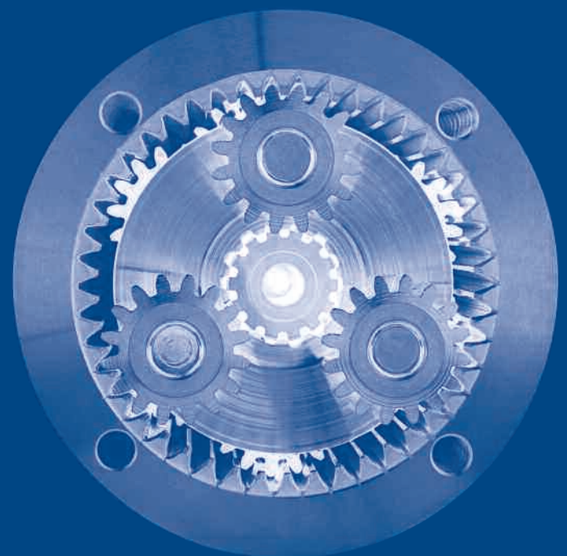
Standard gear drives out of the modular system
for small and medium volume production

Planetary Gears
IMS.**baseline**

- Ø 22 to 120 mm
- 0.2 to 300 Nm
- Plastic and metal-low-noise

The Driving Force. Worldwide.

IMS:GEAR

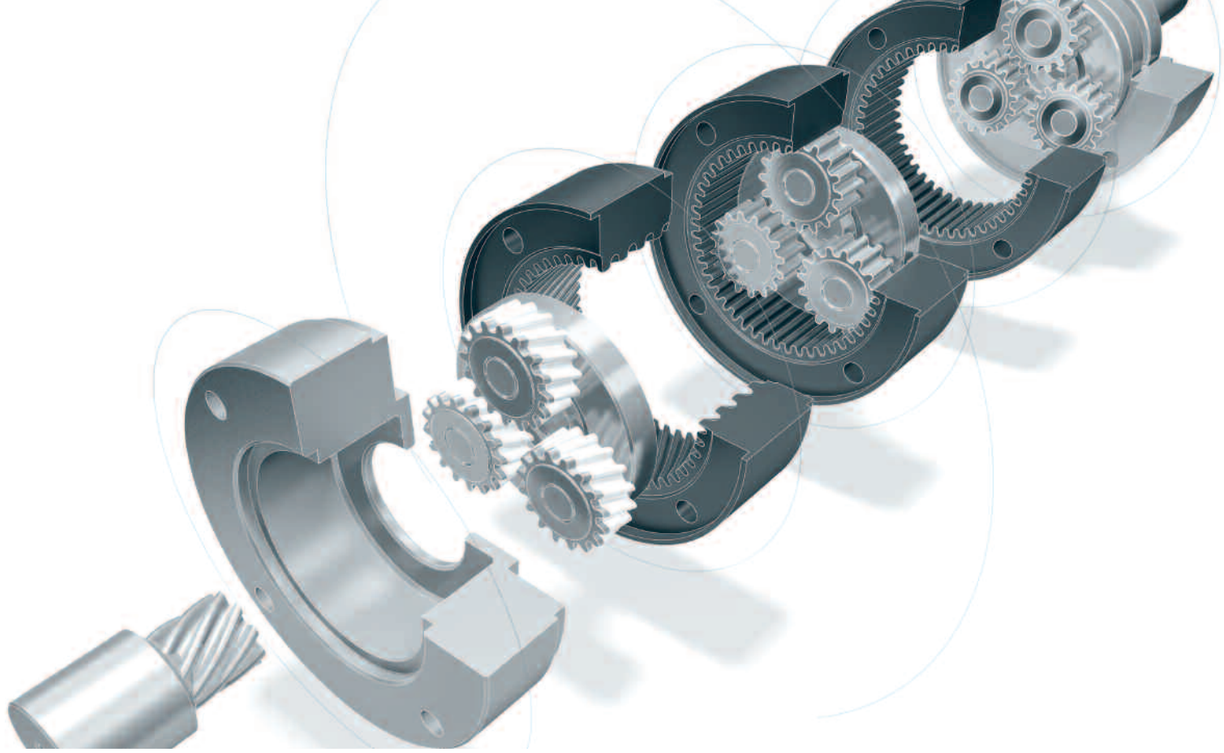


“If you understand geometry
you will understand everything in this world.”

Galileo Galilei

Catalogue of Standard PLG options

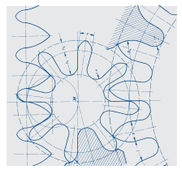
and what you’ll find in it














Donaueschingen, Germany | Eisenbach, Germany | Gainesville, USA | Virginia Beach, USA | Querétaro, Mexico | Taicang, China

IMS Gear Group –

focusing on the future

The sales markets and their structures have changed dramatically over the past few years. Topics such as globalization, pressure on costs and wages, but also substantial changes in the product requirements for new sales markets had to be addressed by enterprises. As early as 1993, IMS Gear has taken the first step toward a fundamental realignment and has meanwhile evolved into a worldwide leading provider in gear engineering. What does all this mean for you as our customer?

Activities of the IMS Gear Group:

- **Automotive**
- **Standard Planetary Gears**
- **IMS KOEPFER Cutting Tools**

IMS Gear Planetary Gears –

one activity of the IMS Gear Group

Concentration on standard planetary gears
By concentrating our capabilities on a few selected fields of competence such as “Planetary Gears“, we are now in a position to bundle the IMS Gear competencies for the highly specific and profound further development of our standard planetary gears. By focusing we can adapt these competences to the fast changing requirements of our customers and markets. This speeds up the pace of development of products, but also of process innovations. This is our way of avoiding the latent risk of remaining “average” by diversifying the product line-up in many fields of technology.

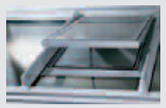
Design of Experience
By firmly focusing on standard planetary gears, the concept of “design of experience” is given a new dimension. Experiences gathered from customer applications and production processes can so be used extensively for advanced developments. For you, our customer, this not only means the certainty of always having the latest in product technology, but also the assurance that these products are made with innovative process technology at an excellent price-performance ratio.

Our vast expertise
Beside our clear focus and the profound treatment of just a few selected fields of competence, there is also another essential factor which distinguishes the IMS Gear Group from other competitors – our manufacturing penetration. This ranges from software development for special gearings via milling operations by IMS KOEPFER Cutting Tools, an ultra-modern noise laboratory, metal and plastic injection molding, the new and highly efficient hardening shop, right through to the construction and building of the necessary assembly plants. You, our customer, benefits from highly flexible responses to changes in technical and logistical requirements, a favorable price level guaranteed by far-reaching independence from external suppliers, and by us accepting the full chain of responsibility from the first consulting meetings to the volume deliveries.

Possible fields of application

for planetary gear drives of IMS.**baseline**

Building services engineering



Skylight window adjustment

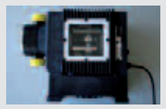
Sun protection

Machine building industry

Welding line machine

Terminal end pressing

Materials handling



Metering pump

Conveyor belt

Power tools

Lawn robots

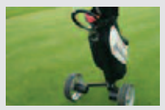
Pressing unit

Medical technology

Rehabilitation device arm

Operating table

Miscellaneous



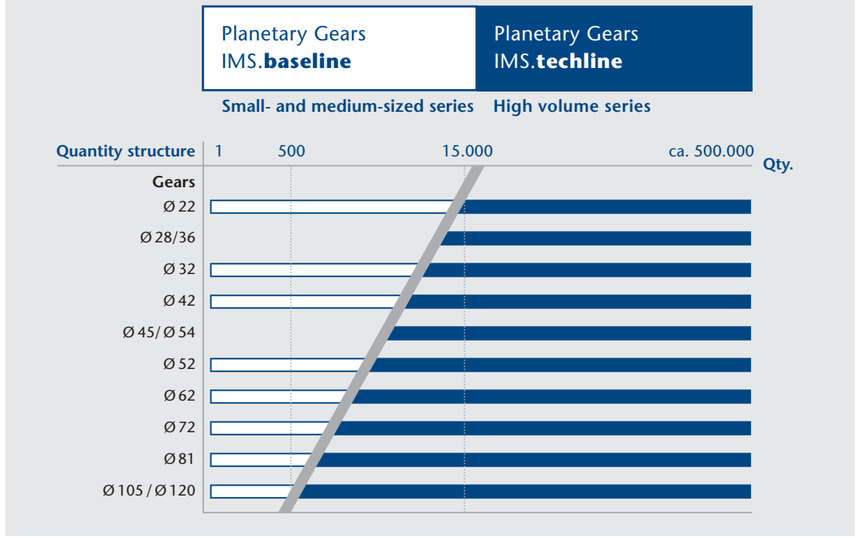
Golf caddy

Advertising column adjustment

Always the optimum

Small-, medium- or high volume series

IMS.**baseline** and IMS.**techline** gives you the freedom to use your imagination. Both lines are based on the modular system and allow the best economical and technical planetary gear solutions.



IMS.**baseline**

- Selected standard gear drives from the modular system
- For small- and medium-sized series as well as for samples
- Fast delivery
- High variety with regards to the diameters, materials, ratios
- Utilization of high volume series know-how for development and production

IMS.**techline**

- Over more than 10,000 configuration possibilities in metal and/or plastic
- For high volume series
- QM-service in equivalent with Automotive Standards
- Customized injection molded input and output flanges
- Development support with regards to technique and “supply chain arrangements”

Nonstandard options of IMS.**baseline**

Do you need special adaptation for planetary gear drives out of the IMS.**baseline**? No problem, we can provide you with the following:

- **Motor flange**
- **Motor pinion**
- **Output flange**
- **Output shaft**
- **Bearing mounted input shaft**

Feel free to contact us – we are here to help.

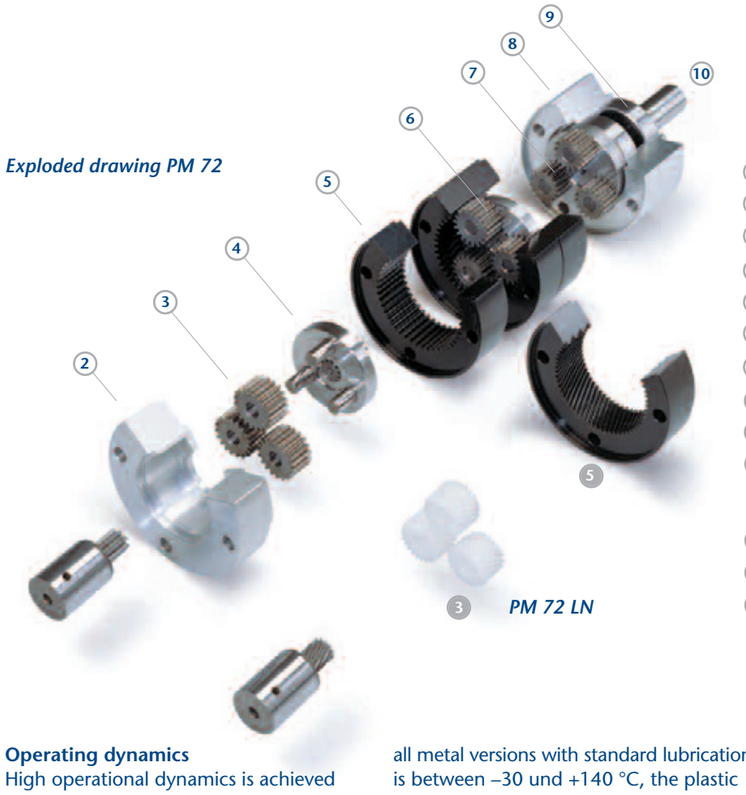
Our planetary gear units

and what you should know about them

Mode of function
As the name says: planetary gears (PLGs) function like planets. The sun wheel in the center is driven by the motor, transferring its movement to three circumferential planetary gear wheels which form a stage. They are arranged on the axles of a planetary carrier. The last planetary carrier is integral to the drive shaft and so assures the power transmission to the output. The planetary gears are running within the gear housing, which is called the outer ring gear.

Properties
Input and output are arranged coaxially. The shafts turn in the same direction. PLGs are suitable for cw and ccw rotation, alternating, continuous and intermittent operation and have an extremely high degree of efficiency. Compared with other gear designs, the compactness of PLGs offers high performance density and high torque transmission in the smallest of spaces.

Exploded drawing PM 72



Planetary gears

1. Motor pinion input side
2. Motor flange
3. Metal planet gears, Stage 1
4. Planet carrier, Stage 1
5. Outer ring gear
6. Metal planet gears and planet carrier, Stage 2
7. Metal planet gears, Stage 3
8. Output flange
9. Ball bearing
10. Output shaft

Low-noise variant

1. Motor pinion input side, helical toothing
3. Plastic planet gears, helical toothing
5. Outer ring gear, helical toothing

Backlash
The backlash at the output side is increasing based on adding the tolerances from the 1st to the 3rd stage. The maximum backlash has to be mentioned.

Ball bearing
Limited through assembly conditions; the installation of the ball bearings in the output flange is designed for a fixed bearing compared to the loose bearing on the output shaft. Per your requirement a different design can be conducted.

Connecting flange
This is where the PLG's flexibility really shows. The planetary gear drives of IMS Gear can be adapted to any (!) motor, with individual options on the input and output side. Contact us with your specific requirements.

Delivery
IMS Gear Planetary Gears delivers units fully assembled and tested with the motor of your choice, or individually with motor pinion for assembly at your premises. We'd be pleased to assist you in selecting the motor.

Efficiency
The gearing efficiency takes account of the rolling motion of the toothed gear, whereas the gear efficiency accounts for all the losses of the entire bearing. This is why we always specify the gear efficiency which is necessarily lower than the gearing efficiency. As there are no standardized measurement methods, particular attention is called for when comparing the efficiency specified by different manufacturers.

Gear backlash
Gear backlash depends on a large number of factors: type of load, number of stages, bearing, design or material combination. When comparing different manufacturers, please note that there are also no standardized measurement methods. The values specified in this catalogue were measured with no load and with blocked input drive.

Heat treatment
The structural transformation taking place when hardening the individual metal components has a positive effect on the strength and the wear resistance of the gear. IMS Gear has its own heat treatment facility. Since we also have the entire metal machining activity in-house, we are free to choose from a variety of different heat-treatable steel grades.

Installation position
Due to grease lubrication and the various types of seals, the planetary gear drives of IMS Gear can be installed in any desired position.

Low-noise gears
Achieving the optimum acoustic performance makes higher demands in terms of true running and axial runout of the motor bearing plate, flange and shaft. The helical gearing causes axial forces to act on the motor shaft bearing. Adequate dimensioning of the motor shaft bearing must therefore be guaranteed. To counter the grease-conveying effect of the helical gearing, radial shaft O-rings or sealed motor bearings are the first choice.

Lubrication
Our PLGs are lubricated with grease and therefore maintenance-free during their useful service life. Depending on requirements, we select the best possible lubricant from a choice of ten different options.

Mounting position of gear drive
If the output shaft faces vertical additional sealing methods can be implemented per your requirement.

Operating dynamics
High operational dynamics is achieved with low moments of inertia, ease of running and low wear and tear. Wherever it makes sense, IMS Gear Planetary Gears uses plastic instead of metal for the planetary gears and arranges these in a well-balanced 120° angle array which, in turn, results in low moments of inertia. We achieve ease of running with high-grade needle bearings or favorable friction values between metal and plastic, low wear through a special gearing design for optimum rotational performance and by using plastic wheels. The typical IMS Gear material mix guarantees excellent operational dynamics **(q.v. ball bearing)**.

Operating factor CB
The mentioned operating factor CB=1.0 in the catalogue relates to constant direction of rotation, no shock load and a daily operating time of 3 hours.

Operating temperature
The operation temperature range depends on material selection and choice of lubricant. The temperature range of our all metal versions with standard lubrication is between –30 und +140 °C, the plastic PK series between –15 and +65 °C.

Output shaft loads
As different manufacturers also use different measuring methods, a comparison is difficult and requires some attention. We'd be pleased to calculate the maximum axial and radial load including all parameters for your specific application. Certain design options also allow higher stress loads.

Output torque
The most important factor when selecting a planetary gear drive is the output torque. The gear reduction reduces the relatively high motor speed to a lower output drive speed, which increases the output torque in inverse ratio.

Overload torque
The maximum overload torque (impact load) is defined as the brief moment in time during which the admissible output torque is exceeded, e.g. when the motor runs up. Peak load equals overload in plastic PLGs, whereas the overload torque can be as much as 1.5 times the peak load in metal-plastic combinations or all metal versions.

Reduction ratios
Changing the number of teeth of the sun gear and the planet gears allows different reduction ratios per each stage. IMS Gear Planetary Gears combines the reductions in as many as three stages and so achieves a total of as many as 44 non-integer reduction ratios, allowing an enormous variety of different gear requirements to be realized.

Sealing modes
The protection categories are defined by DIN EN 60259. If requested, we also supply output and motor side seals which allow you to realize high protection categories.

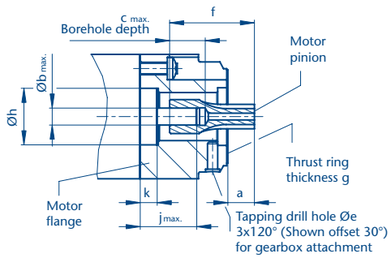
Service Life
Depending on ambient conditions and the operational data of the drive system, the useful service life of a PLG is between 200 and 15.000 hours. With the variety of different options in applications and use, no generally valid statement can be given on the useful service life.

The details given herein are recommended values. Minor variances due to reduction ratios or non-standard testing or measuring methods etc. may occur. Please refer to pages 6 and 7 of this catalogue for basic or additional information, or contact us directly. Technical details subject to change without notice.

PK 22 (ø 22 mm, plastic)

Parameter	1-stage	2-stage	3-stage
Perm. output torque (Appl. factor $C_B = 1.0$)	0.2 Nm	0.4 Nm	0.6 Nm
Gear drive efficiency, approx.	0.80	0.75	0.70
Max. backlash in ° DEG	1.50°	2.00°	2.50°
Recommended initial speed	6,000 rpm	6,000 rpm	6,000 rpm
Operating temperature	-15 °C to +65 °C	-15 °C to +65 °C	-15 °C to +65 °C
Output side with sintered metal bearing			
Max. load, radial (10 mm from flange)	15 N	30 N	45 N
Max. load, axial	30 N	30 N	30 N
Max. perm. fitting pressure	150 N	150 N	150 N
Gear drive length p	33.6 ± 0.5 mm	41.8 ± 0.5 mm	50.0 ± 0.5 mm
Weight approx.	33 g	42 g	50 g

Motor
Motor pinion

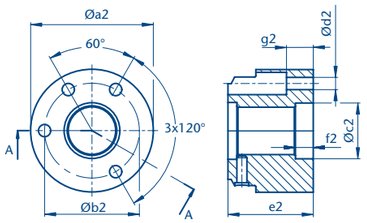


Dimensions of motor mounting in mm

a	b	c	e	f	g	h
4.7 -0.3	3	6.3	1.8	15.0	0.2	10

j	k
10.0	3.0

Motor flange

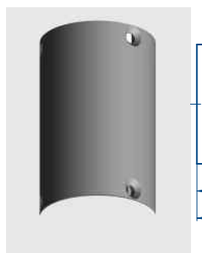


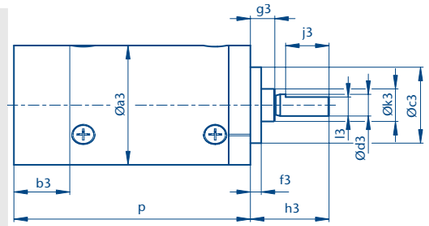
Dimensions of motor mounting/flange in mm

a2	b2	c2	d2	e2	f2	g2
22	17	10 H8	2.2	15.3	3.2	4.8

Further flanges (e.g. NEMA) are available on request.

Planetary gears
Output





Dimensions of planetary gear drive in mm

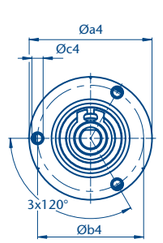
a3	b3	c3	d3	f3	g3	h3
22	10.3	14 h8	4 h7	2.0	4.5	14.5

j3	k3	l3
8	6	3.5

Reduction ratios i rounded

1-stage	2-stage	3-stage	
4:1 (3.70)	14:1 (13.73)	51:1 (50.89)	130:1 (129.62)
5:1 (5.18)	19:1 (19.20)	68:1 (68.06)	150:1 (149.90)
7:1 (6.75)	25:1 (25.01)	79:1 (78.71)	169:1 (168.84)
	29:1 (28.93)	93:1 (92.70)	195:1 (195.26)
	35:1 (34.97)	100:1 (99.50)	236:1 (236.09)
	46:1 (45.56)	115:1 (115.07)	308:1 (307.54)

Output flange



Dimensions of gear unit output/flange in mm

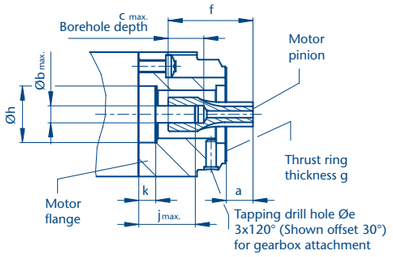
a4	b4	c4
22	19	M2x3.5

Further flanges (e.g. NEMA) are available on request.

(ø 22 mm, metal) PM 22

Parameter	1-stage	2-stage	3-stage
Perm. output torque (Appl. factor $C_B = 1.0$)	0.6 Nm	0.7 Nm	0.8 Nm
Gear drive efficiency, approx.	0.90	0.80	0.70
Max. backlash in ° DEG	1.5°	2.0°	2.5°
Recommended initial speed	6,000 rpm	6,000 rpm	6,000 rpm
Operating temperature	-30 °C to +120 °C	-30 °C to +120 °C	-30 °C to +120 °C
Output side with ball bearing (2Z)			
Max. load, radial (10 mm from flange)	25 N	35 N	50 N
Max. load, axial	10 N	15 N	15 N
Max. perm. fitting pressure	80 N	80 N	80 N
Gear drive length p	33.6 ± 0.3 mm	41.7 ± 0.3 mm	49.8 ± 0.3 mm
Weight approx.	43 g	59 g	75 g

Motor
Motor pinion

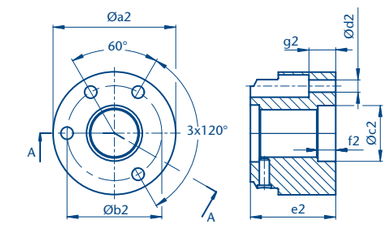


Dimensions of motor mounting in mm

a	b	c	e	f	g	h
4.7 -0.3	3	6.3	1.8	15.0	0.2	10

j	k
10.0	3.0

Motor flange

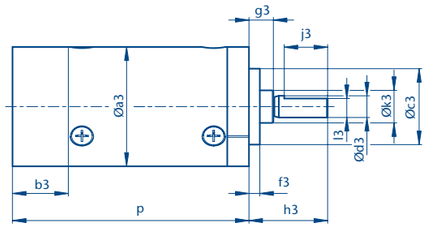


Dimensions of motor mounting/flange in mm

a2	b2	c2	d2	e2	f2	g2
22	17	10 H8	2.2	15.3	3.2	4.8

Further flanges (e.g. NEMA) are available on request.

Planetary gears
Output



Dimensions of planetary gear drive in mm

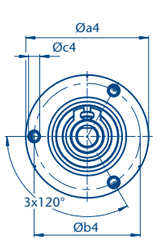
a3	b3	c3	d3	f3	g3	h3
22	10.3	14 h8	4 h7	2.0	4.5	14.5

j3	k3	l3
8	6	3.5

Reduction ratios i rounded

1-stage	2-stage	3-stage	
4:1 (3.70)	14:1 (13.73)	51:1 (50.89)	130:1 (129.62)
5:1 (5.18)	19:1 (19.20)	68:1 (68.06)	150:1 (149.90)
7:1 (6.75)	25:1 (25.01)	79:1 (78.71)	169:1 (168.84)
	29:1 (28.93)	93:1 (92.70)	195:1 (195.26)
	35:1 (34.97)	100:1 (99.50)	236:1 (236.09)
	46:1 (45.56)	115:1 (115.07)	308:1 (307.54)

Output flange



Dimensions of gear unit output/flange in mm

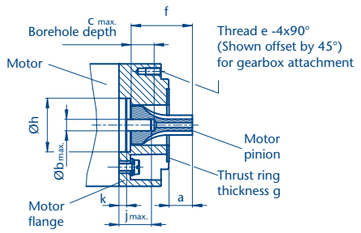
a4	b4	c4
22	19	M2x3.5

Further flanges (e.g. NEMA) are available on request.

PK 32 (ø 32 mm, plastic)

Parameter	1-stage	2-stage	3-stage
Perm. output torque (Appl. factor $C_B = 1.0$)	0.4 Nm	1.0 Nm	2.0 Nm
Gear drive efficiency, approx.	0.75	0.70	0.65
Max. backlash in ° DEG	1.90°	1.95°	2.00°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-15 °C to +65 °C	-15 °C to +65 °C	-15 °C to +65 °C
Output side with sintered metal bearing			
Max. load, radial	15 N	30 N	45 N
Max. load, axial	5 N	10 N	15 N
Max. perm. fitting pressure	150 N	150 N	150 N
Gear drive length p	36.0 ± 0.5 mm	45.5 ± 0.5 mm	55.0 ± 0.5 mm
Weight approx.	100 g	115 g	130 g

Motor
Motor pinion

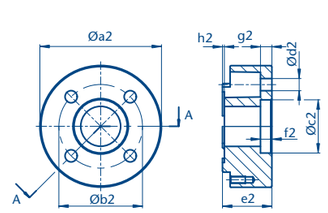


Dimensions of motor mounting in mm

a	b	c	e	f	g	h
6.1 -0.4	3	6	M2	16.0	0.6	14

j	k
8.5	2.0

Motor flange



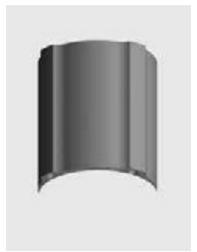
Dimensions of motor mounting/flange in mm

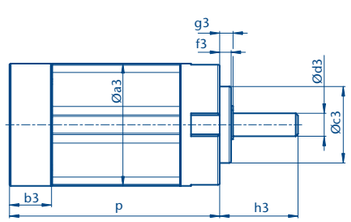
a2	b2	c2	d2	e2	f2	g2
32	22	14 H7	3.2	13.0	3.0	3.0

h2
0.5

Further flanges (e.g. NEMA) are available on request.

Planetary gears
Output





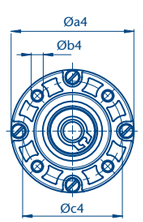
Dimensions of planetary gear drive in mm

a3	b3	c3	d3	f3	g3	h3
32	11	20 h10	6 g6	3.0	3.4	20

Reduction ratios i rounded

1-stage	2-stage		3-stage	
4:1 (3.70)	14:1 (13.73)	51:1 (50.89)		130:1 (129.62)
5:1 (5.18)	19:1 (19.20)	68:1 (68.06)		150:1 (149.90)
7:1 (6.75)	25:1 (25.01)	79:1 (78.71)		169:1 (168.84)
	29:1 (28.93)	93:1 (92.70)		195:1 (195.26)
	35:1 (34.97)	100:1 (99.50)		236:1 (236.09)
	46:1 (45.56)	115:1 (115.07)		308:1 (307.54)

Output flange



Dimensions of gear unit output/flange in mm

a4	b4	c4
32	26	M3x7

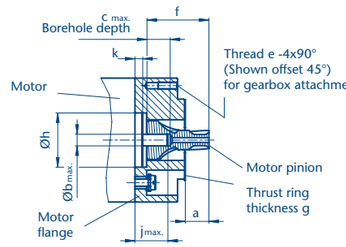
Further flanges (e.g. NEMA) are available on request.

[1] For plastic PL wheels only! Impact of 1st stage for 2-3 stage versions is negligible.

(ø 32 mm, metal-low-noise) PM 32 LN

Parameter	1-stage	2-stage	3-stage
Perm. output torque (Appl. factor $C_B = 1.0$)	0.75 Nm	2.25 Nm	4.50 Nm
Gear drive efficiency, approx.	0.80	0.75	0.70
Max. backlash in ° DEG	1.50° (LN: 2.00°)[1]	1.55°	1.60°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-30 °C to +120 °C	-30 °C to +120 °C	-30 °C to +120 °C
Output side with ball bearing (2Z)			
Max. load, radial	40 N	70 N	100 N
Max. load, axial	10 N	20 N	30 N
Max. perm. fitting pressure	120 N	120 N	120 N
Gear drive length p	32.3 ± 0.5 mm	42.0 ± 0.5 mm	51.5 ± 0.5 mm
Weight approx.	160 g	210 g	260 g

Motor
Motor pinion

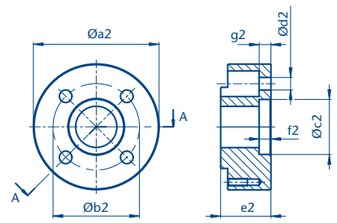


Dimensions of motor mounting in mm

a	b	c	e	f	g	h
6.1 -0.4	3	6	M2	16.0	0.2	14

j	k
8.5	2.0

Motor flange

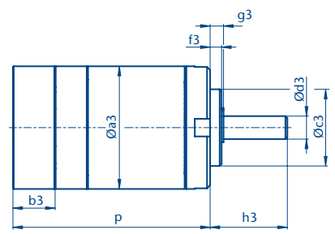


Dimensions of motor mounting/flange in mm

a2	b2	c2	d2	e2	f2	g2
32	22	14 H8	3.2	12.8	3.0	3.0

Further flanges (e.g. NEMA) are available on request.

Planetary gears
Output



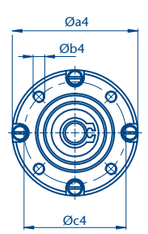
Dimensions of planetary gear drive in mm

a3	b3	c3	d3	f3	g3	h3
32	11	20 h8	6 g6	3.4	3.0	20

Reduction ratios i rounded

1-stage	2-stage		3-stage	
4:1 (3.70)	14:1 (13.73)	51:1 (50.89)		130:1 (129.62)
5:1 (5.18)	19:1 (19.20)	68:1 (68.06)		150:1 (149.90)
7:1 (6.75)	25:1 (25.01)	79:1 (78.71)		169:1 (168.84)
	29:1 (28.93)	93:1 (92.70)		195:1 (195.26)
	35:1 (34.97)	100:1 (99.50)		236:1 (236.09)
	46:1 (45.56)	115:1 (115.07)		308:1 (307.54)

Output flange



Dimensions of gear unit output/flange in mm

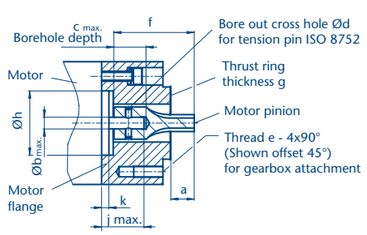
a4	b4	c4
32	26	M3x4

Further flanges (e.g. NEMA) are available on request.

PK 42 (ø 42 mm, plastic)

Parameter	1-stage	2-stage	3-stage
Perm. output torque (Appl. factor $C_B = 1.0$)	0.8 Nm	2.0 Nm	4.0 Nm
Gear drive efficiency, approx.	0.80	0.75	0.70
Max. backlash in ° DEG	1.70°	1.75°	1.80°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-15 °C to +65 °C	-15 °C to +65 °C	-15 °C to +65 °C
Output side with sintered metal bearing			
Max. load, radial	15 N	30 N	45 N
Max. load, axial	5 N	10 N	30 N
Max. perm. fitting pressure	150 N	150 N	150 N
Gear drive length p	60.2 ± 0.5 mm	73.2 ± 0.5 mm	86.2 ± 0.5 mm
Weight approx.	150 g	180 g	215 g

Motor
Motor pinion

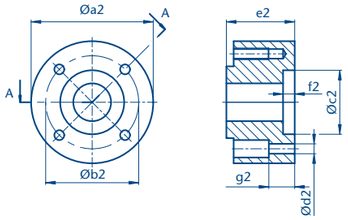


Dimensions of motor mounting in mm

a	b	c	d	e	f	g
8 +0.3	7	11	2	M4	27.5	0.2

h	j	k
22	14.5	2.5

Motor flange

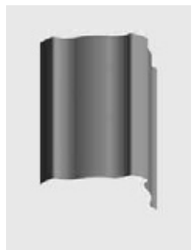


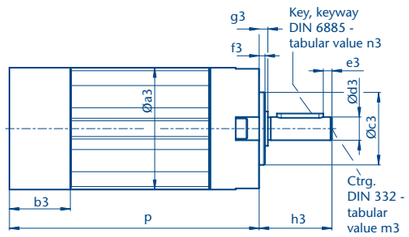
Dimensions of motor mounting/flange in mm

a2	b2	c2	d2	e2	f2	g2
42	32	22 H7	3.4	23.5	3.0	8.9

Further flanges (e.g. NEMA) are available on request.

Planetary gears
Output





Dimensions of planetary gear drive in mm

a3	b3	c3	d3	e3	f3	g3
42	21	25 h10	8 g6	3.0	2.0	3.0

h3	m3	n3
25	D M3	A3x3x16

Reduction ratios i rounded

1-stage	2-stage	3-stage	
4:1 (3.70)	14:1 (13.73)	51:1 (50.89)	130:1 (129.62)
5:1 (5.18)	19:1 (19.20)	68:1 (68.06)	150:1 (149.90)
7:1 (6.75)	25:1 (25.01)	7 9:1 (78.71)	169:1 (168.84)
	29:1 (28.93)	93:1 (92.70)	195:1 (195.26)
	35:1 (34.97)	100:1 (99.50)	236:1 (236.09)
	46:1 (45.56)	115:1 (115.07)	308:1 (307.54)

Output flange

Dimensions of gear unit output/flange in mm

a4	b4	c4	d4	e4
42	36	M4x10	32	2.5 -0.1

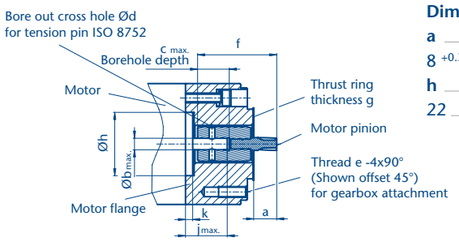
Further flanges (e.g. NEMA) are available on request.

[1] For plastic PL wheels only! Impact of 1st stage for 2-3 stage versions is negligible.

(ø 42 mm, metal-low-noise) PM 42 LN

Parameter	1-stage	2-stage	3-stage
Perm. output torque (Appl. factor $C_B = 1.0$)	3.0 Nm	7.5 Nm	15.0 Nm
Gear drive efficiency, approx.	0.80	0.75	0.70
Max. backlash in ° DEG	0.90° (LN: 1.30°)[1]	0.95°	1.00°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-30 °C to +120 °C	-30 °C to +120 °C	-30 °C to +120 °C
Output side with ball bearing (2RS)			
Max. load, radial	160 N	230 N	300 N
Max. load, axial	50 N	80 N	110 N
Max. perm. fitting pressure	320 N	320 N	320 N
Gear drive length p	60.2 ± 0.5 mm	73.25 ± 0.5 m	86.3 ± 0.5 mm
Weight approx.	275 g	385 g	500 g

Motor
Motor pinion

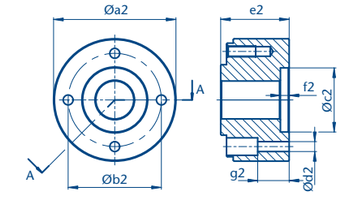


Dimensions of motor mounting in mm

a	b	c	d	e	f	g
8 +0.3	7	11	2	M4	27.5	0.2

h	j	k
22	14.5	2.5

Motor flange

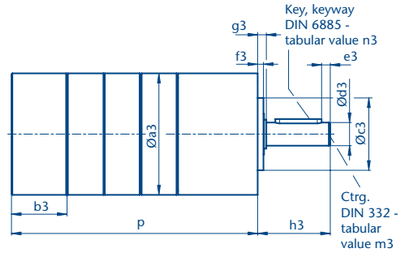


Dimensions of motor mounting/flange in mm

a2	b2	c2	d2	e2	f2	g2
42	32	22 J7	3.4	23.5	3.0	10.8

Further flanges (e.g. NEMA) are available on request.

Planetary gears
Output



Dimensions of planetary gear drive in mm

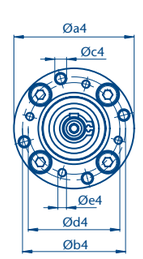
a3	b3	c3	d3	e3	f3	g3
42	21	25 h9	8 g6	3.0	2.0	2.8

h3	m3	n3
25	D M3	A3x3x16

Reduction ratios i rounded

1-stage	2-stage	3-stage	
4:1 (3.65)	14:1 (13.53)	67:1 (67.08)	166:1 (166.40)
5:1 (5.36)	19:1 (18.92)	81:1 (81.11)	192:1 (191.54)
7:1 (6.55)	25:1 (24.65)	91:1 (91.36)	232:1 (231.59)
9:1 (8.63)	28:1 (28.05)	101:1 (101.89)	302:1 (301.68)
	34:1 (33.92)	115:1 (114.77)	393:1 (392.98)
	45:1 (44.69)	128:1 (127.74)	
	58:1 (58.22)	145:1 (145.36)	

Output flange



Dimensions of gear unit output/flange in mm

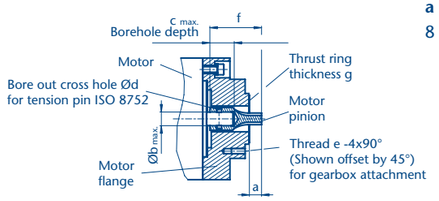
a4	b4	c4	d4	e4
42	36	M4x10	32	M3x10

Further flanges (e.g. NEMA) are available on request.

PK 52 (ø 52 mm, plastic)

Parameter	1-stage	2-stage	3-stage
Perm. output torque (Appl. factor $C_B = 1.0$)	2.0 Nm	5.0 Nm	10.0 Nm
Gear drive efficiency, approx.	0.75	0.70	0.65
Max. backlash in ° DEG	1.10°	1.15°	1.20°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-15 °C to +65 °C	-15 °C to +65 °C	-15 °C to +65 °C
Output side with ball bearing (2RS)			
Max. load, radial	200 N	320 N	450 N
Max. load, axial	60 N	100 N	150 N
Max. perm. fitting pressure	500 N	500 N	500 N
Gear drive length p	72.9 ± 0.5 mm	87.0 ± 0.5 mm	101.1 ± 0.5 mm
Weight approx. with motor flange C80	335 g	395 g	460 g

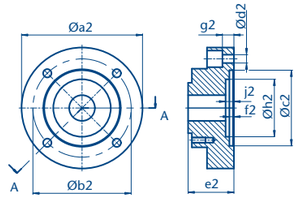
Motor
Motor pinion



Dimensions of motor mounting in mm

a	b	c	d	e	f	g
8 +0.3	10	16	3	M4	34.0	0.3

Motor flange



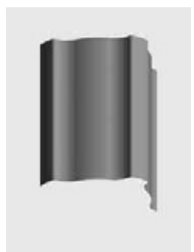
Dimensions of motor mounting/flange in mm

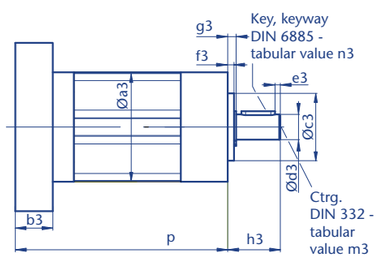
	a2	b2	c2	d2	e2	f2	g2
	80	65	50 H7	5.5	30.3	3.0	10.3

h2	j2
38 H7	5.5

Further flanges (e.g. NEMA) are available on request.

Planetary gears
Output





Dimensions of planetary gear drive in mm

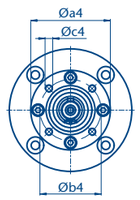
a3	b3	c3	d3	e3	f3	g3
52	17.8	32 h8	12 h7	2.5	3.0	4.0

h3	m3	n3
25	D M4	A4x4x16

Reduction ratios i rounded

1-stage	2-stage	3-stage	
4:1 (3.70)	14:1 (13.73)	51:1 (50.89)	130:1 (129.62)
5:1 (5.18)	19:1 (19.20)	68:1 (68.06)	150:1 (149.90)
7:1 (6.75)	25:1 (25.01)	79:1 (78.71)	169:1 (168.84)
	29:1 (28.93)	93:1 (92.70)	195:1 (195.26)
	35:1 (34.97)	100:1 (99.50)	236:1 (236.09)
	46:1 (45.56)	115:1 (115.07)	308:1 (307.54)

Output flange



Dimensions of gear unit output/flange in mm

a4	b4	c4
52	40	M5x10

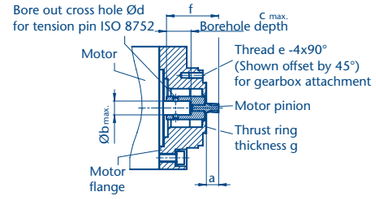
Further flanges (e.g. NEMA) are available on request.

[1] For plastic PL wheels only! Impact of 1st stage for 2-3 stage versions is negligible.

(ø 52 mm, metal-low-noise) PM 52 LN

Parameter	1-stage	2-stage	3-stage
Perm. output torque (Appl. factor $C_B = 1.0$)	4.0 Nm	12.0 Nm	25.0 Nm
Gear drive efficiency, approx.	0.80	0.75	0.70
Max. backlash in ° DEG	0.70° (LN: 1,10°)[1]	0.75°	0.80°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-30 °C to +120 °C	-30 °C to +120 °C	-30 °C to +120 °C
Output side with ball bearing (2RS)			
Max. load, radial	200 N	320 N	450 N
Max. load, axial	60 N	100 N	150 N
Max. perm. fitting pressure	500 N	500 N	500 N
Gear drive length p	73.1 ± 0.5 mm	87.25 ± 0.5 mm	101.4 ± 0.5 mm
Weight approx. with motor flange C80	0.7 kg	0.9 kg	1.1 kg

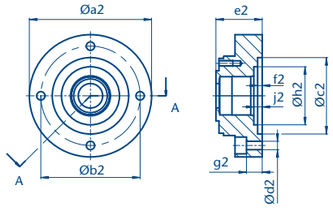
Motor
Motor pinion



Dimensions of motor mounting in mm

a	b	c	d	e	f	g
8 +0.3	10	16	3	M4	34.0	0.3

Motor flange



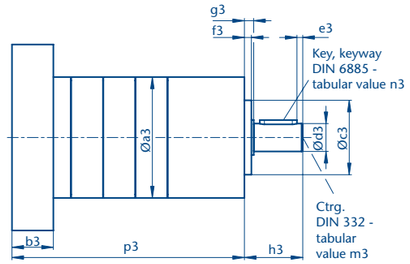
Dimensions of motor mounting/flange in mm

	a2	b2	c2	d2	e2	f2
C 80	80	65	50	5.5	30.3	3.0
C105	105	85	70	6.5	30.3	3.0

	g2	h2	j2
C 80	10.3	38 H7	5.5
C105	10.3	–	–

Further flanges (e.g. NEMA) are available on request.

Planetary gears
Output



Dimensions of planetary gear drive in mm

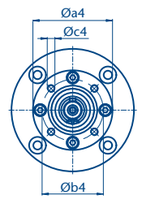
a3	b3	c3	d3	e3	f3	g3
52	17.8	32 h8	12 h7	2.5	3.0	4.2

h3	m3	n3
25	D M4	A3x3x16

Reduction ratios i rounded

1-stage	2-stage	3-stage	
4:1 (3.65)	14:1 (13.53)	67:1 (67.08)	166:1 (166.40)
5:1 (5.36)	19:1 (18.92)	81:1 (81.11)	192:1 (191.54)
7:1 (6.55)	25:1 (24.65)	91:1 (91.36)	232:1 (231.59)
9:1 (8.63)	28:1 (28.05)	101:1 (101.89)	302:1 (301.68)
	34:1 (33.92)	115:1 (114.77)	393:1 (392.98)
	45:1 (44.69)	128:1 (127.74)	
	58:1 (58.22)	145:1 (145.36)	

Output flange



Dimensions of gear unit output/flange in mm

a4	b4	c4
52	40	M5x10

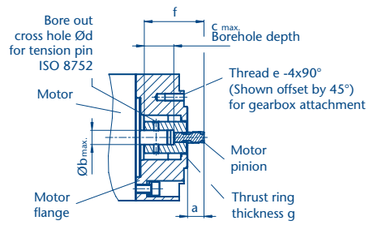
Further flanges (e.g. NEMA) are available on request.

[1] For plastic PL wheels only! Impact of 1st stage for 2-3 stage versions is negligible.

PM 62 LN (ø 62 mm, metal-low-noise)

Parameter	1-stage	2-stage	3-stage
Perm. output torque (Appl. factor $C_B = 1.0$)	8 Nm	25 Nm	50 Nm
Gear drive efficiency, approx.	0.80	0.75	0.70
Max. backlash in ° DEG	0.65° (LN: 0.95°)[1]	0.70°	0.75°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-30 °C to +120 °C	-30 °C to +120 °C	-30 °C to +120 °C
Output side with ball bearing (2RS)			
Max. load, radial (10 mm from flange)	240 N	360 N	520 N
Max. load, axial	70 N	100 N	150 N
Max. perm. fitting pressure	1,000 N	1,000 N	1,000 N
Gear drive length p	73.2 ± 0.5 mm	90.1 ± 0.5 mm	106.9 ± 0.5 mm
Weight approx. with motor flange C80	0.8 kg	1.2 kg	1.6 kg

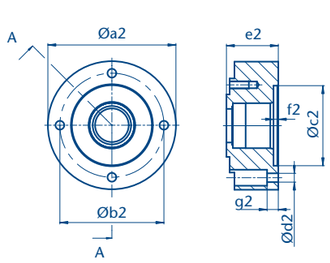
Motor
Motor pinion



Dimensions of motor mounting in mm

a	b	c	d	e	f	g
10.4 -0.3	12	18	3	M5	38.0	0.3

Motor flange

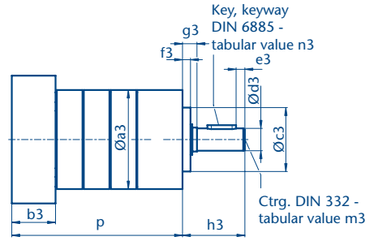


Dimensions of motor mounting/flange in mm

	a2	b2	c2	d2	e2	f2	g2
C 80	80	65	50 H7	5.5	32.4	3.0	7.0
C 90	90	75	60 H7	5.5	32.4	3.0	7.0
C 105	105	85	70 H7	6.5	32.4	3.0	7.0
C 120	120	100	80 H7	6.5	32.4	3.5	7.0

Further flanges (e.g. NEMA) are available on request.

Planetary gears
Output



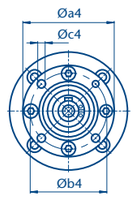
Dimensions of planetary gear drive in mm

a3	b3	c3	d3	e3	f3	g3
62	27.4	40 j7	14 h7	5.5	5.0	9.0
h3	**m3**	**n3**				
39	D M5	A5x5x18				

Reduction ratios i rounded

1-stage	2-stage	3-stage	
4:1 (3.65)	14:1 (13.53)	67:1 (67.08)	166:1 (166.40)
5:1 (5.36)	19:1 (18.92)	81:1 (81.11)	192:1 (191.54)
7:1 (6.55)	25:1 (24.65)	91:1 (91.36)	232:1 (231.59)
9:1 (8.63)	28:1 (28.05)	101:1 (101.89)	302:1 (301.68)
	34:1 (33.92)	115:1 (114.77)	393:1 (392.98)
	45:1 (44.69)	128:1 (127.74)	
	58:1 (58.22)	145:1 (145.36)	

Output flange



Dimensions of gear unit output/flange in mm

a4	b4	c4
62	52	M5x10

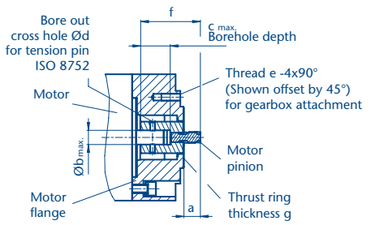
Further flanges (e.g. NEMA) are available on request.

[1] For plastic PL wheels only! Impact of 1st stage for 2-3 stage versions is negligible.

(ø 72 mm, metal-low-noise) PM 72 LN

Parameter	1-stage	2-stage	3-stage
Perm. output torque (Appl. factor $C_B = 1.0$)	14 Nm	42 Nm	84 Nm
Gear drive efficiency, approx.	0.80	0.75	0.70
Max. backlash in ° DEG	0.60° (LN: 0.90°)[1]	0.65°	0.70°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-30 °C to +120 °C	-30 °C to +120 °C	-30 °C to +120 °C
Output side with ball bearing (2RS)			
Max. load, radial	320 N	480 N	760 N
Max. load, axial	70 N	100 N	160 N
Max. perm. fitting pressure	1,300 N	1,300 N	1,300 N
Gear drive length p	85.6 ± 0.5 mm	105.2 ± 0.5 mm	124.7 ± 0.5 mm
Weight approx. with motor flange C80	1.4 kg	1.9 kg	2.4 kg

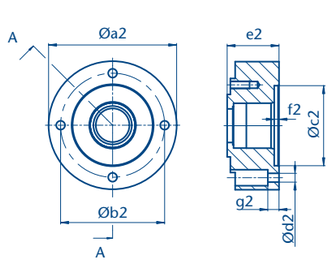
Motor
Motor pinion



Dimensions of motor mounting in mm

a	b	c	d	e	f	g
12.1 -0.3	14	19	3	M6	41.4	0.5

Motor flange

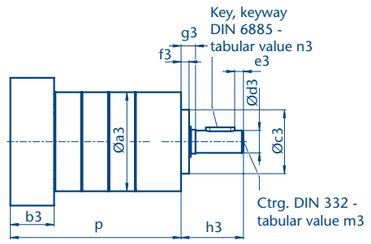


Dimensions of motor mounting/flange in mm

	a2	b2	c2	d2	e2	f2	g2
C 80	80	65	50 H7	5.5	34.3	3.0	9.0
C 90	90	75	60 H7	5.5	34.3	3.0	9.0
C 105	105	85	70 H7	6.5	34.3	3.0	9.0
C 120	120	100	80 H7	6.5	34.3	3.5	9.0

Further flanges (e.g. NEMA) are available on request.

Planetary gears
Output



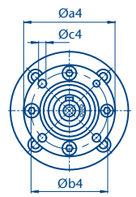
Dimensions of planetary gear drive in mm

a3	b3	c3	d3	e3	f3	g3
72	28.8	45 j7	16 h7	5.0	5.0	9.0
h3	**m3**	**n3**				
49	D M5	A5x5x30				

Reduction ratios i rounded

1-stage	2-stage	3-stage	
4:1 (3.65)	14:1 (13.53)	67:1 (67.08)	166:1 (166.40)
5:1 (5.36)	19:1 (18.92)	81:1 (81.11)	192:1 (191.54)
7:1 (6.55)	25:1 (24.65)	91:1 (91.36)	232:1 (231.59)
9:1 (8.63)	28:1 (28.05)	101:1 (101.89)	302:1 (301.68)
	34:1 (33.92)	115:1 (114.77)	393:1 (392.98)
	45:1 (44.69)	128:1 (127.74)	
	58:1 (58.22)	145:1 (145.36)	

Output flange



Dimensions of gear unit output/flange in mm

a4	b4	c4
72	60	M5x10

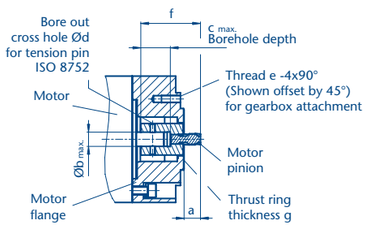
Further flanges (e.g. NEMA) are available on request.

[1] For plastic PL wheels only! Impact of 1st stage for 2-3 stage versions is negligible.

PM 81 LN (ø 81 mm, metal-low-noise)

Parameter	1-stage	2-stage	3-stage
Perm. output torque (Appl. factor $C_B = 1.0$)	20 Nm	60 Nm	120 Nm
Gear drive efficiency, approx.	0.80	0.75	0.70
Max. backlash in ° DEG	0.50° (LN: 0.85°)[1]	0.55°	0.60°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-30 °C to +120 °C	-30 °C to +120 °C	-30 °C to +120 °C
Output side with ball bearing (2RS)			
Max. load, radial	400 N	600 N	1,000 N
Max. load, axial	80 N	120 N	200 N
Max. perm. fitting pressure	1,500 N	1,500 N	1,500 N
Gear drive length p	95.1 ± 0.5 mm	116.8 ± 0.5 mm	138.4 ± 0.5 mm
Weight approx. with motor flange C80	1.8 kg	2.5 kg	3.2 kg

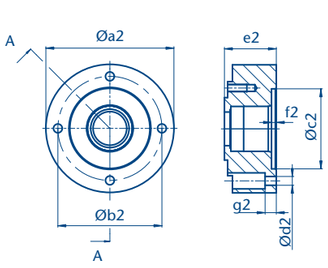
Motor
Motor pinion



Dimensions of motor mounting in mm

a	b	c	d	e	f	g
13.5 +0.15/-0.25	18	21	3	M6	48.5	0.3

Motor flange

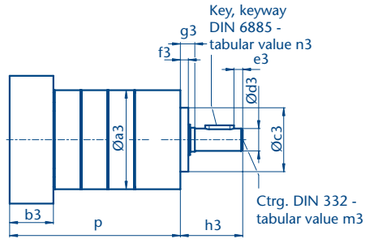


Dimensions of motor mounting/flange in mm

	a2	b2	c2	d2	e2	f2	g2
C 80	81	65	50 H7	5.5	37.8	3.0	7.0
C 90	90	75	60 H7	5.5	37.8	3.0	7.0
C 105	105	85	70 H7	6.5	37.8	3.0	7.0
C 120	120	100	80 H7	6.5	37.8	3.5	7.0

Further flanges (e.g. NEMA) are available on request.

Planetary gears
Output



Dimensions of planetary gear drive in mm

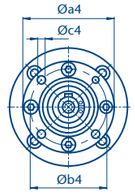
a3	b3	c3	d3	e3	f3	g3
81	32.3	50 j7	19 h7	6.0	5.0	9.0

h3	m3	n3
49	D M6	A6x6x28

Reduction ratios i rounded

1-stage	2-stage	3-stage	
4:1 (3.65)	14:1 (13.53)	67:1 (67.08)	166:1 (166.40)
5:1 (5.36)	19:1 (18.92)	81:1 (81.11)	192:1 (191.54)
7:1 (6.55)	25:1 (24.65)	91:1 (91.36)	232:1 (231.59)
9:1 (8.63)	28:1 (28.05)	101:1 (101.89)	302:1 (301.68)
	34:1 (33.92)	115:1 (114.77)	393:1 (392.98)
	45:1 (44.69)	128:1 (127.74)	
	58:1 (58.22)	145:1 (145.36)	

Output flange



Dimensions of gear unit output/flange in mm

a4	b4	c4
81	65	M6x12

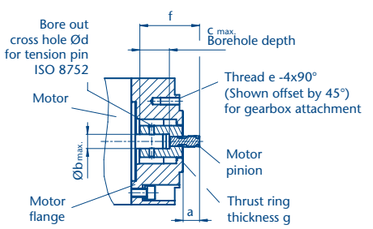
Further flanges (e.g. NEMA) are available on request.

[1] For plastic PL wheels only! Impact of 1st stage for 2-3 stage versions is negligible.

(ø 105 mm, metal-low-noise) PM 105 LN

Parameter	1-stage	2-stage	3-stage
Perm. output torque (Appl. factor $C_B = 1.0$)	35 Nm	105 Nm	195 Nm
Gear drive efficiency, approx.	0.80	0.75	0.70
Max. backlash in ° DEG	0.55° (LN: 0.90°)[1]	0.60°	0.65°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-30 °C to +120 °C	-30 °C to +120 °C	-30 °C to +120 °C
Output side with ball bearing (2RS)			
Max. load, radial	600 N	900 N	1,500 N
Max. load, axial	120 N	180 N	300 N
Max. perm. fitting pressure	2,000 N	2,000 N	2,000 N
Gear drive length p (motorsize 71)	117.2 ± 0.6 mm	148.3 ± 0.6 mm	179.3 ± 0.6 mm
Gear drive length p (motorsize 80)	127.2 ± 0.6 mm	158.3 ± 0.6 mm	189.3 ± 0.6 mm
Weight approx. with motor flange C80	4.4 kg	6.0 kg	7.6 kg

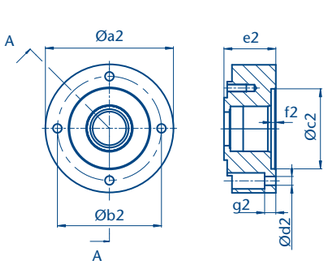
Motor
Motor pinion



Dimensions of motor mounting in mm

a	b	c	d	e	f	g
18.3 -0.3	21	26	5	M10	60.0	0.5

Motor flange

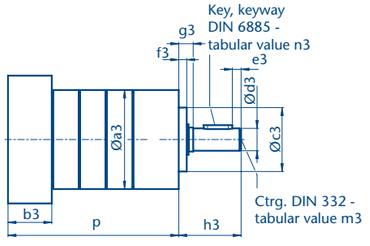


Dimensions of motor mounting/flange in mm

	a2	b2	c2	d2	e2	f2	g2
C 105	105	85	70 H7	6.4	46.4	3.0	15.0
C 120	120	100	80 H7	6.4	56.4	3.5	15.0
C 140	140	100	95 H7	8.4	46.4	3.5	15.0
C 160	160	115	110 H7	8.4	56.4	4.0	15.0

Further flanges (e.g. NEMA) are available on request.

Planetary gears
Output



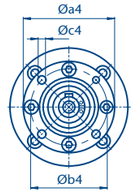
Dimensions of planetary gear drive in mm

	a3	b3	c3	d3	e3
(motorsize 71)	105	40.9	70 j7	25 h7	5.0
(motorsize 80)	105	50.9	70 j7	25 h7	5.0
	f3	**g3**	**h3**	**m3**	**n3**
(motorsize 71)	5.0	9.0	59	D M10	A8x7x40
(motorsize 80)	5.0	9.0	59	D M10	A8x7x40

Reduction ratios i rounded

1-stage	2-stage	3-stage	
4:1 (3.65)	14:1 (13.53)	67:1 (67.08)	166:1 (166.40)
5:1 (5.36)	19:1 (18.92)	81:1 (81.11)	192:1 (191.54)
7:1 (6.55)	25:1 (24.65)	91:1 (91.36)	232:1 (231.59)
9:1 (8.63)	28:1 (28.05)	101:1 (101.89)	302:1 (301.68)
	34:1 (33.92)	115:1 (114.77)	393:1 (392.98)
	45:1 (44.69)	128:1 (127.74)	
	58:1 (58.22)	145:1 (145.36)	

Output flange



Dimensions of gear unit output/flange in mm

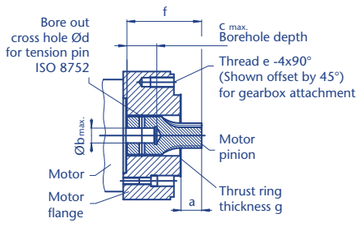
a4	b4	c4
105	85	M8x16

Further flanges (e.g. NEMA) are available on request.

PM 120 (ø 120 mm, metal)

Parameter	1-stage	2-stage	3-stage
Perm. output torque (Appl. factor $C_B = 1.0$)	50 Nm	150 Nm	300 Nm
Gear drive efficiency, approx.	0.80	0.75	0.70
Max. backlash in ° DEG	1.00°	1.50°	2.00°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-30 °C to +140 °C	-30 °C to +140 °C	-30 °C to +140 °C
Output side with ball bearing (2RS)			
Max. load, radial	600 N	900 N	1,500 N
Max. load, axial	120 N	180 N	300 N
Max. perm. fitting pressure	2,500 N	2,500 N	2,500 N
Gear drive length p (motorsize 71)	133.8 ± 0.6 mm	168.0 ± 0.6 mm	202.1 ± 0.6 mm
Gear drive length p (motorsize 81)	143.8 ± 0.6 mm	178.0 ± 0.6 mm	212.1 ± 0.6 mm
Weight approx.	5.6 kg	8.0 kg	10.4 kg

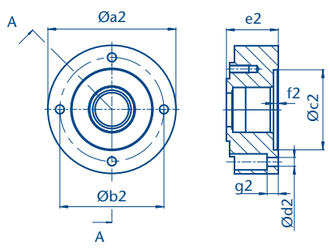
Motor
Motor pinion



Dimensions of motor mounting in mm

a	b	c	d	e	f	g
19.4 $^{+0.2/-0.3}$	26	28	5	M10	70.0	0.5

Motor flange

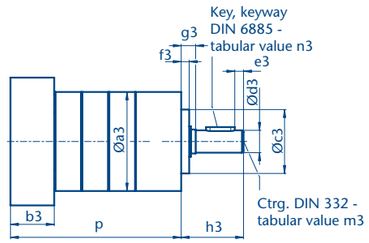


Dimensions of motor mounting/flange in mm

	a2	b2	c2	d2	e2	f2	g2
C 105	105	85	70 H7	6.6	53.6	3.0	15
C 120	120	100	80 H7	6.6	63.6	3.5	15
C 140	140	115	95 H7	9.0	53.6	3.5	15
C 160	160	130	110 H7	9.0	63.6	4.0	15

Further flanges (e.g. NEMA) are available on request.

Planetary gears
Output



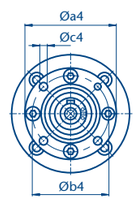
Dimensions of planetary gear drive in mm

	a3	b3	c3	d3	e3
motorsize 71	120	44.2	80 j7	32 k6	4.0
motorsize 81	120	54.2	80 j7	32 k6	4.0
	f3	**g3**	**h3**	**m3**	**n3**
motorsize 71	5.0	15.0	73.0	D M12	A10x8x50
motorsize 81	5.0	15.0	73.0	D M12	A10x8x50

Reduction ratios i rounded

1-stage	2-stage	3-stage
4:1 (3.70)	14:1 (13.73)	51:1 (50.89)
7:1 (6.75)	25:1 (25.01)	93:1 (92.70)
	46:1 (45.56)	169:1 (168.84)
		308:1 (307.54)

Output flange



Dimensions of gear unit output/flange in mm

a4	b4	c4
120	100	M10x22

Further flanges (e.g. NEMA) are available on request.

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