Framo Morat is your partner for customized drive solutions. We offer a comprehensive range of gear technology, worm gear sets and drive systems, covering a broad spectrum of applications. We also develop and produce customer-specific drives for numerous applications and sectors.

Company Page 4

Gear technology Page 10

Worm gear sets Page 14

Compacta slip-on geared motors Page 34

Mini linear actuators Page 48

LiMax linear actuators Page 54

Push-pull LinearChains Page 60

Planetary gears Page 66

Customer-specific drives Page 72

GEARVALLEY

Framo Morat – 150 years of industrial culture in the Black Forest

1863
Johann Morat founds parent company in Eisenbach

1912
Founding of Franz Morat GmbH & Co. KG

1952
Development and production of the company's first series of worm gears

1963
The company F. Morat, founded in 1944, starts processing plastics

1966
Development of the company's first customer-specific drives

Made in Gear Valley.

We have been deriving motion from energy for over 100 years.

Framo Morat is a company with a rich tradition, rooted in the industrial culture of the Black Forest. Eisenbach was already a flourishing center of the watch industry in the 18th century, and many leading producers of precision-engineered parts, precision turned parts and drives are still at home here in the Eisenbach "Gear Valley".

Framo Morat has been developing and producing gear wheels and worm gear sets for over 100 years and is now one of the world's leading suppliers of sector- and customer-specific drive solutions. Whereby we place great value on the typical Black Forest virtues of conscientiousness and rigorousness: Framo Morat is a dependable partner that not only offers advanced technical competence and state-of-the-art production plants, but also brings an eye for detail and a relentless ambition to achieve perfection.

Countless drive solutions have thus been created for leading customers in the most varied of sectors. And we would be pleased to make your drive idea a reality!

Franz Morat senior

Franz Morat senior founded Franz Morat GmbH & Co. KG in 1912 – a company whose innovations have successfully helped shape the market. Production at the time included turned parts and gear wheels for the watch industry, as well as pressure gauges and counters.

Franz Morat junior

As the son of the company founder, Franz Morat junior took over management of the parent company in Eisenbach in 1940 and led the company as the sole shareholder from 1945 to 1977. He laid the foundations for the current success of Framo Morat GmbH & Co. KG by identifying what was feasible, being prepared to take risks and always paying attention to the needs of his workforce.

1981/84

Market introduction of the Compacta rotational drive and the Mini line of compact linear actuators

2005

Company name changed to Framo Morat GmbH & Co. KG

2008

F. Morat & Co. GmbH, specializing in plastic technology, becomes a 100% sister company of Framo Morat GmbH & Co. KG

2009

Expansion of international activities: founding of Framo Morat B.V. in the Netherlands

100 Jahre Franz Morat 1912 - 2012

Turning things into a knack.

Special challenges require special solutions.

Whether gear technology, worm gear sets or complete drives: you will always receive a well thought-out product from Framo Morat, precisely tailored to your application. In addition to our comprehensive standard range, we design and produce customer-specific drive solutions according to your requirements.

Gear technology

Our product range includes gear wheels with internal or external teeth, rotor shafts, as well as pinions and chain sprockets, all also produced according to individual customer requirements. With modern machinery and decades of experience, we also offer solutions for complex processing tasks: soft and hard machining including hardening in our own annealing oven – with Framo Morat you can get everything from a single source.

Worm gear sets

Having produced over one million worm gear sets annually, Framo Morat is a global market leader. In addition to our standard series, we also offer customer-specific solutions made of steel, bronze, fabric-based laminate or plastic in diameters of from 20 to 250 mm and center distances of from 17 to 125 mm.

Drive systems

Our drive systems include slip-on geared motors, linear actuators, push-pull chains and planetary gears that are individually adapted to customer requirements using a modular system. We also develop and produce individual drive solutions according to customer specifications. Customers benefit from Framo Morat's decades of experience in the design and implementation of application-specific drives.

Gear technology

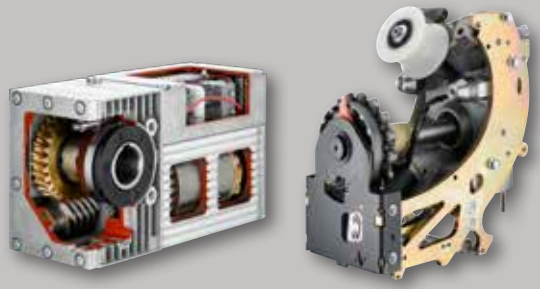
Gear wheels with internal or external teeth, rotor shafts, pinions and chain sprockets according to individual customer requirements

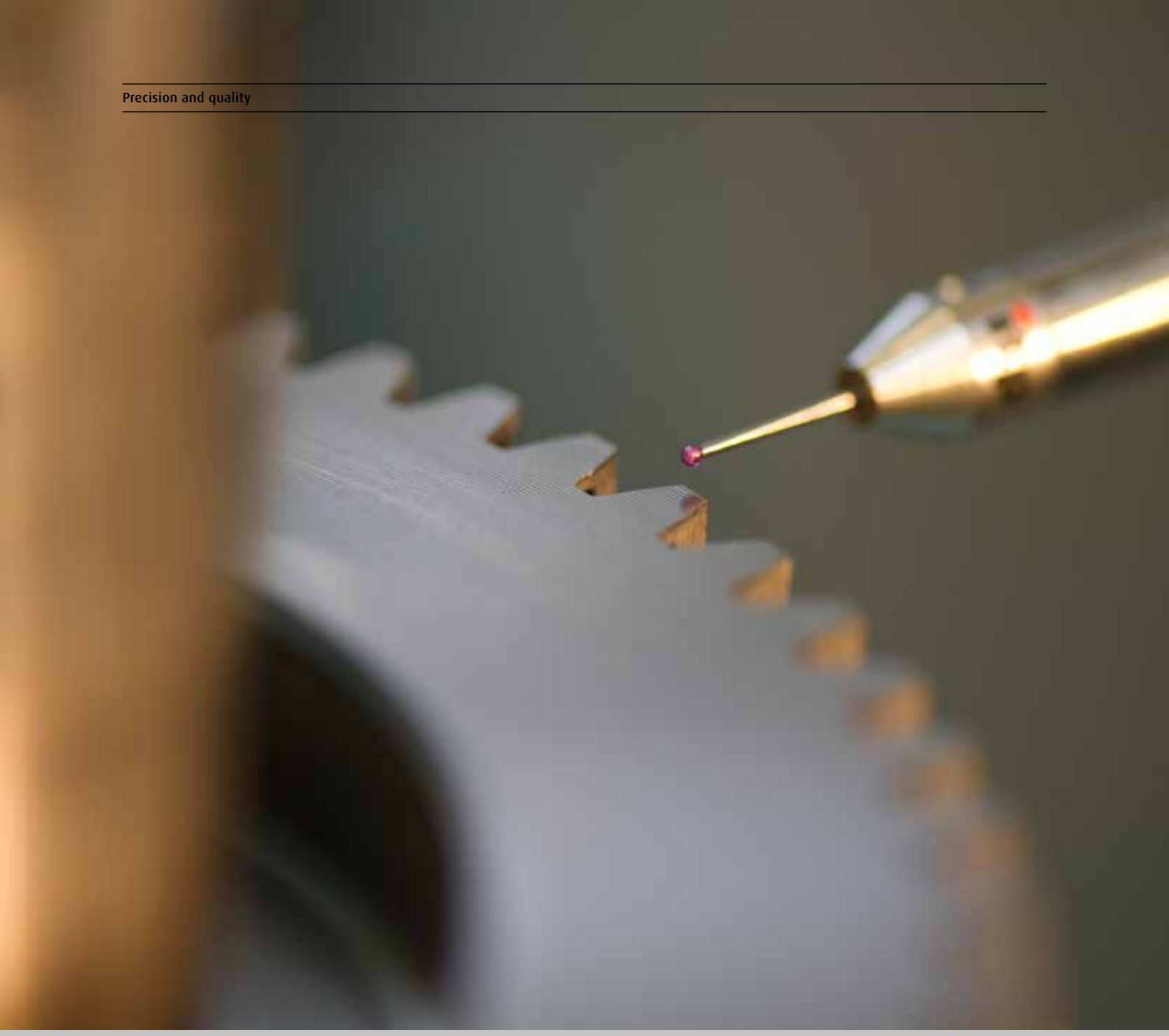
Worm gear sets

Framo Morat is a leading international supplier, with more than one million worm gear sets produced annually, a considerable proportion of which are customer-specific wheel sets.

Drive systems

Innovative standard drives, such as the Compacta slip-on geared motor and drive solutions developed entirely according to customer specifications, are in use in numerous applications.





All work processes from a single source

Turning

State-of-the-art turning centers with several working spindles, tool magazines and automatic bar feeders ensure maximum performance and economical production of both simple and very complex parts.

Milling

Grooves, notches, steps, plane surfaces, etc. can be rapidly, accurately and economically produced at several processing centers with automatic material insertion and removal.

Gear cutting

We can produce straight and helical toothed gear wheels, as well as worms and worm wheels, with our modern gear hobbing machines. Integrated, automatic insertion systems ensure cost-optimized production.

Slotting and broaching

We mainly use slotting and broaching machines to produce toothing. This guarantees accurate adherence to dimensional tolerances and excellent surface quality.

Everything under control.

Every detail counts.

Framo Morat has a very great depth of production: we carry out work steps such as turning, toothing, cylindrical grinding, profile grinding, hob grinding, gear hobbing and gear shaping ourselves – and can thus guarantee the high quality of our products. Our range of performance also includes the straightening of shafts (including inspecting for cracks) for workpiece lengths of up to 1,000 mm and workpiece weights of up to 100 kg.

We are also one of the few producers in our sector to have our own annealing oven: we can accurately influence the material properties of our components, especially their surface hardness and strength, using case hardening or carbonitriding. Precision and quality are our top priorities for production, which is why all processes are designed so that faults are detected and eliminated early on. We ensure reproducible results with maximum quality by means of inline measurement technology and visual fault analysis in all important work steps. Whether the dimensional accuracy of toothing or shafts, surface quality or cleanliness – the aim is zero-defect quality for all our products.

Framo Morat – our quality and environmental protection principles

- We are committed to maximum quality.
  Our aim: zero defects in all parts.
- Qualified and motivated employees are the best prerequisite for meeting high quality standards.
- Faults are prevented and causes of faults overcome through the careful and responsible actions of every individual.
- Environmental protection is a self-evident obligation for us.

Hardening

Framo Morat is one of the few producers to have its own annealing furnace. Workpieces or batches with dimensions of up to 1,000 x 600 x 600 mm³ and weights of up to 600 kg can be refined in our multi-purpose chamber furnace.

Grinding

Our grinding program includes step grinding up to a diameter of 250 mm on a length of 500 mm, bore grinding, as well as face and taper grinding up to a diameter of 50 mm.

Profile grinding

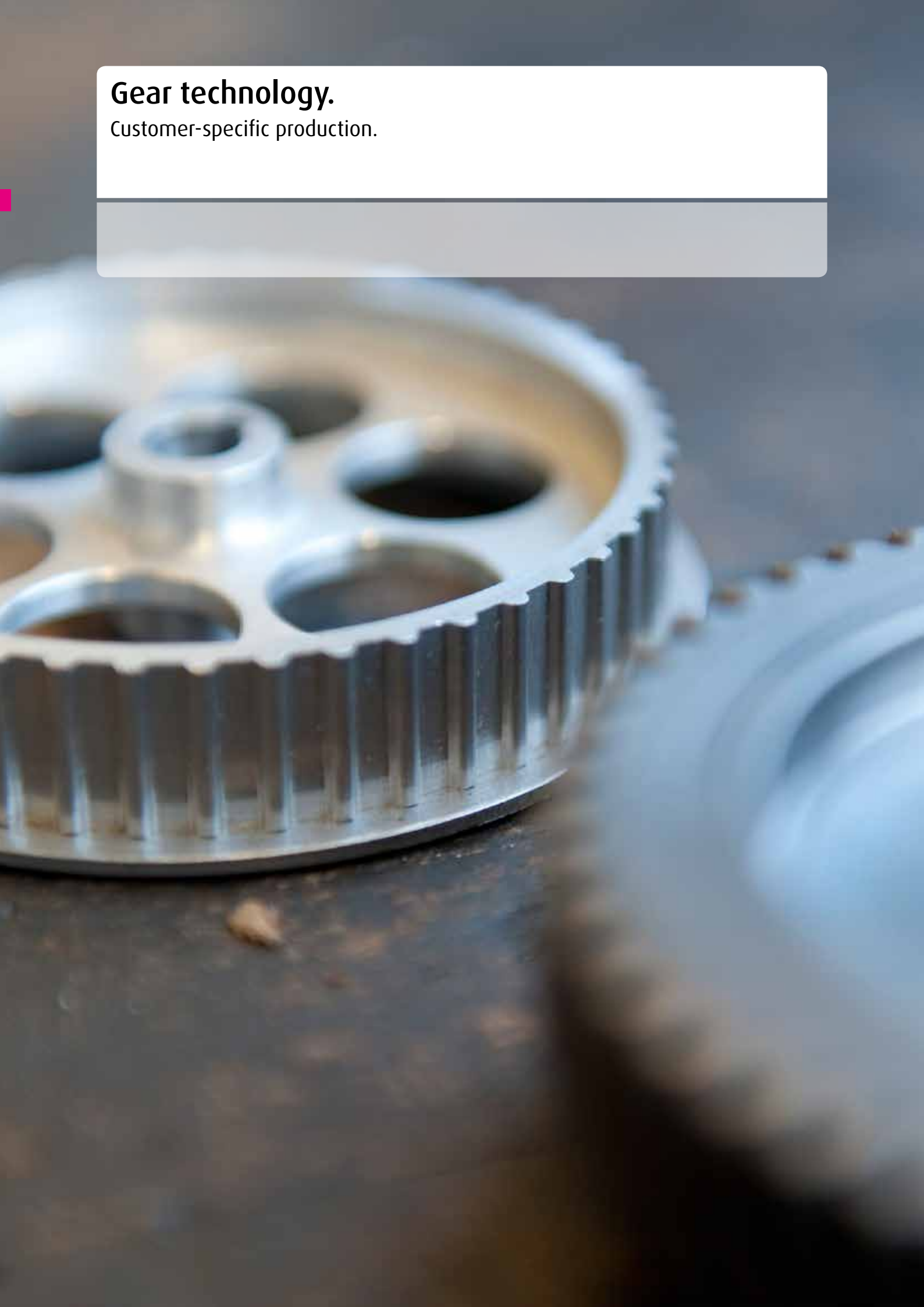
Our profile grinding machines literally put the finishing touches to our toothing and allow process-reliable production in outstanding quality.

Assembly

Our drives undergo final assembly and inspections at modern assembly islands. Kanban technology ensures smooth material flows. As part of a coordinated logistical concept, products are packed ready for shipment directly at the assembly station.

Gear technology.

Customer-specific production.



Gear technology is our specialty: we produce customer-specific gear wheels with internal and external teeth, rotor shafts, pinions and chain sprockets as well as numerous special solutions. Whereby we use a wide range of materials, depending on the requirements – steel, aluminum, a variety of non-ferrous metals and plastic. We thus guarantee that our customers always receive a high-quality product precisely adapted to their application.

We carry out all the important process steps involving soft and hard machining, including hardening in our own annealing oven, ourselves. Thanks to our great depth of production we can also carry out complex processing tasks in precise accordance with customer requirements and in maximum quality.

Gear technology

- Individual production according to customer requirements
- Diameters of up to 300 mm, modules up to size 6, shaft lengths of up to 480 mm
- Straight or helical toothed
- Large selection of materials (e.g. steel, bronze, fabric-based laminate or plastic)
- All process steps (turning, milling, hardening, flank grinding, grinding, measurement) from a single source

Gear technology

Gear wheels with internal or external teeth, rotor shafts, pinions and chain sprockets according to individual customer requirements.

Perfect gear teething.

The basis of every good drive.

Nothing runs properly without gear wheels: they are the fundamental element of every drive. So it is all the more important that these central components are produced with maximum quality. This is guaranteed for all products from Framo Morat – so our customers can rely on the dependable operation, long service life and quiet running of their drives.

We produce gear wheels for numerous applications and sectors, from machine construction to the printing trade and medical technology. Each sector has its own specific requirements that must be taken into account during development and production. For example, components in construction machines and industrial trucks must be very robust, while those for use in the medical sector principally have to run quietly. Framo Morat offers the right solution for every application, however special it is.

Basic information on gear parts

Classification	Type of gearing	Module	Dimensions	Production processes	Heat treatment	Materials
Spur wheels, rotor shafts and other components in drive systems	External / internal gearings, straight or helical toothing	0.5 – 6	Max. length: 480 mm Diameter up to 330 mm	▪ Turning ▪ Milling ▪ Shaving ▪ Grinding ▪ Hobbing (to Module 1.5 and Ø 100) ▪ Slotting ▪ Broaching (up to Module 5)	▪ Case hardened ▪ Gas nitriding (long/short periods) ▪ Tenifer treatment ▪ Inductive hardened ▪ Tempered	▪ Free-cutting steel ▪ Case-hardened steel ▪ Heat-treated steel ▪ Nitriding steel ▪ Non-ferrous metals ▪ Laminated plastic ▪ Plastic ▪ Aluminum

Application examples

Gear and drum motors

Shafts and geared parts of all sorts are used in gear and drum motors for applications in textile machinery or in conveyor systems and hoisting equipment. The drives are extremely robust and durable as a result of high-quality, precisely fitting components from Framo Morat.

Automotive

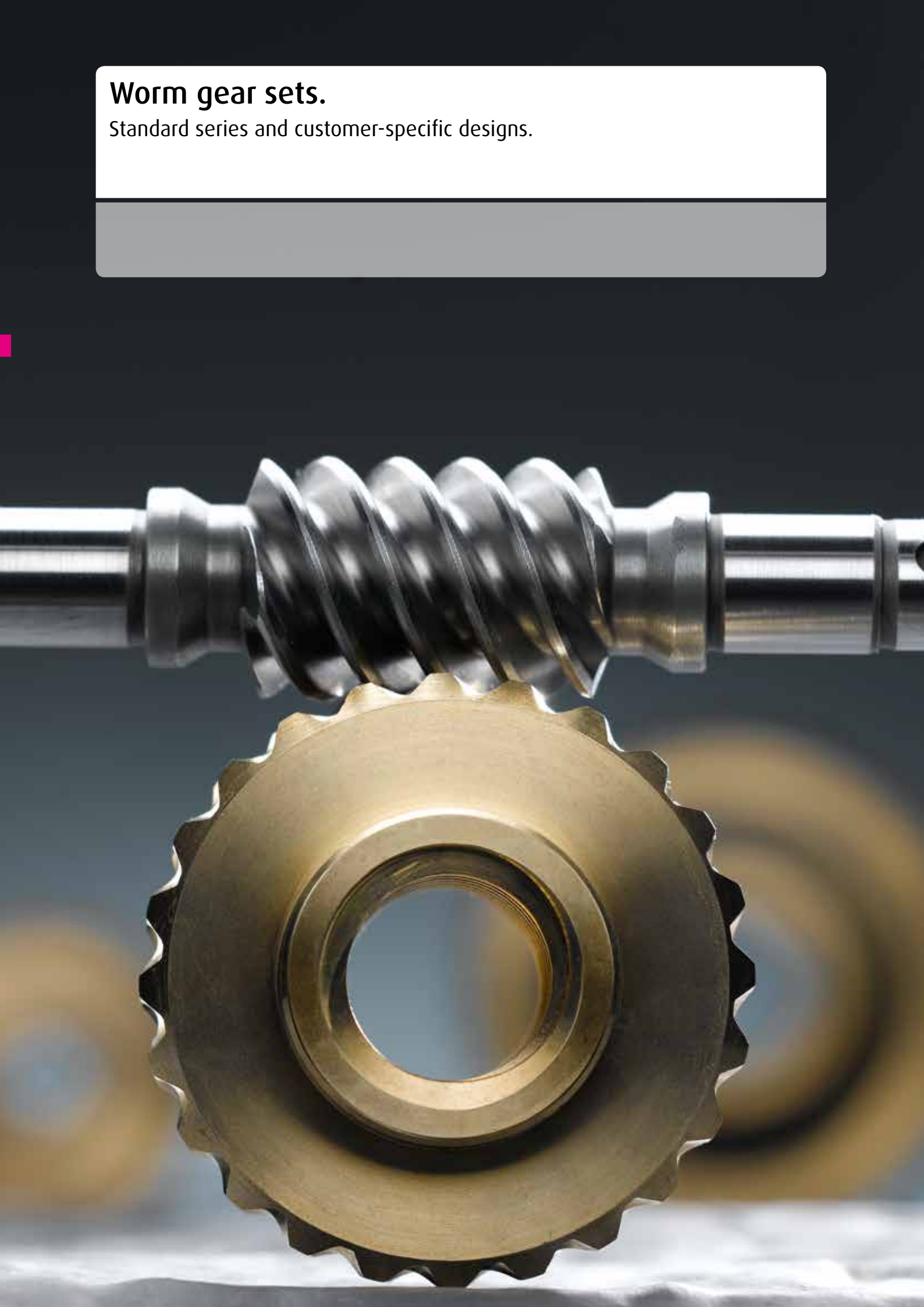
Chain and pump wheels from Framo Morat are used in the drive units of major German sports car producers. They must meet maximum demands regarding grinding quality, stability, precision and quiet running.

Industrial trucks and electric cars

Rotor shafts for the drives of industrial trucks and fork-lift trucks require maximum precision during production in order to withstand the heavy loads in daily operation whilst offering very quiet running. Our rotor shafts for use in sports cars and electric cars meet comparable requirements.

Worm gear sets.

Standard series and customer-specific designs.



Our worm gear sets cover a wide range of applications. The more than one million wheel sets produced in-house annually – most of them in customer-specific designs – demonstrate our many years' experience and high performance capabilities.

Our standard wheel sets are produced with diameters of from 20 to 135 mm and center distances of from 17 to 80 mm. We also offer customer-specific wheel sets with diameters of up to 250 mm and center distances of up to 125 mm.

The standard versions, with a narrow gradation of center distances and gear ratios, are generally available from stock. We can also calculate and produce customer-specific center distances and gear ratios in-house. Wheel sets are preferably right-handed but can, if desired, also be designed with a left-hand thread.

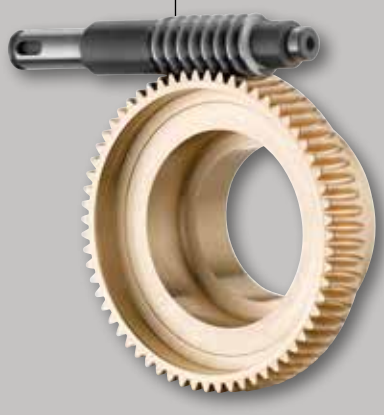
Worm gear sets

- Individual production according to customer specifications
- Diameters of from 20 to 250 mm, center distances of from 17 to 125 mm, Module up to 8, shaft lengths of up to 500 mm
- Choice of material according to customer requirements (steel, bronze, fabric-based laminate or plastic)
- All process steps (turning, milling, hardening, flank grinding, grinding, measurements) from a single source

Worm gear sets in standard series
- Center distances of from 17 to 80 mm
- Gear ratios up to 100:1

Special worm gear sets
- For use in medical technology

Special worm gear sets
- For mobility applications



Tried and tested – in their millions.

The right wheel set for every application.

The functional principle of worm wheels has remained unchanged for over 100 years: a screw-shaped worm engages a gear wheel, the so-called worm wheel. This results in the axes being displaced by 90°. Worm wheels are generally used where large gear ratios (of up to 150:1) must be achieved. This permits, for example, the conversion of the high rotary speed of an electric motor to a slower speed with a high torque.

For producers of gears, motors and drives, worm gear sets from Framo Morat are the benchmark for maximum precision and reliable, durable operation. Whether in the gears of automatic doors and gates, in actuators for aligning parabolic antennae, in the linear drives of handling systems, in the dosing pumps of the chemical industry or in motorized garden equipment – our worm gear sets are successfully used in numerous applications and sectors.

Basic information on worm gear sets

	Center distance	Gear ratio	Material, worm/shaft	Material, worm wheel	Fine machining
Worm gear sets in catalog	17, 22, 25, 31, 33, 35, 40, 50, 53, 63, 65, 80	3:1 – 100:1	Steel ▪ case-hardened ▪ inductive-hardened	Brass	Ground worm profile
Customer-specific designs	17 – 125	3:1 – 100:1	Steel ▪ case-hardened ▪ inductive-hardened Non-ferrous metal Plastic	Brass Bronze Fabric-based laminate Plastic Steel Grey cast iron	Ground worm profile

All specifications in mm.

Application examples

Worm gears and gear motors

Worm gear sets from Framo Morat are used in worm gears and gear motors with the most varied designs and dimensions. What all components have in common, however, is their excellent production quality and precision, ensuring that the drives offer a long service life and high cost-effectiveness.

TRUMPF Medizin Systeme

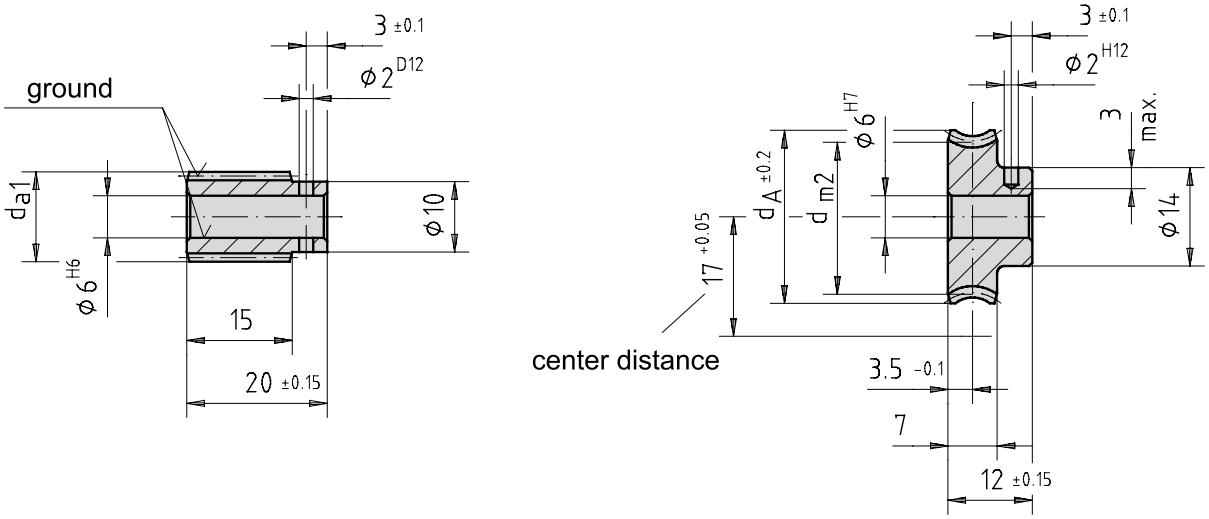
Adjustment systems for operating tables

Medical applications pose the very highest of demands regarding precision, quiet running and long service life. This is also the case for the worm gear sets made of stainless steel, with which all moving parts of an operating table can be adjusted.

Dosing pumps and chemical plants

Our worm gear sets are used in dosing pumps and systems for the chemical and petrochemical industry, as well as for purifying drinking water and water treatment. The high-quality components from Framo Morat also guarantee trouble-free operation over a very long time even under poor operating conditions.

METRIC



A17 (center distance of axes)

Pressure angle 15°

Key

i = gear ratio
γ_m = lead angle
m = module
z_1 = number of threads
d_{m1} = pitch diameter, worm

d_{a1} = tip diameter, worm
z_2 = number of teeth
d_{m2} = pitch diameter, worm gear
d_A = maximum diameter, worm gear

T_2 = output torque
MG = mineral grease
MO = mineral oil/synthetic grease
SO = synthetic oil

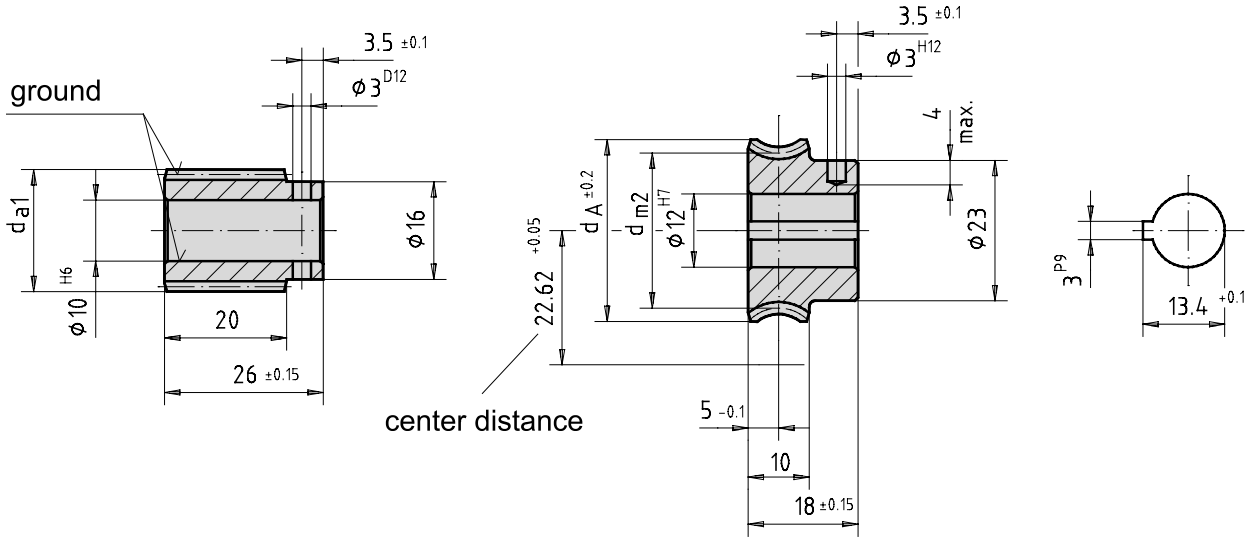
Product				Worm			Worm gear			T_2 [Nm] bronze		
	i	γ_m	m	z_1	d_{m1}	d_{a1}	z_2	d_{m2}	d_A	MG	MO	SO
A17Ü2*	2.25:1	48°15'	0.9	8	10.15	11.95	18	23.85	25.63	1.1	1.3	1.6
A17Ü4	4.5:1	21°50'	0.75	6	12.1	13.6	27	21.9	24.6	1.7	2.0	2.6
A17Ü5	5:1	21°37'	0.7	6	11.4	12.8	30	22.6	24.6	1.8	2.2	2.7
A17Ü7	7:1	14°4'	1	3	12.34	14.34	21	21.66	24.6	1.6	1.9	2.4
A17Ü9	9:1	9°40'	0.75	3	13.4	14.9	27	20.6	22.7	1.5	1.8	2.2
A17Ü10	10:1	11°48'	0.75	3	11.0	12.5	30	23.0	24.6	1.9	2.3	2.8
A17Ü15	15:1	7°38'	0.75	2	11.3	12.8	30	22.7	24.6	1.9	2.3	2.8
A17Ü25	25:1	4°32'	0.9	1	11.4	13.2	25	22.6	24.6	1.8	2.2	2.7
A17Ü30	30:1	3°45'	0.75	1	11.45	12.95	30	22.55	24.6	1.9	2.3	2.8
A17Ü40	40:1	2°3'	0.5	1	13.98	14.98	40	20.02	21.6	1.4	1.7	2.1
A17Ü50**	50:1	3°12'	0.5	1	8.95	9.95	50	25.05	27.2	1.0	1.2	1.5
A17Ü60	60:1	2°18'	0.4	1	9.95	10.75	60	24.05	26.0	1.6	1.9	2.4
A17Ü75	75:1	1°28'	0.3	1	11.74	12.34	75	22.26	24.0	–	–	–
A17Ü80	80:1	1°43'	0.3	1	10.0	10.6	80	24.0	26.0	–	–	–

All specifications in mm.

* Worm gear set A17Ü2 is only available with polished (sanded) worm profile and wheel with helical gear wheel teeth.
** The worm of worm gear set A17Ü50 has a hub diameter of 9 mm.

Worm, right-hand, made of case-hardened steel HV 620 – 700.
Worm gear made of CuZn40Al2/So or plastic.

METRIC



A22 (center distance of axes)

Pressure angle 15°

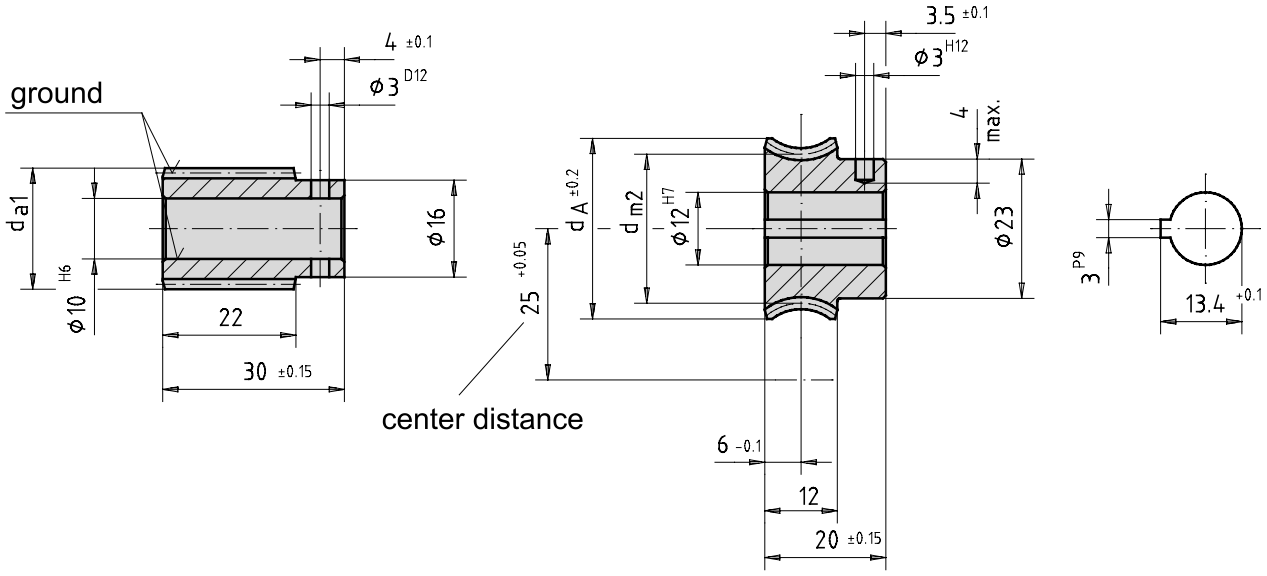
Key		
i = gear ratio γ_m = lead angle m = module z_1 = number of threads d_{m1} = pitch diameter, worm	d_{a1} = tip diameter, worm z_2 = number of teeth d_{m2} = pitch diameter, worm gear d_A = maximum diameter, worm gear	T_2 = output torque MG = mineral grease MO = mineral oil/synthetic grease SO = synthetic oil

Product				Worm			Worm gear			T_2 [Nm] bronze		
	i	γ_m	m	z_1	d_{m1}	d_{a1}	z_2	d_{m2}	d_A	MG	MO	SO
A22Ü3	3:1	17°36'	1.0	7	23.15	25.15	21	22.09	24.8	2.2	2.6	3.3
A22Ü4	4:1	19°32'	1.25	5	18.7	21.2	20	26.54	29.8	3.6	4.3	5.4
A22Ü7	7:1	11°46'	1.25	3	18.4	20.9	21	26.84	29.8	3.6	4.3	5.4
A22Ü11	10.5:1	7°41'	1.25	2	18.7	21.2	21	26.54	29.8	3.4	4.1	5.1
A22Ü21	21:1	3°48'	1.25	1	18.9	21.4	21	26.34	29.8	3.4	4.1	5.1
A22Ü30	30:1	2°50'	0.9	1	18.2	20	30	27.04	29.8	3.6	4.3	5.4
A22Ü40	40:1	2°20'	0.7	1	17.2	18.6	40	28.04	29.8	3.9	4.7	5.8

All specifications in mm.

Worm, right-hand, made of case-hardened steel HV 620 – 700.
Worm gear made of CuZn40Al2/So or plastic.

METRIC



A25 (center distance of axes)

Pressure angle 15°

Key

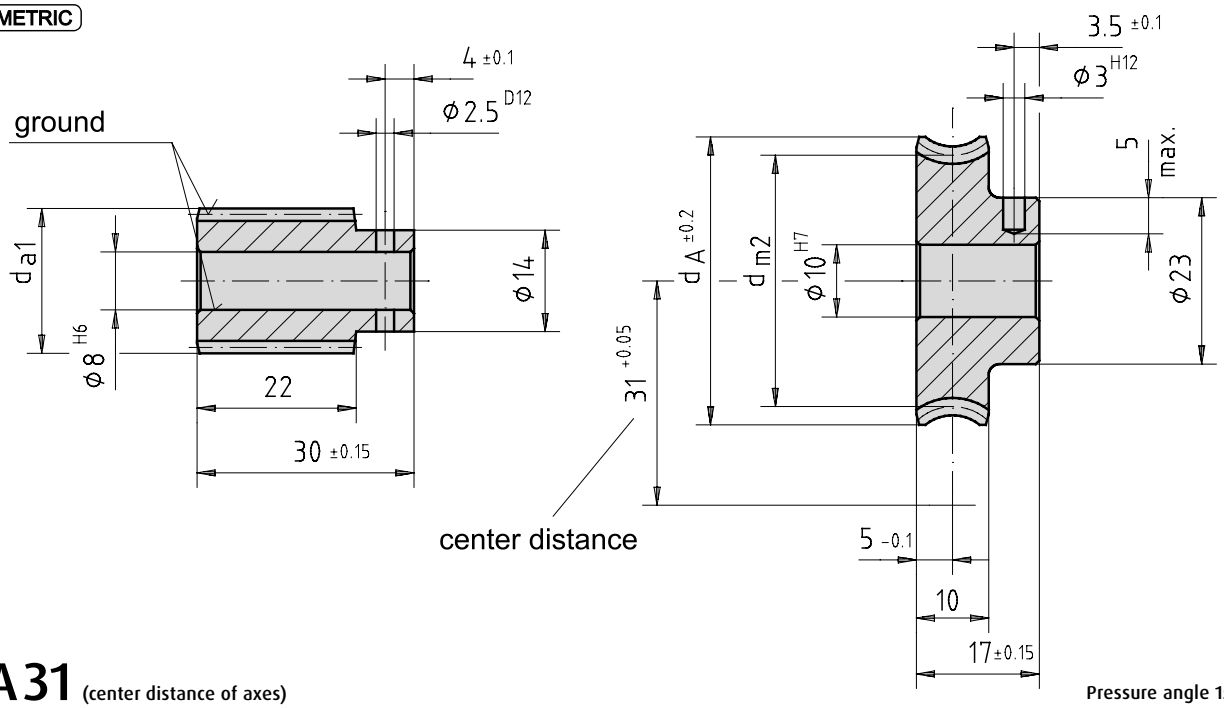
i = gear ratio
γ_m = lead angle
m = module
z_1 = number of threads
d_{m1} = pitch diameter, worm
d_{a1} = tip diameter, worm
z_2 = number of teeth
d_{m2} = pitch diameter, worm gear
d_A = maximum diameter, worm gear
T_2 = output torque
MG = mineral grease
MO = mineral oil/synthetic grease
SO = synthetic oil

Product				Worm			Worm gear			T_2 [Nm] bronze		
	i	γ_m	m	z_1	d_{m1}	d_{a1}	z_2	d_{m2}	d_A	MG	MO	SO
A25Ü4	4:1	20°29'	1.4	5	20	22.8	20	30.0	33.5	5.1	6.1	7.6
A25Ü5	5:1	19°15'	1.5	4	18.2	21.2	20	31.8	34.8	6.5	7.8	9.7
A25Ü6	6.5:1	13°52'	1.15	4	19.2	21.5	26	30.8	34.8	6	7.2	9
A25Ü10	10:1	8°48'	1.5	2	19.6	22.6	20	30.4	34.8	5.9	7.1	8.8
A25Ü15	15:1	6°29'	1.0	2	17.7	19.7	30	32.3	34.8	5.7	6.8	8.5
A25Ü20	20:1	4°19'	1.5	1	19.9	22.9	20	30.1	34.8	5.8	7.0	8.7
A25Ü25	25:1	2°18'	1.0	1	24.96	26.96	25	25.04	27.8	4.1	4.9	6.1
A25Ü30	30:1	2°53'	1.0	1	19.9	21.9	30	30.1	33.5	5.9	7.1	8.8
A25Ü40	40:1	2°33'	0.8	1	17.96	19.56	40	32.04	34.8	6.2	7.4	9.3
A25Ü50	50:1	1°43'	0.6	1	19.96	21.16	50	30.04	33.5	5.1	6.1	7.6

All specifications in mm.

Worm, right-hand, made of case-hardened steel HV 620 – 700.
Worm gear made of CuZn40Al2/So or plastic.

METRIC



A31 (center distance of axes)

Pressure angle 15°

Key

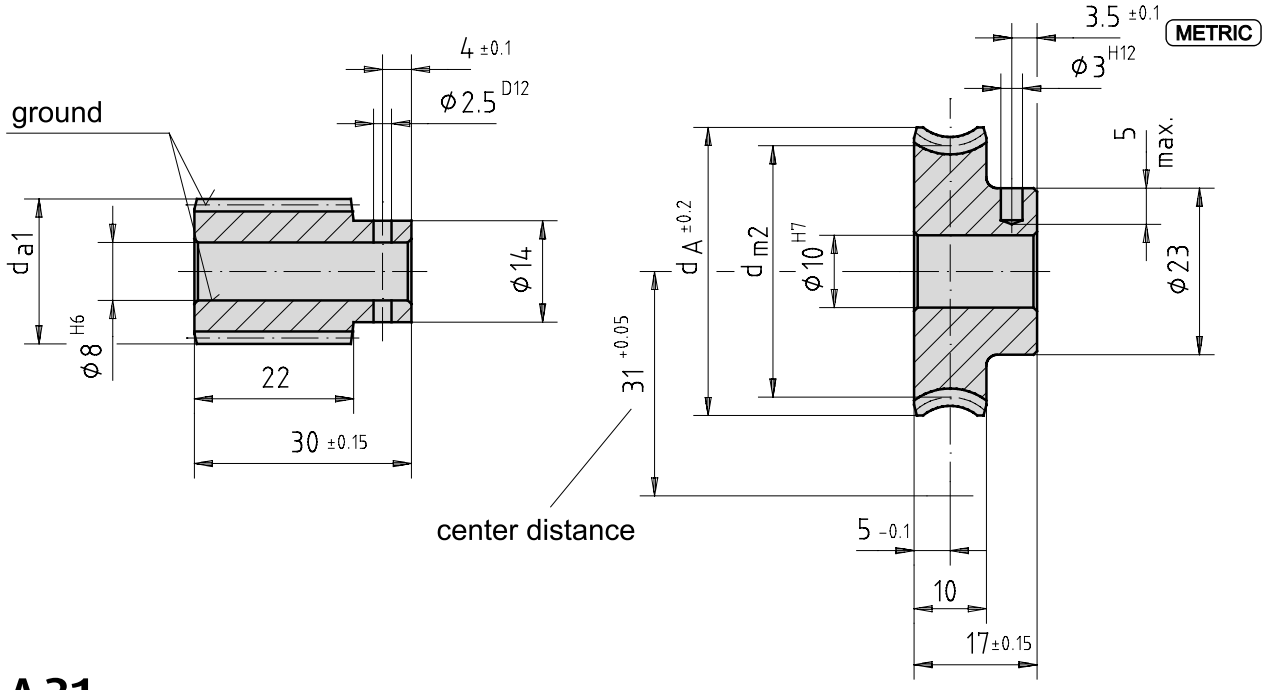
i = gear ratio
γ_m = lead angle
m = module
z_1 = number of threads
d_{m1} = pitch diameter, worm
d_{a1} = tip diameter, worm
z_2 = number of teeth
d_{m2} = pitch diameter, worm gear
d_A = maximum diameter, worm gear
T_2 = output torque
MG = mineral grease
MO = mineral oil/synthetic grease
SO = synthetic oil

Product				Worm			Worm gear			T_2 [Nm] bronze		
	i	γ_m	m	z_1	d_{m1}	d_{a1}	z_2	d_{m2}	d_A	MG	MO	SO
A31Ü2*	2.5:1	45° 15'	1.25	10	17.6	20.1	25	44.4	46.9	4.4	5.3	6.6
A31Ü3*	3:1	35° 10'	1.15	10	19.97	22.27	30	42.03	44.5	4.5	5.4	6.7
A31Ü4	4.28:1	25° 24'	1.25	7	20.4	22.9	30	41.6	45	9	10.8	13.5
A31Ü5	5:1	23° 46'	1.3	6	19.35	21.95	30	42.65	46.5	9.5	11.4	14.2
A31Ü6	6:1	18° 13'	1.3	5	20.8	23.4	30	41.2	45	7.6	9.1	11.4
A31Ü7	7:1	20° 32'	1.5	4	17.1	20.1	28	44.9	48.8	9.7	11.6	14.5
A31Ü8	8.33:1	19° 49'	1.75	3	15.5	19	25	46.5	51	10	12	15
A31Ü10	10:1	12° 50'	1.4	3	18.9	21.7	30	43.1	47	9.5	11.4	14.2
A31Ü12	12:1	13° 55'	1.25	3	15.6	18.1	36	46.4	50	12.1	14.5	18.1
A31Ü15	15:1	10° 40'	1.5	2	16.2	19.2	30	45.8	50	10.7	12.8	16
A31Ü18/1.25	18:1	8° 44'	1.25	2	16.46	18.96	36	45.54	48.8	10.3	12.4	15.4
A31Ü20/0.75	20:1	7° 49'	0.75	3	16.54	18.04	60	45.46	48	8.3	10	12.4
A31Ü20/1.15	20:1	8° 33'	1.15	2	15.47	17.77	40	46.53	50	10.3	12.4	15.4
A31Ü22	22:1	6° 29'	1	2	17.7	19.7	44	44.3	48	9.6	11.5	14.4
A31Ü23	23:1	7° 29'	2	1	15.35	19.35	23	46.65	52	10.5	12.6	15.7
A31Ü24	24:1	5° 4'	1.75	1	19.8	23.3	24	42.2	47	9.2	11	13.8

All specifications in mm.

* Only available with polished (sanded) worm profile and wheel with helical gear wheel teeth

Worm, right-hand, made of case-hardened steel HV 620 – 700.
Worm gear made of CuZn40Al2/So or plastic (can also be supplied with 3P9 spline).



A31 (center distance of axes)

Pressure angle 15°

Key

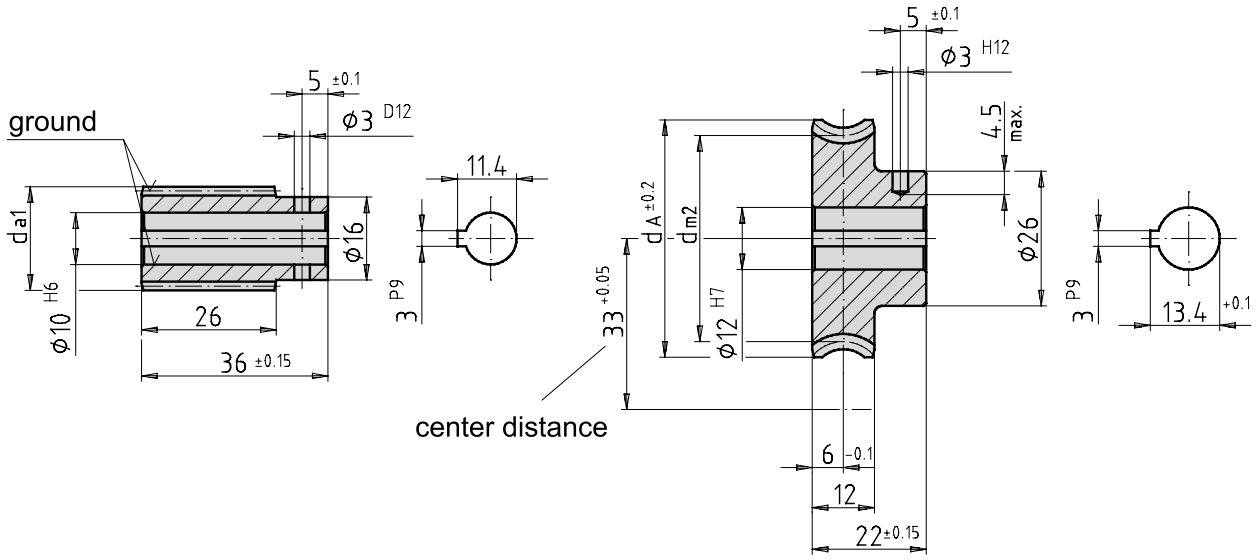
i = gear ratio
γ_m = lead angle
m = module
z_1 = number of threads
d_{m1} = pitch diameter, worm
d_{a1} = tip diameter, worm
z_2 = number of teeth
d_{m2} = pitch diameter, worm gear
d_A = maximum diameter, worm gear
T_2 = output torque
MG = mineral grease
MO = mineral oil/synthetic grease
SO = synthetic oil

Product				Worm			Worm gear			T_2 [Nm] bronze		
	i	γ_m	m	z_1	d_{m1}	d_{a1}	z_2	d_{m2}	d_A	MG	MO	SO
A31Ü25	25:1	5°35'	1.75	1	18	21.5	25	44	48.5	9.6	11.5	14.4
A31Ü28	28:1	4°20'	1.5	1	19.85	22.85	28	42.15	46.5	9.1	10.9	13.6
A31Ü30	30:1	5°7'	1.5	1	16.8	19.8	30	45.2	48.8	10.3	12.4	15.4
A31Ü32	32:1	4°45'	1.4	1	16.9	19.7	32	45.1	48.8	10.2	12.2	15.3
A31Ü38	38:1	5°1'	1.25	1	14.3	16.8	38	47.7	51.2	11.4	13.7	17.1
A31Ü45	45:1	3°23'	1	1	16.93	18.93	45	45.07	48	9.5	11.4	14.2
A31Ü50	50:1	3°3'	0.9	1	16.9	18.7	50	45.1	48	9	10.8	13.5
A31Ü55	55:1	4°12'	0.9	1	12.3	14.1	55	49.7	52	10.4	12.5	15.6
A31Ü60	60:1	2°33'	0.75	1	16.9	18.4	60	45.1	48	8.2	9.8	12.3
A31Ü70	70:1	3°7'	0.7	1	12.9	14.3	70	49.1	52	9	10.8	13.5
A31Ü75	75:1	2°2'	0.6	1	16.9	18.1	75	45.1	47	7.3	8.8	10.9
A31Ü90	90:1	1°41'	0.5	1	17	18	90	45	48	6.4	7.7	9.6
A31Ü100	100:1	2°24'	0.5	1	11.96	12.96	100	50.04	52.7	7.4	8.9	11.1

All specifications in mm.

Worm, right-hand, made of case-hardened steel HV 620 – 700.
Worm gear made of CuZn40Al2/So or plastic (can also be supplied with 3P9 splice).

METRIC



A33 (center distance of axes)

Pressure angle 15°

Key

i = gear ratio
γ_m = lead angle
m = module
z_1 = number of threads
d_{m1} = pitch diameter, worm

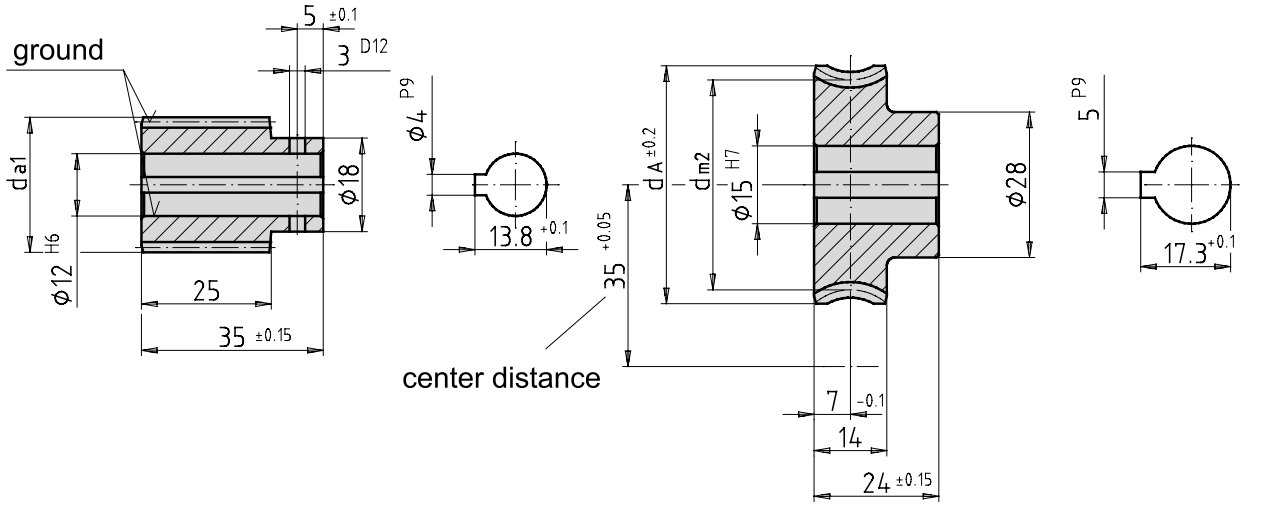
d_{a1} = tip diameter, worm
z_2 = number of teeth
d_{m2} = pitch diameter, worm gear
d_A = maximum diameter, worm gear

T_2 = output torque
MG = mineral grease
MO = mineral oil/synthetic grease
SO = synthetic oil

Product				Worm			Worm gear			T_2 [Nm] bronze		
	i	γ_m	m	z_1	d_{m1}	d_{a1}	z_2	d_{m2}	d_A	MG	MO	SO
A33Ü3	3.5:1	25°57'	1.75	6	24	27.5	21	42	47	10.1	12.1	15.1
A33Ü5	5:1	20°50'	2	4	22.5	26.5	20	43.5	49	10.6	12.7	15.9
A33Ü7	7:1	15°32'	1.5	4	22.4	25.4	28	43.6	48	12.2	14.6	18.3
A33Ü10	10:1	13°10'	1.5	3	19.75	22.75	30	46.25	51	13.3	16	19.9
A33Ü11	11.33:1	10°42'	1.3	3	21	23.6	34	45	49.2	13.3	16	19.9
A33Ü12	12:1	11°14'	1.9	2	19.5	23.3	24	46.5	52	13.5	16.2	20.2
A33Ü14	14:1	7°20'	1.5	2	23.5	26.5	28	42.5	47	11.4	13.7	17.1
A33Ü15	15:1	8°25'	1.5	2	20.5	23.5	30	45.5	50	13	15.6	19.5
A33Ü16	16:1	10°1'	1.5	2	17.24	20.24	32	48.76	53	14	16.8	21
A33Ü17	17:1	9°3'	1.4	2	17.8	20.6	34	48.2	52.5	14.2	17	21.3
A33Ü18	18:1	6°57'	1.25	2	20.65	23.15	36	45.35	49.2	12.6	15.1	18.9
A33Ü20	20:1	6°43'	1.15	2	19.66	21.96	40	46.34	50.5	12.7	15.2	19
A33Ü24	24:1	5°27'	1.9	1	20	23.8	24	46	51	13.2	15.8	19.8
A33Ü28	28:1	3°36'	1.5	1	23.9	26.9	28	42.1	46.6	11.2	13.4	16.8
A33Ü30	30:1	4°8'	1.5	1	20.85	23.85	30	45.15	50	12.7	15.2	19
A33Ü32	32:1	4°50'	1.5	1	17.8	20.8	32	48.2	52.5	13.5	16.2	20.2
A33Ü38	38:1	3°55'	1.25	1	18.26	20.76	38	47.74	51.6	13.9	16.7	20.8
A33Ü50	50:1	2°27'	0.9	1	21	22.8	50	45	48	10	12	15
A33Ü56	56:1	2°10'	0.8	1	21.15	22.75	56	44.85	48	10.1	12.1	15.1
A33Ü60	60:1	2°33'	0.8	1	17.96	19.56	60	48.04	51.5	11.4	13.7	17.1
A33Ü72	72:1	1°30'	0.6	1	22.8	24	72	43.2	46	8.4	1001	12.6
A33Ü75	75:1	1°41'	0.6	1	20.5	21.7	75	45.5	48	9	10.8	13.5
A33Ü75	75:1	1°28'	0.3	1	11.74	12.34	75	22.26	24.0	–	–	–

Worm, right-hand, made of steel, case-hardened HV 620 – 700. Worm gear made of CuZn40Al2/So or plastic. All specifications in mm.

METRIC



A35 (center distance of axes)

Pressure angle 15°

Key

i = gear ratio
γ_m = lead angle
m = module
z_1 = number of threads
d_{m1} = pitch diameter, worm
d_{a1} = tip diameter, worm
z_2 = number of teeth
d_{m2} = pitch diameter, worm gear
d_A = maximum diameter, worm gear
T_2 = output torque
MG = mineral grease
MO = mineral oil/synthetic grease
SO = synthetic oil

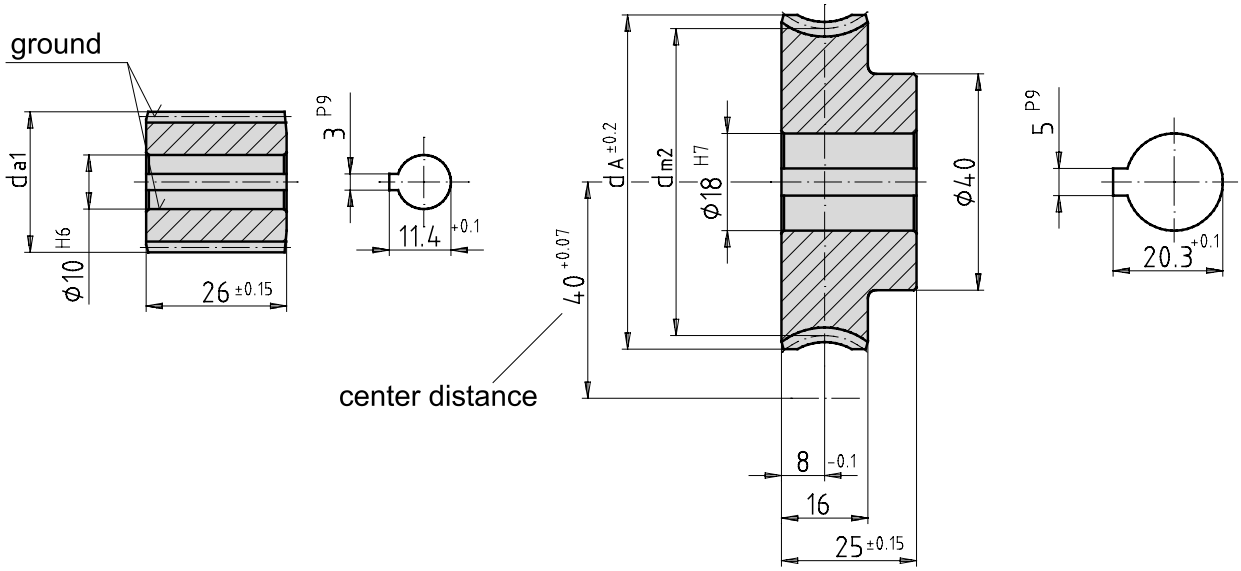
Product				Worm			Worm gear			T_2 [Nm] bronze		
	i	γ_m	m	z_1	d_{m1}	d_{a1}	z_2	d_{m2}	d_A	MG	MO	SO
A35Ü3*	2.78:1	31°55'	1.5	9	26.2	29.2	25	43.8	46.76	6.6	8.2	10.2
A35Ü5	5:1	22°52'	1.75	5	22.52	26.02	25	47.48	53	15.3	18.4	22.9
A35Ü7	7.25:1	13°47'	1.5	4	25.18	28.18	29	44.82	50	14.7	17.6	22
A35Ü8	8:1	14°25'	1.9	3	22.89	26.69	24	47.11	53	16.7	20	25
A35Ü10	10:1	10°43'	1.5	3	24.2	27.2	30	45.8	51	16	19.2	24
A35Ü11	11:1	10°32'	1.4	3	22.98	25.78	33	47.02	52	16.7	20	25
A35Ü12	12:1	9°11'	1.9	2	23.8	27.6	24	46.2	52	16.1	19.3	24
A35Ü15	15:1	7°	1.5	2	24.62	27.62	30	45.38	50	15.3	18.4	22.9
A35Ü20	20:1	5°33'	1.15	2	23.78	26.08	40	46.22	50.5	14.8	17.8	22.2
A35Ü25	25:1	4°9'	0.9	2	24.87	26.67	50	45.13	49	12.9	15.5	19.3
A35Ü30	30:1	3°27'	1.5	1	24.92	27.92	30	45.08	50	15	18	22.5
A35Ü35	35:1	3°51'	1.4	1	20.85	23.65	35	49.15	53	17.1	20.5	25.6
A35Ü40	40:1	2°45'	1.15	1	23.91	26.21	40	46.09	50.5	14.7	17.6	22
A35Ü50	50:1	2°4'	0.9	1	24.93	26.73	50	45.07	49	12.9	15.5	19.3
A35Ü58	58:1	2°21'	0.85	1	20.65	22.35	58	49.35	53	14.5	17.4	21.7
A35Ü90	90:1	1°9'	0.5	1	25	26	90	45	49	9.1	10.9	13.6

All specifications in mm.

* Worm gear set A35Ü3 is only available with polished (sanded) worm profile, pressure angle 20° and wheel with helical gear wheel teeth.

Worm, right-hand, made of case-hardened steel HV 620 – 700.
Worm gear made of CuZn40Al2/So or plastic.

METRIC



A 40 (center distance of axes)

Pressure angle 15°

Key

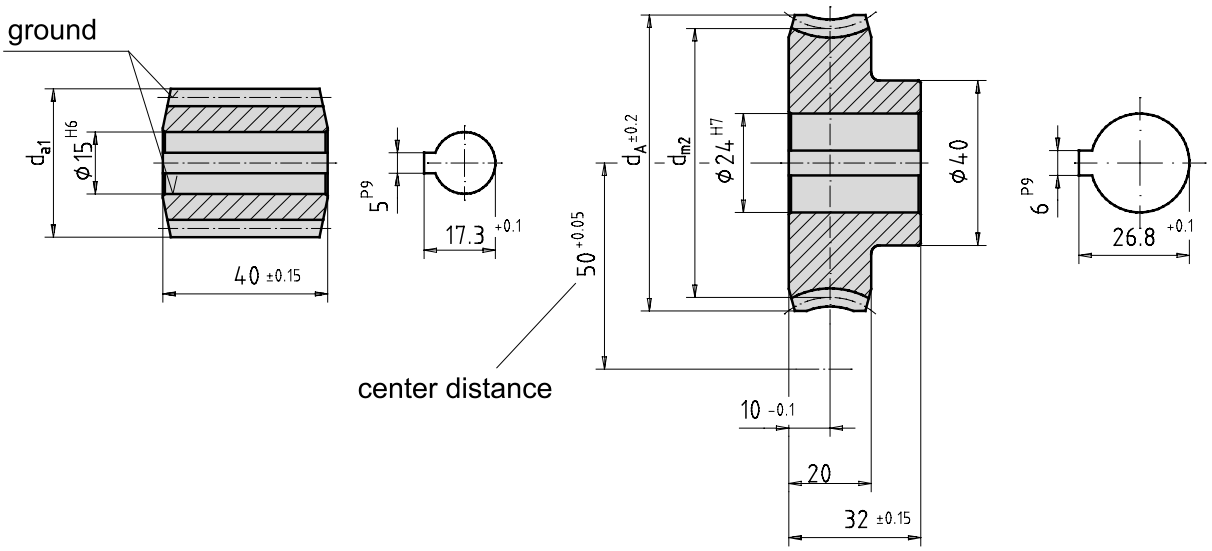
i = gear ratio γ_m = lead angle m = module z_1 = number of threads d_{m1} = pitch diameter, worm	d_{a1} = tip diameter, worm z_2 = number of teeth d_{m2} = pitch diameter, worm gear d_A = maximum diameter, worm gear	T_2 = output torque MG = mineral grease MO = mineral oil/synthetic grease SO = synthetic oil

Product				Worm			Worm gear			T_2 [Nm] bronze		
	i	γ_m	m	z_1	d_{m1}	d_{a1}	z_2	d_{m2}	d_A	MG	MO	SO
A40Ü7	6.75:1	21°19'	2	4	22	26	27	58	64	29.5	35.4	44.2
A40Ü8	8:1	16°35'	2.25	3	23.64	28.14	24	56.36	62.5	27.5	33	41.2
A40Ü10	10:1	16°1'	1.9	3	20.66	24.46	30	59.34	65	29.5	35.4	44.2
A40Ü12	12:1	10°21'	1.5	3	25.05	28.05	36	54.95	60	25.2	30.2	37.8
A40Ü15	15:1	9°53'	1.9	2	22.14	25.94	30	57.86	64	28	33.6	42
A40Ü20	20:1	8°59'	1.5	2	19.2	22.2	40	60.8	66	28.9	34.6	43.3
A40Ü25	25:1	5°58'	1.15	2	22.15	24.45	50	57.85	62	24.4	29.2	36.6
A40Ü28	28:1	4°47'	2	1	24	28	28	56	61.5	28.4	34	42.6
A40Ü30	30:1	5°50'	2	1	19.68	23.68	30	60.32	66	30.1	36.1	45.1
A40Ü35	35:1	5°26'	1.75	1	18.48	21.98	35	61.52	67	31	37.2	46.5
A40Ü36	36:1	3°19	1.5	1	25.91	28.91	36	54.09	59	23.9	28.6	35.8
A40Ü38	38:1	3°46'	1.5	1	22.85	25.85	38	57.17	61.5	27	32.4	40.5
A40Ü40	40:1	4°20'	1.5	1	19.83	22.83	40	60.17	65	28.3	33.9	42.4
A40Ü50	50:1	4°8'	1.25	1	17.3	19.8	50	62.7	68	27	32.4	40.5
A40Ü56	56:1	2°23'	1	1	24	26	56	56	59	21.9	26.2	32.8
A40Ü60	60:1	1°59'	0.9	1	25.92	27.72	60	54.08	57.5	19.3	23.1	28.9
A40Ü70	70:1	3°3'	0.9	1	16.91	18.71	70	63.09	67	24.1	28.9	36.1
A40Ü75	75:1	1°48'	0.75	1	23.75	25.25	75	56.26	60	18.8	22.5	28.2
A40Ü80	80:1	2°10'	0.75	1	19.9	21.4	80	60.1	64	20.1	24.1	30.1
A40Ü90	90:1	2°22'	0.7	1	16.95	18.35	90	63.05	67	19.1	22.9	28.6

All specifications in mm.

Worm, right-hand, made of case-hardened steel HV 620 – 700.
Worm gear made of CuZn40Al2/So or plastic.

METRIC



A50 (center distance of axes)

Pressure angle 15°

Key

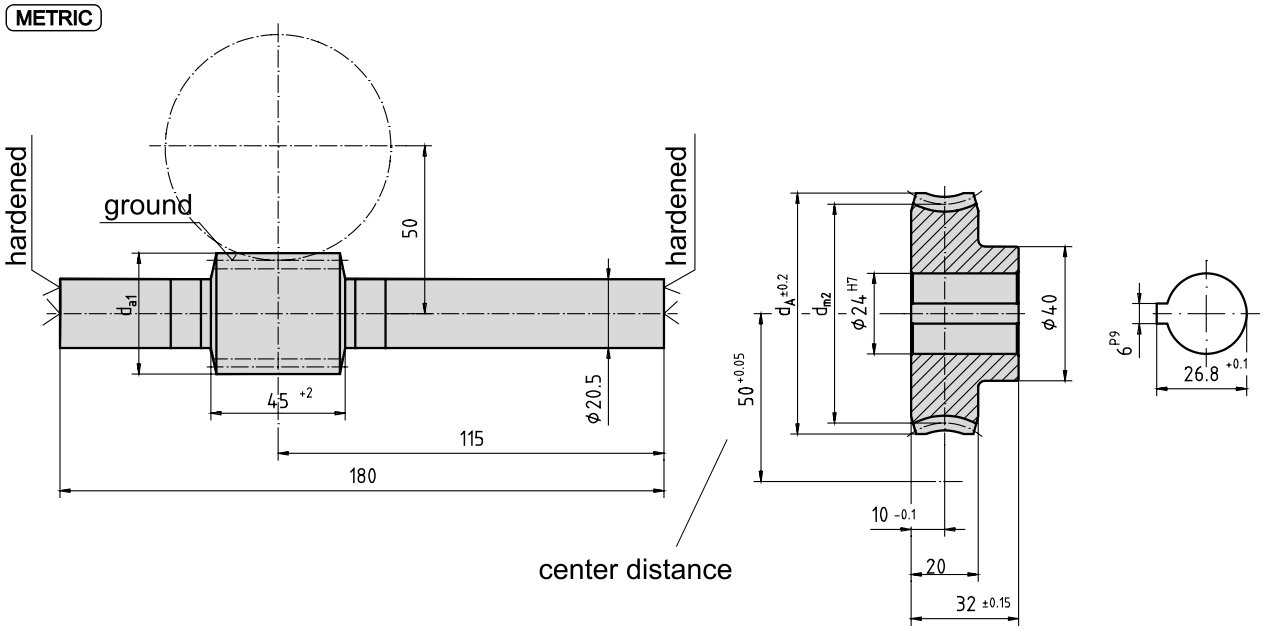
i = gear ratio
γ_m = lead angle
m = module
z_1 = number of threads
d_{m1} = pitch diameter, worm
d_{a1} = tip diameter, worm
z_2 = number of teeth
d_{m2} = pitch diameter, worm gear
d_A = maximum diameter, worm gear
T_2 = output torque
MG = mineral grease
MO = mineral oil/synthetic grease
SO = synthetic oil

Product				Worm			Worm gear			T_2 [Nm] bronze		
	i	γ_m	m	z_1	d_{m1}	d_{a1}	z_2	d_{m2}	d_A	MG	MO	SO
A50Ü4	4.25:1	25°51'	3.5	4	32.1	39.1	17	67.9	77	34	40.8	51
A50Ü6	6:1	19°17'	3.5	3	31.8	38.8	18	68.2	77	52	62.4	78
A50Ü9	8.66:1	13°52'	2.5	3	31.29	36.29	26	68.71	77	64.3	77.1	96.4
A50Ü12	12:1	10°23'	2.75	2	30.5	36	24	69.5	77	66.4	79.6	99.6
A50Ü14	13.5:1	9°38'	2.5	2	29.9	34.9	27	70.1	77	62.8	75.4	94.2
A50Ü19	19:1	6°17'	3.5	1	32	39	19	68	77	78.2	93.8	117.3
A50Ü23	23:1	5°38'	3	1	30.58	36.58	23	69.42	77	71.1	85.3	106.6
A50Ü27	27:1	4°40'	2.5	1	30.73	35.73	27	69.27	77	64.5	77.4	96.7
A50Ü35	35:1	3°51'	2	1	29.78	33.78	35	70.22	77	56.7	68	85
A50Ü46	46:1	2°47'	1.5	1	30.85	33.85	46	69.15	74	50.6	60.7	75.9
A50Ü55	55:1	2°19'	1.25	1	30.9	33.4	55	69.1	74	46.2	55.4	69.3
A50Ü69	69:1	1°51'	1	1	30.9	32.9	69	69.1	74	41.4	49.6	62.8

All specifications in mm.

Worm, right-hand, made of case-hardened steel HV 620 – 700.
Worm gear made of CuZn40Al2/So or plastic.

METRIC



A50 (center distance of axes)

Pressure angle 15°

Key

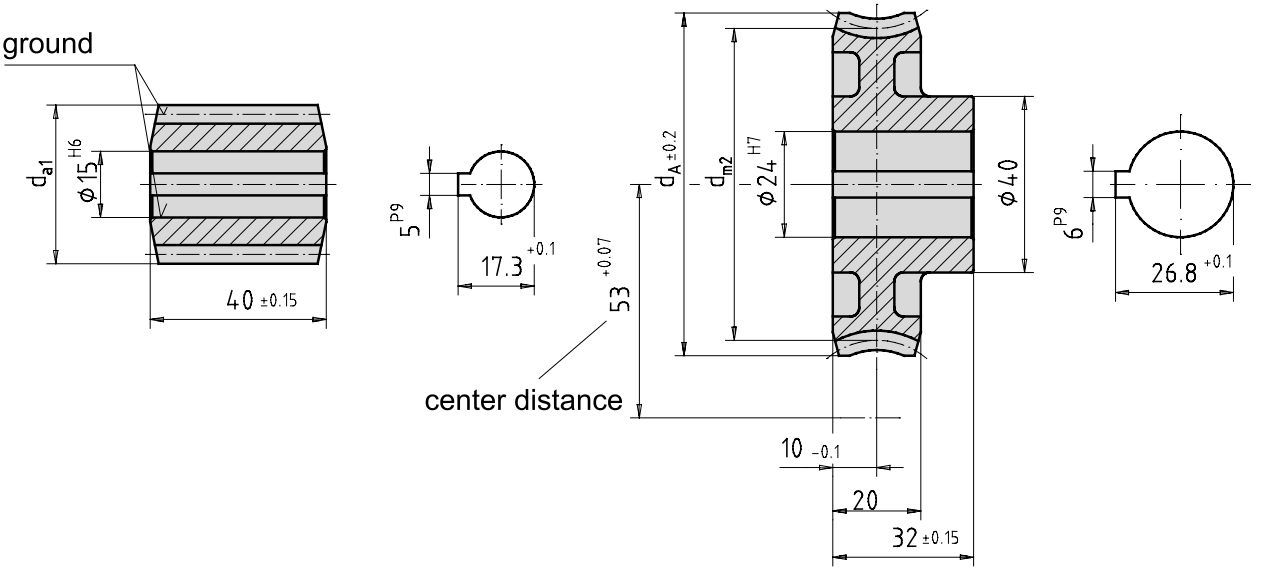
i = gear ratio γ_m = lead angle m = module z_1 = number of threads d_{m1} = pitch diameter, worm	d_{a1} = tip diameter, worm z_2 = number of teeth d_{m2} = pitch diameter, worm gear d_A = maximum diameter, worm gear	T_2 = output torque MG = mineral grease MO = mineral oil/synthetic grease SO = synthetic oil

Product				Worm			Worm gear			T_2 [Nm] bronze		
	i	γ_m	m	z_1	d_{m1}	d_{a1}	z_2	d_{m2}	d_A	MG	MO	SO
A50Ü4	4.25:1	25°51'	3.5	4	32.1	39.1	17	67.9	77	34	40.8	51
A50Ü6	6:1	19°17'	3.5	3	31.8	38.8	18	68.2	77	52	62.4	78
A50Ü9	8.66:1	13°52'	2.5	3	31.29	36.29	26	68.71	77	64.3	77.1	96.4
A50Ü12	12:1	10°23'	2.75	2	30.5	36	24	69.5	77	66.4	79.6	99.6
A50Ü14	13.5:1	9°38'	2.5	2	29.9	34.9	27	70.1	77	62.8	75.4	94.2
A50Ü19	19:1	6°17'	3.5	1	32	39	19	68	77	78.2	93.8	117.3
A50Ü23	23:1	5°38'	3	1	30.58	36.58	23	69.42	77	71.1	85.3	106.6
A50Ü27	27:1	4°40'	2.5	1	30.73	35.73	27	69.27	77	64.5	77.4	96.7
A50Ü35	35:1	3°51'	2	1	29.78	33.78	35	70.22	77	56.7	68	85
A50Ü46	46:1	2°47'	1.5	1	30.85	33.85	46	69.15	74	50.6	60.7	75.9
A50Ü55	55:1	2°19'	1.25	1	30.9	33.4	55	69.1	74	46.2	55.4	69.3
A50Ü69	69:1	1°51'	1	1	30.9	32.9	69	69.1	74	41.4	49.6	62.8

All specifications in mm.

Worm, right-hand, made of case-hardened 16MnCr5 HV 620 – 700, soft shaft.
Worm gear made of CuZn40Al2/So or plastic.

METRIC



A53 (center distance of axes)

Pressure angle 15°

Key

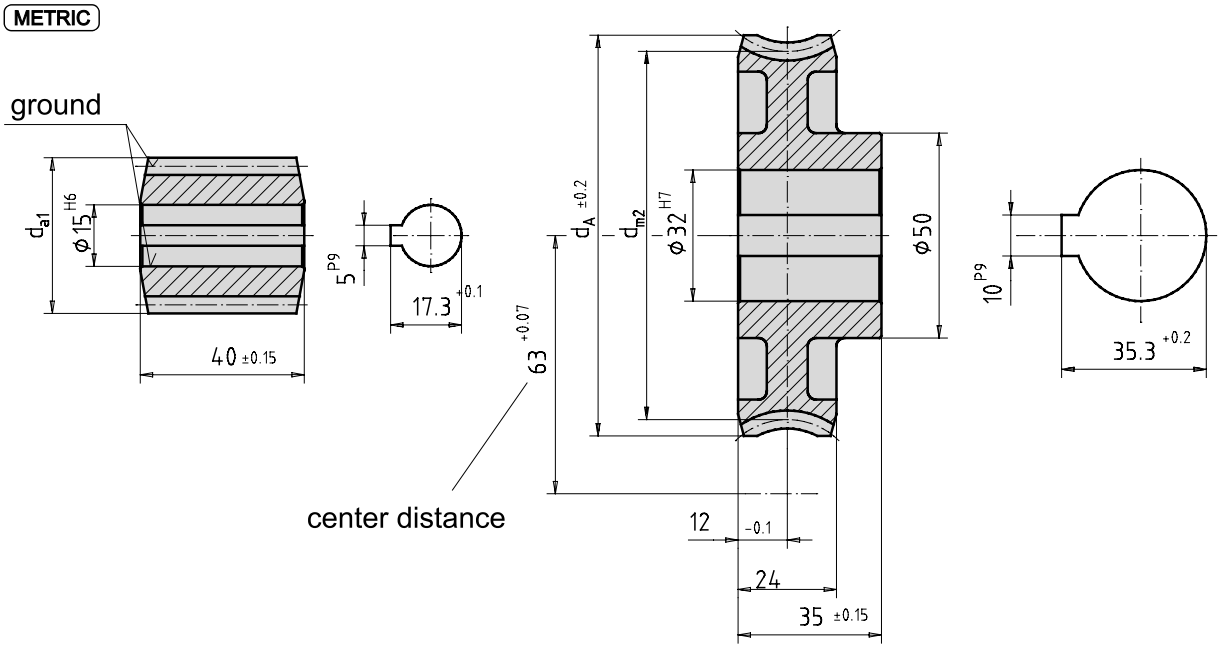
i = gear ratio
γ_m = lead angle
m = module
z_1 = number of threads
d_{m1} = pitch diameter, worm
d_{a1} = tip diameter, worm
z_2 = number of teeth
d_{m2} = pitch diameter, worm gear
d_A = maximum diameter, worm gear
T_2 = output torque
MG = mineral grease
MO = mineral oil/synthetic grease
SO = synthetic oil

Product				Worm			Worm gear			T_2 [Nm] bronze		
	i	γ_m	m	z_1	d_{m1}	d_{a1}	z_2	d_{m2}	d_A	MG	MO	SO
A53Ü5	4.75:1	25°51'	3.5	4	32.1	39.1	19	73.9	83	45	54	67.5
A53Ü7	6.67:1	19°17'	3.5	3	31.8	38.8	20	74.2	84	67	81	101
A53Ü10	9.67:1	13°52'	2.5	3	31.29	36.29	29	74.71	82	77	93	116
A53Ü14	13.5:1	10°23'	2.75	2	30.5	36	27	75.5	84	80	96	120
A53Ü15	15:1	9°38'	2.5	2	29.9	34.9	30	76.1	83	75	90	113
A53Ü21	21:1	6°17'	3.5	1	32	39	21	74	83	94	113	141
A53Ü25	25:1	5°38'	3	1	30.58	36.58	25	75.42	84	84	101	127
A53Ü28	28:1	3°59'	2.5	1	36	41	28	70	77.5	87	104	130
A53Ü30	30:1	4°40'	2.5	1	30.73	35.73	30	75.27	83	77	93	116
A53Ü38	38:1	3°51'	2	1	29.78	33.78	38	76.21	83	68	81	102
A53Ü50	50:1	2°47'	1.5	1	30.85	33.85	50	75.15	81	60	72	90
A53Ü60	60:1	2°19'	1.25	1	30.9	33.4	60	75.1	80	55	66	82
A53Ü75	75:1	1°51'	1	1	30.9	32.9	75	75.1	78	49	59	74

All specifications in mm.

Worm, right-hand, made of case-hardened steel HV 620 – 700.
Worm gear made of CuZn40Al2/So or plastic.

METRIC



A 63 (center distance of axes)

Pressure angle 15°

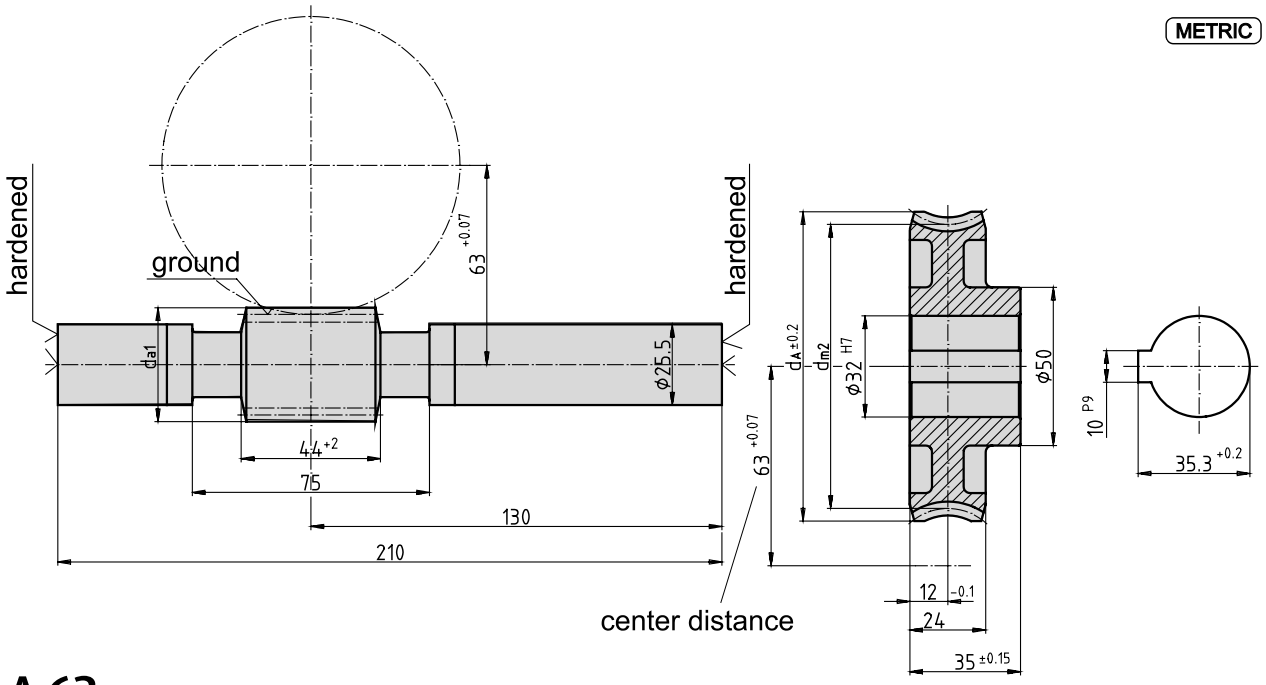
Key		
i = gear ratio γ_m = lead angle m = module z_1 = number of threads d_{m1} = pitch diameter, worm	d_{a1} = tip diameter, worm z_2 = number of teeth d_{m2} = pitch diameter, worm gear d_A = maximum diameter, worm gear	T_2 = output torque MG = mineral grease MO = mineral oil/synthetic grease SO = synthetic oil

Product				Worm			Worm gear			T_2 [Nm] bronze		
	i	γ_m	m	z_1	d_{m1}	d_{a1}	z_2	d_{m2}	d_A	MG	MO	SO
A63Ü6	6:1	25°51'	3.5	4	32.1	39.1	24	93.9	104	89	107	134
A63Ü12	12:1	13°52'	2.5	3	31.29	36.29	36	94.71	104	141	170	212
A63Ü19	19:1	10°8'	2.5	2	28.4	33.4	38	97.6	104	133	159	199
A63Ü26	26:1	6°17'	3.5	1	32	39	26	94	104	172	206	258
A63Ü34	34:1	5°9'	2.75	1	30.6	36.1	34	95.4	104	148	178	222
A63Ü48	48:1	3°51'	2	1	29.78	33.78	48	96.22	104	125	150	187
A63Ü63	63:1	2°47'	1.5	1	30.85	33.85	63	95.15	101	111	133	166
A63Ü70	70:1	1°59	1.25	1	36.1	38.6	70	89.9	97	112	135	169

All specifications in mm.

Worm, right-hand, made of case-hardened steel HV 620 – 700.
Worm gear made of CuZn40Al2/So or plastic.

METRIC



A 63 (center distance of axes)

Pressure angle 15°

Key

i = gear ratio
γ_m = lead angle
m = module
z_1 = number of threads
d_{m1} = pitch diameter, worm

d_{a1} = tip diameter, worm
z_2 = number of teeth
d_{m2} = pitch diameter, worm gear
d_A = maximum diameter, worm gear

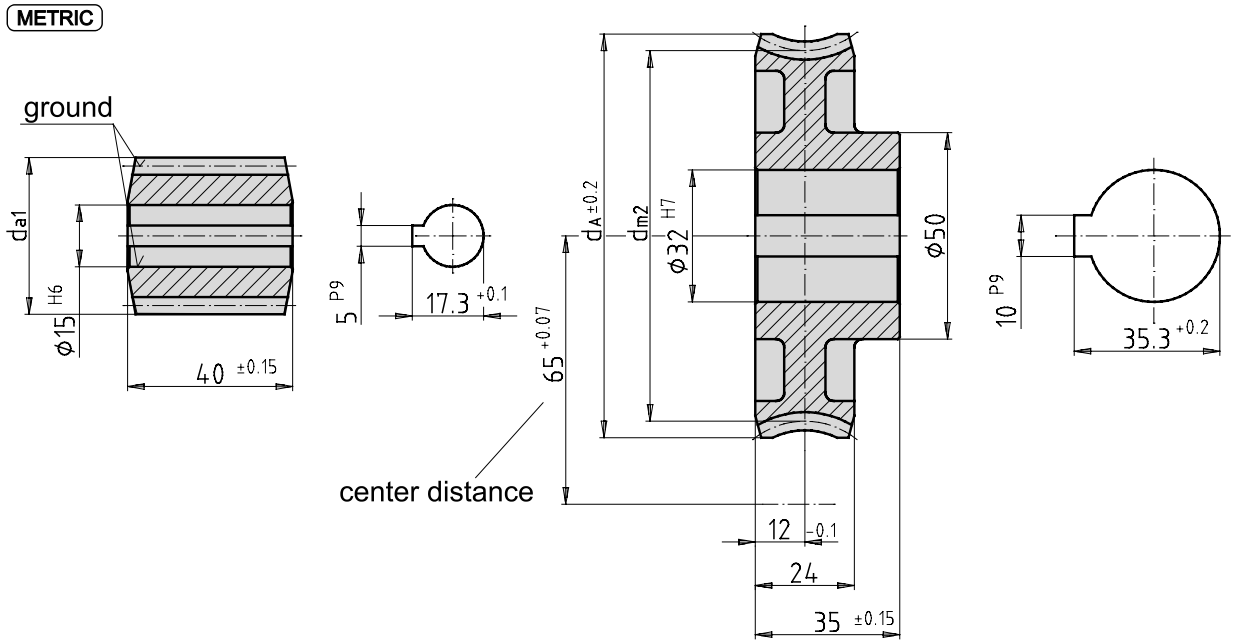
T_2 = output torque
MG = mineral grease
MO = mineral oil/synthetic grease
SO = synthetic oil

Product				Worm			Worm gear			T_2 [Nm] bronze		
	i	γ_m	m	z_1	d_{m1}	d_{a1}	z_2	d_{m2}	d_A	MG	MO	SO
A63Ü6	6:1	25°51'	3.5	4	32.1	39.1	24	93.9	104	89	107	134
A63Ü12	12:1	13°52'	2.5	3	31.29	36.29	36	94.71	104	141	170	212
A63Ü19	19:1	10°8'	2.5	2	28.4	33.4	38	97.6	104	133	159	199
A63Ü26	26:1	6°17'	3.5	1	32	39	26	94	104	172	206	258
A63Ü34	34:1	5°9'	2.75	1	30.6	36.1	34	95.4	104	148	178	222
A63Ü48	48:1	3°51'	2	1	29.78	33.78	48	96.22	104	125	150	187
A63Ü63	63:1	2°47'	1.5	1	30.85	33.85	63	95.15	101	111	133	166
A63Ü70	70:1	1°59	1.25	1	36.1	38.6	70	89.9	97	112	135	169

All specifications in mm.

Worm, right-hand, made of case-hardened 16MnCr5 HV 620 – 700, soft shaft.
Worm gear made of CuZn40Al2/So or plastic.

METRIC



A 65 (center distance of axes)

Pressure angle 15°

Key

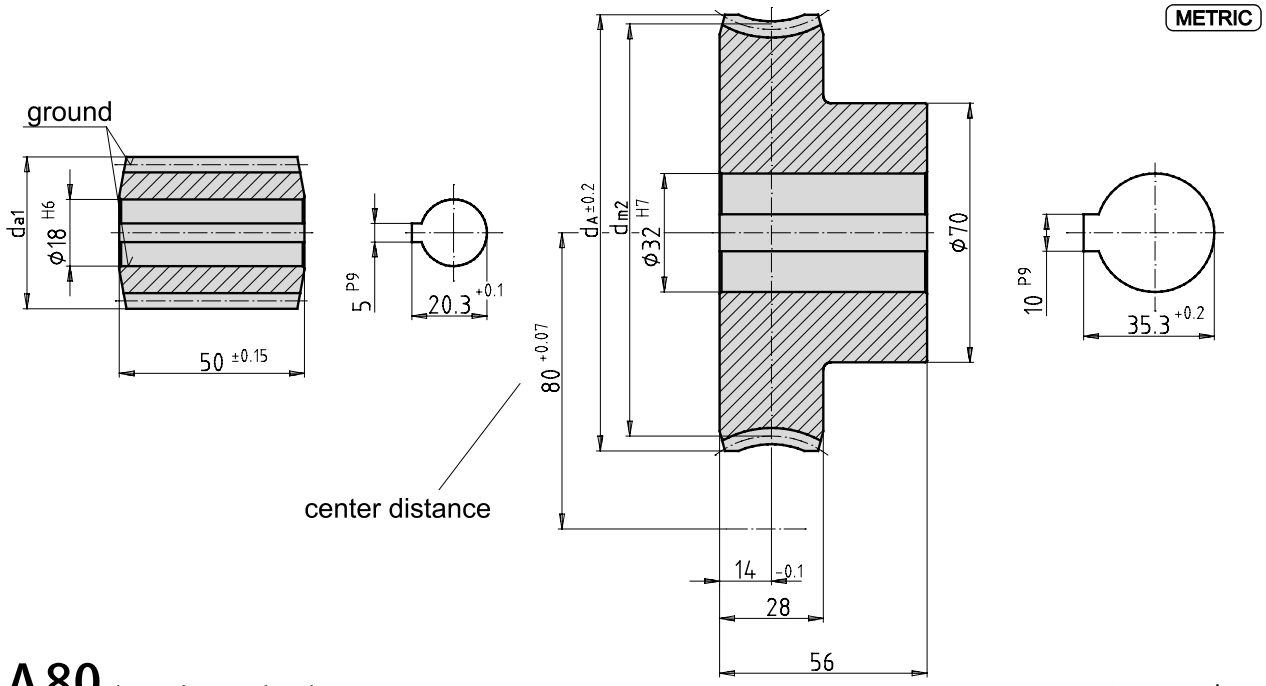
i = gear ratio
γ_m = lead angle
m = module
z_1 = number of threads
d_{m1} = pitch diameter, worm
d_{a1} = tip diameter, worm
z_2 = number of teeth
d_{m2} = pitch diameter, worm gear
d_A = maximum diameter, worm gear
T_2 = output torque
MG = mineral grease
MO = mineral oil/synthetic grease
SO = synthetic oil

Product				Worm			Worm gear			T_2 [Nm] bronze		
	i	γ_m	m	z_1	d_{m1}	d_{a1}	z_2	d_{m2}	d_A	MG	MO	SO
A65Ü6	6.25:1	25°51'	3.5	4	32.1	39.1	25	97.9	108	101	121	151
A65Ü13	12.66:1	13°52'	2.5	3	31.29	36.29	38	98.71	108	156	187	234
A65Ü20	20:1	10°8'	2.5	2	28.4	33.4	40	101.6	108	146	176	220
A65Ü28	28:1	6°17'	3.5	1	32	39	28	98	108	192	230	288
A65Ü36	36:1	5°9'	2.75	1	30.6	36.1	36	99.4	108	164	197	246
A65Ü50	50:1	3°51'	2	1	29.78	33.78	50	100.22	108	137	164	205
A65Ü66	66:1	2°47'	1.5	1	30.85	33.85	66	99.15	107	122	146	183
A65Ü75	75:1	1°59'	1.25	1	36.1	38.6	75	93.9	100	125	150	188

All specifications in mm.

Worm, right-hand, made of case-hardened steel HV 620 – 700.
Worm gear made of CuZn40Al2/So or plastic.

METRIC



A80 (center distance of axes)

Pressure angle 15°

Key

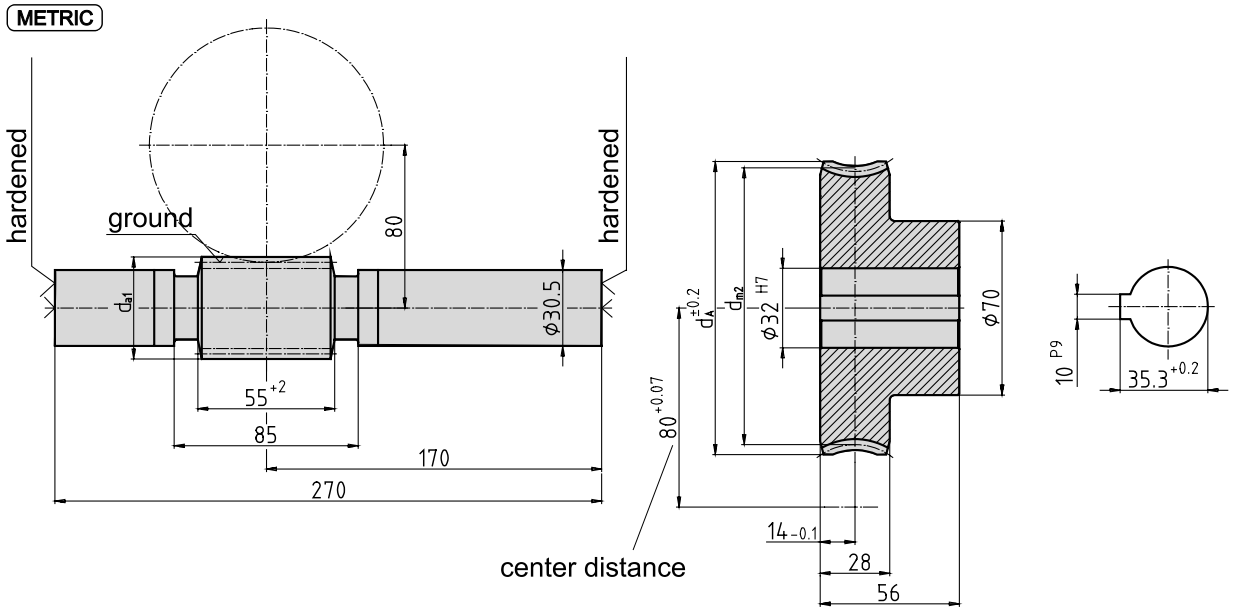
i = gear ratio
γ_m = lead angle
m = module
z_1 = number of threads
d_{m1} = pitch diameter, worm
d_{a1} = tip diameter, worm
z_2 = number of teeth
d_{m2} = pitch diameter, worm gear
d_A = maximum diameter, worm gear
T_2 = output torque
MG = mineral grease
MO = mineral oil/synthetic grease
SO = synthetic oil

Product				Worm			Worm gear			T_2 [Nm] bronze		
	i	γ_m	m	z_1	d_{m1}	d_{a1}	z_2	d_{m2}	d_A	MG	MO	SO
A80Ü7	6.75:1	23°35'	4	4	40	48	27	120	132	150	180	225
A80Ü12	12:1	16°36'	2.5	4	35	40	48	125	132,5	243	290	365
A80Ü20	20:1	8°58'	3	2	38.5	44.5	40	121.5	130,5	290	348	435
A80Ü30	30:1	5°44'	4	1	40	48	30	120	132,5	348	417	522
A80Ü50	50:1	4°6'	2.5	1	35	40	50	125	132,5	248	297	372
A80Ü80	80:1	2°9'	1.5	1	40	43	80	120	124,5	213	255	320

All specifications in mm.

Worm, right-hand, made of case-hardened steel HV 620 – 700.
Worm gear made of CuZn40Al2/So or plastic.

METRIC



A80 (center distance of axes)

Pressure angle 15°

Key

i = gear ratio γ_m = lead angle m = module z_1 = number of threads d_{m1} = pitch diameter, worm	d_{a1} = tip diameter, worm z_2 = number of teeth d_{m2} = pitch diameter, worm gear d_A = maximum diameter, worm gear	T_2 = output torque MG = mineral grease MO = mineral oil/synthetic grease SO = synthetic oil

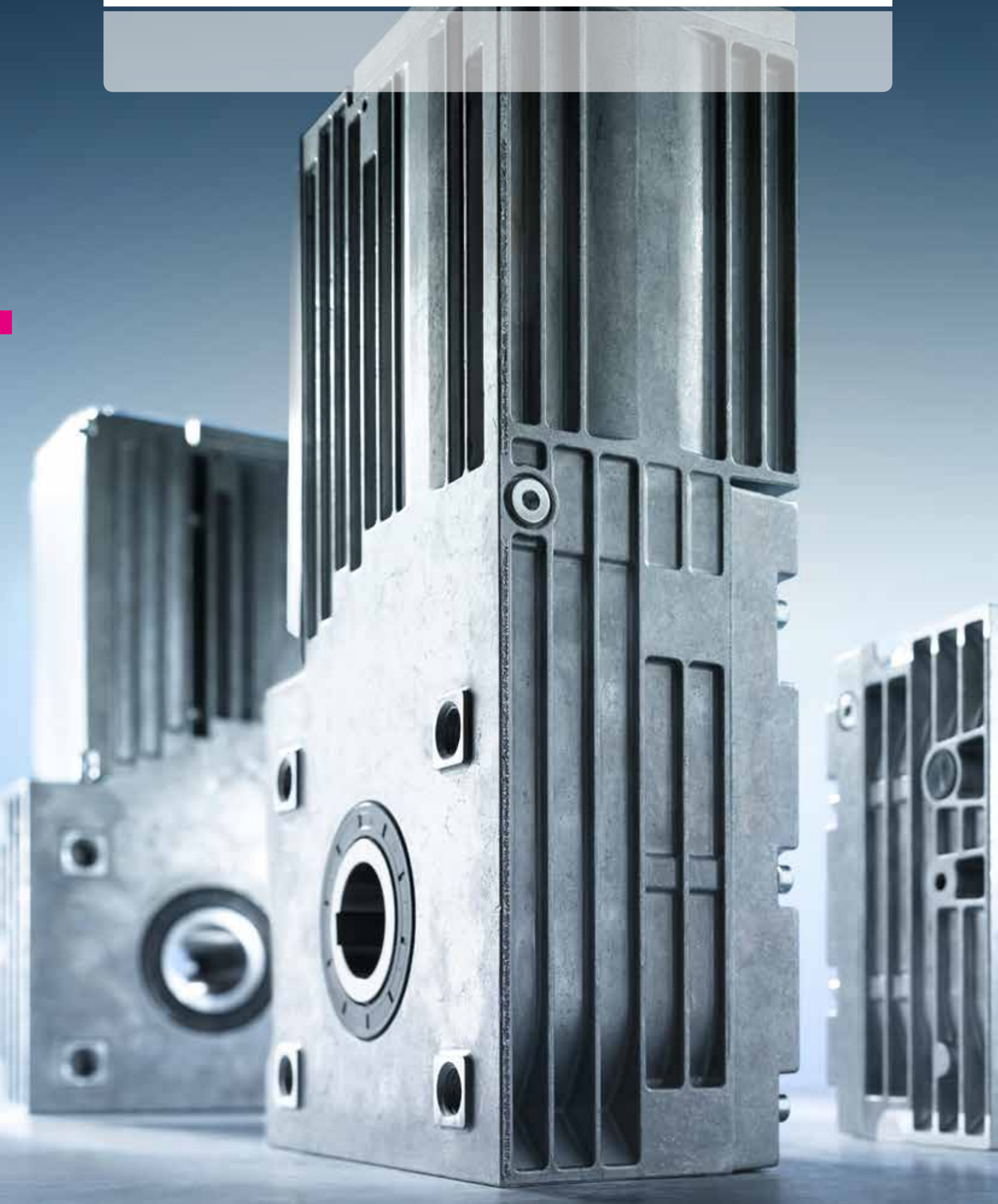
Product				Worm			Worm gear			T_2 [Nm] bronze		
	i	γ_m	m	z_1	d_{m1}	d_{a1}	z_2	d_{m2}	d_A	MG	MO	SO
A80Ü7	6.75:1	23°35'	4	4	40	48	27	120	132	150	180	225
A80Ü12	12:1	16°36'	2.5	4	35	40	48	125	132,5	243	290	365
A80Ü20	20:1	8°58'	3	2	38.5	44.5	40	121.5	130,5	290	348	435
A80Ü30	30:1	5°44'	4	1	40	48	30	120	132,5	348	417	522
A80Ü50	50:1	4°6'	2.5	1	35	40	50	125	132,5	248	297	372
A80Ü80	80:1	2°9'	1.5	1	40	43	80	120	124,5	213	255	320

All specifications in mm.

Worm, right-hand, made of case-hardened 16MnCr5 HV 620 – 700, soft shaft.
Worm gear made of CuZn40Al2/So or plastic.

Slip-on geared motors.

The Compacta series.



Our slip-on geared motors of the Compacta series are complete electromechanical drives. The speed of the installed electric motors is reduced to the desired value via two to four gear levels. The high performance, long lives and compact, light design of the drives are impressive.

Each drive is produced and inspected according to the customer order and specifications. A sophisticated modular system permits a large range of variants and optimum adaptation to customer requirements.

Compacta slip-on geared motors

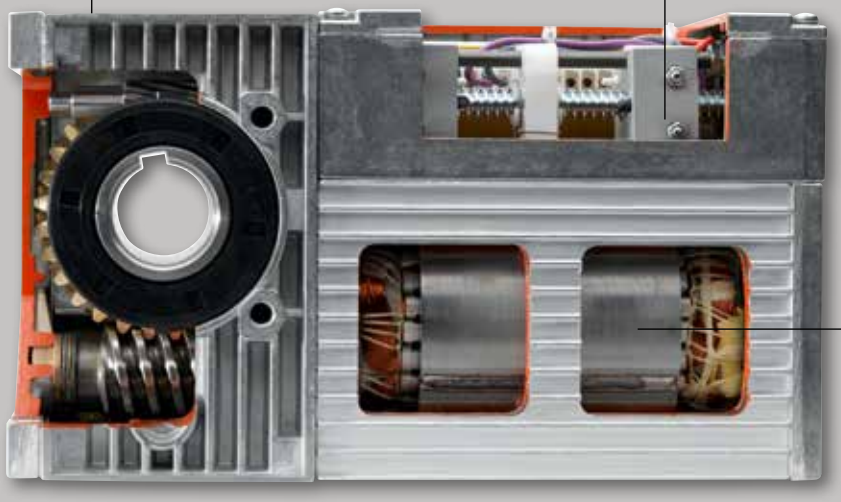
- High torque and rotary speed ranges (torque up to 1,600 Nm and output speed from 0.5 to 193 min^{-1})
- Integrated limit switches
- Compact design with high performance
- Low weight due to consistent use of aluminum die-cast technology
- Long service life, maintenance-free
- Supplied with three-phase, AC or DC motor with standard or special voltages
- Standard enclosure rating of IP 54

Four sizes

The drives of the Compacta series are available in four sizes, with torques from 10 Nm to 1,600 Nm.

Integrated limit switches

The limit switches, available in a variety of designs, allow simple adjustment of the end-positions. The fully integrated solution from Framo Morat means that the complicated cabling and integration of external position limit switches is unnecessary in many applications.



Choice of motors

Compacta drives can be equipped with 24 V DC, 230 V AC or three-phase motors as options – so the right drive is always available for every application.

Small space – great performance.

The complete compact solution.

The slip-on geared motors of the Compacta series with integrated limit switches offer incomparably high performance per volume unit: regardless of the performance class you choose, the drive's small installation dimensions considerably simplify design and installation. The Compacta series is thus particularly suitable for applications in which space is severely limited.

The compact housing has been made possible by a spur/worm gear transmission combined with a performance-optimized motor. Compared to conventional gear motors, Compacta motors are also characterized by a 60% to 70% reduction in weight. This is achieved through the consistent use of aluminum die-cast technology, which also ensures the high rigidity of the gear and motor housings.

A comprehensive selection of options – for example integrated brakes, shaft encoder, slipping clutch, forced ventilation, humidification seal coating – allows individual adaptation to numerous applications, from machine and device construction, through handling and conveyors, to use in sterile rooms.

In addition to these standard options, further customer-specific adaptations are possible at any time.

Compacta MR6

- Output speed: 2.9 – 100 min^{-1}
- Output torque: 10.5 – 60 Nm
- Gear ratio: 27:1 – 450:1

Compacta MS12

- Output speed: 3 – 193 min^{-1}
- Output torque: 12 – 142 Nm
- Gear ratio: 14.2:1 – 225:1

Compacta MR30

- Output speed: 2.6 – 123.4 min^{-1}
- Output torque: 60 – 300 Nm
- Gear ratio: 22.7:1 – 264.6:1

Compacta AG160

- Output speed: 0.45 – 8,3 min^{-1}
- Output torque: 720 – 1,600 Nm
- Gear ratio: 339:1 – 3,111:1

Application examples

Sheet metal machining

Compacta drives precisely adjust the crowning systems on folding presses (sheet metal bending machines). This compensates for the sagging of the table and press bar.

Automotive suppliers

Compacta drives adjust the limit stops of a metal blank loader during production of vehicle body parts.

Lighting and stage equipment

Here, Compacta drive motors are mainly used for raising and moving spotlights and curtains, for example for the adjustment of spotlights in TV studios. Dynamic self-locking of the drive is essential in this application for safety reasons.

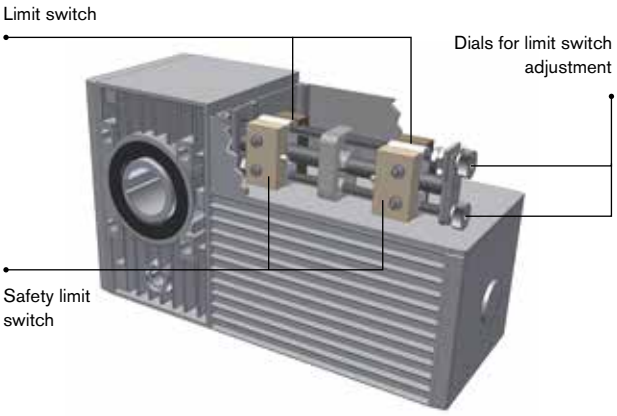
Customized motion.

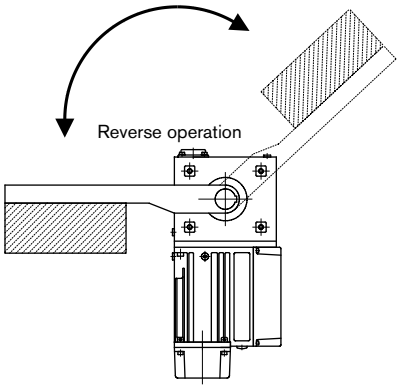
Integrated limit switches for precise positional control.

The slip-on geared motors of our Compacta series are the ideal drives for reversing tasks – thanks to their two integrated limit switches, enabling defined end-positions in both directions. This uncomplicated solution not only simplifies cabling, but also enables the simple and rapid adjustment of end-positions. The high switching accuracy of the limit switches guarantees reliable operation both backwards and forwards.

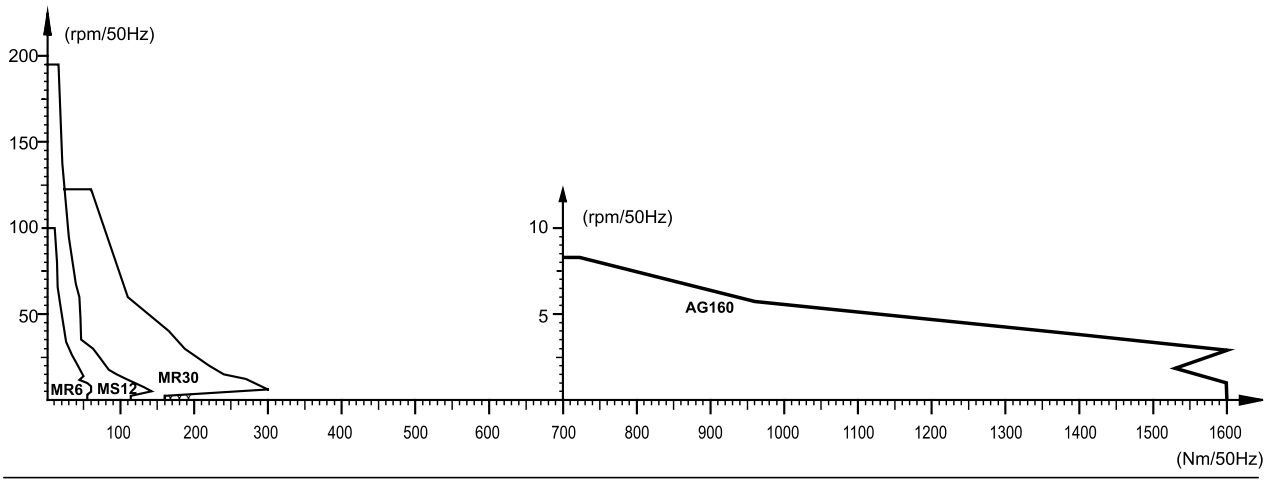
Compacta limit switches are available in several variants, depending on the desired movement profile. In addition to a purely mechanical (and particularly reasonably priced) basic design, variants with integrated power relay or linear potentiometer are also available so that more complex movement profiles can be implemented.

In addition, the Compacta drives of the MR6 series are also available as network-enabled devices with integrated regulatory electronics, absolute measurement system and fieldbus interface (either CANopen or Profibus DP). Complex movement profiles can be implemented with particularly high positioning accuracy via connection to a central controller.

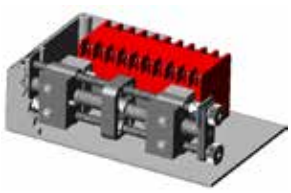
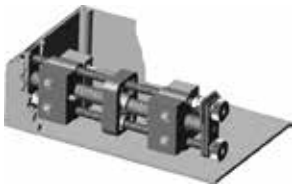
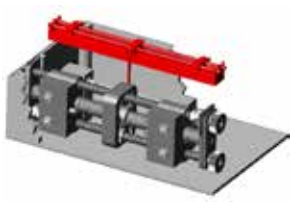
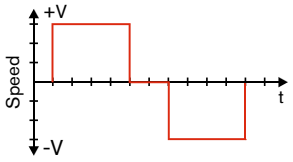
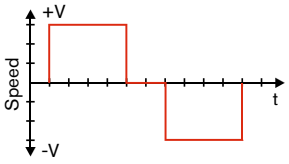
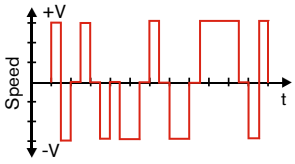




Torque / speed diagram



Limit switches

Limit switch Version 1 with integrated motor reverse protection (red)	Limit switch Version 2 Basic design	Limit switch Version 2P with linear potentiometer (red)	Limit switch with or without potentiometer for Compacta MR6
			
Example of movement profile 	Example of movement profile 	Example of movement profile 	Example of movement profile ▪ Profile 2 or 2P depending on design
Advantages	**Advantages**	**Advantages**	**Advantages**
▪ Stand-alone solution, thus ideal for mobile applications ▪ Jog mode and locking	▪ Simple adjustment of end-position ▪ Minimum installation and mounting effort	▪ Absolute encoder system ▪ Positioning unit	▪ Simple adjustment of end-position ▪ Minimum installation and mounting effort ▪ Linear potentiometer can be integrated

CANopen

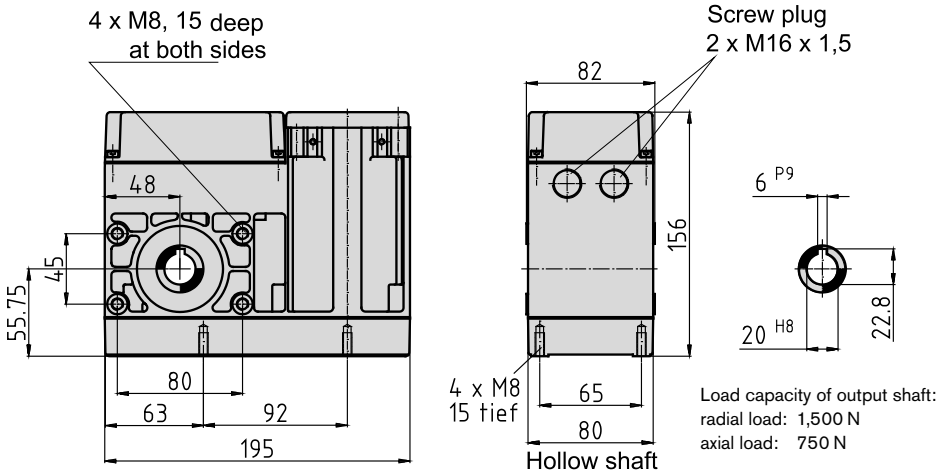
PROFIBUS

Compacta drives with fieldbus interface (CANopen or Profibus DP) can be operated via a central controller. Several hundred drives can thus be networked.

Please note

- Cut-off accuracy depends on the output speed. A spring-pressure single-disk brake is necessary for high cut-off accuracy.
- Backlash on the output shaft is about 0.4°.
- External cooling is recommended at high switching frequencies.

METRIC



Load capacity of output shaft:
radial load: 1,500 N
axial load: 750 N

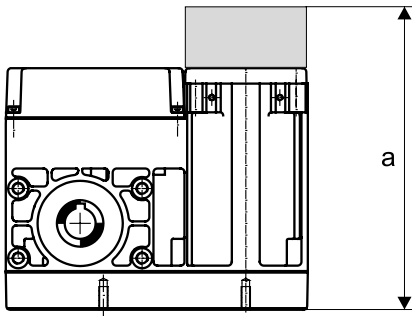
Weight: approx. 5 kg

Compacta MR6

Options

Dimensions with options	a
Spring-pressure single-disk brake	210
DC motor	200

All specifications in mm.



Please note:
Motor and gears can be temporarily overloaded by 50%, whereby AC and DC motors may stall.

Please contact producer for following operating conditions:
- Temperatures below 0°C (AC and DC below 10°C)
- Temperatures over 40°C
- Heavy vibrations

Three-phase AC motors – 3x 230/400V-50Hz

Output speed n_2 [min^{-1}]	Output torque [Nm] (DC = duty cycle)	Gear ratio	Motor speed n_1 [min^{-1}]	Motor output[kW]	Self-locking[1)]	Max. limit switch range output rotations
100	10.5 (30% DC)	27:1	2700	0.22	So	275 (207*)
80	13 (30% DC)	34:1	2700	0.22	So	275 (207*)
67	15 (30% DC)	40:1	2700	0.22	So	184 (140*)
54	19 (30% DC)	50:1	2700	0.22	So	184 (140*)
34	26 (30% DC)	80:1	2700	0.22	So	92 (70*)
27	33 (30% DC)	100:1	2700	0.22	So	92 (70*)
17	40 (30% DC)	160:1	2700	0.22	Ss	46 (35*)
14	50 (30% DC)	200:1	2700	0.22	Ss	46 (35*)
12	44 (30% DC)	224:1	2700	0.22	Sd	33 (25*)
10	55 (30% DC)	280:1	2700	0.22	Sd	33 (25*)
8	60 (20% DC)	160:1	1300	0.15	Ss	46 (35*)
6	60 (20% DC)	224:1	1300	0.15	Sd	33 (25*)
4.8	60 (20% DC)	280:1	1300	0.15	Sd	33 (25*)
3.6	55 (20% DC)	360:1	1300	0.15	Sd	21 (15.5*)
2.9	55 (20% DC)	450:1	1300	0.15	Sd	21 (15.5*)

* For version with potentiometer

AC motors – 1x 230V-50Hz

Output speed n_2 [min^{-1}]	Output torque [Nm] (15% duty cycle)[2)]	Gear ratio	Motor speed n_1 [min^{-1}]	Motor output [kW]	Selflocking[1)]
100	6.0	27:1	2700	0.09	So
80	7.5	34:1	2700	0.09	So
67	8.5	40:1	2700	0.09	So
54	10.5	50:1	2700	0.09	So
34	14.5	80:1	2700	0.09	So
27	18.0	100:1	2700	0.09	So
17	21.0	160:1	2700	0.09	Ss
14	26.5	200:1	2700	0.09	Ss
12	22.0	224:1	2700	0.09	Sd
10	27.5	280:1	2700	0.09	Sd
8	33.5	160:1	1300	0.07	Ss
6	35.0	224:1	1300	0.07	Sd
4.8	43.5	280:1	1300	0.07	Sd
3.6	54.0	360:1	1300	0.07	Sd
2.9	55.0	450:1	1300	0.07	Sd

24 V DC permanent magnet motor

Output speed n_2 [min^{-1}]	Output torque [Nm]	Selflocking[1]	Gear ratio
65	7	So	27 : 1
51.5	8.75	So	34 : 1
44	10	So	40 : 1
35	12	So	50 : 1
22	16.5	So	80 : 1
17.5	20.5	So	100 : 1
11	24.5	So	160 : 1
9	30.5	Ss	200 : 1
8	25	Sd	224 : 1
6	31	Sd	280 : 1
5	38.5	Sd	360 : 1
4	47.5	Sd	450 : 1

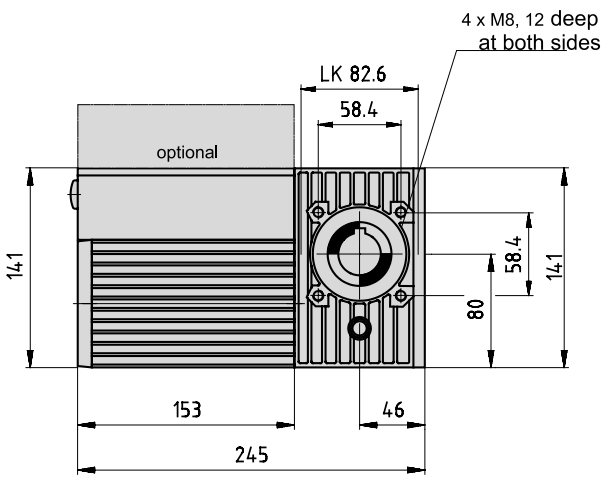
P = 0.12 kW
I = 10.5 A
20% duty cycle
The output speed of Compacta drives with DC motor is load-dependent.

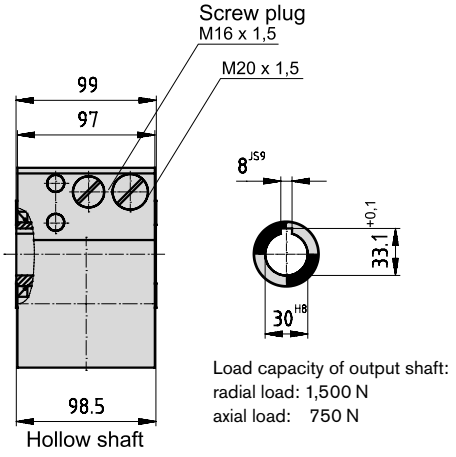
The duty cycle time (DC) applies for 10 minutes operation.

1) So = no self-locking
Ss = static self-locking
Sd = dynamic self-locking

2) The defined AC torques are rated torques.
Some starting torques are only 66% of the catalog figure.
Please contact producer if max. torque required.

METRIC





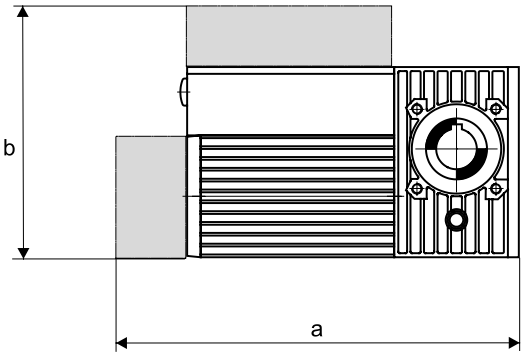
Load capacity of output shaft:
radial load: 1,500 N
axial load: 750 N

Weight: approx. 7 kg

Compacta MS12

Options

Dimensions with options	a	b
Spring pressure single-disk brake	295	
Ventilation through fan blades	283	
Ventilation + spring pressure single-disk brake	307	
Forced ventilation (axial ventilator)	307	
Forced ventilation + spring pressure single-disk brake	333	
Emergency hand crank	382	
DC motor	286	
DC motor + spring pressure single-disk brake	336	
Anchored conical brake	245	
Limit switch, Version 1 / 2P		179
Slipping clutch	(x)	(x)
Single-sided stub shaft	(x)	(x)



(x) Please see Compacta data sheets for further or missing dimensions
All specifications in mm.

Please note:
Motor and gears can be temporarily overloaded by 50 %, whereby AC and DC motors may stall.

Please contact producer for following operating conditions:
- Temperatures below 0 °C (AC and DC below 10 °C)
- Temperatures over 40 °C
- Heavy vibrations

Three-phase AC motors – 3x 230/400V-50Hz

Output speed n_2 [min^{-1}]	Output torque [Nm][1]			Gear ratio	Motor speed n_1 [min^{-1}]	Motor output [kW][1]		Self-locking[2]	Max. limit switch range output rotations
	40 % duty cycle	60 % duty cycle	100 % duty cycle			40 % duty cycle	60/100 % duty cycle		
193	16	12	12	14.2:1	2750	0.4	0.3	So	275
137.5	21	15.7	15.7	20:1	2750	0.4	0.3	So	275
94.8	30	22.5	22.5	29:1	2750	0.4	0.3	So	275
68	39.5	29.5	29.5	40.5:1	2750	0.4	0.3	So	275
61	44	33	33	45:1	2750	0.4	0.3	So	275
47.6	45.5	34	34	29:1	1380	0.3	0.23	So	275
43.6	44	33	33	63:1	2750	0.4	0.3	So	275
36.7	47	35	35	75:1	2750	0.4	0.3	So	275
32.7	59	44	44	84:1	2750	0.4	0.3	Ss	275
30.5	63	47	47	90:1	2750	0.4	0.3	Ss	275
24.1	72	54	54	114:1	2750	0.4	0.3	Ss	275
21.9	66	49	49	63:1	1380	0.3	0.23	So	275
18.3	84	63	63	150:1	2750	0.4	0.3	Sd	275
16.4	88	66	66	84:1	1380	0.3	0.23	Ss	275
15.3	94.5	71	71	90:1	1380	0.3	0.23	Ss	275
12.1	107.5	80.5	80.5	114:1	1380	0.3	0.23	Ss	275
9.2	126	94.5	94.5	150:1	1380	0.3	0.23	Sd	275
7.7	132	99	99	180:1	1380	0.3	0.23	Sd	275
6.1	142	106.5	-	225:1	1380	0.3	0.23	Sd	275
4.5	88	66	-	150:1	680	0.12	0.09	Sd	275
3.8	92	68	-	180:1	680	0.12	0.09	Sd	275
3	100	75	-	225:1	680	0.12	0.09	Sd	275

AC motors – 1x 230V-50Hz

Output speed n_2 [min^{-1}]	Output torque [Nm] (20 % duty cycle)[3]	Gear ratio	Motor speed n_1 [min^{-1}]	Motor output [kW]	Self-locking[2]
193.0	10.0	14.2:1	2750	0.28	So
137.5	13.0	20.0:1	2750	0.28	So
94.8	18.0	29.0:1	2750	0.28	So
68.0	23.9	40.5:1	2750	0.28	So
61.0	26.0	45.0:1	2750	0.28	So
47.6	27.0	29.0:1	1380	0.25	So
43.6	26.0	63.0:1	2750	0.28	So
36.7	28.0	75.0:1	2750	0.28	So
32.7	35.0	84.0:1	2750	0.28	Ss
30.5	38.0	90.0:1	2750	0.28	Ss
24.1	43.0	114.0:1	2750	0.28	Ss
21.9	40.0	63.0:1	1380	0.25	So
18.3	49.8	150.0:1	2750	0.28	Sd
16.4	53.0	84.0:1	1380	0.25	Ss
15.3	56.9	90.0:1	1380	0.25	Ss
12.1	65.0	114.0:1	1380	0.25	Ss
9.2	75.9	150.0:1	1380	0.25	Sd
7.7	79.0	180.0:1	1380	0.25	Sd
6.1	84.9	225.0:1	1380	0.25	Sd

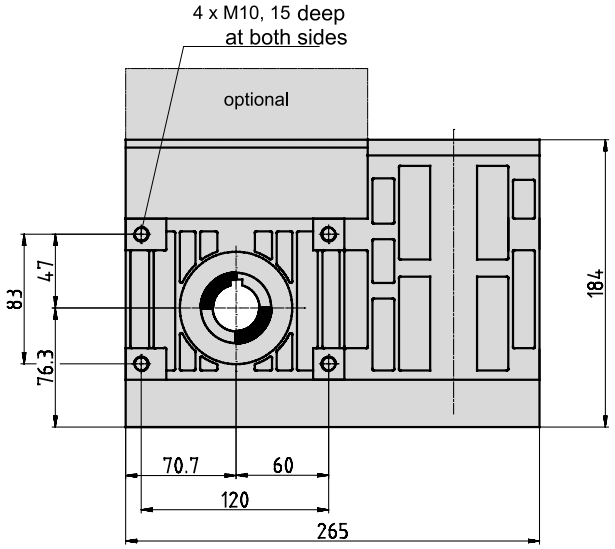
24 V DC permanent magnet motor

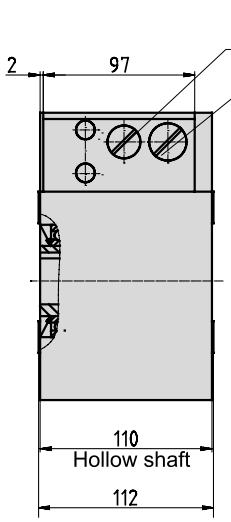
Output speed n_2 [min^{-1}]	Output torque [Nm]	Self-locking[2]	Gear ratio
140	16	So	14.2 : 1
100	21	So	20 : 1
69	30	So	29 : 1
49	40	So	40.5 : 1
44	45	So	45 : 1
32	45	So	63 : 1
27	48	So	75 : 1
24	60	Ss	84 : 1
22	65	Ss	90 : 1
17.5	73	Ss	114 : 1
13	88	Sd	150 : 1
11	91	Sd	180 : 1
8.9	96	Sd	225 : 1

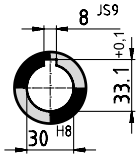
P = 0.3 kW
I = 25 A
30 % duty cycle
The output speed of Compacta drives with DC motor is load-dependent.
The duty cycle time applies for 10 minutes operation.

1) Cooling is fundamentally necessary with 100 % duty operation. With cooling, 100 % duty operation can be achieved when 60 % is specified
2) So = no self-locking
Ss = static self-locking
Sd = dynamic self-locking
3) The defined AC torques are rated torques. Some starting torques are only 66 % of the catalog figure. Please contact producer if max. torque required.

METRIC







Load capacity of output shaft:
radial load: 2,000 N
axial load: 1,000 N

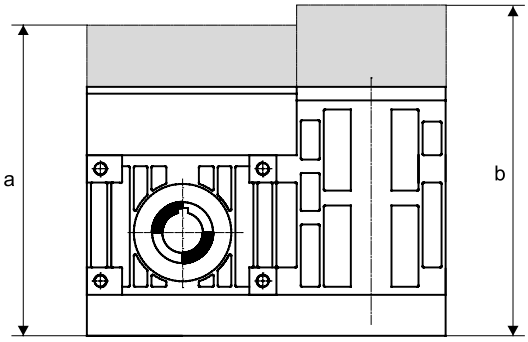
Weight: approx. 12 kg

Compacta MR30

Options

Dimensions with options	a	b
Spring pressure single-disk brake		244
Emergency hand crank		380
DC motor		239
Limit switch, Version 1 / 2P	218	

Please see Compacta data sheets for further or missing dimensions
All specifications in mm.



Please note:
Motor and gears can be temporarily overloaded by 50 %, whereby AC and DC motors may stall.

Please contact producer for following operating conditions:
- Temperatures below 0 °C (AC and DC below 10 °C)
- Temperatures over 40 °C
- Heavy vibrations

Three-phase AC motors – 3x 230/400V-50Hz

Output speed n_2 [min^{-1}]	Output torque [Nm]		Gear ratio	Motor speed n_1 [min^{-1}]	Motor output [kW]	Self-locking[1)]	Max. limit switch range output rotations	
	40 % DC	60 % DC					Standard	Long
123.4		60	22.7:1	2800	1.1	So	260	430
61.6		112	45.4:1	2800	1.1	So	130	215
39		165	71.8:1	2800	1.1	So	85	135
30.8		125	45.4:1	1400	0.6	So	130	215
28.4		187	98.3:1	2800	1.1	So	60	100
21.8		220	128.5:1	2800	1.1	Ss	47	77
19.5		180	71.8:1	1400	0.6	So	85	135
15.4		240	181.4:1	2800	1.1	Ss	32	55
14.2		206	98.3:1	1400	0.6	So	60	100
11.8		270	238.1:1	2800	1.1	Sd	25	42
10.6		250	264.6:1	2800	1.1	Sd	23	38
7.7		267	181.4:1	1400	0.6	Ss	32	55
5.9		300	238.1:1	1400	0.6	Sd	25	42
5.3		278	264.6:1	1400	0.6	Sd	23	38
3.8	148		181.4:1	700	0.23	Ss	32	55
2.9	170		238.1:1	700	0.23	Sd	25	42
2.6	160		264.6:1	700	0.23	Sd	23	38

AC motors – 1x 230V-50Hz

Output speed n_2 [min^{-1}]	Output torque [Nm] (20 % duty cycle)[2)]	Gear ratio	Motor speed n_1 [min^{-1}]	Motor output [kW]	Self-locking[1)]
123.4	36.0	22.7:1	2800	0.66	So
61.6	67.2	45.4:1	2800	0.66	So
39.0	99.0	71.8:1	2800	0.66	So
30.8	73.3	45.4:1	1400	0.36	So
28.4	112.2	98.3:1	2800	0.66	So
21.8	132.0	128.5:1	2800	0.66	Ss
19.5	108.0	71.8:1	1400	0.36	So
15.4	144.0	181.4:1	2800	0.66	Ss
14.1	122.3	98.3:1	1400	0.36	So
11.8	162.0	238.1:1	2800	0.66	Sd
10.9	144.0	128.5:1	1400	0.36	Ss
10.6	150.0	264.6:1	2800	0.66	Sd
7.7	157.1	181.4:1	1400	0.36	Ss
5.9	176.7	238.1:1	1400	0.36	Sd
5.3	163.4	264.6:1	1400	0.36	Sd

24 V DC permanent magnet motor

Output speed n_2 [min^{-1}]	Output torque [Nm]	Self-locking[1)]	Gear ratio
66	52	So	22.7 : 1
33	97	So	45.4 : 1
21	141	So	71.8 : 1
15	162	So	98.3 : 1
11.5	190	Ss	128.5 : 1
8	205	Ss	181.4 : 1
6.5	220	Sd	238.1 : 1
5.5	200	Sd	264.6 : 1

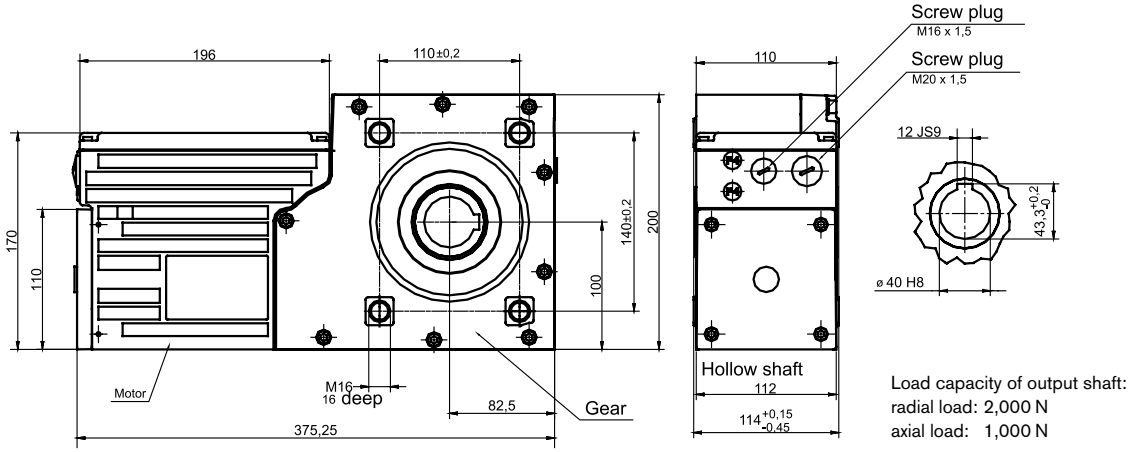
P = 0.5 kW
I = 30 A
40 % duty cycle
The output speed of Compacta drives with DC motor is load-dependent.

The duty cycle time (DC) applies for 10 minutes operation.

1) So = no self-locking
Ss = static self-locking
Sd = dynamic self-locking

2) The defined AC torques are rated torques.
Some starting torques are only 66% of the catalog figure.
Please contact producer if max. torque required.

METRIC



Load capacity of output shaft:
radial load: 2,000 N
axial load: 1,000 N

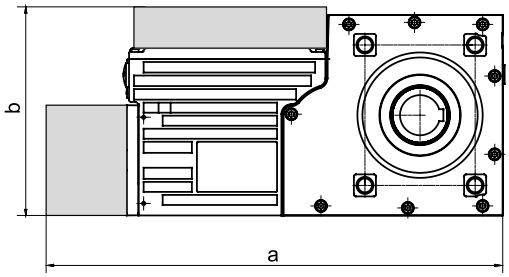
Weight: approx. 20 kg

Compacta AG160

Options

Dimensions with options	a	b
Spring pressure single-disk brake	435	
Emergency hand crank	486	
Limit switch, Version 1 / 2P		209

Please see Compacta data sheets for further or missing dimensions
All specifications in mm.



Please note:
Motor and gears can be temporarily overloaded by 50 %, whereby AC and DC motors may stall.

Please contact producer for following operating conditions:
- Temperatures below 0 °C (AC and DC below 10 °C)
- Temperatures over 40 °C
- Heavy vibrations

Three-phase AC motors – 3x 230/400V-50Hz

Output speed n_2 [min^{-1}]	Output torque [Nm]	Gear ratio	Motor speed n_1 [min^{-1}]	Motor output [kW]	Self-locking[1)]	Max. limit switch range output rotations
	60 % duty cycle					
8,30	720	339 : 1	2800	1.10	So	275
5,70	960	490 : 1	2800	1.10	So	275
3,70	1400	764 : 1	2800	1.10	So	275
2,90	1600	490 : 1	1400	0.60	So	275
1,80	1530	764 : 1	1400	0.60	So	275
0,90	1600	3111 : 1	2800	1.10	Sd	275
0,45	1600	3111 : 1	1400	0.60	Sd	275

The duty cycle time applies for 10 minutes operation.

1) So = no self-locking
Ss = static self-locking
Sd = dynamic self-locking

Linear actuators.

The Mini series.

The linear actuators of the Mini series are characterized by their particularly compact housings for their high performance. They are therefore the ideal choice when little mounting space is available. The Mini drives cover a very wide range of applications thanks to the numerous serially available options.

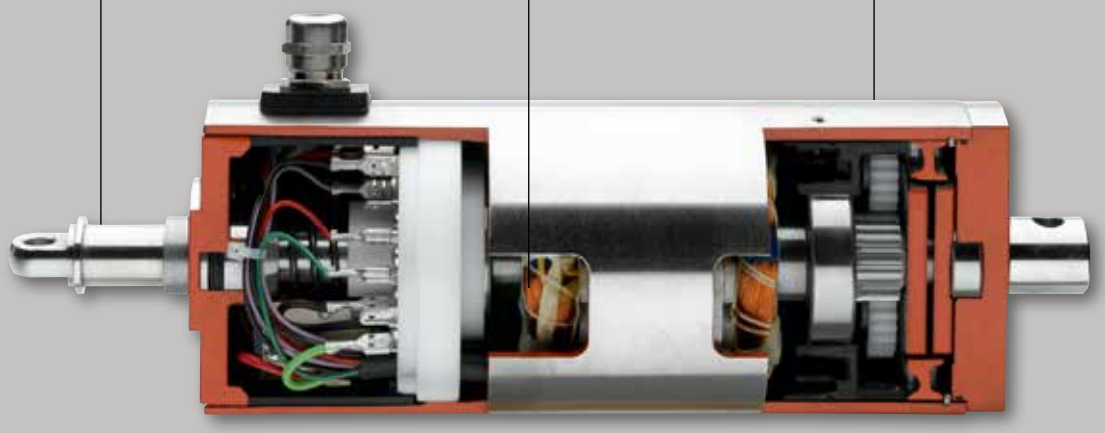
Mini linear actuators

- 5 sizes with stroke forces of up to 26,000 N
- Low operating costs due to high efficiency
- Integrated thermal protection
- Life-long lubrication
- High performance with small housings
- Standard enclosure rating of IP 54

Mounting
Differing connection heads and mounting methods offer variety of mounting possibilities.

Short overall length
Use of powerful hollow shaft motors results in extremely short overall lengths.

Gears
Combined with differing spindle pitches, 1-, 2- and 3-stage planetary gears provide a wide variety of stroke speeds.

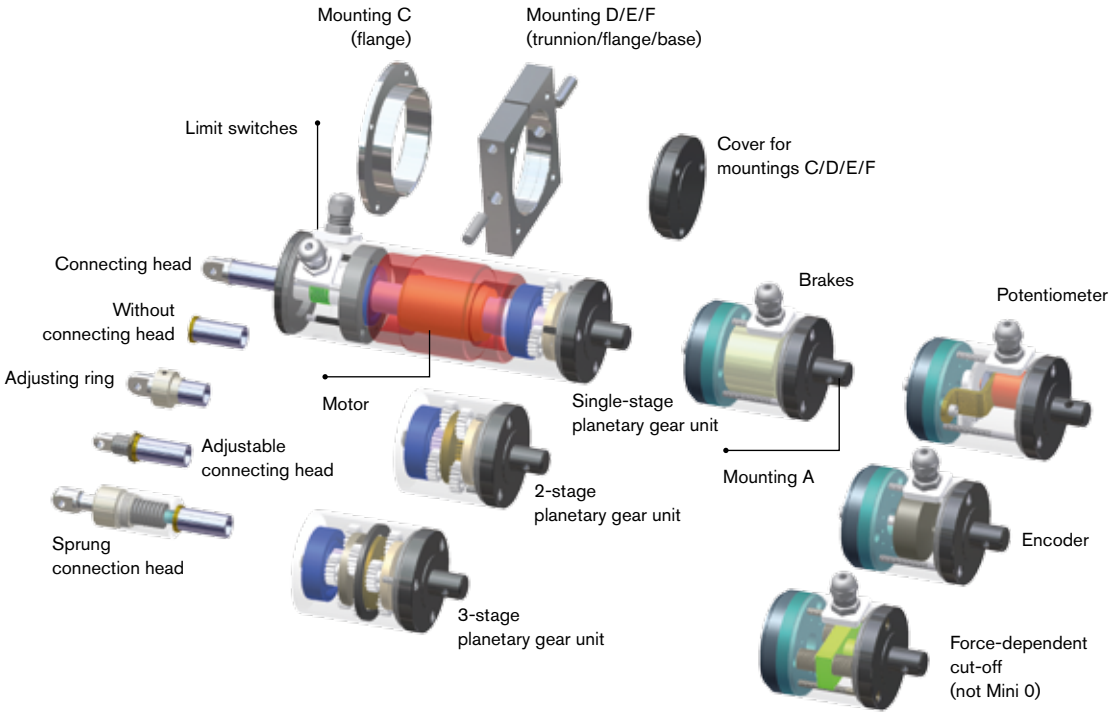


Compact performance.

The right solution for all space constraints.

The linear actuators of the Mini series are based on the economic principle of minimalism: the use of particularly powerful hollow shaft motors allows the necessary stroke force to be achieved in a very short housing in relation to the stroke length. Mini drives are therefore particularly suitable for use where space is at a premium. They are extremely robust and durable despite their compact and light design.

A comprehensive range of options enables individual adaptation to numerous applications – for example at inspection stations in the automotive industry, in print machines, in the food industry or in façade engineering. Customer-specific adaptations are possible beyond the standard options, further expanding the range of application.



Mini 0
- Stroke force up to 1,000 N
- Stroke speed up to 30 mm/s
- Standard stroke lengths up to 300 mm

Mini 01
- Stroke force up to 1,600 N
- Stroke speed up to 130 mm/s
- Standard stroke lengths up to 300 mm

Mini 1
- Stroke force up to 3,500 N
- Stroke speed up to 136 mm/s
- Standard stroke lengths up to 400 mm

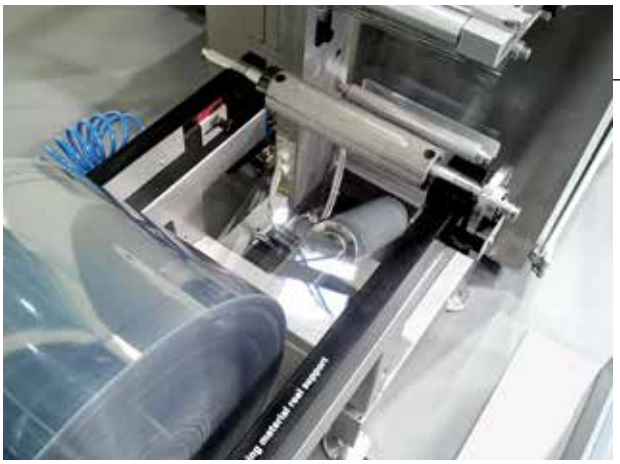
Mini 2
- Stroke force up to 14,000 N
- Stroke speed up 49 mm/s
- Standard stroke lengths up to 300 mm

Mini 3
- Stroke force up to 26,000 N
- Stroke speed up to 29 mm/s
- Standard stroke lengths up to 500 mm

Application examples

Automotive industry

A truck's driver's cab (including engine and chassis) is aligned during assembly with the help of two Mini drives.



Packaging technology

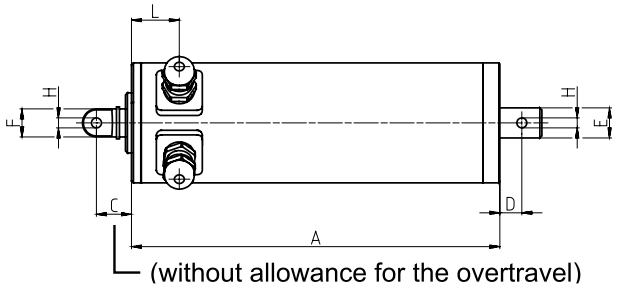
Mini drives are used on blister packing machines to adjust the feed and unwinding of the forming film.

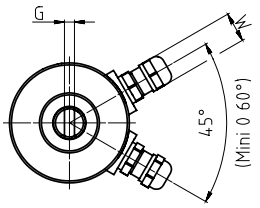
Crane construction

A Mini drive in a construction crane releases the brakes for the wind-release system. Cranes must be able to turn like a weathervane in strong winds to prevent air resistance becoming too high and the subsequent risk that the crane might tip over.

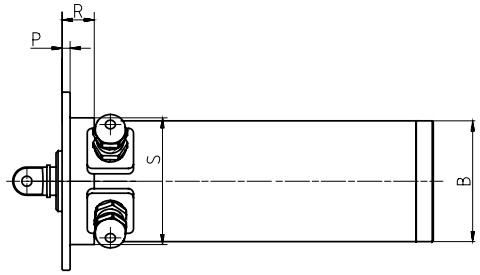
Version A

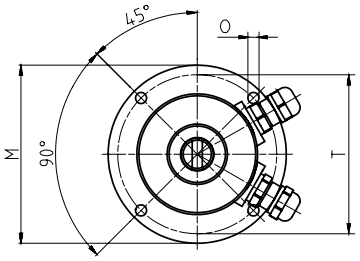
METRIC





Version C





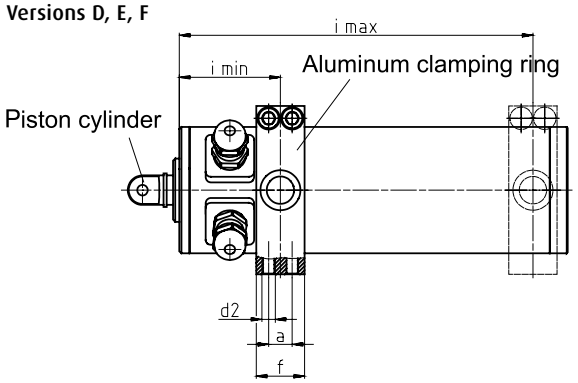
Mini

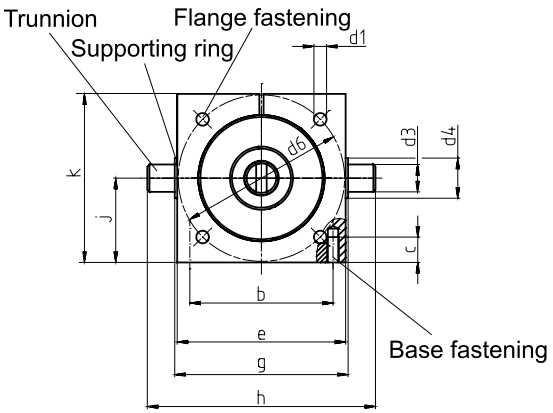
Version A, Version C

Type	Basic stroke*	A*			B	C	D	E	F	G	H	L	M	O	P	R	S	T	W
		1-st.	2-st.	3-st.							H9								
Mini 0	100	186	198	210	Ø60	21 ±0.5	10	Ø15	Ø14	5	Ø5	24	89	Ø5.5	4	16	Ø63	Ø79	PG9
Mini 01	100	210	227	242	Ø80	21.5 ±0.7	12	Ø20	Ø16	8	Ø8	28	110	Ø6.5	5	30	Ø82	Ø100	PG9
Mini 1	150	279	299	319	Ø95	25.5 ±0.7	16	Ø20	Ø20	8	Ø8	28	130	Ø8.5	6	30	Ø100	Ø115	PG11
Mini 2	175	300	324	348	Ø115	37.5 ±1	22	40x14	Ø28	14	Ø14	29	165	Ø10.5	10	30	Ø122	Ø145	PG11
Mini 3	175	373	408	443	Ø128	53 ±1.3	35	50x25	Ø40	20	Ø20	39	185	Ø13	12	35	Ø134	Ø161	PG11

* Dimension A is based on the basic stroke. For longer strokes, dimension A increases by the difference to the basic stroke length.

Versions D, E, F





Versions D, E, F

Type	Basic stroke*	i min	i max*	e	k	h	j	d3 h7	d4	g	d1	d6	d2	a	b	c	f
						Trunnion					Flange		Base				
Mini 0	100	48	168	78	80	108.4	40	8	14	82.4	6	79	M6	0	69	12	16
Mini 01	100	54	188	100	110	130.4	50	10	16	102.4	7	100	M8	0	87	16	20
Mini 1	150	59	254	128	130	163	65	15	21	133	9.5	115	M12	0	104	24	30
Mini 2	175	70	265	148	150	197	75	25	35	154	11.5	145	M12	21	127	24	43
Mini 3	175	85	329	178	180	236	90	35	45	185	13.5	161	M20	0	149	40	60

* Dimension “i max” is based on the basic stroke. For longer strokes, dimension “i max” increases by the difference to the basic stroke length.
All specifications in mm.

Performance table (for DC on request)

Size	Motor			Planetary gear unit stages	Trapezoidal spindle [mm]	Stroke speed [mm/s]	Max. stroke force [N] for stroke lengths [mm]						
	Speed n_1 [min^{-1}]	Output P_1 [kW]	Duty cycle [%]				100	150	175	200	250 300	350 400	450 500
Mini 0 110V / 230 V AC 24 V DC	1200	0.030	15	1-st.	10x6 So	30	450	450		450	450		
	1200	0.030	15	1-st.	10x3 Sd	15	600	600		600	600		
	1200	0.030	15	1-st.	10x2 Sd	10	600	600		600	600		
	1200	0.030	15	2-st.	10x6 So	8	1000	1000		1000	600		
	1200	0.015	30-40	2-st.	10x3 Sd	4	1000	1000		1000	600		
	1200	0.015	30-40	2-st.	10x2 Sd	2.7	1000	1000		1000	600		
	1200	0.015	50-60	3-st.	10x6 So	2	1000	1000		1000	600		
	1200	0.015	50-60	3-st.	10x3 Sd	1	1000	1000		1000	600		
	1200	0.015	50-60	3-st.	10x2 Sd	0.7	1000	1000		1000	600		
Mini 01 3x 230 V / 400 V AC 110 V / 230 V AC	1300	0.05	15	1:1	10x6 So	130	200	200		200	200		
	1300	0.05	15	1:1	10x3 Sd	65	280	280		280	280		
	1300	0.05	15	1:1	10x2 Sd	43	310	310		310	310		
	1300	0.05	15	1-st.	10x6 So	30	700	700		700	540		
	1300	0.05	15	1-st.	10x3 Sd	15	1000	1000		1000	540		
	1300	0.05	15	1-st.	10x2 Sd	10	1000	1000		1000	1000		
	1300	0.032	40	2-st.	10x6 So	7	1500	1500		1000	540		
	1300	0.032	40	2-st.	10x3 Sd	3	1500	1500		1000	540		
	1300	0.022	50-60	2-st.	10x2 Sd	2	1500	1500		1500	1000		
	1300	0.022	50-60	3-st.	10x6 So	1.5	1600	1600		1000	540		
	1300	0.022	50-60	3-st.	10x3 Sd	1	1600	1600		1000	540		
	1300	0.022	50-60	3-st.	10x2 Sd	0.5	1600	1600		1600	1000		
Mini 1 3x 230 V / 400 V AC 110 V / 230 V AC	1360	0.18	15	1:1	12x6 So	136		600		600	600	600	
	1360	0.18	15	1:1	12x3 Sd	68		850		850	850	850	
	1360	0.18	15	1:1	12x2 Sd	45		900		900	900	900	
	1360	0.18	15	1-st.	12x6 So	32		2200		2200	1560	940	
	1360	0.18	15	1-st.	12x4 Ss	21		2500		2500	2500	1640	
	1360	0.18	15	1-st.	12x3 Sd	16		2510		2510	1560	940	
	1360	0.18	15	1-st.	12x2 Sd	10.5		3300		3300	2740	1640	
	1360	0.11	40	2-st.	12x6 So	7		3500		3000	1560	940	
	1360	0.11	40	2-st.	12x4 Ss	5		3500		3500	2740	1640	
	1360	0.11	40	2-st.	12x2 Sd	2.5		3500		3500	2740	1640	
	1360	0.06	50-60	3-st.	12x4 Ss	1		3500		3500	2740	1640	
	1360	0.06	50-60	3-st.	12x2 Sd	0.5		3500		3500	2740	1640	
Mini 2 3x 230 V / 400 V AC	1360	0.5	15	1-st.	18x8 So	49			3800		3800		
	1360	0.5	15	1-st.	18x4 Ss	24.5			5000		5000		
	1360	0.5	15	1-st.	18x3 Sd	18			5300		5300		
	1360	0.5	15	2-st.	18x8 So	13			10000		9080		
	1360	0.3	40	2-st.	18x4 Ss	6			10000		9080		
	1360	0.3	40	2-st.	18x3 Sd	5			10000		10000		
	1360	0.15	50-60	3-st.	18x4 Ss	2			14000		9080		
	1360	0.15	50-60	3-st.	18x3 Sd	1.5			14000		12000		
Mini 3 3x 230 V / 400 V AC	1400	1.5	15	1-st.	28x8 Ss	47			8100		8100	8100	8100
	1400	1.5	15	1-st.	28x5 Sd	29			8900		8900	8900	8900
	1400	1.5	15	1-st.	28x3 Sd	17.5			9900		9900	9900	9900
	1400	1.5	15	2-st.	28x8 Ss	12			20000		20000	19400	13120
	1400	1.5	15	2-st.	28x5 Sd	7.3			20000		20000	20000	20000
	1400	0.75	40	2-st.	28x3 Sd	4.4			20000		20000	20000	20000
	1400	0.5	50-60	3-st.	28x8 Ss	2.9			26000		26000	19400	13120
	1400	0.5	50-60	3-st.	28x5 Sd	1.8			26000		26000	26000	20000
	1400	0.5	50-60	3-st.	28x3 Sd	1.1			26000		26000	26000	26000

Please note:
Motor and gears can be temporarily overloaded by 50 %, whereby AC and DC motors may stall.

Please contact producer for following operating conditions:
- Temperatures below 0 °C (AC and DC below 10 °C)
- Temperatures over 40 °C
- Heavy vibrations

The output speed of drives with DC motor is load-dependent.
The duty cycle time applies for 10 minutes operation.

1) So = no self-locking
Ss = static self-locking
Sd = dynamic self-locking

2) The defined AC torques are rated torques.
Some starting torques are only 66 % of the catalog figure.
Please contact producer if max. torque required.

Order example

Type	Version	Stroke force	Stroke speed	Stroke length
Mini 2	D/A	10000	13	175

Linear actuators.

The LiMax series.

The linear actuators of the LiMax series are characterized by their very high stroke forces and slender housings. With their modular design and numerous options, they can be flexibly adapted to the most varied of applications and customer requirements. The LiMax is a very cost-effective linear actuator offering an optimum price/performance ratio.

LiMax linear actuators

- Stroke forces of up to 5,000 N
- Freely adjustable limit switches
- Low operating costs due to high efficiency
- Integrated thermal protection
- Life-long lubrication
- Splashproof stainless steel housing (IP 65)
- Standard enclosure rating of IP 54

Modular design
Numerous options in modular design. Customer-specific adaptations possible.

Stainless steel housings
The rustproof stainless steel surface and splashproofing to IP 65 allow use even in harsh environmental conditions.

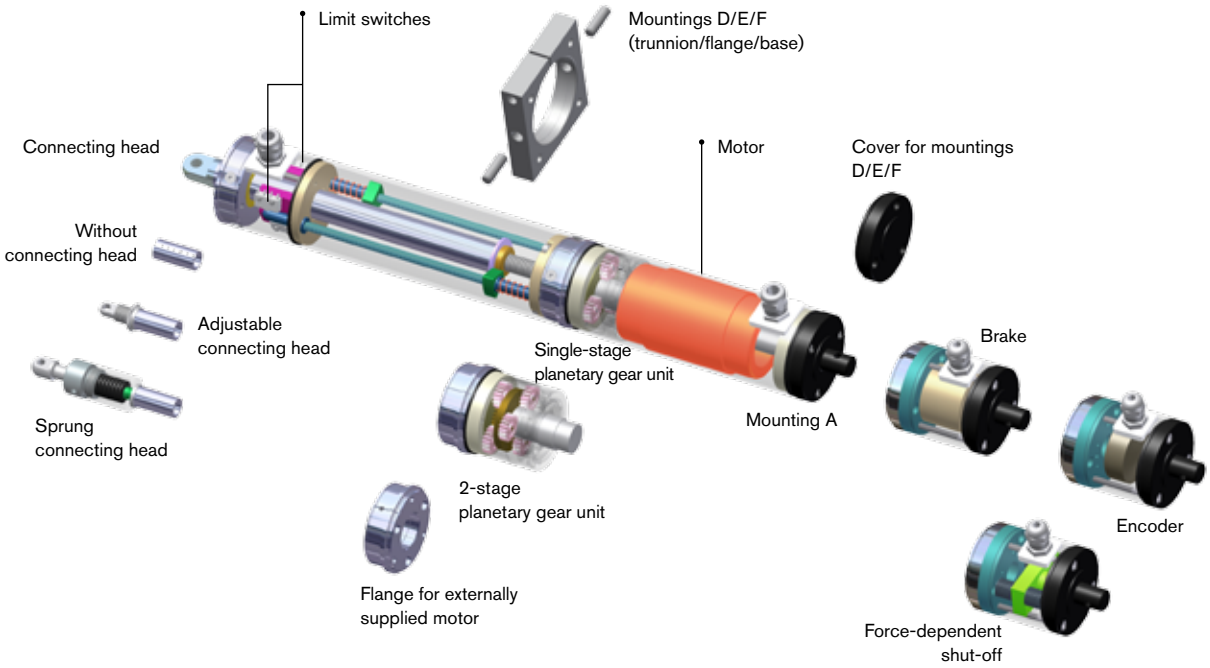
Adjustable stroke lengths
Stroke lengths can be easily and comfortably adjusted in situ by means of integrated limit switches with optional safety switches.

Dazzling performance.

A strong actuator with a slender shape.

The linear actuators of the LiMax series have a modular design: screw, planetary gears and motor are arranged in a row. This permits large stroke forces to be achieved with a comparatively low diameter. The drives have integrated limit switches, adjustable over the entire stroke length, and can thus easily be adapted to a variety of applications. A comprehensive choice of options makes the LiMax particularly versatile and customer-specific adaptations are also possible.

Thanks to the rustproof stainless steel housing, the actuators of the LiMax series also offer trouble-free use in harsh operating conditions, e.g. in outdoor applications. Their stylish appearance also allows use in visible parts of machines and plants, as well as installation in building facades.



LiMax 60

- Stroke force up to 3,000 N
- Stroke speed up to 31 mm/s
- Standard stroke lengths up to 300 mm

LiMax 80

- Stroke force up to 5,000 N
- Stroke speed up to 84 mm/s
- Standard stroke lengths up to 400 mm

Application examples

Façade technology

Thanks to their attractive design, the actuators of the LiMax series are frequently used in the shading systems of large buildings. They are used here for positioning the sunblind elements. An entire row of sunblinds can be adjusted with a single drive via a suitable positioning system.

Handling equipment and conveyors

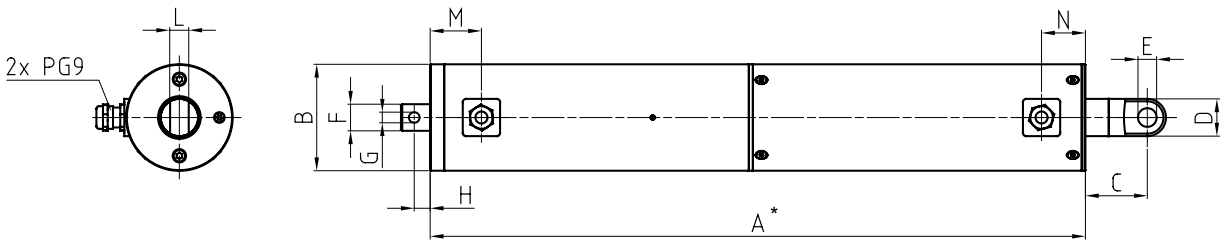
In use on vacuum-based lifting equipment, a LiMax actuator implements the 90° turning movement of the transported material. It is easily integrated in handling systems thanks to its slender and light design.

The food industry

Splashproofing (IP 65) and the use of rust-free stainless steel also permit use of the LiMax actuator under harsh and aggressive environmental conditions, for example in hygienic areas in the food industry.

Version A

METRIC



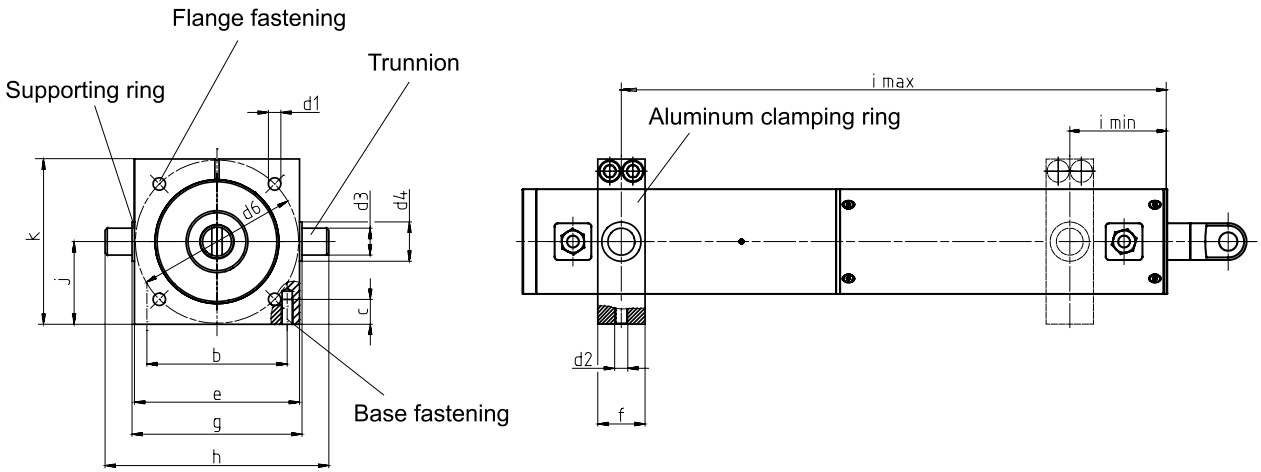
LiMax

Version A

Type	Basic stroke	A*		B	C	D	E	F	G	H	L	M	N
		1-st.	2-st.							H9			
LiMax 60	200**	551	563	Ø60.3	34	Ø20	Ø8	Ø15	Ø5	10	8	36	31
LiMax 80	200**	563	578	Ø80	46.5	Ø28	Ø14	Ø20	Ø8	12	14	38.5	33

* Dimension A is based on the basic stroke. For longer strokes, dimension A increases by the difference to the basic stroke length.
** Special stroke lengths on request
All specifications in mm.

Version D: Trunnion
Version E: Flange mounting
Version F: Base mounting



Versions D, E, F

					Trunnion					Flange		Base			
Type	i min	i max*	e	k	h	j	d3 h7	d4	g	d1	d6	d2	b	c	f
LiMax 60	55	428	78	80	108.4	40	8	14	82.4	6	79	M6	69	12	16
LiMax 80	60	437	100	110	130.4	50	10	16	102.4	7	100	M8	87	16	20

* Dimension “i max” is based on the basic stroke (200 mm). For longer strokes, dimension “i max” increases by the difference to the basic stroke length.
All specifications in mm.

Performance table (for DC on request)

LiMax 60 AC (1x 230 V AC)

Rotary speed n_1 [min^{-1}]	Output P_1 [kW]	Duty cycle [%]	Planetary gear stages	Trapezoidal spindle [mm]	Stroke speed [mm/s]	Max. stroke force [N] for stroke lengths [mm]	
						200	300
1200	0.06	15	1-st.	Tr12x6 So	31*	790	790
1200	0.06	15	1-st.	Tr12x4 Ss	21*	930	930
1200	0.06	15	1-st.	Tr12x3 Sd	15	1050	1050
1200	0.06	15	1-st.	Tr12x2 Sd	10	1150	1150
1200	0.06	15	2-st.	Tr12x6 So	8	2600	2200
1200	0.06	15	2-st.	Tr12x3 Sd	4	3000	2200
1200	0.06	15	2-st.	Tr12x2 Sd	3	3000	3000

LiMax 80 three-phase (3x 230 / 400 V AC)

Rotary speed n_1 [min^{-1}]	Output P_1 [kW]	Duty cycle [%]	Planetary gear stages	Trapezoidal spindle [mm]	Stroke speed [mm/s]	Max. stroke force [N] for stroke lengths [mm]	
						200	300
2700	0.22	30	1-st.	Tr18x8 So	84*	1000	1000
2700	0.22	30	1-st.	Tr18x4 Ss	42*	1320	1320
2700	0.22	30	1-st.	Tr18x3 Sd	31*	1400	1400
2700	0.22	30	2-st.	Tr18x8 So	19*	3700	3700
2700	0.22	30	2-st.	Tr18x4 Ss	10	5000	5000
2700	0.22	30	2-st.	Tr18x3 Sd	7	5000	5000

LiMax 80 AC (1x 230 V AC)

Rotary speed n_1 [min^{-1}]	Output P_1 [kW]	Duty cycle [%]	Planetary gear stages	Trapezoidal spindle [mm]	Stroke speed [mm/s]	Max. stroke force [N] for stroke lengths [mm]	
						200	300
2700	0.12	15	1-st.	Tr18x8 So	84*	540	540
2700	0.12	15	1-st.	Tr18x4 Ss	42*	720	720
2700	0.12	15	1-st.	Tr18x3 Sd	31*	760	760
2700	0.12	15	2-st.	Tr18x8 So	19*	2000	2000
2700	0.12	15	2-st.	Tr18x4 Ss	10	2700	2700
2700	0.12	15	2-st.	Tr18x3 Sd	7	2800	2800

* A brake may be needed depending on the application and the stroke speed. The duty cycle time applies for 10 minutes operation. The maximum stroke force at the particular stroke speed applies for tensile loading.

General

- The permissible ambient temperature is -20 °C to +60 °C. A motor heater is necessary when motor is inactive at temperatures below zero.
- A grease nipple for re-lubrication is recommended with vertical installation.
- The piston tube may rotate.

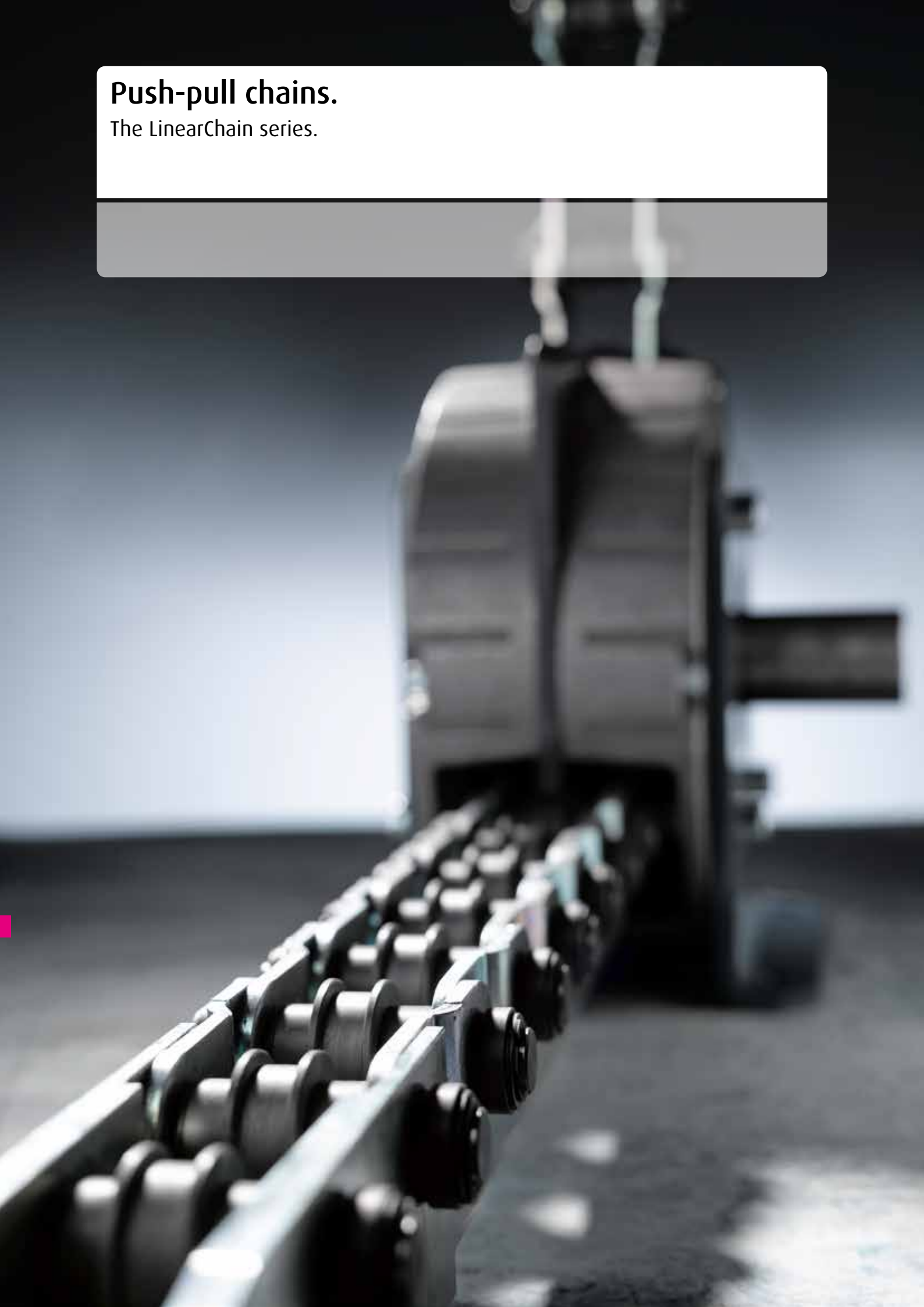
So = no self-locking
Ss = static self-locking
Sd = dynamic self-locking

Order example

Type	Version	Stroke force	Stroke speed	Stroke length
LiMax 60	W/A	1150	10	200

Push-pull chains.

The LinearChain series.



Push-pull LinearChain systems are able to move large loads both horizontally and vertically with a high level of positioning accuracy. The chain consists of specially shaped links whose geometry prevents buckling under pressure loads. The LinearChain can thus be used like a conventional linear drive.

The chain is driven via a special housing with an integrated sprocket, to which a gear motor – for example a Compacta slip-on geared motor – is flange-mounted.

LinearChain push-pull systems

- Stroke forces up to 35,000 N
- Ideal for implementing long strokes, especially when space is limited
- Compact storage of the chain, also multitrack
- No rebound under load
- Retention of absolute position
- Smooth movements, without jolting
- Synchronous operation during horizontal or vertical movements

Special chain geometry

The special shape of the chain links and the arrangement of the anchor point permit transmission of traction and thrust.

Drive housing

The rotary movement of a connected motor (e.g. the Compacta series) is transferred to the push-pull chain via the drive housing.

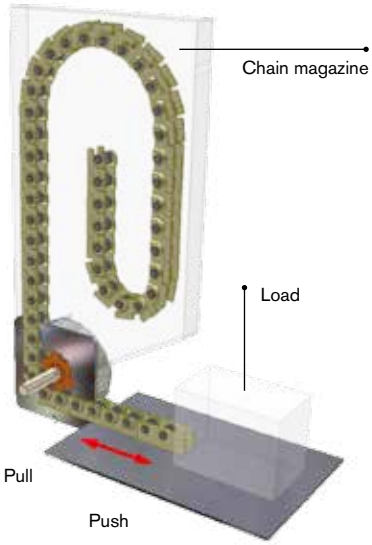
Flexible energy release.

A drive with a special profile.

The push-pull chains of the LinearChain series consist of specially shaped mechanical links that can move large loads by means of traction and thrust (pulling and pushing). Thanks to their special profile, the links continuously interlock, whereby the push-pull chain can be coiled in one direction and form a rigid unit in the other.

The transmission of traction and thrust forces of from a few kilograms to several tonnes takes place with low backlash and high positioning accuracy, whereby even large stroke lengths can be mastered. For this purpose, the chain can also be safeguarded against buckling even in profile guides. The parallel coupling of several chains is also possible if the desired thrust loads, thrust lengths or spatial constrains demand this. As a result, synchronization is achieved mechanically without the need for any complicated electronic regulation.

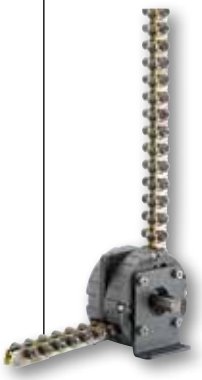
The chain can be stored spirally in the magazine – in the smallest of spaces – so that only little space is required to bridge long transport distances. The LinearChain is thus an interesting alternative to conventional systems (such as gear racks, winches, hydraulic and pneumatic cylinders) and is often the only possible solution when space is lacking. As a result of their versatility, the push-pull chains of the LinearChain series are used in numerous sectors, e.g. in handling and warehousing systems, mechanical engineering and in the wood-processing industry.



Spiral storage of the chain in a magazine in effect allows the chain to roll out.

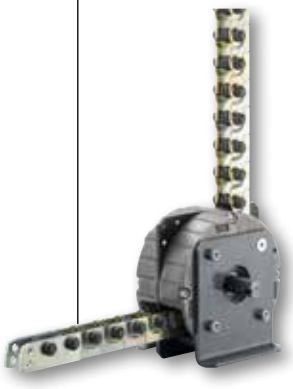
LinearChain with a pitch of 25

- Thrust of up to 3,000 N



LinearChain with a pitch of 40

- Thrust of up to 12,000 N



LinearChain with a pitch of 60

- Thrust of up to 35,000 N

Application examples

Industrial furnaces

The insertion and removal of charges for heat treatment take place with the help of a LinearChain push-pull chain system. This permits retention of the vacuum in the furnace when changing chambers.

Handling and warehousing systems

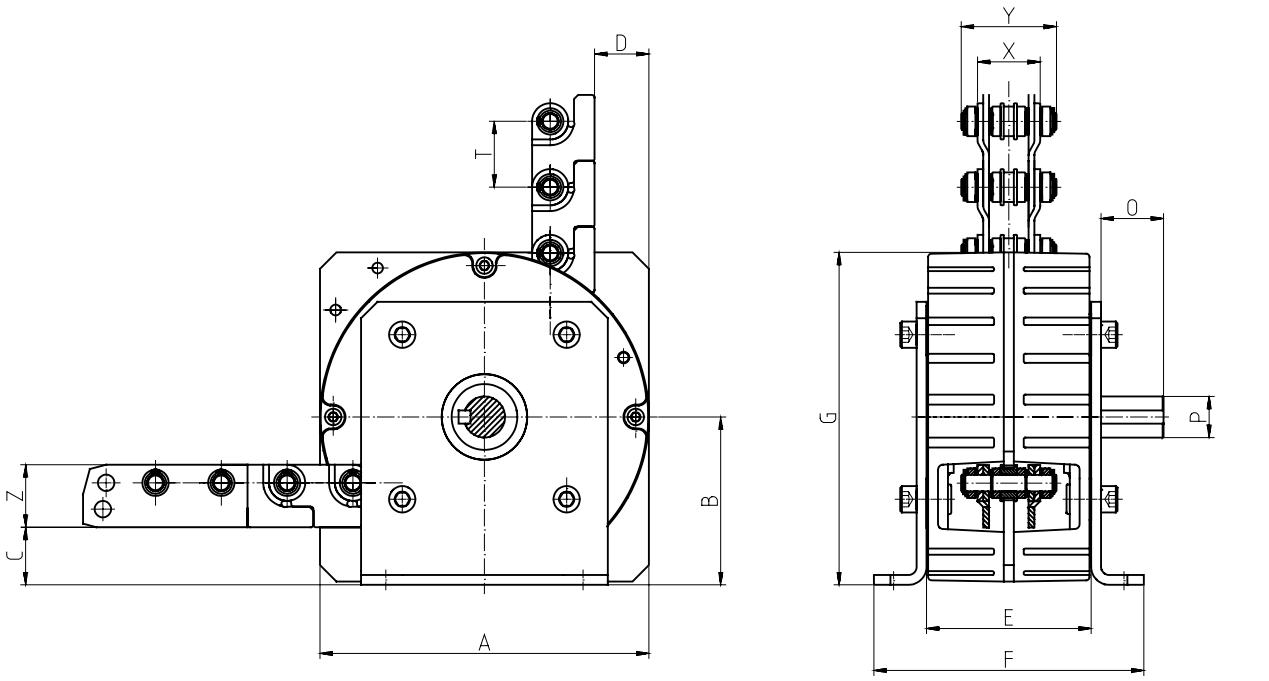
A push-pull LinearChain, driven by a Compacta slip-on geared motor, is used as a drive unit for the elevating platform on automated guided vehicles (AGVs).

The "Container Mover"

The Container Mover shunts containers from railway wagons to truck trailers or vice versa. The container can be loaded onto the train within three minutes using the same truck that transported the container – without the help of a crane or fork-lift.

Dimensions

METRIC

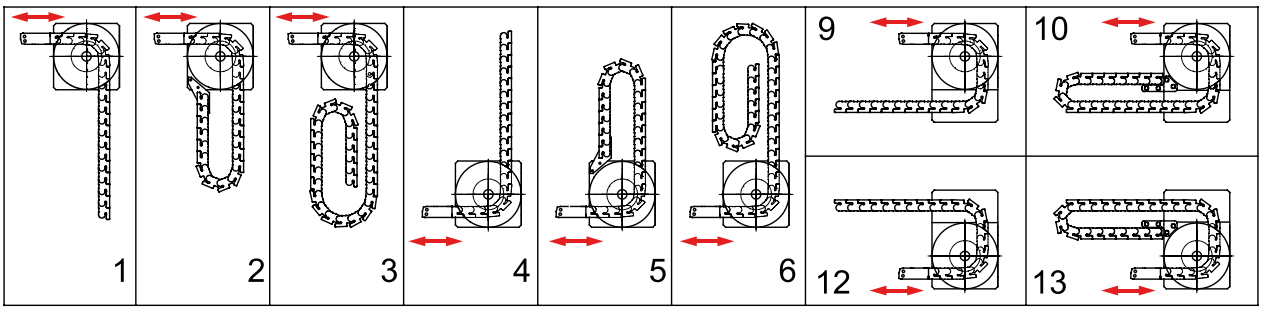


LinearChain

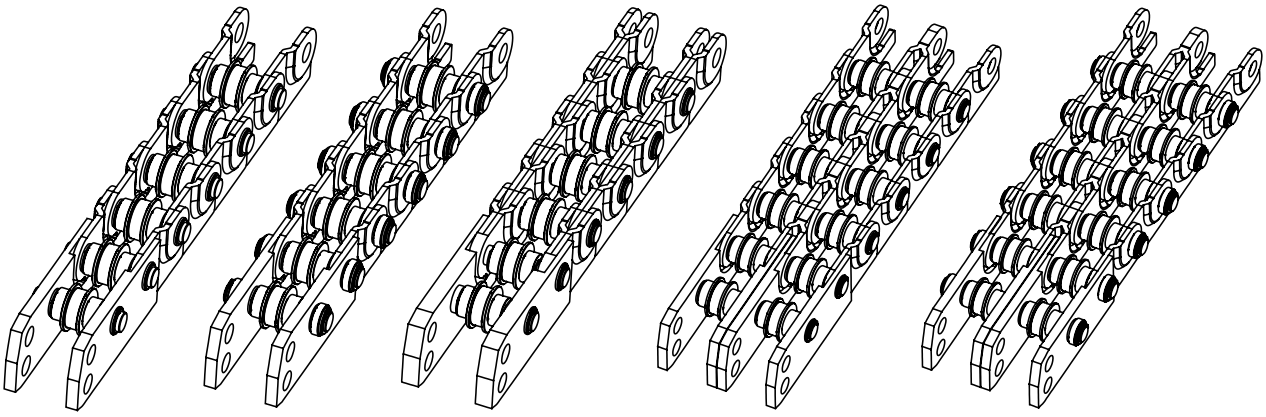
Pitch	Type	Drive housing							Shaft		Chain		
T		A	B	C	D	E	F	G	O	P	X	Y	Z
25	PS	140	72	22.8	20.8	75	139	142	35	Ø20	23	27	23.5
	PSG	140	72	22.8	20.8	75	139	142	35	Ø20	23	48	23.5
40	PS	200	102	35	33	100	164	202	39	Ø25	38	46	38
	PSG	200	102	35	33	100	164	202	39	Ø25	38	58	38
	PSR	200	102	35	33	100	164	202	39	Ø25	51	58	38
60	PS	270	137	38	36	120	204	272	72	Ø45	58	70	57
	PSG	270	137	38	36	120	204	272	72	Ø45	58	82	57
	PSR	270	137	38	36	120	204	272	72	Ø45	75	82	57
	PD	270	137	38	36	178	262	272	72	Ø45	116	125	57
	PDG	270	137	38	36	178	262	272	72	Ø45	116	140	57

All specifications in mm.

Examples of chain guidance and storage



Chain types

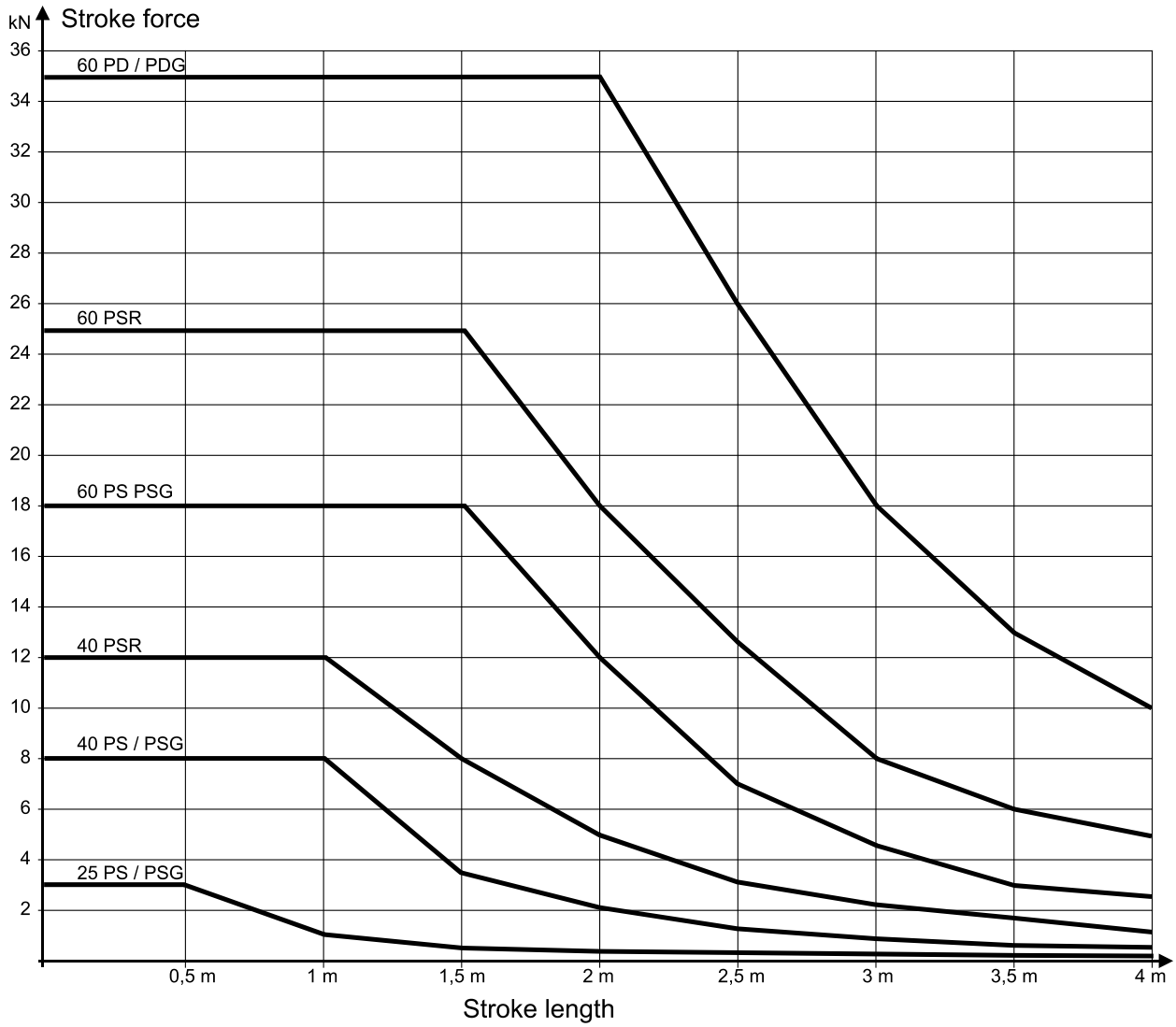


The dimensions of the LinearChain differ in pitch – 25 mm, 40 mm or 60 mm. Modifying the individual sizes results in a fine gradation of the stroke force.

PS Single unguided basic version
PSG Guided version for longer stroke lengths with constant stroke force
PSR Reinforced version with paired chain link plates for larger stroke forces
PD Double version for almost double the stroke force
PDG Double version, guided, for longer stroke lengths with constant stroke force

Horizontal compressive forces dependent on stroke lengths

For unguided LinearChain systems, guided load



Planetary gears.

Customized for your application.

Planetary gears and more – your application is our priority.

Project development

We develop the optimum technical and cost-effective solution for the defined application based on your specifications.

Application expertise

We have already developed and produced countless drive solutions – from worm, spur or planetary gears to complex drive systems – for the most varied of applications.

System competence

You profit from our great wealth of experience gained from the technical implementation of countless drive solutions.

Nothing can replace competence and experience – Framo Morat has been at home in the world of drive technology for a hundred years. So it's not surprising that our drive solutions impress through their excellent technical performance. The secret of our quality? We develop and produce all the components ourselves, from the individual gear to the complete drive solution. In addition to the gear technology, we handle selection of the suitable motor and the integration of peripheral components, such as positioning and path measurement systems, brakes, ventilators or bus interfaces. We thus ensure integration of the drive in your entire system.

Framo Morat – your planetary gear developer with systems competence:

- Individual choice of material, diameter, mounting, tooth width, etc. for each planetary stage
- Perfect linkage at every interface
- Integration of the drive in your complete system, taking into account mechanics, electronics and control technology

Quality assurance

We ensure reproducible results at the highest quality level by means of inline measurements and visual inspections.

Depth of production

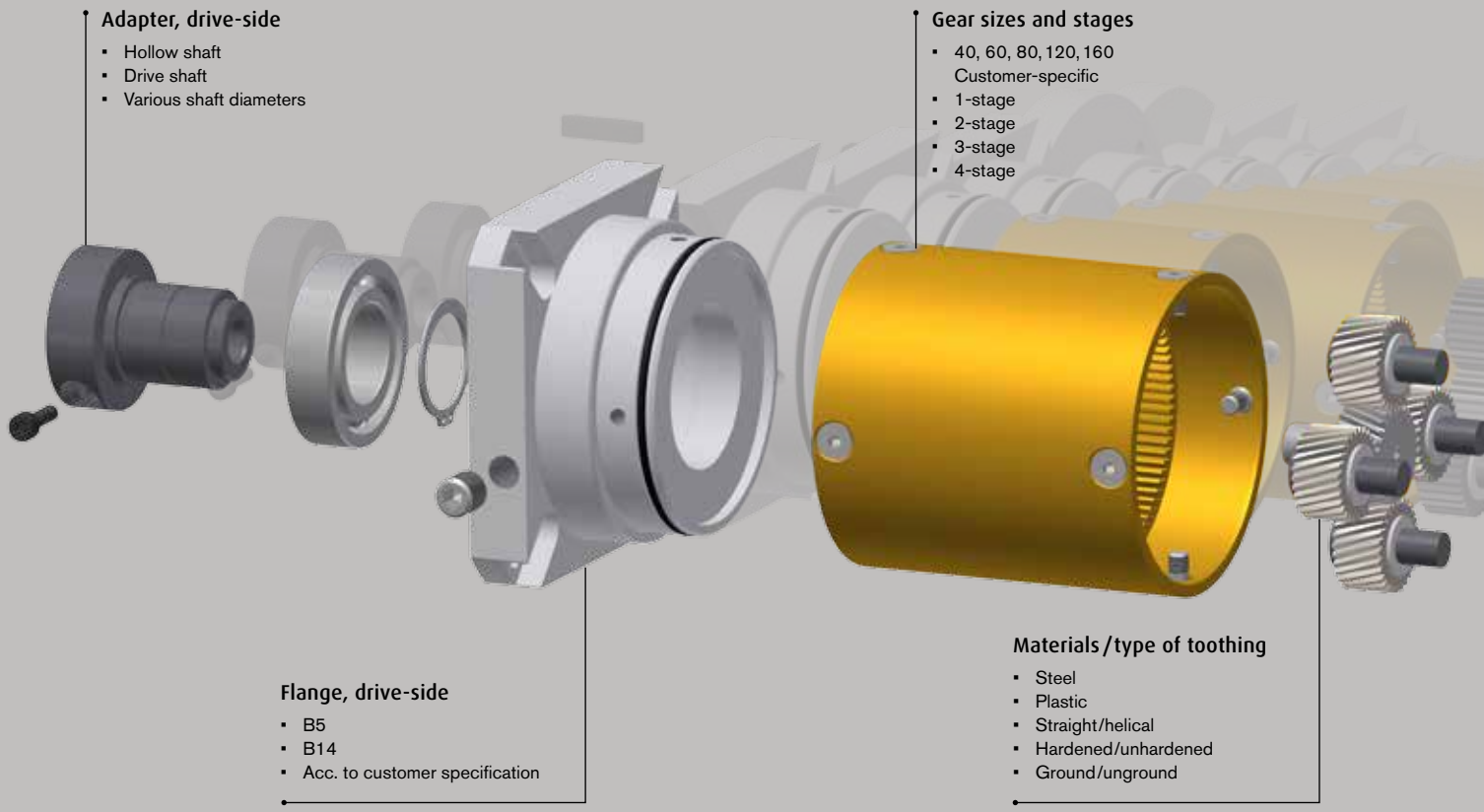
Turning, milling, toothing, squaring up, countersinking, hardening, grinding – we produce all components, from the individual gearwheel, through the gears, to the complete drive, in our own workshops.

Serial production

After successful quality inspections, we mount the components at separate assembly islands – ready for delivery.

Planetary gear modules.

The rapid path to your drive.



Configuration example:

Hollow shaft with centering bush	+	Flange: B14	+	Gear size 60, 2-stage	+	1st stage: plastic / helical 2nd stage: steel / straight	+	

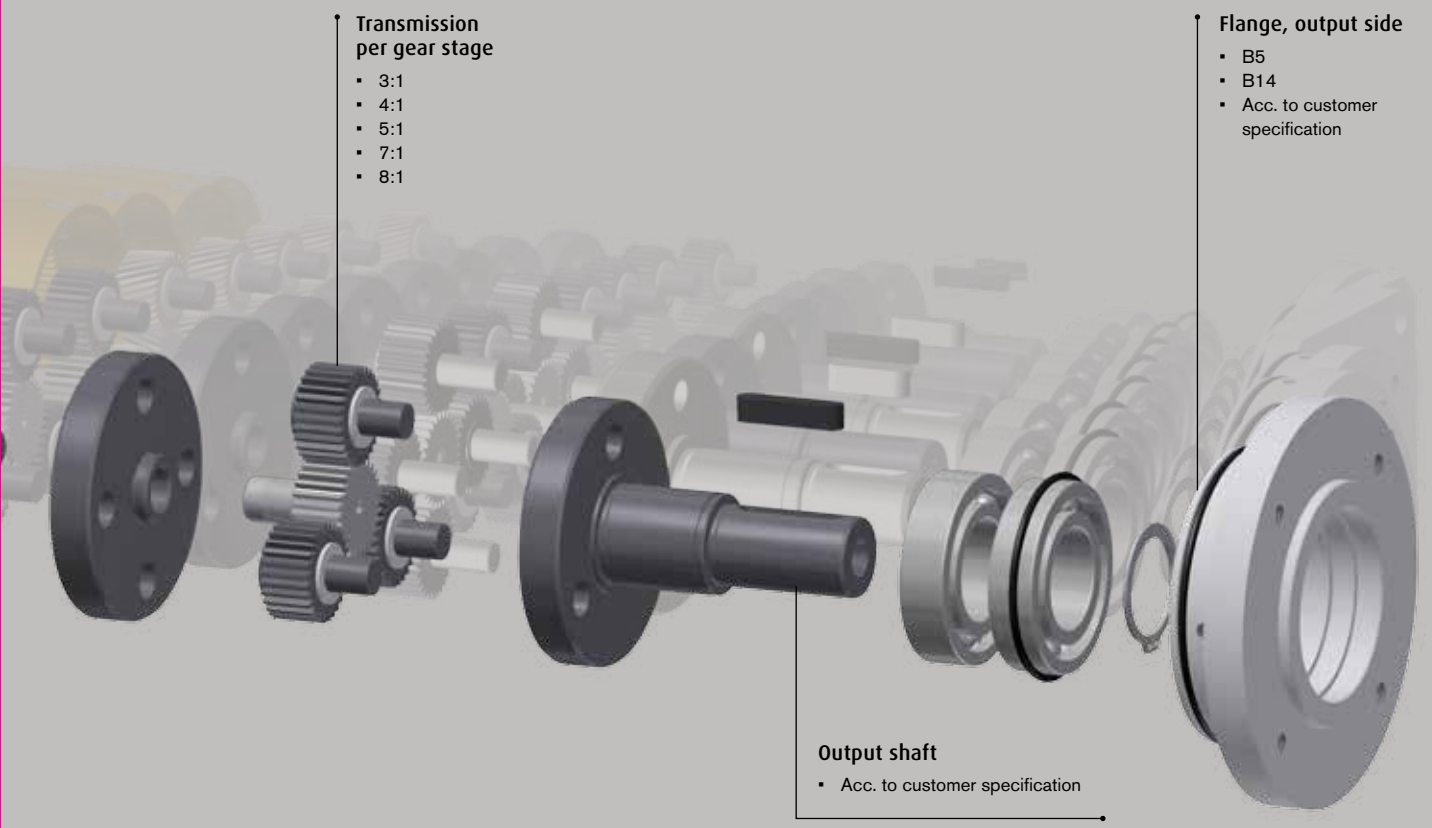
Variety according to customer specifications

Each planetary gear from Framo Morat is precisely designed for the requirements of the particular application. As a result of intensive coordination during a very early phase of the project we achieve flawless technical results and prevent time- and cost-intensive corrective cycles during the development process. This leads to a smooth market introduction with high availability in the field.

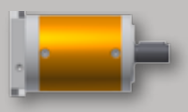
It is not necessary to re-invent every gear again in order to achieve this goal. For numerous solutions we can combine existing modules from our comprehensive modular system with components specially redesigned for the task.

Framo Morat – our planetary gears are designed according to the following parameters:

- Torque
- Precision
- Speed and dynamism
- Noise generation
- Type of teeth (straight / helical)
- Adaptation to existing interfaces
- Corrosion resistance / enclosure rating
- Existing space / operating temperature



Transmission 1:20 + Wavelength: 66 mm Diameter: 12 mm + Customer-specific output flange =



Basic modular elements – preconfigured for you:

Diameter Gearbox (mm)		40	60	80	120	160
Nominal output torque (Nm)		8.5 – 11	15 – 21	37 – 48	100 – 130	200 – 250
Acceleration torque (Nm)		17 – 22	30 – 42	74 – 96	200 – 260	400 – 500
Emergency stop torque (Nm)		25.5 – 33	45 – 63	111 – 144	300 – 390	600 – 750
Transmission	1-st.	4, 5, 7, 8	3, 4, 5, 7, 8	3, 4, 5, 7, 8	3, 4, 5, 7, 8	3, 4, 5, 7, 8
	2-st.	12, 16, 20, 25, 32, 40, 49, 64	12, 15, 16, 20, 25, 32, 40, 49, 64	12, 15, 16, 20, 25, 32, 40, 49, 64	12, 15, 16, 20, 25, 32, 40, 49, 64	12, 15, 16, 20, 25, 32, 40, 49, 64
	3-st.	80, 100, 125, 160, 200, 256, 512	60, 80, 100, 125, 160, 200, 256, 512	60, 80, 100, 125, 160, 200, 256, 512	60, 80, 100, 125, 160, 200, 256, 512	60, 80, 100, 125, 160, 200, 256, 512
Backlash (arcmin)	1-st.	<=20	<=12	<=9	<=10	<=10
	2-st.	<=24	<=15	<=12	<=15	<=15
	3-st.	<=30	<=20	<=15	<=20	<=20

Planetary gears in use.

The driving force in many sectors.

"Your idea – our drive": our drive solutions have set standards for numerous applications and sectors according to this motto. Our customers appreciate us as experienced development partners who, at the end of the process, deliver a technically and economically convincing result. Many innovative special systems with a planetary gear at their core have already been created in this way – for example our watertight, corrosion-resistant tubular motor for underwater unwinding systems in swimming pools. You benefit from this wealth of experience. Because no application is so special that we would not have the right solution – whether a complete customer-specific new development or planetary gears produced from our modular system, used for propulsion in automation technology, machine construction or the packaging industry.

Customer-specific variants

Our development team for customer-specific solutions accompanies each project from the specification to serial production.

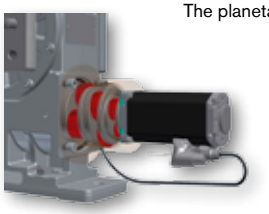
The modular principle

Planetary gear solutions using the modular system are technically and economically efficient. We support you during individual configuration.

Application examples

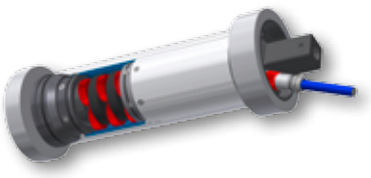
Tracking drive for mirror reflectors

This drive, developed by Framo Morat, is used to enable the tracking of mirror reflectors. During its development, great attention was paid to achieving minimum backlash and maximum torque. The drive achieves a maximum output torque of 5,000 Nm and consists of a servomotor, a 3-stage planetary gear, a worm gear, a position tracking system and two adapter plates.
A single drive moves a total mirror area of 330 m². One special aspect of this development was the adapted size of the various planetary gear stages. The planetary gears achieve a translation of 729:1.



Underwater unwinding systems for swimming pools

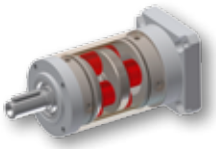
Unwinding systems for pool covers are installed underwater and must therefore be absolutely watertight for years to come. For this demanding application, Framo Morat developed a special tubular motor that is doubly sealed using AQUASEAL technology and thus offers long-term corrosion resistance and is maintenance-free. The integrated 3-stage planetary gears consist of differing materials and supply a transmission of 1000:1 with an output torque of 300 Nm.



Application examples

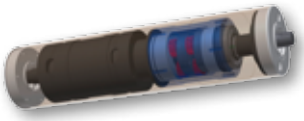
Automation & handling

Planetary gears handle numerous tasks during assembly. In this application example, the 2-stage planetary gears with a backlash of 14 arcmin and transmission of 49:1 are responsible for the removal of parts in automatic plastic injection molding machines.



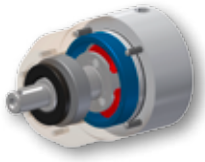
Conveyor systems

Planetary gears are an indispensable element in drum motors for conveyor belts and rollers. The selection of 2-stage planetary gears made of plastic was mainly influenced by the need to keep noise generation as low as possible. The conveyors are driven forward by means of the friction between the drum motor and the belt.



Machine construction

Planetary gears that are used in machine construction must meet maximum demands regarding precision and durability. Three single-stage planetary gears with a transmission of 7:1 directly connected to three hydraulic motors turn the rollers in sheet-metal bending machines.



Customer-specific drives.

Your idea – Our drive.

Framo Morat – your development partner for drive systems

Specifications

The customer's idea is the start of every new drive solution: it defines the parameters used to design the drive.

Development

We develop a technically and economically sophisticated solution for the defined application, based on the customer specification.

Design

Our experts work out the detailed design with the help of state-of-the-art CAD and calculation software for optimizing gear parts.

Prototypes

Together with the customer, we test prototypes to ensure that our suggested solution offers all the desired properties.

Framo Morat is not only well-known for its comprehensive production competence; our customers also appreciate us as an experienced development partner for innovative drive solutions. Our development team for customer-specific drives supervises each project from the specification to serial production, and ensures that this results in a technically and economically impressive product.

What is so fascinating about customer-specific projects is that no two applications are the same. Thanks to our comprehensive expertise in drive systems we do not have to reinvent the wheel every time. Our customers profit from this wealth of knowledge and experience because they can rely on us mastering the most demanding of tasks.

In this way, countless drive solutions have already been created – from worm, spur or planetary gears to complex drive systems. We are proud that our solutions have been able to contribute towards the success of many prominent customers and we would be pleased to do the same for you!

Framo Morat – your development partner for drive systems

- We have vast experience from numerous customer projects.
- We supervise your project from the specification to the application.
- You receive a complete solution, optimized for function and cost, from a single source.
- We guarantee the outstanding quality of all our gears and components.

Testing

Compliance with the specifications is tested in detail. Comprehensive tests simulate the loads found in the field.

Production

Our great depth of production and our complete quality assurance system guarantee extremely high-quality results on competitive terms.

Assembly

Following the successful quality inspections of all components the drive units are entirely pre-assembled and delivered to the customer ready for installation.

Application

Framo Morat has already developed and produced numerous drive solutions, from worm, spur or planetary gears to complex drive systems.

Customized drives.

Our response to your special requirements.

Standard drives are not always suitable for a particular application. Insufficient space is available, for example, or the performance data (such as rotary speed, torque, stroke speed or stroke force) are inappropriate. Sometimes the requirements are also so complex that a suitable drive practically has to be designed and constructed from scratch. Framo Morat offers customer-specific drives for such cases.

Together with the customer, we develop detailed specifications that form the basis for product development. In addition to the purely technical performance data, they take into account economic criteria such as efficient production and material procurement, as well as the availability of services and user-friendly maintenance and repair.

Each development project involves several project phases (milestones). Continuously updated scheduling and budget planning ensure a high level of project transparency at all times. Results are discussed with the customer on achievement of each milestone, and the next development step is approved. We thus ensure that the result corresponds to what the customer wanted in all regards.

Application examples

Stair lift

The stair lift drive developed by Framo Morat actually consists of a total of three drives: the main drive for the lift's upward and downward movements, one for swiveling the seat (making it easy to get on and off), and a drive for tilt correction so that the seating position is always horizontal despite differing gradients within a stair section.

Two-component mixer

This drive is used in dental practices. At the touch of a button it automatically doses and mixes two viscous, paste-like substances in the correct proportion and in the desired quantity. The challenge posed by this application consisted in designing the drive for an upgraded model – a quieter and smaller drive but twice as powerful.

Application examples

Adjustment unit for tractors

The adjustment unit evaluates the signals of an electronic control device on the tractor and adjusts the desired transmission via a drive shaft. Electronics, electric motor, planetary gears, bevel gears and encoders form a compact unit. The encoder provides a high number of pulses per rotation and shows the position of the output shaft via its own reference output. Integrated electronics evaluate the signals and provide feedback to the tractor.

The “Solar Tracker”

This two-axle tracking system (Solar Tracker) is used to increase the effectiveness of photovoltaic plants. The Solar Tracker aligns the solar module to the sun horizontally and vertically. Framo Morat developed special drive systems for the precise adjustment of azimuth and elevation (± 2°) in which all components – from the drive housing to the cable – have been specially designed for use in harsh outdoor environments. A positioning system developed in-house allows the control of a complete row of trackers with just one drive.

Worm gear units for motorized motion rails

Two worm gear units have been built into a shoulder motion rail: one raises and lowers the patient’s arm; the other carries out a rotational movement of the shoulder. This generates a movement corresponding to the natural pattern for the shoulder. Maximum accuracy is required for post-operative movement of the shoulder, which is moved over the top dead center. Too great a gear backlash can be painful for the patient so our gears are produced with a total play of less than 1.5°.

Application examples

Tracking of Fresnel collectors

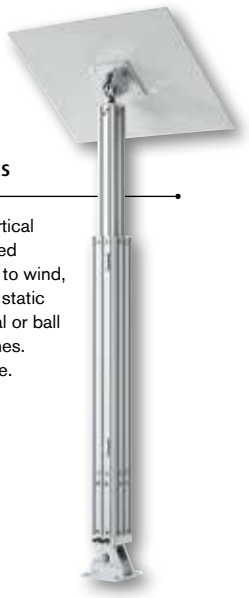
The reflectors of a solar thermal power station must make several thousand tracking movements a day for optimum energy yield. Drives must therefore meet maximum demands for robustness and durability, resist the high temperatures and fluctuating dampness, and withstand dust and sandstorms in desert regions. The adjustment drives from Framo Morat thus have a very high enclosure rating and are only made of high-quality, corrosion-resistant materials.

Façade adjustment systems

Façades are constantly exposed to wind and weather. Drives for adjusting extensive façade elements and sunblinds must therefore be highly resistant and durable. Framo Morat offers rack and pinion drives with a very high enclosure rating for this application. Their components are exclusively made of corrosion-resistant materials. The drives are not just reliable – they also look good, and are thus suitable for use in architecturally demanding façades. A total of 1,320 rack and pinion drives from Framo Morat are used to adjust the sunblinds of the award-winning, 270-meter-long “Kraanspoor” office building in Amsterdam’s port.

Adjusting the elevation of photovoltaic plants

We have developed special linear actuators for the vertical tracking of photovoltaic modules. They are characterized by low maintenance requirements and high resistance to wind, dampness and temperature fluctuations (dynamic and static loads of up to 50 and 210 kN respectively). Trapezoidal or ball screws are used with or without integrated limit switches. A variety of transmissions and motors are also available.



Application examples

The "Caravan Mover"

This caravan maneuvering system is equipped with a spindle drive that swivels the Caravan Mover in front of the vehicle's tires when required. The power of the spindle is critical in providing the necessary contact pressure. The maneuvering system is controlled by remote control, allowing the trailer to be maneuvered into tight parking spaces without a towing vehicle. Two of these maneuvering systems are used per caravan.

Brewing group for fully automatic coffee machine

The motor-driven brewing group, consisting of a gear frame and brewing head, is used in professional automatic coffee machines for the catering sector. The ground coffee is transferred from the grinder to the brewing compartment and compressed. Hot water is then fed in and mixed with the coffee. When the brewing process is over, the brewing unit is placed in the release position. The coffee is released via movement of the outlet piston, after which the brewing group returns to its starting position.

The "Stair Climber"

A three-stage spur gear was developed for a stair-climbing aid. The Stair Climber can easily be attached to a conventional wheelchair so that persons weighing up to 160 kg can be transported up and down stairs. Particular attention was given to the quality of the gear components because of the extremely high demands made of the drive regarding performance and quiet running. Framo Morat won the contract to supply the drives because of the high quality we were able to guarantee.

Notes: