 4-pole: P_1 = 3 kW
- Line frequency: f = 50 Hz
- Output speed: n_{GM} = 22.5 rpm… 40.5 rpm
- Service factor: $f_1 \geq 1.4$

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Configuration (continued)

2.2 Selection of the geared motor

Set filter in accordance with the actual values and select geared motor with regard to the shaft arrangement.

Note: The standard assignment as shown in the table on Page 5/2 must be complied with. Other combinations are available on request.

The thermal capacity of the geared motor must be checked.

Selection: KAF 88

Possible speeds for MOTOX-N: 35, 29, 25

2.3 Selection of speed of the geared motor

$$n_2 = \frac{n_{GM}}{i_{actSIP}}$$

For table, see Page 3/8.

Due to the wide variety of possible speeds for MOTOX-N, the use of a matrix is recommended for the purposes of comparing all the combinations.

Output speed of geared motor n_{GM}	Actual ratio i planetary gear unit i_{istSIP}					
	25.07	27.26	30.00	33.52	38.22	44.80
35	1.40	1.28	1.17	1.04	0.92	0.78
29	1.16	1.06	0.97	0.87	0.76	0.65
25	1.00	0.92	0.83	0.75	0.65	0.56

Selected geared motor:

- K88-LA100ZLD4E with:
  - P_1 = 3 kW
  - n_{GM} = 35 rpm

2.4 Check for overload

The peak loads resulting from the starting procedure must not exceed the maximum factor for the gear unit combination f_{max}. If this is the case, it is important to implement appropriate limiting using a frequency converter, or similar.

The peak factors f_{Bk}/f_{St} must be taken from the associated motor data sheet of Catalog D 87.1 MOTOX Geared Motors. The highest value must be used in each case.

$$f_{max} \geq f_{Bk} \text{ or } f_{St}$$

$$f_{max} = \frac{f_{SactSIP}}{f_3} \qquad f_3 \text{ see Page 3/7}$$

$$f_{SactSIP} = \frac{T_{2N}}{T_2} = \frac{45000\ \text{Nm}}{31833.4\ \text{Nm}}$$

$$f_{SactSIP} = 1.41$$

$$f_{max} = \frac{1.41}{0.67} = 2.1$$

$$2.1 \leq 3.9$$

The breakdown torque or starting torque of the electric motor must therefore be limited to maximum 2.1 times, using a frequency converter for example.

2.5 Configuration of geared motor with mandatory selection of options:

1. Flange mounting type – design FAF.. or K..AF..
2. Output shaft type – hollow shaft
3. Diameter of output shaft – to match d_1 on Page 4/2 or 4/3

5

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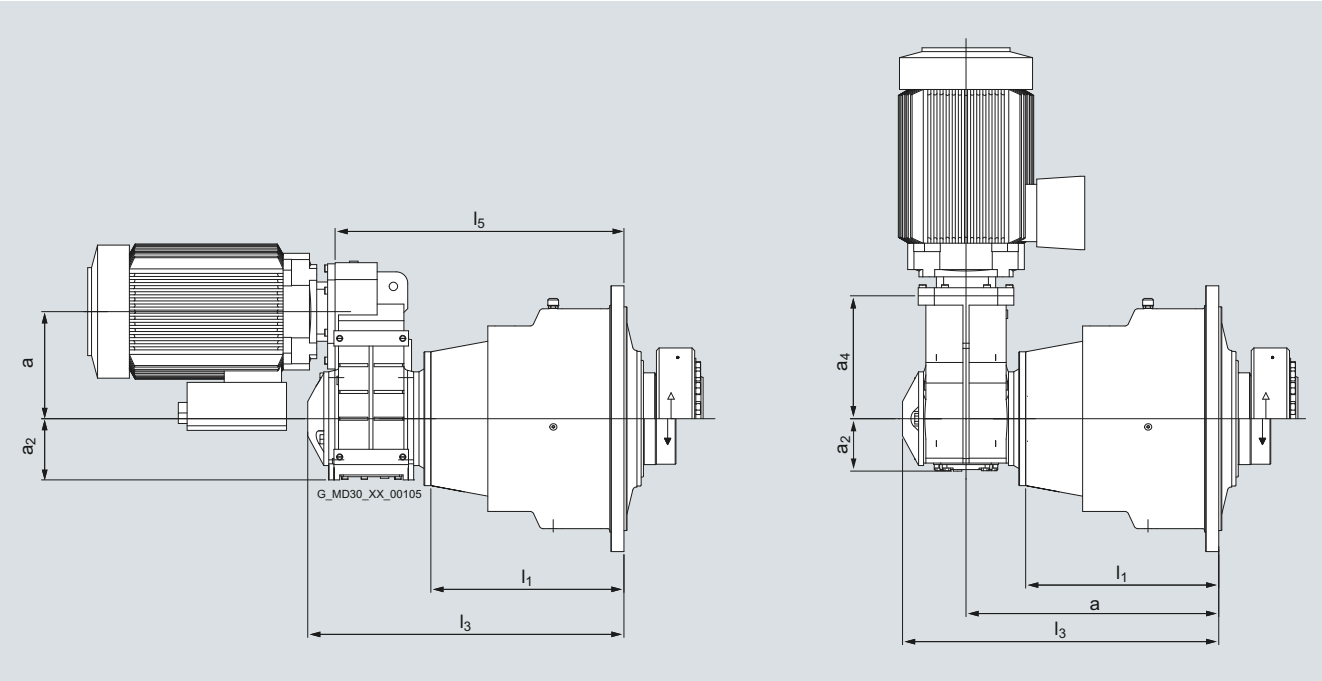
Gear unit combinations
FLENDER SIP with MOTOX-N

Dimensioned drawings



Data position of the Order			1 to 6	7		8	9	10	11	12		13	14	15	16
Order No.:			**2LP069**	.	-	**0**	**F**	■	.	**0**	-	.	.	**A**	.
O2RR Gear unit sizes	KAF..size	Dimensions in mm SIP	KAF..						For order No. supplement for 7th, 11th, 13th, 14th and 16th position, see Pages 5/5 to 5/6						
		l_1	a	a_2	a_4	l_3									
30	48	332	432	78	186	520		**A**							
35	48	351	451	78	186	539		**B**							
37	68	373	486	89	220	593		**C**							
40	68	379	492	89	220	599		**D**							
45	88	394	536	110	262	671		**E**							
50	88	416	558	110	262	693		**F**							
55	108	483	639	136	328	799		**G**							
60	108	502	658	136	328	818		**H**							

Data position of the Order			1 to 6	7		8	9	10	11	12		13	14	15	16
Order No.:			**2LP069**	.	-	**0**	**F**	■	.	**1**	-	.	.	**A**	.
O2RP Gear unit sizes	F..AF..size	Dimensions in mm SIP	F..AF..						For order No. supplement for 7th, 11th, 13th, 14th and 16th position, see Pages 5/5 to 5/6						
		l_1	a	a_2	l_3	l_5									
30	48	332	150	93	533	491		**A**							
35	48	351	150	93	552	510		**B**							
37	68	373	180	111	606	551		**C**							
40	68	379	180	111	612	557		**D**							
45	88	394	230	132	683	621		**E**							
50	88	416	230	132	706	643		**F**							
55	108	483	280	160	805	739		**G**							
60	108	502	280	160	824	758		**H**							

The motor dimensions can be found in Catalog D 87.1, MOTOX Geared Motors. The overall dimensions of the SIP MOTOX-N combination are obtained on the basis of these values.

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Selection and ordering data

Order No. supplement 7th, 11th, 12th and 14th position

	Data position of the Order No.	1 to 6	7	8	9	10	11	12	13	14	15	16
	Order No.	**2LP069**	■	- **0**	**F**	.	■	■	-	.	■	**A**	.
Output shaft design												
Hollow shaft for shrink disk			**0**									
Hollow shaft with splines in accordance with DIN 5480			**1**									
Sealing												
Seal on input shaft	**Seal on output shaft**											
WDR	WDR						**0**					
WDR	Taconite						**1**					
Type												
O2RR (FLENDER SIP O2RR with intermediate gear KAF.., shaft arrangement d_1 to d_2: orthogonal)								**0**				
O2RP (FLENDER SIP O2RP with intermediate gear F..AF.., shaft arrangement d_1 to d_2: parallel)								**1**				
Nominal gear ratio i_N												
25										**A**		
27										**B**		
30										**C**		
33.5										**D**		
38										**E**		
45										**F**		

Order No. supplement 13th and 16th position for FLENDER SIP O2RR with intermediate gear KAF

	Data position of the Order No.	1 to 6	7	8	9	10	11	12	13	14	15	16
	Order No.	**2LP069**	.	- **0**	**F**	.	.	**0**	-	■	.	**A**	■
Ratio of intermediate gear												
SIP O2RR gear unit sizes												
30	**35**	**37**	**40**	**45**	**50**	**55**	**60**					
7.22	7.22	5.36	5.36	5.54	5.54	7.68	7.68			**0**		**0**
8.40	8.40	6.44	6.44	6.69	6.69	9.36	9.36			**0**		**1**
9.32	9.32	7.58	7.58	8.03	8.03	10.97	10.97			**0**		**2**
10.15	10.15	8.50	8.50	9.41	9.41	12.90	12.90			**0**		**3**
11.35	11.35	9.52	9.52	11.21	11.21	13.74	13.74			**0**		**4**
11.95	11.95	10.40	10.40	11.64	11.64	16.75	16.75			**0**		**5**
13.90	13.90	11.41	11.41	14.04	14.04	19.63	19.63			**0**		**6**
15.42	15.42	11.94	11.94	16.85	16.85	23.08	23.08			**0**		**7**
16.79	16.79	14.35	14.35	19.75	19.75	26.48	26.48			**0**		**8**
18.78	18.78	16.89	16.89	23.54	23.54	31.25	31.25			**1**		**0**
20.54	20.54	18.93	18.93	25.53	25.53	33.87	33.87			**1**		**1**
22.54	22.54	21.22	21.22	28.50	28.50	36.44	36.44			**1**		**2**
24.85	24.85	23.16	23.16	30.87	30.87	44.44	44.44			**1**		**3**
27.55	27.55	25.42	25.42	34.40	34.40	52.08	52.08			**1**		**4**
28.90	28.90	27.99	27.99	41.50	41.50	61.22	61.22			**1**		**5**
33.60	33.60	30.38	30.38	49.80	49.80	70.24	70.24			**1**		**6**
37.28	37.28	32.78	32.78	58.37	58.37	82.90	82.90			**1**		**7**
40.60	40.60	39.39	39.39	69.57	69.57	89.85	89.85			**1**		**8**
45.41	45.41	46.37	46.37	75.45	75.45	99.90	99.90			**2**		**0**
49.65	49.65	51.96	51.96	84.21	84.21	108.52	108.52			**2**		**1**
54.49	54.49	58.23	58.23	91.22	91.22	120.03	120.03			**2**		**2**
60.08	60.08	63.57	63.57	103.38	103.38	128.86	128.86			**2**		**3**
66.60	66.60	69.78	69.78	111.37	111.37	138.87	138.87			**2**		**4**
75.45	75.45	76.84	76.84	120.42	120.42	150.31	150.31			**2**		**5**
83.25	83.25	83.40	83.40	130.77	130.77	163.51	163.51			**2**		**6**
94.12	94.12	90.89	90.89	144.58	144.58	178.90	178.90			**2**		**7**
107.47	107.47	99.55	99.55	156.63	156.63	201.11	201.11			**2**		**8**
122.19	122.19	109.64	109.64	176.50	176.50	219.64	219.64			**2**		**0**
130.78	130.78	126.09	126.09	193.24	193.24	243.47	243.47			**3**		**1**
150.76	150.76	136.60	136.60	215.25	215.25	278.10	278.10			**3**		**2**
169.53	169.53	150.98	150.98	246.13	246.13	307.24	307.24			**3**		**3**
		176.14	176.14	272.95	272.95					**3**		**4**
		196.07	196.07	302.68	302.68					**3**		**5**
		215.68	215.68							**3**		**6**
		243.72	243.72							**3**		**7**

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Gear unit combinations
FLENDER SIP with MOTOX-N

Selection and ordering data (continued)

Order No. supplement 13th and 16th position for FLENDER SIP O2RP with intermediate gear F.AF

								Data position of the Order No.	1 to 6	7	8	9	10	11	12	13	14	15	16
								Order No.	2LP069	.	-	0	F	.	.	1	-	■	.	A	■
Ratio of intermediate gear																			
SIP O2RP gear unit sizes																			
30	**35**	**37**	**40**	**45**	**50**	**55**	**60**												
4.33	4.33	3.97	3.97	4.77	4.77	5.68	5.68									**0**			**0**
5.20	5.20	4.49	4.49	5.82	5.82	6.60	6.60									**0**			**1**
6.12	6.12	5.75	5.75	6.82	6.82	7.32	7.32									**0**			**2**
6.86	6.86	6.74	6.74	8.01	8.01	8.70	8.70									**0**			**3**
7.68	7.68	8.03	8.03	9.19	9.19	10.04	10.04									**0**			**4**
8.39	8.39	8.55	8.55	10.71	10.71	10.98	10.98									**0**			**5**
9.23	9.23	10.31	10.31	13.07	13.07	12.77	12.77									**0**			**6**
11.09	11.09	12.38	12.38	15.31	15.31	14.16	14.16									**0**			**7**
13.05	13.05	14.51	14.51	18.00	18.00	16.82	16.82									**0**			**8**
14.63	14.63	17.29	17.29	20.65	20.65	19.41	19.41									**1**			**0**
16.39	16.39	18.75	18.75	24.38	24.38	22.81	22.81									**1**			**1**
17.89	17.89	20.93	20.93	26.42	26.42	25.85	25.85									**1**			**2**
19.64	19.64	22.67	22.67	29.38	29.38	30.33	30.33									**1**			**3**
21.63	21.63	25.69	25.69	31.91	31.91	33.09	33.09									**1**			**4**
23.48	23.48	27.68	27.68	35.29	35.29	36.10	36.10									**1**			**5**
25.59	25.59	29.93	29.93	37.89	37.89	38.95	38.95									**1**			**6**
28.02	28.02	32.50	32.50	40.83	40.83	43.54	43.54									**1**			**7**
30.86	30.86	35.93	35.93	44.20	44.20	46.64	46.64									**1**			**8**
35.49	35.49	38.93	38.93	48.03	48.03	48.24	48.24									**2**			**0**
38.45	38.45	43.87	43.87	52.60	52.60	50.15	50.15									**2**			**1**
42.50	42.50	48.03	48.03	54.47	54.47	54.17	54.17									**2**			**2**
43.09	43.09	50.48	50.48	59.13	59.13	58.20	58.20									**2**			**3**
47.40	47.40	53.50	53.50	64.58	64.58	58.80	58.80									**2**			**4**
49.58	49.58	58.71	58.71	65.43	65.43	64.21	64.21									**2**			**5**
55.06	55.06	61.17	61.17	77.04	77.04	69.84	69.84									**2**			**6**
55.19	55.19	65.14	65.14	86.33	86.33	81.86	81.86									**2**			**7**
59.62	59.62	70.93	70.93	96.75	96.75	97.57	97.57									**2**			**8**
60.71	60.71	79.33	79.33	105.61	105.61	105.81	105.81									**3**			**0**
67.43	67.43	86.74	86.74	115.93	115.93	118.11	118.11									**3**			**1**
74.10	74.10	95.20	95.20	127,,66	127,,66	127.92	127.92									**3**			**2**
81.73	81.73	104.96	104.96	138.56	138.56	144.99	144.99									**3**			**3**
90.53	90.53	116.36	116.36	151.01	151.01	156.19	156.19									**3**			**4**
100.80	100.80	131.82	131.82	165.38	165.38	168.88	168.88									**3**			**5**
115.68	115.68	145.44	145.44	182.15	182.15	183.39	183.39									**3**			**6**
128.04	128.04	164.44	164.44	209.49	209.49	202.77	202.77									**3**			**7**
145.63	145.63	187.76	187.76	226.94	226.94	219.66	219.66									**3**			**8**
166.19	166.19	213.48	213.48	250.83	250.83	247.53	247.53									**4**			**0**
187.24	187.24	228.48	228.48	292.64	292.64	271.01	271.01									**4**			**1**
209.23	209.23	263.39	263.39	325.76	325.76	301.88	301.88									**4**			**2**
238.65	238.65	296.18	296.18	358.33	358.33	345.19	345.19									**4**			**3**
268.80	268.80			404.92	404.92	382.79	382.79									**4**			**4**
						424.49	424.49									**4**			**5**

Two-stage paralllel shaft geared motor FZAF
Three-stage parallell shaft geared motor FDAF

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Connection dimensions

6

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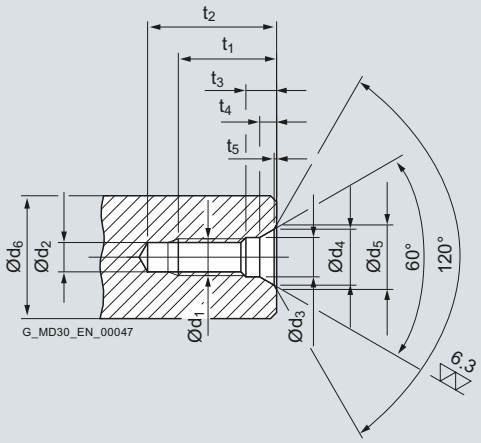
Cylindrical shaft ends

Central holes, form DS in shaft ends DIN 332-1

Dimensioned drawings

Form DS with thread, straight running surface and protective counterbore



Recommended diameter ranges Ø d_6 [1]		Form DS											
		DS centering	Ø d_1	Ø d_2 [2]	Ø d_3	Ø d_4	Ø d_5	t_1	t_2		t_3	t_4	t_5
above	to							+2	min.	max.			
mm	mm		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
16	**21**	DS 6	M 6	5.0	6.4	9.6	10.5	16.0	21	23	5.0	2.8	0.4
21	**24**	DS 8	M 8	6.8	8.4	12.2	13.2	19.0	25	28	6.0	3.3	0.4
24	**30**	DS 10	M 10	8.5	10.5	14.9	16.3	22.0	30	34	7.5	3.8	0.6
30	**38**	DS 12	M 12	10.2	13.0	18.1	19.8	28.0	37	42	9.5	4.4	0.7
38	**50**	DS 16	M 16	14.0	17.0	23.0	25.3	36.0	45	50	12.0	5.2	1.0

[1] Diameter refers to the finished workpiece.
[2] Tap hole drill diameter acc. to DIN 336-1.

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Overview

Selection of fit

Selection of fit	Shaft Ø d		Shaft tolerance	Bore tolerance
	above	to		
	mm	mm		
Shaft tolerance acc. to Flender standard		25	k6	H7
	25	100	m6	
	100		h6	

For heavy duty operating conditions, e.g. reversing under load, it is recommended that a tighter fit and for the hub keyway width of the ISO tolerance P9 is selected (special design).

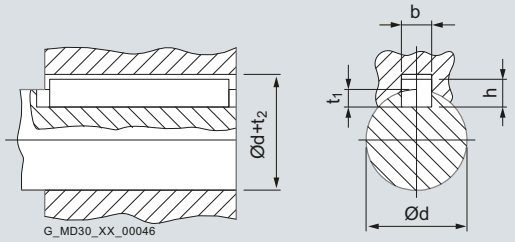
In this case, the customer should give the relevant information.

Parallel keys and parallel keyways

Drive type fastening without taper action

Parallel key and keyway to DIN 6885-1

Parallel key form B



Diameter		Width	Height	Depth of keyway in shaft	Depth of keyway in hub
Ø d		b [1]	h	t_1	d + t_2
above	to				DIN 6885-1
mm	mm	mm	mm	mm	mm
17	22	6	6	3.5	d + 2.8
22	30	8	7	4	d + 3.3
30	38	10	8	5	d + 3.3
38	44	12	8	5	d + 3.3
44	50	14	9	5.5	d + 3.8
50	58	16	10	6	d + 4.3
58	65	18	11	7	d + 4.4

For heavy duty operating conditions, e.g. reversing under load, it is recommended that a tighter fit and for the hub keyway width of the ISO tolerance P9 is selected (special design).

In this case, the customer should give the relevant information.

[1] The tolerance zone for the hub keyway width b is ISO JS9, or ISO P9 for heavy duty operating conditions (P9 special design).

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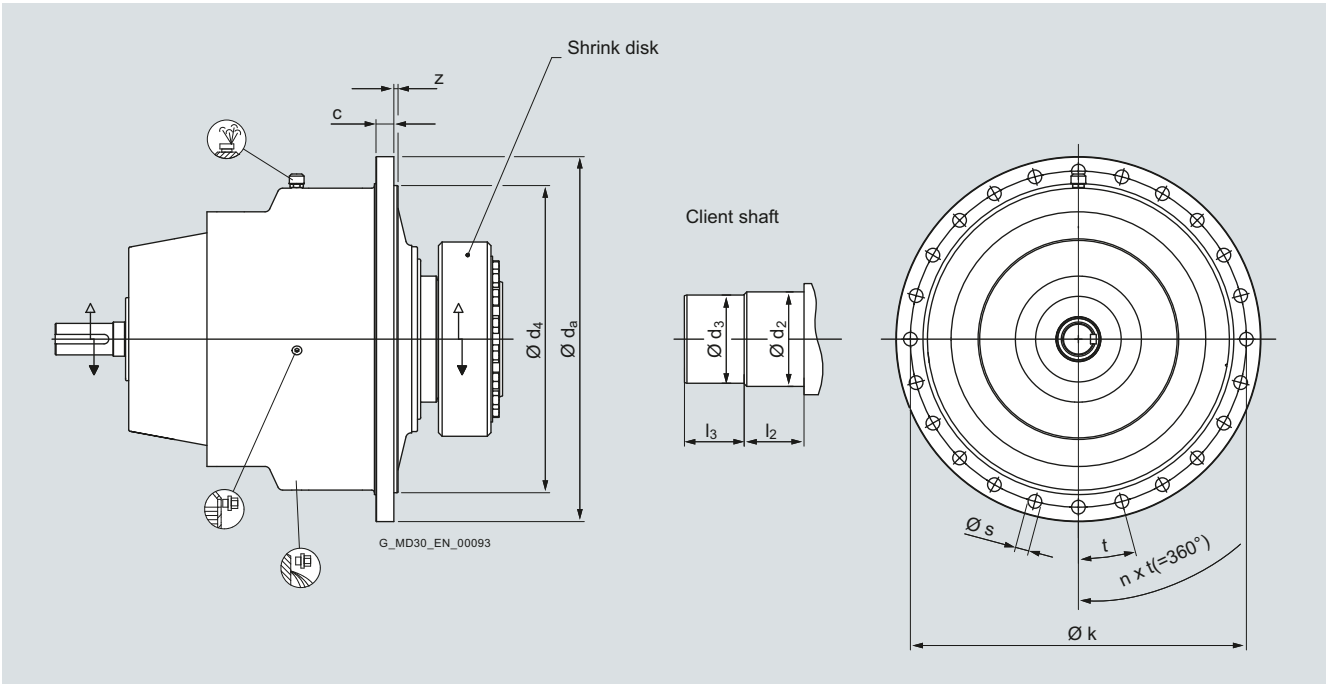
For shrink disk

Dimensioned drawings



6

Gear unit sizes	Chamfer on d_2	Dimensions in mm Shaft of driven machine				Flange							
		Ø d_2	Ø d_3	l_2	l_3	c	Ø s	n	t	Ø k	z	Ø d_4 f7	Ø d_a
30	1 x 45°	90 h6	88 h6	60	60	17	17.5	16	22.5°	335	8	290	375
35	1 x 45°	100 h6	98 h6	64	64	17	17.5	20	18°	385	8	340	425
37	1 x 45°	110 h6	108 h6	68	68	19	17.5	24	15°	410	8	370	450
40	1 x 45°	120 h6	118 h6	76	76	19	22	18	20°	435	8	390	480
45	2.5 x 45°	130 h6	125 h6	80	80	19	22	20	18°	490	8	445	540
50	2.5 x 45°	140 h6	135 h6	82	82	24	22	24	15°	540	8	495	585
55	2.5 x 45°	165 g6	160 h6	96	96	29	26	24	15°	595	8	535	650
60	2.5 x 45°	180 g6	175 g6	116	100	34	26	24	15°	640	8	585	695

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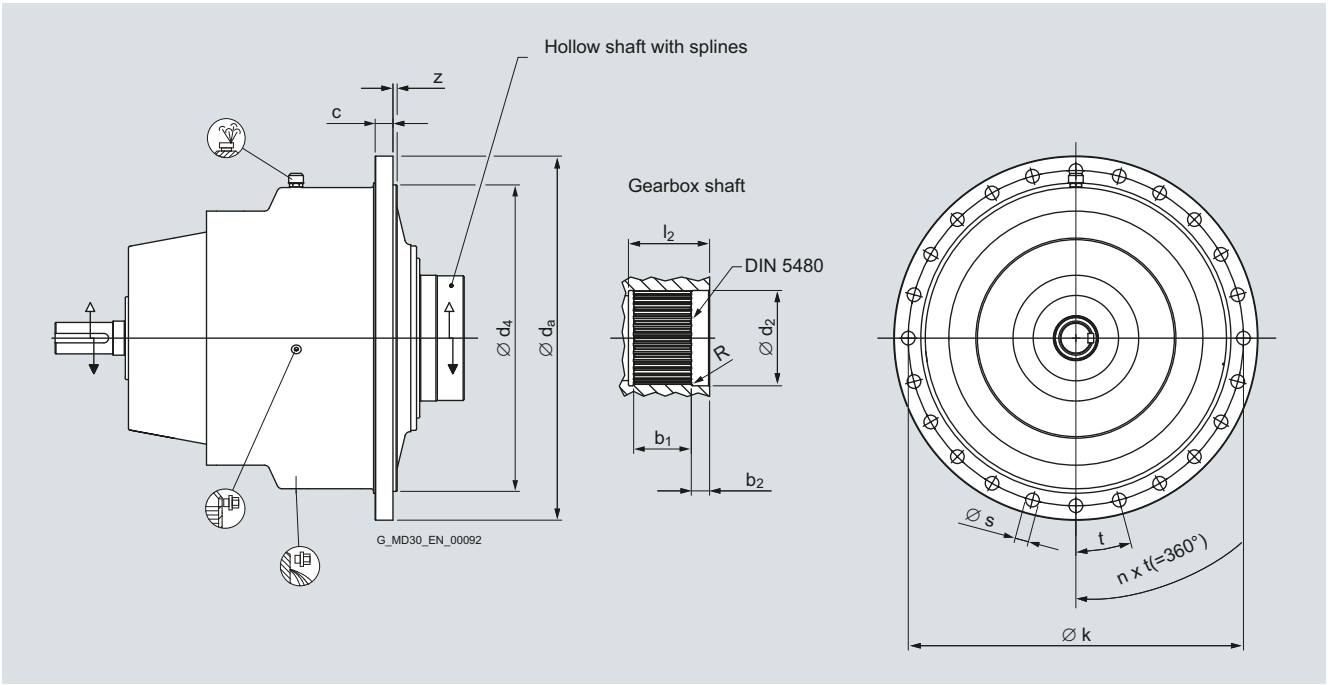
Dimensioned drawings (continued)



Gear unit sizes	Chamfer on d_2	Dimensions in mm Shaft of driven machine				Shaft of driven machine with splines in accordance with DIN 5480	Flange							
		Ø d_2	l_2	b_1	b_2		c	Ø s	n	t	Ø k	z	Ø d_4 f7	Ø d_a
30	1 x 45°	92 h6	81	55	20	W 90 x 3 x 28 x 8f	17	17.5	16	22.5°	335	8	290	375
35	1 x 45°	102 h6	86	60	20	W 100 x 3 x 32 x 8f	17	17.5	20	18°	385	8	340	425
37	1 x 45°	112 h6	102	70	25	W 110 x 3 x 35 x 8f	19	17.5	24	15°	410	8	370	450
40	1 x 45°	122 h6	107	75	25	W 120 x 3 x 38 x 8f	19	22	18	20°	435	8	390	480
45	2.5 x 45°	132 h6	118	80	30	W 130 x 5 x 24 x 8f	19	22	20	18°	490	8	445	540
50	2.5 x 45°	142 h6	123	85	30	W 140 x 5 x 26 x 8f	24	22	24	15°	540	8	495	585
55	2.5 x 45°	172 g6	144	100	35	W 170 x 5 x 32 x 8f	29	26	24	15°	595	8	535	650
60	2.5 x 45°	182 g6	155	110	35	W 180 x 5 x 34 x 8f	34	26	24	15°	640	8	585	695

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Connection dimensions

Notes

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Options for operation

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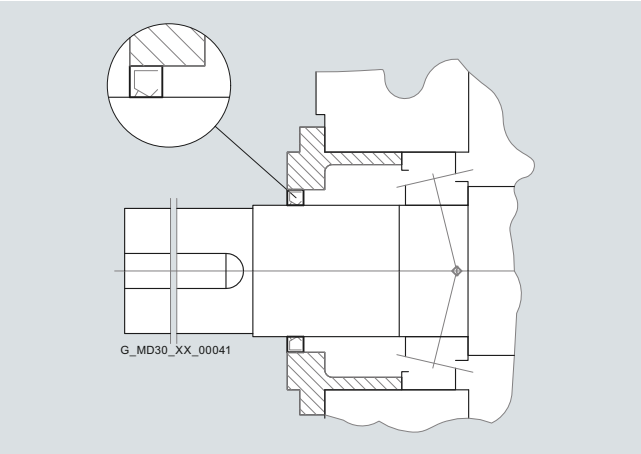
Shaft seals

Radial shaft seal Taconite

Overview

Radial shaft seal

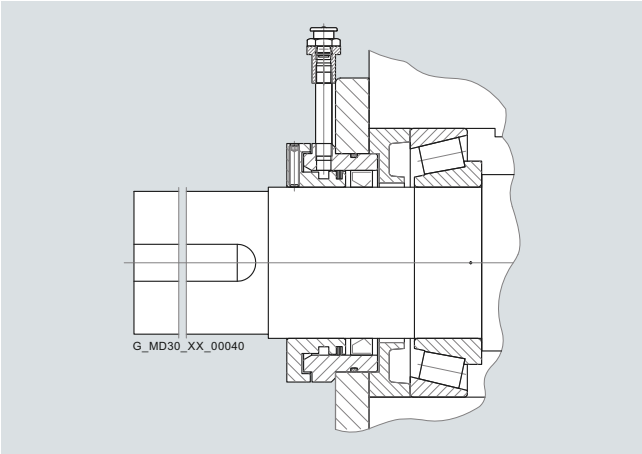


Radial shaft seals are suitable for low to average operating speeds. They can be used for all types and sizes.

Other features are:

- Wearing seal, however, easy to maintain
- Local heat development on sealing lip; therefore, adequate lubrication (cooling) required
- Commercial product
- Design with low oil level on request

Taconite



Taconite seals are grease-filled, refillable labyrinth seal combinations.

With this seal a high degree of operational reliability is achieved for the gear unit in dusty environments. This seal is a combination of 3 sealing elements which protect the gear unit from the ingress of dust-like particles.

When a geared motor is used in accordance with Chapter 5 "Gear unit combinations", taconite seals are not required on the input shaft because the coupling enclosure is sealed dust-tight.

Ordering information

Data position of the Order No.		1 to 6	7	8	9	10	11	12	13	14	15	16
Order No.		**2LP069**	.	- **0**	.	.	■	.	-	.	.	.	.
Sealing												
Seal on input shaft	**Seal on output shaft**											
WDR	WDR						**0**					
WDR	Taconite						**1**					
Taconite	WDR						**2**					
Taconite	Taconite						**3**					

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Options for installation and attachment parts

8

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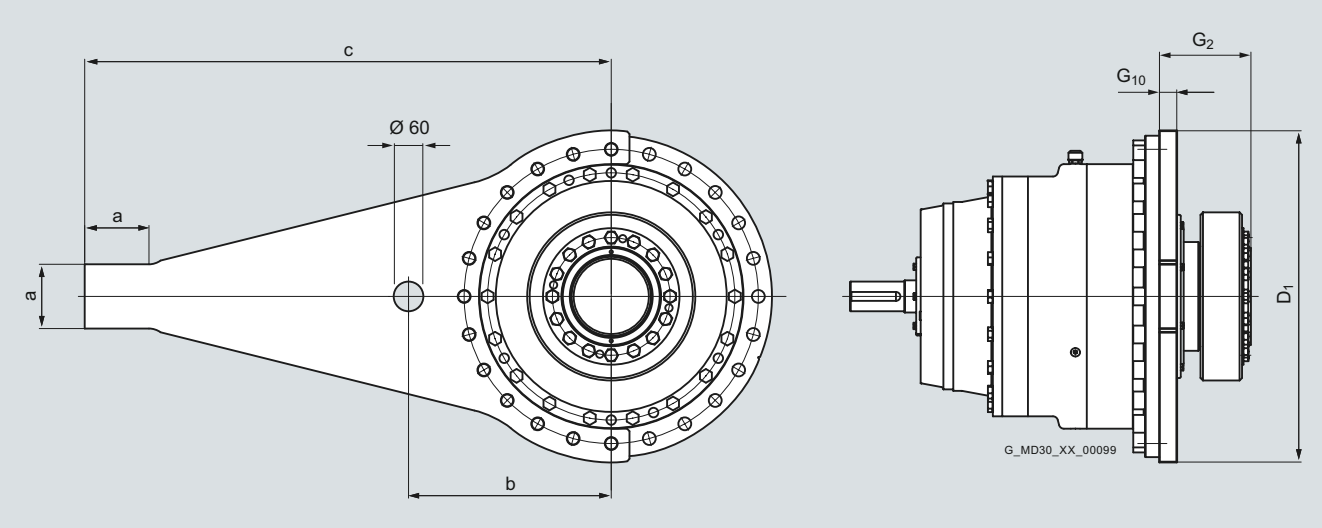
Housing torque arm (single arm)

Dimensioned drawings



Gear unit sizes	Nominal output torque T_{2N}	Dimensions in mm D_1	G_2	G_{10}	a	b	c	Weight, approx.
	Nm							kg
30	10000	375	132	25	55	225	435	12.5
35	15000	425	115	25	60	240	480	15
37	20000	450	122	25	70	260	555	18.5
40	25000	480	125	35	80	310	690	29
45	35000	540	135	35	90	330	725	32
50	45000	585	135	35	110	430	905	49
55	65000	670	185	35	130	410	1065	72
60	80000	695	206	35	130	500	1065	72

In the case of shaft-mounted gear units with a torque arm, the connection between the torque arm and foundation must always permit the gear unit to move in accordance with the bearings of the machine shaft, without constraining forces acting on the gear unit.

Ordering information

When ordering the housing torque arm, **-Z** should be added to the order number.

Data position of the Order No.	1 to 6	7	8	9	10	11	12	13	14	15	16	Order code
Order No.	**2LP069**	.	-	**0**	.	.	.	.	-	.	.	.	.	**-Z**
Housing torque arm (single arm)												**M10**
Prepared for mounting a housing torque arm (single arm)												**M11**

Mounting of a twin housing torque arm is supported as standard.

If a single housing torque arm is used, special bearings are required.

This is also necessary if the housing torque arm is not included in the order, but the customer plans to use it.

If a single housing torque arm is used, compliance with the minimum dimension c for the length of the lever arm is essential.

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Appendix

9

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Partner at Industry Automation and Drive Technologies

At Siemens Industry Automation and Drive Technologies, more than 85 000 people are resolutely pursuing the same goal: long-term improvement of your competitive ability. We are committed to this goal. Thanks to our commitment, we continue to set new standards in automation and drive technology. In all industries – worldwide.

At your service locally, around the globe for consulting, sales, training, service, support, spare parts ... on the entire Industry Automation and Drive Technologies range.

Your personal contact can be found in our Contacts Database at: www.siemens.com/automation/partner

You start by selecting a

- Product group,
- Country,
- City,
- Service.

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Siemens Industry Automation and Drive Technologies in the WWW

A detailed knowledge of the range of products and services available is essential when planning and configuring automation systems. It goes without saying that this information must always be fully up-to-date.

Siemens Industry Automation and Drive Technologies has therefore built up a comprehensive range of information in the World Wide Web, which offers quick and easy access to all data required.

Under the address

www.siemens.com/industry

you will find everything you need to know about products, systems and services.

Product Selection Using the Interactive Catalog CA 01 of Industry

Detailed information together with convenient interactive functions:
The interactive catalog CA 01 covers more than 80 000 products and thus provides a full summary of the Siemens Industry Automation and Drive Technologies product base.

Here you will find everything that you need to solve tasks in the fields of automation, switchgear, installation and drives.
All information is linked into a user interface which is easy to work with and intuitive.

After selecting the product of your choice you can order at the press of a button, by fax or by online link.

Information on the interactive catalog CA 01 can be found in the Internet under

www.siemens.com/automation/ca01

or on DVD.

Easy Shopping with the Industry Mall

The Industry Mall is the virtual department store of Siemens AG in the Internet. Here you have access to a huge range of products presented in electronic catalogs in an informative and attractive way.

Data transfer via EDIFACT allows the whole procedure from selection through ordering to tracking of the order to be carried out online via the Internet.

Numerous functions are available to support you.

For example, powerful search functions make it easy to find the required products, which can be immediately checked for availability. Customer-specific discounts and preparation of quotes can be carried out online as well as order tracking and tracing.

Please visit the Industry Mall on the Internet under:

www.siemens.com/industrymall

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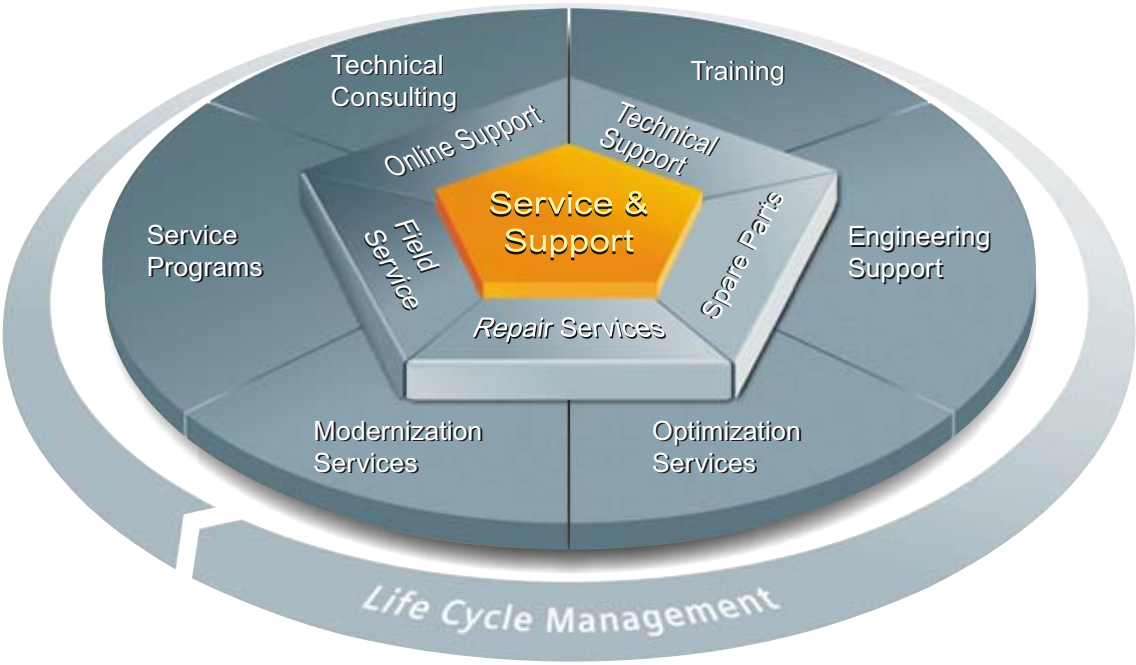
Service & Support

The unmatched complete service for the entire life cycle



For machine constructors, solution providers and plant operators: The service offering from Siemens Industry, Automation and Drive Technologies includes comprehensive services for a wide range of different users in all sectors of the manufacturing and process industry

To accompany our products and systems, we offer integrated and structured services that provide valuable support in every phase of the life cycle of your machine or plant – from planning and implementation through commissioning as far as maintenance and modernization.

Our Service & Support accompanies you worldwide in all matters concerning automation and drives from Siemens. We provide direct on-site support in more than 100 countries through all phases of the life cycle of your machines and plants.

You have an experienced team of specialists at your side to provide active support and bundled know-how. Regular training courses and intensive contact among our employees – even across continents – ensure reliable service in the most diverse areas.

Online Support

The comprehensive online information platform supports you in all aspects of our Service & Support at any time and from any location in the world.

www.siemens.com/automation/service&support

Technical Consulting

Support in planning and designing your project: From detailed actual-state analysis, definition of the goal and consulting on product and system questions right through to the creation of the automation solution.

Technical Support

Expert advice on technical questions with a wide range of demand-optimized services for all our products and systems.

www.siemens.com/automation/support-request

Training

Extend your competitive edge – through practical know-how directly from the manufacturer.

www.siemens.com/sitrain

Contact information is available in the Internet at:
www.siemens.com/automation/partner

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The unmatched complete service for the entire life cycle

Engineering Support

Support during project engineering and development with services fine-tuned to your requirements, from configuration through to implementation of an automation project.

Field Service

Our Field Service offers you services for commissioning and maintenance – to ensure that your machines and plants are always available.

Spare parts

In every sector worldwide, plants and systems are required to operate with constantly increasing reliability. We will provide you with the support you need to prevent a standstill from occurring in the first place: with a worldwide network and optimum logistics chains.

Repairs

Downtimes cause problems in the plant as well as unnecessary costs. We can help you to reduce both to a minimum – with our worldwide repair facilities.

Optimization

During the service life of machines and plants, there is often a great potential for increasing productivity or reducing costs. To help you achieve this potential, we are offering a complete range of optimization services.

Modernization

You can also rely on our support when it comes to modernization – with comprehensive services from the planning phase all the way to commissioning.

Service programs

Our service programs are selected service packages for an automation and drives system or product group. The individual services are coordinated with each over to ensure smooth coverage of the entire life cycle and support optimum use of your products and systems.

The services of a Service Program can be flexibly adapted at any time and used separately.

Examples of service programs:

- Service contracts
- Plant IT Security Services
- Life Cycle Services for Drive Engineering
- SIMATIC PCS 7 Life Cycle Services
- SINUMERIK Manufacturing Excellence
- SIMATIC Remote Support Servicess

Advantages at a glance:

- Reduced downtimes for increased productivity
- Optimized maintenance costs due to a tailored scope of services
- Costs that can be calculated and therefore planned
- Service reliability due to guaranteed response times and spare part delivery times
- Customer service personnel will be supported and relieved of additional tasks
- Comprehensive service from a single source, fewer interfaces and greater expertise

Contact information is available in the Internet at:
www.siemens.com/automation/partner

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Knowledge Base on DVD

For locations without online connections to the Internet there are excerpts of the free part of the information sources available on DVD (Service & Support Knowledge Base). This DVD contains all the latest product information at the time of production (FAQs, Downloads, Tips and Tricks, Updates) as well as general information on Service & Support.

The DVD also includes a full-text search and our Knowledge Manager for targeted searches for solutions. The DVD will be updated every 4 months.

Just the same as our online offer in the Internet, the Service & Support Knowledge Base on DVD comes complete in 5 languages (German, English, French, Italian, Spanish).

You can order the **Service & Support Knowledge Base** DVD from your Siemens contact.

Order no. **6ZB5310-0EP30-0BA2**

Automation Value Card

Small card – great support

The Automation Value Card is an integral component of the comprehensive service concept with which Siemens Automation and Drives will accompany you in each phase of your automation project.

It doesn't matter whether you want just specific services from our Technical Support or want to purchase something on our Online portal, you can always pay with your Automation Value Card. No invoicing, transparent and safe. With your personal card number and associated PIN you can view the state of your account and all transactions at any time.

Services on card. This is how it's done.

Card number and PIN are on the back of the Automation Value Card. When delivered, the PIN is covered by a scratch field, guaranteeing that the full credit is on the card.

By entering the card number and PIN you have full access to the Service & Support services being offered. The charge for the services procured is debited from the credits on your Automation Value Card.

All the services offered are marked in currency-neutral credits, so you can use the Automation Value Card worldwide.

Order your Automation and Value Card easily and comfortably like a product with your sales contact.

Automation Value Card order numbers	
Credits	Order no.
200	**6ES7 997-0BA00-0XA0**
500	**6ES7 997-0BB00-0XA0**
1 000	**6ES7 997-0BC00-0XA0**
10 000	**6ES7 997-0BG00-0XA0**

Detailed information on the services offered is available on our Internet site at:

www.siemens.com/automation/service&support

Service & Support à la Card: Examples

Technical Support	
"Priority"	Priority processing for urgent cases
"24 h"	Availability round the clock
"Extended"	Technical consulting for complex questions
"Mature Products"	Consulting service for products that are not available any more
Support Tools in the Support Shop	
	Tools that can be used directly for configuration, analysis and testing

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Subject index

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Conditions of sale and delivery
Export regulations

Terms and Conditions of Sale and Delivery

By using this catalog you can acquire hardware and software products described therein from Siemens AG subject to the following terms. Please note! The scope, the quality and the conditions for supplies and services, including software products, by any Siemens entity having a registered office outside of Germany, shall be subject exclusively to the General Terms and Conditions of the respective Siemens entity. The following terms apply exclusively for orders placed with Siemens AG.

For customers with a seat or registered office in Germany

The "General Terms of Payment" as well as the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry" shall apply.

For software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or registered Office in Germany" shall apply.

For customers with a seat or registered office outside of Germany

The "General Terms of Payment" as well as the "General Conditions for Supplies of Siemens, Automation and Drives for Customers with a Seat or registered Office outside of Germany" shall apply.

For software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or registered Office outside of Germany" shall apply.

General

The dimensions are in mm. In Germany, according to the German law on units in measuring technology, data in inches only apply to devices for export.

Illustrations are not binding.

Insofar as there are no remarks on the corresponding pages, - especially with regard to data, dimensions and weights given - these are subject to change without prior notice.

The prices are in € (Euro) ex works, exclusive packaging.

The sales tax (value added tax) is not included in the prices. It shall be debited separately at the respective rate according to the applicable legal regulations.

Prices are subject to change without prior notice. We will debit the prices valid at the time of delivery.

Surcharges will be added to the prices of products that contain silver, copper, aluminum, lead and/or gold if the respective basic official prices for these metals are exceeded. These surcharges will be determined based on the official price and the metal factor of the respective product.

The surcharge will be calculated on the basis of the official price on the day prior to receipt of the order or prior to the release order.
The metal factor determines the official price as of which the metal surcharges are charged and the calculation method used. The metal factor, provided it is relevant, is included with the price information of the respective products.

An exact explanation of the metal factor and the text of the Comprehensive Terms and Conditions of Sale and Delivery can be downloaded at:
www.siemens.com/automation/salesmaterial-as/catalog/en/terms_of_trade_en.pdf

Export regulations

Siemens shall not be obligated to fulfill this agreement if such fulfillment is prevented by any impediments arising out of national or international foreign trade or customs requirements or any embargoes or other sanctions.

If you transfer goods (hardware and/ or software and/ or technology as well as corresponding documentation, regardless of the mode of provision) delivered by us or works and services (including all kinds of technical support) performed by us to a third party worldwide, you shall comply with all applicable national and international (re-) export control regulations.

If required to conduct export control checks, you, upon request by us, shall promptly provide us with all information pertaining to particular end customer, destination and intended use of goods, works and services provided by us, as well as any export control restrictions existing.

The products listed in this catalog / price list may be subject to European / German and/or US export regulations.

Therefore, any export requiring a license is subject to approval by the competent authorities.

According to current provisions, the following export regulations must be observed with respect to the products featured in this catalog / price list:

AL	Number of the German Export List Products marked other than "N" require an export license. In the case of software products, the export designations of the relevant data medium must also be generally adhered to. Goods labeled with an "AL" not equal to "N" are subject to a European or German export authorization when being exported out of the EU.
ECCN	Export Control Classification Number Products marked other than "N" are subject to a reexport license to specific countries. In the case of software products, the export designations of the relevant data medium must also be generally adhered to. Goods labeled with an "ECCN" not equal to "N" are subject to a US re-export authorization.

Even without a label or with an "AL: N" or "ECCN: N", authorization may be required due to the final destination and purpose for which the goods are to be used.

The deciding factors are the AL or ECCN export authorization indicated on order confirmations, delivery notes and invoices.

Errors excepted and subject to change without prior notice.

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Catalogs

Industry Automation, Drive Technologies and Low-Voltage Power Distribution

Further information can be obtained from our branch offices listed in the appendix or at www.siemens.com/automation/partner

Interactive Catalog on DVD

	Catalog
for Industry Automation, Drive Technologies and Low Voltage Distribution	**CA 01**

Drive Systems

Variable-Speed Drives	
SINAMICS G110, SINAMICS G120 Standard Inverters SINAMICS G110D, SINAMICS G120D Distributed Inverters	D 11.1
SINAMICS G130 Drive Converter Chassis Units SINAMICS G150 Drive Converter Cabinet Units	D 11
SINAMICS GM150, SINAMICS SM150 Medium-Voltage Converters	D 12
SINAMICS S120 Chassis Format Units and Cabinet Modules SINAMICS S150 Converter Cabinet Units	D 21.3
SINAMICS DCM Converter Units	D 23.1
Three-phase Induction Motors • H-compact • H-compact PLUS	D 84.1
Asynchronous Motors Standardline	D 86.1
Synchronous Motors with Permanent-Magnet Technology, HT-direct	D 86.2
DC Motors	DA 12
SIMOREG DC MASTER 6RA70 Digital Chassis Converters	DA 21.1
SIMOREG K 6RA22 Analog Chassis Converters	DA 21.2
PDF: SIMOREG DC MASTER 6RM70 Digital Converter Cabinet Units	*DA 22*
SIMOVERT PM Modular Converter Systems	DA 45
SIEMOSYN Motors	DA 48
MICROMASTER 420/430/440 Inverters	DA 51.2
MICROMASTER 411/COMBIMASTER 411	DA 51.3
SIMOVERT MASTERDRIVES Vector Control	DA 65.10
SIMOVERT MASTERDRIVES Motion Control	DA 65.11
Synchronous and asynchronous servomotors for SIMOVERT MASTERDRIVES	DA 65.3
SIMODRIVE 611 universal and POSMO	DA 65.4
SIMOTION, SINAMICS S120 and Motors for Production Machines	PM 21
SINAMICS S110 The Basic Positioning Drive	PM 22
Low-Voltage Three-Phase-Motors	
IEC Squirrel-Cage Motors	D 81.1
MOTOX Geared Motors	D 87.1
Automation Systems for Machine Tools SIMODRIVE • Motors • Converter Systems SIMODRIVE 611/POSMO	NC 60
Automation Systems for Machine Tools SINAMICS • Motors • Drive System SINAMICS S120	NC 61
Mechanical Driving Machines	
FLENDER Standard Couplings	MD 10.1
FLENDER SIG Standard industrial gear unit	MD 30.1

Low-Voltage Power Distribution and Electrical Installation Technology

Protection, Switching, Measuring & Monitoring Devices	LV 10.1
Switchboards and Distribution Systems	LV 10.2
GAMMA Building Management Systems	ET G1
PDF: DELTA Switches and Socket Outlets	*ET D1*
SICUBE System Cubicles and Cubicle Air-Conditioning	LV 50
SIVACON 8PS Busbar Trunking Systems	LV 70

Motion Control

	Catalog
SINUMERIK & SIMODRIVE Automation Systems for Machine Tools	NC 60
SINUMERIK & SINAMICS Equipment for Machine Tools	NC 61
SINUMERIK 828D BASIC T/BASIC M, SINAMICS S120 Combi and 1FK7/1PH8 motors	NC 82
SIMOTION, SINAMICS S120 and Motors for Production Machines	PM 21
SINAMICS S110 The Basic Positioning Drive	PM 22
Drive and Control Components for Cranes	CR 1

Power Supply and System Cabling

Power supply SITOP	KT 10.1
System cabling SIMATIC TOP connect	KT 10.2

Process Instrumentation and Analytics

Field Instruments for Process Automation	FI 01
SIREC Recorders and Accessories	MP 20
SIPART, Controllers and Software	MP 31
Products for Weighing Technology	WT 10
PDF: Process Analytical Instruments	*PA 01*
PDF: Process Analytics, Components for the System Integration	*PA 11*

Safety Integrated

Safety Technology for Factory Automation	SI 10

SIMATIC HMI/PC-based Automation

Human Machine Interface Systems/ PC-based Automation	ST 80/ ST PC

SIMATIC Ident

Industrial Identification Systems	ID 10

SIMATIC Industrial Automation Systems

Products for Totally Integrated Automation and Micro Automation	ST 70
SIMATIC PCS 7 Process Control System	ST PCS 7
Add-ons for the SIMATIC PCS 7 Process Control System	ST PCS 7.1
PDF: Migration solutions with the SIMATIC PCS 7 Process Control System	*ST PCS 7.2*

SIMATIC NET

Industrial Communication	IK PI

SINVERT Photovoltaics

Inverters and Components for Photovoltaic Installations	RE 10

SIRIUS Industrial Controls

SIRIUS Industrial Controls	IC 10
SIRIUS Industrial Controls (selected content from catalog IC 10)	IC 90

System Solutions

Applications and Products for Industry are part of the interactive catalog CA 01

PDF: These catalogs are only available as pdf files.

Download-Center

PDF versions of the catalogs are available on the Internet at:
www.siemens.com/drives/infocenter

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