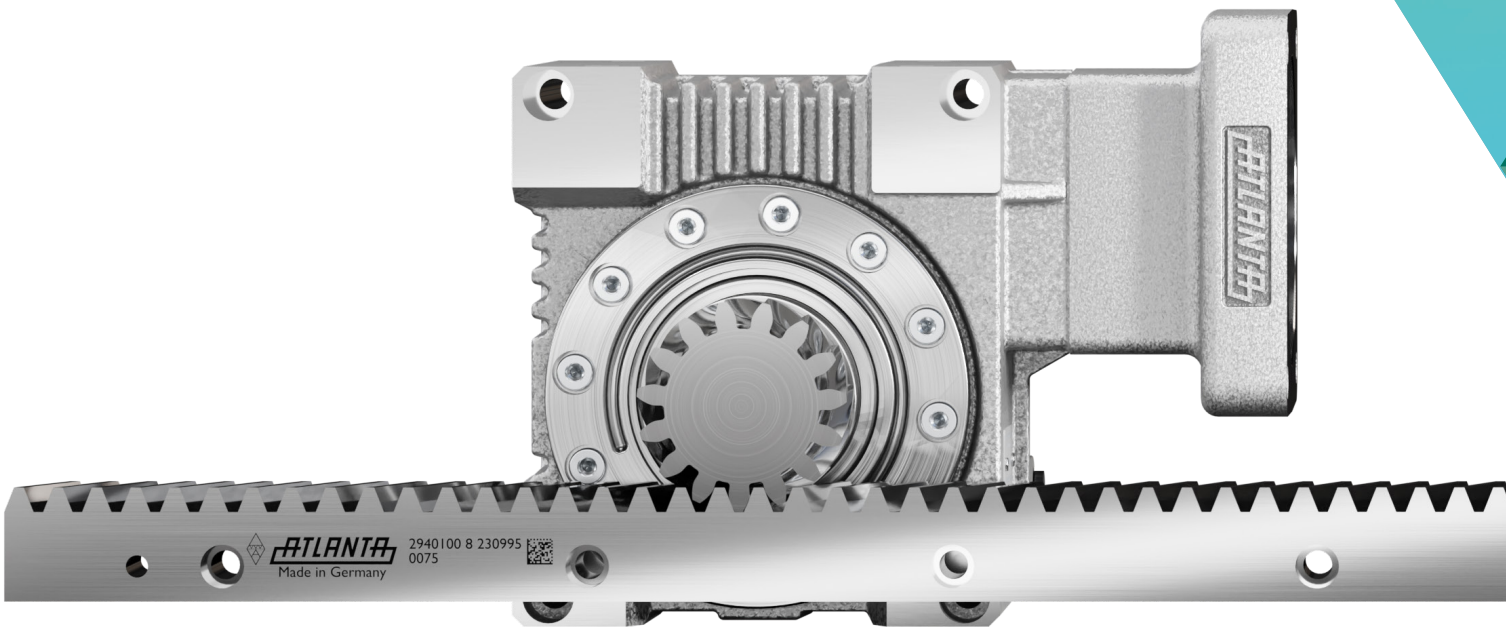


Servo Drive Systems

ATLANTA

PREMIUM

QUALITY

SINCE 1929

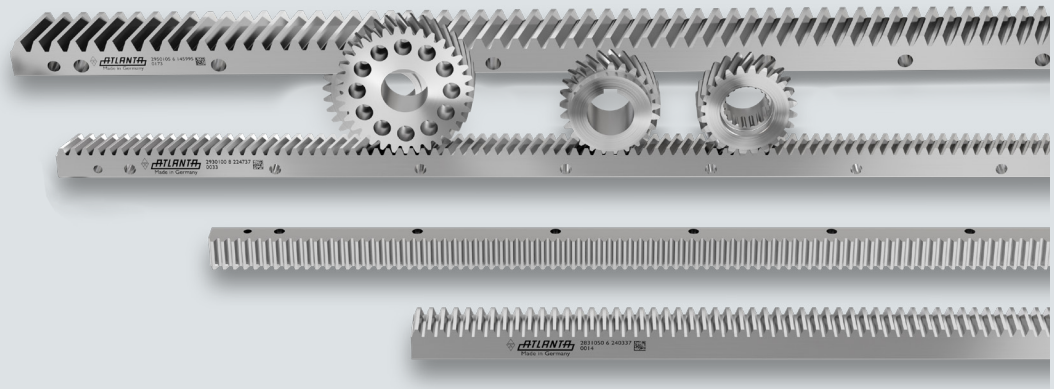
Innovative Drive Systems
for the Highest Demands

As a medium-sized family company from Baden-Württemberg, we have been convincing customers with the development, design and manufacture of high-quality drive systems for almost 100 years. As an established manufacturer of drive technology, we produce excellent solutions for a wide range of applications worldwide.

Our high-quality, low-backlash gearboxes, racks, pinions and lifting drives are characterized by their precision and durability. Through constant further development, we remain flexible in order to react to complex challenges in drive technology.

In addition to our extensive catalog range, we also offer tailor-made solutions in the area of special gears and special individual parts. Our experienced team of engineers and professionals work closely with our customers to meet individual requirements.

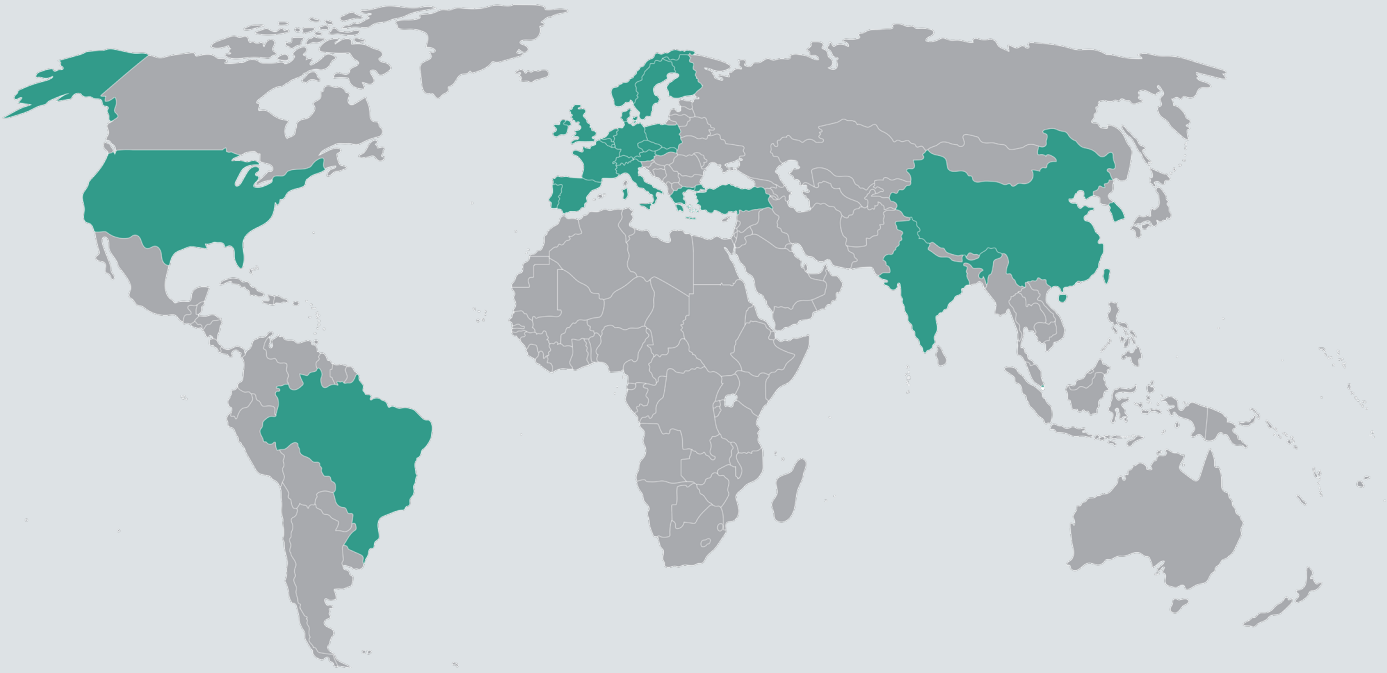
Trust in our many years of experience and our commitment to quality. We pride ourselves on supporting our customers with reliable drive systems that meet the highest standards.



Qualified Staff And Modern Production Technologies Are The Guarantee For Our Success

The consistent high quality of all ATLANTA products has always been and will always be the driving force behind our work. The ISO 9001:2015 certification is the basis for the high standard of ATLANTA quality assurance, both in the standard and customer-specific solutions. With our qualified staff and modern production facilities, we guarantee very high manufacturing standards and the supply of premium quality drive systems.

The durability and reliability of our drive systems are highly valued by our longstanding customers worldwide. With a continuous improvement process for all our products, we ensure that you can always trust in the future "**Made by ATLANTA**".



ATLANTA Worldwide - Boundless Contact When It Comes To Drive Technology

With our subsidiary companies in the USA, China and France, as well as 23 agencies in all industrialized countries of the world, we are present for our customers worldwide. Project-related advice and short delivery times make us a flexible and reliable partner in the world of drive technology.

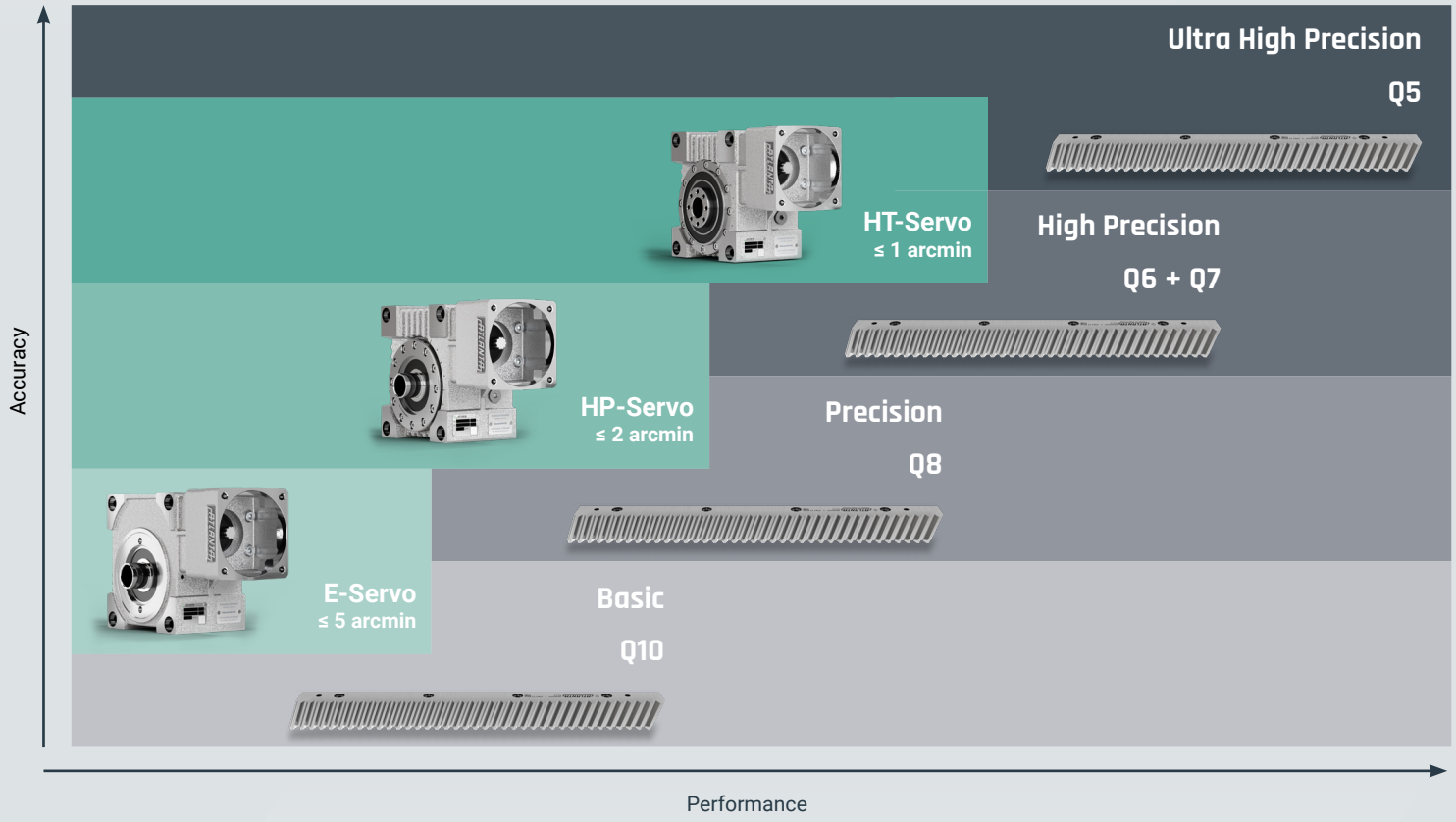
Industry Specific Drive Solutions

Discover the perfect drive solution for your industry with ATLANTA drive systems! Every industry brings its own challenges and requirements. This is exactly why we offer you our industry-specific drive solutions based on the proven modular principle.

From high-quality, low-backlash servo-worm gearboxes to high-precision racks and pinions as well as efficient lubrication systems, we cover the entire spectrum of drive components. And the best thing about it: Our products are individually tailored to your needs. You get the tailor-made solution that fits your machine perfectly.

Our many years of experience and expertise in the industry have made us a reliable partner for thousands of companies worldwide. With our first-class products, you can be sure of optimal performance and a long service life of your machines.

Trust In The Well-Known Premium Quality From ATLANTA!



Robotics

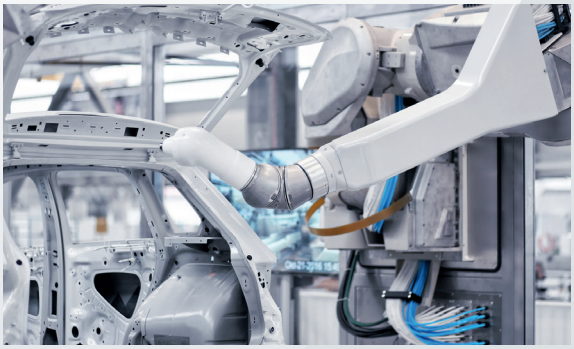


Foto: Dürr AG

Material Handling

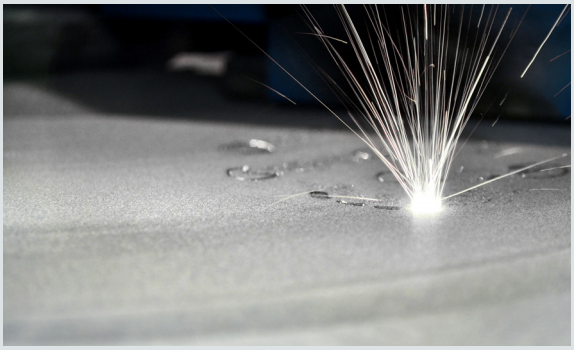
Foto: Vanslichen Lineairtechniek Belgium

Automation

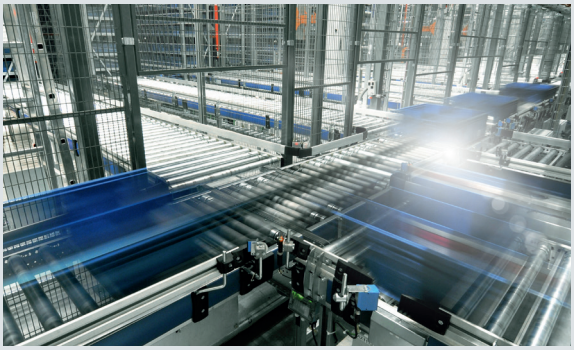
Machine Tools

Packaging Machinery

Additive Manufacturing



Conveyor Technology



Measuring Technology

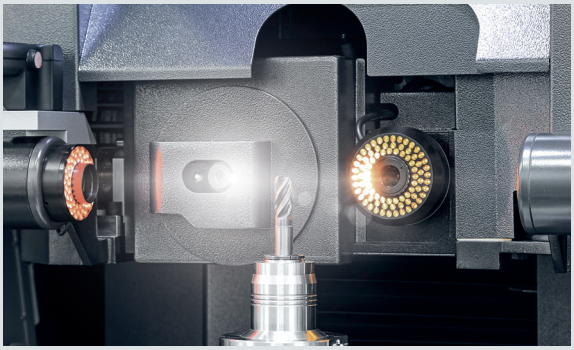


Foto: E. ZOLLER GmbH & Co. KG

ATLANTA Service Tool

Smart Drive Technology of Tomorrow

Start with ATLANTA and the world's first digital rack to move into the smart drive technology of tomorrow. The web-based tool, which requires no installation, can be used with all devices to access the technical product data of ATLANTA Racks at any time, as well as other applications such as Rack Mapping or requesting an identical Replacement Rack for your machine.

Also, the Motor-Match function gives you a selection of the individual components that are required for the motor connection of an ATLANTA Servo-Worm Gearbox.

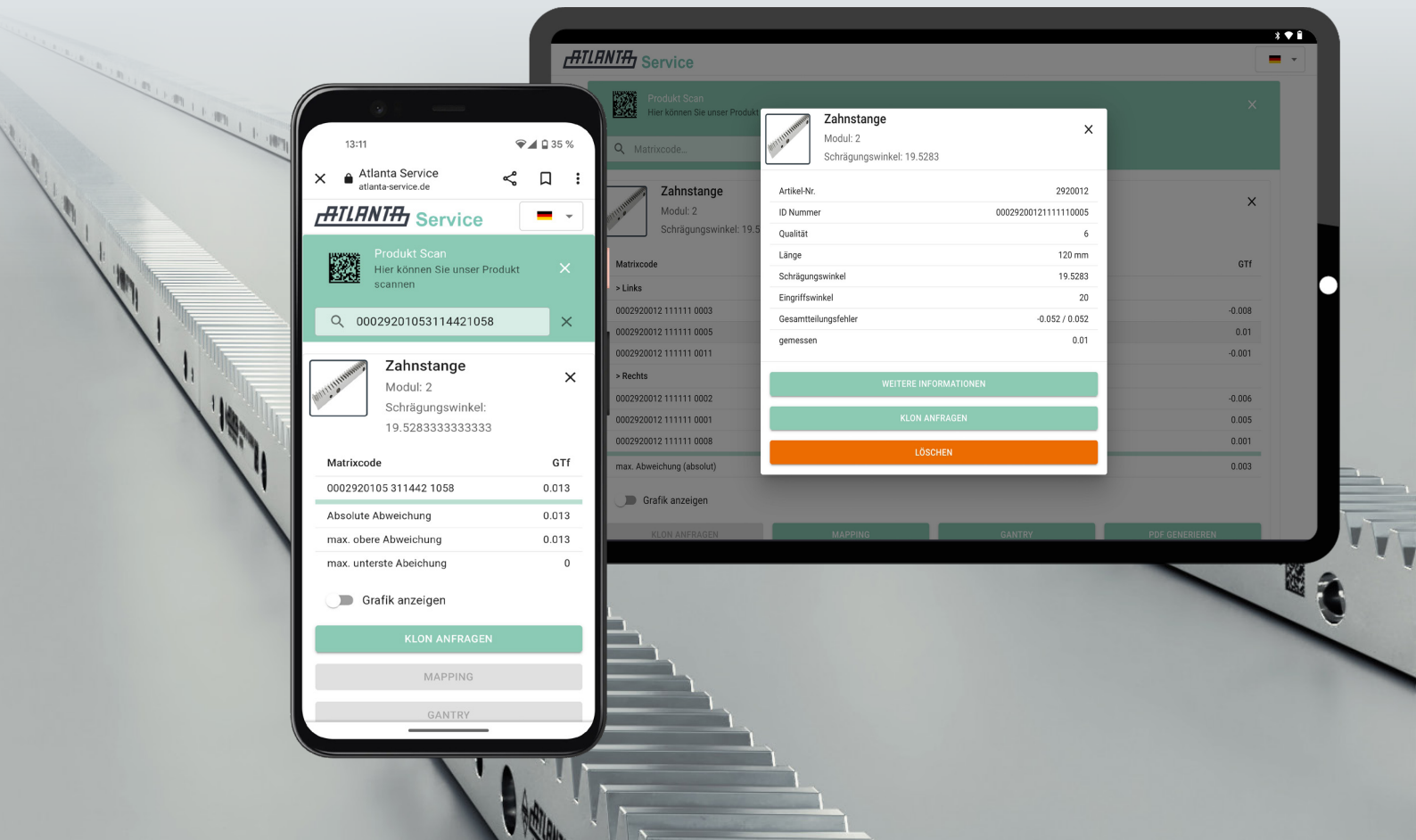
Product Scan
Search of product specific information directly from the ATLANTA Cloud

Mapping
Determine the optimal assembly sequence of racks within a rack series

Digital Twin
Request an identical replacement rack within a rack series

Gantry
Determine the optimum assembly sequence of racks within a parallel rack series

For more information on the ATLANTA Service Tool, please go visit: **www.atlanta-service.com**

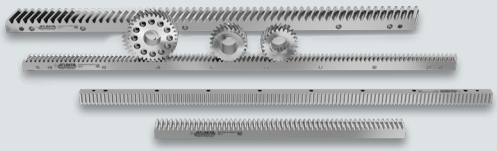


Product Range

Servo-Worm Gearboxes

- Three Variations (High Torque, High Performance and Economy)
- Backlash from ≤ 1 to 5 arc-minutes
- Maximum Output Torque up to 2,200 Nm
- 6 Sizes (center distance 32, 50, 63, 80, 100 and 125 mm)
- 8 Ratios, from 4.75 up to 52:1

Rack & Pinions



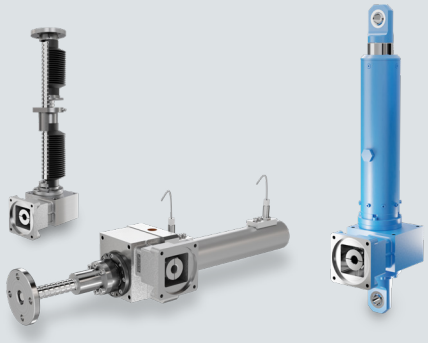
- Four Classes of Racks (UHPR, HPR, PR and BR)
- Gearing Qualities from 5 to 10
- Total Pitch Errors down to ≤ 0.022 mm per meter
- Tooth Thickness Tolerances to 15 µm
- Feed Forces up to 409 kN

Automatic Lubrication Systems

- Four different electronic lubrication systems
- For single and multi-point lubrication
- Felt lubrication pinion for an even supply of lubricant
- Individually adjustable emptying time up to 36 months
- Up to 70 bar (1,015 psi) delivery pressure for long supply routes

Special Gearboxes & Parts

Linear Actuators



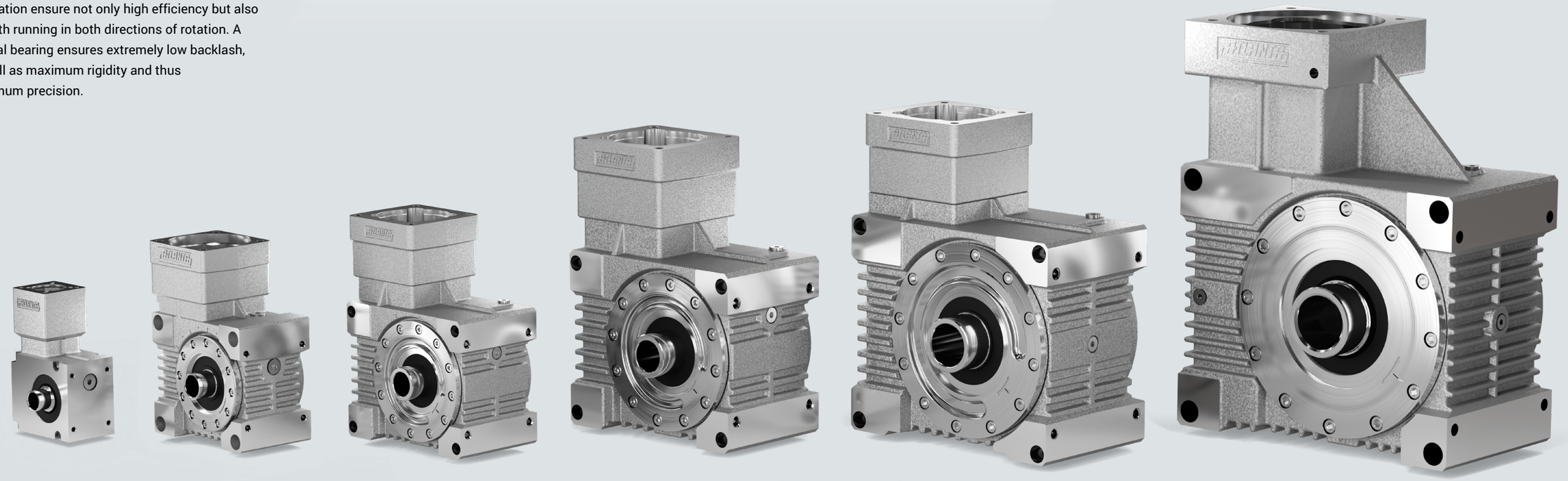
Further information can be found at:

www.atlantadrives.com

ATLANTA Servo-Worm Gearboxes

These gearboxes have been specially developed for use with DC servo motors. As high-performance worm gearboxes, they excel with their precision, strong performance and dynamics, as well as a long service life. The three series: High-Torque, High-Performance and Economy offer different accuracy levels, which are used depending on the requirements. Due to the compact design and flexibility, our servo-worm gearboxes achieve excellent performance and high torque, even in applications with a small installation space. The housing is made of light metal, which ensures optimum heat dissipation at peak performance.

Our servo-worm gearboxes are made of extremely wear-resistant materials, which do not show any changes in backlash even after years in operation. The use of ground, right-handed worms and a worm wheel made of wear-optimized special bronze in conjunction with immersion lubrication ensure not only high efficiency but also smooth running in both directions of rotation. A special bearing ensures extremely low backlash, as well as maximum rigidity and thus maximum precision.



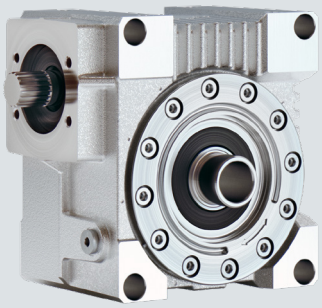
a=32mm | a=50mm | a=63mm | a=80mm | a=100mm | a=125mm

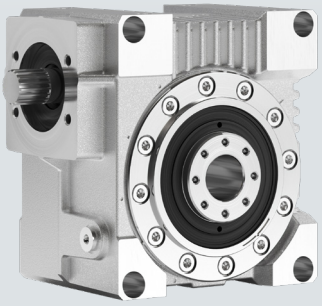
The Right Size For Every Application

Our servo-worm gearboxes are available in six different sizes, each with eight different gear ratios. Our product range of servo-worm gearboxes extends from a center distance of 32 mm (E-series) to a center distance of 125 mm (HP-series) and a ratio range of i = 4.75 to 52:1. This makes it possible to find the optimum drive system for almost all requirements and applications.

Output

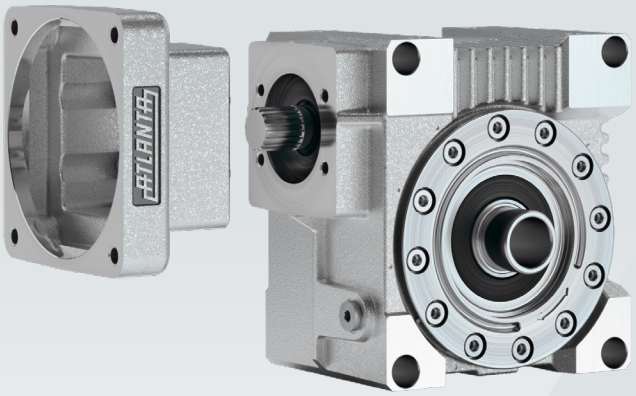
The ATLANTA servo-worm gearboxes provide a comprehensive selection of servo right-angle gearboxes with hollow shaft outputs. Whether in combination with a compression or keyed output bore, both output variants are designed to absorb high additional forces. In order to meet the demand for a frictional connection and largely torsion-free connection between the gearbox and the output shaft, especially in servo operation, our High-Torque gearbox series has, in addition to the compression connection, an interface according to DIN EN ISO 9409-1-A.





Modular Motor Flange For More Flexibility

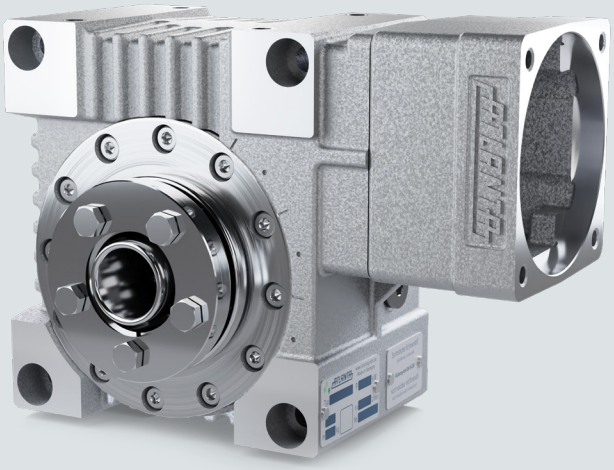
All our servo-worm gearboxes are available with an interchangeable motor flange. By using an interchangeable flange, an installed ATLANTA gearbox can be adapted with all common types of servo motors from different manufacturers. In this way, we offer you a cost-effective solution that increases the flexibility and versatility of your machine, while at the same time significantly reducing production downtime.



Input & Output Couplings

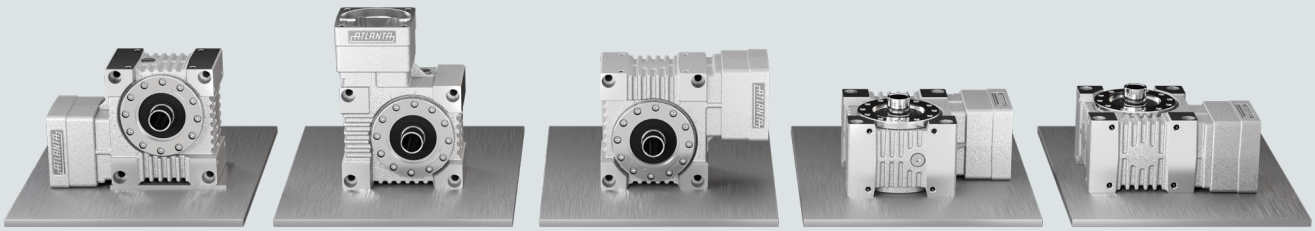
To ensure a backlash-free drive and maximum power transmission, the connection between our servo-worm gearboxes and a drive motor is made by a special input coupling, the internal teeth of which, together with the drive shaft of the gearbox, correspond to the gear hub profile analogous to DIN 5480.

When using the ATLANTA servo-worm gearboxes with compression connection outputs, you need a corresponding compression coupling for mounting the output shaft. This allows high torques to be transmitted backlash-free to the output shaft.

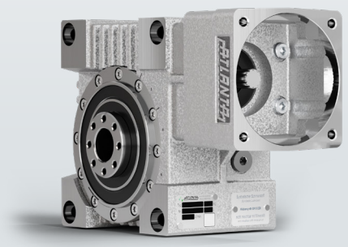


Installation In All Positions

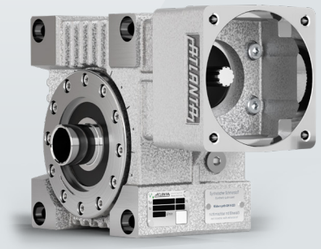
For the assembly of our worm gearboxes, 5 machined mounting surfaces with fixing and threaded holes are available for tension-free assembly in all mounting positions.



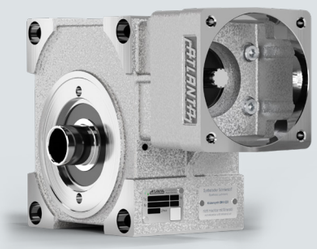
Servo-Worm Gearboxes Range Overview



HT High-Torque Servo-Worm Gearboxes

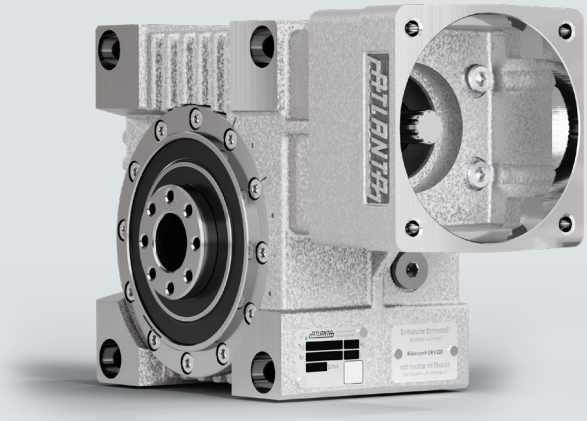


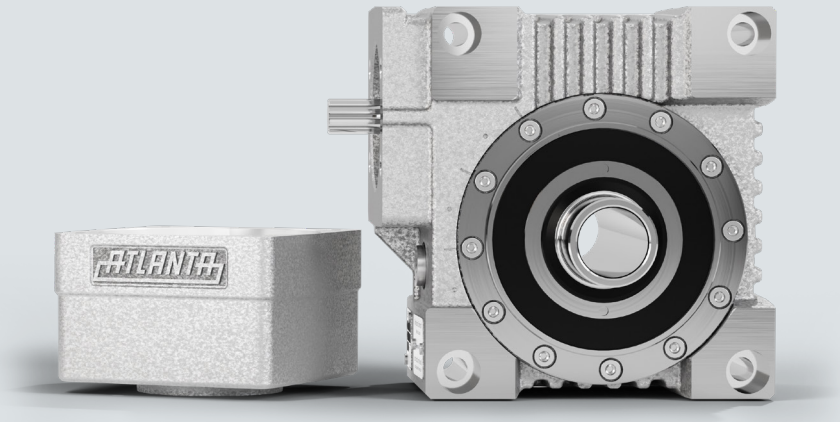
HP High-Performance Servo-Worm Gearboxes



E Economy Servo-Worm Gearboxes

Series	98 xx xxx	58 xx xxx	59 xx xxx
Center Distance (in mm)	50, 63, 80 and 100	50, 63, 80, 100 and 125	32, 50, 63, 80 and 100
Backlash Level	≤ 1 Arc-Minute	≤ 2 Arc-Minutes	≤ 5 Arc-Minutes
Available Ratios	4.75, 6.75, 9.25, 14.5, 19.5, 29, 39, 50, 52:1	4.75, 6.75, 9.25, 14.5, 19.5, 29, 39, 50, 52:1	4.75, 6.75, 9.25, 14.5, 19.5, 29, 39, 50, 52:1
Output Torque Rating	90 to 1,200 Nm	60 to 2,200 Nm	15 to 800 Nm
Maximum Radial Load Rating	Up to 17,800 N	Up to 21, 000 N	Up to 10,000 N
Torsional Rigidity	■■■■■	■■■■□	■■■■□
Hollow Output Types Available	EN ISO 9409-1-A and Clamp Connection	Key and Clamp Connection	Key and Clamp Connection
Adjustable Backlash	Yes	Yes	No
Available In ATEX Design	Yes	Yes	Yes
Available With Food Grade Oil	Yes	Yes	Yes
Motor Flange	Modular	Modular	Modular
Catalog	**Page B-11**	**Page B-23**	**Page B-37**





Center Distance a_o = 50 mm

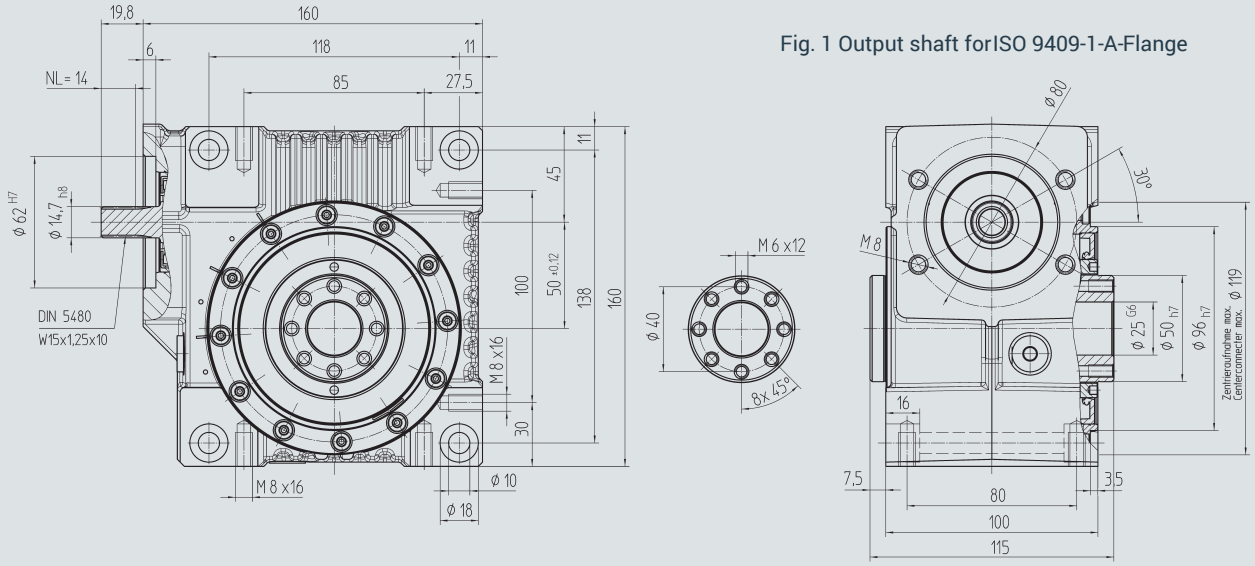


Fig. 1 Output shaft forISO 9409-1-A-Flange

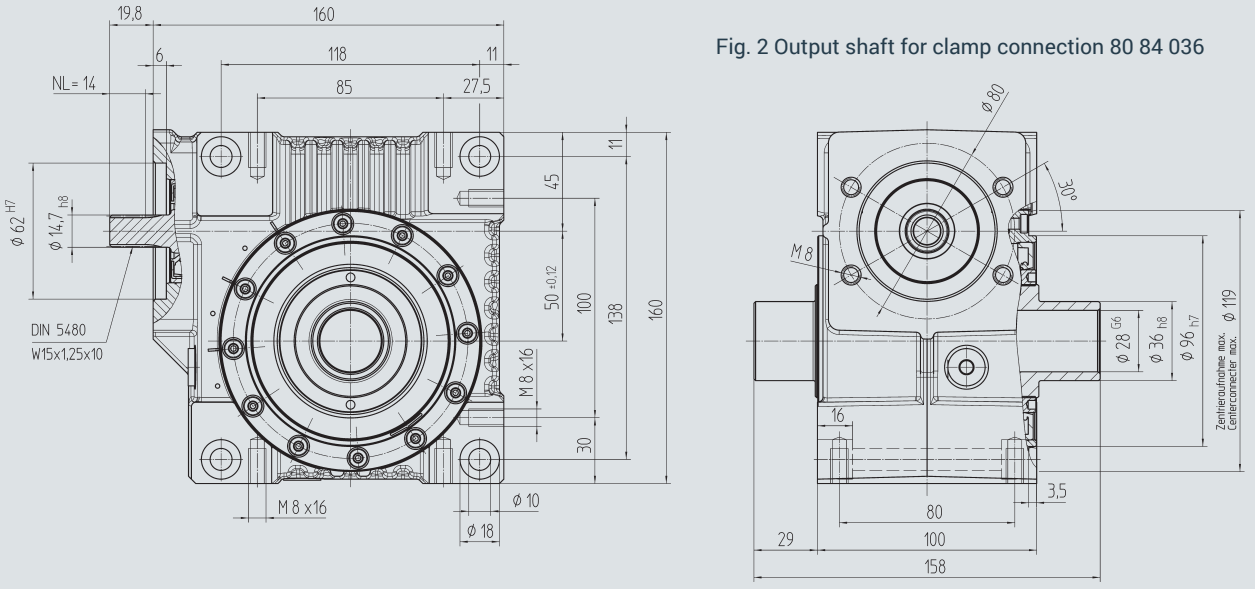


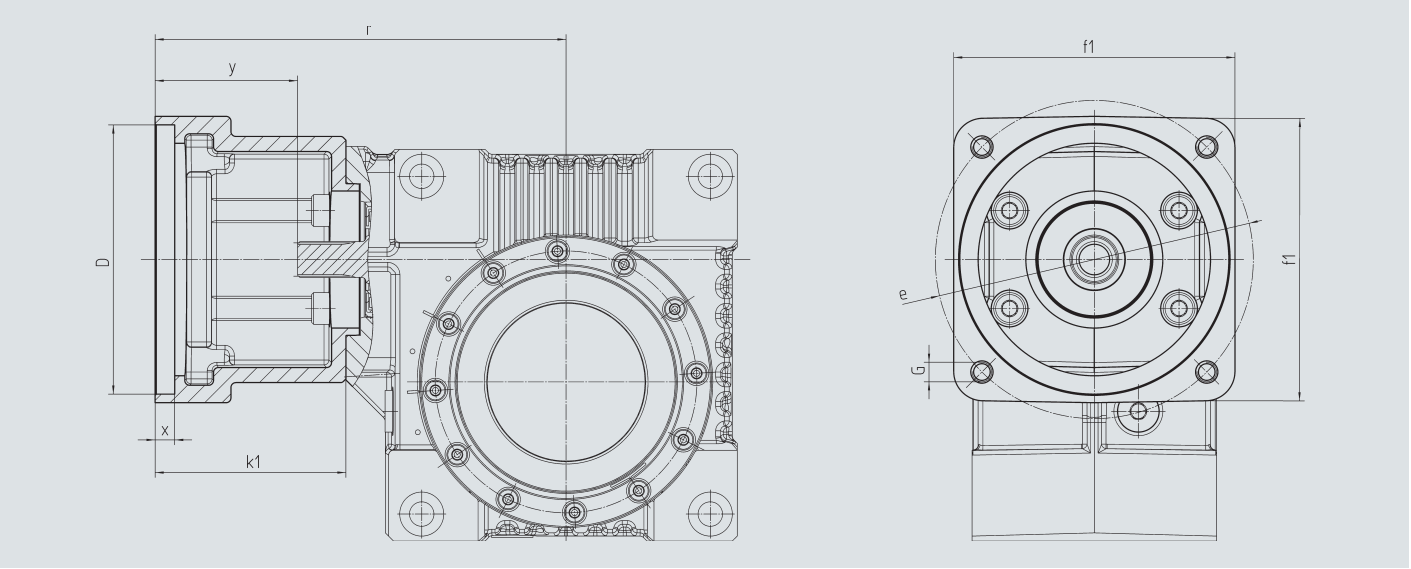
Fig. 2 Output shaft for clamp connection 80 84 036

Order Code Fig. 1	Fig. 2	Ratio i	kg	J_{red} 10^{-4} kg m²
98 03 005	**98 13 005**	4.75	7.0	0.8280
98 03 007	**98 13 007**	6.75	7.0	0.4140
98 03 009	**98 13 009**	9.25	7.0	0.3490
98 03 015	**98 13 015**	14.50	7.0	0.2800
98 03 020	**98 13 020**	19.50	7.0	0.1960
98 03 029	**98 13 029**	29.00	7.0	0.2694
98 03 039	**98 13 039**	39.00	7.0	0.2310
98 03 050	**98 13 050**	50.00	7.0	0.2140

With food grade oil: Order code 98 03 **1**xx / 98 13 **1**xx
In ATEX with food grade oil: Order code 98 03 **2**xx / 98 13 **2**xx

All dimensions are in mm

Motor Flange



Center Distance a_0 = 50 mm

Order Code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 301	95.0	62	152	12.5	42	100	115	M8	0.60
65 59 302	50.0	62	152	10.0	42	100	70; 95; 115	M4; M6; M8	0.70
65 59 303	80.0	62	152	10.0	42	100	100	M6	0.65
65 59 304	95.0	78	168	10.0	58	115	130	M8	0.80
65 59 306	60.0	74	164	21.0	54	100	75; 90; 115	M5; M5; M8	0.90
65 59 307	70.0	70	160	21.0	50	100	90; 115	M6; M8	0.80
65 59 401	95.0	73	163	8.0	53	100	115	M8	0.75
65 59 402	110.0	78	168	8.0	58	115	130	M8	0.80
65 59 403	95.0	73	163	12.0	53	115	130	M8	0.75
65 59 404	110.0	73	163	12.0	53	115	130	M8	0.70
65 59 405	95.0	78	168	11.0	58	140	165	M10	1.20
65 59 406	110.0	78	168	11.0	58	140	165	M10	1.15
65 59 407	130.0	78	168	11.0	53	140	165	M10	1.00
65 59 409	130.0	98	188	14.0	78	140	165	M10	1.10
65 59 410	110.0	74	164	8.0	54	120	145	M8	1.00
65 59 411	110.0	84	174	8.0	64	120	145	M8	1.20
65 59 412	114.3	105	195	8.0	85	180	200	M12	3.70
65 59 413	114.3	139	229	8.0	119	180	200	M12	3.35
65 59 414	114.3	91	181	8.0	71	180	200	M12	2.65
65 59 415	110.0	89	179	8.0	69	120	145	M8	1.30

An order should contain gearbox 98 03 0xx / 98 13 0xx and flange 65 59 3xx or 4xx.

Center Distance a_0 = 63 mm

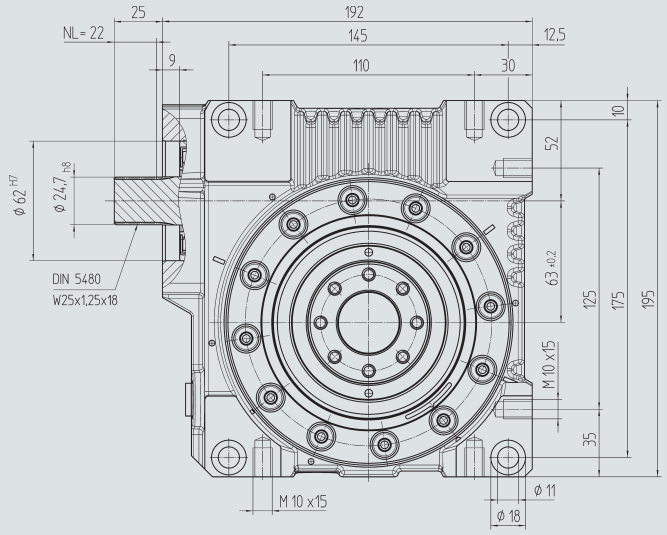
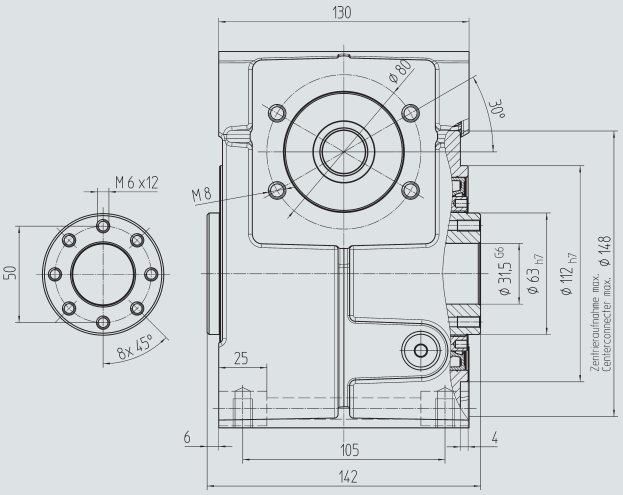


Fig. 1 Output shaft with ISO 9409-1-A-50 flange



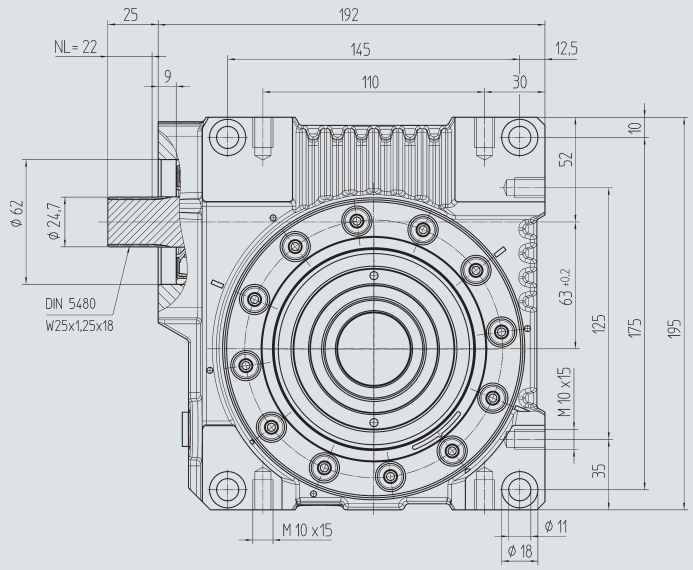
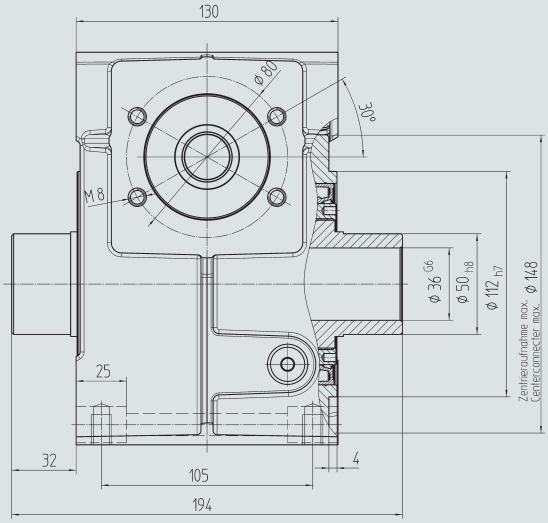


Fig. 2 Output shaft for clamp connection 80 85 050

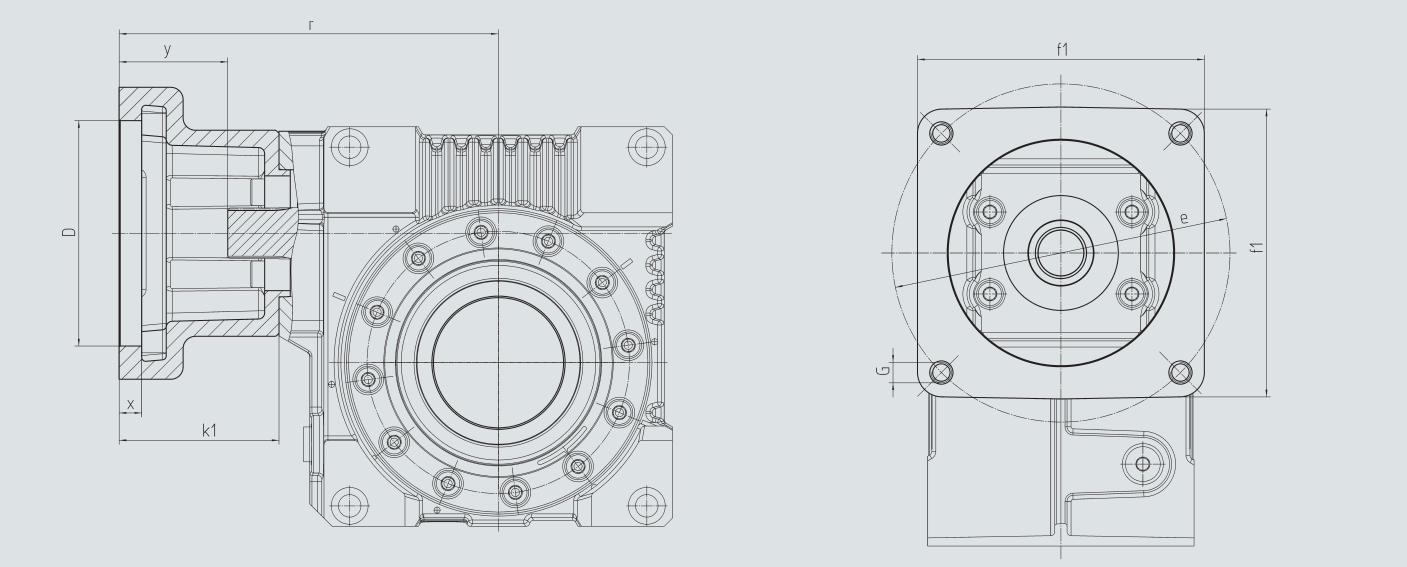


Order Code Fig. 1	Fig. 2	Ratio i	kg	J_{red} 10^{-4} kg m²
98 04 005	**98 14 005**	4.75	12.0	2.5350
98 04 007	**98 14 007**	6.75	12.0	1.3720
98 04 009	**98 14 009**	9.25	12.0	0.9825
98 04 015	**98 14 015**	14.50	12.0	0.9590
98 04 020	**98 14 020**	19.50	12.0	0.6940
98 04 029	**98 14 029**	29.00	12.0	0.9966
98 04 039	**98 14 039**	39.00	12.0	1.0100
98 04 052	**98 14 052**	52.00	12.0	0.5305

With food grade oil: Order code 98 04 **1**xx / 98 14 **1**xx
In ATEX with food grade oil: Order code 98 04 **2**xx / 98 14 **2**xx

All dimensions are in mm

Motor Flange



Center Distance a_0 = 63 mm

Order Code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 301	95.0	62	169	12.5	37	100	115	M8	0.60
65 59 302	50.0	62	169	10.0	37	100	70; 95; 115	M4; M6; M8	0.70
65 59 303	80.0	62	169	10.0	37	100	100	M6	0.65
65 59 304	95.0	78	185	10.0	53	115	130	M8	0.80
65 59 306	60.0	74	181	21.0	49	100	75; 90; 115	M5; M5; M8	0.90
65 59 307	70.0	70	177	21.0	45	100	90; 115	M6; M8	0.80
65 59 401	95.0	73	180	8.0	48	100	115	M8	0.75
65 59 402	110.0	78	185	8.0	53	115	130	M8	0.80
65 59 403	95.0	73	180	12.0	48	115	130	M8	0.75
65 59 404	110.0	73	180	12.0	48	115	130	M8	0.70
65 59 405	95.0	78	185	11.0	53	140	165	M10	1.20
65 59 406	110.0	78	185	11.0	53	140	165	M10	1.15
65 59 407	130.0	78	185	11.0	53	140	165	M10	1.00
65 59 409	130.0	98	205	14.0	78	140	165	M10	1.10
65 59 410	110.0	74	181	8.0	49	120	145	M8	1.00
65 59 411	110.0	84	191	8.0	59	120	145	M8	1.20
65 59 412	114.3	105	212	8.0	80	180	200	M12	3.70
65 59 413	114.3	139	246	8.0	114	180	200	M12	3.35
65 59 414	114.3	91	198	8.0	66	180	200	M12	2.65
65 59 415	110.0	89	196	8.0	64	120	145	M8	1.30

An order should contain gearbox 98 04 0xx / 98 14 0xx and flange 65 59 3xx or 4xx.

Center Distance a_0 = 80 mm

Fig. 1 Output shaft with ISO 9409-1-A-63 flange

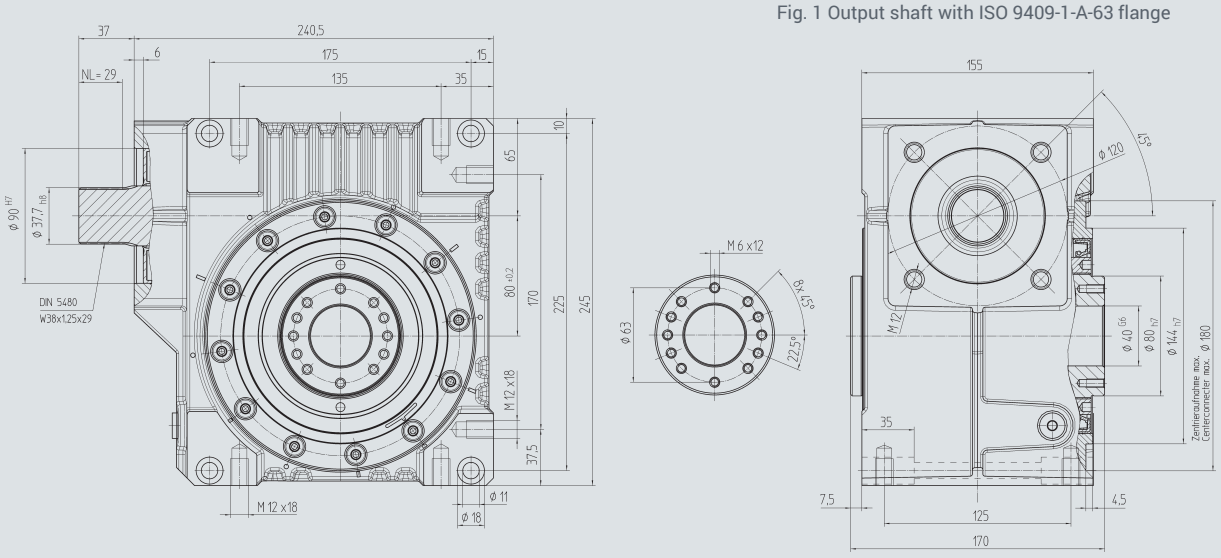
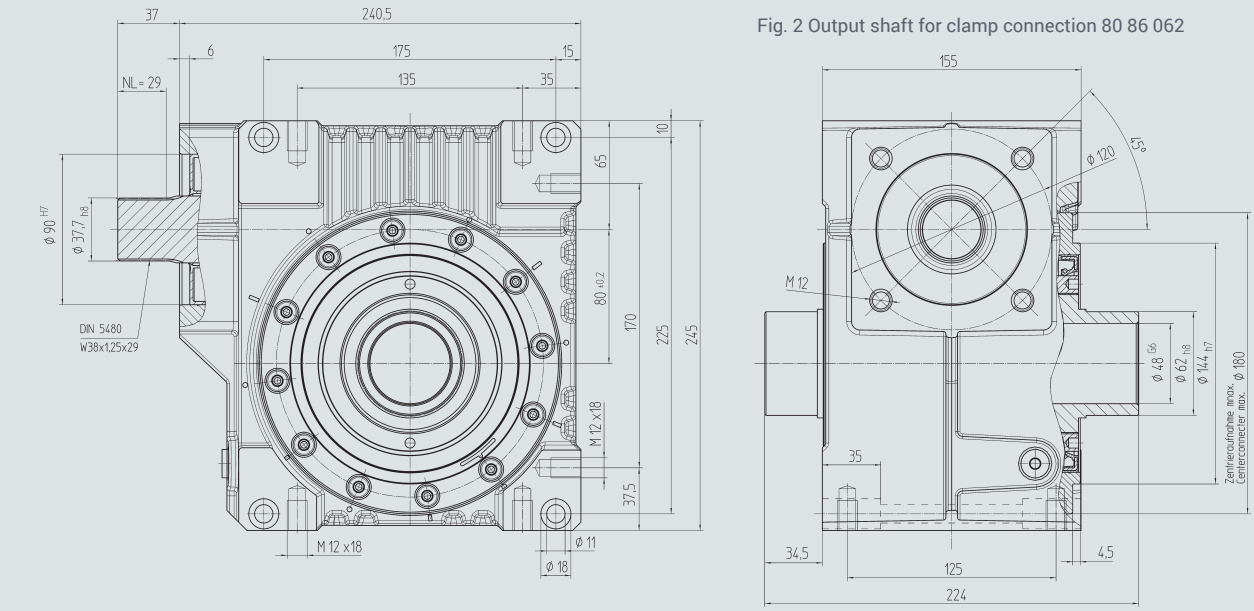


Fig. 2 Output shaft for clamp connection 80 86 062

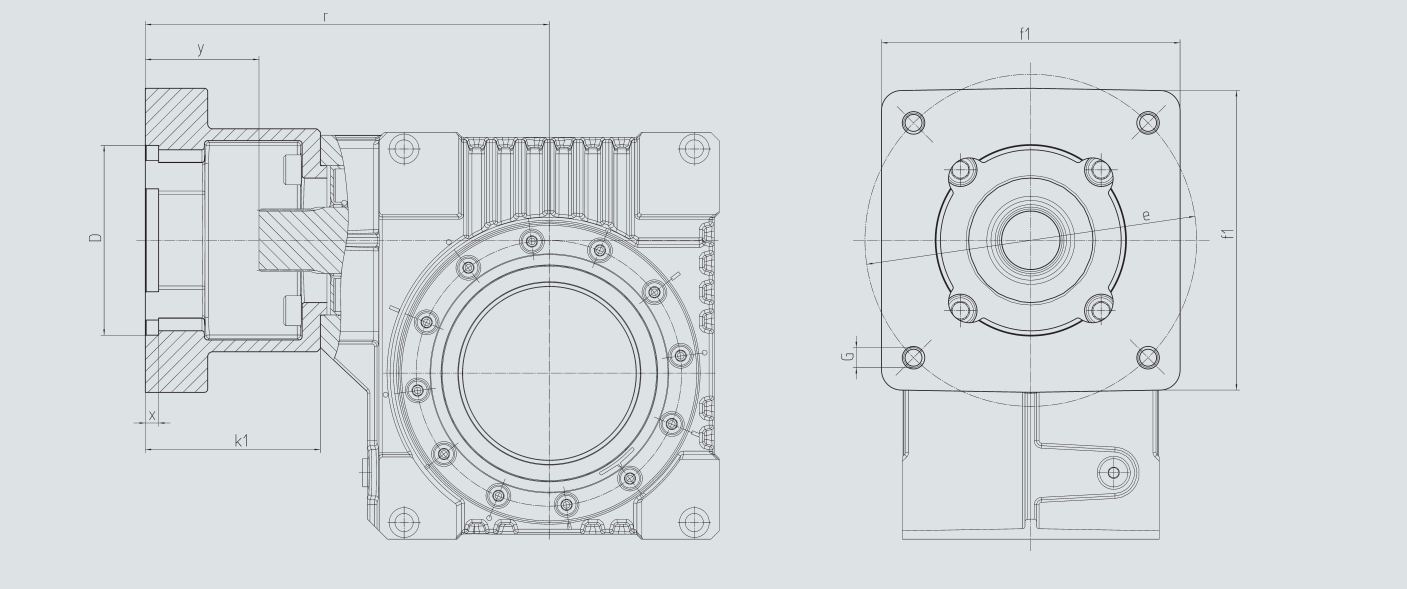


Order Code Fig. 1	Fig.2	Ratio i	kg	J_{red} 10^{-4} kg m²
98 05 005	**98 15 005**	4.75	23.0	9.6180
98 05 007	**98 15 007**	6.75	23.0	6.0910
98 05 009	**98 15 009**	9.25	23.0	4.7650
98 05 015	**98 15 015**	14.50	23.0	5.3080
98 05 020	**98 15 020**	19.50	23.0	3.9350
98 05 029	**98 15 029**	29.00	23.0	4.0500
98 05 039	**98 15 039**	39.00	23.0	4.1800
98 05 052	**98 15 052**	52.00	23.0	3.7140

With food grade oil: Order code 98 05 **1**xx / 98 15 **1**xx
In ATEX with food grade oil: Order code 98 05 **2**xx / 98 15 **2**xx

All dimensions are in mm

Motor Flange



Center Distance a_0 = 80 mm

Order Code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 501	110.0	92.0	230.0	8.0	55.0	140	165	M10	2.00
65 59 502	130.0	92.0	230.0	8.0	55.0	140	165	M10	1.90
65 59 503	180.0	122.0	260.0	8.0	85.0	192	215	M12	3.40
65 59 504	180.0	127.0	265.0	8.0	90.0	192	215	M12	3.80
65 59 505	180.0	112.0	250.0	10.0	75.0	192	215	M12	2.70
65 59 506	130.0	112.0	250.0	10.0	75.0	192	215	M12	3.00
65 59 507	130.0	112.0	250.0	10.0	75.0	140	165	M10	2.50
65 59 508	110.0	90.0	228.0	8.0	53.0	140	145	M8	2.00
65 59 509	110.0	108.5	246.5	8.0	71.5	140	145	M8	2.50
65 59 510	114.3	129.5	267.5	8.0	92.5	180	200	M12	5.00
65 59 511	114.3	163.5	301.5	8.0	126.5	180	200	M12	4.20
65 59 512	114.3	105.5	243.5	8.0	68.5	180	200	M12	3.50
65 59 513	110.0	113.5	251.5	8.0	76.5	140	145	M8	2.70

An order should contain gearbox 98 05 0xx / 98 15 0xx and flange 65 59 5xx.

Center Distance a_0 = 100 mm

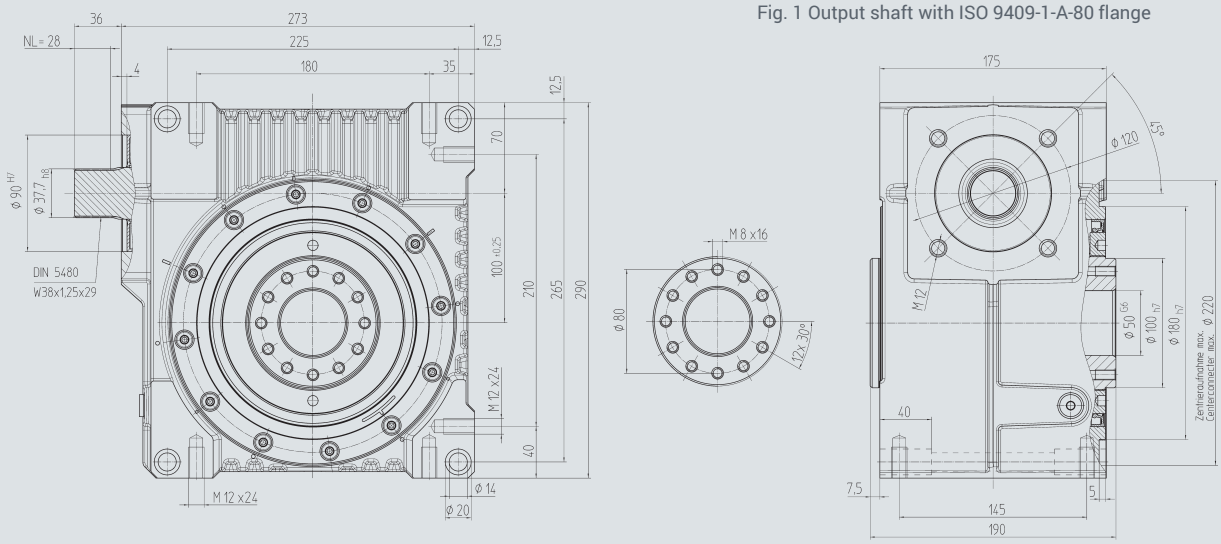


Fig. 1 Output shaft with ISO 9409-1-A-80 flange

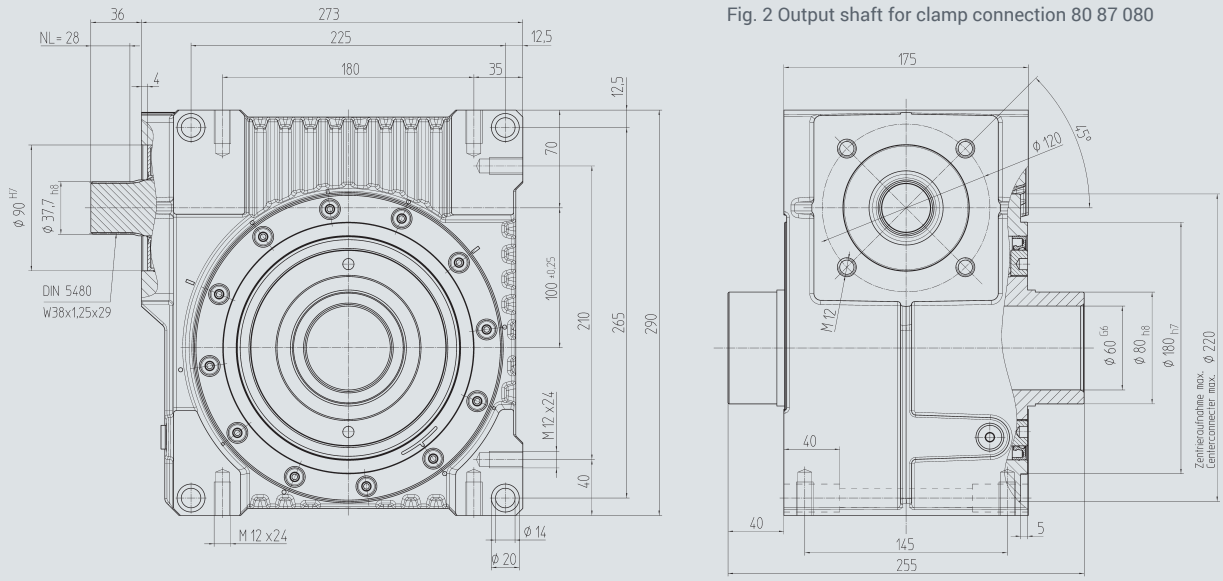


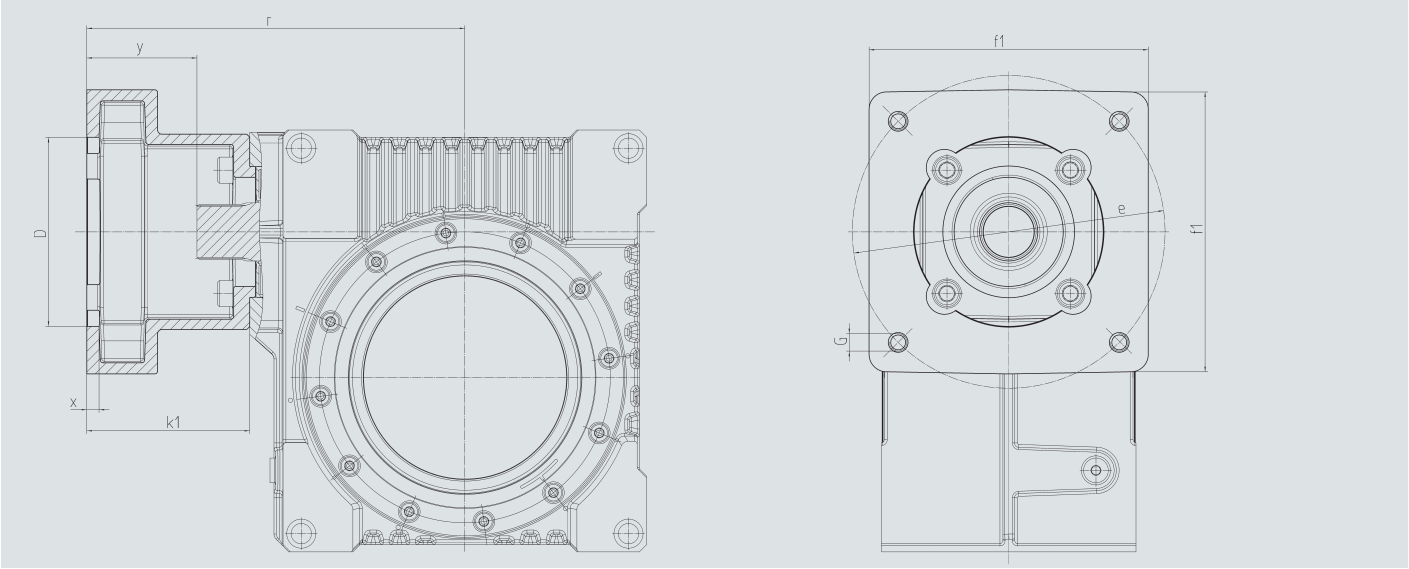
Fig. 2 Output shaft for clamp connection 80 87 080

Order Code Fig. 1	Fig. 2	Ratio i	kg	J_{red} 10^{-4} kg m²
98 06 005	**98 16 005**	4.75	38.0	22.9320
98 06 007	**98 16 007**	6.75	38.0	12.8835
98 06 009	**98 16 009**	9.25	38.0	8.0975
98 06 015	**98 16 015**	14.50	38.0	7.2190
98 06 020	**98 16 020**	19.50	38.0	5.4030
98 06 029	**98 16 029**	29.00	38.0	4.7207
98 06 039	**98 16 039**	39.00	38.0	8.4300
98 06 052	**98 16 052**	52.00	38.0	9.7400

With food grade oil: Order code 98 06 **1**xx / 98 16 **1**xx
In ATEX with food grade oil: Order code 98 06 **2**xx / 98 16 **2**xx

All dimensions are in mm

Motor Flange



Center Distance a_o = 100 mm

Order Code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 501	110.0	92.0	240.0	8.0	55.0	140	165	M10	2.00
65 59 502	130.0	92.0	240.0	8.0	55.0	140	165	M10	1.90
65 59 503	180.0	122.0	270.0	8.0	85.0	192	215	M12	3.40
65 59 504	180.0	127.0	275.0	8.0	90.0	192	215	M12	3.80
65 59 505	180.0	112.0	260.0	10.0	75.0	192	215	M12	2.70
65 59 506	130.0	112.0	260.0	10.0	75.0	192	215	M12	3.00
65 59 507	130.0	112.0	260.0	10.0	75.0	140	165	M10	2.50
65 59 508	110.0	90.0	238.0	8.0	53.0	140	145	M8	2.00
65 59 509	110.0	108.5	256.5	8.0	71.5	140	145	M8	2.50
65 59 510	114.3	129.5	277.5	8.0	92.5	180	200	M12	5.00
65 59 511	114.3	163.5	311.5	8.0	126.5	180	200	M12	4.20
65 59 512	114.3	105.5	253.5	8.0	68.5	180	200	M12	3.50
65 59 513	110.0	113.5	253.5	8.0	76.5	140	145	M8	2.70

An order should contain gearbox 98 06 0xx / 98 16 0xx and flange 65 59 5xx.

The values in the tables are based upon wear or maximum flank load at 12,000 hours full load and on servo-operation. Please see our operating manual on our webpage **www.atlantadrives.com.** With continuous full-load operation it may be necessary to consider temperature limits! Please ask us if in doubt.

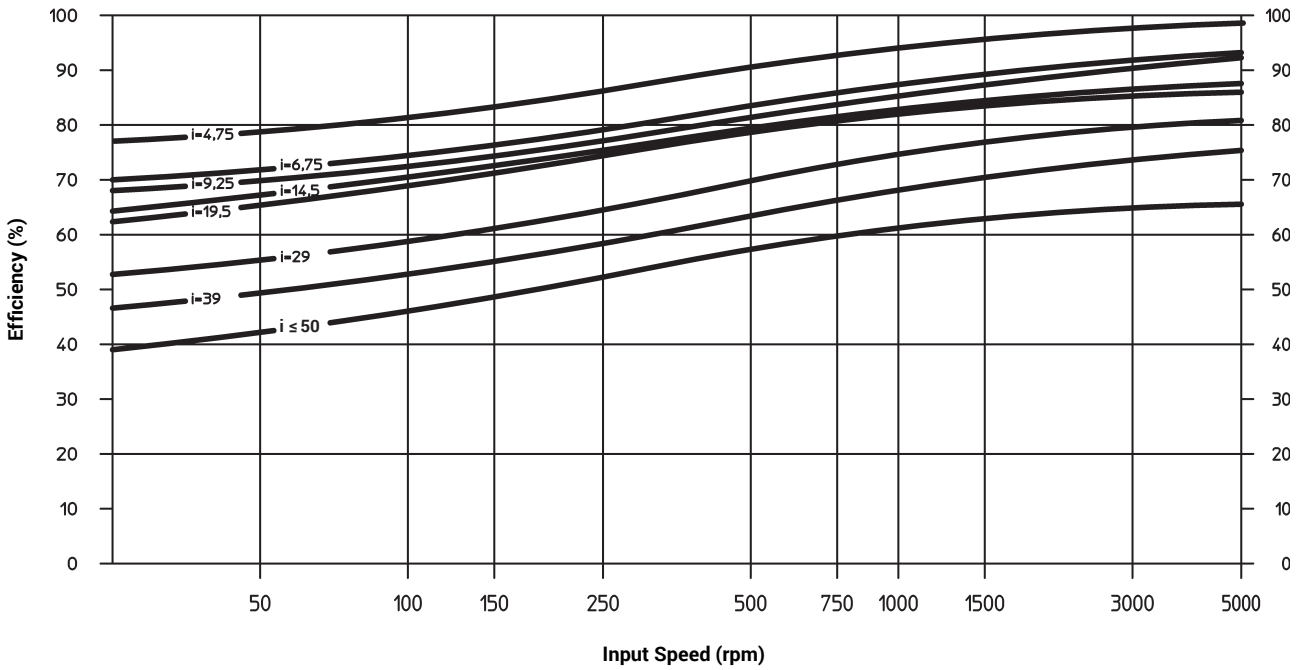
$T_{2max.}$ = static torque to avoid tooth fracture, T_1 = input torque in Nm, T_2 = output torque in Nm.

Order Code		a_0 (mm)	i	$T_{2\,max.}$	Input Speed n_1 (rpm) 250		500		750		1000		1500		2000	
					T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)
98 03 003	98 13 003	50	3.00*													
98 03 005	98 13 005		4.75	820	17.4	73	22.7	97	22.7	97	24.4	105	24.6	105	24.8	105
98 03 007	98 13 007		6.75	600	10.8	63	14.1	84	14.8	88	15.7	94	17.1	103	17.1	103
98 03 009	98 13 009		9.25	410	7.2	53	9.4	72	9.8	76	10.4	81	11.1	87	11.9	93
98 03 015	98 13 015		14.50	520	5.5	64	7.1	85	7.5	90	8.0	97	8.7	105	8.9	107
98 03 020	98 13 020		19.50	370	3.6	50	4.6	67	4.9	72	5.1	75	5.5	82	5.8	87
98 03 029	98 13 029		29.00	450	2.9	54	3.7	72	3.9	78	4.0	82	4.4	90	4.7	95
98 03 039	98 13 039		39.00	300	2.7	58	3.4	78	3.6	84	3.8	90	4.0	97	4.2	102
98 03 050	98 13 050		50.00	220	2.3	47	2.8	63	2.8	66	2.9	70	3.1	75	3.3	80
98 04 003	98 14 003	63	3.00*													
98 04 005	98 14 005		4.75	1500	56.3	244	58.4	255	61.8	270	61.9	270	58.7	255	56.1	242
98 04 007	98 14 007		6.75	1120	32.3	194	41.9	255	44.2	270	44.2	270	41.8	255	39.9	242
98 04 009	98 14 009		9.25	750	16.2	128	21.3	172	23.0	187	23.9	195	24.6	202	24.6	202
98 04 015	98 14 015		14.50	900	16.7	198	20.3	247	22.1	270	22.1	270	22.1	270	21.7	265
98 04 020	98 14 020		19.50	750	8.4	130	10.7	172	11.6	187	12.0	195	12.5	202	13.4	217
98 04 029	98 14 029		29.00	970	10.3	206	12.6	262	13.6	285	14.6	307	15.7	330	15.2	317
98 04 039	98 14 039		39.00	670	6.3	159	7.8	210	8.2	225	8.8	240	9.6	262	9.8	270
98 04 052	98 14 052		52.00	450	3.7	106	4.5	142	4.9	157	5.3	172	5.7	187	6.1	200
98 05 003	98 15 003	80	3.00*													
98 05 005	98 15 005		4.75	3000	154.3	680	142.3	630	128.9	570	122.2	540	112.5	495	107.3	470
98 05 007	98 15 007		6.75	2100	97.8	603	101.3	630	91.6	570	86.8	540	79.8	495	76.1	470
98 05 009	98 15 009		9.25	1650	56.3	465	66.2	555	66.1	555	64.3	540	59.0	495	56.2	470
98 05 015	98 15 015		14.50	1950	52.4	646	53.9	675	53.7	675	50.1	630	44.1	555	41.3	517
98 05 020	98 15 020		19.50	1500	32.9	530	33.7	555	36.3	600	36.2	600	32.6	540	31.4	520
98 05 029	98 15 029		29.00	1800	34.4	747	35.0	780	36.8	825	35.4	795	32.7	735	31.3	700
98 05 039	98 15 039		39.00	1270	22.5	617	22.7	645	24.0	690	25.6	735	25.0	720	23.9	685
98 05 052	98 15 052		52.00	900	9.4	325	9.9	360	10.7	390	11.2	412	12.3	450	12.7	465
98 06 005	98 16 005	100	4.75	4950	351.4	1564	295.9	1320	269.3	1200	253.6	1125	231.5	1027	220.6	975
98 06 007	98 16 007		6.75	3450	190.8	1195	197.7	1245	178.6	1125	172.2	1080	157.9	990	152.0	950
98 06 009	98 16 009		9.25	2850	141.4	1192	146.5	1245	132.2	1125	127.2	1080	116.6	990	112.2	950
98 06 015	98 16 015		14.50	3070	105.1	1338	108.3	1395	102.3	1320	94.4	1215	83.9	1080	80.3	1030
98 06 020	98 16 020		19.50	2700	77.8	1292	79.9	1350	77.0	1305	71.7	1215	63.7	1080	60.9	1030
98 06 029	98 16 029		29.00	3450	73.0	1654	74.8	1725	69.2	1605	65.5	1515	55.2	1275	54.4	1250
98 06 039	98 16 039		39.00	2470	52.8	1551	53.7	1620	51.0	1545	49.4	1500	44.5	1350	42.7	1290
98 06 052	98 16 052		52.00	1650	31.1	1139	30.1	1140	32.2	1230	33.4	1275	30.8	1177	29.5	1125

* On Request

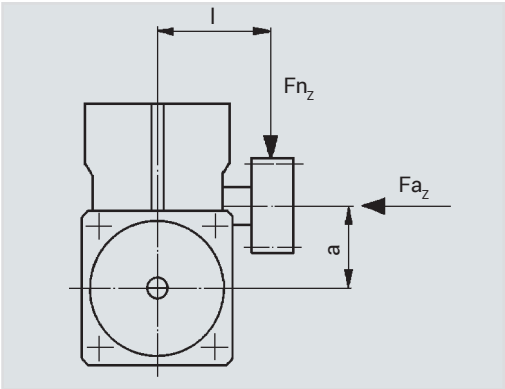
Input Speed n_1 (rpm)															
2500		3000		3500		4000		4500		5000		5500		6000	
T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)
25.0	105	25.2	105	24.5	101	23.7	97	23.2	94	22.7	91	21.4	85	20.4	80
17.2	103	17.3	103	16.9	100	16.5	97	16.1	94	15.7	91	14.9	86	14.1	81
12.6	99	13.3	105	13.3	105	13.4	105	13.0	101	12.6	97	11.9	92	11.4	87
9.1	110	9.3	112	9.4	112	9.4	112	9.5	112	9.6	112	9.1	106	8.7	100
6.1	92	6.5	97	6.5	97	6.5	97	6.5	97	6.6	97	6.2	91	5.9	86
4.9	100	5.2	105	5.2	105	5.3	105	5.1	101	5.0	97	4.7	91	4.5	86
4.4	107	4.6	112	4.6	112	4.6	112	4.6	112	4.7	112	4.5	105	4.3	100
3.4	85	3.6	90	3.6	90	3.6	90	3.6	90	3.6	90	3.7	93	3.8	95
53.4	230	50.8	217	49.3	210	47.8	202	44.4	186	41.3	172				
38.1	230	36.1	217	35.1	210	34.0	202	31.7	187	29.7	174	27.9	163		
24.6	202	24.7	202	24.0	196	23.4	189	21.9	176	20.7	165	19.6	156	18.6	147
21.4	260	21.1	255	20.6	248	20.1	240	18.7	222	17.6	207	16.6	194		
14.4	232	15.4	247	14.9	240	14.5	232	13.7	217	12.9	204	12.2	192	11.7	181
14.6	305	14.1	292	13.9	285	13.6	277	12.8	257	12.0	239	11.3	223		
10.2	277	10.5	285	10.5	285	10.7	285	10.0	266	9.5	249	9.0	234	8.6	221
6.5	212	6.9	225	7.2	233	7.4	240	7.2	232	6.9	218	6.6	205	6.3	194
102.2	445	96.8	420	88.4	381	79.9	343								
72.4	445	68.6	420	63.0	384	57.3	347	53.0	320	49.4	297				
53.5	445	50.7	420	46.8	386	42.8	352	39.8	326	37.3	303	35.0	283		
38.5	480	35.6	442	32.8	405	30.0	368	27.8	340	25.9	315				
30.3	500	29.2	480	27.1	442	24.9	404	23.1	374	21.7	349	20.4	326		
29.9	665	28.5	630	26.3	576	24.0	523	22.3	482						
22.8	650	21.7	615	20.1	566	18.5	517	17.3	478	16.3	445	15.3	417		
13.2	480	13.7	495	13.7	495	13.8	494	13.0	462	12.3	432	11.6	407		
209.5	922	198.4	870												
146.1	910	140.2	870	126.5	782	103.8	639								
107.9	910	103.5	870	94.3	789	78.3	654	79.9	663	74.5	616				
76.6	980	73.0	930	66.0	838	60.4	763								
58.2	980	55.5	930	50.6	845	46.6	775	43.2	715	0.8	663				
53.6	1225	52.8	1200	47.9	1081										
41.0	1230	39.2	1170	35.8	1061	29.9	881	30.6	896						
28.2	1072	26.9	1020	24.8	931	23.0	856	21.5	792	18.8	691				

Gearing efficiency of servo worm gearboxes with driving worm and under full load.



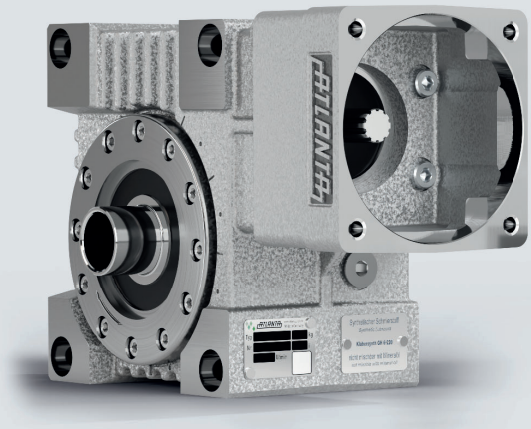
Additional Loads On Gearbox Output

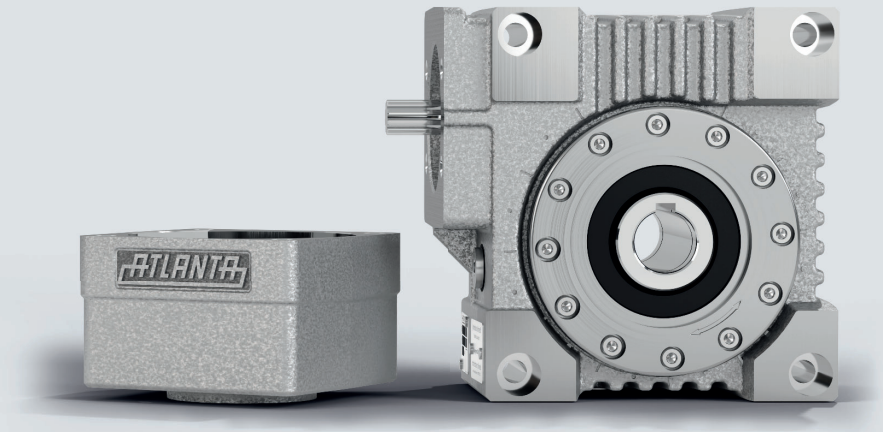
The data given are reference values. You should consider the values arising from the choice of the tooth system. It is assumed that the point of action of the force is the center of the shaft. In cases where additional axial forces occur, over and above high transverse forces, please ask for advice.



Center Distance	a (mm)	50		63		80		100	
Dimension from center of housing to center of teeth		**ISO**	**Clamp**	**ISO**	**Clamp**	**ISO**	**Clamp**	**ISO**	**Clamp**
l (mm)		71	105	86	120	103	135	118	162
Max. additional load:									
Radial Fn$_z$	[N]	6800	4600	9600	7000	15300	11700	17800	13200
Axial Fa$_z$	[N]	2700	2700	3800	3800	6000	6000	7500	7500
Only Axial Load (Fn=0)	Fa$_z$ [N]	5000		8000		15000		35000	

All dimensions are in mm





Center Distance a_o = 50 mm

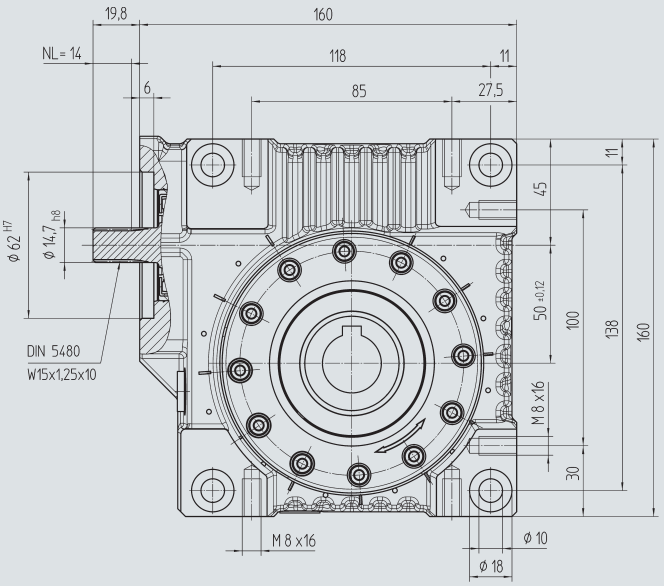
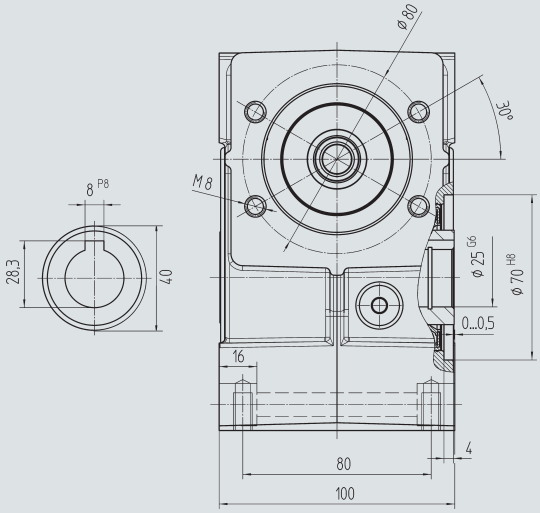


Fig. 1 Output shaft with key connection



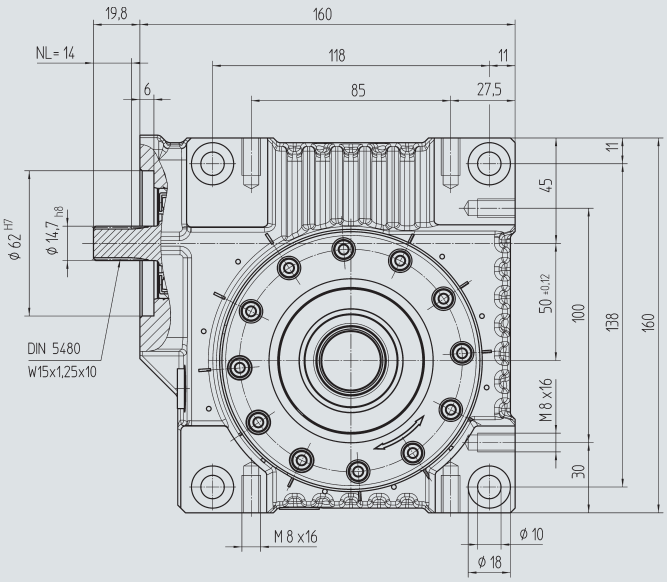
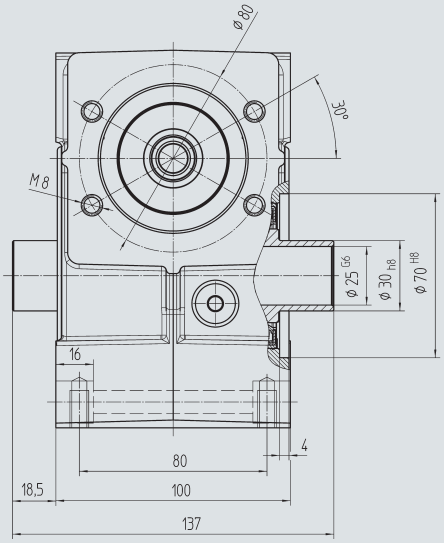


Fig. 2 Output shaft for clamp connection 80 83 030

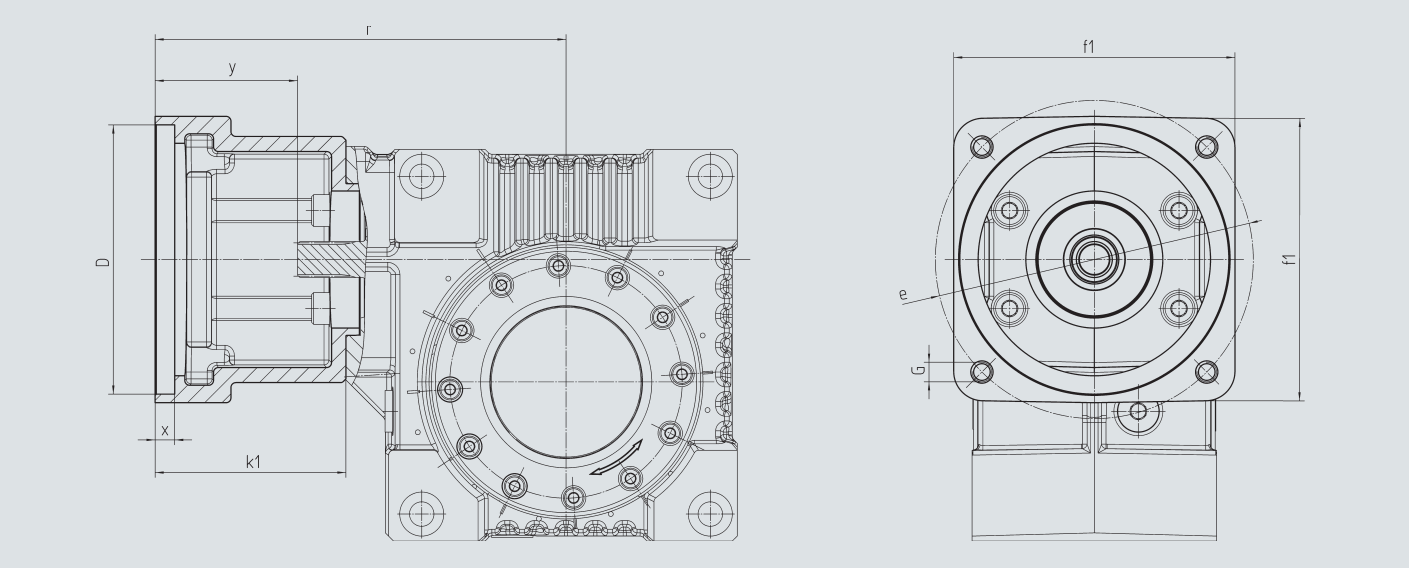


Order Code Fig. 1	Fig. 2	Ratio i	kg	J_{red} 10^{-4} kg m²
58 03 005	**58 13 005**	4.75	7.0	0.8280
58 03 007	**58 13 007**	6.75	7.0	0.4140
58 03 009	**58 13 009**	9.25	7.0	0.3490
58 03 015	**58 13 015**	14.50	7.0	0.2800
58 03 020	**58 13 020**	19.50	7.0	0.1960
58 03 029	**58 13 029**	29.00	7.0	0.2694
58 03 039	**58 13 039**	39.00	7.0	0.2310
58 03 050	**58 13 050**	50.00	7.0	0.2140

With food grade oil: Order Code 58 03 **1**xx / 58 13 **1**xx
In ATEX with food grade oil: Order Code 58 03 **2**xx / 58 13 **2**xx

All dimensions are in mm

Motor Flange



Center Distance a_0 = 50 mm

Order Code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 301	95.0	62	152	12.5	42	100	115	M8	0.60
65 59 302	50.0	62	152	10.0	42	100	70; 95; 115	M4; M6; M8	0.70
65 59 303	80.0	62	152	10.0	42	100	100	M6	0.65
65 59 304	95.0	78	168	10.0	58	115	130	M8	0.80
65 59 306	60.0	74	164	21.0	54	100	75; 90; 115	M5; M5; M8	0.90
65 59 307	70.0	70	160	21.0	50	100	90; 115	M6; M8	0.80
65 59 401	95.0	73	163	8.0	53	100	115	M8	0.75
65 59 402	110.0	78	168	8.0	58	115	130	M8	0.80
65 59 403	95.0	73	163	12.0	53	115	130	M8	0.75
65 59 404	110.0	73	163	12.0	53	115	130	M8	0.70
65 59 405	95.0	78	168	11.0	58	140	165	M10	1.20
65 59 406	110.0	78	168	11.0	58	140	165	M10	1.15
65 59 407	130.0	78	168	11.0	58	140	165	M10	1.00
65 59 409	130.0	98	188	14.0	78	140	165	M10	1.10
65 59 410	110.0	74	164	8.0	54	120	145	M8	1.00
65 59 411	110.0	84	174	8.0	64	120	145	M8	1.20
65 59 412	114.3	105	195	8.0	85	180	200	M12	3.70
65 59 413	114.3	139	229	8.0	119	180	200	M12	3.35
65 59 414	114.3	91	181	8.0	71	180	200	M12	2.65
65 59 415	110.0	89	179	8.0	69	120	145	M8	1.30

An order should contain gearbox 58 03 0xx / 58 13 0xx and flange 65 59 3xx or 4xx.

Center Distance a_o = 63 mm

Fig. 1 Output shaft with key connection

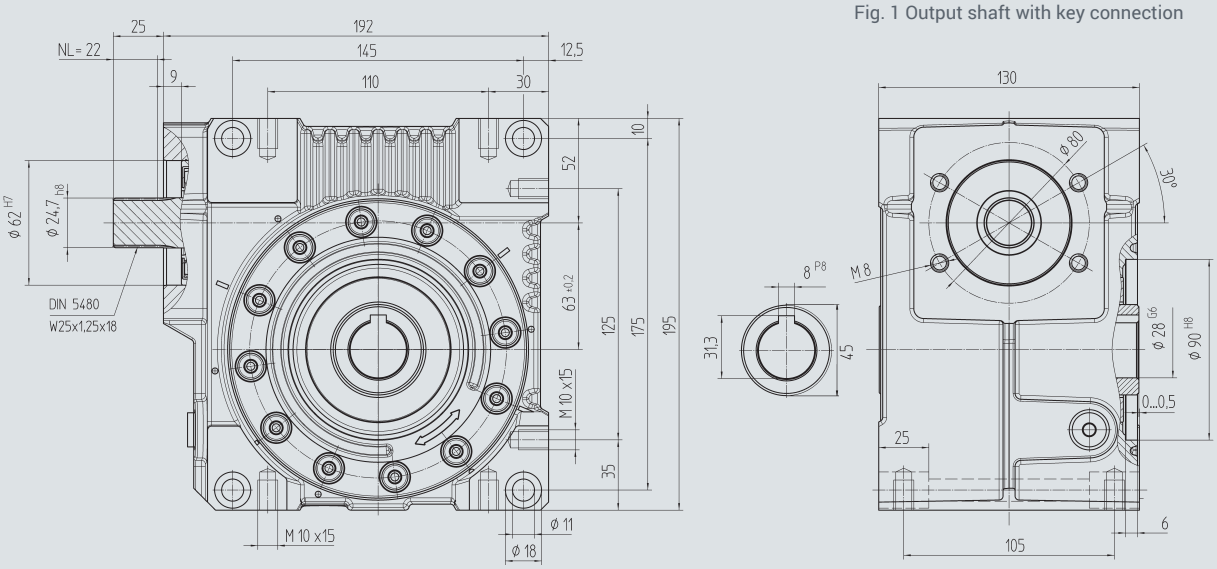
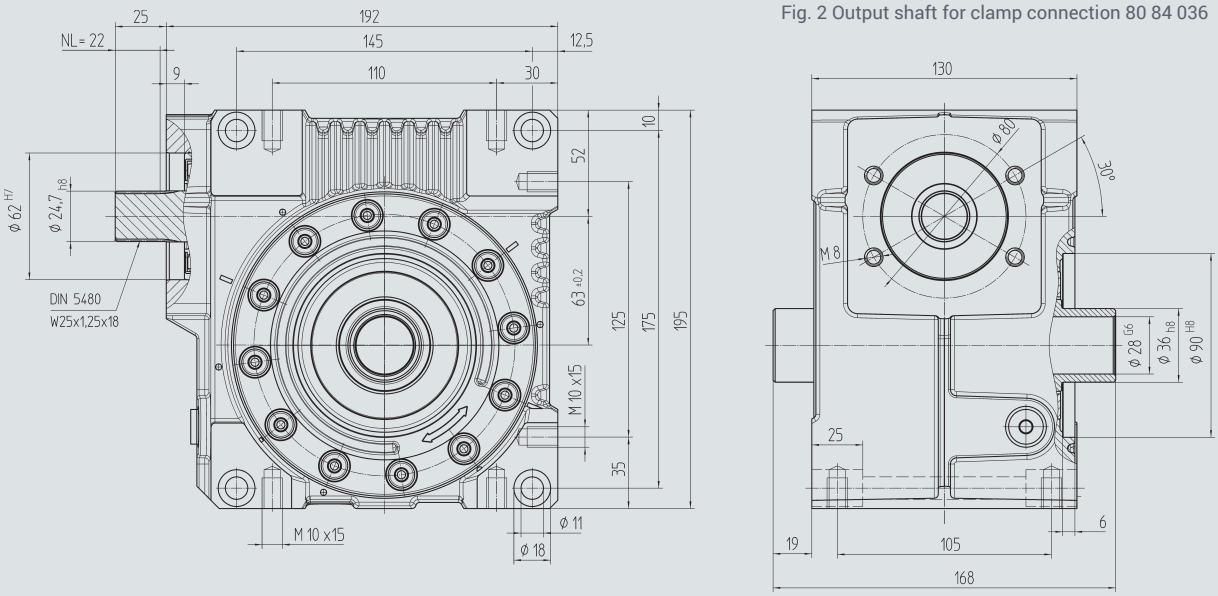


Fig. 2 Output shaft for clamp connection 80 84 036

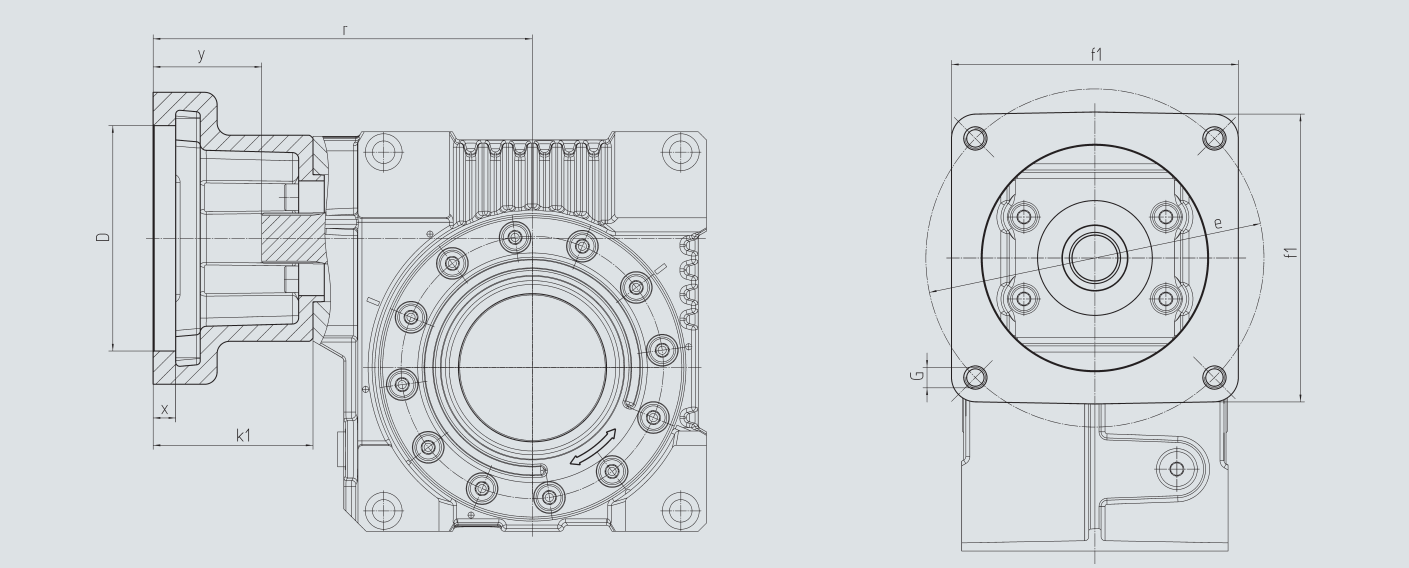


Order Code Fig. 1	Fig. 2	Ratio i	kg	J_{red} 10^{-4} kg m²
58 04 005	**58 14 005**	4.75	11.5	2.5350
58 04 007	**58 14 007**	6.75	11.5	1.3720
58 04 009	**58 14 009**	9.25	11.5	0.9825
58 04 015	**58 14 015**	14.50	11.5	0.9590
58 04 020	**58 14 020**	19.50	11.5	0.6940
58 04 029	**58 14 029**	29.00	11.5	0.9966
58 04 039	**58 14 039**	39.00	11.5	1.0100
58 04 052	**58 14 052**	52.00	11.5	0.5305

With food grade oil: Order Code 58 04 **1**xx / 58 14 **1**xx
In ATEX with food grade oil: Order Code 58 04 **2**xx / 58 14 **2**xx

All dimensions are in mm

Motor Flange



Center Distance a_o = 63 mm

Order Code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 301	95.0	62	169	12.5	37	100	115	M8	0.60
65 59 302	50.0	62	169	10.0	37	100	70; 95; 115	M4; M6; M8	0.70
65 59 303	80.0	62	169	10.0	37	100	100	M6	0.65
65 59 304	95.0	78	185	10.0	53	115	130	M8	0.80
65 59 306	60.0	74	181	21.0	49	100	75; 90; 115	M5; M5; M8	0.90
65 59 307	70.0	70	177	21.0	45	100	90; 115	M6; M8	0.80
65 59 401	95.0	73	180	8.0	48	100	115	M8	0.75
65 59 402	110.0	78	185	8.0	53	115	130	M8	0.80
65 59 403	95.0	73	180	12.0	48	115	130	M8	0.75
65 59 404	110.0	73	180	12.0	48	115	130	M8	0.70
65 59 405	95.0	78	185	11.0	53	140	165	M10	1.20
65 59 406	110.0	78	185	11.0	53	140	165	M10	1.15
65 59 407	130.0	78	185	11.0	53	140	165	M10	1.00
65 59 409	130.0	98	205	14.0	73	140	165	M10	1.10
65 59 410	110.0	74	181	8.0	49	120	145	M8	1.00
65 59 411	110.0	84	191	8.0	59	120	145	M8	1.20
65 59 412	114.3	105	212	8.0	80	180	200	M12	3.70
65 59 413	114.3	139	246	8.0	114	180	200	M12	3.35
65 59 414	114.3	91	198	8.0	66	180	200	M12	2.65
65 59 415	110.0	89	196	8.0	64	120	145	M8	1.30

An order should contain gearbox 58 04 0xx / 58 14 0xx and flange 65 59 3xx or 4xx.

Center Distance a_o = 80 mm

Fig. 1 Output shaft with key connection

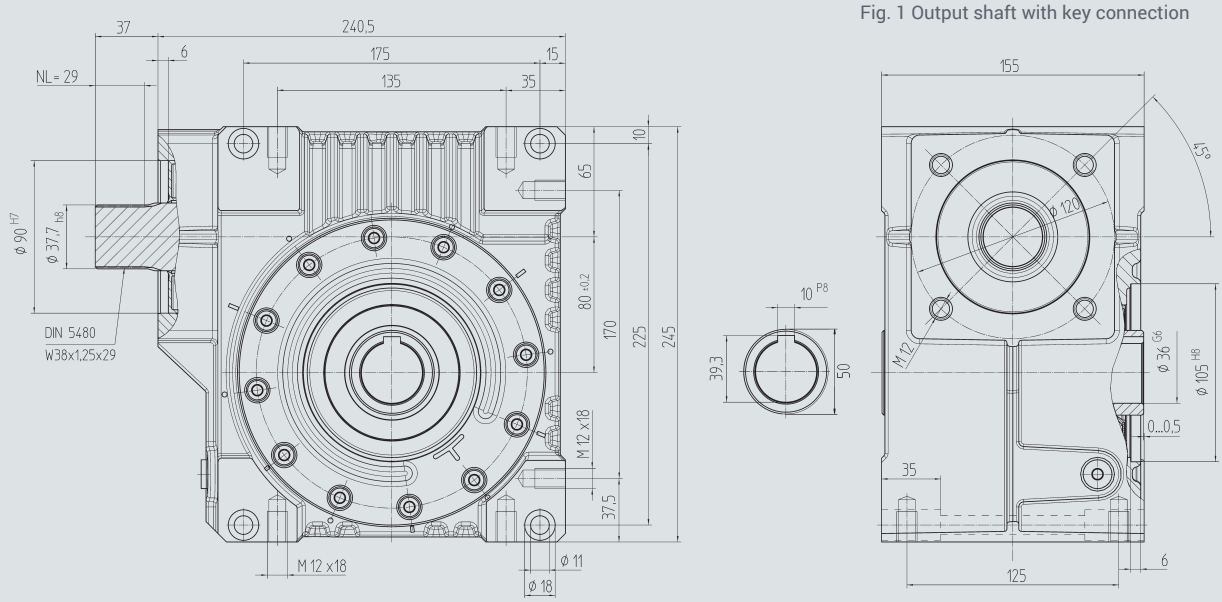
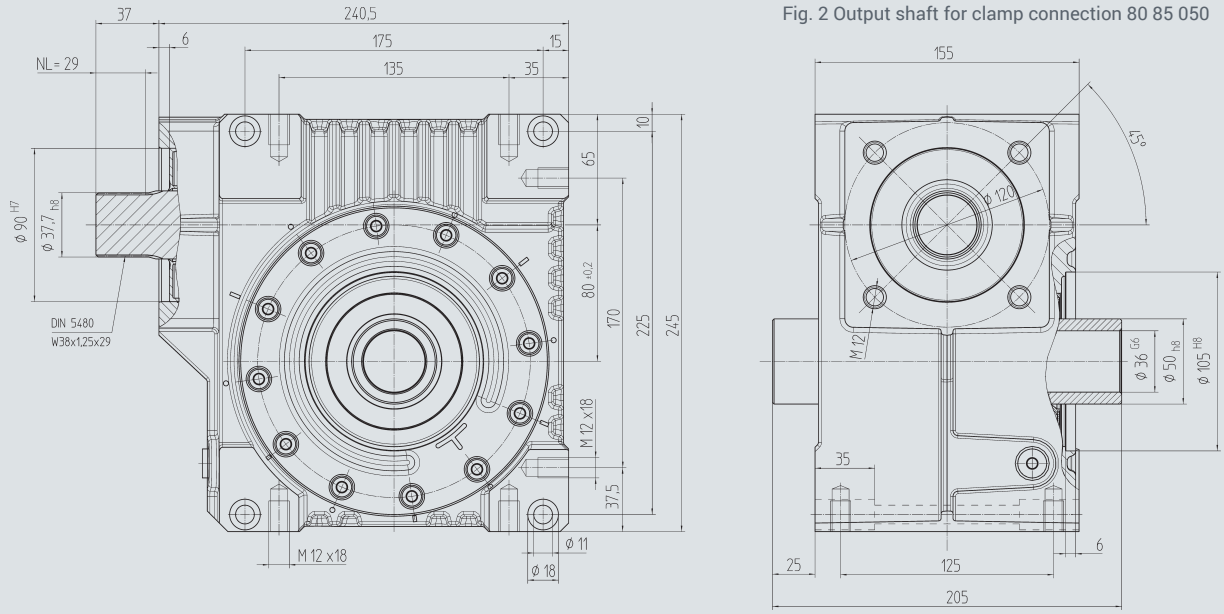


Fig. 2 Output shaft for clamp connection 80 85 050

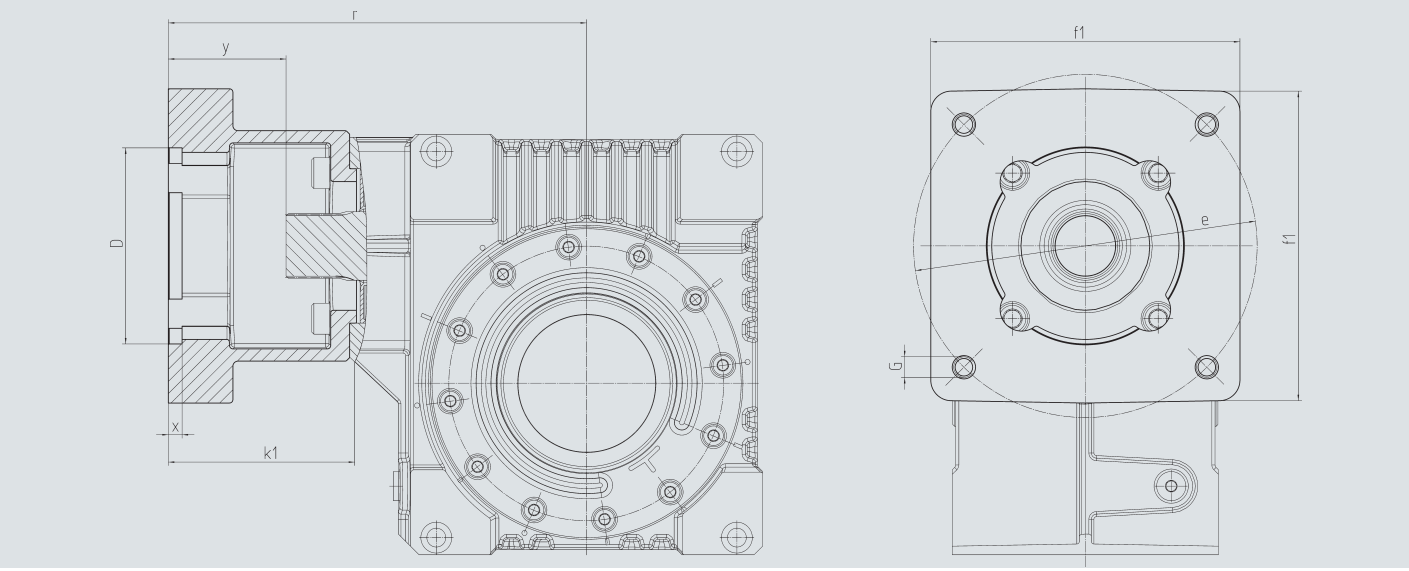


Order Code Fig. 1	Fig. 2	Ratio i	kg	J_{red} 10^{-4} kg m²
58 05 005	**58 15 005**	4.75	22.0	9.6180
58 05 007	**58 15 007**	6.75	22.0	6.0910
58 05 009	**58 15 009**	9.25	22.0	4.7650
58 05 015	**58 15 015**	14.50	22.0	5.3080
58 05 020	**58 15 020**	19.50	22.0	3.9350
58 05 029	**58 15 029**	29.00	22.0	4.0500
58 05 039	**58 15 039**	39.00	22.0	4.1800
58 05 052	**58 15 052**	52.00	22.0	3.7140

With food grade oil: Order Code 58 05 **1**xx / 58 15 **1**xx
In ATEX with food grade oil: Order Code 58 05 **2**xx / 58 15 **2**xx

All dimensions are in mm

Motor Flange



Center Distance a_0 = 80 mm

Order Code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 501	110.0	92.0	230.0	8.0	55.0	140	165	M10	2.00
65 59 502	130.0	92.0	230.0	8.0	55.0	140	165	M10	1.90
65 59 503	180.0	122.0	260.0	8.0	85.0	192	215	M12	3.40
65 59 504	180.0	127.0	265.0	8.0	90.0	192	215	M12	3.80
65 59 505	180.0	112.0	250.0	10.0	75.0	192	215	M12	2.70
65 59 506	130.0	112.0	250.0	10.0	75.0	192	215	M12	3.00
65 59 507	130.0	112.0	250.0	10.0	75.0	140	165	M10	2.50
65 59 508	110.0	90.0	228.0	8.0	53.0	140	145	M8	2.00
65 59 509	110.0	108.5	246.5	8.0	71.5	140	145	M8	2.50
65 59 510	114.3	129.5	267.5	8.0	92.5	180	200	M12	5.00
65 59 511	114.3	163.5	301.5	8.0	126.5	180	200	M12	4.20
65 59 512	114.3	105.5	243.5	8.0	68.5	180	200	M12	3.50
65 59 513	110.0	113.5	251.5	8.0	76.5	140	145	M8	2.70

An order should contain gearbox 58 05 0xx / 58 15 0xx and flange 65 59 5xx

Center Distance a_o = 100 mm

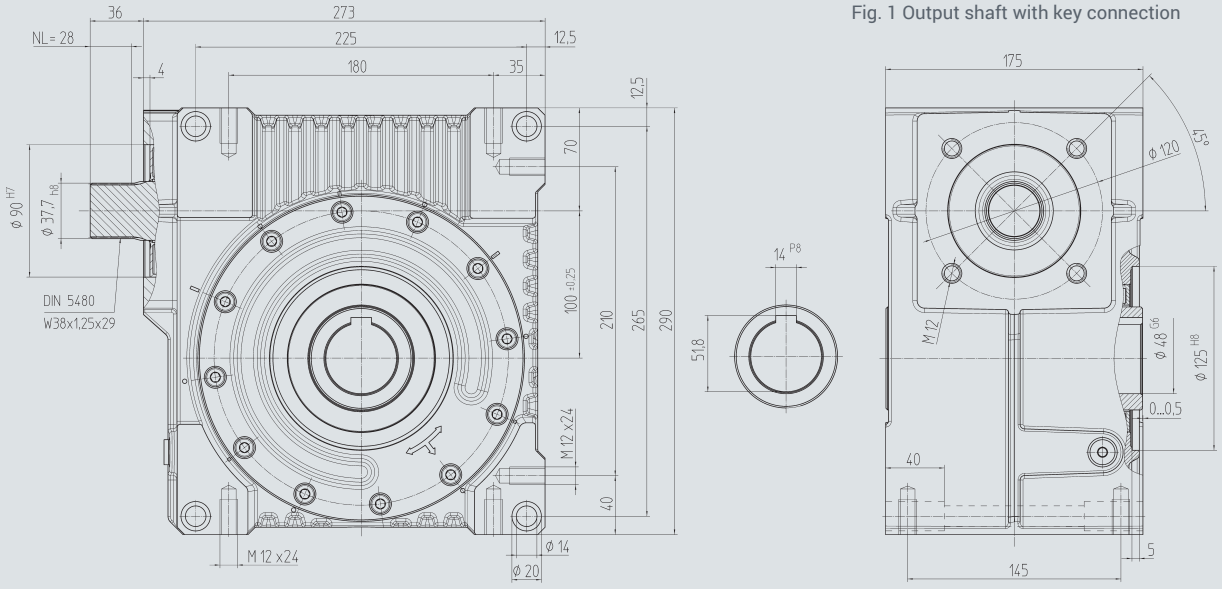


Fig. 1 Output shaft with key connection

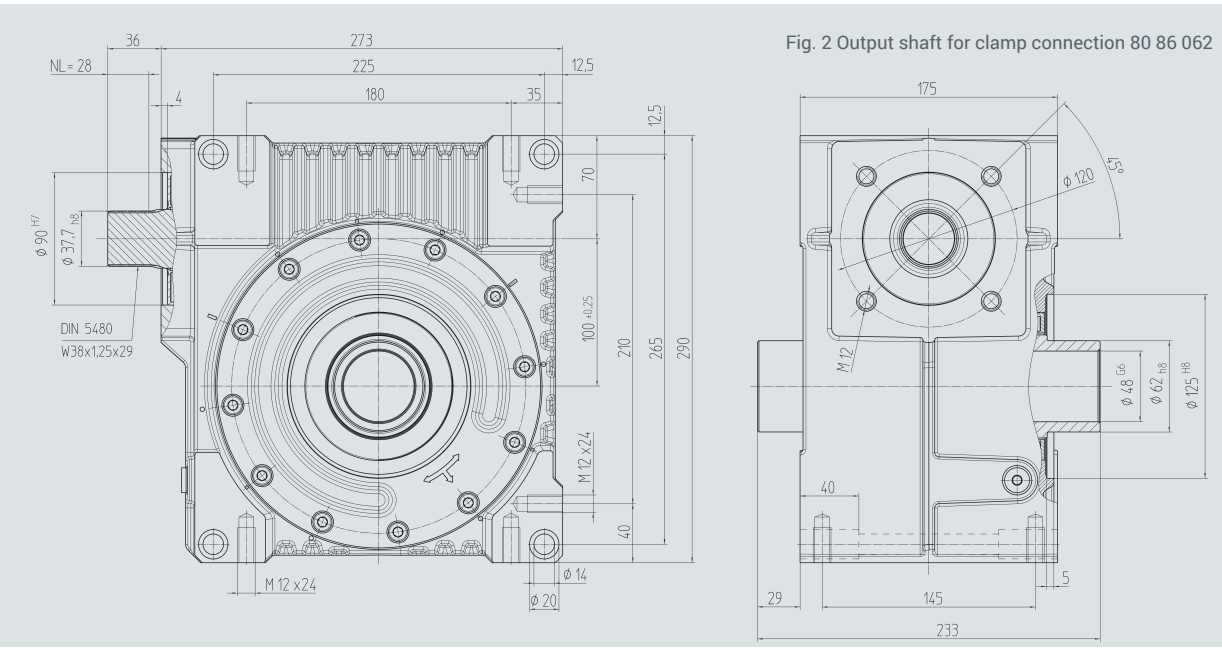


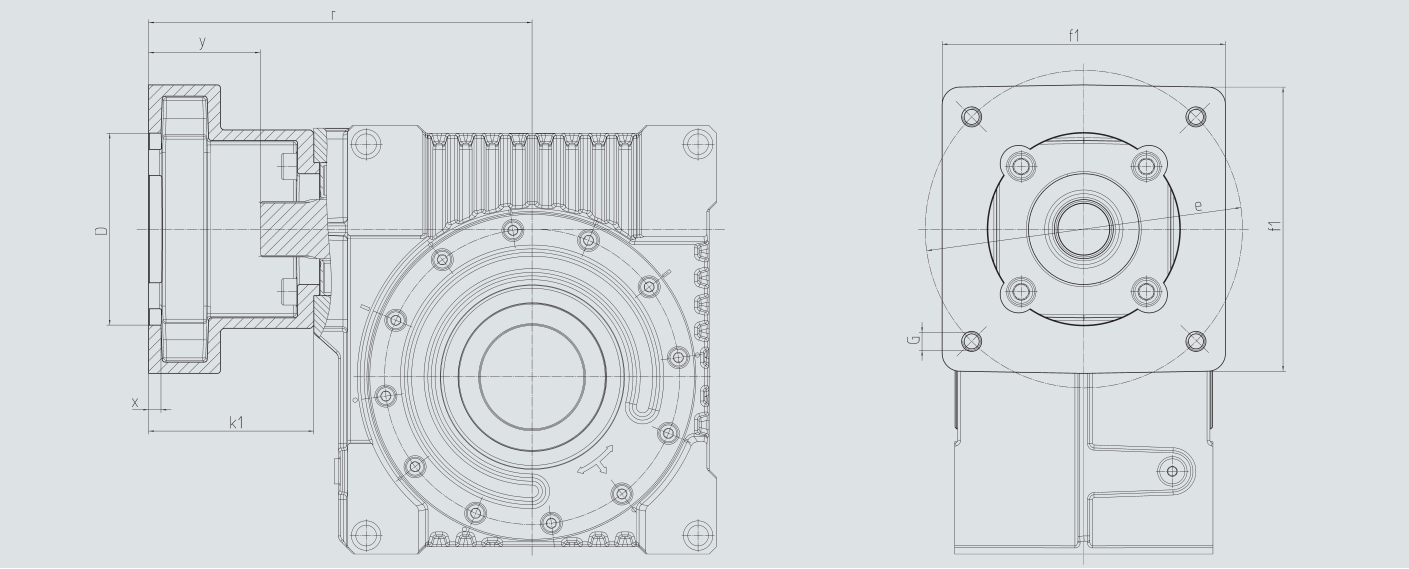
Fig. 2 Output shaft for clamp connection 80 86 062

Order Code Fig. 1	Fig. 2	Ratio i	kg	J_{red} 10^{-4} kg m²
58 06 005	**58 16 005**	4.75	37.0	22.9320
58 06 007	**58 16 007**	6.75	37.0	12.8835
58 06 009	**58 16 009**	9.25	37.0	8.0975
58 06 015	**58 16 015**	14.50	37.0	7.2190
58 06 020	**58 16 020**	19.50	37.0	5.4030
58 06 029	**58 16 029**	29.00	37.0	4.7207
58 06 039	**58 16 039**	39.00	37.0	8.4300
58 06 052	**58 16 052**	52.00	37.0	9.7400

With food grade oil: Order Code 58 06 **1**xx / 58 16 **1**xx
In ATEX with food grade oil: Order Code 58 06 **2**xx / 58 16 **2**xx

All dimensions are in mm

Motor Flange



Center Distance a_0 = 100 mm

Order Code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 501	110.0	92.0	240.0	8.0	55.0	140	165	M10	2.00
65 59 502	130.0	92.0	240.0	8.0	55.0	140	165	M10	1.90
65 59 503	180.0	122.0	270.0	8.0	85.0	192	215	M12	3.40
65 59 504	180.0	127.0	275.0	8.0	90.0	192	215	M12	3.80
65 59 505	180.0	112.0	260.0	10.0	75.0	192	215	M12	2.70
65 59 506	130.0	112.0	260.0	10.0	75.0	192	215	M12	3.00
65 59 507	130.0	112.0	260.0	10.0	75.0	140	165	M10	2.50
65 59 508	110.0	90.0	238.0	8.0	53.0	140	145	M8	2.00
65 59 509	110.0	108.5	256.5	8.0	71.5	140	145	M8	2.50
65 59 510	114.3	129.5	277.5	8.0	92.5	180	200	M12	5.00
65 59 511	114.3	163.5	311.5	8.0	126.5	180	200	M12	4.20
65 59 512	114.3	105.5	253.5	8.0	68.5	180	200	M12	3.50
65 59 513	110.0	113.5	261.5	8.0	76.5	140	145	M8	2.70

An order should contain gearbox 58 06 0xx / 58 16 0xx and flange 65 59 5xx

Center Distance a_o = 125 mm

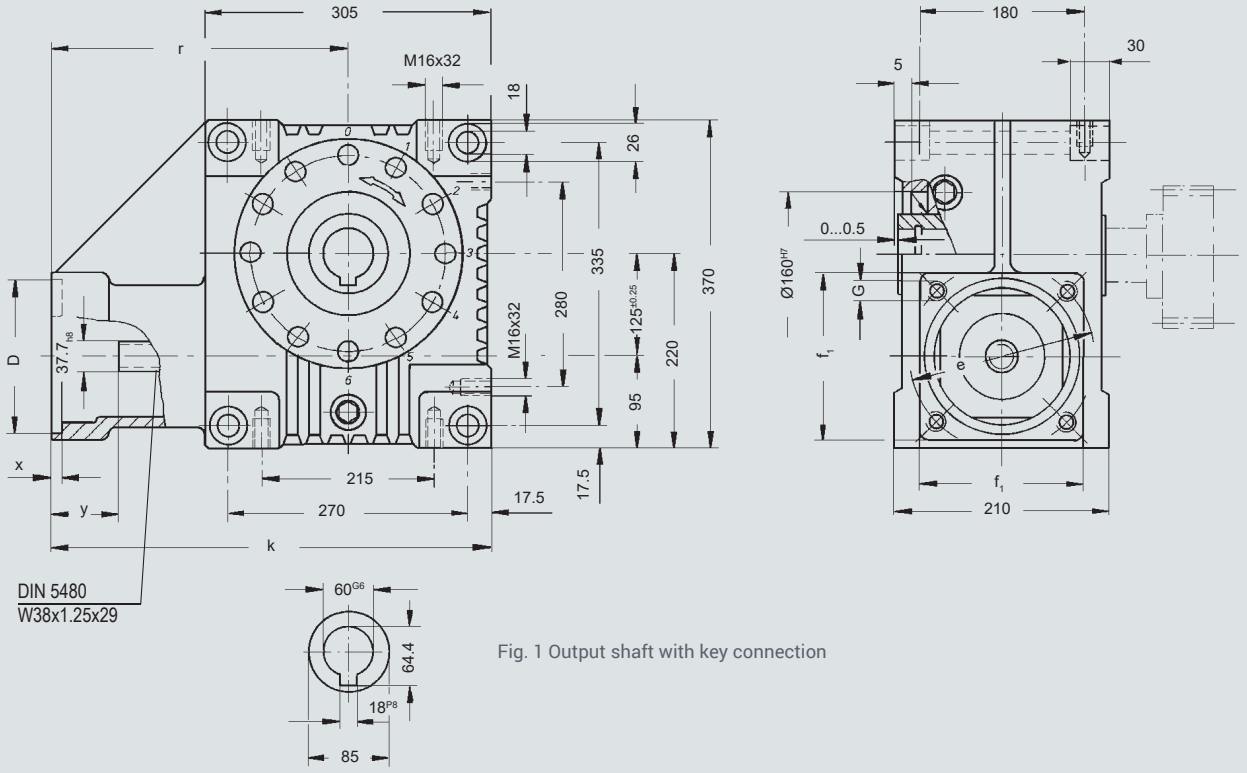


Fig. 1 Output shaft with key connection

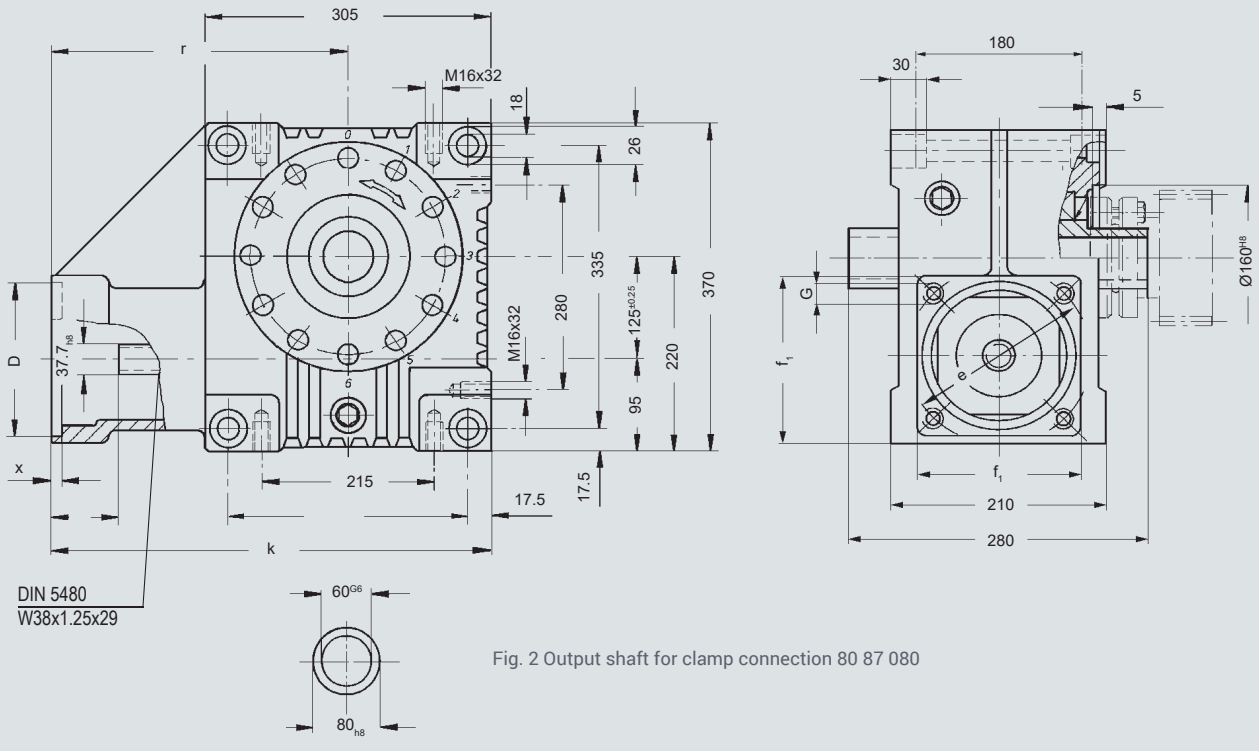


Fig. 2 Output shaft for clamp connection 80 87 080

All dimensions are in mm

Center Distance a_0 = 125 mm

Order Code Fig.1	Fig. 2	Ratio i	D^{G7}	k	r	x	y	f_1	e	G	kg	J_{red} 10^{-4} kg m²
58 47 007	**58 87 007**	6.75										35.9192
58 47 009	**58 87 009**	9.25										23.3256
58 47 015	**58 87 015**	14.50										25.5742
58 47 020	**58 87 020**	19.50	180	468	315.5	6	75	200	215	M12	68	16.4748
58 47 029	**58 87 029**	29.00										23.4384
58 47 039	**58 87 039**	39.00										15.3588
58 47 052	**58 87 052**	52.00										11.2943
58 47 107	**58 87 107**	6.75										35.9192
58 47 109	**58 87 109**	9.25										23.3256
58 47 115	**58 87 115**	14.50										25.5742
58 47 120	**58 87 120**	19.50	180	484	331.5	6	91	200	215	M12	68	16.4748
58 47 129	**58 87 129**	29.00										23.4384
58 47 139	**58 87 139**	39.00										15.3588
58 47 152	**58 87 152**	52.00										11.2943

Other center distances and ratios available on request

The values in the tables are based upon wear or maximum flank load at 12,000 hours full load and on servo-operation. Please see here for also our manual on our webpage **www.atlantadrives.com.** With continuous full-load operation it may be necessary to consider temperature limits! Please ask us if in doubt.

$T_{2max.}$ = static torque to avoid tooth fracture, T_1 = input torque in Nm, T_2 = output torque in Nm.

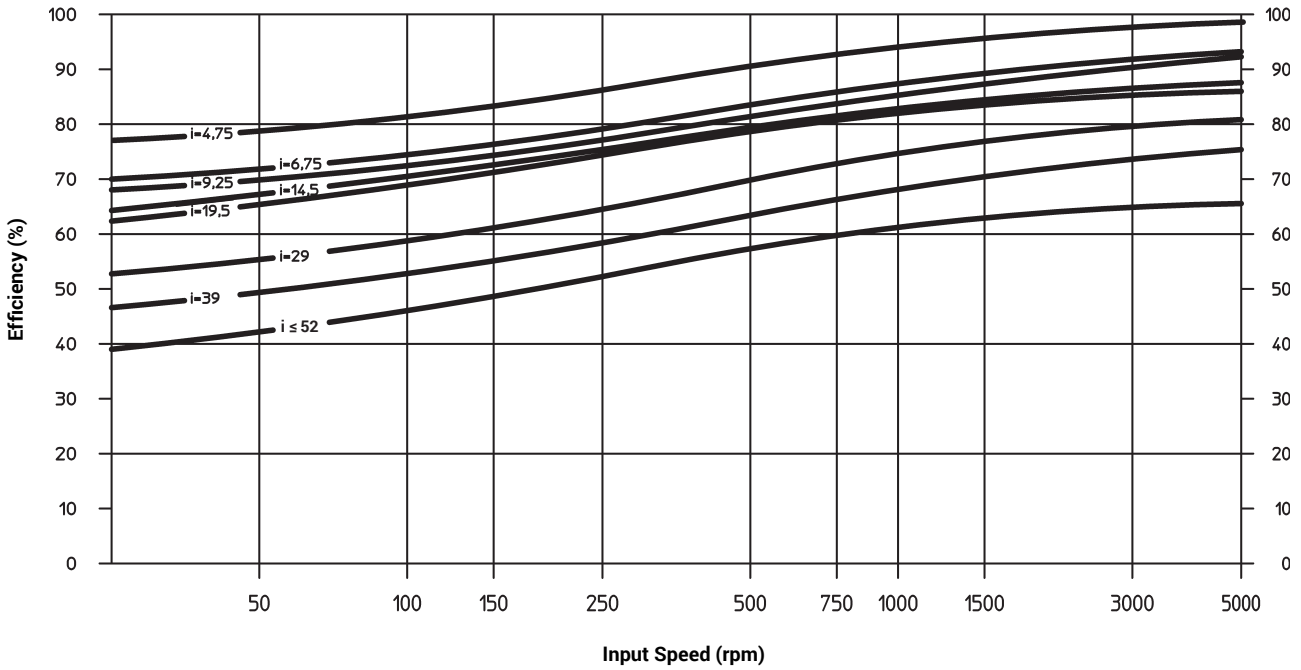
Order Code		a_0 (mm)	i	$T_{2\,max.}$	Input Speed n_1 (rpm) 250		500		750		1000		1500		2000	
					T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)
58 03 003	58 13 003	50	3.00*													
58 03 005	58 13 005		4.75	550	11.6	48	15.1	65	15.1	65	16.3	70	16.4	70	16.5	70
58 03 007	58 13 007		6.75	400	7.2	42	9.4	56	9.9	59	10.5	63	11.4	69	11.4	69
58 03 009	58 13 009		9.25	275	4.8	35	6.3	48	6.5	51	6.9	54	7.4	58	7.9	62
58 03 015	58 13 015		14.50	350	3.7	42	4.8	57	5.0	60	5.3	65	5.8	70	5.9	72
58 03 020	58 13 020		19.50	250	2.4	33	3.1	45	3.3	48	3.4	50	3.7	55	3.9	58
58 03 029	58 13 029		29.00	300	1.9	36	2.4	48	2.6	52	2.7	55	2.9	60	3.1	63
58 03 039	58 13 039		39.00	200	1.8	39	2.3	52	2.4	56	2.5	60	2.7	65	2.8	68
58 03 050	58 13 050		50.00	150	1.5	31	1.9	42	1.9	44	2.0	47	2.1	50	2.2	53
58 04 003	58 14 003	63	3.00*													
58 04 005	58 14 005		4.75	1000	37.6	163	38.9	170	41.2	180	41.3	180	39.2	170	37.4	162
58 04 007	58 14 007		6.75	750	21.5	129	27.9	170	29.4	180	29.4	180	27.9	170	26.6	162
58 04 009	58 14 009		9.25	500	10.8	85	14.2	115	15.3	125	15.9	130	16.4	135	16.4	135
58 04 015	58 14 015		14.50	600	11.1	132	13.6	165	14.7	180	14.7	180	14.7	180	14.5	177
58 04 020	58 14 020		19.50	500	5.6	87	7.2	115	7.7	125	8.0	130	8.3	135	9.0	145
58 04 029	58 14 029		29.00	650	6.9	137	8.4	175	9.1	190	9.7	205	10.5	220	10.1	212
58 04 039	58 14 039		39.00	450	4.2	106	5.2	140	5.5	150	5.8	160	6.4	175	6.6	180
58 04 052	58 14 052		52.00	300	2.4	71	3.0	95	3.3	105	3.5	115	3.8	125	4.0	133
58 05 003	58 15 003	80	3.00*													
58 05 005	58 15 005		4.75	2000	102.9	453	94.9	420	85.9	380	81.5	360	75.0	330	71.5	313
58 05 007	58 15 007		6.75	1400	65.2	402	67.6	420	61.1	380	57.8	360	53.2	330	50.7	313
58 05 009	58 15 009		9.25	1100	37.5	310	44.2	370	44.1	370	42.9	360	39.3	330	37.5	313
58 05 015	58 15 015		14.50	1300	34.9	431	35.9	450	35.8	450	33.4	420	29.4	370	27.5	345
58 05 020	58 15 020		19.50	1000	21.9	353	22.5	370	24.2	400	24.1	400	21.7	360	20.9	347
58 05 029	58 15 029		29.00	1200	22.9	498	23.3	520	24.5	550	23.6	530	21.8	490	20.8	467
58 05 039	58 15 039		39.00	850	15.0	412	15.1	430	16.0	460	17.0	490	16.7	480	15.9	457
58 05 052	58 15 052		52.00	600	6.3	216	6.6	240	7.1	260	7.5	275	8.2	300	8.5	310
58 06 005	58 16 005	100	4.75	3300	234.2	1043	197.3	880	179.6	800	169.1	750	154.3	685	147.1	650
58 06 007	58 16 007		6.75	2300	127.2	797	131.8	830	119.1	750	114.8	720	105.3	660	101.3	633
58 06 009	58 16 009		9.25	1900	94.3	794	97.6	830	88.1	750	84.8	720	77.7	660	74.8	633
58 06 015	58 16 015		14.50	2050	70.0	892	72.2	930	68.2	880	62.9	810	55.9	720	53.5	687
58 06 020	58 16 020		19.50	1800	51.8	861	53.3	900	51.3	870	47.8	810	42.5	720	40.6	687
58 06 029	58 16 029		29.00	2300	48.7	1103	49.9	1150	46.1	1070	43.7	1010	36.8	850	36.2	833
58 06 039	58 16 039		39.00	1650	35.2	1034	35.8	1080	34.0	1030	33.0	1000	29.7	900	28.5	860
58 06 052	58 16 052		52.00	1100	20.7	759	20.0	760	21.5	820	22.3	850	20.6	785	19.7	750
58 47 _07	58 87 _07	125	4.75	6450	287.3	1815	260.3	1650	236.7	1500	221.1	1400	206.0	1300	198.7	1250
58 47 _09	58 87 _09		9.25	4400	179.3	1534	186.0	1600	168.4	1450	156.9	1350	139.8	1200	134.3	1150
58 47 _15	58 87 _15		14.50	5850	145.3	1874	138.7	1800	127.0	1650	134.8	1750	115.8	1500	111.1	1433
58 47 _20	58 87 _20		19.50	3900	106.5	1825	101.1	1750	92.2	1600	86.3	1500	80.8	1400	77.1	1333
58 47 _29	58 87 _29		29.00	5700	98.0	2290	93.0	2200	86.4	2050	82.2	1950	76.3	1800	73.0	1717
58 47 _39	58 87 _39		39.00	3800	71.6	2190	67.5	2100	62.4	1950	59.2	1850	54.6	1700	52.7	1633
58 47 _52	58 87 _52		52.00	2500	46.2	1801	45.0	1800	42.3	1700	39.8	1600	37.4	1500	35.8	1433

* on request

All dimensions are in mm

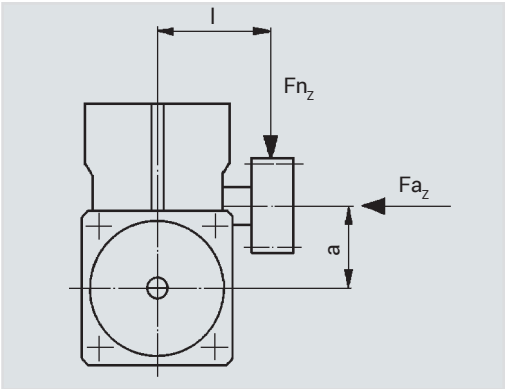
Input Speed n_1 (rpm)															
2500		3000		3500		4000		4500		5000		5500		6000	
T. (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)
25.0	70	16.8	70	16.3	67	15.8	65	15.5	63	15.1	61	14.3	57	13.6	53
17.2	69	11.6	69	11.3	67	11.0	65	10.7	63	10.5	61	9.9	57	9.4	54
12.6	66	8.9	70	8.9	70	8.9	70	8.7	67	8.4	65	8.0	61	7.6	58
9.1	73	6.2	75	6.2	75	6.3	75	6.3	75	6.4	75	6.1	70	5.8	67
6.1	61	4.3	65	4.3	65	4.3	65	4.3	65	4.4	65	4.2	61	4.0	58
4.9	67	3.5	70	3.5	70	3.5	70	3.4	67	3.3	65	3.2	61	3.0	57
4.4	71	3.1	75	3.1	75	3.1	75	3.1	75	3.1	75	3.0	70	2.9	66
3.4	57	2.4	60	2.4	60	2.4	60	2.4	60	2.4	60	2.5	62	2.5	64
53.4	153	34.0	145	32.9	140	31.9	135	29.6	124	27.5	115				
38.1	153	24.1	145	23.4	140	22.7	135	21.1	125	19.8	116	18.6	109		
24.6	135	16.5	135	16.0	130	15.6	126	14.6	117	13.8	110	13.0	104	12.4	98
21.4	173	14.1	170	13.7	165	13.4	160	12.5	148	11.7	138	11.1	130		
14.4	155	10.3	165	9.9	160	9.7	155	9.1	144	8.6	136	8.2	128	7.8	121
14.6	203	9.4	195	9.3	190	9.1	185	8.5	171	8.0	159	7.6	149		
10.2	185	7.0	190	7.0	190	7.1	190	6.7	177	6.3	166	6.0	156	5.7	148
6.5	142	4.6	150	4.8	155	5.0	160	4.8	155	4.6	145	4.4	137	4.2	129
102.2	297	64.6	280	58.9	254	53.2	228								
72.4	297	45.7	280	42.0	256	38.2	232	35.3	213	32.9	198				
53.5	297	33.8	280	31.2	257	28.5	234	26.6	217	24.8	202	23.3	189		
38.5	320	23.8	295	21.9	270	20.0	245	18.5	226	17.3	210				
30.3	333	19.5	320	18.0	295	16.6	269	15.4	250	14.5	233	13.6	218		
29.9	443	19.0	420	17.5	384	16.0	348	14.9	322						
22.8	433	14.5	410	13.4	377	12.4	345	11.5	319	10.8	297	10.2	278		
13.2	320	9.1	330	9.1	330	9.2	330	8.6	308	8.2	288	7.8	271		
209.5	615	132.3	580												
146.1	607	93.5	580	84.3	521	69.2	426								
107.9	607	69.0	580	62.9	526	52.2	436	53.2	442	49.6	410				
76.6	653	48.6	620	44.0	559	40.2	509								
58.2	653	37.0	620	33.7	564	31.1	516	28.8	477	26.8	442				
53.6	817	35.2	800	31.9	721										
41.0	820	26.1	780	23.9	708	19.9	587	20.4	597						
28.2	715	18.0	680	16.5	621	15.3	570	14.3	528	12.6	461				
191.2	1200	183.8	1150												
128.8	1100	123.4	1050	112.5	955	101.3	856								
106.3	1367	101.4	1300												
73.5	1267	69.8	1200	63.1	1081	57.6	985								
69.9	1633	66.6	1550												
50.8	1567	48.9	1500	44.2	1349										
34.2	1367	32.7	1300	29.9	1182	27.4	1081								

Gearing efficiency of servo worm gearboxes with driving worm and under full load.



Additional Loads On Gearbox Output

The data given are reference values. You should consider the values arising from the choice of the tooth system. It is assumed that the point of action of the force is the center of the shaft. In cases where additional axial forces occur, over and above high transverse forces, please ask for advice.



Center Distance	a (mm)	50		63		80		100		125	
Dimension from center of housing to center of teeth											
l (mm)		90	140	110	160	125	175	140	190	175	220
Max. Additional Load:											
Radial Fn$_z$	[N]	3600	2300	5000	3500	8400	6000	10000	7500	21000	16000
Axial Fa$_z$	[N]	1800	1800	2500	2500	4000	4000	5000	5000	10000	10000
Only Axial Load (Fn=0)	Fa$_z$ [N]	3000		5000		12000		15000		25000	

All dimensions are in mm

Center Distance a_o = 32 mm

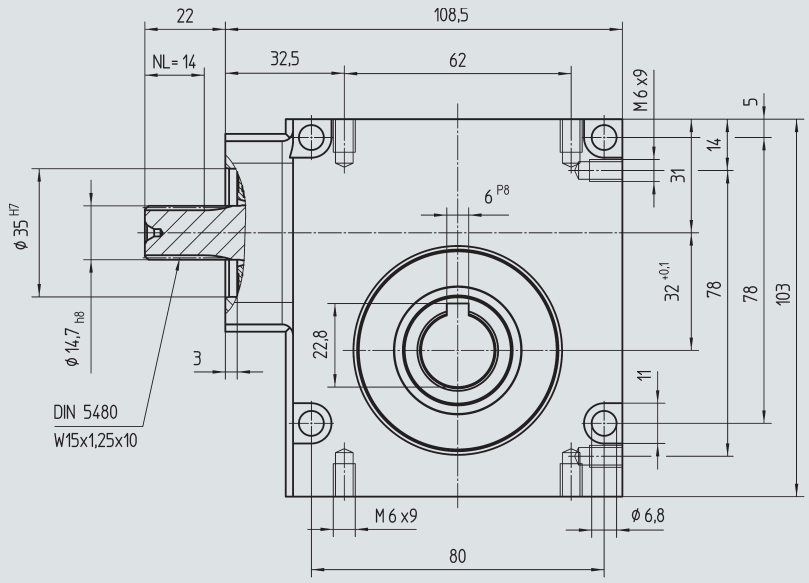
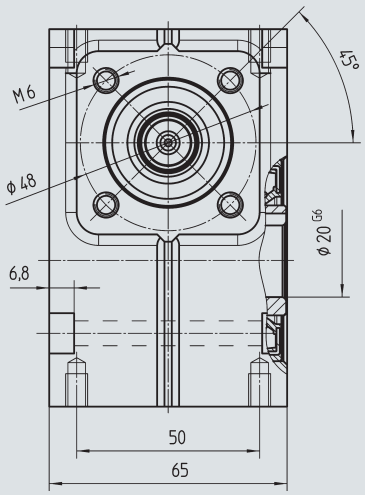


Fig. 1 Output shaft with key connection



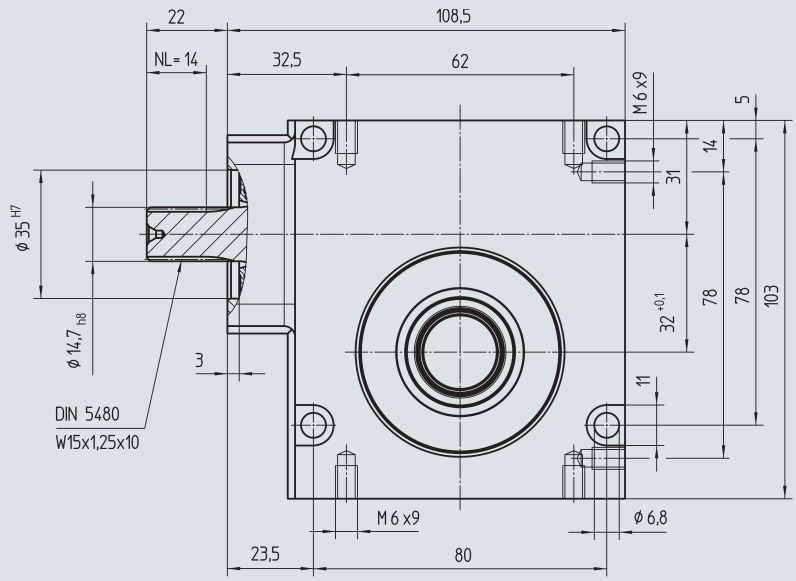
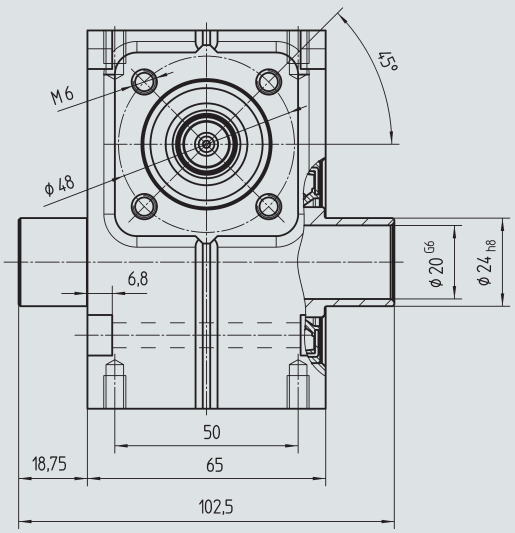


Fig. 2 Output shaft for clamp connection 80 81 024

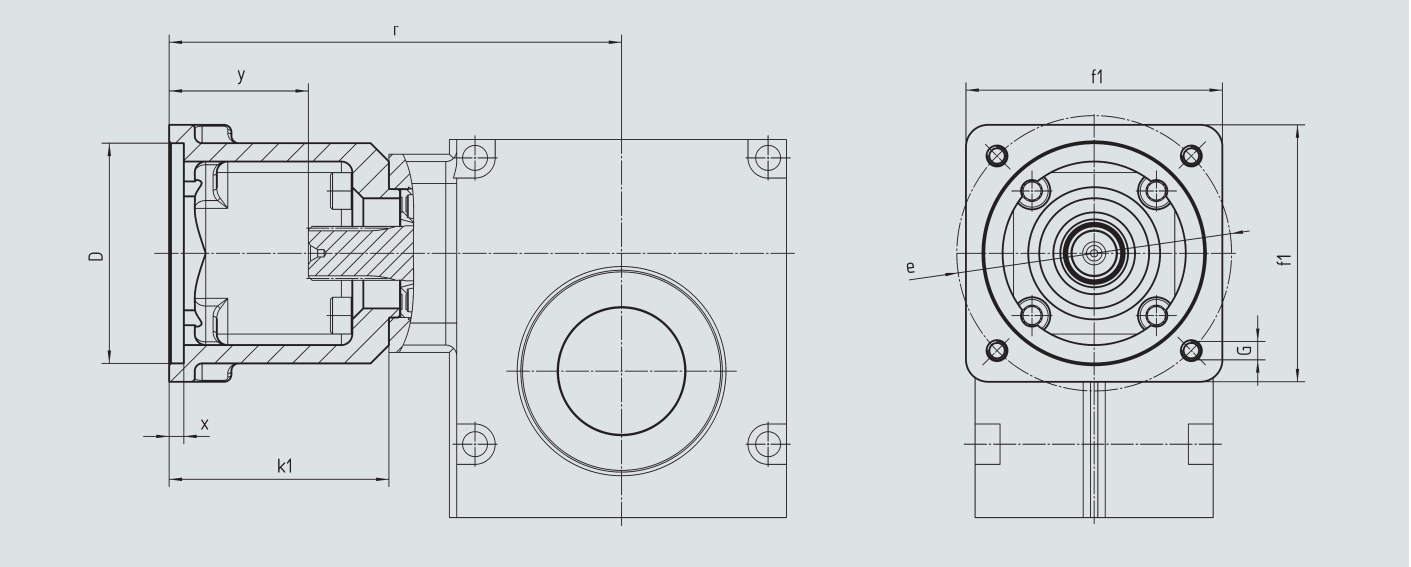


Order Code Fig. 1	Fig. 2	Ratio i	kg	J_{red} 10^{-4} kg m²
59 01 005	**59 11 005**	4.75	2.0	1.1109
59 01 007	**59 11 007**	6.75	2.0	1.0574
59 01 009	**59 11 009**	9.25	2.0	8.1272
59 01 015	**59 11 015**	14.50	2.0	8.4039
59 01 020	**59 11 020**	19.50	2.0	6.9016
59 01 029	**59 11 029**	29.00	2.0	8.4475
59 01 039	**59 11 039**	39.00	2.0	7.0256
59 01 050	**59 11 050**	50.00	2.0	6.4653

With food grade oil: Order Code 59 01 **1**xx / 59 11 1xx
In ATEX withfood grade oil: Order Code 59 01 **2**xx / 59 11**2**xx

All dimensions are in mm

Motor Flange



Center Distance a_o = 32 mm

Order Code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 101	40.0	56.5	120.0	2.5	34.5	60	63	M5	0.26
65 59 102	50.0	64.0	127.5	4.0	42.0	60	70	M5	0.29
65 59 103	60.0	60.0	123.5	3.5	38.0	70	75	M5	0.28
65 59 104	80.0	64.0	127.5	4.5	42.0	85	100	M6	0.30
65 59 105	60.0	64.0	127.5	4.5	42.0	85	90	M5	0.30
65 59 107	40.0	56.5	120.0	2.5	34.5	60	63	M4	0.31
65 59 108	70.0	64.0	127.5	5.0	42.0	85	90	M6	0.26

An order should contain gearbox 59 01 0xx / 59 11 0xx and flange 65 59 1xx

Center Distance a_o = 50 mm

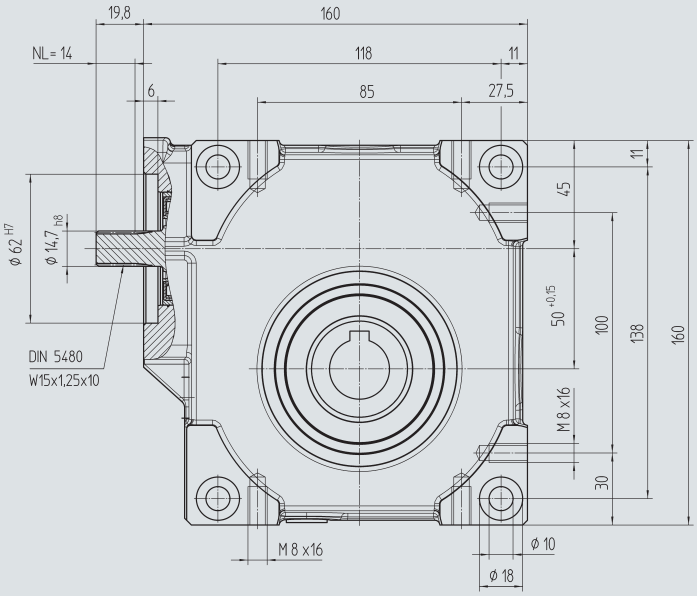
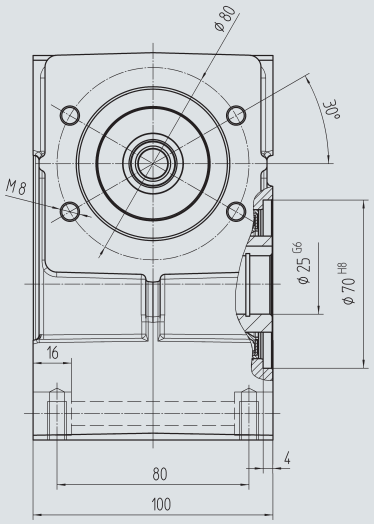


Fig. 1 Output shaft with key connection



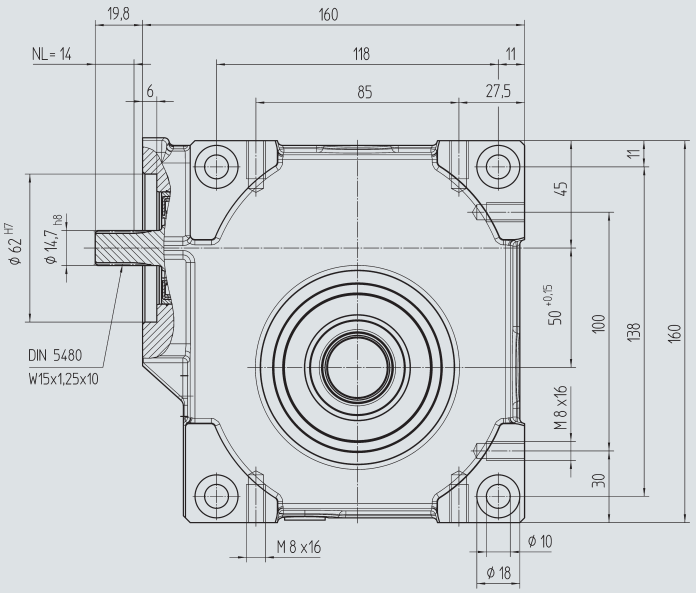
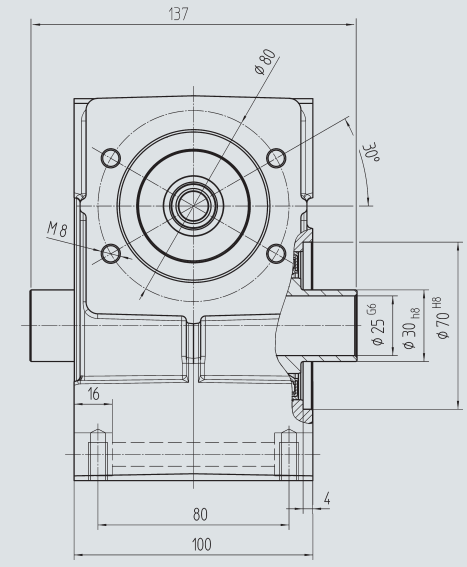


Fig. 2 Output shaft for clamp connection 80 83 030

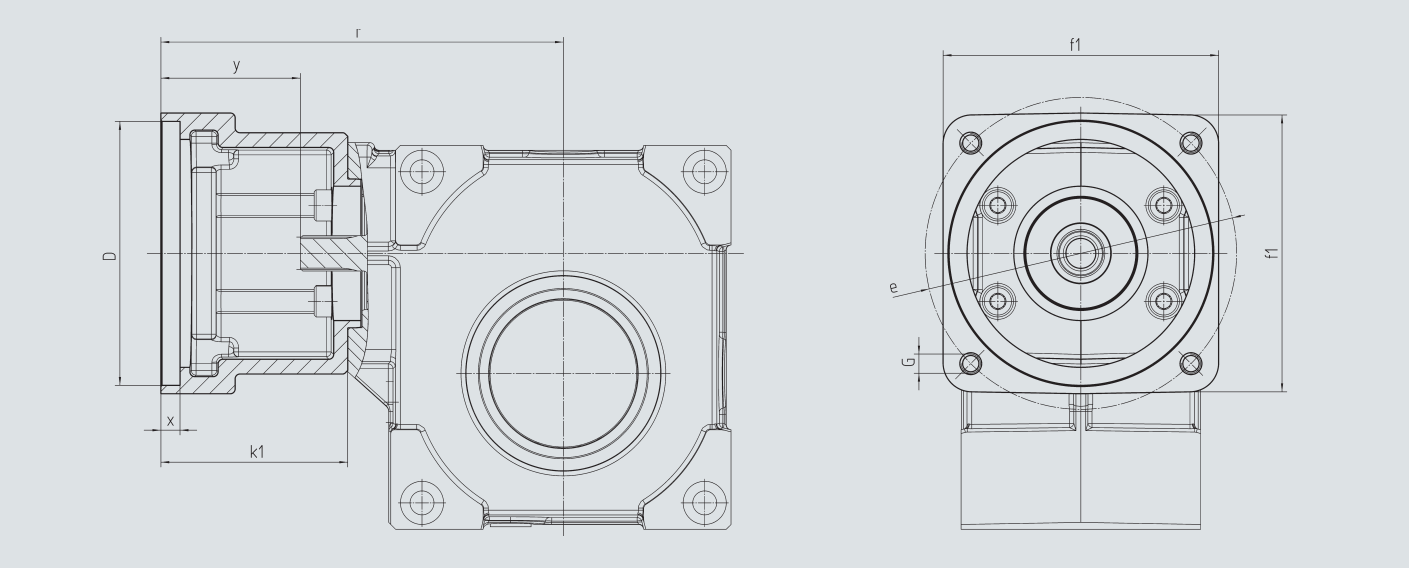


Order Code Fig. 1	Fig. 2	Ratio i	kg	J_{red} 10^{-4} kg m²
59 03 005	**59 13 005**	4.75	6.5	0.8280
59 03 007	**59 13 007**	6.75	6.5	0.4140
59 03 009	**59 13 009**	9.25	6.5	0.3490
59 03 015	**59 13 015**	14.50	6.5	0.2800
59 03 020	**59 13 020**	19.50	6.5	0.1960
59 03 029	**59 13 029**	29.00	6.5	0.2694
59 03 039	**59 13 039**	39.00	6.5	0.2310
59 03 050	**59 13 050**	50.00	6.5	0.2140

With food grade oil: Order Code 59 03 **1**xx / 59 13 **1**xx
In ATEX with food grade oil: Order Code 59 03 **2**xx / 59 13 **2**xx

All dimensions are in mm

Motor Flange



Center Distance a_o = 50 mm

Order Code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 301	95.0	62	152	12.5	42	100	115	M8	0.60
65 59 302	50.0	62	152	10.0	42	100	70; 95; 115	M4; M6; M8	0.70
65 59 303	80.0	62	152	10.0	42	100	100	M6	0.65
65 59 304	95.0	78	168	10.0	59	115	130	M8	0.80
65 59 306	60.0	74	164	21.0	54	100	75; 90; 115	M5; M5; M8	0.90
65 59 307	70.0	70	160	21.0	50	100	90; 115	M6; M8	0.80
65 59 401	95.0	73	163	8.0	53	100	115	M8	0.75
65 59 402	110.0	78	168	8.0	59	115	130	M8	0.80
65 59 403	95.0	73	163	12.0	53	115	130	M8	0.75
65 59 404	110.0	73	163	12.0	53	115	130	M8	0.70
65 59 405	95.0	78	168	11.0	59	140	165	M10	1.20
65 59 406	110.0	78	168	11.0	59	140	165	M10	1.15
65 59 407	130.0	78	168	11.0	59	140	165	M10	1.00
65 59 409	130.0	98	188	14.0	78	140	165	M10	1.10
65 59 410	110.0	74	164	8.0	54	120	145	M8	1.00
65 59 411	110.0	84	174	8.0	64	120	145	M8	1.20
65 59 412	114.3	105	195	8.0	85	180	200	M12	3.70
65 59 413	114.3	139	229	8.0	119	180	200	M12	3.35
65 59 414	114.3	91	181	8.0	71	180	200	M12	2.65
65 59 415	110.0	89	179	8.0	69	120	145	M8	1.30

An order should contain gearbox 59 03 0xx / 59 13 0xx and flange 65 59 3xx or 4xx.

Center Distance a_o = 63 mm

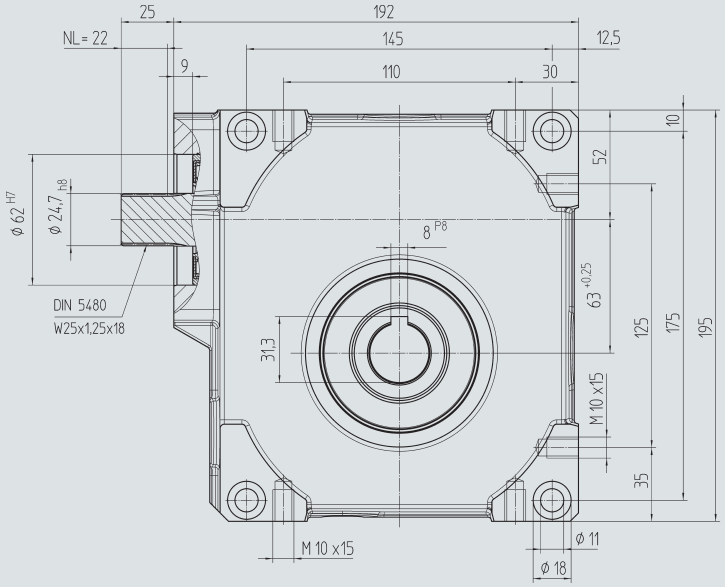
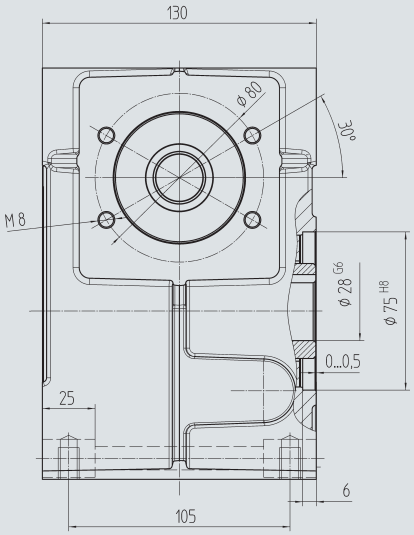


Fig. 1 Output shaft with key connection



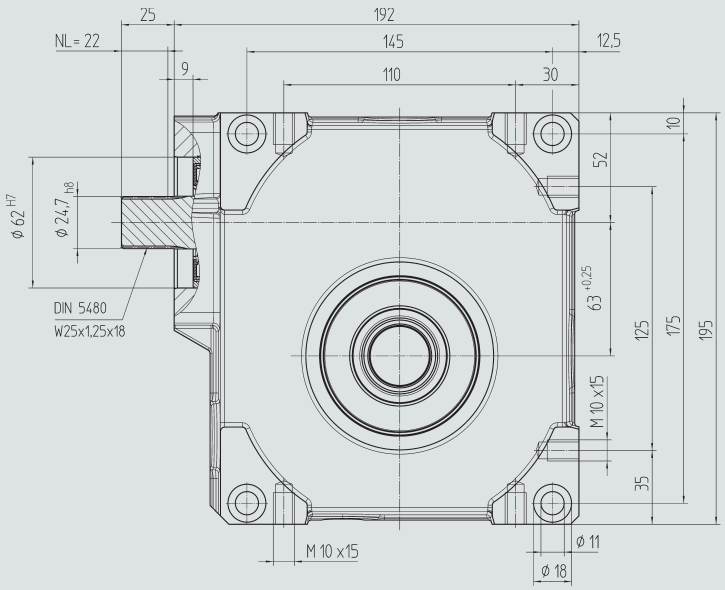
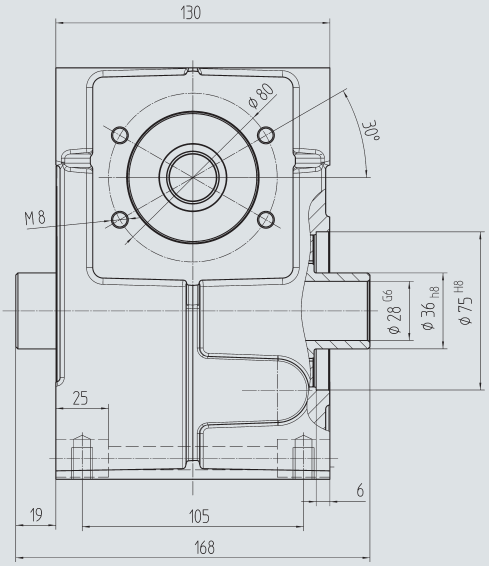


Fig. 2 Output shaft for clamp connection 80 84 036

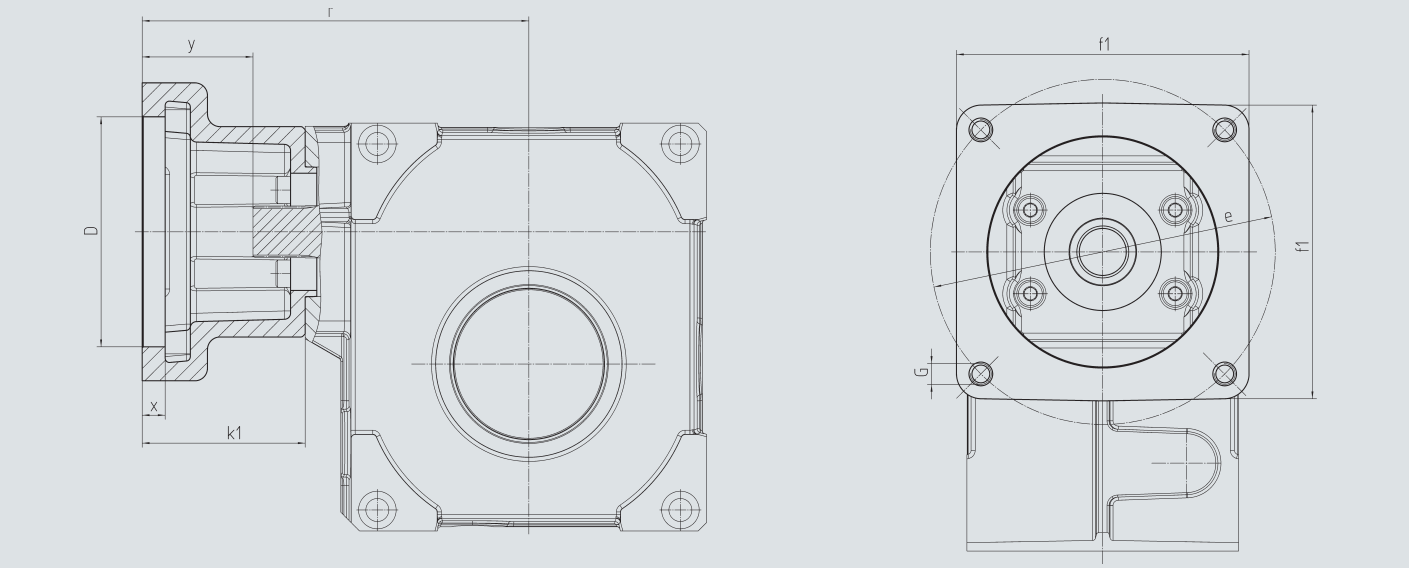


Order Code Fig. 1	Fig. 2	Ratio i	kg	J_{red} 10^{-4} kg m²
59 04 005	**59 14 005**	4.75	11.5	2.5350
59 04 007	**59 14 007**	6.75	11.5	1.3720
59 04 009	**59 14 009**	9.25	11.5	0.9825
59 04 015	**59 14 015**	14.50	11.5	0.9590
59 04 020	**59 14 020**	19.50	11.5	0.6940
59 04 029	**59 14 029**	29.00	11.5	0.9966
59 04 039	**59 14 039**	39.00	11.5	1.0100
59 04 052	**59 14 052**	52.00	11.5	0.5305

With food grade oil: Order Code 59 04 **1**xx / 59 14 **1**xx
In ATEX with food grade oil: Order Code 59 04 **2**xx / 59 14 **2**xx

All dimensions are in mm

Motor Flange



Center Distance a_o = 63 mm

Order Code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 301	95.0	62	152	12.5	42	100	115	M8	0.60
65 59 302	50.0	62	152	10.0	42	100	70; 95; 115	M4; M6; M8	0.70
65 59 303	80.0	62	152	10.0	42	100	100	M6	0.65
65 59 304	95.0	78	168	10.0	59	115	130	M8	0.80
65 59 306	60.0	74	164	21.0	54	100	75; 90; 115	M5; M5; M8	0.90
65 59 307	70.0	70	160	21.0	50	100	90; 115	M6; M8	0.80
65 59 401	95.0	73	163	8.0	53	100	115	M8	0.75
65 59 402	110.0	78	168	8.0	59	115	130	M8	0.80
65 59 403	95.0	73	163	12.0	53	115	130	M8	0.75
65 59 404	110.0	73	163	12.0	53	115	130	M8	0.70
65 59 405	95.0	78	168	11.0	59	140	165	M10	1.20
65 59 406	110.0	78	168	11.0	59	140	165	M10	1.15
65 59 407	130.0	78	168	11.0	59	140	165	M10	1.00
65 59 409	130.0	98	188	14.0	78	140	165	M10	1.10
65 59 410	110.0	74	164	8.0	54	120	145	M8	1.00
65 59 411	110.0	84	174	8.0	64	120	145	M8	1.20
65 59 412	114.3	105	195	8.0	85	180	200	M12	3.70
65 59 413	114.3	139	229	8.0	119	180	200	M12	3.35
65 59 414	114.3	91	181	8.0	71	180	200	M12	2.65
65 59 415	110.0	89	179	8.0	69	120	145	M8	1.30

An order should contain gearbox 59 04 0xx / 59 14 0xx and flange 65 59 3xx or 4xx.

Center Distance a_o = 80 mm

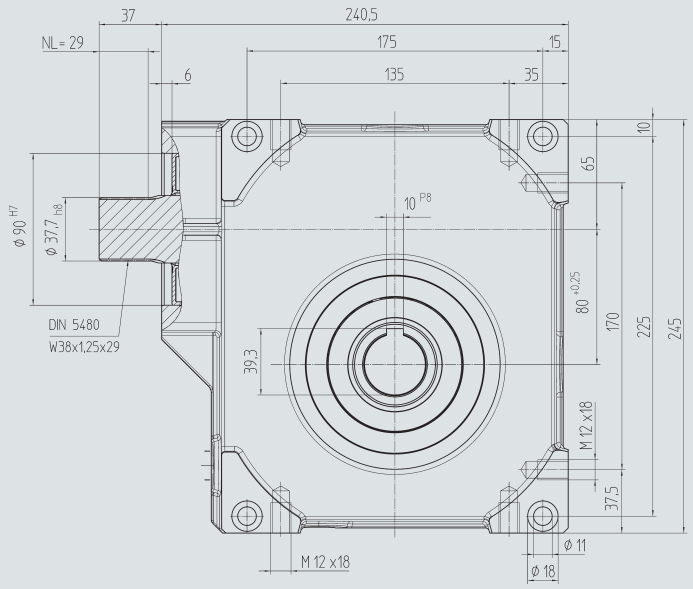
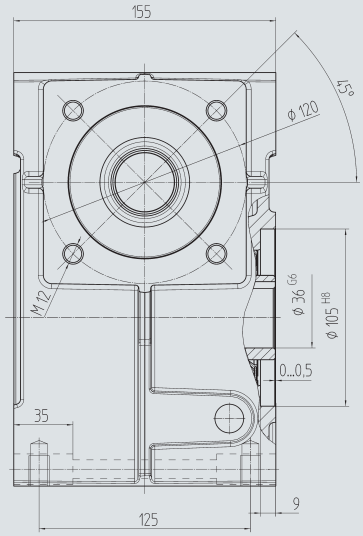


Fig. 1 Output shaft with key connection



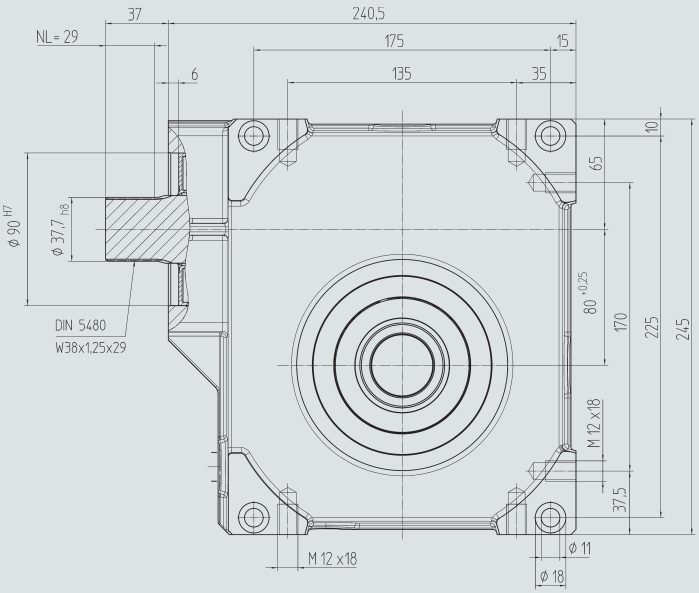
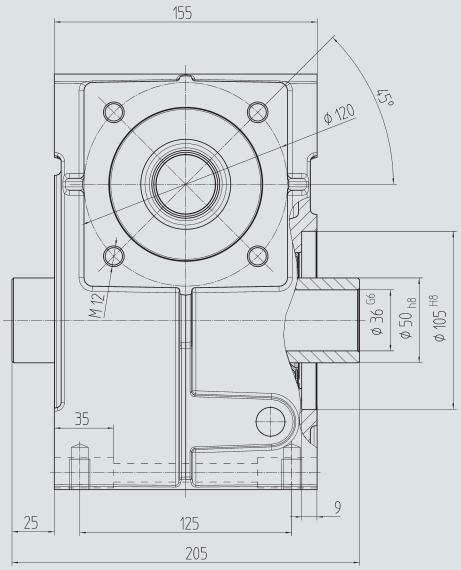


Fig. 2 Output shaft for clamp connection 80 85 050

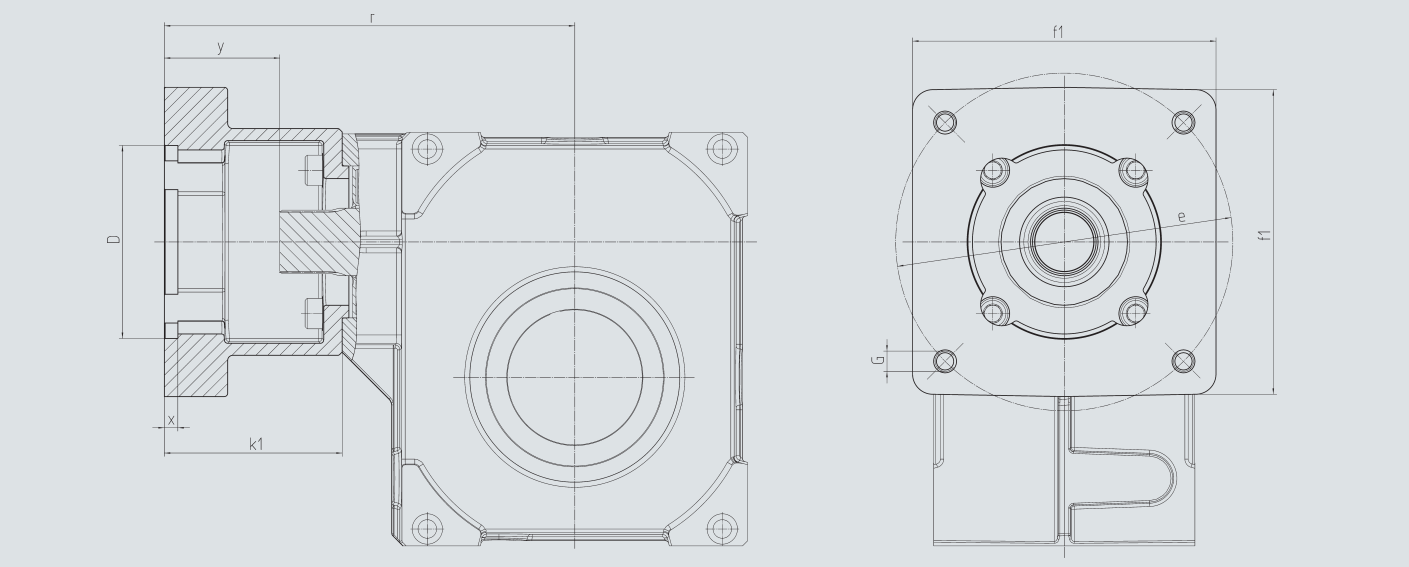


Order Code Fig. 1	Fig. 2	Ratio i	kg	J_{red} 10^{-4} kg m²
59 05 005	**59 15 005**	4.75	22.0	9.6180
59 05 007	**59 15 007**	6.75	22.0	6.0910
59 05 009	**59 15 009**	9.25	22.0	4.7650
59 05 015	**59 15 015**	14.50	22.0	5.3080
59 05 020	**59 15 020**	19.50	22.0	3.9350
59 05 029	**59 15 029**	29.00	22.0	4.0500
59 05 039	**59 15 039**	39.00	22.0	4.1800
59 05 052	**59 15 052**	52.00	22.0	3.7140

With food grade oil: Order Code 59 05 **1**xx / 59 15 **1**xx
In ATEX with food grade oil: Order Code 59 05 **2**xx / 59 15 **2**xx

All dimensions are in mm

Motor Flange



Center Distance a_0 = 80 mm

Order Code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 501	110.0	92.0	230.0	8.0	55.0	140	165	M10	2.00
65 59 502	130.0	92.0	230.0	8.0	55.0	140	165	M10	1.90
65 59 503	180.0	122.0	260.0	8.0	85.0	192	215	M12	3.40
65 59 504	180.0	127.0	265.0	8.0	90.0	192	215	M12	3.80
65 59 505	180.0	112.0	250.0	10.0	75.0	192	215	M12	2.70
65 59 506	130.0	112.0	250.0	10.0	75.0	192	215	M12	3.00
65 59 507	130.0	112.0	250.0	10.0	75.0	140	165	M10	2.50
65 59 508	110.0	90.0	228.0	8.0	53.0	140	145	M8	2.00
65 59 509	110.0	108.5	246.5	8.0	71.5	140	145	M8	2.50
65 59 510	114.3	129.5	267.5	8.0	92.5	180	200	M12	5.00
65 59 511	114.3	163.5	301.5	8.0	126.5	180	200	M12	4.20
65 59 512	114.3	105.5	243.5	8.0	68.5	180	200	M12	3.50
65 59 513	110.0	113.5	251.5	8.0	76.5	140	145	M8	2.70

An order should contain gearbox 59 05 0xx / 59 15 0xx and flange 65 59 5xx

Center Distance a_o = 100 mm

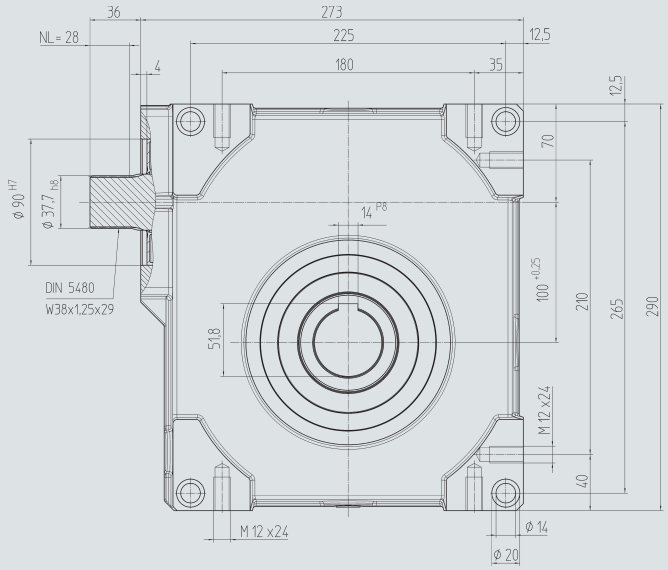
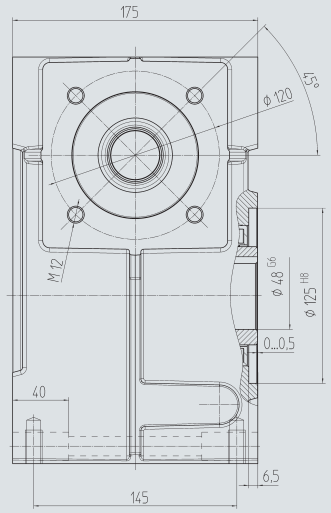


Fig. 1 Output shaft with key connection



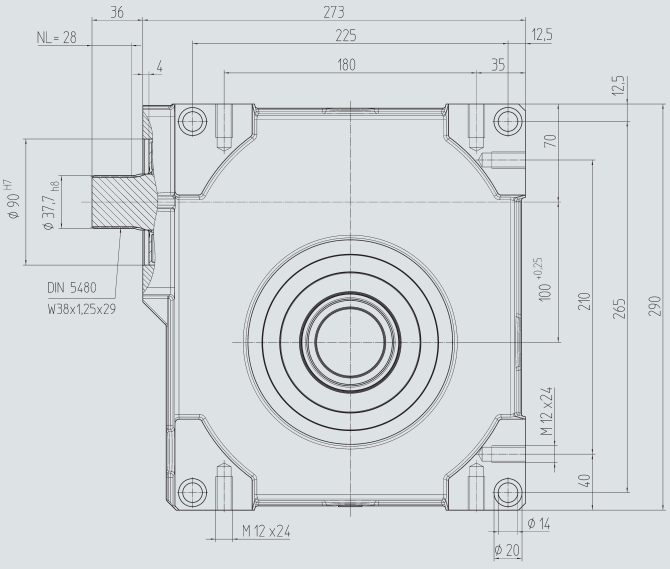
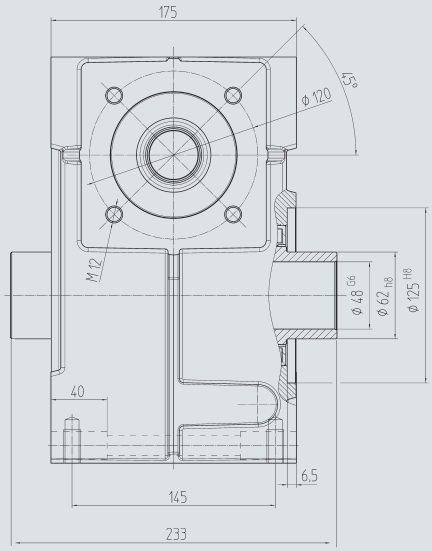


Fig. 2 Output shaft for clamp connection 80 86 062

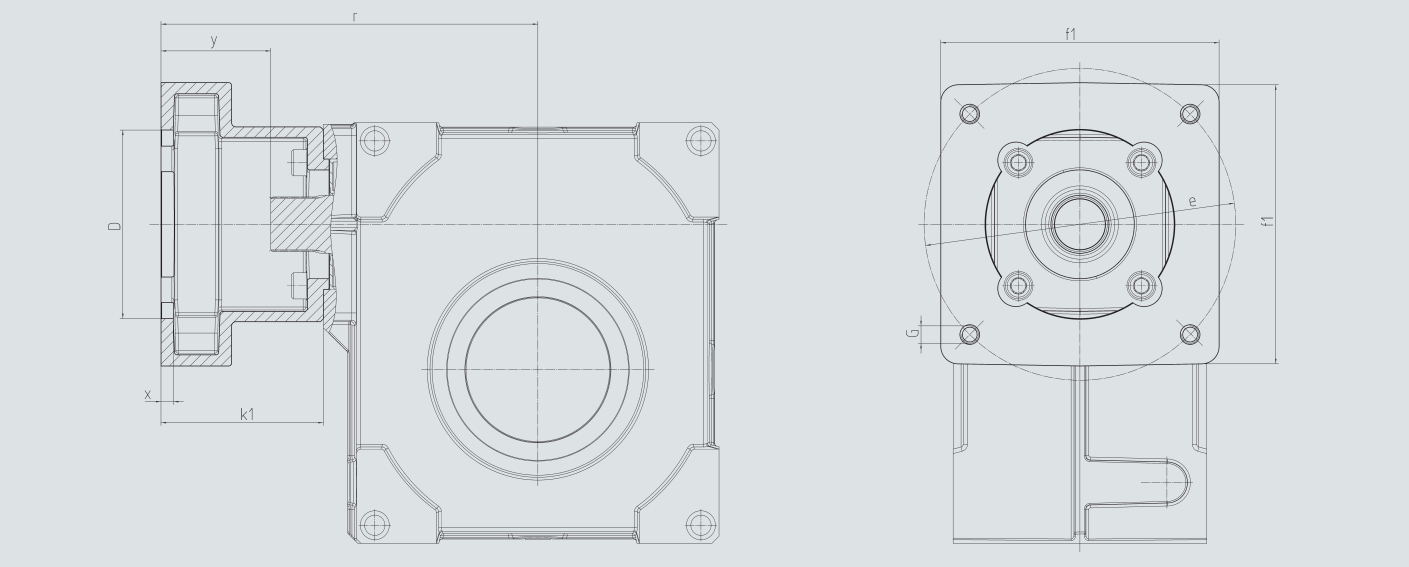


Order Code Fig. 1	Fig. 2	Ratio i	kg	J_{red} 10^{-4} kg m²
59 06 005	**59 16 005**	4.75	37.0	22.9320
59 06 007	**59 16 007**	6.75	37.0	12.8835
59 06 009	**59 16 009**	9.25	37.0	8.0975
59 06 015	**59 16 015**	14.50	37.0	7.2190
59 06 020	**59 16 020**	19.50	37.0	5.4030
59 06 029	**59 16 029**	29.00	37.0	4.7207
59 06 039	**59 16 039**	39.00	37.0	8.4300
59 06 052	**59 16 052**	52.00	37.0	9.7400

With food grade oil: Order Code 59 06 **1**xx / 59 16 **1**xx
In ATEX with food grade oil: Order Code 59 06 **2**xx / 59 16 **2**xx

All dimensions are in mm

Motor Flange



Center Distance a_0 = 100 mm

Order Code	D^{G7}	k_1	r	x	y	f_1	e	G	kg
65 59 501	110.0	92.0	230.0	8.0	55.0	140	165	M10	2.00
65 59 502	130.0	92.0	230.0	8.0	55.0	140	165	M10	1.90
65 59 503	180.0	122.0	260.0	8.0	85.0	192	215	M12	3.40
65 59 504	180.0	127.0	265.0	8.0	90.0	192	215	M12	3.80
65 59 505	180.0	112.0	250.0	10.0	75.0	192	215	M12	2.70
65 59 506	130.0	112.0	250.0	10.0	75.0	192	215	M12	3.00
65 59 507	130.0	112.0	250.0	10.0	75.0	140	165	M10	2.50
65 59 508	110.0	90.0	228.0	8.0	53.0	140	145	M8	2.00
65 59 509	110.0	108.5	246.5	8.0	71.5	140	145	M8	2.50
65 59 510	114.3	129.5	267.5	8.0	92.5	180	200	M12	5.00
65 59 511	114.3	163.5	301.5	8.0	126.5	180	200	M12	4.20
65 59 512	114.3	105.5	243.5	8.0	68.5	180	200	M12	3.50
65 59 513	110.0	113.5	251.5	8.0	76.5	140	145	M8	2.70

An order should contain gearbox 59 06 0xx / 59 16 0xx and flange 65 59 5xx

The values in the tables are based upon wear or maximum flank load at 12,000 hours full load and on servo-operation. Please see here for also our manual on our webpage **www.atlantadrives.com.** With continuous full-load operation it may be necessary to consider temperature limits! Please ask us if in doubt.

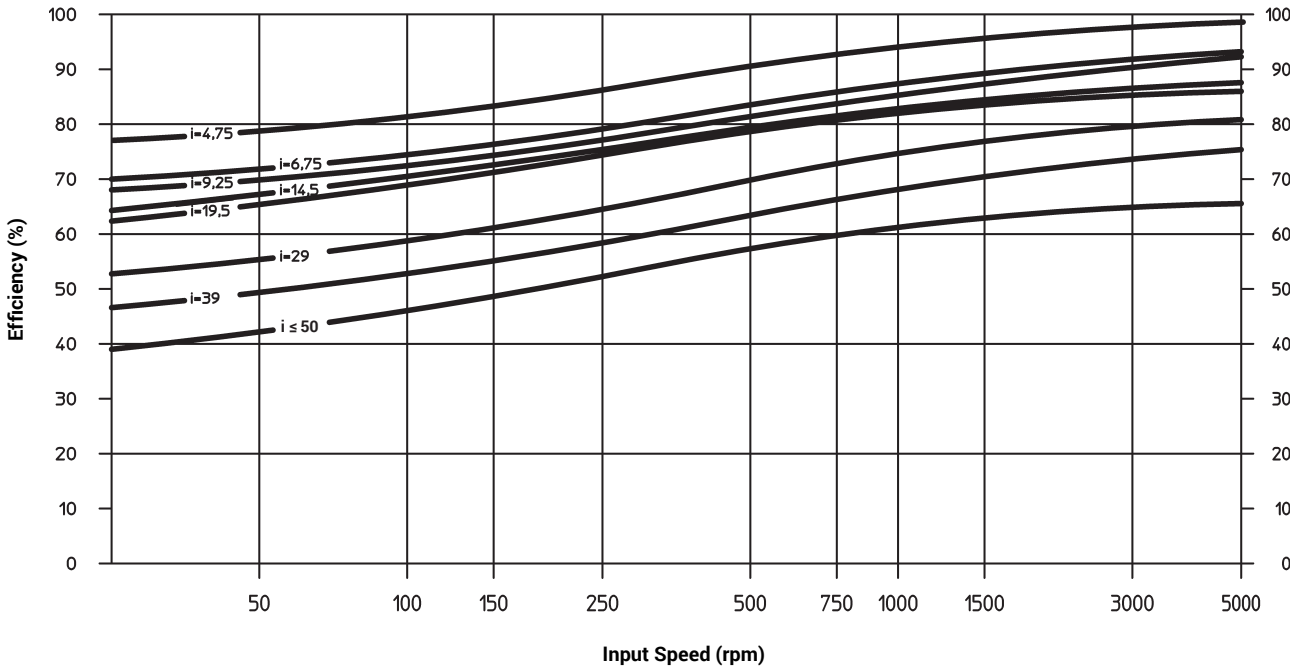
$T_{2max.}$ = static torque to avoid tooth fracture, T_1 = input torque in Nm, T_2 = output torque in Nm.

Order Code		a_0	i	$T_{2\,max.}$	Input Speed n_1 (rpm)											
					250		500		750		1000		1500		2000	
		(mm)			T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)
59 01 003	59 11 003	32	3.00*													
59 01 005	59 11 005		4.75	135	3.2	12	4.2	16	4.1	16	4.4	17	3.8	17	4.3	17
59 01 007	59 11 007		6.75	100	2.0	10	2.6	14	2.8	15	2.9	16	2.8	17	3.0	17
59 01 009	59 11 009		9.25	65	1.3	9	1.8	12	1.8	13	2.0	14	1.8	15	2.1	16
59 01 015	59 11 015		14.50	85	1.0	10	1.3	14	1.4	15	1.5	16	1.4	17	1.5	17
59 01 020	59 11 020		19.50	55	0.7	9	0.9	12	0.9	12	1.0	13	0.9	14	1.1	15
59 01 029	59 11 029		29.00	70	0.5	9	0.7	12	0.7	13	0.8	14	0.7	15	0.8	16
59 01 039	59 11 039		39.00	50	0.5	10	0.6	13	0.7	14	0.7	15	0.6	16	0.7	17
59 01 050	59 11 050		50.00	35	0.4	8	0.5	11	0.5	11	0.6	12	0.4	13	0.6	14
59 03 003	59 13 003	50	3.00*													
59 03 005	59 13 005		4.75	550	11.6	48	15.1	65	15.1	65	16.3	70	16.4	70	16.5	70
59 03 007	59 13 007		6.75	400	7.2	42	9.4	56	9.9	59	10.5	63	11.4	69	11.4	69
59 03 009	59 13 009		9.25	275	4.8	35	6.3	48	6.5	51	6.9	54	7.4	58	7.9	62
59 03 015	59 13 015		14.50	350	3.7	42	4.8	57	5.0	60	5.3	65	5.8	70	5.9	72
59 03 020	59 13 020		19.50	250	2.4	33	3.1	45	3.3	48	3.4	50	3.7	55	3.9	58
59 03 029	59 13 029		29.00	300	1.9	36	2.4	48	2.6	52	2.7	55	2.9	60	3.1	63
59 03 039	59 13 039		39.00	200	1.8	39	2.3	52	2.4	56	2.5	60	2.7	65	2.8	68
59 03 050	59 13 050		50.00	150	1.5	31	1.9	42	1.9	44	2.0	47	2.1	50	2.2	53
59 04 003	59 14 003	63	3.00*													
59 04 005	59 14 005		4.75	1000	37.6	163	38.9	170	41.2	180	41.3	180	39.2	170	37.4	162
59 04 007	59 14 007		6.75	750	21.5	129	27.9	170	29.4	180	29.4	180	27.9	170	26.6	162
59 04 009	59 14 009		9.25	500	10.8	85	14.2	115	15.3	125	15.9	130	16.4	135	16.4	135
59 04 015	59 14 015		14.50	600	11.1	132	13.6	165	14.7	180	14.7	180	14.7	180	14.5	177
59 04 020	59 14 020		19.50	500	5.6	87	7.2	115	7.7	125	8.0	130	8.3	135	9.0	145
59 04 029	59 14 029		29.00	650	6.9	137	8.4	175	9.1	190	9.7	205	10.5	220	10.1	212
59 04 039	59 14 039		39.00	450	4.2	106	5.2	140	5.5	150	5.8	160	6.4	175	6.6	180
59 04 052	59 14 052		52.00	300	2.4	71	3.0	95	3.3	105	3.5	115	3.8	125	4.0	133
59 05 003	59 15 003	80	3.00*													
59 05 005	59 15 005		4.75	2000	102.9	453	94.9	420	85.9	380	81.5	360	75.0	330	71.5	313
59 05 007	59 15 007		6.75	1400	65.2	402	67.6	420	61.1	380	57.8	360	53.2	330	50.7	313
59 05 009	59 15 009		9.25	1100	37.5	310	44.2	370	44.1	370	42.9	360	39.3	330	37.5	313
59 05 015	59 15 015		14.50	1300	34.9	431	35.9	450	35.8	450	33.4	420	29.4	370	27.5	345
59 05 020	59 15 020		19.50	1000	21.9	353	22.5	370	24.2	400	24.1	400	21.7	360	20.9	347
59 05 029	59 15 029		29.00	1200	22.9	498	23.3	520	24.5	550	23.6	530	21.8	490	20.8	467
59 05 039	59 15 039		39.00	850	15.0	412	15.1	430	16.0	460	17.0	490	16.7	480	15.9	457
59 05 052	59 15 052		52.00	600	6.3	216	6.6	240	7.1	260	7.5	275	8.2	300	8.5	310
59 06 005	59 16 005	100	4.75	3300	234.2	1043	197.3	880	179.6	800	169.1	750	154.3	685	147.1	650
59 06 007	59 16 007		6.75	2300	127.2	797	131.8	830	119.1	750	114.8	720	105.3	660	101.3	633
59 06 009	59 16 009		9.25	1900	94.3	794	97.6	830	88.1	750	84.8	720	77.7	660	74.8	633
59 06 015	59 16 015		14.50	2050	70.0	892	72.2	930	68.2	880	62.9	810	55.9	720	53.5	687
59 06 020	59 16 020		19.50	1800	51.8	861	53.3	900	51.3	870	47.8	810	42.5	720	40.6	687
59 06 029	59 16 029		29.00	2300	48.7	1103	49.9	1150	46.1	1070	43.7	1010	36.8	850	36.2	833
59 06 039	59 16 039		39.00	1650	35.2	1034	35.8	1080	34.0	1030	33.0	1000	29.7	900	28.5	860
59 06 052	59 16 052		52.00	1100	20.7	759	20.0	760	21.5	820	22.3	850	20.6	785	19.7	750

* on request

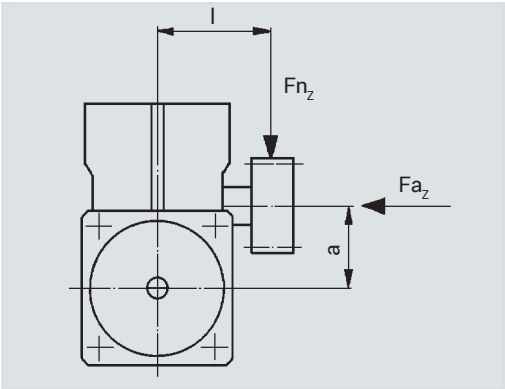
Input Speed n_1 (rpm)															
2500		3000		3500		4000		4500		5000		5500		6000	
T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)	T_1 (Nm)	T_2 (Nm)
4.3	17	4.3	17	4.4	18	4.5	18	4.5	18	4.5	18	4.3	17	4.1	16
3.0	17	3.0	17	3.1	18	3.1	18	3.1	18	3.1	18	3.3	19	3.4	19
2.2	16	2.3	17	2.3	18	2.4	18	2.3	18	2.4	18	2.5	19	2.6	19
1.6	18	1.6	18	1.6	18	1.6	18	1.5	18	1.6	18	1.6	19	1.7	19
1.1	15	1.1	16	1.1	16	1.1	16	1.1	16	1.1	16	1.1	17	1.2	17
0.9	16	0.9	17	0.9	17	0.9	17	0.9	17	0.9	17	0.9	18	1.0	18
0.8	17	0.8	18	0.8	18	0.8	18	0.8	18	0.8	18	0.8	19	0.8	19
0.6	14	0.6	15	0.6	16	0.7	16	0.7	17	0.7	18	0.8	19	0.8	19
25.0	70	16.8	70	16.3	67	15.8	65	15.5	63	15.1	61	14.3	57	13.6	53
17.2	69	11.6	69	11.3	67	11.0	65	10.7	63	10.5	61	9.9	57	9.4	54
12.6	66	8.9	70	8.9	70	8.9	70	8.7	67	8.4	65	8.0	61	7.6	58
9.1	73	6.2	75	6.2	75	6.3	75	6.3	75	6.4	75	6.1	70	5.8	67
6.1	61	4.3	65	4.3	65	4.3	65	4.3	65	4.4	65	4.2	61	4.0	58
4.9	67	3.5	70	3.5	70	3.5	70	3.4	67	3.3	65	3.2	61	3.0	57
4.4	71	3.1	75	3.1	75	3.1	75	3.1	75	3.1	75	3.0	70	2.9	66
3.4	57	2.4	60	2.4	60	2.4	60	2.4	60	2.4	60	2.5	62	2.5	64
53.4	153	34.0	145	32.9	140	31.9	135	29.6	124	27.5	115				
38.1	153	24.1	145	23.4	140	22.7	135	21.1	125	19.8	116	18.6	109		
24.6	135	16.5	135	16.0	130	15.6	126	14.6	117	13.8	110	13.0	104	12.4	98
21.4	173	14.1	170	13.7	165	13.4	160	12.5	148	11.7	138	11.1	130		
14.4	155	10.3	165	9.9	160	9.7	155	9.1	144	8.6	136	8.2	128	7.8	121
14.6	203	9.4	195	9.3	190	9.1	185	8.5	171	8.0	159	7.6	149		
10.2	185	7.0	190	7.0	190	7.1	190	6.7	177	6.3	166	6.0	156	5.7	148
6.5	142	4.6	150	4.8	155	5.0	160	4.8	155	4.6	145	4.4	137	4.2	129
102.2	297	64.6	280	58.9	254	53.2	228								
72.4	297	45.7	280	42.0	256	38.2	232	35.3	213	32.9	198				
53.5	297	33.8	280	31.2	257	28.5	234	26.6	217	24.8	202	23.3	189		
38.5	320	23.8	295	21.9	270	20.0	245	18.5	226	17.3	210				
30.3	333	19.5	320	18.0	295	16.6	269	15.4	250	14.5	233	13.6	218		
29.9	443	19.0	420	17.5	384	16.0	348	14.9	322						
22.8	433	14.5	410	13.4	377	12.4	345	11.5	319	10.8	297	10.2	278		
13.2	320	9.1	330	9.1	330	9.2	330	8.6	308	8.2	288	7.8	271		
209.5	615	132.3	580												
146.1	607	93.5	580	84.3	521	69.2	426								
107.9	607	69.0	580	62.9	526	52.2	436	53.2	442	49.6	410				
76.6	653	48.6	620	44.0	559	40.2	509								
58.2	653	37.0	620	33.7	564	31.1	516	28.8	477	26.8	442				
53.6	817	35.2	800	31.9	721										
41.0	820	26.1	780	23.9	708	19.9	587	20.4	597						
28.2	715	18.0	680	16.5	621	15.3	570	14.3	528	12.6	461				

Gearing efficiency of servo-worm gearboxes with driving worm and under full load.



Additional Loads On Gearbox Output

The data given are reference values. You should consider the values arising from the choice of the tooth system. It is assumed that the point of action of the force is the center of the shaft. In cases where additional axial forces occur, over and above high transverse forces, please ask for advice.



Center Distance	**a (mm)**	**32**		**50**		**63**		**80**		**100**	
Dimension from center of housing to center of teeth											
l (mm)		70	100	90	140	110	160	125	175	140	190
Max. Additional Load:											
Radial Fn$_z$	[N]	2250	1600	3600	2300	5000	3500	8400	6000	10000	7500
Axial Fa$_z$	[N]	1500	1500	1800	1800	2500	2500	4000	4000	5000	5000
Only Axial Load (Fn=0)	Fa$_z$ [N]	3000		3000		5000		12000		15000	

All dimensions are in mm

The values given in the ratings table are based on uniform, smooth servo-operation. Since, in practice, the applications are very diverse, it is essential to consider the given conditions by using the appropriate factors S, K_A and b_B (see symbols). The maximum oil-sump temperature of 80° C should not be exceeded.

Formulas for determining power and torque data:

$$a = \frac{v}{t_b} \quad [m/s^2]$$

$$F_u = m \cdot g + m \cdot a \quad \text{(for lifting axle)} \quad [N]$$

$$F_u = m \cdot g \cdot \mu + m \cdot a \quad \text{(for driving axle)} \quad [N]$$

$$T_{2req.} = \frac{F_u \cdot d}{2000} \quad [Nm]$$

$$n_2 = \frac{v}{d \cdot \pi} \cdot 60000 \quad (rpm)$$

$$i_{gear} = \frac{n_1}{n_2}$$

$$T_{2perm.} = \frac{T_{2table}}{K_A \cdot S \cdot b_B} \quad [Nm]$$

Condition $T_{2perm.} > T_{2req.}$ must be fulfilled

$$P_{1req.} = \frac{T_{2req.} \cdot n_2}{9550 \cdot \eta} \quad [kW]$$

Load Factor K_A

Drive	Type of load from the machine to be driven		
	Uniform	Medium Shocks	Heavy Shocks
Uniform	1.00	1.25	1.75
Light Shocks	1.25	1.50	2.00
Medium Shocks	1.50	1.75	2.25

Operating Time Factor b_B

Operating Time	4 - 8 hours	8 - 12 hours	> 12 hours
Operating Time Factor	1.00	1.20	1.35

Safety Coefficient S

The safety coefficient should be allowed for according to experience (S = 1.1- 1.4).

Combination of all factors: Shock Factor ($K_A \cdot b_B \cdot S$)

Symbols

a	=	acceleration or deceleration	(m/s²)
b_B	=	operating time factor	
d	=	pinion pitch-circle diameter	(mm)
g	=	acceleration due to gravity	(9.81m /s²)
m	=	mass	(kg)
n_1	=	gearbox input rpm	
n_2	=	gearbox output rpm	
t_b	=	acceleration time	(s)
i	=	gear ratios	
v	=	travelling/lifting speed	(m/s)
F_u	=	peripheral force at the pinion	(N)
K_A	=	load factor	
P_1	=	gearbox input power	(kW)
S	=	safety coefficient	
T_2	=	gearbox output torque	(Nm)
η	=	gearbox efficiency	
μ	=	coefficient of friction	
π	=	3.14159	

Calculation Example

Values Given

○ Travelling Operation	⊗ Lifting Operation		
Mass to be Moved	m	=	300 kg
Speed	v	=	1.08 m/s
Acceleration Time	t_b	=	0.27 s
Acceleration Due to Gravity	g	=	9.81 m/s²
Coefficient of Friction	μ	=	—
Pitch-Circle Dia. of Pinion	d	=	63.66 mm
Load Factor	K_A	=	1.25
Operation Time Factor	b_B	=	1.2
Safety Coefficient	S	=	1.2
Motor rpm	n_1	=	3000 rpm
Motor Type			
Motor Manutacturer			

Calculation Process

		Results
$a = \frac{v}{t_b}$	$a = \frac{1.08}{0.27}$	= 4 m/s²
$F_u = m \cdot g + m \cdot a$	$F_u = 300 \cdot 9.81 + 300 \cdot 4$	= 4,143 N
$F_u = m \cdot g \cdot \mu + m \cdot a$	only Travelling Operation	
$T_{2erf.} = \frac{F_u \cdot d}{2000}$	$T_{2erf.} = \frac{4143 \cdot 63.66}{2000}$	= 132 Nm
$n_2 = \frac{v}{d \cdot \pi} \cdot 60{,}000$	$n_2 = \frac{1.08}{63.66 \cdot \pi} \cdot 60000$	= 324 rpm
$i_{Getr.} = \frac{n_1}{n_2}$	$i_{Getr.} = \frac{3000}{325}$	≅ 9.25

Permissible Gear Torque T_{2table} see page B-34 & B-35
assumed 58_5_09 with T_2=280 Nm at 3,000 rpm

$$T_{2zul.} = \frac{T_{2Table}}{K_A \cdot S \cdot b_B} \qquad T_{2zul.} = \frac{280}{1.25 \cdot 1.2 \cdot 1.2} = 155 \text{ Nm}$$

Condition

$T_{2zul.} > T_{2erf}$ = 155 Nm > 132 Nm = fulfilled

$$P_{1erf} = \frac{T_{2erf} \cdot n_2}{9550 \cdot \eta} \qquad P_{1erf} = \frac{132 \cdot 324}{9550 \cdot 0.90} = 4.98 \text{ KW}$$

Your Calculation

Values Given

○ Traveling Operation	○ Lifting Operation			
Mass to be Moved	m	=	_____	kg
Speed	v	=	_____	m/s
Acceleration Time	t_b	=	_____	s
Acceleration Due to Gravity	g	=	9.81	m/s²
Coefficient of Friction	μ	=	_____	
Pitch-Circle Dia. of Pinion	d	=	_____	mm
Load Factor	K_A	=	_____	
Operation Time Factor	b_B	=	_____	
Safety Coefficient	S	=	_____	
Motor rpm	n_1	=	_____	rpm
Motor Type			_____	
Motor Manutacturer			_____	

Calculation Process

		Results
$a = \frac{v}{t_b}$	a = _____	= _____ m/s²
$F_u = m \cdot g + m \cdot a$	F_u = _____	= _____ N
$F_u = m \cdot g \cdot \mu + m \cdot a$	F_u = _____	= _____ N
$T_{2erf.} = \frac{F_u \cdot d}{2000}$	$T_{2erf.}$ = _____	= _____ Nm
$n_2 = \frac{v}{d \cdot \pi} \cdot 60000$	n_2 = _____ · 60000	= _____ rpm
$i_{Getr.} = \frac{n_1}{n_2}$	$i_{Getr.}$ = _____	≅ _____

Permissible Gear Torque T2table see page ...

$$T_{2zul.} = \frac{T_{2Table}}{K_A \cdot S \cdot b_B} \qquad T_{2zul.} = \text{\_\_\_\_\_} = \text{\_\_\_\_\_ Nm}$$

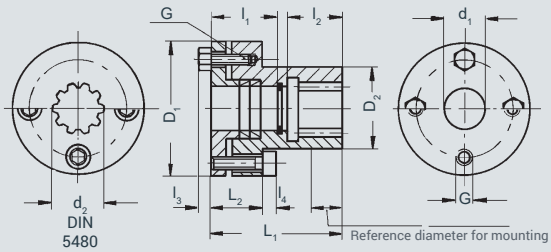
Condition

$T_{2zul.} > T_{2erf}$ = Nm > Nm = fulfilled

$$P_{1erf} = \frac{T_{2erf} \cdot n_2}{9550 \cdot \eta} \qquad P_{1erf} = \text{\_\_\_\_\_} = \text{\_\_\_\_\_ KW}$$

Input Couplings For Motor & Gearboxes, rigid model, nitrided, preassembled for motor shafts without key

Bore on gearbox side low-clearance spline profile corresponding to DIN 5480 for push-fitting



Bore on motor side with locking elements as clamp connection

Order Code	1)	d_1	d_2	D_1	D_2	l_1	l_2	l_3	l_4	L_1	L_2	G	J_{red} 10^{-4} kg m²	kg
65 43 110	9 71 80 010	10	15x1.25x10	48	29	22	17	-	5	44	18	4xM5	0.835	0.40
65 43 111	9 71 80 011	11	15x1.25x10	48	29	20.5	17	-	5	64	18	4xM5	0.976	0.50
65 43 114	9 71 80 014	14	15x1.25x10	48	29	24	19	-	5	50	18	4xM5	0.835	0.45
65 43 116	9 71 80 016	16	15x1.25x10	48	29	27	16	-	5	50	18	4xM5	0.824	0.45
65 43 119	9 71 80 019	19	15x1.25x10	48	29	24	16	-	5	40	18	4xM5	0.799	0.40
65 43 914	9 71 80 014	14	15x1.25x10	48	29	26	19	-	5	64	18	4xM5	0.985	0.50
65 43 916	9 71 80 016	16	15x1.25x10	48	29	27	15	-	5	64.3	18.3	4xM5	0.975	0.40
65 43 919	9 71 80 019	19	15x1.25x10	48	29	23	17	-	5	55	18	4xM5	0.853	0.45
65 43 924	9 71 80 024	24	15x1.25x10	50	29	34	22	-	6	56	40	4xM6	1.041	0.52
65 44 024	9 71 80 024	24	25x1.25x18	50	29	41.5	24	-	6	66.5	59.5	4xM6	2.628	0.75
65 44 114	9 71 80 014	14	25x1.25x18	55	32	24	23.5	-	6	64	21	4xM6	1.645	0.50
65 44 116	9 71 80 016	16	25x1.25x18	55	32	34	23.5	-	6	64	21	4xM6	1.622	0.50
65 44 119	9 71 80 019	19	25x1.25x18	55	32	33	26.5	-	6	63	21	4xM6	1.598	0.50
65 44 120	9 71 80 020	20	25x1.25x18	55	32	33.2	26.5	-	6	63	21	4xM6	1.550	0.50
65 44 219	9 71 80 019	19	25x1.25x18	55	32	27	26.5	-	6	74	21	4xM6	1.703	0.50
65 44 919	9 71 80 019	19	25x1.25x18	55	32	31	26.5	-	6	78	21	4xM6	1.757	0.55
65 44 928	9 71 80 028	28	25x1.25x18	70	48	48	26	-	6	83	25	5xM6	5.998	0.85
65 44 932	9 71 80 032	32	25x1.25x18	70	48	43	23	-	6	78	25	5xM6	5.921	0.80
65 44 935	9 71 81 035	35	25x1.25x18	70	48	52	26	-	6	78	25	5xM6	6.155	0.95
65 46 024	9 71 80 024	24	38x1.25x29	55	-	38.5	31	4	6	72.5	-	5xM6	4.452	0.90
65 46 834	9 71 81 035	1 3/8"	38x1.25x29	80	58	63	34	-	6	100	40	6xM6	16.320	1.95
65 46 928	9 71 80 028	28	38x1.25x29	70	48	47	34	-	6	90	25	5xM6	5.882	0.90
65 46 932	9 71 80 032	32	38x1.25x29	70	48	43	34	-	6	86	25	5xM6	5.784	0.85
65 46 935	9 71 81 035	35	38x1.25x29	80	58	65	34	-	6	100	40	6xM6	16.550	1.95
65 46 938	9 71 80 038	38	38x1.25x29	80	58	62	34	-	6	100	40	6xM6	16.240	1.88
65 47 948	9 71 80 048	48	38x1.25x29	95	66	58	31	-	8	92	42	6xM8	41.860	3.10

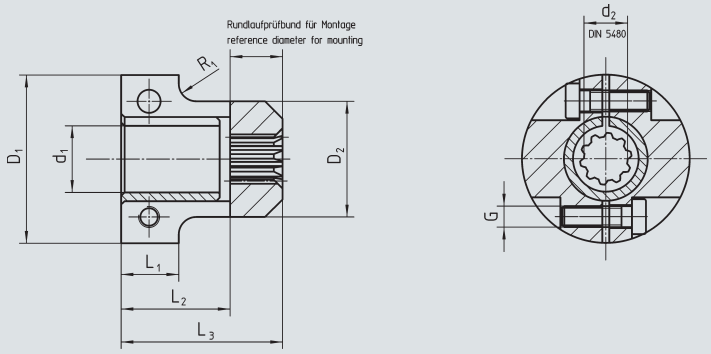
1) Spare part clamping element

To ensure a corresponding freedom from backlash and maximum power transmission, the connection between our servo-worm gearboxes and a drive motor is made by a special coupling, the internal teeth of which, together with the drive shaft of the gearbox, correspond to the splined profile DIN 5480.

All dimensions are in mm

Input Couplings For Motor & Gearboxes, rigid model, nitrided, preassembled for motor shafts without key

Bore on gearbox side
low-clearance spline
profile corresponding to
DIN 5480 for push-fitting

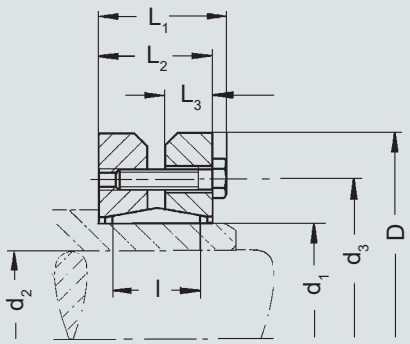


Order Code	d_1	d_2	D_1	D_2	L_1	L_3	R_1	G	L_2	J_{red} 10^{-4} kg m²	kg
65 51 008	8	15x1.25x10	36	23	14.0	46.0	5	M5	31.2	0.236	0.2
65 51 009	9	15x1.25x10	36	23	14.0	46.0	5	M5	31.2	0.246	0.2
65 51 010	10	15x1.25x10	36	23	14.0	46.0	5	M5	31.2	0.244	0.2
65 51 011	11	15x1.25x10	36	23	14.0	46.0	5	M5	31.2	0.243	0.2
65 51 014	14	15x1.25x10	36	23	14.0	46.0	5	M5	31.2	0.234	0.2
65 51 016	16	15x1.25x10	36	23	14.0	46.0	5	M5	31.2	0.225	0.2
65 53 019	19	15x1.25x10	48	33	16.5	46.0	5	M6	31.2	0.704	0.3
65 53 020	20	15x1.25x10	48	33	16.5	46.0	5	M6	31.2	0.704	0.3
65 53 022	22	15x1.25x10	48	33	16.5	46.0	5	M6	31.2	0.704	0.3
65 53 024	24	15x1.25x10	48	33	16.5	46.0	5	M6	31.2	0.647	0.2
65 53 025	25	15x1.25x10	64	51	18.0	55.5	5	M8	41.5	5.946	1.1
65 53 028	28	15x1.25x10	64	51	18.0	55.5	5	M8	41.5	5.871	1.1
65 53 032	32	15x1.25x10	64	51	18.0	55.5	5	M8	41.5	4.158	0.8
65 53 035	35	15x1.25x10	78	51	18.0	55.5	5	M8	41.5	5.605	1.0
65 53 038	38	15x1.25x10	78	51	18.0	55.5	5	M8	41.5	5.432	0.9
65 54 009	9	25x1.25x18	49	35	17.0	68.0	5	M6	43.5	2.306	0.5
65 54 010	10	25x1.25x18	49	35	17.0	68.0	5	M6	43.5	2.300	0.5
65 54 011	11	25x1.25x18	49	35	17.0	68.0	5	M6	43.5	2.381	0.5
65 54 014	14	25x1.25x18	49	35	17.0	68.0	5	M6	43.5	1.161	0.5
65 54 015	15	25x1.25x18	49	35	17.0	68.0	5	M6	43.5	2.328	0.5
65 54 016	16	25x1.25x18	49	35	17.0	68.0	5	M6	43.5	1.161	0.5
65 54 019	19	25x1.25x18	49	35	17.0	68.0	5	M6	43.5	1.112	0.4
65 54 020	20	25x1.25x18	49	35	17.0	68.0	5	M6	43.5	2.268	0.5
65 54 022	22	25x1.25x18	49	35	17.0	68.0	5	M6	43.5	2.179	0.4
65 54 024	24	25x1.25x18	49	35	17.0	68.0	5	M6	43.5	1.007	0.4
65 54 025	25	25x1.25x18	64	51	18.0	68.0	5	M8	43.5	8.165	1.2
65 54 028	28	25x1.25x18	64	51	18.0	68.0	5	M8	43.5	8.061	1.2
65 54 032	32	25x1.25x18	64	51	18.0	68.0	5	M8	43.5	7.751	1.2
65 54 035	35	25x1.25x18	78	51	18.0	68.0	5	M8	43.5	7.690	1.1
65 54 038	38	25x1.25x18	78	51	18.0	68.0	5	M8	43.5	7.348	1.1
65 54 042	42	25x1.25x18	78	51	18.0	65.5	5	M8	43.5	6.595	1.1
65 55 014	14	38x1.25x29	64	51	18.0	72.5	5	M8	41.5	8.056	1.2
65 55 016	16	38x1.25x29	64	51	18.0	72.5	5	M8	41.5	8.029	1.2
65 55 019	19	38x1.25x29	64	51	18.0	72.5	5	M8	41.5	7.978	1.2
65 55 020	20	38x1.25x29	64	51	18.0	72.5	5	M8	41.5	7.945	1.2
65 55 022	22	38x1.25x29	64	51	18.0	72.5	5	M8	41.5	7.911	1.2
65 55 024	24	38x1.25x29	64	51	18.0	72.5	5	M8	41.5	7.860	1.2
65 55 025	25	38x1.25x29	64	51	18.0	72.5	5	M8	41.5	7.818	1.1
65 55 028	28	38x1.25x29	64	51	18.0	72.5	5	M8	41.5	8.105	1.3
65 55 032	32	38x1.25x29	64	51	18.0	72.5	5	M8	41.5	7.863	1.2
65 55 035	35	38x1.25x29	78	51	18.0	72.5	5	M8	41.5	7.610	1.1
65 55 038	38	38x1.25x29	78	51	18.0	72.5	5	M8	41.5	7.284	1.0
65 55 042	42	38x1.25x29	78	51	18.0	70.5	5	M8	41.5	6.547	1.0

Couplings on page B-54 can be used as well.

Output Compression Couplings, for output drive shafts and gearwheels with ground teeth

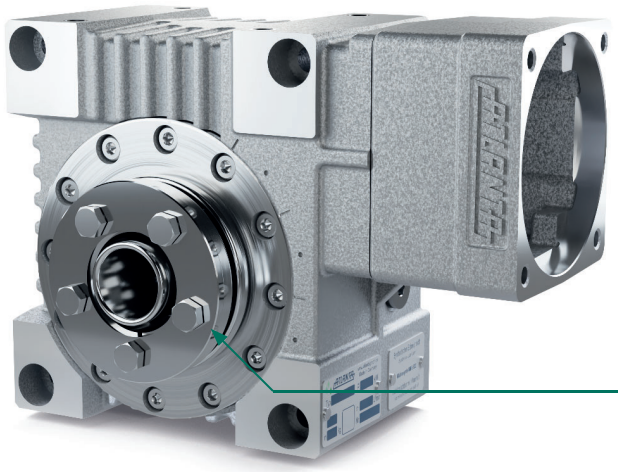
Supplied as complete set



$$J_{red} = \frac{J}{i^2}$$

Order Code	Gearbox a_0 mm HT	HP/E	T_{2max} Nm	d_2	d_1	d_3	D	L_1	L_2	L_3	l	G	$J_{red}10^{-4}$ kg m²	kg
80 81 024	x	32	270	20	24	36	50.2	23.0	19.5	7.60	14.0	5 x M5	0.780	0.2
80 83 030	x	50	400	25	30	44	60.2	25.0	21.5	9.00	18.0	7 x M5	1.756	0.3
			200	19										
			130	16										
80 84 036	50	63	540	28	36	52	72.2	27.5	23.5	10.00	22.5	5 x M6	4.029	0.4
			270	22										
80 85 050	63	80	1350	38	50	72	90.2	31.5	27.5	12.00	22.0	9 x M6	11.322	0.8
			1180	36										
			870	32										
			730	30										
80 86 062	80	100	2300	48	62	89	110.2	34.5	30.5	13.00	22.0	12 x M6	27.137	1.3
			1420	40										
80 87 080	100	125	3240	60	80	100	145.3	38.0	32.5	14.00	22.0	7 x M8	88.870	1.9
			2580	55										

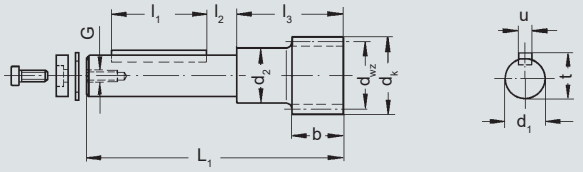
x) Not suitable for gearboxes



Output compression coupling for each size of hollow shaft

All dimensions are in mm

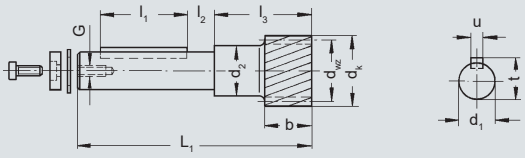
Straight-Tooth Pinion Shafts, 20° pressure angle, hardened & ground, crowned, tolerances according to DIN 3962/63/67



16MnCr5, 1.7131
Case-Hardened
Quality 6 e 25

Order Code	Gearbox ao HP / E	Module	Number of teeth	x	d[1]	d_{wz}[2]	d_k	b	d_{1h6}	d_2	L_1	l_1	l_2	l_3	u	t	G	a	kg
20 28 115	32	2	15	0.375	30.00	31.50	35.5	25	20	24	105	28	13.5	50.0	6	22.5	M 5	37.75	0.50
20 28 021	50	2	21	–	42.00	42.00	46.0	25	25	35	141	63	13.0	53.0	8	28.0	M 8	43.00	1.21
20 28 332	50	2	32	–	64.00	64.00	68.0	25	25	38	141	63	13.0	53.0	8	28.0	M 8	54.00	1.25
20 28 321	50	3	21	–	63.00	63.00	69.0	30	25	38	143	63	13.0	55.0	8	28.0	M 8	57.50	1.33
20 28 432	63	2	32	–	64.00	64.00	68.0	25	28	42	166	80	14.5	57.5	8	31.0	M 8	54.00	1.50
20 28 421	63	3	21	–	63.00	63.00	69.0	30	28	42	168	80	14.5	60.0	8	31.0	M 8	57.50	1.60
20 28 417	63	4	17	–	68.00	68.00	76.0	40	28	42	173	80	14.5	65.0	8	31.0	M 8	69.00	2.00
20 28 532	80	2	32	–	64.00	64.00	68.0	25	36	48	181	100	12.5	57.0	10	39.0	M 12	54.00	2.35
20 28 521	80	3	21	–	63.00	63.00	69.0	30	36	48	186	100	12.5	62.0	10	39.0	M 12	57.50	2.50
20 28 517	80	4	17	–	68.00	68.00	76.0	40	36	48	191	100	12.5	67.0	10	39.0	M 12	69.00	2.65
20 28 621	100	3	21	–	63.00	63.00	69.0	30	48	57	206	125	9.0	62.0	14	51.5	M 12	57.50	3.50
20 28 617	100	4	17	–	68.00	68.00	76.0	40	48	57	216	125	9.0	72.0	14	51.5	M 12	69.00	4.05
20 28 630	100	4	30	–	120.00	120.00	128.0	40	48	57	216	125	9.0	72.0	14	51.5	M 12	95.00	6.40
20 28 613	100	5	13	0.500	65.00	70.00	80.0	50	48	57	226	125	9.0	82.0	14	51.5	M 12	69.00	4.20
20 28 730	125	4	30	–	120.00	120.00	128.0	40	60	70	262	150	10.0	80.0	18	64.0	M 16	95.00	8.80
20 28 715	125	5	15	0.500	75.00	80.00	90.0	50	60	68	272	150	10.0	90.0	18	64.0	M 16	74.00	6.94
20 28 713	125	6	13	0.500	78.00	84.00	96.0	60	60	68	282	150	10.0	100.0	18	64.0	M 16	85.00	7.45

Helical-Tooth Pinion Shafts, 19°31'42" left-hand, 20° pressure angle, hardened & ground, crowned, tolerances according to DIN 3962/63/67



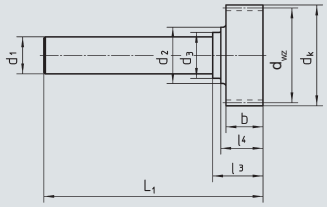
16MnCr5, 1.7131
Case-Hardened
Quality 6 e 25

Order Code	Gearbox ao HP / E	Module	Number of Teeth	x	d[1]	d_{wz}[2]	d_k	b	d_{1h6}	d_2	L_1	l_1	l_2	l_3	u	t	G	a	kg
20 29 120	32	1.5	20	–	31.83	31.83	34.83	20	20	26	100	40	7.5	45.0	6	22.5	M 5	33.42	0.60
20 29 115	32	2	15	0.4172	31.83	33.50	37.50	25	20	24	105	28	13.5	50.0	6	22.5	M 5	39.75	0.50
20 29 020	50	2	20	–	42.44	42.44	46.44	25	25	35	141	63	13.0	53.0	8	28.0	M 8	43.22	1.21
20 29 330	50	2	30	–	63.66	63.66	67.70	25	25	38	141	63	13.0	53.0	8	28.0	M 8	53.83	1.25
20 29 320	50	3	20	–	63.66	63.66	69.70	30	25	38	143	63	13.0	55.0	8	28.0	M 8	57.83	1.33
20 29 430	63	2	30	–	63.66	63.66	67.70	25	28	42	166	80	14.5	57.5	8	31.0	M 8	53.83	1.50
20 29 420	63	3	20	–	63.66	63.66	69.70	30	28	42	168	80	14.5	60.0	8	31.0	M 8	57.83	1.60
20 29 415	63	4	15	–	63.66	63.66	71.70	40	28	42	173	80	14.5	65.0	8	31.0	M 8	66.83	1.85
20 29 530	80	2	30	–	63.66	63.66	69.70	25	36	48	181	100	12.5	57.0	10	39.0	M 12	53.83	2.40
20 29 520	80	3	20	–	63.66	63.66	69.70	30	36	48	186	100	12.5	62.0	10	39.0	M 12	57.87	2.40
20 29 515	80	4	15	–	63.66	63.66	71.70	40	36	48	191	100	12.5	67.0	10	39.0	M 12	66.83	2.50
20 29 620	100	3	20	–	63.66	63.66	69.70	30	48	57	206	125	9.0	62.0	14	51.5	M 12	57.83	3.50
20 29 615	100	4	15	–	63.66	63.66	71.70	40	48	57	216	125	9.0	72.0	14	51.5	M 12	66.83	3.90
20 29 630	100	4	30	–	127.32	127.32	135.30	40	48	57	216	125	9.0	72.0	14	51.5	M 12	98.66	6.90
20 29 612	100	5	12	0.434	63.66	68.00	78.00	50	48	57	226	125	9.0	82.0	14	51.5	M 12	68.00	4.20
20 29 730	125	4	30	–	127.32	127.32	135.30	40	60	70	262	150	12.5	80.0	18	64.0	M 16	98.66	9.00
20 29 715	125	5	15	0.500	79.58	84.58	94.50	50	60	68	272	150	10.0	90.0	18	64.0	M 16	76.29	7.24
20 29 713	125	6	13	0.500	82.76	88.76	100.70	60	60	70	282	150	10.0	100.0	18	64.0	M 16	87.38	7.89

1) d = reference pitch diameter
2) d_{WZ} = working pitch diameter

For calculation of center distance 'a' between rack and pinion, see page B-62

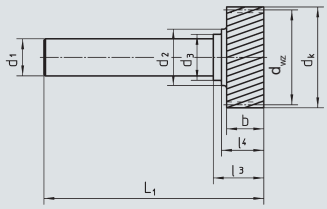
Straight-Tooth Pinion Shafts, 20° pressure angle, hardened & ground, crowned, tolerances according to DIN 3962/63/67



16MnCr5, 1.7131
Case-Hardened
Quality 6 e 25

Order Code	Gearbox Size HT	Gearbox Size HP/E	Module	Number of Teeth	x	$d^{1)}$	d_{wz} 2)	d_k	b	d_{1h6}	d_2	d_3	L_1	l_3	l_4	a	kg
20 88 115	x	32	2	15	0.375	30.00	31.50	35.5	25	20	24	–	105	31.0	–	37.75	0.50
20 88 021	x	50	2	21	–	42.00	42.00	46.0	25	25	35	31	148	34.0	28.5	43.00	1.21
20 88 332	x	50	2	32	–	64.00	64.00	68.0	25	25	38	31	148	34.0	28.5	54.00	1.25
20 88 321	x	50	3	21	–	63.00	63.00	69.0	30	25	31	–	150	36.5	–	57.50	1.33
20 88 432	50	63	2	32	–	64.00	64.00	68.0	25	28	42	36	180	38.5	33.0	54.00	1.50
20 88 421	50	63	3	21	–	63.00	63.00	69.0	30	28	42	36	183	41.0	35.5	57.50	1.60
20 88 417	50	63	4	17	–	68.00	68.00	76.0	40	28	36	–	188	46.0	–	69.00	2.00
20 88 532	63	80	2	32	–	64.00	64.00	68.0	25	36	48	–	203	32.5	–	54.00	2.35
20 88 521	63	80	3	21	–	63.00	63.00	69.0	30	36	48	–	208	37.5	–	57.50	2.50
20 88 517	63	80	4	17	–	68.00	68.00	76.0	40	36	48	–	213	42.5	–	69.00	2.65
20 88 621	80	100	3	21	–	63.00	63.00	69.0	30	48	57	–	230	33.5	–	57.50	3.65
20 88 617	80	100	4	17	–	68.00	68.00	76.0	40	48	57	–	240	43.5	–	69.00	4.05
20 88 630	80	100	4	30	–	120.00	120.00	128.0	40	48	57	–	240	43.5	–	95.00	6.40
20 88 613	80	100	5	13	0.500	65.00	70.00	80.0	50	48	57	–	250	53.5	–	69.00	4.10
20 88 730	100	125	4	30	–	120.00	120.00	128.0	40	60	68	–	265	45.0	–	95.00	8.70
20 88 715	100	125	5	15	0.500	75.00	80.00	90.0	50	60	68	–	275	55.0	–	74.00	6.30
20 88 713	100	125	6	13	0.500	78.00	84.00	96.0	60	60	68	–	285	65.0	–	85.00	6.84

Helical-Tooth Pinion Shafts, 19°31'42" left-hand, 20° pressure angle, hardened & ground, crowned, tolerances according to DIN 3962/63/67



16MnCr5, 1.7131
Case-Hardened
Quality 6 e 25

Order Code	Gearbox Size HT	Gearbox Size HP/E	Module	Number of Teeth	x	$d^{1)}$	d_{wz} 2)	d_k	b	d_{1h6}	d_2	d_3	L_1	l_3	l_4	a	kg
20 89 120	x	32	1.5	20	–	31.83	31.83	34.83	20	20	26	–	100.25	26.0	–	33.40	0.50
20 89 115	x	32	2	15	0.4172	31.83	33.50	37.50	25	20	24	–	105	31.0	–	38.75	0.50
20 89 020	x	50	2	20	–	42.44	42.44	46.44	25	25	35	31	148	34.0	28.5	43.22	1.21
20 89 330	x	50	2	30	–	63.66	63.66	67.70	25	25	38	31	148	34.0	28.5	53.83	1.25
20 89 320	x	50	3	20	–	63.66	63.66	69.70	30	25	31	–	150	36.5	–	57.83	1.33
20 89 430	50	63	2	30	–	63.66	63.66	67.70	25	28	42	36	180	38.5	33.0	53.83	1.60
20 89 420	50	63	3	20	–	63.66	63.66	69.70	30	28	42	36	183	41.0	35.5	57.83	1.60
20 89 415	50	63	4	15	–	63.66	63.66	71.70	40	28	36	–	188	46.0	–	66.83	1.85
20 89 530	63	80	2	30	–	63.66	63.66	69.70	25	36	48	–	203	32.5	–	53.83	2.35
20 89 520	63	80	3	20	–	63.66	63.66	69.70	30	36	48	–	208	37.5	–	57.83	2.40
20 89 515	63	80	4	15	–	63.66	63.66	71.70	40	36	48	–	213	42.5	–	66.83	2.50
20 89 620	80	100	3	20	–	63.66	63.66	69.70	30	48	57	–	230	33.5	–	57.83	3.65
20 89 615	80	100	4	15	–	63.66	63.66	71.70	40	48	57	–	240	43.5	–	66.83	3.90
20 89 630	80	100	4	30	–	127.32	127.32	135.30	40	48	57	–	240	43.5	–	98.66	6.90
20 89 612	80	100	5	12	0.434	63.66	68.00	78.00	50	48	57	–	250	53.5	–	68.00	4.10
20 89 613	80	100	6	13	0.500	82.76	88.76	100.76	60	48	57	–	260	63.5	–	87.38	4.30
20 89 730	100	125	4	30	–	127.32	127.32	135.30	40	60	70	–	265	45.0	–	98.66	9.15
20 89 715	100	125	5	15	0.500	79.58	84.58	94.50	50	60	70	–	275	55.0	–	76.29	6.57
20 89 713	100	125	6	13	0.500	82.76	88.76	100.76	60	60	70	–	285	65.0	–	84.38	7.13
20 48 713	100	125	6	13	0.500	82.76	88.76	100.76	60	60	70	–	285	65.0	–	87.38	7.13
20 48 715	100	125	6	15	0.500	95.49	101.49	113.49	60	60	70	–	285	65.0	–	73.75	7.60

1) d = Reference Pitch Diameter
2) d_{WZ} = Working Pitch Diameter

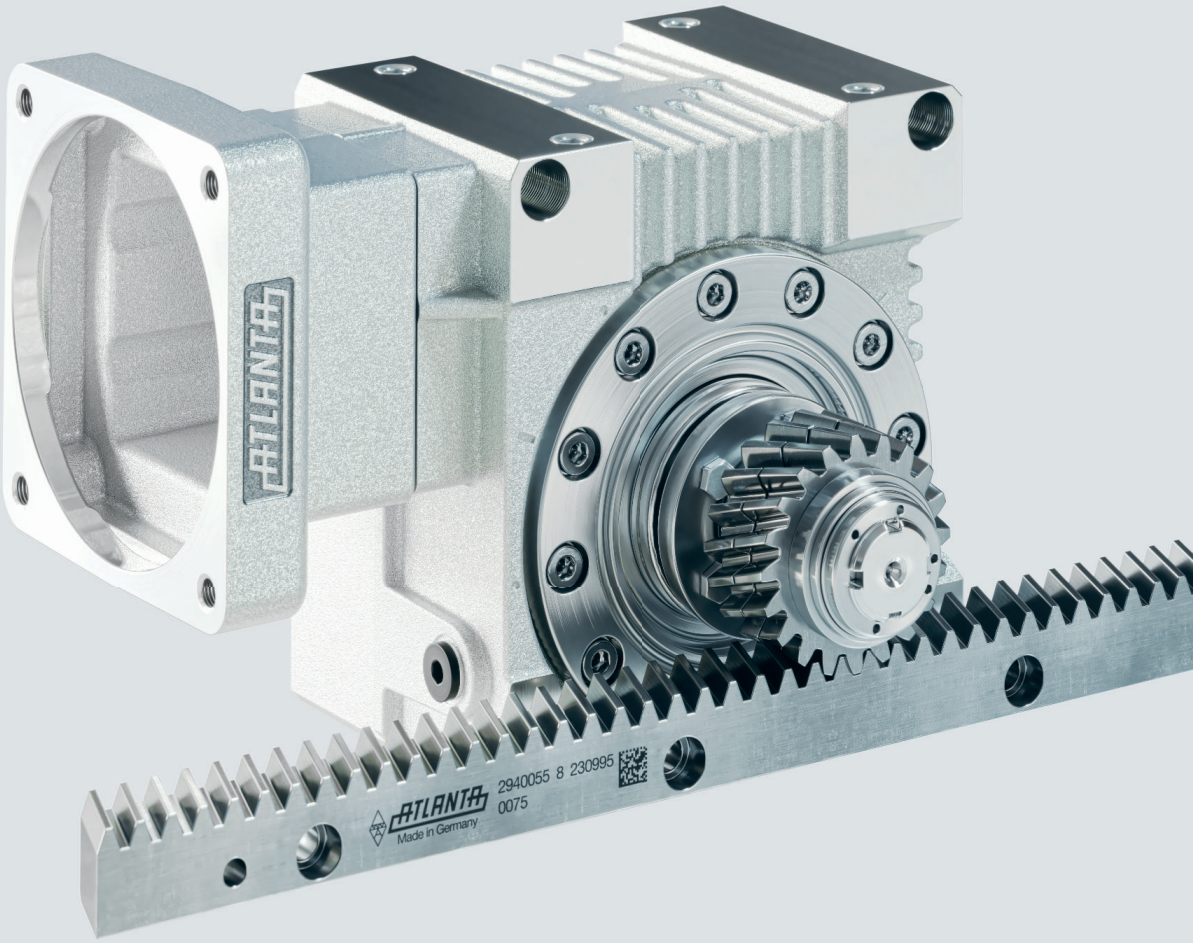
x) Not suitable for gearboxes

For calculation of center distance 'a' between pinion and rack, see page B-62

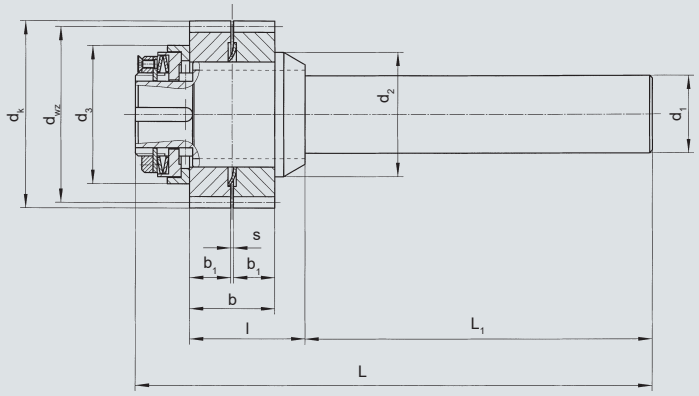
Description of Operation

Preloaded split-pinion shafts consist of an output shaft, a helical split-pinion set and a preload unit. The split-pinion is manufactured as a set with an axial distance between the pinion halves of 1 mm (modules 2 to 4) and 2 mm (modules 5 to 8).

By reducing the distance between the pinion halves (axial displacement of the outer pinion), the backlash is reduced and when both pinion halves are in mesh with the rack, preload is initiated. A defined preload torque between rack and split pinion can be produced by means of the preload unit.



Helical Split-Pinion Shafts, 19°31'42" left-hand, 20° pressure angle, hardened & ground teeth, tolerances according to DIN 3962/63/67



16MnCr5, 1.7131
Case-Hardened
Quality 7 e 25

Attention: The preload is adjusted in assembled state with rack; therefore the preload unit at the front side of the pinion shaft must be accessible.

Order Code	Module	Gearbox Size HT	Gearbox Size HP	Output Coupling	T_2* (Nm) Without Preload	T_{vmax}* (Nm) With Max. Preload	Number of Teeth	$d^{1)}$	$d_{wz}^{2)}$	d_k	b	b_1	d_{1h6}	d_2	d_3	s	l	L_1	L	kg
74 92 330	**2**	x	50	80 83 030	135	67	30	63.66	63.66	67.7	31	15	25	45	50	1	37.5	114.0	171.5	1.41
74 92 430	**2**	50	63	80 84 036	135	67	30	63.66	63.66	67.7	31	15	28	45	50	1	42.0	141.5	203.5	1.75
74 93 320	**3**	x	50	80 83 030	250	125	20	63.66	63.66	69.7	31	15	25	45	50	1	37.5	114.0	171.5	1.45
74 93 420	**3**	50	63	80 84 036	250	125	20	63.66	63.66	69.7	31	15	28	45	50	1	42.0	141.5	203.5	1.70
74 93 520	**3**	63	80	80 85 050	250	125	20	63.66	63.66	69.7	31	15	36	48	50	1	41.0	170.5	237.5	2.45
74 94 515	**4**	63	80	80 85 050	385	192	15	63.66	63.66	71.7	41	20	36	48	50	1	46.0	170.5	237.5	2.50
74 95 615	**5**	80	100	80 86 062	650	325	15	79.58	84.58	94.5	52	25	48	57	70	2	57.0	196.5	284.5	5.50
74 96 613	**6**	80	100	80 86 062	975	487	13	82.76	88.76	100.7	62	30	48	57	68	2	67.0	196.5	284.5	6.00
74 96 713	**6**	100	125	80 87 080	975	487	13	82.76	88.76	100.7	62	30	60	72	68	2	67.0	220.0	308.0	9.00
74 98 712	**8**	100	125	80 87 080	2100	1050	12	101.86	109.86	125.8	82	40	60	80	88	2	88.0	220.0	332.0	9.50

1) d = Reference Pitch Diameter
2) d_{wz} = Working Pitch Diameter
x) Not suitable for gearboxes
* Torques based on using hardened and ground racks

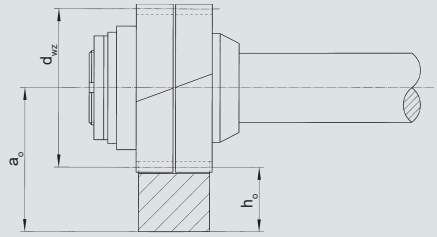
Maximum Preload Torque $T_{v\,max}$

Module	$T_{v\,max.}$	Plate Spring Layers	Tightening of Adjusting Nut
2	67 Nm	Single	14 Graduation Marks
3	125 Nm	Double	6 Graduation Marks
4	192 Nm	Triple	7 Graduation Marks
5	325 Nm	Double	3 Graduation Marks
6	487 Nm	Double	5 Graduation Marks
8	550 Nm	Double	3 Graduation Marks
8	1050 Nm	Double	6 Graduation Marks

Note: Stronger preload is possible by means of multiple spring layers, but then $T_{v\,max}$ has to be reduced. Plate springs can be ordered separately, please ask us.

For how to adjust the preload split-pinion shaft, see our Installation & Maintenance Instruction MPZ001.

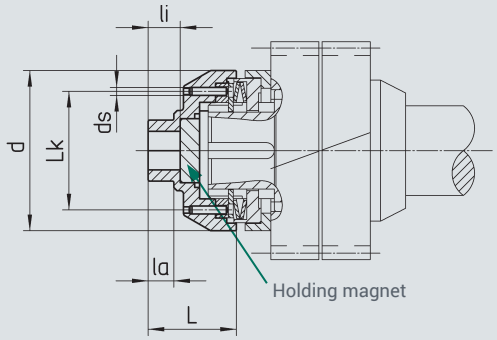
Calculation of Center Distance 'a' Between Pinion And Rack

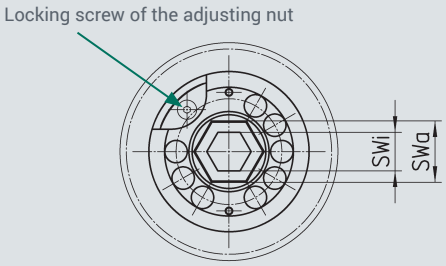


$$a_o = \frac{d_{wz}}{2} + h_o$$

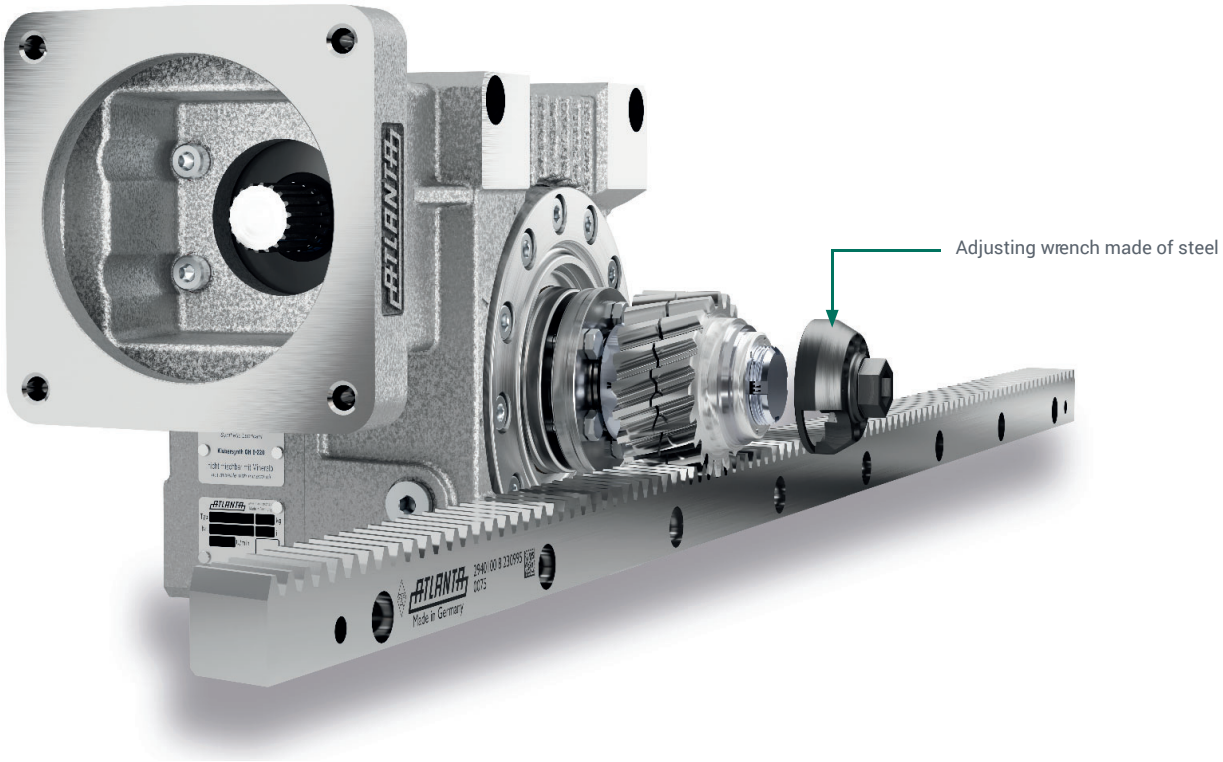
m	a_o	x	ho
2	53.83	–	22
3	57.83	–	26
4	66.83	–	35
5	76.29	0.5	34
6	87.38	0.5	43
8	125.93	0.5	71

Preload Adjusting Wrench





Order Code	Pre-load $T_{2\ max}$ Pinion Shafts	Wrench Size	la	SWi	li	ds	Lk	d	L	kg
74 90 001	**74 92 330** **74 92 430** **74 93 320** **74 93 420** **74 93 520** **74 94 515**	19	8	12	10.0	2.5	37	50	27.5	0.113
74 90 002	**74 95 615** **74 96 613** **74 96 713**	19	8	12	12.5	4.0	50	74	34.0	0.338
74 90 003	**74 98 612** **74 98 712**	22	9	12	13.0	6.0	67	96	40.0	0.625



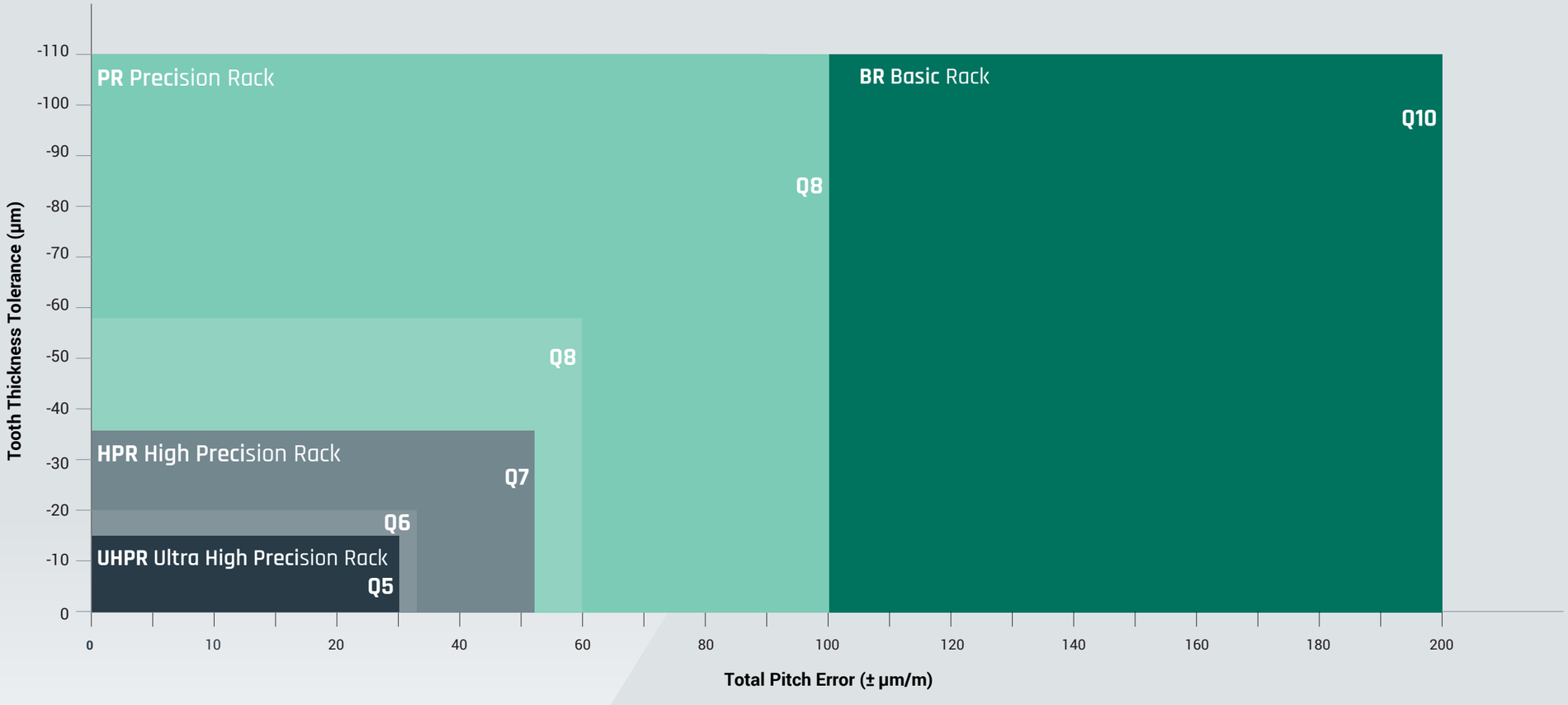
All dimensions are in mm

Welcome To The World's Widest Range Of High-Quality Racks & Pinions

As a specialist in the field of high-quality racks, we offer more than 350 types of racks. This is most comprehensive rack program that is currently available on the market. ATLANTA offers four different rack classes to meet any application:

- Ultra High Precision Rack (UHPR)
- High Precision Rack, (HPR)
- Precision Rack (PR)
- Basic Rack (BR)

These range from quality 5 to 10, in helical or straight-tooth, with milled, hardened or hardened & ground teeth. We also offer a wide range of suitable gears, servo-worm gearboxes, pinion shafts and lubrication systems for a complete drive system.

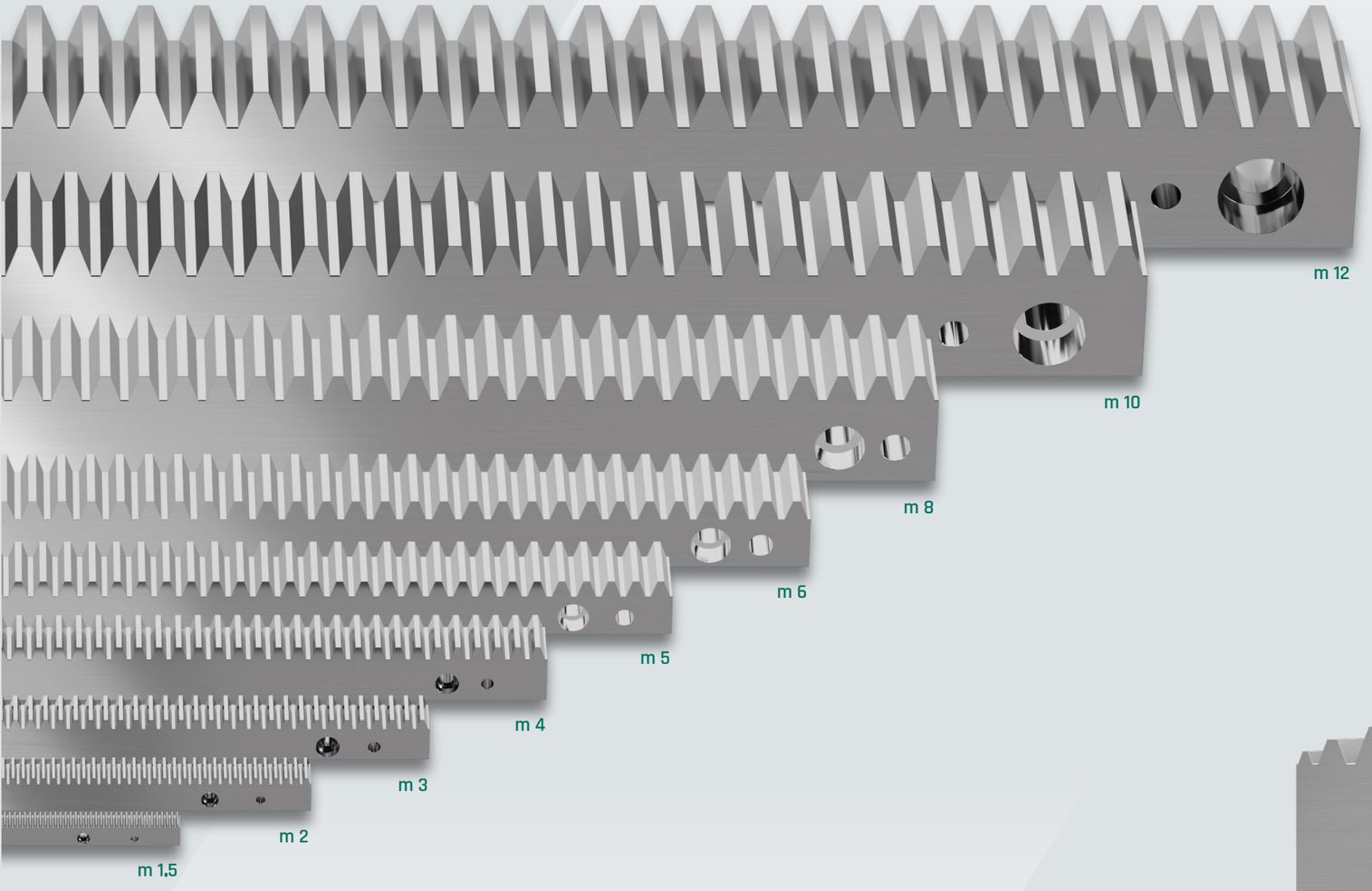


The Right Rack For Every Application

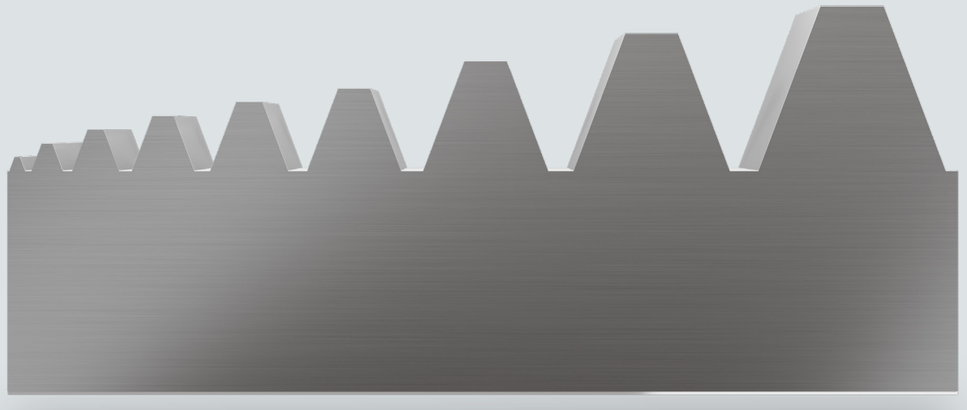
Depending on the application and the machine accuracy requirements, you can choose from a wide variety of different racks with quality levels from 5 to 10 and lengths of up to 2,000 mm.

A Wide Range Of Rack & Pinion Sizes In All Qualities

To realize a complete range of rack and pinion drives, we offer our high-quality racks in sizes from module 1.5 to module 12. This means that almost all conceivable applications can be achieved and the best solution can be found for every application.



Modular Gear Sizing According To DIN 867



Premium Quality Down To The Smallest Detail

We produce racks and gears at the highest level. Only materials that meet the highest requirements of our ATLANTA specification are used in production. Together with our hardening process, this creates the well-known **ATLANTA Premium Quality** for the highest loads and the lowest tolerances within a rack and pinion drive.

Gear Correction
Optimally matched to the pinion and rack for perfect running properties

Special Materials According To ATLANTA Specification
With the hardening process optimally matched for the highest load capacities

Laser Marking
With all information needed to identify the racks, and the possibility to add customer information and logo.

2D Data Matrix Code
For reading the rack data from the ATLANTA Cloud

The Advantage Of Using ATLANTA Long, Ground Racks

For mounted racks, the achieved accuracy and required installation time are important. With ATLANTA ground racks in lengths of 1,500 mm and 2,000 mm, the total pitch error per meter is reduced considerably and therefore the pitch error of the entire axis is correspondingly lower. By using long racks, the number of rack joints is reduced, which improves the accuracy of the entire axis and significantly reduces the installation time at the same time.

Ground racks have the advantage that the complete rack is more precise, the meshing takes place evenly and the pinion bearing stress is reduced unlike a milled tooth. The ground rack drives have lower friction which increase energy efficiency.

Example:

Size of the racks: m=4

Quality of the racks: Q6

Assembly length: 6 meters mounted with companion rack for assembly(joint accuracy Q_{joint} = 25 µm)

Time: Number of screws x t_{screw} + number of joints x t_{joint} + number of pins x t_{pin}

Using 3 Pieces Of Two Meter Racks

Time: Number of Screws: 3 x 16 = 48 screws Number of Joints: 2 Pins: 0

Rack Accuracy: GT_f: 44 µm

Maximum Pitch Error: 3 x 44 µm + 2 x 25 µm = **182 µm**

Using 6 Pieces Of One Meter Racks

Time: Number of Screws: 6 x 8 = 48 Screws Number of Joints: 5 Pins: 0

Rack Accuracy: GT_f: 34 µm

Maximum Pitch Error: 6 x 34 µm + 5 x 25 µm = **329 µm**

Using 12 Pieces Of Half Meter Racks

Time: Number of Screws: 12 x 4 = 48 Screws Number of Joints: 11 Pins: 12 x 2 = 24

Rack Accuracy: GT_f: 26 µm

Maximum Pitch Error: 12 x 26 µm + 11 x 25 µm = **587 µm**

Class	ATLANTA Quality	Module	Total Pitch Error [1] (± µm/m)	Tooth Thickness Tolerance (µm)	Maximum Length (mm)	Maximum Feed Force Per Pinion Contact [2] (kN)	Application Examples
UHPR Ultra High Precision Rack	5 Hardened & Ground	2	30	-15	1000	19.5	High-precision machine tools, Laser cutting systems, CNC cutting machines
		3	30	-15	1000	28.5	
HPR High Precision Rack	6 Hardened & Ground	2	34	-20	1000	19.5	Machine tools, Waterjet/Plasma/Laser cutting machines, CNC cutting machines, Tube bending systems, Robots, Automation
		3	34	-20	1000	31.0	
		4	34	-20	1000	60.0	
	6 Hardened & Ground	1.5	34	-20	1000	9.0	Machine tools, Waterjet/Plasma/Laser cutting machines, CNC cutting machines, Tube bending systems, Robots, Automation
		2	34	-20	2000	15.5	
		3	34	-20	2000	28.5	
		4	34	-20	2000	51.5	
		5	34	-20	2000	76.0	
		6	34	-20	2000	109.0	
		8	34	-20	1920	191.0	
		10	34	-20	1500	287.0	
		12	34	-20	1000	409.0	
	7 Hardened & Ground	2	52	-36	2000	15.5	Woodworking/Waterjet/Plasma/Laser cutting machines, CNC cutting machines, Tube bending systems, Robots, Automation
		3	52	-36	2000	28.5	
		4	52	-36	2000	51.5	
		5	52	-36	2000	76.0	
		6	52	-36	2000	109.0	
		8	52	-36	1920	191.0	
		10	52	-36	1500	287.0	
PR Precision Rack	8 Hardened & Ground	2	60	-58	2000	13.5	Material handling, Robots, Automation
		3	60	-58	2000	24.5	
		4	60	-58	2000	44.0	
		5	60	-58	2000	64.5	
		6	60	-58	2000	90.5	
	8 Quenched & Tempered, Milled	2	100	-110	2000	8.0	Material handling, Robots, Automation
		3	100	-110	2000	14.0	
		4	100	-110	2000	27.0	
BR Basic Rack	10 Induction-Hardened Milled	1.5	200	-110	1000	3.5	Lifting axis, Material handling, Welding robots
		2	200	-110	2000	9.5	
		3	200	-110	2000	17.5	
		4	200	-110	2000	32.0	
		5	200	-110	2000	49.0	
		6	200	-110	2000	67.5	
		8	200	-110	1920	118.5	
		10	200	-110	1000	178.5	
		12	200	-110	1000	252.5	

1) Values are for rack lengths of 1,000 mm. For total pitch errors values for other rack lengths, please see the respective catalog pages.

2) Values are only valid for special steel according ATLANTA-Standard.

When using the maximum capacity of the teeth, or multiple pinions in contact, the mounting screw loads must be checked separately! Please ask ATLANTA for advice!

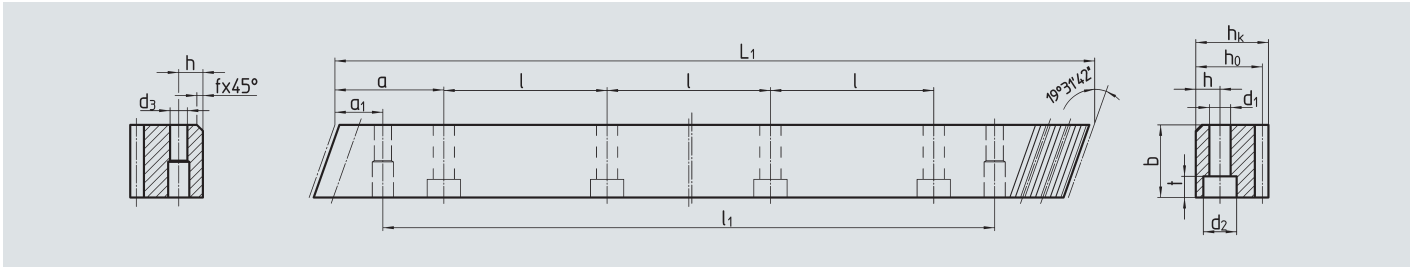
Class & Quality			UHPR 5	HPR 6	HPR 6	HPR 7	PR 8	PR 8	BR 10
Material			Heat-Treat Steel 1)	Case-Hardened 1)	Heat-Treat Steel 1)	Heat-Treat Steel 1)	Heat-Treat Steel 1)	Heat-Treat Steel 1)	Heat-Treat Steel 1)
Heat Treatment			High-Performance Hardening	High-Performance Hardening	High-Performance Hardening	High-Performance Hardening	High-Performance Hardening	Quenched & Tempered	High-Performance Hardening
Module	Mounting Holes	Rack Lengths mm	Order Code						
1.5	✓	500			29 15 055				39 15 050
		1000			29 15 105				39 15 100
	×	500							39 16 050
		1000			29 16 105				39 16 100
2	✓	500		29 20 050	29 20 055			38 21 050	39 20 050
		1000	5 01 79 004	29 20 100	29 20 105	29 20 107	29 20 108	38 21 100	39 20 100
		1500			29 20 155	29 20 157	29 20 158		
		2000			29 20 205	29 20 207	29 20 208	38 21 200	39 20 200
	×	500		29 21 050					39 21 050
		1000		29 21 100	29 21 105			38 20 100	39 21 100
		2000			29 21 205			38 20 200	39 21 200
3	✓	500		29 30 050	29 30 055			38 31 050	39 30 050
		1000	5 01 79 005	29 30 100	29 30 105	29 30 107	29 30 108	38 31 100	39 30 100
		1500			29 30 155	29 30 157	29 30 158		
		2000			29 30 205	29 30 207	29 30 208	38 31 200	39 30 200
	×	500		29 31 050					39 31 050
		1000		29 31 100	29 31 105			38 30 100	39 31 100
		2000			29 31 205			38 30 200	39 31 200
4	✓	500		29 40 050					39 40 050
		1000		29 40 100	29 40 105			38 41 100	39 40 100
		2000			29 40 205			38 41 200	39 40 200
	✓ Large Holes	1000		29 42 100	29 42 105	29 40 107	29 40 108		
		1500			29 42 155	29 40 157	29 40 158		
		2000			29 42 205	29 40 207	29 40 208		
	×	500		29 41 050					
		1000		29 41 100	29 41 105			38 40 100	39 41 100
		2000			29 41 205			38 40 200	39 41 200
5	✓	500			29 50 055				
		1000			29 50 105	29 50 107	29 50 108		39 50 100
		2000			29 50 205	29 50 207	29 50 208		39 50 200
	×	1000			29 51 105				39 51 100
		2000			29 51 205				
6	✓	500			29 60 055				
		1000			29 60 105	29 60 107	29 60 108		39 60 100
		2000			29 60 205	29 60 207	29 60 208		39 60 200
	×	1000			29 61 105				39 61 100
		2000			29 61 205				39 61 200
8	✓	1000			29 80 105				
		2000			29 80 205				
	×	1000			29 81 105				39 81 100
		2000			29 81 205				39 81 200
10	✓	1000			29 10 105				
	×	1000			29 11 105				39 11 100
12	✓	1000			29 12 105				
	×	1000			29 13 105				39 13 100
Page			C-14	C-15	C-16	C-17	C-18	C-19	C-20 – C-21

1) According to ATLANTA-Standard

✓ With mounting holes

× Without mounting holes

ATLANTA Quality 5



Order Code	Module	L_1	N° of Teeth	$b^{+0.4}$	h_k	h_0	f	a	l	N° of Holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
501 79 004	2	1000.00	150	24	24	22	2	62.5	125	8	8	7	11	7	31.7	936.6	5.7	4.10
501 79 005	3	1000.00	150	29	29	26	2	62.5	125	8	9	10	15	9	35.0	930.0	7.7	5.90

Total Pitch Error: GT_f / 1000 ≤ 0.030 mm

- Teeth hardened with the ATLANTA High-Performance hardening process and ground
- Heat-treatable steel according to ATLANTA-Standard
- Ground on all sides after hardening

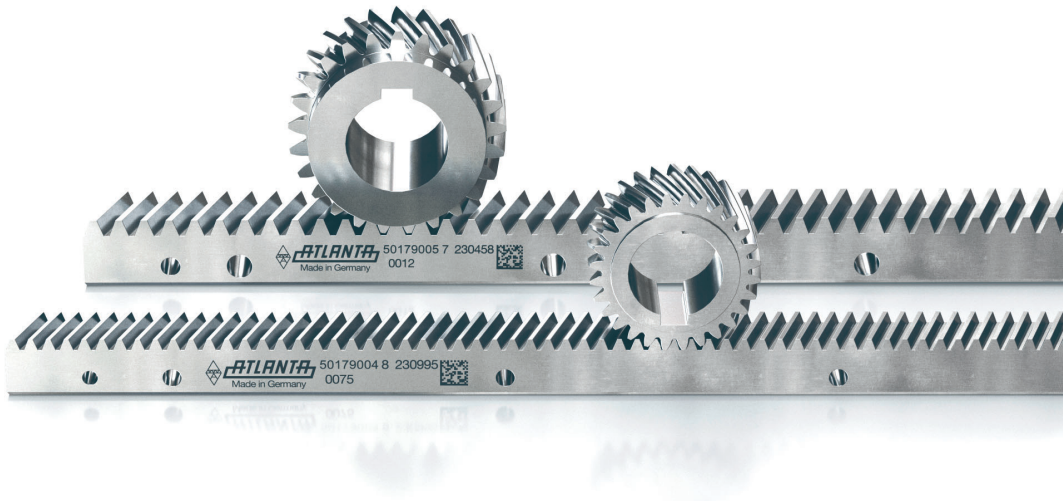
For information on mounting racks, see page C-92.

To achieve precision rack joints, we recommend our patented rack assembly kit, see page C-96.

For lubrication of racks & pinions, we recommend our electronic lubrication systems, see Chapter D.

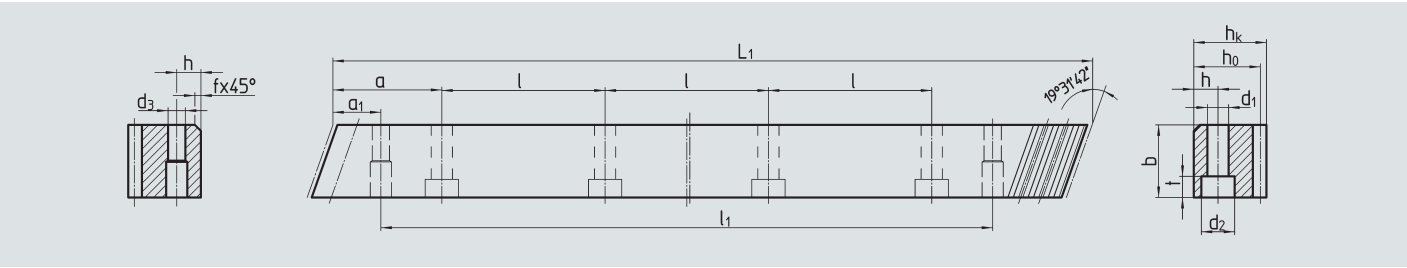
For the calculation and selection of the rack & pinion drive, see pages C-44 to C-55.

For screws for rack mounting, see page C- 95.



All dimensions are in mm

ATLANTA Quality 6



Order Code	Module	L_1	N° of Teeth z	$b^{+0.4}$	h_k	h_0	f	a	l	N° of Holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
29 20 050 [2]	2	500.00	75	24	24	22	2	62.5	125	4	8	7	11	7	31.7	436.6	5.7	2.10
29 21 050	2	500.00	75	24	24	22	2	without mounting holes										2.10
29 20 100	2	1000.00	150	24	24	22	2	62.5	125	8	8	7	11	7	31.7	936.6	5.7	4.10
29 21 100	2	1000.00	150	24	24	22	2	without mounting holes										4.10
29 30 050 [2]	3	500.00	50	29	29	26	2	62.5	125	4	9	10	15	9	35.0	430.0	7.7	2.90
29 31 050	3	500.00	50	29	29	26	2	without mounting holes										2.90
29 30 100	3	1000.00	100	29	29	26	2	62.5	125	8	9	10	15	9	35.0	930.0	7.7	5.90
29 31 100	3	1000.00	100	29	29	26	2	without mounting holes										5.90
29 40 050 [1)2)]	4	506.67	38	39	39	35	2	62.5	125	4	12	10	15	9	33.3	433.0	7.7	5.40
29 31 050	4	506.67	38	39	39	35	2	without mounting holes										5.40
29 40 100	4	1000.00	75	39	39	35	2	62.5	125	8	12	10	15	9	33.3	933.4	7.7	10.70
29 41 100	4	1000.00	75	39	39	35	2	without mounting holes										10.70
29 42 100	4	1000.00	75	39	39	35	2	62.5	125	8	12	14	20	13	33.3	933.4	11.7	10.70

1) This rack can only be used for continuous linking with the left side (see sketch).
2) Due to the screw connection, the feed force is max. 50 % of the value for racks with L1 = 1,000 mm

Total Pitch Error: GT_f **/ 500 ≤ 0.026 mm**
GT_f **/1000 ≤ 0.034 mm**

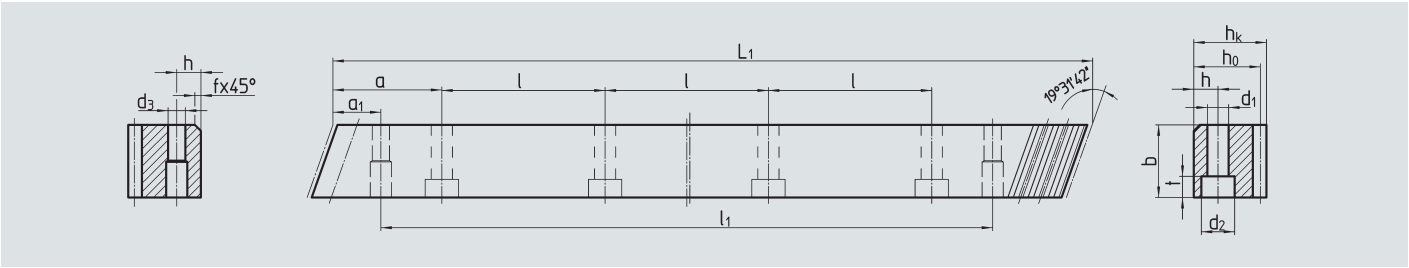
- Teeth hardened with the ATLANTA High-Performance hardening process and ground
- Heat-treatable steel according to ATLANTA-Standard
- Ground on all sides after hardening

For information on mounting racks, see page C-92.

To achieve precision rack joints, we recommend our patented rack assembly kit, see page C-96. For lubrication of racks & pinions, we recommend our electronic lubrication systems, see Chapter D. For the calculation and selection of the rack & pinion drive, see pages C-44 to C-55.

For screws for rack mounting, see page C- 95.

ATLANTA Quality 6



Order Code	Module	L_1	N° of Teeth z	$b^{+0.4}$	h_k	h_0	f	a	l	N° of Holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
29 15 055 2)	1.5	500.00	100	19	19	17.5	2	62.5	125	4	8	7	11	7	31.7	436.6	5.7	1.30
29 15 105	1.5	1000.00	200	19	19	17.5	2	62.5	125	8	8	7	11	7	31.7	936.6	5.7	2.60
29 16 105	1.5	1000.00	200	19	19	17.5	2		without mounting holes									2.60
29 20 055 2)	2	500.00	75	24	24	22	2	62.5	125	4	8	7	11	7	31.7	436.6	5.7	2.10
29 20 105	2	1000.00	150	24	24	22	2	62.5	125	8	8	7	11	7	31.7	936.6	5.7	4.10
29 21 105	2	1000.00	150	24	24	22	2		without mounting holes									4.10
29 20 155	2	1500.00	225	24	24	22	2	62.5	125	12	8	7	11	7	31.7	1436.6	5.7	6.15
29 20 205	2	2000.00	300	24	24	22	2	62.5	125	16	8	7	11	7	31.7	1936.6	5.7	8.20
29 21 205	2	2000.00	300	24	24	22	2		without mounting holes									8.20
29 30 055 2)	3	500.00	50	29	29	26	2	62.5	125	4	9	10	15	9	35.0	430.0	7.7	2.90
29 30 105	3	1000.00	100	29	29	26	2	62.5	125	8	9	10	15	9	35.0	930.0	7.7	5.90
29 31 105	3	1000.00	100	29	29	26	2		without mounting holes									5.90
29 30 155	3	1500.00	150	29	29	26	2	62.5	125	12	9	10	15	9	35.0	1430.0	7.7	8.85
29 30 205	3	2000.00	200	29	29	26	2	62.5	125	16	9	10	15	9	35.0	1930.0	7.7	11.80
29 31 205	3	2000.00	200	29	29	26	2		without mounting holes									11.80
29 40 105	4	1000.00	75	39	39	35	2	62.5	125	8	12	10	15	9	33.3	933.4	7.7	10.70
29 41 105	4	1000.00	75	39	39	35	2		without mounting holes									10.70
29 42 105	4	1000.00	75	39	39	35	2	62.5	125	8	12	14	20	13	33.3	933.4	11.7	10.70
29 42 155 1)	4	1506.67	113	39	39	35	2	62.5	125	12	12	14	20	13	33.3	1433.4	11.7	16.05
29 40 205	4	2000.00	150	39	39	35	2	62.5	125	16	12	10	15	9	33.3	1933.4	7.7	21.40
29 41 205	4	2000.00	150	39	39	35	2		without mounting holes									21.40
29 42 205	4	2000.00	150	39	39	35	2	62.5	125	16	12	14	20	13	33.3	1933.4	11.7	21.40
29 50 055 2)	5	500.00	30	49	39	34	2.5	62.5	125	4	12	14	20	13	37.5	425.0	11.7	6.50
29 50 105	5	1000.00	60	49	39	34	2.5	62.5	125	8	12	14	20	13	37.5	925.0	11.7	13.00
29 51 105	5	1000.00	60	49	39	34	2.5		without mounting holes									13.00
29 50 205	5	2000.00	120	49	39	34	2.5	62.5	125	16	12	14	20	13	37.5	1925.0	11.7	26.00
29 51 205	5	2000.00	120	49	39	34	2.5		without mounting holes									26.00
29 60 055 2)	6	500.00	25	59	49	43	2.5	62.5	125	4	16	18	26	17	37.5	425.0	15.7	9.90
29 60 105	6	1000.00	50	59	49	43	2.5	62.5	125	8	16	18	26	17	37.5	925.0	15.7	18.10
29 61 105	6	1000.00	50	59	49	43	2.5		without mounting holes									18.10
29 60 205	6	2000.00	100	59	49	43	2.5	62.5	125	16	16	18	26	17	37.5	1925.0	15.7	36.20
29 61 205	6	2000.00	100	59	49	43	2.5		without mounting holes									36.20
29 80 105	8	960.00	36	79	79	71	2.5	60.0	120	8	25	22	33	21	120.0	720.0	19.7	42.50
29 81 105	8	960.00	36	79	79	71	2.5		without mounting holes									42.50
29 80 205	8	1920.00	72	79	79	71	2.5	60.0	120	16	25	22	33	21	120.0	1680.0	19.7	85.00
29 81 205	8	1920.00	72	79	79	71	2.5		without mounting holes									85.00
29 10 105 3)	10	1000.00	30	99	99	89	2.5	62.5	125	8	32	33	48	32	125.0	750.0	19.7	68.72
29 11 105 3)	10	1000.00	30	99	99	89	2.5		without mounting holes									68.72
29 10 155 3)	10	1500.00	45	99	99	89	2.5	62.5	125	12	32	33	48	32	125	1250.0	19.7	103.00
29 12 105 3)	12	1000.00	25	120	120	108	2.5	40.0	125	8	40	39	58	38	125.0	750.0	19.7	111.00
29 13 105 3)	12	1000.00	25	120	120	108	2.5		without mounting holes									111.00

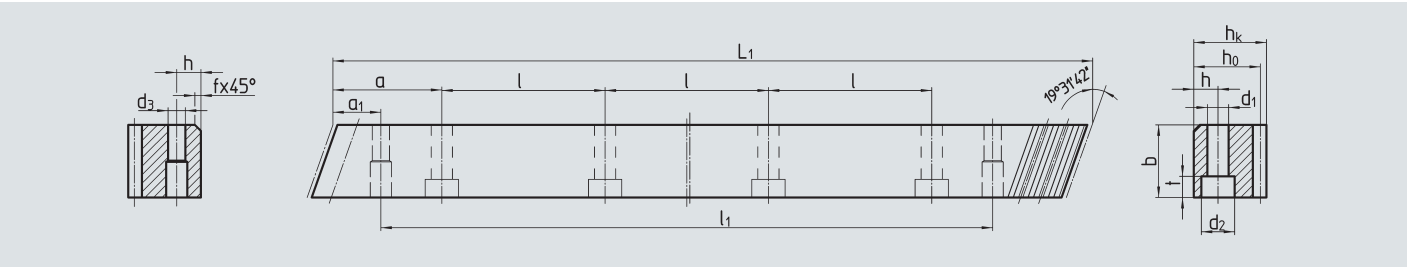
1) This rack can only be used for continuous linking with the left side
2) Due to the screw connection, the feed force is max. 50 % of the value for racks with L1 = 1,000 mm
3) On Request

Total Pitch Error: GT_f/ 500 ≤ 0.026 mm
GT_f/1000 ≤ 0.034 mm
GT_f/1500 ≤ 0.041 mm (≙ 0.027 mm / 1000)
GT_f/2000 ≤ 0.044 mm (≙ 0.022 mm / 1000)

For further information see next page

All dimensions are in mm

ATLANTA Quality 7



Order Code	Module	L_1	N° of Teeth	$b^{+0.4}$	h_k	h_0	f	a	l	N° of Holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
29 20 107	2	1000.00	150	24	24	22	2	62.5	125	8	8	7	11	7	31.7	936.6	5.7	4.10
29 20 157	2	1500.00	225	24	24	22	2	62.5	125	12	8	7	11	7	31.7	1436.6	5.7	6.15
29 20 207	2	2000.00	300	24	24	22	2	62.5	125	16	8	7	11	7	31.7	1936.6	5.7	8.20
29 30 107	3	1000.00	100	29	29	26	2	62.5	125	8	9	10	15	9	35.0	930.0	7.7	5.90
29 30 157	3	1500.00	150	29	29	26	2	62.5	125	12	9	10	15	9	35.0	1430.0	7.7	8.85
29 30 207	3	2000.00	200	29	29	26	2	62.5	125	16	9	10	15	9	35.0	1930.0	7.7	11.80
29 40 107	4	1000.00	75	39	39	35	2	62.5	125	8	12	14	20	13	33.3	933.4	11.7	10.70
29 40 157 [1]	4	1506.67	113	39	39	35	2	62.5	125	12	12	14	20	13	33.3	1433.0	11.7	16.00
29 40 207	4	2000.00	150	39	39	35	2	62.5	125	16	12	14	20	13	33.3	1933.4	11.7	21.40
29 50 107	5	1000.00	60	49	39	34	2.5	62.5	125	8	12	14	20	13	37.5	925.0	11.7	13.00
29 50 207	5	2000.00	120	49	39	34	2.5	62.5	125	16	12	14	20	13	37.5	1925.0	11.7	26.00
29 60 107	6	1000.00	50	59	49	43	2.5	62.5	125	8	16	18	26	17	37.5	925.0	15.7	18.10
29 60 207	6	2000.00	100	59	49	43	2.5	62.5	125	16	16	18	26	17	37.5	1925.0	15.7	36.20

1) This rack can only be used for continuous linking with the left side

Other lengths on request

Total Pitch Error: $GT_f/1000 \leq 0.052$ mm
$GT_f/1500 \leq 0.062$ mm (≙ 0.042 mm / 1000)
$GT_f/2000 \leq 0.068$ mm (≙ 0.034 mm / 1000)

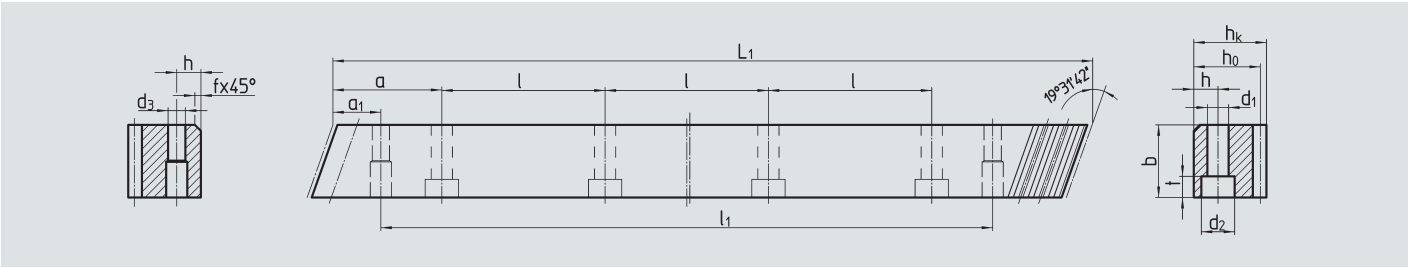
- Teeth hardened with the ATLANTA High-Performance hardening process and ground
- Heat-treatable steel according to ATLANTA-Standard
- Ground on all sides after hardening

For information on mounting racks, see page C-92.

To achieve precision rack joints, we recommend our patented rack assembly kit, see page C-96. For lubrication of racks & pinions, we recommend our electronic lubrication systems, see Chapter D. For the calculation and selection of the rack & pinion drive, see pages C-44 to C-55.

For screws for rack mounting, see page C- 95.

ATLANTA Quality 8



Order Code	Module	L_1	N° of Teeth	$b^{+0.4}$	h_k	h_0	f	a	l	N° of Holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
29 20 108	2	1000.00	150	24	24	22	2	62.5	125	8	8	7	11	7	31.7	936.6	5.7	4.12
29 20 158	2	1500.00	225	24	24	22	2	62.5	125	12	8	7	11	7	31.7	1436.6	5.7	6.15
29 20 208	2	2000.00	300	24	24	22	2	62.5	125	16	8	7	11	7	31.7	1936.6	5.7	8.00
29 30 108	3	1000.00	100	29	29	26	2	62.5	125	8	9	10	15	9	35.0	930.0	7.7	5.70
29 30 158	3	1500.00	150	29	29	26	2	62.5	125	12	9	10	15	9	35.0	1430.0	7.7	8.90
29 30 208	3	2000.00	200	29	29	26	2	62.5	125	16	9	10	15	9	35.0	1930.0	7.7	11.20
29 40 108	4	1000.00	75	39	39	35	2	62.5	125	8	12	14	20	13	33.3	933.4	11.7	10.10
29 40 158 [1]	4	1506.67	113	39	39	35	2	62.5	125	12	12	14	20	13	33.3	1433.4	11.7	16.00
29 40 208	4	2000.00	150	39	39	35	2	62.5	125	16	12	14	20	13	33.3	1933.4	11.7	20.16
29 50 108	5	1000.00	60	49	39	34	2.5	62.5	125	8	12	14	20	13	37.5	925.0	11.7	13.00
29 50 208	5	2000.00	120	49	39	34	2.5	62.5	125	16	12	14	20	13	37.5	1925.0	11.7	24.52
29 60 108	6	1000.00	50	59	49	43	2.5	62.5	125	8	16	18	26	17	37.5	925.0	15.7	18.25
29 60 208	6	2000.00	100	59	49	43	2.5	62.5	125	16	16	18	26	17	37.5	1925.0	15.7	36.20

1) This rack can only be used for continuous linking with the left side

Other lengths and without mounting holes on request

Total Pitch Error: **GT_f/1000 ≤ 0.060 mm**
GT_f/1500 ≤ 0.072 mm (≙ 0.048 mm / 1000)
GT_f/2000 ≤ 0.078 mm (≙ 0.039 mm / 1000)

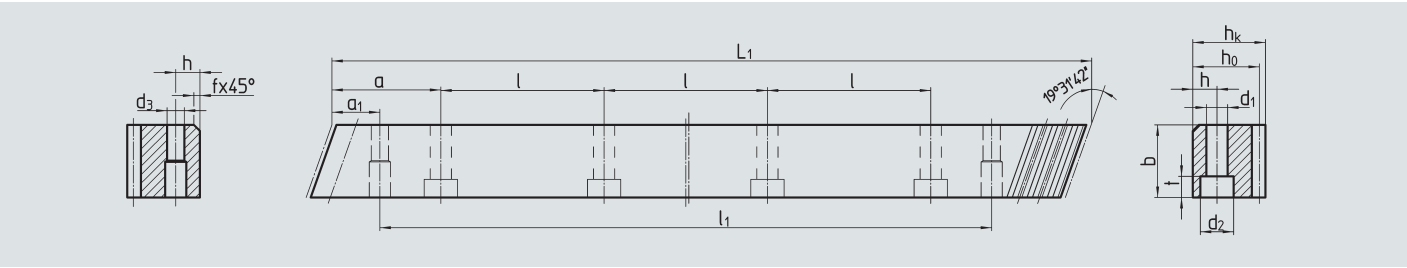
- Teeth hardened with the ATLANTA High-Performance hardening process and ground
- Heat-treatable steel according to ATLANTA-Standard
- Ground on all sides after hardening

For information on mounting racks, see page C-92.

To achieve precision rack joints, we recommend our patented rack assembly kit, see page C-96. For lubrication of racks & pinions, we recommend our electronic lubrication systems, see Chapter D. For the calculation and selection of the rack & pinion drive, see pages C-44 to C-55.

For screws for rack mounting, see page C- 95.

ATLANTA Quality 8



Order Code	Module	L_1	N° of Teeth	$b^{+0.4}$	h_k	h_0	f	a	l	N° of Holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
38 21 050 [2]	2	500.00	75	25	24	22	2	62.5	125	4	8	7	11	7	31.7	436.6	5.7	2.10
38 21 100	2	1000.00	150	25	24	22	2	62.5	125	8	8	7	11	7	31.7	936.6	5.7	4.30
38 20 100	2	1000.00	150	25	24	22	2	without mounting holes										4.30
38 21 200	2	2000.00	300	25	24	22	2	62.5	125	16	8	7	11	7	31.7	1936.6	5.7	8.60
38 20 200	2	2000.00	300	25	24	22	2	without mounting holes										8.60
38 31 050 [2]	3	500.00	50	30	29	26	2	62.5	125	4	9	10	15	9	35.0	430.0	7.7	3.00
38 31 100	3	1000.00	100	30	29	26	2	62.5	125	8	9	10	15	9	35.0	930.0	7.7	6.10
38 30 100	3	1000.00	100	30	29	26	2	without mounting holes										6.10
38 31 200	3	2000.00	200	30	29	26	2	62.5	125	16	9	10	15	9	35.0	1930.0	7.7	12.20
38 30 200	3	2000.00	200	30	29	26	2	without mounting holes										12.20
38 41 100	4	1000.00	75	40	39	35	2	62.5	125	8	12	10	15	9	33.3	933.4	7.7	10.90
38 40 100	4	1000.00	75	40	39	35	2	without mounting holes										10.90
38 41 200	4	2000.00	150	40	39	35	2	62.5	125	16	12	10	15	9	33.3	1933.4	7.7	21.80
38 40 200	4	2000.00	150	40	39	35	2	without mounting holes										21.80

2) Due to the screw connection, the feed force is maximum 50 % of the value for racks with L1 = 1,000 mm

Total Pitch Error: GT_f/ 500 ≤ 0.050 mm
GT_f/1000 ≤ 0.100 mm
GT_f/2000 ≤ 0.200 mm

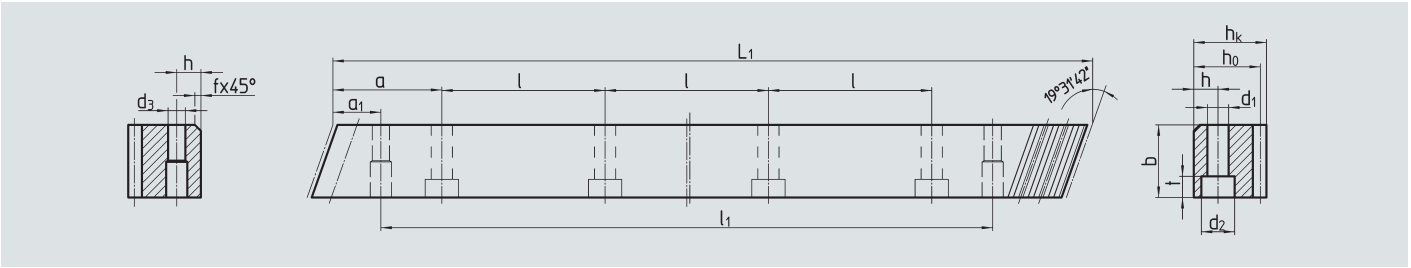
- Teeth milled, quenched & tempered
- Heat-treatable steel according to ATLANTA-Standard
- Backside machined

For information on mounting racks, see page C-92.

To achieve precision rack joints, we recommend our patented rack assembly kit, see page C-96. For lubrication of racks & pinions, we recommend our electronic lubrication systems, see Chapter D. For the calculation and selection of the rack & pinion drive, see pages C-44 to C-55.

For screws for rack mounting, see page C- 95.

ATLANTA Quality 10



Order Code	Module	L_1	N° of Teeth	$b^{+0.4}$	h_k	h_0	f	a	l	N° of Holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
39 15 050 [2]	1.5	500.00	100	17	17	15.5	2	62.5	125	4	6	6	10	6	31.7	436.6	5.7	2.00
39 16 050	1.5	500.00	100	17	17	15.5	2	without mounting holes										2.00
39 15 100	1.5	1000.00	200	17	17	15.5	2	62.5	125	8	6	6	10	6	31.7	936.6	5.7	2.60
39 16 100	1.5	1000.00	200	17	17	15.5	2	without mounting holes										2.60
39 20 050 [2]	2	500.00	75	25	24	22	2	62.5	125	4	8	7	11	7	31.7	436.6	2.7	2.10
39 21 050	2	500.00	75	25	24	22	2	without mounting holes										2.10
39 20 100	2	1000.00	150	25	24	22	2	62.5	125	8	8	7	11	7	31.7	936.6	5.7	4.20
39 21 100	2	1000.00	150	25	24	22	2	without mounting holes										4.20
39 20 200	2	2000.00	300	25	24	22	2	62.5	125	16	8	7	11	7	31.7	1936.6	5.7	8.40
39 21 200	2	2000.00	300	25	24	22	2	without mounting holes										8.40
39 30 050 [2]	3	500.00	50	30	29	26	2	62.5	125	4	9	10	15	9	35.0	430.0	7.7	3.00
39 31 050	3	500.00	50	30	29	26	2	without mounting holes										3.00
39 30 100	3	1000.00	100	30	29	26	2	62.5	125	8	9	10	15	9	35.0	930.0	7.7	6.00
39 31 100	3	1000.00	100	30	29	26	2	without mounting holes										6.00
39 30 200	3	2000.00	200	30	29	26	2	62.5	125	16	9	10	15	9	35.0	1930.0	7.7	12.00
39 31 200	3	2000.00	200	30	29	26	2	without mounting holes										12.00
39 40 050 [1][2]	4	506.67	38	40	39	35	2	62.5	125	4	12	10	15	9	33.3	433.0	7.7	5.30
39 40 100	4	1000.00	75	40	39	35	2	62.5	125	8	12	10	15	9	33.3	933.4	7.7	10.50
39 41 100	4	1000.00	75	40	39	35	2	without mounting holes										10.50
39 40 200	4	2000.00	150	40	39	35	2	62.5	125	16	12	10	15	9	33.3	1933.4	7.7	21.00
39 41 200	4	2000.00	150	40	39	35	2	without mounting holes										21.00
39 50 100	5	1000.00	60	50	39	34	2.5	62.5	125	8	12	14	20	13	37.5	925.0	11.7	13.00
39 51 100	5	1000.00	60	50	39	34	2.5	without mounting holes										13.00
39 50 200	5	2000.00	120	50	39	34	2.5	62.5	125	16	12	14	20	13	37.5	1925.0	11.7	26.00
39 60 100	6	1000.00	50	60	49	43	2.5	62.5	125	8	16	18	26	17	37.5	925.0	15.7	19.80
39 61 100	6	1000.00	50	60	49	43	2.5	without mounting holes										19.80
39 60 200	6	2000.00	100	60	49	43	2.5	62.5	125	16	16	18	26	17	37.5	1925.0	15.7	39.60
39 61 200	6	2000.00	100	60	49	43	2.5	without mounting holes										39.60

1) This rack can only be used for continuous linking with the left side
2) Due to the screw connection, the feed force is maximum 50 % of the value for racks with L1 = 1,000 mm

Total Pitch Error: $GT_f/\ 500 \leq 0.100$ mm
$GT_f/1000 \leq 0.200$ mm
$GT_f/1500 \leq 0.300$ mm
$GT_f/2000 \leq 0.400$ mm

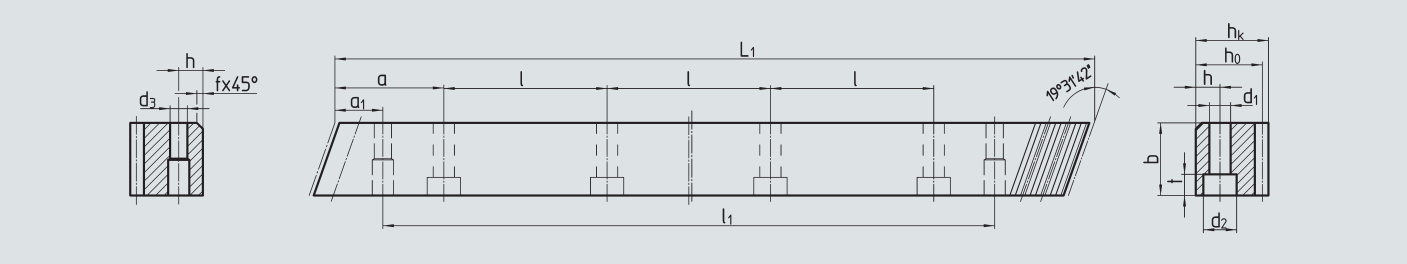
- Teeth hardened with the ATLANTA High-Performance hardening process and ground
- Heat-treatable steel according to ATLANTA-Standard
- Ground on all sides after hardening

For information on mounting racks, see page C-92.

To achieve precision rack joints, we recommend our patented rack assembly kit, see page C-96. For lubrication of racks & pinions, we recommend our electronic lubrication systems, see Chapter D. For the calculation and selection of the rack & pinion drive, see pages C-44 to C-55.

For screws for rack mounting, see page C- 95.

ATLANTA Quality 10



Order Code	Module	L_1	N° of Teeth	$b^{+0.4}$	h_k	h_0	f	a	l	N° of Holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
39 81 100	8	960.00	36	80	79	71	2.5			without mounting holes								42.50
39 81 200	8	1920.00	72	80	79	71	2.5			without mounting holes								85.00
39 11 100	10	1000.00	30	100	99	89	2.5			without mounting holes								68.72
39 13 100	12	1000.00	25	120	120	108	2.5			without mounting holes								120.00

Total Pitch Error: $GT_f/1000 \leq 0.200$ mm
$GT_f/2000 \leq 0.400$ mm

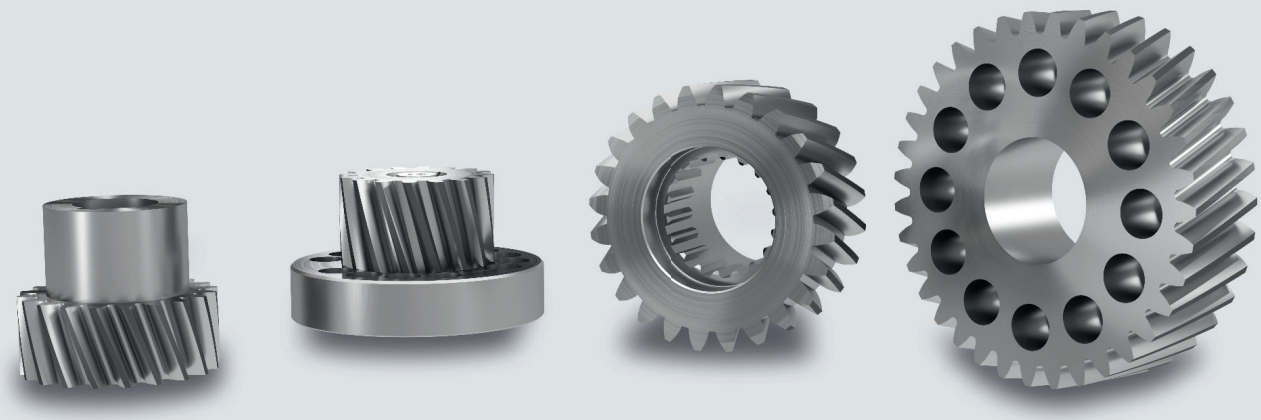
- Teeth hardened with the ATLANTA High-Performance hardening process and ground
- Heat-treatable steel according to ATLANTA-Standard
- Backside machined, profile blasted

For information on mounting racks, see page C-92.

To achieve precision rack joints, we recommend our patented rack assembly kit, see page C-96. For lubrication of racks & pinions, we recommend our electronic lubrication systems, see Chapter D. For the calculation and selection of the rack & pinion drive, see pages C-44 to C-55.

For screws for rack mounting, see page C- 95.

Series	Module	Tolerance of Teeth	Page
78 .. 5.. Hardened & Ground Pinions With ISO 9409-1-A Flange	2, 3, 4, 5	5 e 24	C-24 – C-27
78 .. ... TR and TRS Flanged Pinions	2, 3, 4, 5, 6, 8, 10	5 e 24	C-28 – C-36
79 .. ... Hardened & Ground Pinions and spline profile according DIN 5480	1.5, 2, 3, 4	5 e 24	C-38
24 .. ... Hardened & Ground Bored & Keyed Pinions	1.5, 2, 3, 4, 5, 6, 8, 10	7 e 25	C-39 – C-41
24 .. ... Hardened & Ground Pinions with plain bore for rework	2, 3, 4, 5, 6, 8	6 e 25	C-42



Helical-Tooth, 19° 31' 42" left-hand, A-31.5 to A-63 flange

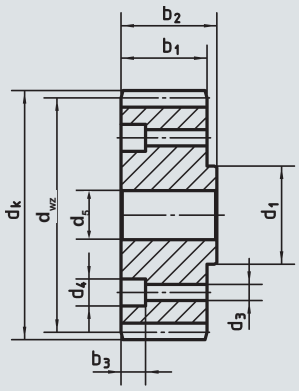


Fig. 1

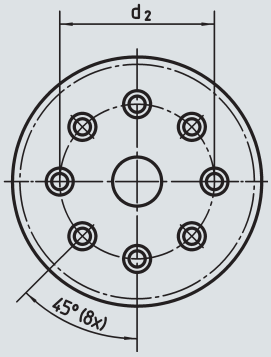
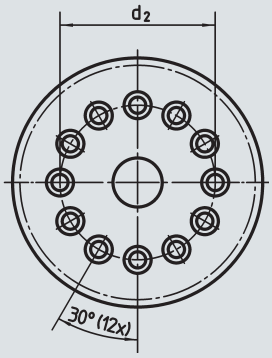


Fig. 2

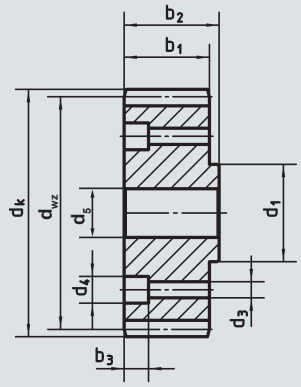


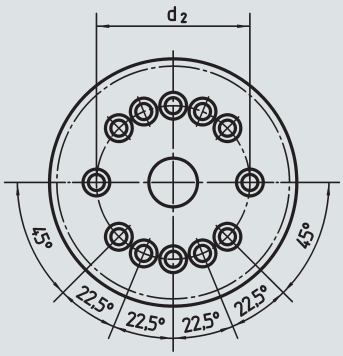
16MnCr5, 1.7131
Case-Hardened
Quality 5 e 24

With Screws 12.9 DIN 912

Order Code	Fig.	Module	N° of Teeth z	x (1)	d_0	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	d_5^{H6}	b_1	b_2	b_3	L=PI*d L	kg	ISO Interface
78 20 526	1	2	26	0.4065	55.17	56.80	60.60	20.0	31.5	5.5	10	15	26	29.0	12	173.33	0.4	9409-1-A-31.5
78 20 527	1	2	27	0	57.30	57.30	61.29	20.0	31.5	5.5	10	15	30	33.5	11	180.00	0.5	9409-1-A-31.5
78 20 529	1	2	29	0.4150	61.54	63.20	67.00	20.0	31.5	5.5	10	15	26	29.0	12	193.33	0.5	9409-1-A-31.5
78 20 535	1	2	35	0.3819	74.27	75.80	79.60	20.0	31.5	5.5	10	15	26	29.0	12	233.33	0.8	9409-1-A-31.5
78 25 529	1	2	29	0.4150	61.54	63.20	67.00	25.0	40.0	6.6	11	20	26	30.0	14	193.33	0.5	9409-1-A-40
78 21 533	1	2	33	0.3928	70.03	71.60	75.30	31.5	50.0	6.6	11	20	26	30.0	14	220.00	0.7	9409-1-A-50
78 20 536	1	2	36	0	76.40	76.40	80.39	31.5	50.0	6.6	11	20	30	34.0	8	240.00	1.2	9409-1-A-50
78 21 537	1	2	37	0.4209	78.52	80.20	84.00	31.5	50.0	6.6	11	20	26	30.0	14	246.67	0.9	9409-1-A-50
78 31 531	1	3	31	0.3540	98.68	100.80	106.60	31.5	50.0	6.6	11	20	31	35.5	9	310.00	1.8	9409-1-A-50

(1) Profile Modification Factor





16MnCr5, 1.7131
Case-Hardened
Quality 5 e 24

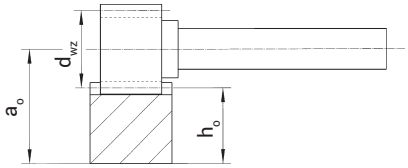
With Screws 12.9 DIN 912

Order Code	Module	N° of Teeth z	x (1)	d_0	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	d_5^{H6}	b_1	b_2	b_3	L=PI*d L	kg	ISO Interface
78 22 540	2	40	0.3792	84.88	86.40	90.20	40.0	63.0	6.6	11	31.5	26	30	14	266.69	1.0	9409-1-A-63
78 22 545	2	45	0.3267		96.80	100.60	40.0	63.0	6.6	11	31.5	26	30	14	300.00	1.4	9409-1-A-63
78 30 530	3	30	0	95.49	95.49	101.49	40.0	63.0	6.6	11	20.0	35	39	10	300.00	2.2	9409-1-A-63

(1) Profile Modification Factor

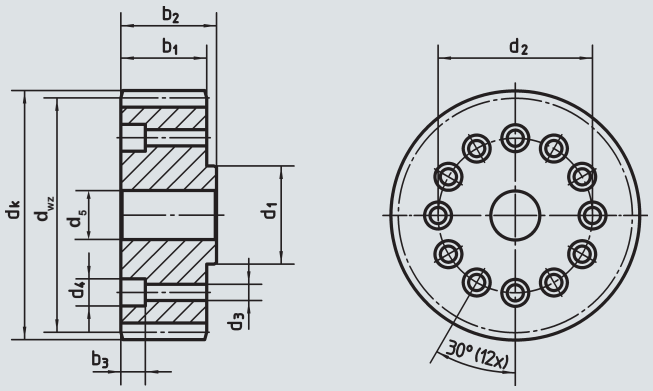
The maximum torque is limited by the threaded connection

Calculation of center distance 'a' between pinion and rack.



$$a_o = \frac{d_{wz}}{2} + h_o$$

Helical-Tooth, 19° 31' 42" left-hand, A-80 to A-125 flange



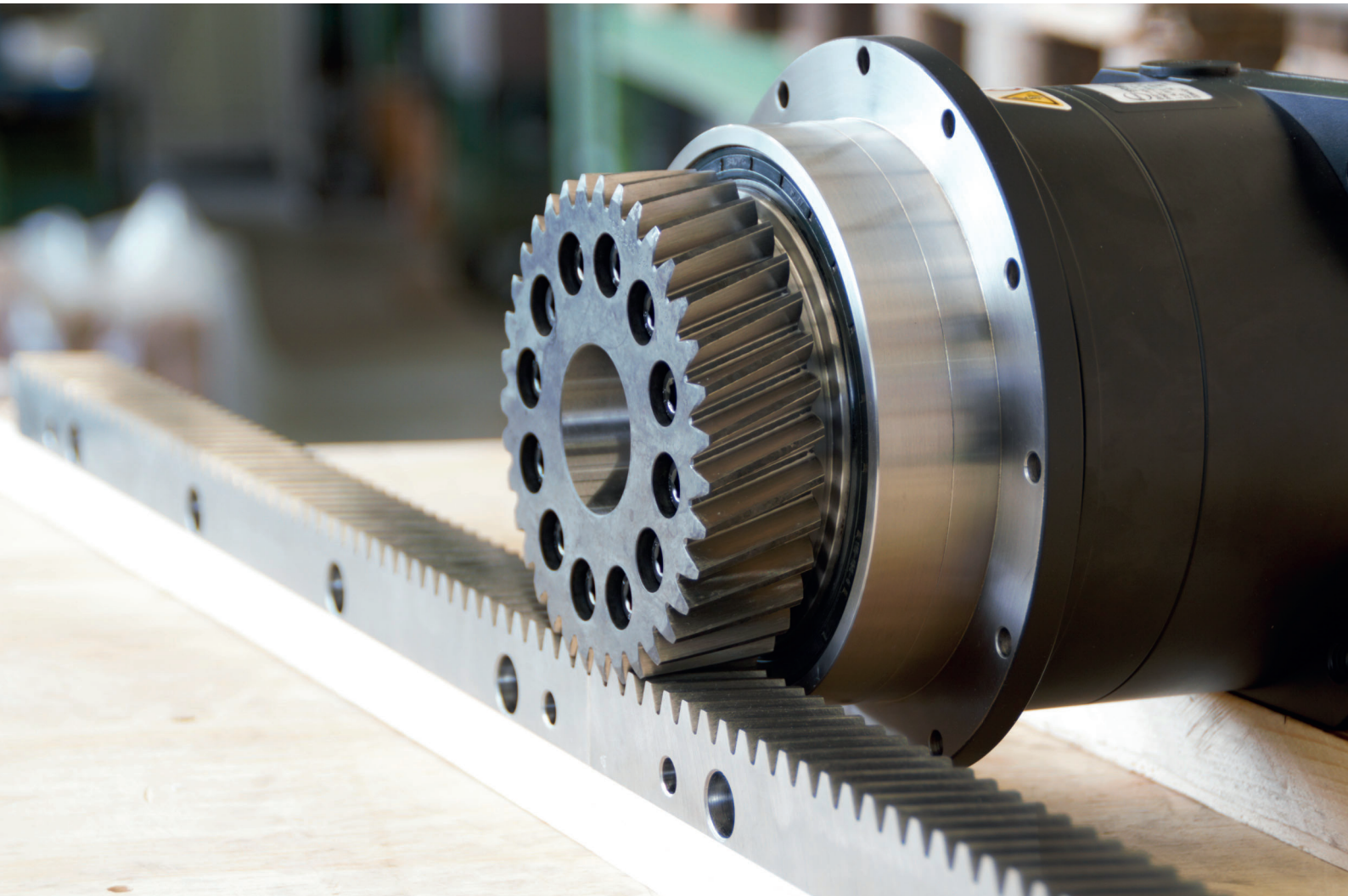
16MnCr5, 1.7131
Case-Hardened
Quality 5 e 24

With Screws 12.9 DIN 912

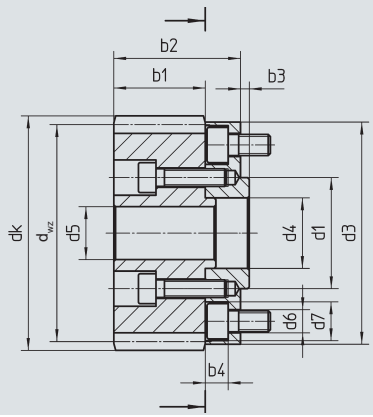
Order Code	Module	N° of Teeth z	x (1)	d_0	d_{wz}	d_k	d_{1h6}	d_2	d_3	d_4	d_5^{H6}	b_1	b_2	b_3	L=PI*d L	kg	ISO Interface
78 33 535	3	35	0.3652		113.60	119.40	50	80	9	15	40	31	35.0	11	350.00	1.8	9409-1-A-80
78 33 540	3	40	0.3792		129.60	135.40	50	80	9	15	40	31	35.0	11	400.00	2.5	9409-1-A-80
78 40 530	4	30	0		127.32	135.32	50	80	9	15	40	45	49.0	11	400.00	3.5	9409-1-A-80
78 50 521	5	21	0		111.40	121.40	50	80	9	–	40	59	64.5	–	350.00	3.5	9409-1-A-80
78 50 536	5	36	0		190.99	200.98	80	125	11	18	60	55	61.0	13	600.00	8.0	9409-1-A-125

(1) Profile Modification Factor

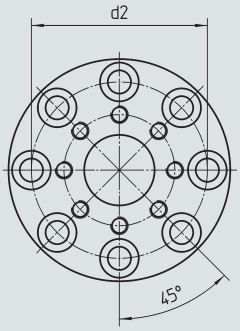
The max. torque is limited by the threaded connection.



Helical-Tooth, 19° 31' 42" left-hand, A-50 to A-63 flange



Set consists of pinion and flange



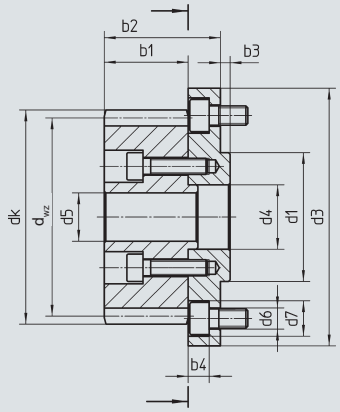
Interface A50

16MnCr5, 1.7131
Case-Hardened
Quality 5 e 24

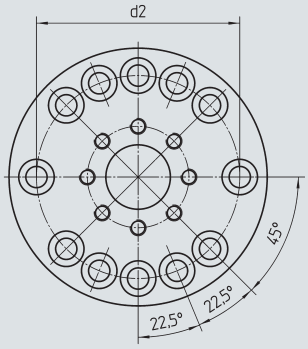
With Screws 12.9 DIN 912

Order Code Pinion	Order Code Flange	Module	N° of Teeth z	x (1)	d_0	d_{wz}	dk	d_{1h6}	d2	d3	d4	d5	d6	d7	b1	b2	b3	b4	L=Pl*d L	kg	ISO Interface
78 20 526	**2 65 78 001**	2	26	0.4065	55.17	56.80	60.60	31.5	50	63	20	15	6.6	11	26	36	2.5	6.5	173.33	0.6	9409-1-A-31.5/50
78 20 527	**2 65 78 001**	2	27	0	57.30	57.30	61.29	31.5	50	63	20	15	6.6	11	30	40	2.5	6.5	180.00	0.7	9409-1-A-31.5/50
78 20 529	**2 65 78 001**	2	29	0.4150	61.54	63.20	67.00	31.5	50	63	20	15	6.6	11	26	36	2.5	6.5	193.33	0.7	9409-1-A-31.5/50
78 20 535	**2 65 78 001**	2	35	0.3819	74.27	75.80	79.60	31.5	50	63	20	15	6.6	11	26	36	2.5	6.5	233.33	1.0	9409-1-A-31.5/50

(1) Profile Modification Factor



Set consists of pinion and flange



Interface A63

16MnCr5, 1.7131
Case-Hardened
Quality 5 e 24

With Screws 12.9 DIN 912

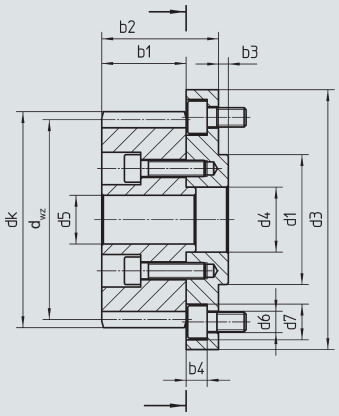
Order Code Pinion	Order Code Flange	Module	N° of Teeth z	x (1)	d.	d_{wz}	dk	d_{1h6}	d2	d3	d4	d5	d6	d7	b1	b2	b3	b4	L=Pl*d L	kg	ISO Interface
78 20 526	**2 65 78 002**	2	26	0.4065	55.17	56.80	60.60	40	63	80	20	15	6.6	11	26	36	3	6.5	173.33	0.7	9409-1-A-31.5/63
78 20 527	**2 65 78 002**	2	27	0	57.30	57.30	61.29	40	63	80	20	15	6.6	11	30	40	3	6.5	180.00	0.8	9409-1-A-31.5/63
78 20 529	**2 65 78 002**	2	29	0.4150	61.54	63.20	67.0	40	63	80	20	15	6.6	11	26	36	3	6.5	193.33	0.8	9409-1-A-31.5/63
78 20 535	**2 65 78 002**	2	35	0.3819	74.27	75.80	79.60	40	63	80	20	15	6.6	11	26	36	3	6.5	233.33	1.1	9409-1-A-31.5/63

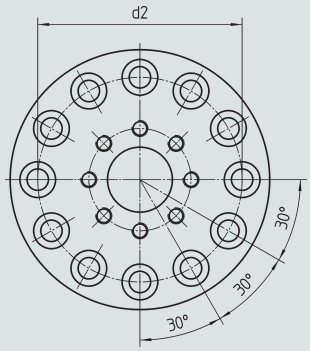
(1) Profile Modification Factor

The maximum torque is limited by the threaded connection

Helical-Tooth, 19° 31' 42" left-hand, A-80 to A-125 flange

Set consists pinion and flange





Interface A80

16MnCr5, 1.7131
Case-Hardened
Quality 5 e 24

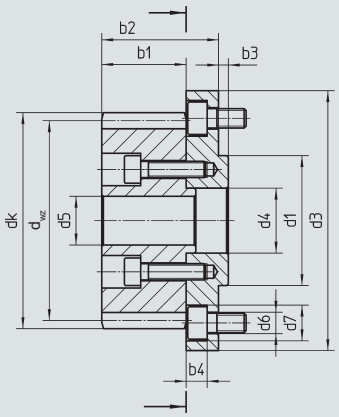
With Screws 12.9 DIN 912

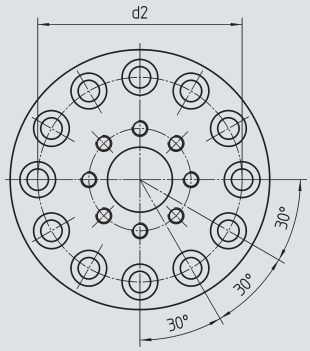
Order Code Pinion	Order Code Flange	Module	N° of Teeth z	x(1)	d_0	d_{wz}	dk	d_{1h6}	d2	d3	d4	d5	d6	d7	b1	b2	b3	b4	L=Pl*d L	kg	ISO Interface
78 20 526	**2 65 78 001** (2)	2	26	0.4065	55.17	56.80	60.60	50	80	100	31.5	15	9	15	26	49	4	9	173.33	1.2	9409-1-A-31.5/50/80
	2 65 78 003 (2)																				
78 20 527	**2 65 78 001** (2)	2	27	0	57.30	57.30	61.29	50	80	100	31.5	15	9	15	30	53	4	9	180.00	1.3	9409-1-A-31.5/50/80
	2 65 78 003 (2)																				
78 20 529	**2 65 78 001** (2)	2	29	0.4150	61.54	63.20	67.00	50	80	100	31.5	15	9	15	26	49	4	9	193.33	1.3	9409-1-A-31.5/50/80
	2 65 78 003 (2)																				
78 20 535	**2 65 78 001** (2)	2	35	0.3819	74.27	75.80	79.60	50	80	100	31.5	15	9	15	26	49	4	9	233.33	1.6	9409-1-A-31.5/50/80
	2 65 78 003 (2)																				
78 21 533	**2 65 78 003**	2	33	0.3928	70.03	71.60	75.30	50	80	100	31.5	20	9	15	26	39	4	9	220.00	1.3	9409-1-A-50/80
78 20 536	**2 65 78 003**	2	36	0	76.40	76.40	80.40	50	80	100	31.5	20	9	15	30	43	4	9	240.00	1.4	9409-1-A-50/80
78 21 537	**2 65 78 003**	2	37	0.4209	78.52	80.20	84.00	50	80	100	31.5	20	9	15	26	39	4	9	246.67	1.5	9409-1-A-50/80
78 31 531	**2 65 78 003**	3	31	0.3540	98.68	100.80	106.60	50	80	100	31.5	20	9	15	31	44	4	9	310.00	2.4	9409-1-A-50/80

(1) Profile Modification Factor

(2) Uses two flanges

Set consists of pinion and flange





Interface A125

16MnCr5, 1.7131
Case-Hardened
Quality 5 e 24

With Screws 12.9 DIN 912

Order Code Pinion	Order Code Flange	Module	N° of Teeth z	x(1)	d_0	d_{wz}	dk	d_{1h6}	d2	d3	d4	d5	d6	d7	b1	b2	b3	b4	L=Pl*d L	kg	ISO Interface
78 31 531	**2 65 78 003** (2)	3	31	0.3540	98.68	100.80	106.60	80	125	148	50	20	11	18	31	63	6	14	310.00	3.4	9409-1-A-50/80/125
	2 65 78 004 (2)																				
78 33 535	**2 65 78 004**	3	35	0.3652	111.41	113.60	119.40	80	125	148	50	40	11	18	31	50	6	14	350.00	3.8	9409-1-A80/125
78 33 540	**2 65 78 004**	3	40	0.3792	127.32	129.60	135.40	80	125	148	50	40	11	18	31	50	6	14	400.00	4.5	9409-1-A80/125
78 40 530	**2 65 78 004**	4	30	0	127.32	127.32	135.32	80	125	148	50	40	11	18	45	64	6	14	400.00	5.5	9409-1-A80/125
78 50 521	**2 65 78 004**	5	21	0	111.40	111.40	121.40	80	125	148	50	40	11	18	59	78	6	14	350.00	5.5	9409-1-A80/125

(1) Profile Modification Factor (2) Uses two flanges

The maximum torque is limited by the threaded connection

TR and TRS Pinions

Our high-precision TR and TRS Pinions (TR = Torque Reduction, TRS = Torque Reduction Supporter) for highly dynamic applications have been specially developed for use on planetary reducers. They comply with the ISO 9409-1-A interface. Used together with ATLANTA racks they open up new possibilities. The compact dimensions of TR and TRS Pinions offer impressive performance: they transmit high circumferential forces and generate low drive torques. This allows you to use smaller and more cost-effective reducers and motors without sacrificing performance.

The TR and TRS Pinions are manufactured in quality 5, which maximizes their load capacity. This makes it possible to realise extremely backlash-free and smooth-running rack drives that offer the highest precision and reliability. Our TR and TRS Pinions enable the implementation of highly rigid and highly dynamic drives due to their unique combination of high stiffness, low mass moment of inertia and minimal backlash.

German Patent
Nr. 10 2008 024 070.2

The teeth of the TR and TRS Pinions are designed in such a way that it is possible to switch between spur and helical geared drives without having to adjust the centre distance. The bolted flange design also allows for easy replacement of the pinion without having to carry out major disassembly work.

The Advantages of TR/TRS Pinions With An Example Calculation:

The following example recalculates 2 pinions for a horizontal traveling operation axis and the suitable planetary gearboxes will be chosen.

Given Values:

Mass to be moved:	m	= 10000 kg
Speed:	v	= 0.7 m/s
Acceleration time:	t_b	= 0.67 s
Coefficient of friction:	μ	= 0.05
Motor rpm:	n_{Mot}	= 1500 min^{-1}

Acceleration due to gravity:	g	= 9.81 m/s^2
Load factor:	K_A	= 1.25
Safety coefficient:	S	= 1.3
Operating time factor :	b_B	= 1.2

Acceleration:

$$a = \frac{v}{t_b} = \frac{0.7}{0.67} = 1.05 m/s^2$$

Tangential force at the pinion:

$$F_u = m \cdot g \cdot \mu + m \cdot a = 10000 \cdot 9.81 \cdot 0.05 + 10000 \cdot 1.05 = 15400\ N$$

TR-Pinion

Module:	m = 5
Number of teeth:	z = 12
Pitch diameter ø of pinion:	d = 63.66 mm

$$T_{2\,req} = \frac{F_u \cdot d}{2000} = \frac{15400 \cdot 63.66}{2000} = \mathbf{490\ Nm}$$

$$n_{pinion} = 60000 \cdot \frac{v}{\pi \cdot d} = 60000 \cdot \frac{0.7}{\pi \cdot} = \mathbf{210\ min^{-1}}$$

$$T_{2\,per} = \frac{T_{2\,Tab.}}{K_A \cdot S \cdot b_B} = \frac{1050}{1.25 \cdot 1.3 \cdot 1.2} = \mathbf{538\ Nm}$$

$$i_{max\text{-}gearbox} = \frac{n_{Motor}}{n_{pinion}} = \frac{1500}{210} = \mathbf{7.14}$$

Conventional Pinion

Module:	m = 5
Number of teeth:	z = 36
Pitch diameter ø of pinion:	d = 190.99 mm

$$T_{2\,req} = \frac{F_u \cdot d}{2000} = \frac{15400 \cdot 190.99}{2000} = \mathbf{1471\ Nm}$$

$$n_{pinion} = 60000 \cdot \frac{v}{\pi \cdot d} = 60000 \cdot \frac{0.7}{\pi \cdot 190.99} = \mathbf{69.9\ min^{-1}}$$

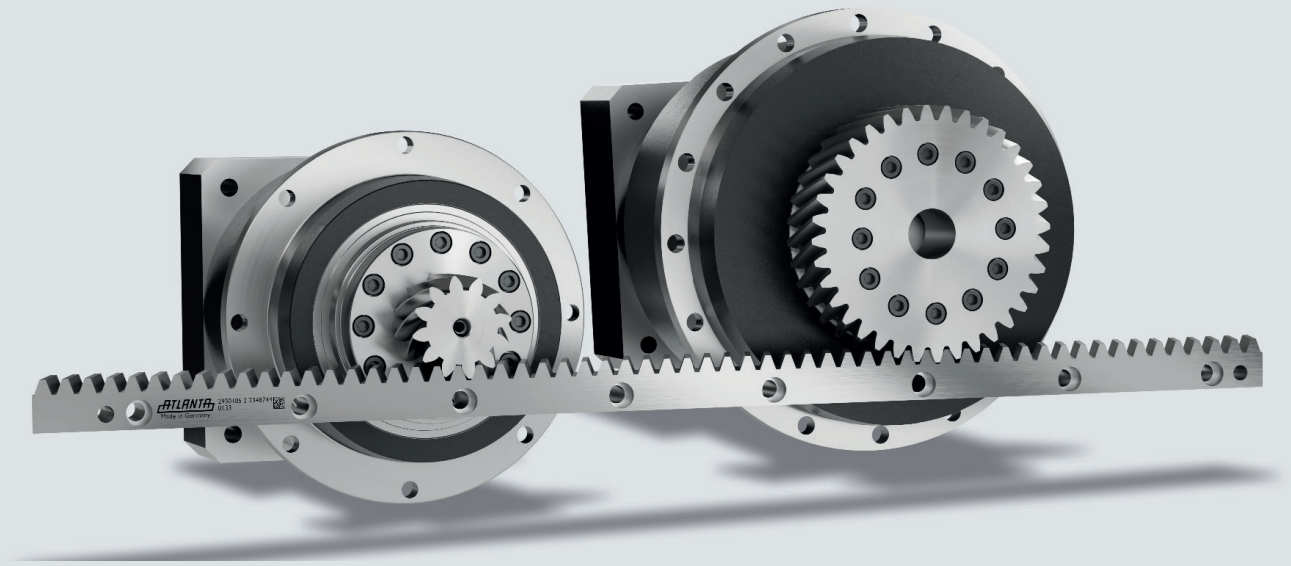
$$T_{2\,per} = \frac{T_{2\,Tab.}}{K_A \cdot S \cdot b_B} = \frac{3300}{1.25 \cdot 1.3 \cdot 1.2} = \mathbf{1692\ Nm}$$

$$i_{max\text{-}gearbox} = \frac{n_{Motor}}{n_{Ritzel\,/\,pinion}} = \frac{1500}{67.1} = \mathbf{22.3}$$

Comparison Results

Pinion Used	TR-Pinion m = 5 z = 12	Conventional Pinion m = 5 z = 36
Pitch Diameter ø of Pinion	d = 63.66 mm	d = 190.99 mm
Required Torque	490 Nm	1471 Nm
Planetary Gearbox Size	Ø 200 mm	Ø 250 mm
Gearbox Ratio	i = 7:1 (1-stage)	i = 20:1 (2-stage)

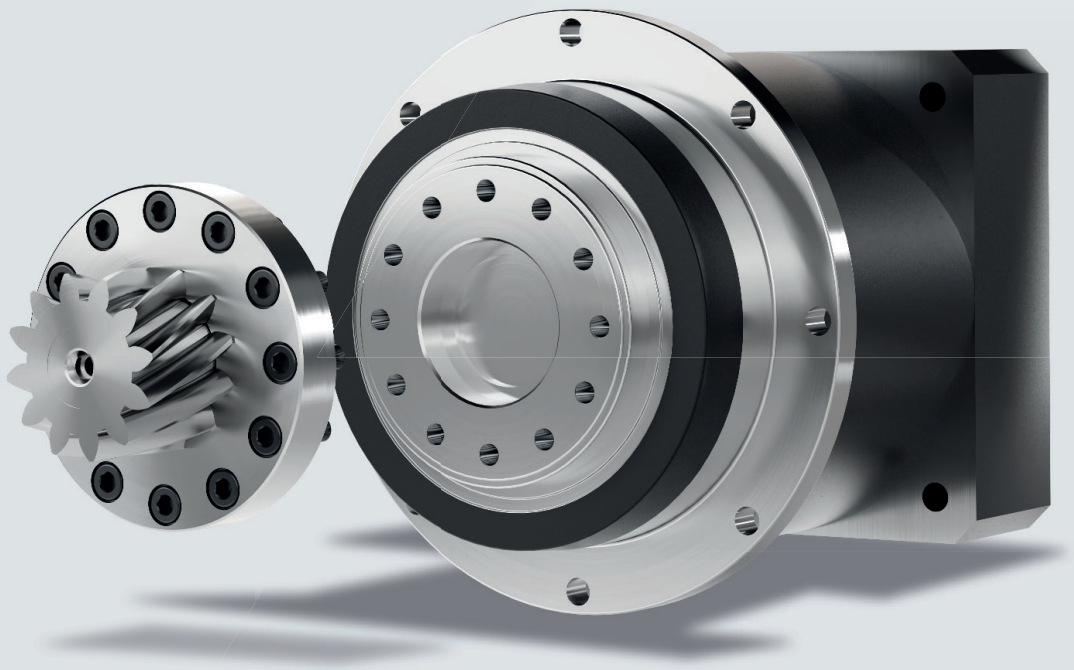
By using a TR-pinion with a smaller pitch diameter, the required torque in this example was reduced by ~66%, allowing a smaller gearbox size to be used and reducing the reduction ratio so only a single stage gearbox is needed.



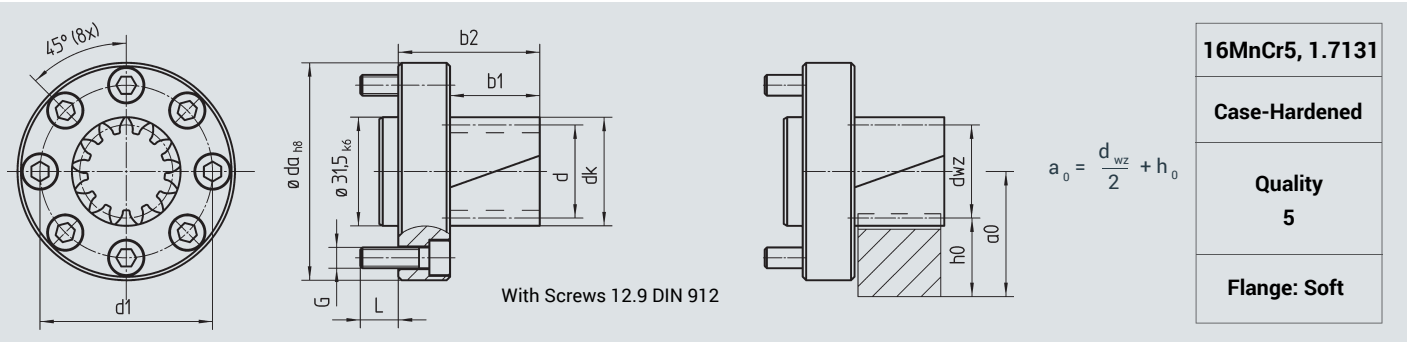
Size Comparison When Using A TR Pinion And A Conventional Pinion

ATLANTA TR and TRS Pinions Offer A Variety Of Advantages:

- **More Compact Design:** The smaller pitch diameter saves you valuable installation space in your machine. The compact design allows you to use the available space more efficiently and opens up additional freedom in the design of your system.
- **Reduced Torque:** With a smaller pinion, you reduce the required torque for your rack and pinion drive. At the same time, smaller drives and motors can be used, resulting in cost savings.
- **Precise Positioning:** The smaller pinion reduces backlash and increases the accuracy of your machine. As a result, you achieve more precise positioning and improved quality of your manufactured products.
- **Higher Accelerations:** Thanks to the lower inertia of the smaller gear, higher acceleration and shorter machining times can be realized in your machine.
- **Increased Linear Stiffness:** The use of a TR and TRS Pinions helps increase linear stiffness and improves the precision and repeatability of the entire rack drive. The use of the TRS pinion and a counter-bearing to the gear enables additional stiffness and associated dynamics and accuracy of your application.

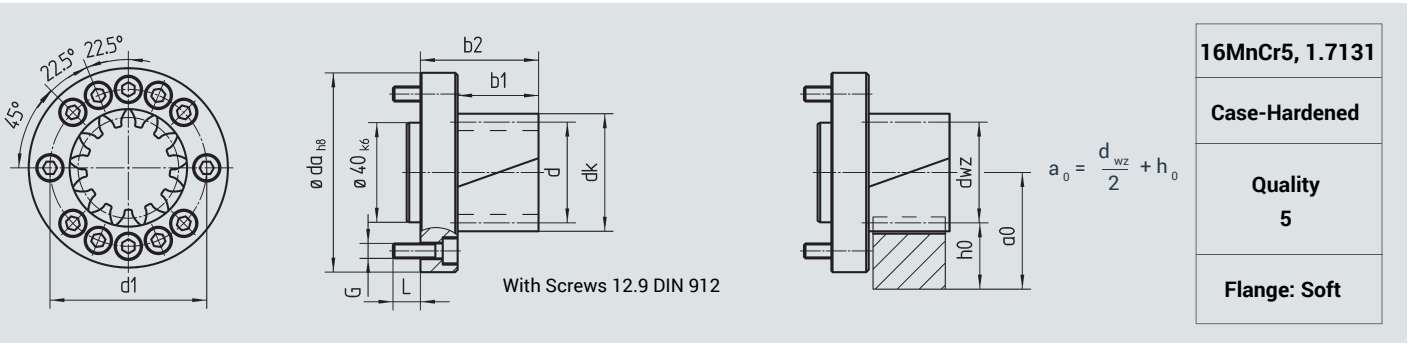


Helical-Tooth Pinion, 19° 31' 42" left-hand, A-50 flange



Order Code	No. of Teeth z	Profile Modification Factor x	d	d_{wz}	dk	b1	b2	a0	ISO Interface	d1	G	da_{h8}	L	kg
Module 2														
78 21 912	12	0.5	25.46	27.46	31.50	26.0	41	35.73	9409-1-A-50	50	M6	63	11	0.5
78 21 916	16	0	33.95	33.95	37.95	26.0	41	38.98	9409-1-A-50	50	M6	63	11	0.6

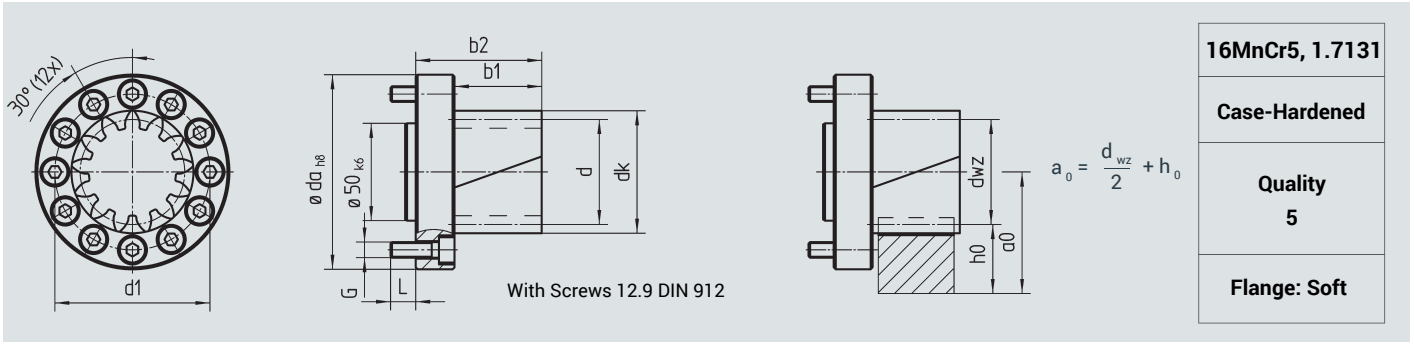
Helical-Tooth Pinion, 19° 31' 42" left-hand, A-63 flange



Order Code	No. of Teeth z	Profile Modification Factor x	d	d_{wz}	dk	b1	b2	a0	ISO Interface	d1	G	da_{h8}	L	kg
Module 2														
78 22 912	12	0.5	25.46	27.46	31.5	26.0	41	35.73	9409-1-A-63	63	M6	80	11	0.8
78 22 919	19	0	40.32	40.32	44.3	26.0	41	42.16	9409-1-A-63	63	M6	80	11	0.9
78 22 923	23	0	48.81	48.81	52.8	26.0	41	46.40	9409-1-A-63	63	M6	80	11	1.0
Module 3														
78 32 912	12	0.5	38.20	41.20	47.2	32.5	47.5	46.60	9409-1-A-63	63	M6	80	11	1.0
78 32 914	14	0.3	44.56	46.36	52.4	32.5	47.5	49.18	9409-1-A-63	63	M6	80	11	1.0

Note: The rack and pinion drive must be installed with backlash present, not pressed into engagement with no backlash! Please refer to the ATLANTA operating manual MPZ 001e.

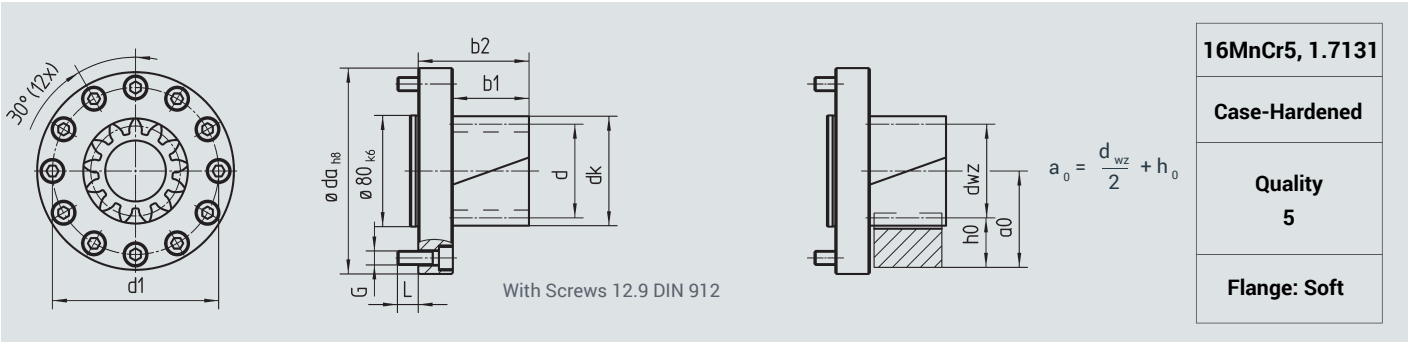
Helical-Tooth Pinion, 19° 31' 42" left-hand, A-80 flange



Order Code	No. of Teeth z	Profile Modification Factor x	d	d_{wz}	dk	b1	b2	a0	ISO Interface	d1	G	da_{h8}	L	kg
Module 2														
78 23 912	12	0.5	25.46	27.46	31.5	26.0	46	35.73	9409-1-A-80	80	M8	100	13	1.4
78 23 923	23	0	48.81	48.81	52.8	26.0	46	46.40	9409-1-A-80	80	M8	100	8	1.6
Module 3														
78 33 916	16	0	50.93	50.93	56.9	32.5	52.5	51.46	9409-1-A-80	80	M8	100	8	1.8
78 33 917	17	0	54.11	54.11	60.1	32.5	52.5	53.06	9409-1-A-80	80	M8	100	8	1.9
78 33 919	19	0	60.48	60.48	66.5	32.5	52.5	56.24	9409-1-A-80	80	M8	100	8	2.0
Module 4														
78 43 912	12	0.5	50.93	54.93	62.9	45.0	65	62.46	9409-1-A-80	80	M8	100	8	2.1

Note: The rack and pinion drive must be installed with backlash present, not pressed into engagement with no backlash! Please refer to the ATLANTA operating manual MPZ 001e.

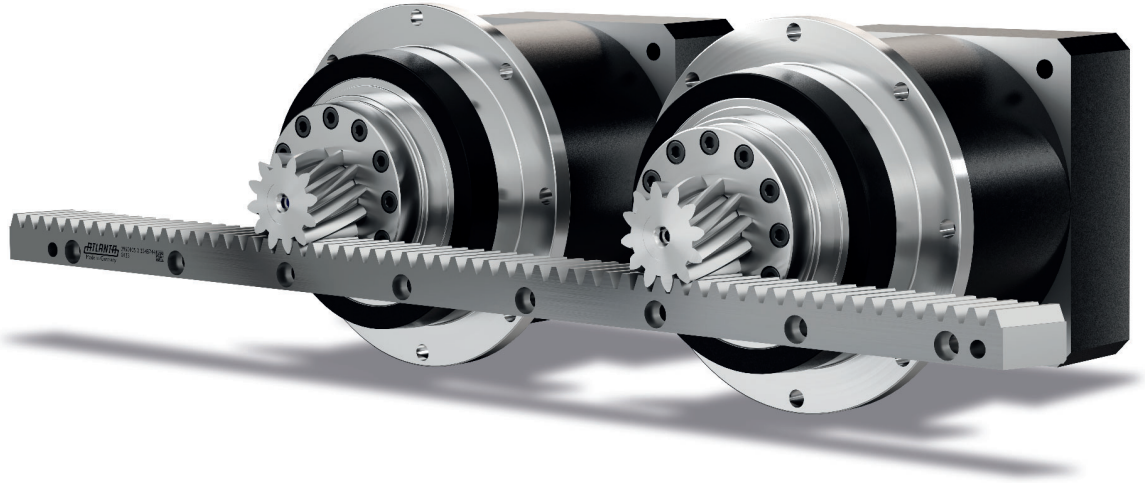
Helical-Tooth Pinion, 19° 31' 42" left-hand, A-125 flange



16MnCr5, 1.7131
Case-Hardened
Quality 5
Flange: Soft

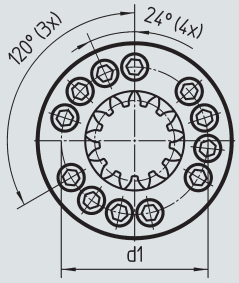
Order Code	No. of Teeth z	Profile Modification Factor x	d	d_{wz}	dk	b1	b2	a0	ISO Interface	d1	G	da_{h8}	L	kg
Module 3														
78 34 919	19	0	60.48	60.48	66.50	32.5	57.5	56.24	9409-1-A-125	125	M10	148	15	4.2
78 34 926	26	0	82.76	82.76	88.80	32.5	57.5	67.38	9409-1-A-125	125	M10	148	15	4.9
78 34 932	32	0	101.86	101.86	107.90	32.5	57.5	76.93	9409-1-A-125	125	M10	148	15	5.6
Module 4														
78 44 912	12	0.5	50.93	54.93	62.90	45.0	70.0	62.46	9409-1-A-125	125	M10	148	15	4.4
78 44 917	17	0	72.15	72.15	80.15	45.0	70.0	71.07	9409-1-A-125	125	M10	148	15	5.0
78 44 919	19	0.11	80.64	81.52	89.50	45.0	70.0	75.76	9409-1-A-125	125	M10	148	15	5.4
78 44 920	20	0	84.88	84.88	92.90	45.0	70.0	77.44	9409-1-A-125	125	M10	148	15	5.5
Module 5														
78 54 912	12	0.5	63.66	68.66	78.70	55	80	68.33	9409-1-A-125	125	M10	148	15	5.1
78 54 916	16	0	84.88	84.88	94.90	55	80	76.44	9409-1-A-125	125	M10	148	15	6.0
78 54 918	18	0	95.49	95.49	105.50	55	80	81.75	9409-1-A-125	125	M10	148	15	6.6
Module 6														
78 64 915	15	0	95.49	95.49	107.50	65	90	90.75	9409-1-A-125	125	M10	148	15	6.8

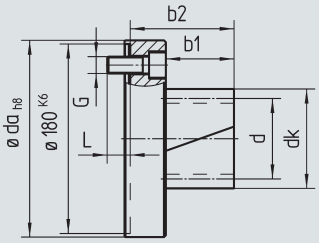
Note: The rack and pinion drive must be installed with backlash present, not pressed into engagement with no backlash! Please refer to the ATLANTA operating manual MPZ 001e.



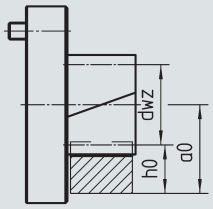
Multiple Pinion Contact For Electrical Preloading

Helical-Tooth Pinion, 19° 31' 42" left-hand, A-140 flange





With Screws 12.9 DIN 912

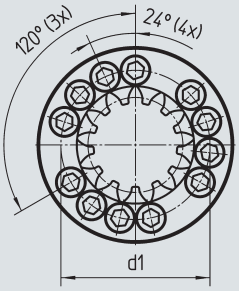


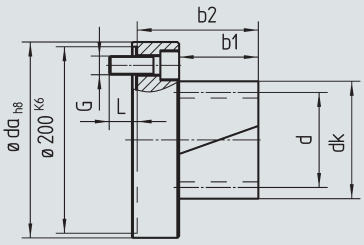
$a_0 = \frac{d_{wz}}{2} + h_0$

16MnCr5, 1.7131
Case-Hardened
Quality 5
Flange: Soft

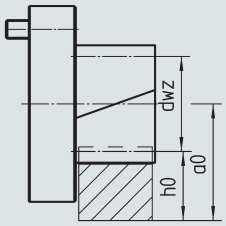
Order Code	No. of Teeth z	Profile Modification Factor x	d	d_{wz}	dk	b1	b2	a0	ISO Interface	d1	G	da_{h8}	L	kg
Module 4														
78 46 919	19	0.11	80.64	81.52	89.50	45	79	75.76		140	M16	187	22	9.1
Module 5														
78 56 918	18	0	95.49	95.49	105.50	55	89	81.75		140	M16	187	22	10.3
78 56 919	19	0	100.80	100.80	110.80	55	89	84.40	–	140	M16	187	22	10.6
Module 6														
78 66 916	16	0	101.86	101.86	113.90	65	99	93.93	–	140	M16	187	22	11.3

Helical-Tooth Pinion, 19° 31' 42" left-hand, A-160 flange





With Screws 12.9 DIN 912



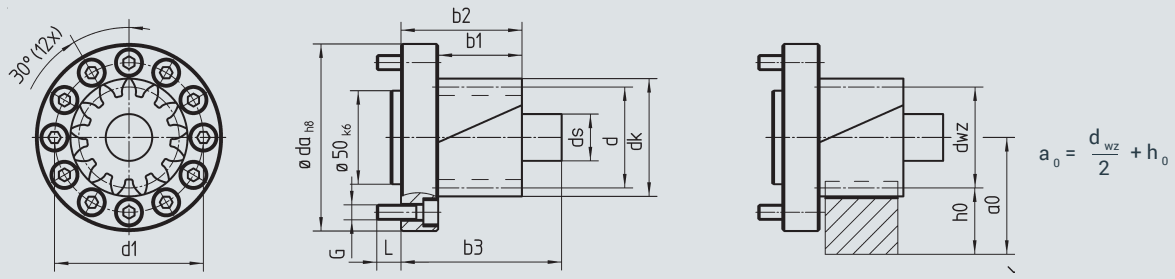
$a_0 = \frac{d_{wz}}{2} + h_0$

16MnCr5, 1.7131
Case-Hardened
Quality 5
Flange: Soft

Order Code	No. of Teeth z	Profile Modification Factor x	d	d_{wz}	dk	b1	b2	a0	ISO Interface	d1	G	da_{h8}	L	kg
Module 5														
78 57 919	19	0	100.80	100.80	110.8	55	100	84.40	–	160	M20	210	30	15.6
Module 6														
78 67 916	16	0	101.86	101.86	113.9	65	110	93.93	–	160	M20	210	30	15.9
Module 8														
78 87 912	12	0.5	101.86	109.86	125.9	85	130	125.93	–	160	M20	210	30	17.8

Note: The rack and pinion drive must be installed with backlash present, not pressed into engagement with no backlash! Please refer to the ATLANTA operating manual MPZ 001e.

Helical-Tooth Pinion, 19° 31' 42" left-hand, A-80 flange

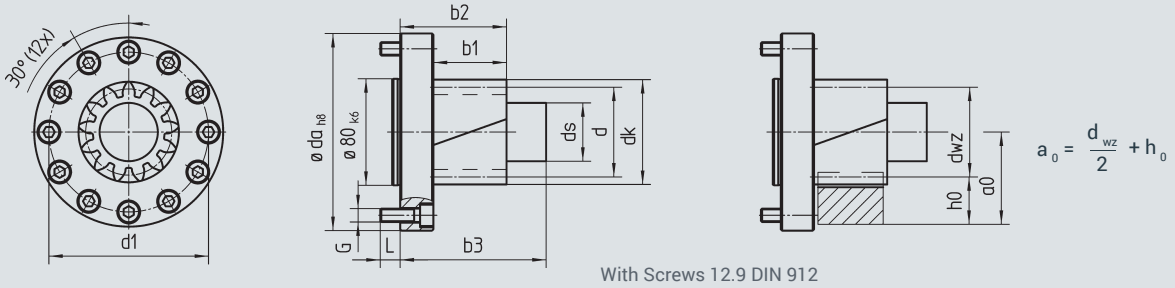


With Screws 12.9 DIN 912

16MnCr5, 1.7131
Case-Hardened
Quality 5
Flange: Soft

Order Code	No. of Teeth z	Profile Modification Factor x	d	d_{wz}	dk	b1	b2	b_3	d_s	a0	ISO Interface	d1	G	$d_{a\,h8}$	L	kg
Module 2																
2 78 00 701	23	0	48.81	48.81	52.8	26.0	46	64	25.024	46.40	9409-1-A-80	80	M8	100	13	1.6
Module 3																
2 78 00 703	17	0	54.11	54.11	60.1	32.5	52.5	70.5	25.024	53.06	9409-1-A-80	80	M8	100	13	1.9

Helical-Tooth Pinion, 19° 31' 42" left-hand, A-125 flange



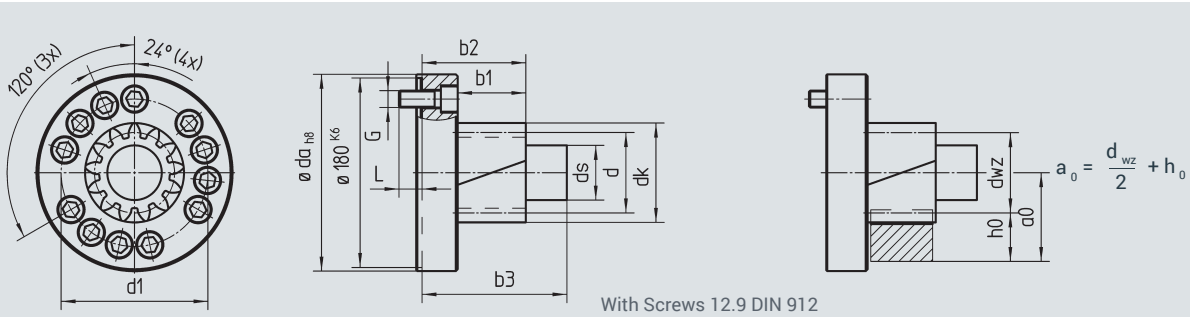
With Screws 12.9 DIN 912

16MnCr5, 1.7131
Case-Hardened
Quality 5
Flange: Soft

Order Code	No. of Teeth z	Profile Modification Factor x	d	d_{wz}	dk	b1	b2	b_3	d_s	a0	ISO Interface	d1	G	$d_{a\,h8}$	L	kg
Module 3																
2 78 00 801	26	0	82.76	82.76	88.80	42	67	96	48.024	67.38	9409-1-A-125	125	M10	148	15	4.9
2 78 00 802	32	0	101.86	101.86	107.90	42	67	96	48.024	76.93	9409-1-A-125	125	M10	148	15	5.6
Module 4																
2 78 00 803	20	0	84.88	84.88	92.90	45	70	96	48.024	77.44	9409-1-A-125	125	M10	148	15	5.5
Module 5																
2 78 00 804	16	0	84.88	84.88	94.90	55	80	106	48.024	76.44 (1)	9409-1-A-125	125	M10	148	15	6.0

Note: The rack and pinion drive must be installed with backlash present, not pressed into engagement with no backlash! Please refer to the ATLANTA operating manual MPZ 001e.

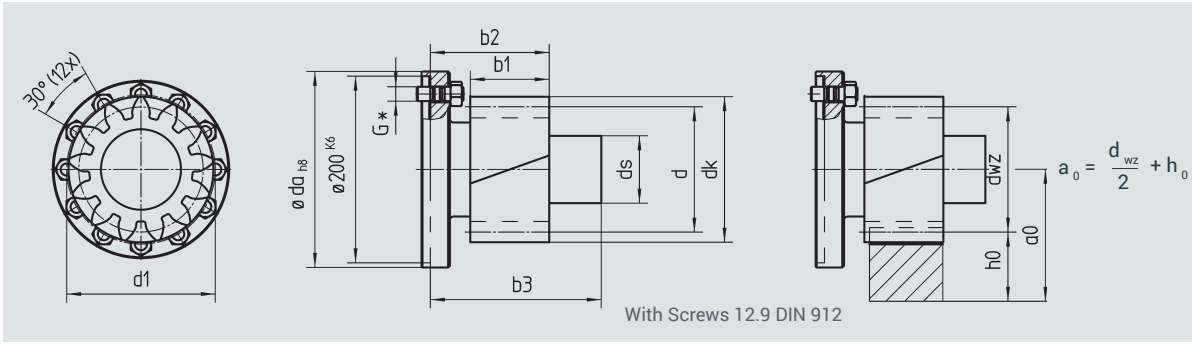
Helical-Tooth Pinion, 19° 31' 42" left-hand, A-140 flange



16MnCr5, 1.7131
Case-Hardened
Quality 5
Flange: Soft

Order Code	No. of Teeth z	Profile Modification Factor x	d	d_{wz}	dk	b1	b2	b_3	d_s	a0	ISO Interface	d1	G	$d_{a\,h8}$	L	kg
Module 5																
2 78 00 901	20	0	106.10	106.10	116.1	55	89	131	50.026	87.05	–	140	M16	187	22	10.3
Module 6																
2 78 00 902	16	0	101.86	101.86	113.86	65	99	141	50.026	93.93	–	140	M16	187	22	11.3

Helical-Tooth Pinion, 19° 31' 42" left-hand, A-170 flange

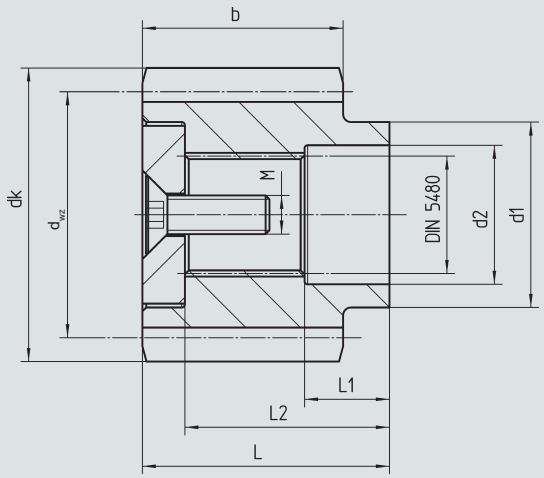


16MnCr5, 1.7131
Case-Hardened
Quality 5
Flange: Soft

Order Code	No. of Teeth z	Profile Modification Factor x	d	d_{wz}	dk	b1	b2	b_3	d_s	a0	ISO Interface	d1	G	$d_{a\,h8}$	L	kg
Module 8																
2 78 00 101	19	0	161.28	161.28	177.28	100	157	205	55.026	151.64	–	170	M20	210	25	26.7
Module 10																
2 78 00 102	15	0.25	159.16	164.16	184.16	100	157	205	55.026	171.08	–	170	M20	210	25	27.5

Note: The rack and pinion drive must be installed with backlash present, not pressed into engagement with no backlash! Please refer to the ATLANTA operating manual MPZ 001e.

Helical-Tooth Pinion, 19° 31' 42" left-hand, splined bore



16MnCr5, 1.7131

Carborized & Hardened

Quality 5 e 24

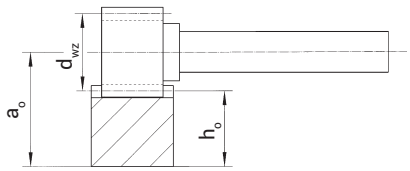
With washer and screw DIN 7991

Screw Size	Strength Class	Tightening Torque (Nm)
M5	10.9	7
M8	8.8	20
M12	8.8	68
M16	8.8	168
M20	8.8	340

Order Code	N° of Teeth	Module	Profile Modification Factor x	Fu Tab.	d	d_{wz}	dk	d1	L	d2	L1	L2	b	M	Spline, Soft DIN 5480 *	kg
79 11 538	38	1.5	–	6.8	60.48	60.48	63.48	30	33	24	12	27.5	20	M8x25	N22x1.25x30x16x7H	0.1
79 20 515	15	2	0.5922	4.5	31.83	34.20	38.0	24	32	18	11	26.5	26	M5x16	N16x0.8x30x18x7H	0.2
79 20 516	16	2	0.6117	4.5	33.95	36.40	40.1	24	32	18	11	26.5	26	M5x16	N16x0.8x30x18x7H	0.2
79 20 518	18	2	0.5000	4.5	38.20	40.20	44.0	24	32	18	11	26.5	26	M5x16	N16x0.8x30x18x7H	0.3
79 21 518	18	2	0.5000	6.8	38.20	40.20	44.0	30	33	24	12	27.5	26	M8x25	N22x1.25x30x16x7H	0.3
79 21 520	20	2	0.4900	6.8	42.44	44.40	48.2	30	33	24	12	27.5	26	M8x25	N22x1.25x30x16x7H	0.3
79 21 522	22	2	0.4786	6.8	46.69	48.60	52.5	30	33	24	12	27.5	26	M8x25	N22x1.25x30x16x7H	0.4
79 21 525	25	2	–	6.8	53.05	53.05	57.05	30	33	24	12	27.5	26	M8x25	N22x1.25x30x16x7H	0.4
79 22 523	23	2	0.4981	19.0	48.81	50.80	54.6	40	34	35	13	27.0	26	M12x35	N32x1.25x30x24x7H	0.4
79 22 525	25	2	0.4871	20.0	53.05	55.00	59.0	40	34	35	13	27.0	26	M12x35	N32x1.25x30x24x7H	0.4
79 22 527	27	2	0.3760	20.0	57.30	58.80	62.6	40	34	35	13	27.0	26	M12x35	N32x1.25x30x24x7H	0.5
79 33 520	20	3	0.4563	28.5	63.66	66.40	72.2	50	51	41	20	41.0	31	M16x45	N40x2x30x18x7H	0.7
79 33 522	22	3	0.4620	29.5	70.03	72.80	78.6	50	51	41	20	41.0	31	M16x45	N40x2x30x18x7H	0.8
79 33 524	24	3	0.4676	29.5	76.39	79.20	85.0	50	51	41	20	41.0	31	M16x45	N40x2x30x18x7H	1.0
79 44 520	20	4	0.4000	54.0	84.88	88.08	96.1	75	54	56	20	44.0	41	M20x50	N55x2x30x26x7H	1.5
79 45 525	25	4	0.3400	57.5	106.10	108.82	116.8	90	65	72	24	55.0	41	M20x50	N70x2x30x34x7H	3.0

* Put MoS2-powder or suitable grease in spline area to reduce micro corrosion

Calculation of center distance 'a' between pinion and rack



$$a_o = \frac{d_{wz}}{2} + h_o$$

All dimensions are in mm

Helical-Tooth Pinion, 19° 31' 42" left-hand, with bore ØH6 and keyway acc. to DIN 6885

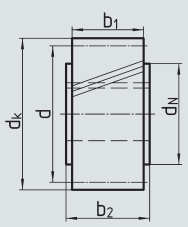


Fig. 1

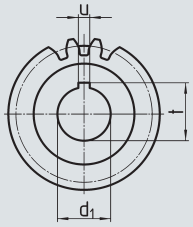


Fig. 1 + 3 Keyway middle of tooth gap

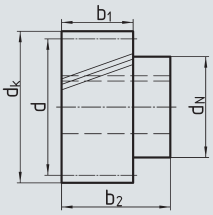


Fig. 3

16MnCr5, 1.7131
Case-Hardened
Quality 6 e 25

Order Code	Fig.	N° of Teeth z	d (=d_{wz})	d*PI	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	Couplings on Page C-76
Module 1.5													
24 11 520 [1]	1	20	31.83	100.00	34.83	11	25	20	22	4	12.8	0.13	
24 14 520 [1]	1	20	31.83	100.00	34.83	14	25	20	22	5	16.3	0.13	
24 16 520 [1]	1	20	31.83	100.00	34.83	16	25	20	22	5	18.3	0.13	
24 16 321 [1]	3	21	33.42	105.00	36.42	16	30	20	46	5	18.3	0.15	80 83 030
Module 2													
24 26 518	1	18	38.197	120.00	42.2	16	25	28	30	5	18.3	0.2	
24 29 520	1	20	42.44	133.33	46.4	19*	30	28	30	6	21.8	0.3	
24 29 320	3	20	42.44	133.33	46.4	19*	30	28	56	6	21.8	0.3	80 83 030
24 22 520	1	20	42.44	133.33	46.4	20	30	28	30	6	22.8	0.3	
24 20 320	3	20	42.44	133.33	46.4	22*	36	28	56	6	24.8	0.3	80 84 036
24 23 520	1	20	42.44	133.33	46.4	22	30	28	30	6	24.8	0.3	
24 26 521	1	21	44.56	140.00	48.6	16	25	28	30	5	18.3	0.3	
24 20 321	3	21	44.56	140.00	48.6	22	36	28	56	6	24.8	0.2	80 84 036
24 29 522	1	22	46.69	146.67	50.7	19*	30	28	30	6	21.8	0.2	
24 29 322	3	22	46.69	146.67	50.7	19*	30	28	56	6	21.8	0.4	80 83 030
24 20 522	1	22	46.69	146.67	50.7	22*	30	28	30	6	24.8	0.3	
24 20 322	3	22	46.69	146.67	50.7	22*	36	28	56	6	24.8	0.4	80 84 036
24 29 525	1	25	53.05	166.67	57.1	19*	30	28	30	6	21.8	0.4	
24 29 325	3	25	53.05	166.67	57.1	19*	30	28	56	6	21.8	0.5	80 83 030
24 22 525	1	25	53.05	166.67	57.1	20	30	28	30	6	22.8	0.4	
24 20 525	1	25	53.05	166.67	57.1	22*	30	28	30	6	24.8	0.3	
24 20 325	3	25	53.05	166.67	57.1	22*	36	28	56	6	24.8	0.5	80 84 036
24 23 525	1	25	53.05	166.67	57.1	25	36	28	30	8	28.3	0.4	
24 29 528	1	28	59.42	186.67	63.4	19*	30	28	30	6	21.8	0.4	
24 29 328	3	28	59.42	186.67	63.4	19*	30	28	56	6	21.8	0.6	80 83 030
24 20 528	1	28	59.42	186.67	63.4	22*	30	28	30	6	24.8	0.4	
24 20 328	3	28	59.42	186.67	63.4	22*	36	28	56	6	24.8	0.7	80 84 036
24 25 528	1	28	59.42	186.67	63.4	35	48	28	30	10	38.3	0.4	
24 26 530	1	30	63.66	200.00	67.7	16	25	28	30	5	18.3	0.7	
24 22 530	1	30	63.66	200.00	67.7	20	30	28	30	6	22.8	0.6	
24 20 330	3	30	63.66	200.00	67.7	22	36	28	56	6	24.8	0.6	80 84 036
24 23 530	1	30	63.66	200.00	67.7	25	36	28	30	8	28.3	0.8	
24 24 530	1	30	63.66	200.00	67.7	30	45	28	30	8	33.3	0.6	
24 22 330	3	30	63.66	200.00	67.7	30	50	28	60	8	33.3	0.8	80 85 050
24 23 330	3	30	63.66	200.00	67.7	32	55	28	65	10	35.3	0.8	80 80 055
24 22 532	1	32	67.91	213.33	71.9	20	30	28	30	6	22.8	0.8	
24 20 532	1	32	67.91	213.33	71.9	22*	30	28	30	6	24.8	0.7	
24 20 332	3	32	67.91	213.33	71.9	22*	36	28	56	6	27.8	0.9	80 84 036
24 23 532	1	32	67.91	213.33	71.9	25	36	28	30	8	28.3	0.7	
24 25 532	1	32	67.91	213.33	71.9	35	48	28	30	10	38.3	0.6	
24 25 536	1	36	76.39	240.00	80.4	35	48	28	30	10	38.3	0.8	
24 23 339	3	39	82.76	260.00	86.8	32	55	28	65	10	35.3	1.3	80 80 055
24 25 540	1	40	84.88	266.67	88.9	35	48	28	30	10	38.3	1.1	

* Bore tolerance G6

[1] Tooth quality 6 f 24

Helical-Tooth Pinion, 19° 31' 42" left-hand, with bore ØH6 and keyway acc. to DIN 6885

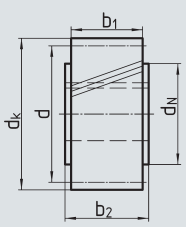


Fig. 1

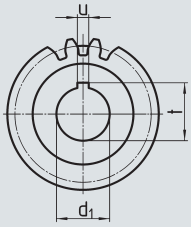


Fig. 1 + 3 Keyway middle of tooth gap

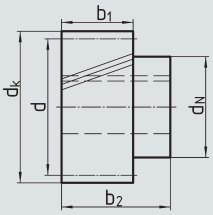


Fig. 3

16MnCr5, 1.7131
Case-Hardened
Quality 6 e 25

Order Code	Fig.	N° of Teeth z	d (=d_{wz})	d*PI	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	Couplings on Page C-76
Module 3													
24 30 320	3	20	63.66	200.00	69.7	22	36	28	56	6	24.8	0.6	80 84 036
24 31 320	3	20	63.66	200.00	69.7	25	44	28	60	8	28.3	0.7	80 80 044
24 34 520	1	20	63.66	200.00	69.7	30	45	28	30	8	33.3	0.8	
24 32 320	3	20	63.66	200.00	69.7	30	50	28	60	8	33.3	0.8	80 85 050
24 33 320	3	20	63.66	200.00	69.7	32	55	28	65	10	35.3	0.8	80 80 055
24 35 520	1	20	63.66	200.00	69.7	35	48	28	30	10	38.3	0.7	
24 33 522	1	22	70.03	220.00	76.0	25	36	28	30	8	28.3	0.8	
24 34 522	1	22	70.03	220.00	76.0	30	45	28	30	8	33.3	0.7	
24 33 322	3	22	70.03	220.00	76.0	32*	55	28	65	10	35.3	1.0	80 80 055
24 35 522	1	22	70.03	220.00	76.0	35	48	28	30	10	38.3	0.7	
24 35 322	3	22	70.03	220.00	76.0	40*	62	28	65	12	43.3	1.0	80 86 062
24 30 325	3	25	79.58	250.00	85.6	22	36	28	56	6	24.8	1.0	80 84 036
24 33 525	1	25	79.58	250.00	85.6	25	36	28	30	8	28.3	1.0	
24 31 325	3	25	79.58	250.00	85.6	25	44	28	60	8	28.3	1.1	80 80 044
24 34 525	1	25	79.58	250.00	85.6	30	45	28	30	8	33.3	1.0	
24 32 325	3	25	79.58	250.00	85.6	30	50	28	60	8	33.3	1.2	80 85 050
24 33 325	3	25	79.58	250.00	85.6	32	55	28	65	10	35.3	1.2	80 80 055
24 35 525	1	25	79.58	250.00	85.6	35	48	28	30	10	38.3	0.9	
24 34 325	3	25	79.58	250.00	85.6	35	55	28	65	10	38.3	1.1	80 80 055
24 36 525	1	25	79.58	250.00	85.6	40	70	28	50	12	43.3	1.1	
24 35 325	3	25	79.58	250.00	85.6	40*	62	28	65	12	43.3	1.1	80 86 062
24 33 328	3	28	89.13	280.00	95.1	32*	55	28	65	10	35.3	1.1	80 80 055
24 35 328	3	28	89.13	280.00	95.1	40*	62	28	65	12	43.3	1.1	80 86 062
24 33 332	3	32	101.86	320.00	107.85	32*	55	28	65	10	35.3	2.1	80 80 055
24 35 332	3	32	101.86	320.00	107.85	40*	62	28	65	12	43.3	2.1	80 86 062

* Bore tolerance G6

Helical-Tooth Pinion, 19° 31' 42" left-hand, with bore ØH6 and keyway acc. to DIN 6885

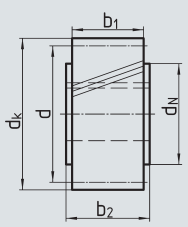


Fig. 1

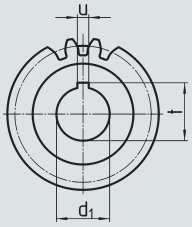


Fig. 1 + 3 Keyway middle of tooth gap

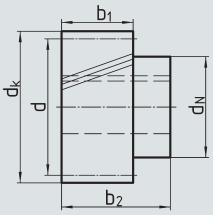
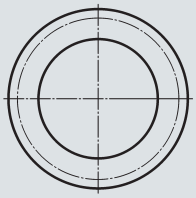


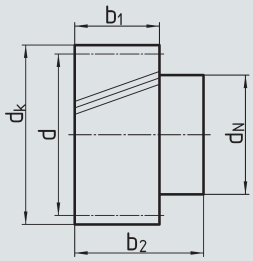
Fig. 3

16MnCr5, 1.7131
Case-Hardened
Quality 6 e 25

Order Code	Fig.	N° of Teeth z	d (=d_{wz})	d*PI	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	Couplings on Page C-76
Module 4													
24 45 515	1	15	63.66	200.00	71.7	35	52	40	50	10	38.3	1.4	
24 43 318	3	18	76.39	240.00	84.4	32	55	40	75	10	35.3	1.5	80 80 055
24 45 520	1	20	84.88	266.67	92.9	35	52	40	50	10	38.3	1.9	
24 47 520	1	20	84.88	266.67	92.9	45	65	40	50	14	48.8	1.6	
24 43 321	3	21	89.13	280.00	97.1	32	55	40	75	10	35.3	2.0	80 80 055
24 44 321	3	21	89.13	280.00	97.1	35	55	40	75	10	38.3	1.9	80 80 055
24 45 321	3	21	89.13	280.00	97.1	40	62	40	75	12	43.3	1.9	80 86 062
24 46 321	3	21	89.13	280.00	97.1	45	68	40	75	14	48.8	1.7	80 80 068
24 45 522	1	22	93.37	293.33	101.4	35	52	40	50	10	38.3	2.3	
24 47 522	1	22	93.37	293.33	101.4	45	65	40	50	14	48.8	2.0	
24 43 324	3	24	101.86	320.00	109.9	32	55	40	75	10	35.3	2.6	80 80 055
24 44 324	3	24	101.86	320.00	109.9	35	55	40	75	10	38.3	2.5	80 80 055
24 45 324	3	24	101.86	320.00	109.9	40	62	40	75	12	43.3	2.5	80 86 062
24 46 324	3	24	101.86	320.00	109.9	45	68	40	75	14	48.8	2.3	80 80 068
24 47 324	3	24	101.86	320.00	109.9	55	80	40	80	16	59.3	2.4	80 87 080
24 45 525	1	25	106.10	333.33	114.1	35	52	40	50	10	38.3	3.1	
24 47 525	1	25	106.10	333.33	114.1	45	65	40	50	14	48.8	2.8	
24 47 325	3	25	106.10	333.33	114.1	55	80	40	80	16	59.3	2.9	80 87 080
Module 5													
24 56 318	3	18	95.49	300.00	105.5	45	68	50	85	14	48.8	2.7	80 80 068
24 56 324	3	24	127.32	400.00	137.3	45	68	50	85	14	48.8	4.9	80 80 068
24 57 324	3	24	127.32	400.00	137.3	55	80	50	90	16	59.3	4.9	80 87 080
24 58 324	3	24	127.32	400.00	137.3	75	110	50	110	20	79.9	5.6	80 80 110
Module 6													
24 67 320	3	20	127.32	400.00	139.3	55	80	60	100	16	59.3	5.7	80 87 080
24 68 320	3	20	127.32	400.00	139.3	75	110	60	120	20	79.9	6.3	80 80 110
24 67 325	3	25	159.16	500.00	171.2	55	80	60	100	16	59.3	9.0	80 87 080
24 68 325	3	25	159.16	500.00	171.2	75	110	60	120	20	79.9	9.6	80 80 110
Module 8													
24 88 318	3	18	152.79	480.00	168.8	75	110	80	140	20	79.9	10.8	80 80 110
24 89 320	3	20	169.80	533.44	185.8	85	125	80	145	22	90.4	13.6	80 80 125
Module 10													
24 09 720	3	20	212.21	666.68	232.2	85	125	100	165	22	90.4	26.2	80 80 125

Helical-Tooth Pinion, 19° 31' 42" left-hand, with plain bore





16MnCr5, 1.7131
Carburized, Induction-Hardened
Quality 6 e 25

Order Code	Module	N° of Teeth z	d (=d_{wz})	d*PI	d_k	d_N	b_1	b_2	kg	Couplings on Page C-76
24 99 121	1.5	21	33.42	105.00	36.4	30	20	46	0.3	80 83 030
24 99 218	2	18	38.20	120.00	42.2	30	28	56	0.3	80 83 030
24 99 220	2	20	42.44	133.33	46.4	30	28	56	0.4	80 83 030
24 99 222	2	22	46.69	146.67	50.7	36	28	56	0.5	80 84 036
24 99 225	2	25	53.05	166.67	57.1	44	28	60	0.8	80 80 044
24 99 228	2	28	59.42	186.67	63.4	50	28	60	1.0	80 85 050
24 99 230	2	30	63.66	200.00	67.7	50	28	60	1.1	80 85 050
24 99 232	2	32	67.91	213.33	71.9	55	28	65	1.4	80 80 055
24 99 318	3	18	57.30	180.00	63.3	44	28	60	0.8	80 80 044
24 99 320	3	20	63.66	200.00	69.7	50	28	60	1.0	80 85 050
24 99 322	3	22	70.03	220.00	76.0	55	28	65	1.4	80 80 055
24 99 325	3	25	79.58	250.00	85.6	62	28	65	1.8	80 86 062
24 99 328	3	28	89.13	280.00	95.1	68	28	65	2.3	80 80 068
24 99 418	4	18	76.39	240.00	84.4	62	40	77	2.0	80 86 062
24 99 420	4	20	84.88	266.67	92.9	62	40	77	2.4	80 86 062
24 99 421	4	21	89.13	280.00	97.1	68	40	77	2.8	80 80 068
24 99 422	4	22	93.37	293.33	101.4	68	40	77	2.9	80 80 068
24 99 424	4	24	101.86	320.00	109.9	80	40	80	3.9	80 87 080
24 99 425	4	25	106.10	333.33	114.1	80	40	80	4.0	80 87 080
24 99 522	5	22	116.71	366.67	126.7	80	50	90	5.5	80 87 080
24 99 524	5	24	127.32	400.00	137.3	110	50	110	9.6	80 80 110
24 99 525	5	25	132.63	416.67	142.6	110	50	110	9.1	80 80 110
24 99 620	6	20	127.32	400.00	139.3	110	60	120	9.7	80 80 110
24 99 820 [1]	8	20	169.77	533.33	185.8	125	80	145	19.4	80 80 125

[1] With bore Ø 40^{H7}

The pinion could be fixed at d_k or d_N to be reworked.

Maximum bore diameter of the pinion on request.

Rack Type		HPR	BR
ATLANTA Quality		6	10
Rack	Material	ATLANTA Standard Heat-Treatable Steel	
	Heat Treatment	High-Performance Hardening Process	
Pinion	Material	16MnCr5	
	Heat Treatment	Case-Hardened	Induction Hardened
No. of Pinion Teeth[1)]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels)	
12	19.10 mm	3.0 kN	1.5 kN
13	20.69 mm	3.0 kN	2.0 kN
14	22.28 mm	4.0 kN	2.5 kN
15	23.87 mm	4.5 kN	2.5 kN
16	25.46 mm	4.5 kN	2.5 kN
17	27.06 mm	5.0 kN	3.0 kN
18	28.65 mm	5.0 kN	3.0 kN
19	30.24 mm	5.5 kN	3.5 kN
20	31.83 mm	6.0 kN	3.5 kN
21	33.42 mm	6.0 kN	3.5 kN
22	35.01 mm	6.5 kN	4.0 kN
23	36.61 mm	7.0 kN	4.0 kN
24	38.20 mm	7.0 kN	4.5 kN
25	39.79 mm	7.5 kN	4.5 kN
26	41.38 mm	8.0 kN	4.5 kN
27	42.97 mm	8.0 kN	4.5 kN
28	44.56 mm	8.5 kN	4.5 kN
29	46.16 mm	9.0 kN	4.5 kN
30	47.75 mm	9.0 kN	4.5 kN
31	49.34 mm	9.0 kN	4.5 kN
32	50.93 mm	9.0 kN	4.5 kN
33	52.52 mm	9.0 kN	4.5 kN
34	54.11 mm	9.0 kN	4.5 kN
35	55.70 mm	9.0 kN	4.5 kN
36	57.30 mm	9.0 kN	4.5 kN
37	58.89 mm	9.0 kN	4.5 kN
38	60.48 mm	9.0 kN	4.5 kN
39	62.07 mm	9.0 kN	4.5 kN
40	63.66 mm	9.0 kN	4.5 kN

1) Check availability

Maximum Permissible Feed Forces [1)] in kN

These ratings are maximum values under perfect conditions, with proper mounting & alignment of the rack & pinion, using only ATLANTA materials with adequate grease lubrication (i.e. the using our electronic lubrication systems in Chapter D or manual lubrication at least once a day).

The ratings are based on a speed of v = 1.5 m/s, with safety coefficient Sb = 1.0, lifetime factor fn = 1.0 and linear load distribution factor KHb = 1.0.

Calculation of the maximum forces of an application design is always necessary, please see pages C-53 to C-55.

1) For keyway transmission, please make a separate calculation, for torques with compression couplings, please see page C-76

When using the maximum capacity of the teeth, or multiple pinions in contact, the mounting screw holding forces must be checked separately!

All dimensions are in mm

Rack Type		UHPR	HPR			PR		BR
ATLANTA Quality		5	6		7	8		10
Rack	Material	Heat-Treatable Steel [2]	Case-Hardened [2]	ATLANTA Standard Heat-Treatable Steel				
	Heat Treatment	Case-Hardened	High-Performance Hardening Process				Quenched & Tempered	High Perf. Hardening
Pinion	Material	16MnCr5						
	Heat Treatment	Case-Hardened						
No. of Pinion Teeth[1]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels)						
12	25.46 mm	6.0 kN	8.0 kN	6.0 kN	6.0 kN	5.0 kN	2.0 kN	3.5 kN
13	27.59 mm	6.0 kN	8.5 kN	6.0 kN	6.0 kN	5.5 kN	2.0 kN	4.0 kN
14	29.71 mm	7.5 kN	10.0 kN	7.5 kN	7.5 kN	6.5 kN	2.5 kN	4.5 kN
15	31.83 mm	8.0 kN	11.0 kN	8.0 kN	8.0 kN	7.0 kN	2.5 kN	5.0 kN
16	33.95 mm	9.0 kN	12.0 kN	9.0 kN	9.0 kN	7.5 kN	3.0 kN	5.5 kN
17	36.08 mm	9.5 kN	13.0 kN	9.5 kN	9.5 kN	8.0 kN	3.0 kN	6.0 kN
18	38.20 mm	10.0 kN	13.5 kN	10.0 kN	10.0 kN	8.5 kN	3.5 kN	6.5 kN
19	40.32 mm	10.5 kN	14.5 kN	10.5 kN	10.5 kN	9.0 kN	3.5 kN	7.0 kN
20	42.44 mm	11.5 kN	15.5 kN	11.5 kN	11.5 kN	9.5 kN	4.0 kN	7.0 kN
21	44.56 mm	12.0 kN	16.0 kN	12.0 kN	12.0 kN	10.5 kN	4.0 kN	7.5 kN
22	46.69 mm	12.5 kN	17.0 kN	12.5 kN	12.5 kN	11.0 kN	4.0 kN	8.0 kN
23	48.81 mm	13.0 kN	17.5 kN	13.0 kN	13.0 kN	11.5 kN	4.5 kN	8.5 kN
24	50.93 mm	13.5 kN	18.0 kN	13.5 kN	13.5 kN	12.0 kN	4.5 kN	8.5 kN
25	53.05 mm	14.5 kN	18.5 kN	14.5 kN	14.5 kN	12.5 kN	5.0 kN	9.0 kN
26	55.17 mm	15.0 kN	18.5 kN	15.0 kN	15.0 kN	13.0 kN	5.0 kN	9.0 kN
27	57.30 mm	15.0 kN	18.5 kN	15.0 kN	15.0 kN	13.0 kN	5.5 kN	9.0 kN
28	59.42 mm	15.0 kN	18.5 kN	15.0 kN	15.0 kN	13.0 kN	5.5 kN	9.5 kN
29	61.54 mm	15.0 kN	18.5 kN	15.0 kN	15.0 kN	13.0 kN	6.0 kN	9.5 kN
30	63.66 mm	15.0 kN	18.5 kN	15.0 kN	15.0 kN	13.0 kN	6.0 kN	9.5 kN
31	65.78 mm	15.5 kN	19.0 kN	15.5 kN	15.5 kN	13.0 kN	6.0 kN	9.5 kN
32	67.91 mm	15.5 kN	19.0 kN	15.5 kN	15.5 kN	13.0 kN	6.5 kN	9.5 kN
33	70.03 mm	15.5 kN	19.0 kN	15.5 kN	15.5 kN	13.5 kN	6.5 kN	9.5 kN
34	72.15 mm	15.5 kN	19.0 kN	15.5 kN	15.5 kN	13.5 kN	7.0 kN	9.5 kN
35	74.27 mm	15.5 kN	19.0 kN	15.5 kN	15.5 kN	13.5 kN	7.0 kN	9.5 kN
36	76.39 mm	15.5 kN	19.0 kN	15.5 kN	15.5 kN	13.5 kN	7.5 kN	9.5 kN
37	78.52 mm	15.5 kN	19.0 kN	15.5 kN	15.5 kN	13.5 kN	7.5 kN	9.5 kN
38	80.64 mm	15.5 kN	19.0 kN	15.5 kN	15.5 kN	13.5 kN	7.5 kN	9.5 kN
39	82.76 mm	15.5 kN	19.0 kN	15.5 kN	15.5 kN	13.5 kN	8.0 kN	9.5 kN
40	84.88 mm	15.5 kN	19.5 kN	15.5 kN	15.5 kN	13.5 kN	8.0 kN	9.5 kN

1) Check availability
2) According to ATLANTA-Standard

Maximum permissible feed forces – See page C-44 for more information.

All dimensions are in mm

Rack Type		UHPR	HPR			PR		BR
ATLANTA Quality		5	6		7	8		10
Rack	Material	Heat-Treatable Steel [2]	Case-Hardened [2]	ATLANTA Standard Heat-Treatable Steel				
	Heat Treatment	Case-Hardened	High-Performance Hardening Process				Quenched & Tempered	High Perf. Hardening
Pinion	Material	16MnCr5						
	Heat Treatment	Case-Hardened						
No. of Pinion Teeth[1]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels)						
12	38.20 mm	9.5 kN	13.0 kN	9.5 kN	9.5 kN	8.0 kN	3.0 kN	5.5 kN
13	41.38 mm	11.0 kN	15.0 kN	11.0 kN	11.0 kN	9.0 kN	3.5 kN	6.5 kN
14	44.56 mm	13.0 kN	18.0 kN	13.0 kN	13.0 kN	11.0 kN	4.5 kN	8.0 kN
15	47.75 mm	14.5 kN	19.5 kN	14.5 kN	14.5 kN	12.0 kN	5.0 kN	9.0 kN
16	50.93 mm	15.5 kN	21.0 kN	15.5 kN	15.5 kN	13.0 kN	5.0 kN	9.5 kN
17	54.11 mm	16.5 kN	22.5 kN	16.5 kN	16.5 kN	14.0 kN	5.5 kN	10.0 kN
18	57.30 mm	18.0 kN	24.0 kN	17.5 kN	17.5 kN	14.5 kN	6.0 kN	11.0 kN
19	60.48 mm	19.0 kN	25.5 kN	19.0 kN	19.0 kN	15.5 kN	6.0 kN	11.5 kN
20	63.66 mm	20.0 kN	27.0 kN	20.0 kN	20.0 kN	16.5 kN	6.5 kN	12.0 kN
21	66.85 mm	21.0 kN	28.5 kN	21.0 kN	21.0 kN	17.5 kN	7.0 kN	13.0 kN
22	70.03 mm	22.0 kN	29.5 kN	22.0 kN	22.0 kN	18.5 kN	7.5 kN	13.5 kN
23	73.21 mm	23.0 kN	29.5 kN	23.0 kN	23.0 kN	19.0 kN	7.5 kN	14.0 kN
24	76.39 mm	24.0 kN	29.5 kN	24.0 kN	24.0 kN	20.0 kN	8.0 kN	15.0 kN
25	79.58 mm	25.5 kN	30.0 kN	25.5 kN	25.0 kN	21.0 kN	8.5 kN	15.5 kN
26	82.76 mm	26.5 kN	30.0 kN	26.5 kN	26.5 kN	22.0 kN	8.5 kN	16.0 kN
27	85.94 mm	27.5 kN	30.0 kN	27.5 kN	27.5 kN	22.5 kN	9.0 kN	17.0 kN
28	89.13 mm	27.5 kN	30.5 kN	27.5 kN	27.5 kN	23.5 kN	9.5 kN	17.0 kN
29	92.31 mm	27.5 kN	30.5 kN	27.5 kN	27.5 kN	23.5 kN	10.0 kN	17.0 kN
30	95.49 mm	28.0 kN	30.5 kN	27.5 kN	27.5 kN	24.0 kN	10.0 kN	17.5 kN
31	98.68 mm	28.0 kN	30.5 kN	28.0 kN	28.0 kN	24.0 kN	10.5 kN	17.5 kN
32	101.86 mm	28.0 kN	30.5 kN	28.0 kN	28.0 kN	24.0 kN	11.0 kN	17.5 kN
33	105.04 mm	28.0 kN	31.0 kN	28.0 kN	28.0 kN	24.0 kN	11.5 kN	17.5 kN
34	108.23 mm	28.0 kN	31.0 kN	28.0 kN	28.0 kN	24.0 kN	11.5 kN	17.5 kN
35	111.41 mm	28.0 kN	31.0 kN	28.0 kN	28.0 kN	24.0 kN	12.0 kN	17.5 kN
36	114.59 mm	28.5 kN	31.0 kN	28.5 kN	28.5 kN	24.5 kN	12.5 kN	17.5 kN
37	117.77 mm	28.5 kN	31.0 kN	28.5 kN	28.5 kN	24.5 kN	13.0 kN	17.5 kN
38	120.96 mm	28.5 kN	31.0 kN	28.5 kN	28.5 kN	24.5 kN	13.0 kN	17.5 kN
39	124.14 mm	28.5 kN	31.0 kN	28.5 kN	28.5 kN	24.5 kN	13.5 kN	17.5 kN
40	127.32 mm	28.5 kN	31.0 kN	28.5 kN	28.5 kN	24.5 kN	14.0 kN	17.5 kN

1) Check availability
2) According to ATLANTA-Standard

Maximum permissible feed forces – See page C-44 for more information.

All dimensions are in mm

Rack Type		HPR			PR		BR
ATLANTA Quality		6		7	8		10
Rack	Material	Case-Hardened [2]	ATLANTA Standard Heat-Treatable Steel				
	Heat Treatment	High-Performance Hardening Process				Quenched & Tempered	High Perf. Hardening
Pinion	Material	16MnCr5					
	Heat Treatment	Case-Hardened					
No. of Pinion Teeth[1]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels)					
12	50.93 mm	24.0 kN	18.0 kN	17.5 kN	15.0 kN	6.0 kN	11.0 kN
13	55.17 mm	28.0 kN	20.5 kN	20.5 kN	17.5 kN	7.0 kN	13.0 kN
14	59.42 mm	32.5 kN	24.0 kN	24.0 kN	20.5 kN	8.0 kN	15.0 kN
15	63.66 mm	37.0 kN	27.5 kN	27.5 kN	23.5 kN	9.5 kN	17.0 kN
16	67.91 mm	39.5 kN	29.5 kN	29.5 kN	25.0 kN	10.0 kN	18.5 kN
17	72.15 mm	42.0 kN	31.5 kN	31.0 kN	26.5 kN	10.5 kN	19.5 kN
18	76.39 mm	45.0 kN	33.5 kN	33.0 kN	28.5 kN	11.5 kN	21.0 kN
19	80.64 mm	47.5 kN	35.5 kN	35.0 kN	30.0 kN	12.0 kN	22.5 kN
20	84.88 mm	50.0 kN	37.0 kN	37.0 kN	31.5 kN	13.0 kN	23.5 kN
21	89.13 mm	53.0 kN	39.0 kN	39.0 kN	33.5 kN	13.5 kN	25.0 kN
22	93.37 mm	55.5 kN	41.0 kN	41.0 kN	35.0 kN	14.0 kN	26.0 kN
23	97.62 mm	56.5 kN	43.0 kN	43.0 kN	37.0 kN	15.0 kN	27.5 kN
24	101.86 mm	57.0 kN	45.0 kN	45.0 kN	38.5 kN	15.5 kN	28.5 kN
25	106.10 mm	57.5 kN	47.0 kN	47.0 kN	40.0 kN	16.0 kN	30.0 kN
26	110.35 mm	57.5 kN	49.0 kN	49.0 kN	42.0 kN	17.0 kN	30.5 kN
27	114.59 mm	58.0 kN	49.5 kN	49.5 kN	42.0 kN	17.5 kN	31.0 kN
28	118.84 mm	58.5 kN	49.5 kN	49.5 kN	42.0 kN	18.5 kN	31.0 kN
29	123.08 mm	58.5 kN	50.0 kN	50.0 kN	42.5 kN	19.0 kN	31.0 kN
30	127.32 mm	58.5 kN	50.0 kN	50.0 kN	42.5 kN	19.5 kN	31.0 kN
31	131.57 mm	59.0 kN	50.0 kN	50.0 kN	42.5 kN	20.5 kN	31.0 kN
32	135.81 mm	59.0 kN	50.5 kN	50.5 kN	43.0 kN	21.0 kN	31.5 kN
33	140.06 mm	59.0 kN	50.5 kN	50.5 kN	43.0 kN	22.0 kN	31.5 kN
34	144.30 mm	59.5 kN	50.5 kN	50.5 kN	43.0 kN	22.5 kN	31.5 kN
35	148.54 mm	59.5 kN	51.0 kN	51.0 kN	43.5 kN	23.0 kN	31.5 kN
36	152.79 mm	59.5 kN	51.0 kN	51.0 kN	43.5 kN	24.0 kN	31.5 kN
37	157.03 mm	59.5 kN	51.0 kN	51.0 kN	43.5 kN	24.5 kN	31.5 kN
38	161.28 mm	59.5 kN	51.5 kN	51.5 kN	43.5 kN	25.5 kN	32.0 kN
39	165.52 mm	59.5 kN	51.5 kN	51.5 kN	43.5 kN	26.0 kN	32.0 kN
40	169.77 mm	60.0 kN	51.5 kN	51.5 kN	44.0 kN	27.0 kN	32.0 kN

1) Check availability
2) According to ATLANTA-Standard

Maximum permissible feed forces – See page C-44 for more information.

All dimensions are in mm

Rack Type		HPR		PR	BR
ATLANTA Quality		6	7	8	10
Rack	Material	ATLANTA Standard Heat-Treatable Steel			
	Heat Treatment	High Performance Hardening			
Pinion	Material	16MnCr5			
	Heat Treatment	Case-Hardened			
No. of Pinion Teeth[1)]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels			
12	63.66 mm	28.0 kN	28.0 kN	23.5 kN	17.5 kN
13	68.97 mm	32.5 kN	32.5 kN	27.5 kN	20.5 kN
14	74.27 mm	37.5 kN	37.5 kN	32.0 kN	23.5 kN
15	79.58 mm	43.0 kN	43.0 kN	36.5 kN	27.0 kN
16	84.88 mm	46.0 kN	46.0 kN	39.0 kN	29.0 kN
17	90.19 mm	49.5 kN	49.5 kN	42.0 kN	31.0 kN
18	95.49 mm	52.5 kN	52.5 kN	44.5 kN	33.0 kN
19	100.80 mm	55.5 kN	55.5 kN	47.0 kN	35.0 kN
20	106.10 mm	58.5 kN	58.5 kN	49.5 kN	37.0 kN
21	111.41 mm	61.5 kN	61.5 kN	52.5 kN	39.0 kN
22	116.71 mm	65.0 kN	65.0 kN	55.0 kN	41.0 kN
23	122.02 mm	68.0 kN	68.0 kN	57.5 kN	43.0 kN
24	127.32 mm	71.0 kN	71.0 kN	60.5 kN	45.0 kN
25	132.63 mm	74.5 kN	74.5 kN	63.0 kN	47.0 kN
26	137.93 mm	75.0 kN	75.0 kN	63.5 kN	48.0 kN
27	143.24 mm	75.5 kN	75.5 kN	64.0 kN	48.0 kN
28	148.54 mm	75.5 kN	75.5 kN	64.0 kN	48.5 kN
29	153.85 mm	76.0 kN	76.0 kN	64.5 kN	48.5 kN
30	159.16 mm	76.0 kN	76.0 kN	64.5 kN	49.0 kN

1) Check availability

Maximum permissible feed forces – See page C-44 for more information.

All dimensions are in mm

Rack Type		HPR		BR
ATLANTA Quality		6	7	10
Rack	Material	ATLANTA Standard Heat-Treatable Steel		
	Heat Treatment	High Performance Hardening		
Pinion	Material	16MnCr5		
	Heat Treatment	Case-Hardened		
No. of Pinion Teeth[1)]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels		
12	76.39 mm	40.5 kN	40.5 kN	25.5 kN
13	82.76 mm	47.0 kN	47.0 kN	29.5 kN
14	89.13 mm	54.5 kN	54.5 kN	34.5 kN
15	95.49 mm	62.5 kN	62.5 kN	39.0 kN
16	101.86 mm	67.0 kN	67.0 kN	42.0 kN
17	108.23 mm	71.5 kN	71.5 kN	45.0 kN
18	114.59 mm	76.0 kN	76.0 kN	47.5 kN
19	120.96 mm	80.5 kN	80.5 kN	50.5 kN
20	127.32 mm	85.0 kN	85.0 kN	53.5 kN
21	133.69 mm	89.5 kN	89.5 kN	56.5 kN
22	140.06 mm	94.0 kN	94.0 kN	59.0 kN
23	146.42 mm	98.5 kN	98.5 kN	62.0 kN
24	152.79 mm	103.0 kN	103.0 kN	65.0 kN
25	159.16 mm	107.0 kN	107.0 kN	66.5 kN
26	165.52 mm	107.5 kN	107.5 kN	66.5 kN
27	171.89 mm	108.0 kN	108.0 kN	67.0 kN
28	178.25 mm	108.0 kN	108.0 kN	67.0 kN
29	184.62 mm	108.5 kN	108.5 kN	67.5 kN
30	190.99 mm	109.0 kN	109.0 kN	67.5 kN

1) Check availability

Maximum permissible feed forces – See page C-44 for more information.

All dimensions are in mm

Rack Type		HPR		BR
ATLANTA Quality		6	7	10
Rack	Material	ATLANTA Standard Heat-Treatable Steel		
	Heat Treatment	High Performance Hardening		
Pinion	Material	16MnCr5		
	Heat Treatment	Case-Hardened		
No. of Pinion Teeth[1)]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels		
12	101.86 mm	72.5 kN	72.5 kN	45.5 kN
13	110.35 mm	84.5 kN	84.5 kN	53.0 kN
14	118.84 mm	97.5 kN	97.5 kN	61.5 kN
15	127.32 mm	111.5 kN	111.5 kN	70.0 kN
16	135.81 mm	119.5 kN	119.5 kN	75.0 kN
17	144.30 mm	127.5 kN	127.5 kN	80.0 kN
18	152.79 mm	135.5 kN	135.5 kN	85.0 kN
19	161.28 mm	143.5 kN	143.5 kN	90.0 kN
20	169.77 mm	151.5 kN	151.5 kN	95.5 kN
21	178.25 mm	160.0 kN	159.5 kN	100.5 kN
22	186.74 mm	168.0 kN	167.5 kN	105.5 kN
23	195.23 mm	176.0 kN	176.0 kN	110.5 kN
24	203.72 mm	184.0 kN	184.0 kN	115.5 kN
25	212.21 mm	187.0 kN	187.0 kN	116.5 kN
26	220.70 mm	188.0 kN	188.0 kN	117.0 kN
27	229.18 mm	189.0 kN	188.5 kN	117.5 kN
28	237.67 mm	189.5 kN	189.5 kN	117.5 kN
29	246.16 mm	190.5 kN	190.5 kN	118.0 kN
30	254.65 mm	191.0 kN	191.0 kN	118.5 kN

1) Check availability

All dimensions are in mm

Maximum permissible feed forces – See page C-44 for more information.

Rack Type		HPR		BR
ATLANTA Quality		6	7	10
Rack	Material	ATLANTA Standard Heat-Treatable Steel		
	Heat Treatment	High Performance Hardening		
Pinion	Material	16MnCr5		
	Heat Treatment	Case-Hardened		
No. of Pinion Teeth[1)]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels		
12	127.32 mm	114.0 kN	114.0 kN	71.5 kN
13	137.93 mm	132.5 kN	132.5 kN	83.0 kN
14	148.54 mm	153.5 kN	153.5 kN	96.0 kN
15	159.16 mm	175.0 kN	175.0 kN	109.5 kN
16	169.77 mm	187.5 kN	187.5 kN	117.5 kN
17	180.38 mm	200.0 kN	200.0 kN	125.5 kN
18	190.99 mm	212.5 kN	212.5 kN	133.5 kN
19	201.60 mm	225.5 kN	225.0 kN	141.5 kN
20	212.21 mm	238.0 kN	237.5 kN	149.5 kN
21	222.82 mm	250.5 kN	250.5 kN	157.0 kN
22	233.43 mm	263.0 kN	263.0 kN	165.0 kN
23	244.04 mm	276.0 kN	276.0 kN	173.0 kN
24	254.65 mm	285.5 kN	285.5 kN	178.0 kN
25	265.26 mm	287.0 kN	287.0 kN	178.5 kN

1) Check availability

Maximum permissible feed forces – See page C-44 for more information.

All dimensions are in mm

Rack Type		HPR	BR
ATLANTA Quality		6	10
Rack	Material	ATLANTA Standard Heat-Treatable Steel	
	Heat Treatment	High Performance Hardening	
Pinion	Material	16MnCr5	
	Heat Treatment	Case-Hardened	
No. of Pinion Teeth[1)]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels	
12	152.79 mm	163.0 kN	101.0 kN
13	165.52 mm	189.5 kN	117.5 kN
14	178.25 mm	219.0 kN	136.0 kN
15	190.99 mm	249.5 kN	155.0 kN
16	203.72 mm	267.0 kN	166.0 kN
17	216.45 mm	285.5 kN	177.0 kN
18	229.18 mm	303.0 kN	188.5 kN
19	241.92 mm	321.0 kN	199.5 kN
20	254.65 mm	339.0 kN	210.5 kN
21	267.38 mm	357.0 kN	222.0 kN
22	280.11 mm	375.0 kN	233.0 kN
23	292.85 mm	393.5 kN	244.5 kN
24	305.58 mm	407.5 kN	251.0 kN
25	318.31 mm	409.0 kN	252.5 kN

1) Check availability

All dimensions are in mm

Maximum permissible feed forces – See page C-44 for more information.

The values given in the load table are based upon uniform, smooth operation, $K_{H\beta}$=1.0 and reliable grease lubrication. Since, in practice, the applications are very diverse, it is important to consider the given conditions by using appropriate factors S_B, K_A, $L_{KH\beta}$ and f_n (see below).

Formulas for Determining the Tangential Force

$$a = \frac{v}{t_b} \quad [m/s^2]$$

$$F_u = \frac{m \cdot g + m \cdot a}{1000} \text{ (for lifting axle)} \quad [kN]$$

$$F_u = \frac{m \cdot g \cdot \mu + m \cdot a}{1000} \text{ (for driving axle)} \quad [kN]$$

$$F_{u\,perm.} = \frac{F_{u\,Tab}}{K_A \cdot S_B \cdot f_n \cdot L_{KH\beta}} \quad [kN]$$

Formula dimensions see page ZD-3

The Condition $F_u < F_{u\,perm.}$ Must be Fulfilled.

Load Factor K_A

Drive	Type of load from the machines to be driven		
	Uniform	Medium Shocks	Heavy Shocks
Uniform		1.25	1.75
Light Shocks	1.25	1.50	2.00
Medium Shocks	1.50	1.75	2.25

Safety Coefficient S_B

The safety coefficient should be allowed for according to experience (S_B = 1.1 to 1.4).

Life-Time Factor f_n

considering of the peripheral speed of the pinion and lubrication.

Lubrication		Continuous	Daily	Monthly
Peripheral Speed of Gearing				
m/sec	m/min			
0.5	30	0.85	0.95	
1.0	60	0.95	1.10	from
1.5	90	1.00	1.20	3
2.0	120	1.05	1.30	to
3.0	180	1.10	1.50	10
5.0	300	1.25	1.90	

Linear Load Distribution Factor $L_{KH\beta}$

The linear load distribution factor considers the contact stress, while it describes unintegrated load distribution over the tooth width ($L_{KH\beta} = \sqrt{K_{H\beta}}$).

$L_{KH\beta}$ = 1.1 for counter bearing, e.g. Torque Supporter
= 1.2 for preloaded bearings on the output shaft e.g. ATLANTA HT, HP and E servo-worm gear unit, BG bevel-gear unit
= 1.5 for unpreloaded bearings on the output shaft e.g. ATLANTA B servo-worm gear unit

Calculation Example

Values Given

⊗ Travelling Operation

Mass to be Moved	m	=	820 kg
Speed	v	=	2 m/s
Acceleration Time	t_b	=	1 s
Acceleration Due to Gravity	g	=	9.81 m/s²
Coefficient of Friction	μ	=	0.1
Load Factor	K_A	=	1.5
Life-Time Factor	f_n	=	1.05 (cont. lubrication)
Safety Coefficient	S_B	=	1.2
Linear Load Distribution Factor	$L_{KH\beta}$	=	1.5

Calculation Process — Results

$$a = \frac{v}{t_b} \qquad a = \frac{2}{1} \qquad = 2 \text{ m/s}^2$$

$$F_u = \frac{m \cdot g \cdot \mu + m \cdot a}{1000}$$

$$F_u = \frac{820 \cdot 9.81 \cdot 0.1 + 820 \cdot 2}{1000} = 2.44 \text{ kN}$$

Assumed feed force: rack C45, ind. hardened, straight tooth, module 3, pinion 16MnCr5, case hardened, 20 teeth, page C-46 with Futab = 11.5 kN

$$F_{u\,zul./per.} = \frac{F_{uTab}}{K_A \cdot S_B \cdot f_n \cdot L_{KH\beta}};$$

$$F_{u\,zul./per.} = \frac{11.5 \text{ kN}}{1.5 \cdot 1.2 \cdot 1.05 \cdot 1.5} = 4.05 \text{ kN}$$

Condition

$F_{u\,zul./per.} > F_u$; 4.05 kN > 2.44 kN => fulfilled

Result: Rack 34 30 100 Page C-64

Pinion 24 35 220 Page C-40

Case-Hardened

Your Calculation

Values Given

⊗ Travelling Operation

Mass to be Moved	m	=	_____ kg
Speed	v	=	_____ m/s
Acceleration Time	t_b	=	_____ s
Acceleration Due to Gravity	g	=	9.81 m/s²
Coefficient of Friction	μ	=	_____
Load Factor	K_A	=	_____
Life-Time Factor	f_n	=	_____
Safety Coefficient	S_B	=	_____
Linear Load Distribution Factor	$L_{KH\beta}$	=	_____

Calculation Process — Results

$$a = \frac{v}{t_b} \qquad a = \_\_\_\_\_ = \_\_\_\_\_ \text{ m/s}^2$$

$$F_u = \frac{m \cdot g \cdot \mu + m \cdot a}{1000}; \quad F_u = \frac{\_\_\_\_\_}{1000} = \_\_\_\_\_ \text{ kN}$$

Permissible Feed Force $F_{u\,Tab}$

$$F_{u\,zul./per.} = \frac{F_{u\,Tab}}{K_A \cdot S_B \cdot f_n \cdot L_{KH\beta}};$$

$F_{u\,zul./per.}$ = _____ = _____ kN

Condition

$F_{u\,zul./per.} > F_u$; _____ kN > _____ kN => fulfilled

Calculation Example

Values Given

○ Lifting Operation

Mass to be Moved	m	=	300 kg
Speed	v	=	1.08 m/s
Acceleration Time	t_b	=	0.27 s
Acceleration Due to Gravity	g	=	9.81 m/s²
Load Factor	K_A	=	1.2
Life-Time Factor	f_n	=	1.1 (Cont. Lubrication)
Safety Coefficient	S_B	=	1.2
Linear Load Distribution Factor	$L_{KH\beta}$	=	1.2

Calculation Process — Results

$a = \frac{v}{t_b}$ $\quad a = \frac{1.08}{0.27}$ $\quad = 4\ m/s^2$

$F_u = \frac{m \cdot g + m \cdot a}{1000}$ $\quad _u = \frac{300 \cdot 9.81 + 300 \cdot 4}{1000}$ $\quad = 4.1\ kN$

Assumed feed force: rack C45, ind. hardened, helical, module 2, pinion 16MnCr5, case hardened, 20 teeth, page C-45 with $F_{utab} = 12$ kN

$F_{u\ zul./per.} = \frac{F_{u\ Tab}}{K_A \cdot S_B \cdot f_n \cdot L_{KH\beta}}$; $F_{u\ zul./per.} = \frac{11.5\ kN}{1.2 \cdot 1.2 \cdot 1.1 \cdot 1.2}$

$= 5.9\ kN$

Condition

$F_{u\ zul./per.} > F_u$; 6.0 kN > 4.1 kN => fulfilled

Result:	Rack	29 20 105	Page C-16
	Pinion	24 29 520	Page C-39

Your Calculation

Values Given

○ Lifting Operation

Mass to be Moved	m	=	_____ kg
Speed	v	=	_____ m/s
Acceleration Time	t_b	=	_____ s
Acceleration Due to Gravity	g	=	9.81 m/s²
Load Factor	K_A	=	_____
Life-Time Factor	f_n	=	_____
Safety Coefficient	S_B	=	_____
Linear Load Distribution Factor	$L_{KH\beta}$	=	_____

Calculation Process — Results

$a = \frac{v}{t_b}$ $\quad a =$ _____ $=$ _____ m/s²

$F_u = \frac{m \cdot g + m \cdot a}{1000}$ $\quad F_{u\ erf./req.} = \frac{\text{_____}}{1000} =$ _____ kN

Permissible Feed Force $F_{u\ tab}$

$F_{u\ zul./per.} = \frac{F_{u\ Tab}}{K_A \cdot S_B \cdot f_n \cdot L_{KH\beta}}$; $F_{u\ zul./per.} =$ _____ $=$ _____ kN

Condition

$F_{u\ zul./per.} > F_u$; _____ kN > _____ kN => fulfilled

Class	ATLANTA Quality	Module	Total Pitch Error [1] (± µm/m)	Tooth Thickness Tolerance (µm)	Maximum Length (mm)	Maximum Feed Force Per Pinion Contact [2] (kN)	Application Examples
UHPR Ultra High Precision Rack	5 Hardened & Ground	2	30	-15	1005	19.5	High-precision machine tools, Laser cutting systems, CNC cutting machines
		3	30	-15	1017	28.5	
HPR High Precision Rack	6 Hardened & Ground	2	34	-20	1005	15.5	Machine tools, Waterjet/Plasma/Laser cutting machines, CNC cutting machines, Tube bending systems, Robots, Automation
		3	34	-20	1018	25.5	
		4	34	-20	1005	49.0	
	6 Hardened & Ground	2	34	-20	2011	12.5	Machine tools, Waterjet/Plasma/Laser cutting machines, CNC cutting machines, Tube bending systems, Robots, Automation
		3	34	-20	2036	23.5	
		4	34	-20	2011	42.0	
		5	34	-20	2011	62.0	
		6	34	-20	2036	89.0	
		8	34	-20	2011	155.5	
		10	34	-20	1005	234.0	
		12	34	-20	1018	333.0	
	7 Hardened & Ground	2	52	-36	1005	12.5	Woodworking/Waterjet/Plasma/Laser cutting machines, CNC cutting machines, Tube bending systems, Robots, Automation
		3	52	-36	1018	23.0	
		4	52	-36	1005	42.0	
		5	52	-36	1005	62.0	
PR Precision Rack	8 Hardened & Ground	2	60	-59	2011	12.0	Material handling, Robots, Automation
		3	60	-59	2036	22.0	
		4	60	-59	2011	39.0	
		5	60	-59	2011	57.5	
	8 Quenched & Tempered, Milled	2	100	-110	2011	7.0	Material handling, Robots, Automation
		3	100	-110	2036	12.0	
		4	100	-110	2011	23.0	
BR Basic Rack	10 Induction-Hardened Milled	1	200	-110	999	2.0	Lifting axis, Material handling, Welding robots
		1.5	200	-110	1998	3.5	
		2	200	-110	2011	7.0	
		3	200	-110	2036	16.5	
		4	200	-110	2011	29.5	
		5	200	-110	2011	45.5	
		6	200	-110	2036	63.0	
		8	200	-110	2011	110.0	
		10	200	-110	1005	166.0	
		12	200	-110	1018	252.5	

1) Values are for rack lengths of 1,000 mm. For total pitch errors values for other rack lengths, please see the respective catalog pages.

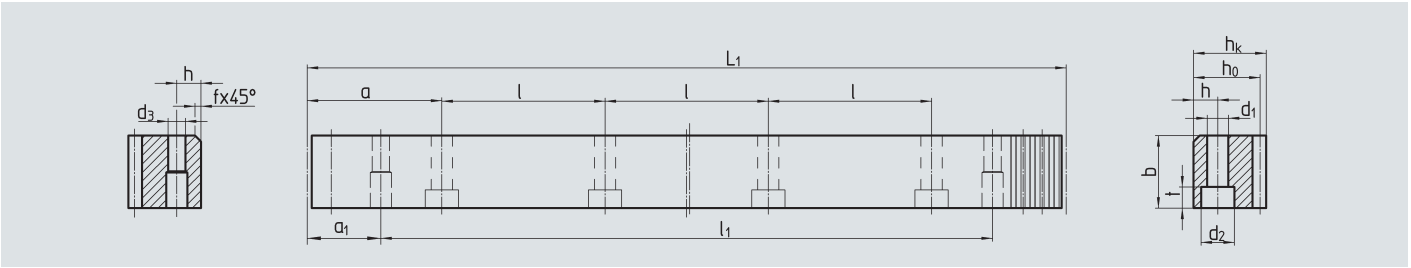
2) Values are only valid for special steel according ATLANTA-Standard.

When using the maximum capacity of the teeth, or multiple pinions in contact, the mounting screw loads must be checked separately! Please ask ATLANTA for advice!

Class & Quality			UHPR 5	HPR 6	HPR 6	HPR 7	PR 8	PR 8	BR 10
Material			Heat-Treat Steel 1)	Case-Hardened 1)	Heat-Treat Steel 1)	Heat-Treat Steel 1)	Heat-Treat Steel 1)	Heat-Treat Steel 1)	Heat-Treat Steel 1)
Heat Treatment			High-Performance Hardening	High-Performance Hardening	High-Performance Hardening	High-Performance Hardening	High-Performance Hardening	Quenched & Tempered	High-Performance Hardening
Module	Mounting Holes	Rack Lengths mm	Order Code						
1	×	1000							34 93 100
1.5	×	1000							34 16 100
		2000							34 16 200
2	✓	250		28 20 025					
		500		28 20 050				33 21 050	34 20 050
		1000	5 01 79 002	28 20 100	28 20 105	28 20 107	28 20 108	33 21 100	34 20 100
		2000			28 20 205	28 20 207	28 20 208	33 21 200	34 20 200
	×	500		28 21 050					34 21 050
		1000		28 21 100	28 21 105			33 20 100	34 21 100
		2000			28 21 205			33 20 200	34 21 200
3	✓	250		28 30 025					
		500		28 30 050				33 31 050	34 30 050
		1000	5 01 79 003	28 30 100	28 30 105	28 30 107	28 30 108	33 31 100	34 30 100
		2000			28 30 205	28 30 207	28 30 208	33 31 200	34 30 200
	×	500		28 31 050					34 31 050
		1000		28 31 100	28 31 105			33 30 100	34 31 100
		2000			28 31 205			33 30 200	34 31 200
4	✓	500		28 40 050					34 40 050
		1000		28 40 100	28 40 105			33 41 100	34 40 100
		2000			28 40 205			33 41 200	34 40 200
	✓ Large Holes	500		28 42 050					
		1000		28 42 100	28 42 105	28 40 107	28 40 108		34 42 100
		1500							34 42 150
		2000			28 42 205	28 40 207	28 40 208		34 42 200
	×	500		28 41 050					
		1000		28 41 100	28 41 105			33 40 100	34 41 100
		2000			28 41 205			33 40 200	34 41 200
5	✓	1000			28 50 105	28 50 107	28 50 108		34 50 100
		2000			28 50 205	28 50 207	28 50 208		34 50 200
	×	1000			28 51 105				34 51 100
		2000			28 51 205				34 51 200
6	✓	1000			28 60 105				34 60 100
		2000			28 60 205				34 60 200
	×	1000			28 61 105				34 61 100
		2000			28 61 205				34 61 200
8	✓	1000			28 80 105				
		2000			28 80 205				
	×	1000			28 81 105				34 81 100
		2000			28 81 205				34 81 200
10	✓	1000			28 10 105				
	×	1000			28 11 105				34 11 100
12	✓	1000			28 12 105				
	×	1000			28 13 105				34 13 100
Page			C-58	C-59	C-60	C-61	C-62	C-63	C-64

1) According to ATLANTA-Standard ✓ With mounting holes × Without mounting holes

ATLANTA Quality 5



Order Code	Module	L_1	N° of Teeth z	$b^{+0.4}$	h_k	h_0	f	a	l	N° of Holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
501 79 002	2	1005.31	160	24	24	22	2	62.83	125.66	8	8	7	11	7	31.3	942.7	5.7	4.20
501 79 003	3	1017.88	108	29	29	26	2	63.62	127.23	8	9	10	15	9	34.4	949.1	7.7	6.00

Total Pitch Error: GT_f/ 1000 ≤ 0.030 mm

- Teeth hardened with the ATLANTA High-Performance hardening process and ground
- Heat-treatable steel according to ATLANTA-Standard
- Ground on all sides after hardening

For information on mounting racks, see page C-92.

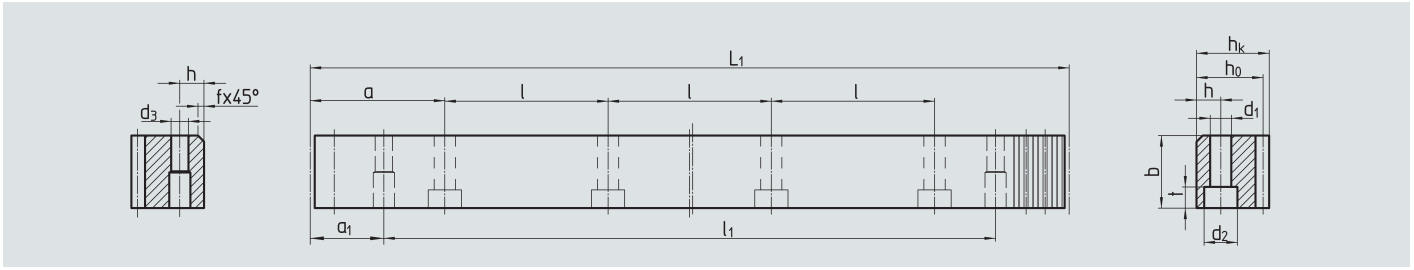
To achieve precision rack joints, we recommend our patented rack assembly kit, see page C-96.

For lubrication of racks & pinions, we recommend our electronic lubrication systems, see Chapter D.

For the calculation and selection of the rack & pinion drive, see pages C-44 to C-55.

For screws for rack mounting, see page C- 95.

ATLANTA Quality 6



Order Code	Module	L_1	N° of Teeth z	$b^{+0.4}$	h_k	h_0	f	a	l	N° of Holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
28 20 025	2	251.30	40	24	24	22.0	2	62.8	125.66	2	8	7	11	7	31.3	188.7	5.7	1.00
28 20 050 [2]	2	502.70	80	24	24	22.0	2	62.8	125.66	4	8	7	11	7	31.3	440.1	5.7	2.10
28 21 050	2	502.70	80	24	24	22.0	2	without mounting holes										2.10
28 20 100	2	1005.30	160	24	24	22.0	2	62.8	125.66	8	8	7	11	7	31.4	942.7	5.7	4.20
28 21 100	2	1005.30	160	24	24	22.0	2	without mounting holes										4.20
28 30 025	3	254.50	27	29	29	26.0	2	63.6	127.23	2	9	10	15	9	34.4	185.7	7.7	1.50
28 30 050 [2]	3	508.90	54	29	29	26.0	2	63.6	127.23	4	9	10	15	9	34.4	440.1	7.7	3.00
28 31 050	3	508.90	54	29	29	26.0	2	without mounting holes										3.00
28 30 100	3	1017.90	108	29	29	26.0	2	63.6	127.23	8	9	10	15	9	34.4	949.1	7.7	6.00
28 31 100	3	1017.90	108	29	29	26.0	2	without mounting holes										6.00
28 40 050 [2]	4	502.70	40	39	39	35.0	2	62.8	125.66	4	12	10	15	9	37.5	427.7	7.7	5.30
28 41 050	4	502.70	40	39	39	35.0	2	without mounting holes										5.30
28 42 050	4	502.40	40	39	39	35.0	2	62.8	125.66	4	12	14	15	9	37.5	427.7	7.7	5.30
28 40 100	4	1005.30	80	39	39	35.0	2	62.8	125.66	8	12	10	15	9	37.5	930.3	7.7	10.50
28 41 100	4	1005.30	80	39	39	35.0	2	without mounting holes										10.50
28 42 100	4	1005.30	80	39	39	35.0	2	62.8	125.66	8	12	14	20	13	37.5	930.3	11.7	10.50

2) Due to the screw connection, the feed force is max. 50 % of the value for racks with L_1 = 1,000 mm

Total Pitch Error: **GT_f/ 250 ≤ 0.020 mm**
GT_f/ 500 ≤ 0.026 mm
GT_f/1000 ≤ 0.034 mm

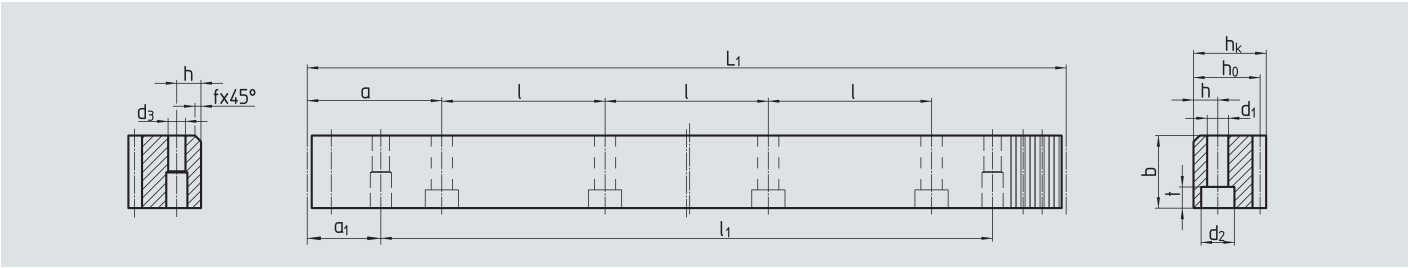
- Teeth hardened with the ATLANTA High-Performance hardening process and ground
- Heat-treatable steel according to ATLANTA-Standard
- Ground on all sides after hardening

For information on mounting racks, see page C-92.

To achieve precision rack joints, we recommend our patented rack assembly kit, see page C-96. For lubrication of racks & pinions, we recommend our electronic lubrication systems, see Chapter D. For the calculation and selection of the rack & pinion drive, see pages C-44 to C-55.

For screws for rack mounting, see page C- 95.

ATLANTA Quality 6



Order Code	Module	L_1	N° of Teeth z	$b^{+0.4}$	h_k	h_0	f	a	l	N° of Holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
28 20 105	2	1005.30	160	24	24	22.0	2	62.8	125.66	8	8	7	11	7	31.4	942.70	5.7	4.20
28 21 105	2	1005.30	160	24	24	22.0	2			without mounting holes								4.20
28 20 205	2	2010.62	320	24	24	22.0	2	62.8	125.66	16	8	7	11	7	31.4	1948.00	5.7	8.40
28 21 205	2	2010.62	320	24	24	22.0	2			without mounting holes								8.40
28 30 105	3	1017.90	108	29	29	26.0	2	63.6	127.23	8	9	10	15	9	34.4	949.10	7.7	6.00
28 31 105	3	1017.90	108	29	29	26.0	2			without mounting holes								6.00
28 30 205	3	2035.75	216	29	29	26.0	2	63.6	127.23	16	9	10	15	9	34.4	1967.00	7.7	12.00
28 31 205	3	2035.75	216	29	29	26.0	2			without mounting holes								12.00
28 40 105	4	1005.30	80	39	39	35.0	2	62.8	125.66	8	12	10	15	9	37.5	930.30	7.7	10.50
28 41 105	4	1005.30	80	39	39	35.0	2			without mounting holes								10.50
28 42 105	4	1005.30	80	39	39	35.0	2	62.8	125.66	8	12	14	20	13	37.5	930.30	11.7	10.50
28 40 205	4	2010.62	160	39	39	35.0	2	62.8	125.66	16	12	10	15	9	37.5	1935.60	7.7	21.00
28 41 205	4	2010.62	160	39	39	35.0	2			without mounting holes								21.00
28 42 205	4	2010.62	160	39	39	35.0	2	62.8	125.66	16	12	14	20	13	37.5	1935.60	11.7	21.00
28 50 105	5	1005.30	64	49	39	34	2.5	62.8	125.66	8	12	14	20	13	30.1	945.00	11.7	13.40
28 51 105	5	1005.30	64	49	39	34	2.5			without mounting holes								13.40
28 50 205	5	2010.62	128	49	39	34	2.5	62.8	125.66	16	12	14	20	13	30.1	1950.40	11.7	26.80
28 51 205	5	2010.62	128	49	39	34	2.5			without mounting holes								26.80
28 60 105	6	1017.88	54	59	49	43	2.5	63.6	127.23	8	16	18	26	17	31.4	955.00	15.7	18.50
28 61 205	6	1017.88	54	59	49	43	2.5			without mounting holes								18.50
28 60 205	6	2035.75	108	59	49	43	2.5	63.6	127.23	16	16	18	26	17	31.4	1973.00	15.7	37.00
28 61 205	6	2035.75	108	59	49	43	2.5			without mounting holes								37.00
28 80 105	8	1005.30	40	79	79	71	2.5	62.8	125.66	8	25	22	33	21	26.6	952.00	19.7	44.76
28 81 105	8	1005.30	40	79	79	71	2.5			without mounting holes								44.76
28 80 205	8	2010.61	80	79	79	71	2.5	62.8	125.66	16	25	22	33	21	26.6	1957.30	19.7	89.50
28 81 205	8	2010.61	80	79	79	71	2.5			without mounting holes								89.50
28 10 105 [1]	10	1005.30	32	99	99	89	2.5	62.83	125.66	8	32	33	48	32	125.66	753.96	19.7	68.72
28 11 105 [1]	10	1005.30	32	99	99	89	2.5			without mounting holes								68.72
28 12 105 [1]	12	1017.90	27	120	120	108	2.5	63.60	127.23	8	40	39	58	38	127.23	763.40	19.7	111.00
28 13 105 [1]	12	1017.90	27	120	120	108	2.5			without mounting holes								120.00

1) On request

Other lengths available on request

Total Pitch Error: $GT_f/1000 \leq 0.034$ mm
$GT_f/1500 \leq 0.041$ mm (≙ 0.027 mm / 1000)
$GT_f/2000 \leq 0.044$ mm (≙ 0.022 mm / 1000)

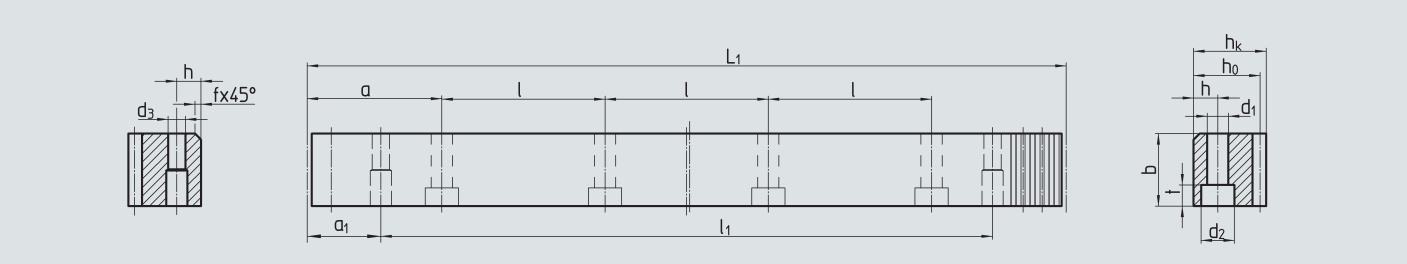
- Teeth hardened with the ATLANTA High-Performance hardening process and ground
- Heat-treatable steel according to ATLANTA-Standard
- Ground on all sides after hardening

For information on mounting racks, see page C-92.

To achieve precision rack joints, we recommend our patented rack assembly kit, see page C-96. For lubrication of racks & pinions, we recommend our electronic lubrication systems, see Chapter D. For the calculation and selection of the rack & pinion drive, see pages C-44 to C-55.

For screws for rack mounting, see page C- 95.

ATLANTA Quality 7



Order Code	Module	L_1	N° of Teeth z	$b^{+0.4}$	h_k	h_0	f	a	l	N° of Holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
28 20 107	2	1005.30	160	24	24	22	2	62.8	125.66	8	8	7	11	7	31.4	942.7	5.7	4.20
28 20 207	2	2010.60	320	24	24	22	2	62.8	125.66	16	8	7	11	7	31.4	1948.0	5.7	8.40
28 30 107	3	1017.90	108	29	29	26	2	63.6	127.23	8	9	10	15	9	34.4	949.1	7.7	6.00
28 30 207	3	2035.70	216	29	29	26	2	63.6	127.23	16	9	10	15	9	34.4	1967.0	7.7	12.00
28 40 107	4	1005.30	80	39	39	35	2	62.8	125.66	8	12	14	20	13	37.5	930.3	11.7	10.50
28 40 207	4	2010.60	160	39	39	35	2	62.8	125.66	16	12	14	20	13	37.5	1935.6	11.7	21.00
28 50 107	5	1005.30	64	49	39	34	2.5	62.8	125.66	8	12	14	20	13	30.1	945.0	11.7	13.40
28 50 207	5	2010.60	128	49	39	34	2.5	62.8	125.66	16	12	14	20	13	30.1	1950.4	11.7	26.80

Other lengths and without mounting holes available on request

Total Pitch Error: **$GT_f/1000 \leq 0.052$ mm**
$GT_f/2000 \leq 0.068$ mm ($\triangleq$ 0.034 mm / 1000)

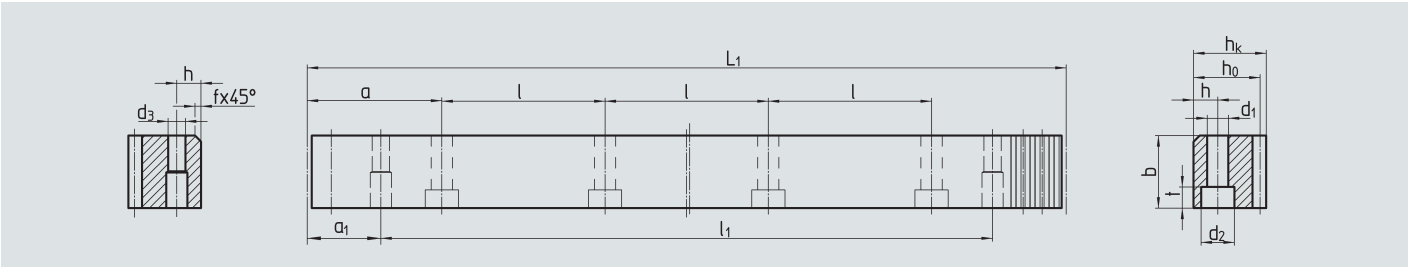
- Teeth hardened with the ATLANTA High-Performance hardening process and ground
- Heat-treatable steel according to ATLANTA-Standard
- Ground on all sides after hardening

For information on mounting racks, see page C-92.

To achieve precision rack joints, we recommend our patented rack assembly kit, see page C-96. For lubrication of racks & pinions, we recommend our electronic lubrication systems, see Chapter D. For the calculation and selection of the rack & pinion drive, see pages C-44 to C-55.

For screws for rack mounting, see page C- 95.

ATLANTA Quality 8



Order Code	Module	L_1	N° of Teeth z	$b^{+0.4}$	h_k	h_0	f	a	l	N° of Holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
28 20 108	2	1005.30	160	24	24	22	2	62.8	125.66	8	8	7	11	7	31.3	942.7	5.7	4.20
28 20 208	2	2010.62	320	24	24	22	2	62.8	125.66	16	8	7	11	7	31.3	1948.0	5.7	8.40
28 30 108	3	1017.90	108	29	29	26	2	63.6	127.23	8	9	10	15	9	34.4	949.1	7.7	6.00
28 30 208	3	2035.75	216	29	29	26	2	63.6	127.23	16	9	10	15	9	34.4	1967.0	7.7	12.00
28 40 108	4	1005.30	80	39	39	35	2	62.8	125.66	8	12	14	20	13	37.5	930.3	11.7	10.50
28 40 208	4	2010.62	160	39	39	35	2	62.8	125.66	16	12	14	20	13	37.5	1935.6	11.7	21.00
28 50 108	5	1005.30	64	49	39	34	2.5	62.8	125.66	8	12	14	20	13	30.2	945.0	11.7	13.40
28 50 208	5	2010.62	128	49	39	34	2.5	62.8	125.66	16	12	14	20	13	30.2	1950.4	11.7	26.80

Other lengths and without mounting holes available on request

Total Pitch Error: $GT_f/1000 \leq 0.060$ mm
$GT_f/2000 \leq 0.078$ mm (≙ 0.039 mm / 1000)

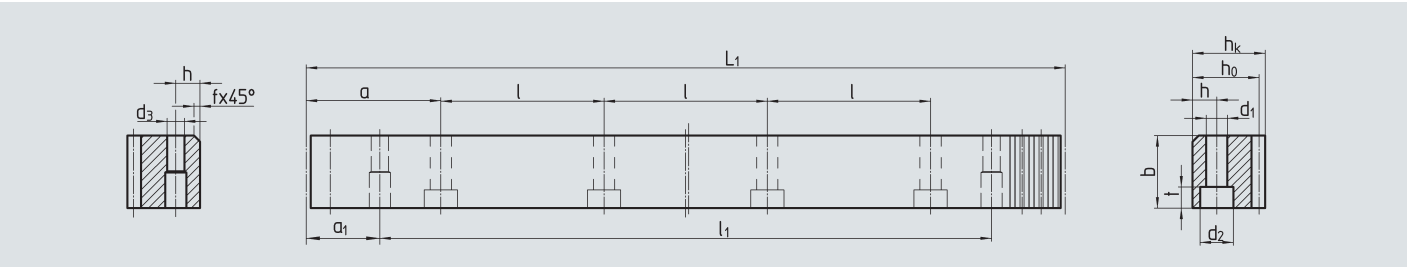
- Teeth hardened with the ATLANTA High-Performance hardening process and ground
- Heat-treatable steel according to ATLANTA-Standard
- Ground on all sides after hardening

For information on mounting racks, see page C-92.

To achieve precision rack joints, we recommend our patented rack assembly kit, see page C-96. For lubrication of racks & pinions, we recommend our electronic lubrication systems, see Chapter D. For the calculation and selection of the rack & pinion drive, see pages C-44 to C-55.

For screws for rack mounting, see page C- 95.

ATLANTA Quality 8



Order Code	Module	L_1	N° of Teeth z	$b^{+0.4}$	h_k	h_0	f	a	l	N° of Holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
33 21 050 [2]	2	502.65	80	25	24	22	2	62.83	125.66	4	8	7	11	7	31.3	440.1	5.7	2.20
33 21 100	2	1005.31	160	25	24	22	2	62.83	125.66	8	8	7	11	7	31.3	942.7	5.7	4.30
33 20 100	2	1005.31	160	25	24	22	2	without mounting holes										4.30
33 21 200	2	2010.62	320	25	24	22	2	62.83	125.66	16	8	7	11	7	31.3	1948.0	5.7	8.60
33 20 200	2	2010.62	320	25	24	22	2	without mounting holes										8.60
33 31 050 [2]	3	508.94	54	30	29	26	2	63.62	127.23	4	9	10	15	9	34.4	440.1	7.7	3.10
33 31 100	3	1017.88	108	30	29	26	2	63.62	127.23	8	9	10	15	9	34.4	949.1	7.7	6.20
33 30 100	3	1017.88	108	30	29	26	2	without mounting holes										6.20
33 31 200	3	2035.75	216	30	29	26	2	63.62	127.23	16	9	10	15	9	34.4	1967.0	7.7	12.40
33 30 200	3	2035.75	216	30	29	26	2	without mounting holes										12.40
33 41 100	4	1005.31	80	40	39	35	2	62.83	125.66	8	12	10	15	9	37.5	930.3	7.7	11.00
33 40 100	4	1005.31	80	40	39	35	2	without mounting holes										11.00
33 41 200	4	2010.62	160	40	39	35	2	62.83	125.66	16	12	10	15	9	37.5	1935.6	7.7	22.00
33 40 200	4	2010.62	160	40	39	35	2	without mounting holes										22.00

2) Due to the screw connection, the feed force is max. 50 % of the value for racks with L_1 = 1,000 mm

Total Pitch Error: GT_f / 500 ≤ 0.050 mm
GT_f /1000 ≤ 0.100 mm
GT_f /2000 ≤ 0.200 mm

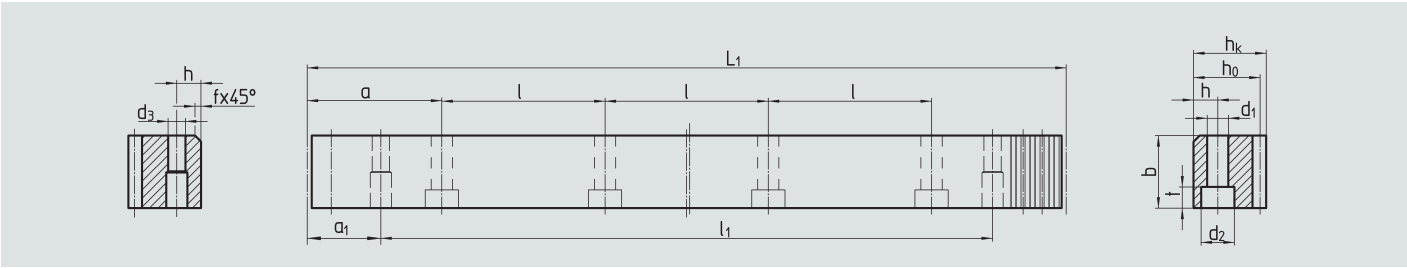
- Teeth quenched & tempered, milled
- Heat-treatable steel according to ATLANTA-Standard
- Bright steel, backside machined

For information on mounting racks, see page C-92.

To achieve precision rack joints, we recommend our patented rack assembly kit, see page C-96. For lubrication of racks & pinions, we recommend our electronic lubrication systems, see Chapter D. For the calculation and selection of the rack & pinion drive, see pages C-44 to C-55.

For screws for rack mounting, see page C- 95.

ATLANTA Quality 10



Order Code	Module	L_1	N° of Teeth z	$b^{+0.4}$	h_k	h_0	f	a	l	N° of Holes	h	d_1	d_2	t	a_1	l_1	d_3	kg
34 93 100	1	999.06	318	15	15	14	2			without mounting holes								1.64
34 16 100	1.5	999.03	212	17	17	15.5	2			without mounting holes								2.06
34 16 200	1.5	1998.05	424	17	17	15.5	2			without mounting holes								4.12
34 20 050 [2]	2	502.65	80	25	24	22	2	62.83	125.66	4	8	7	11	7	31.3	440.1	5.7	2.10
34 21 050	2	502.65	80	25	24	22	2			without mounting holes								2.10
34 20 100	2	1005.31	160	25	24	22	2	62.83	125.66	8	8	7	11	7	31.3	942.7	5.7	4.20
34 21 100	2	1005.31	160	25	24	22	2			without mounting holes								4.20
34 20 200	2	2010.62	320	25	24	22	2	62.83	125.66	16	8	7	11	7	31.3	1948.0	5.7	8.40
34 21 200	2	2010.62	320	25	24	22	2			without mounting holes								8.40
34 30 050	3	508.94	54	30	29	26	2	63.62	127.23	4	9	10	15	9	34.4	440.1	7.7	3.00
34 31 050	3	508.94	54	30	29	26	2			without mounting holes								3.00
34 30 100	3	1017.88	108	30	29	26	2	63.62	127.23	8	9	10	15	9	34.4	949.1	7.7	6.00
34 31 100	3	1017.88	108	30	29	26	2			without mounting holes								6.00
34 30 200	3	2035.75	216	30	29	26	2	63.62	127.23	16	9	10	15	9	34.4	1967	7.7	12.00
34 31 200	3	2035.75	216	30	29	26	2			without mounting holes								12.00
34 40 050 [2]	4	502.65	40	40	39	35	2	62.83	125.66	4	12	10	15	9	37.5	427.7	7.7	5.30
34 40 100	4	1005.31	80	40	39	35	2	62.83	125.66	8	12	10	15	9	37.5	930.3	7.7	10.20
34 41 100	4	1005.31	80	40	39	35	2			without mounting holes								10.20
34 42 100	4	1005.31	80	40	39	35	2	62.83	125.66	8	12	14	20	13	37.5	930.3	11.7	10.20
34 42 150	4	1507.96	120	40	39	35	2	62.83	125.66	12	12	14	20	13	37.5	1432.9	11.7	15.80
34 40 200	4	2010.62	160	40	39	35	2	62.83	125.66	16	12	10	15	9	37.5	1935.6	7.7	20.50
34 41 200	4	2010.62	160	40	39	35	2			without mounting holes								20.50
34 42 200	4	2010.62	160	40	39	35	2	62.83	125.66	16	12	14	20	13	37.5	1935.6	11.7	20.50
34 50 100	5	1005.31	64	50	39	34	2.5	62.83	125.66	8	12	14	20	13	30.2	945.0	11.7	13.80
34 51 100	5	1005.31	64	50	39	34	2.5			without mounting holes								13.80
34 50 200	5	2010.62	128	50	39	34	2.5	62.83	125.66	16	12	14	20	13	30.2	1950.3	11.7	27.50
34 51 200	5	2010.62	128	50	39	34	2.5			without mounting holes								27.50
34 60 100	6	1017.88	54	60	49	43	2.5	63.62	127.23	8	16	18	26	17	31.4	955.0	15.7	21.00
34 61 100	6	1017.88	54	60	49	43	2.5			without mounting holes								21.00
34 60 200	6	2035.75	108	60	49	43	2.5	63.62	127.23	16	16	18	26	17	31.4	1972.9	15.7	42.00
34 61 200	6	2035.75	108	60	49	43	2.5			without mounting holes								42.00
34 81 100	8	1005.31	40	80	79	71	2.5			without mounting holes								44.63
34 81 200	8	2010.61	80	80	79	71	2.5			without mounting holes								82.26
34 11 100	10	1005.30	32	100	99	89	2.5			without mounting holes								70.60
34 13 100	12	1017.88	27	120	120	108	2.5			without mounting holes								110.00

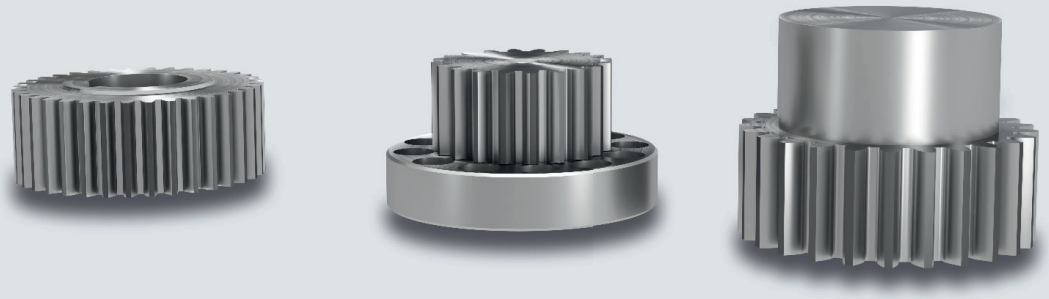
2) Due to the screw connection, the feed force is max. 50 % of the value for racks with L_1 = 1,000 mm

Total Pitch Error: GT_f/ 500 ≤ 0.100 mm
GT_f/1000 ≤ 0.200 mm
GT_f/1500 ≤ 0.300 mm
GT_f/2000 ≤ 0.400 mm

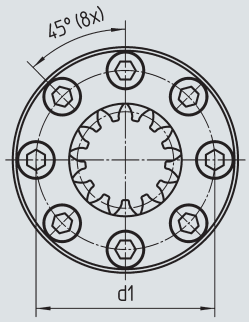
- Teeth hardened with the ATLANTA high preformance hardening process
- Heat-treatable steel according to ATLANTA-Standard
- Bright steel

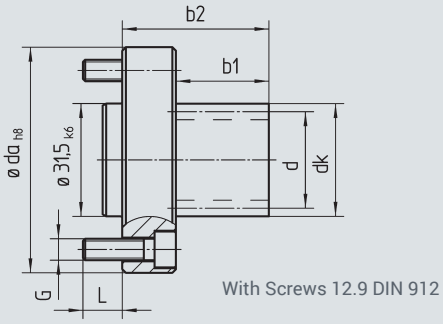
For further information, see previous page.

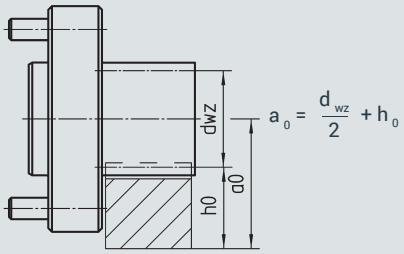
Series	Module	Tolerance of Teeth	Page
78 .. ... TR Flanged Pinions	2, 3, 4, 5, 6, 8	5 e 24	C-66 – C-68
24 .. ... Hardened & Ground Bored & Keyed Pinions	2, 3, 4, 5, 6, 8, 10	5 e 24	C-69 – C-74
24 .. ... Hardened & Ground Plain Bore Pinions For Rework	2, 3, 4, 5, 6, 8	6 e 25	C-75



Straight Pinion, A-50 flange



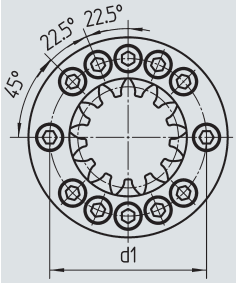


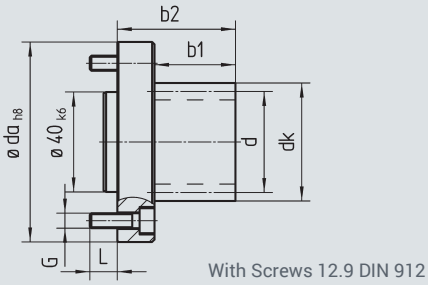


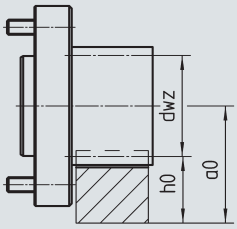
16MnCr5, 1.7131
Case-Hardened
Quality 5
Flange: Soft

Order Code	No. of Teeth z	Profile Modification Factor x	d	d_{wz}	dk	b1	b2	a0	ISO Interface	d1	G	da_{h8}	L	kg
Module 2														
78 21 813	13	0.366	27.59	27.47	31.5	26	41	35.73	9409-1-A-50	50	M6	63	11	0.5
78 21 817	17	-0.012	36.08	33.95	38.0	26	41	38.98	9409-1-A-50	50	M6	63	11	0.6

Straight Pinion, A-63 flange





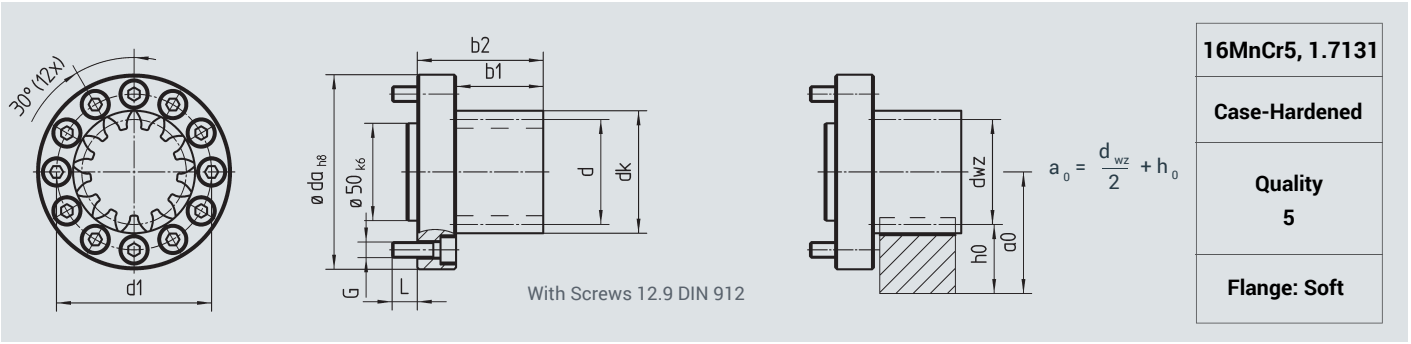


16MnCr5, 1.7131
Case-Hardened
Quality 5
Flange: Soft

Order Code	No. of Teeth z	Profile Modification Factor x	d	d_{wz}	dk	b1	b2	a0	ISO Interface	d1	G	da_{h8}	L	kg
Module 2														
78 22 817	17	-0.012	36.08	33.95	38.0	26	41	38.98	9409-1-A-63	63	M6	80	11	0.8
78 22 824	24	0.202	50.93	48.81	52.8	26	41	46.40	9409-1-A-63	63	M6	80	11	1.0
Module 3														
78 32 813	13	0.366	41.38	41.20	47.2	32.5	47.5	46.60	9409-1-A-63	63	M6	80	11	1.0

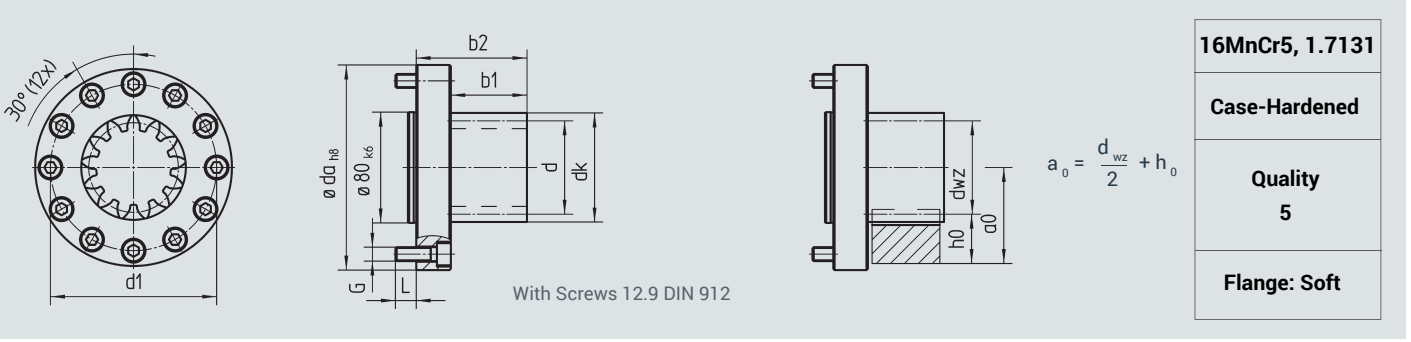
Note: The rack and pinion drive must be installed with backlash present, not pressed into engagement with no backlash! Please refer to the ATLANTA operating manual MPZ 001e.

Straight Pinion, A-80 flange



Order Code	No. of Teeth z	Profile Modification Factor x	d	d_{wz}	dk	b1	b2	a0	ISO Interface	d1	G	da_{h8}	L	kg
Module 2														
78 23 824	24	0.202	50.93	48.81	52.8	26	46	46.40	9409-1-A-80	80	M8	100	8	1.6
Module 3														
78 33 820	20	0.080	63.66	60.48	66.5	32.5	52.5	56.24	9409-1-A-80	80	M8	100	8	2.0
Module 4														
78 43 813	13	0.366	55.17	54.93	62.9	45	65	62.47	9409-1-A-80	80	M8	100	13	2.1

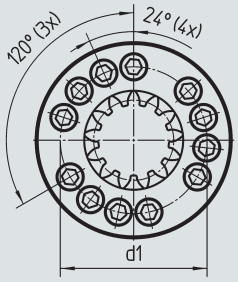
Straight Pinion, A-125 flange

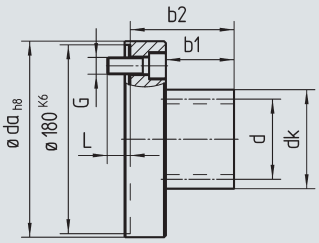


Order Code	No. of Teeth z	Profile Modification Factor x	d	d_{wz}	dk	b1	b2	a0	ISO Interface	d1	G	da_{h8}	L	kg
Module 3														
78 34 820	20	0.080	63.66	60.48	66.5	32.5	57.5	56.24	9409-1-A-125	125	M10	148	15	4.2
Module 4														
78 44 821	21	0.110	89.13	84.88	92.9	45	70	77.44	9409-1-A-125	125	M10	148	15	5.5
Module 5														
78 54 819	19	0.049	100.80	95.49	105.5	55	80	81.75	9409-1-A-125	125	M10	148	15	6.6
Module 6														
78 64 816	16	-0.042	101.86	95.49	107.5	65	90	90.75	9409-1-A-125	125	M10	148	15	6.8

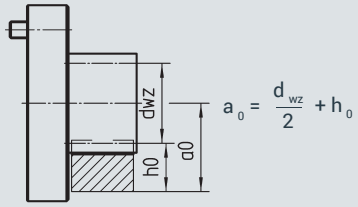
Note: The rack and pinion drive must be installed with backlash present, not pressed into engagement with no backlash! Please refer to the ATLANTA operating manual MPZ 001e.

Straight Pinion, A-140 flange





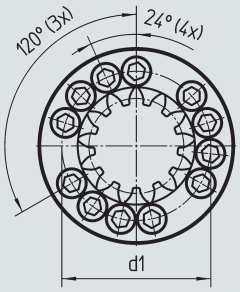
With Screws 12.9 DIN 912

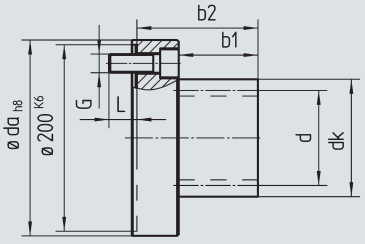


16MnCr5, 1.7131
Case-Hardened
Quality 5
Flange: Soft

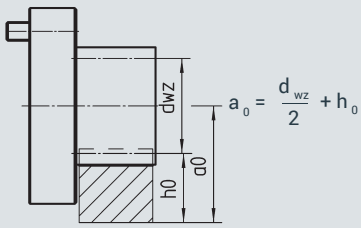
Order Code	No. of Teeth z	Profile Modification Factor x	d	d_{wz}	dk	b1	b2	a0	ISO Interface	d1	G	da_{h8}	L	kg
Module 5														
78 56 820	20	0.080	106.10	100.80	110.8	55	89	84.40	–	140	M16	187	22	10.6
Module 6														
78 66 817	17	-0.012	108.23	101.86	113.9	65	99	93.93	–	140	M16	187	22	10.9

Straight Pinion, A-160 flange





With Screws 12.9 DIN 912



16MnCr5, 1.7131
Case-Hardened
Quality 5
Flange: Soft

Order Code	No. of Teeth z	Profile Modification Factor x	d	d_{wz}	dk	b1	b2	a0	ISO Interface	d1	G	da_{h8}	L	kg
Module 8														
78 87 813	13	0.366	110.35	109.86	125.9	85	130	125.93	–	160	M20	210	30	17.8

Note: The rack and pinion drive must be installed with backlash present, not pressed into engagement with no backlash! Please refer to the ATLANTA operating manual MPZ 001e.

Straight Pinion, with bore ØH6 and keyway according to DIN 6885

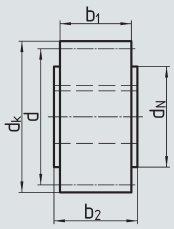


Fig. 1

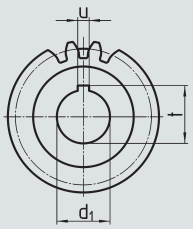


Fig. 1 + 3 Keyway middle of tooth gap

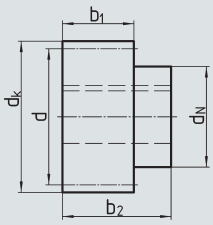


Fig. 3

16MnCr5, 1.7131
Case-Hardened
Quality 6 e 25

Order Code	Fig.	N° of Teeth z	d (=d_{wz})	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	Coupling on Page C-76
Module 2												
24 21 216	1	16	32	36	15	25	28	30.0	5	17.3	0.1	
24 21 218	1	18	36	40	15	28	28	30.0	5	17.3	0.2	
24 22 218	1	18	36	40	20	28	28	30.0	6	22.8	0.2	
24 21 220	1	20	40	44	15	25	28	30.0	5	17.3	0.2	
24 29 420	3	20	40	44	19*	30	28	56.0	6	21.8	0.2	80 83 030
24 29 220	1	20	40	44	19*	30	28	30.0	6	21.8	0.2	
24 22 220	1	20	40	44	20*	30	28	30.0	6	22.8	0.2	
24 20 120	3	20	40	44	22*	36	28	56.0	6	24.8	0.3	80 84 036
24 20 220	1	20	40	44	22*	30	28	30.0	6	24.8	0.2	
24 21 222	1	22	44	48	15	25	28	30.0	5	17.3	0.3	
24 29 222	1	22	44	48	19*	30	28	30.0	6	21.8	0.3	
24 29 422	3	22	44	48	19*	30	28	56.0	6	21.8	0.3	80 83 030
24 22 222	1	22	44	48	20	30	28	30.0	6	22.8	0.3	
24 20 222	1	22	44	48	22*	30	28	30.0	6	24.8	0.2	
24 20 122	3	22	44	48	22	36	28	56.0	6	27.8	0.2	80 84 036
24 23 222	1	22	44	48	25	36	28	30.0	8	28.3	0.2	
24 21 225	1	25	50	54	15	25	28	30.0	5	17.3	0.4	
24 26 225	3	25	50	54	16	30	28	54.0	5	18.3	0.3	80 83 030
24 29 225	1	25	50	54	19*	30	28	30.0	6	21.8	0.3	
24 29 425	3	25	50	54	19*	30	28	56.0	6	21.8	0.3	80 83 030
24 22 225	1	25	50	54	20	30	28	30.0	6	22.8	0.4	
24 20 225	1	25	50	54	22	30	28	30.0	6	24.8	0.3	
24 20 425	3	25	50	54	22*	36	28	56.0	6	24.8	0.4	80 84 036
24 23 225	1	25	50	54	25	36	28	30.0	8	28.3	0.3	
24 24 225	1	25	50	54	30	45	28	30.0	8	33.3	0.3	
24 21 228	1	28	56	60	15	25	28	30.0	5	17.3	0.5	
24 29 228	1	28	56	60	19*	30	28	30.0	6	21.8	0.5	
24 29 428	3	28	56	60	19*	30	28	56.0	6	21.8	0.5	80 83 030
24 22 228	1	28	56	60	20	30	28	30.0	6	22.8	0.5	
24 20 128	3	28	56	60	22*	36	28	56.0	6	24.8	0.3	80 84 036
24 20 228	1	28	56	60	22*	30	28	30.0	6	24.8	0.3	
24 23 228	1	28	56	60	25	36	28	30.0	8	28.3	0.4	
24 22 428	3	28	56	60	30	50	28	60.0	8	33.3	0.4	80 85 050
24 24 228	1	28	56	60	30	45	28	30.0	8	33.3	0.4	
24 25 228	1	28	56	60	35	48	28	30.0	10	38.3	0.3	
24 21 232	1	32	64	68	15	36	28	30.0	5	17.3	0.6	
24 26 232	3	32	64	68	16	30	28	54.0	5	18.3	0.6	80 83 030
24 22 232	1	32	64	68	20	30	28	30.0	6	22.8	0.6	
24 20 232	1	32	64	68	22*	30	28	30.0	6	24.8	0.4	
24 20 432	3	32	64	68	22	36	28	56.0	6	24.8	0.6	80 84 036
24 23 232	1	32	64	68	25	36	28	30.0	8	28.3	0.6	
24 22 432	3	32	64	68	30	50	28	60.0	8	33.3	0.6	80 85 050
24 24 232	1	32	64	68	30	45	28	30.0	8	33.3	0.6	
24 23 432	3	32	64	68	32	55	28	65.0	10	35.3	0.5	80 80 055
24 25 232	1	32	64	68	35	48	28	30.0	10	38.3	0.5	
24 22 236	1	36	72	76	20	30	28	30.0	6	22.8	0.8	
24 23 236	1	36	72	76	25	36	28	30.0	8	28.3	0.8	
24 24 236	1	36	72	76	30	45	28	30.0	8	33.3	0.7	
24 25 236	1	36	72	76	35	48	28	30.0	10	38.3	0.7	
24 25 436	3	36	72	76	40	62	28	65.0	12	43.3	0.5	80 86 062
24 27 236	1	36	72	76	45	58	28	30.0	14	48.8	0.6	

* Bore G6 or H7

Straight Pinion, with bore ØH6 and keyway according to DIN 6885

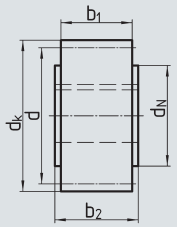


Fig. 1

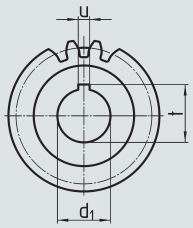


Fig. 1 + 3 Keyway middle of tooth gap

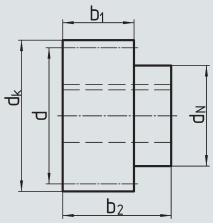


Fig. 3

16MnCr5, 1.7131
Case-Hardened
Quality 6 e 25

Order Code	Fig.	N° of Teeth z	d (=d_{wz})	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	Coupling on Page C-76
Module 2												
24 21 240	1	40	80	84	15	36	28	30.0	5	17.3	1.0	
24 22 240	1	40	80	84	20	30	28	30.0	6	22.8	1.0	
24 23 240	1	40	80	84	25	36	28	30.0	8	28.3	1.0	
24 24 240	1	40	80	84	30	45	28	30.0	8	33.3	1.0	
24 23 440	3	40	80	84	32	55	28	65.0	10	35.3	0.9	80 80 055
24 25 240	1	40	80	84	35	48	28	30.0	10	38.3	0.9	
24 25 440	3	40	80	84	40	62	28	65.0	12	43.3	0.7	80 86 062
24 26 440	3	40	80	84	45	68	28	65.0	14	48.8	1.3	80 80 068
24 27 240	1	40	80	84	45	58	28	30.0	14	48.8	0.8	
24 22 245	1	45	90	94	20	30	28	30.0	6	22.8	1.3	
24 23 245	1	45	90	94	25	36	28	30.0	8	28.3	1.2	
24 25 245	1	45	90	94	35	48	28	30.0	10	38.3	1.2	
24 27 245	1	45	90	94	45	58	28	30.0	14	48.8	1.1	
24 22 250	1	50	100	104	20	30	28	30.0	6	22.8	1.6	
24 23 250	1	50	100	104	25	36	28	30.0	8	28.3	1.5	
24 25 250	1	50	100	104	35	48	28	30.0	10	38.3	1.5	
24 27 250	1	50	100	104	45	58	28	30.0	14	48.8	1.4	
24 26 450	3	50	100	104	45	68	28	65.0	14	48.8	2.0	80 80 068
24 23 256	1	56	112	116	25	36	28	30.0	8	28.3	1.9	
24 25 256	1	56	112	116	35	48	28	30.0	10	38.3	1.8	
24 23 263	1	63	126	130	25	36	28	30.0	8	28.3	2.5	
24 25 271	1	71	142	146	35	48	28	30.0	10	38.3	3.15	
24 25 280	1	80	160	164	35	48	28	30.0	10	38.3	4.2	
24 27 290	1	90	180	184	45	58	28	30.0	14	48.8	5.7	

Straight Pinion, with bore ØH6 and keyway according to DIN 6885

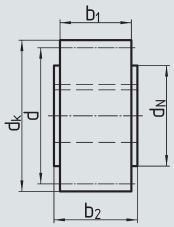


Fig. 1

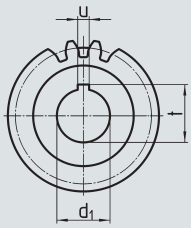


Fig. 1 + 3 Keyway middle of tooth gap

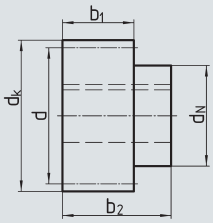


Fig. 3

16MnCr5, 1.7131
Case-Hardened
Quality 6 e 25

Order Code	Fig.	N° of Teeth z	d (=d_{wz})	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	Coupling on Page C-76
Module 3												
24 33 218	1	18	54	60	25	36	28	30.0	8	28.3	0.4	
24 33 220	1	20	60	66	25	36	28	30.0	8	28.3	0.5	
24 34 220	1	20	60	66	30	45	28	30.0	8	33.3	0.5	
24 35 220	1	20	60	66	35	48	28	30.0	10	38.3	0.4	
24 30 422	3	22	66	72	22	36	28	56.0	6	24.8	0.8	80 84 036
24 31 422	3	22	66	72	25	44	28	60.0	8	28.3	0.9	80 80 044
24 33 222	1	22	66	72	25	36	28	30.0	8	28.3	0.6	
24 32 422	3	22	66	72	30	50	28	60.0	8	33.3	0.9	80 85 050
24 34 222	1	22	66	72	30	45	28	30.0	8	33.3	0.6	
24 33 422	3	22	66	72	32	55	28	65.0	10	35.3	1.0	80 80 055
24 34 422	3	22	66	72	35	55	28	65.0	10	38.3	0.9	80 80 055
24 35 222	1	22	66	72	35	48	28	30.0	10	38.3	0.6	
24 35 422	3	22	66	72	40*	62	28	65	12	43.3	1.0	80 86 062
24 33 225	1	25	75	81	25	36	28	30.0	8	28.3	0.9	
24 34 225	1	25	75	81	30	45	28	30.0	8	33.3	0.8	
24 33 425	3	25	75	81	32*	55	28	65	10	35.3	1.2	80 80 055
24 35 225	1	25	75	81	35	48	28	30.0	10	38.3	0.8	
24 35 425	3	25	75	81	40	62	28	65.0	12	43.3	1.2	80 86 062
24 37 225	1	25	75	81	45	58	28	30.0	14	48.8	0.6	
24 30 428	3	28	84	90	22	36	28	56.0	6	24.8	1.3	80 84 036
24 31 428	3	28	84	90	25	44	28	60.0	8	28.3	1.4	80 80 044
24 33 228	1	28	84	90	25	36	28	30.0	8	28.3	1.1	
24 32 428	3	28	84	90	30	50	28	60.0	8	33.3	1.4	80 85 050
24 34 228	1	28	84	90	30	45	28	30.0	8	33.3	1.1	
24 33 428	3	28	84	90	32	55	28	65.0	10	35.3	1.5	80 80 055
24 34 428	3	28	84	90	35	55	28	65.0	10	38.3	1.4	80 80 055
24 35 228	1	28	84	90	35	48	28	30.0	10	38.3	1.0	
24 35 428	3	28	84	90	40*	62	28	65	12	43.3	1.4	80 86 062
24 36 428	3	28	84	90	45	68	28	65.0	14	48.8	1.5	80 80 068
24 37 228	1	28	84	90	45	58	28	30.0	14	48.8	0.9	
24 33 232	1	32	96	102	25	36	28	30.0	8	28.3	1.5	
24 34 232	1	32	96	102	30	45	28	30.0	8	33.3	1.4	
24 33 432	3	32	96	102	32*	55	28	65	10	35.3	1.8	80 80 055
24 35 232	1	32	96	102	35	48	28	30.0	10	38.3	1.4	
24 35 432	3	32	96	102	40	62	28	65.0	12	43.3	1.8	80 86 062
24 37 232	1	32	96	102	45	58	28	30.0	14	48.8	1.3	
24 39 232	1	32	96	102	60	80	28	30.0	18	64.4	1.1	
24 33 236	1	36	108	114	25	36	28	30.0	8	28.3	1.9	
24 35 236	1	36	108	114	35	48	28	30.0	10	38.3	1.8	
24 36 436	3	36	108	114	45	68	28	65.0	14	48.8	2.2	80 80 068
24 37 236	1	36	108	114	45	58	28	30.0	14	48.8	1.7	
24 39 236	1	36	108	114	60	80	28	30.0	18	64.4	1.4	
24 33 240	1	40	120	126	25	36	28	30	8	28.3	2.3	
24 35 240	1	40	120	126	35	48	28	30.0	10	38.3	2.3	
24 37 240	1	40	120	126	45	58	28	30.0	14	48.8	2.1	
24 39 240	1	40	120	126	60	80	28	30.0	18	64.4	1.9	
24 33 245	1	45	135	141	25	36	28	30.0	8	28.3	3.0	
24 35 245	1	45	135	141	35	48	28	30.0	10	38.3	2.7	
24 37 245	1	45	135	141	45	58	28	30.0	14	48.8	2.4	

* Bore G6

Straight Pinion, with bore ØH6 and keyway according to DIN 6885

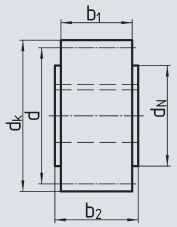


Fig. 1

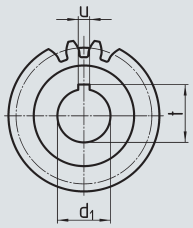


Fig. 1 + 3 Keyway middle of tooth gap

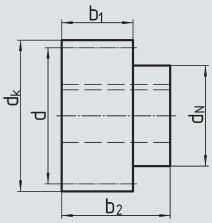


Fig. 3

16MnCr5, 1.7131
Case-Hardened
Quality 6 e 25

Order Code	Fig.	N° of Teeth z	d (=d_{wz})	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg
Module 3											
24 39 245	1	45	135	141	60	80	28	30.0	18	64.4	2.4
24 35 250	1	50	150	156	35	48	28	30.0	10	38.3	3.6
24 37 250	1	50	150	156	45	58	28	30	14	48.8	3.5
24 37 256	1	56	168	174	45	58	28	30.0	14	48.8	4.4
24 37 263	1	63	189	195	45	58	28	30.0	14	48.8	5.4
24 39 263	1	63	189	195	60	80	28	30.0	18	64.4	5.4

Straight Pinion, with bore ØH6 and keyway according to DIN 6885

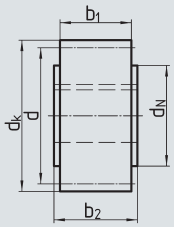


Fig. 1

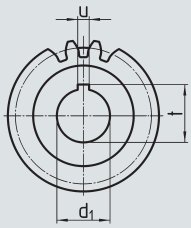


Fig. 1 + 3 Keyway middle of tooth gap

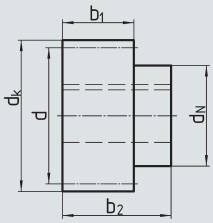


Fig. 3

16MnCr5, 1.7131
Case-Hardened
Quality 6 e 25

Order Code	Fig.	N° of Teeth z	d (=d_{wz})	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	Coupling on Page C-76
Module 4												
24 43 420	3	20	80	88	32	55	40	75.0	10	35.3	1.7	80 80 055
24 45 220	1	20	80	88	35	52	40	50.0	10	38.3	1.3	
24 44 420	3	20	80	88	35	55	40	75.0	10	38.3	1.7	80 80 055
24 45 420	3	20	80	88	40	62	40	75.0	12	43.3	1.7	80 86 062
24 47 220	1	20	80	88	45	65	40	50.0	14	48.8	1.2	
24 45 222	1	22	88	96	35	52	40	50.0	10	38.3	1.7	
24 47 222	1	22	88	96	45	65	40	50.0	14	48.8	1.5	
24 46 422	3	22	88	96	45	68	40	75.0	14	48.8	2.0	80 80 068
24 43 425	3	25	100	108	32	55	40	75.0	10	35.3	2.6	80 80 055
24 45 225	1	25	100	108	35	52	40	50.0	10	38.3	2.2	
24 44 425	3	25	100	108	35	55	40	75.0	10	38.3	2.5	80 80 055
24 45 425	3	25	100	108	40	62	40	75.0	12	43.3	2.5	80 86 062
24 47 225	1	25	100	108	45	65	40	50.0	14	48.8	2.0	
24 47 425	3	25	100	108	55	80	40	80.0	16	59.3	2.5	80 87 080
24 45 228	1	28	112	120	35	52	40	50.0	10	38.3	2.9	
24 47 228	1	28	112	120	45	65	40	50.0	14	48.8	2.7	
24 46 428	3	28	112	120	45	68	40	75.0	14	48.8	3.1	80 80 068
24 45 232	1	32	128	136	35	52	40	50.0	10	38.3	3.8	
24 47 232	1	32	128	136	45	65	40	50.0	14	48.8	3.7	
24 47 432	3	32	128	136	55	80	40	80.0	16	59.3	4.1	80 87 080
24 48 432	3	32	128	136	75	110	40	100.0	20	79.9	5.0	80 80 110
24 47 240	1	40	160	168	45	65	40	50.0	14	48.8	5.9	
24 49 240	1	40	160	168	60	80	40	50.0	18	64.4	5.6	
24 48 440	3	40	160	168	75	110	40	100.0	20	79.9	7.3	80 80 110

Straight Pinion, with bore ØH6 and keyway according to DIN 6885

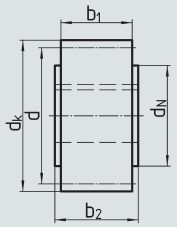


Fig. 1

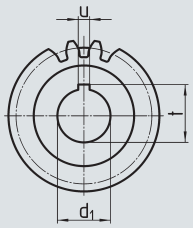


Fig. 1 + 3 Keyway middle of tooth gap

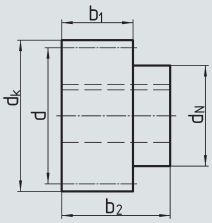
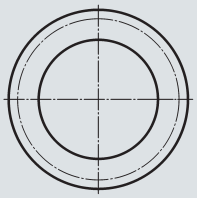


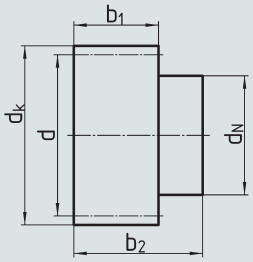
Fig. 3

16MnCr5, 1.7131
Case-Hardened
Quality 6 e 25

Order Code	Fig.	N° of Teeth z	d (=d_{wz})	d_k	d_1^{H6}	d_N	b_1	b_2	u	t	kg	Coupling on Page C-76
Module 5												
24 56 421		21	105	115	45	68	50	85.0	14	48.8	3.7	80 80 068
24 57 421		21	105	115	55	80	50	90.0	16	59.3	3.7	80 87 080
24 56 425		25	125	135	45	68	50	85.0	14	48.8	5.2	80 80 068
24 57 425		25	125	135	55	80	50	90.0	16	59.3	5.1	80 87 080
24 58 425		25	125	135	75	110	50	110.0	20	80.4	4.7	80 80 110
Module 6												
24 67 421		21	126	138	55	80	60	100.0	16	59.3	5.6	80 87 080
24 68 421		21	126	138	75	110	60	120.0	20	79.9	4.7	80 80 110
24 67 425		25	150	162	55	80	60	100.0	16	59.3	8.0	80 87 080
24 68 425		25	150	162	75	110	60	120.0	20	79.9	7.1	80 80 110
Module 8												
24 88 420		20	160	176	75	110	80	140	20	79.9	12.0	80 80 110
24 89 420		20	160	176	85	125	80	145	22	90.4	12.1	80 80 125
Module 10												
24 09 620		20	200	220	85	125	100	165	22	90.4	23	80 80 125

Straight-Tooth Pinion, with plain bore





16MnCr5, 1.7131
Carburized, Induction-Hardened
Quality 6 e 25

Order Code	Module	N° of Teeth z	d (=d_{wz})	d_k	d_N	b_1	b_2	kg	Coupling on page C-76
24 98 218	2	18	36	40	30	28	56	0.3	80 83 030
24 98 220	2	20	40	44	30	28	56	0.4	80 83 030
24 98 222	2	22	44	48	36	28	56	0.5	80 84 036
24 98 225	2	25	50	54	44	28	60	0.7	80 80 044
24 98 228	2	28	56	60	50	28	60	0.9	80 85 050
24 98 230	2	30	60	64	50	28	60	1.0	80 85 050
24 98 232	2	32	64	68	55	28	65	1.3	80 80 055
24 98 236	2	36	72	76	62	28	65	1.6	80 86 062
24 98 240	2	40	80	84	68	28	65	2.0	80 80 068
24 98 318	3	18	54	60	44	28	60	0.8	80 80 044
24 98 320	3	20	60	66	50	28	60	1.0	80 85 050
24 98 322	3	22	66	72	55	28	65	1.3	80 80 055
24 98 325	3	25	75	81	62	28	65	1.7	80 86 062
24 98 328	3	28	84	90	68	28	65	2.1	80 80 068
24 98 330	3	30	90	96	68	28	65	2.2	80 80 068
24 98 332	3	32	96	102	68	28	65	2.4	80 80 068
24 98 336	3	36	108	114	68	28	65	2.8	80 80 068
24 98 340	3	40	120	126	68	28	65	3.3	80 80 068
24 98 418	4	18	72	80	55	40	77	1.7	80 80 055
24 98 420	4	20	80	88	62	40	77	2.2	80 86 062
24 98 422	4	22	88	96	68	40	77	2.7	80 80 068
24 98 425	4	25	100	108	80	40	80	3.7	80 87 080
24 98 428	4	28	112	120	80	40	80	4.4	80 87 080
24 98 430	4	30	120	128	80	40	80	4.6	80 87 080
24 98 432	4	32	128	136	110	40	100	7.9	80 80 110
24 98 436	4	36	144	152	110	40	100	8.9	80 80 110
24 98 440	4	40	160	168	110	40	100	9.9	80 80 110
24 98 521	5	21	105	115	80	50	90	4.9	80 87 080
24 98 522	5	22	110	120	80	50	90	5.0	80 87 080
24 98 525	5	25	125	135	110	50	110	9.0	80 80 110
24 98 528	5	28	140	150	110	50	110	10.2	80 80 110
24 98 530	5	30	150	160	110	50	110	10.9	80 80 110
24 98 621	6	21	126	138	110	60	120	5.9	80 80 110
24 98 625	6	25	150	162	110	60	120	8.9	80 80 110
24 98 820 [1]	8	20	160	176	125	80	145	18.5	80 80 125

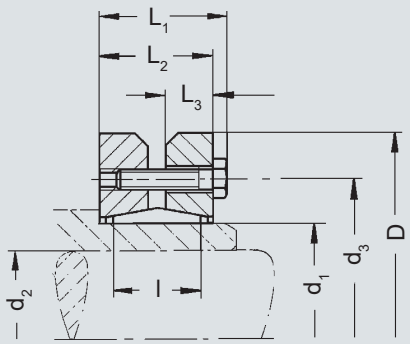
[1] With bore Ø 40^{H7}

The pinion could be fixed at d_k or d_N to be reworked.

Maximum bore diameter of the pinion on request.

Compression Couplings, for servo-worm gearbox output shafts and hardened & ground pinions

Supplied as complete set



$$J_{red} = \frac{J}{i^2}$$

Order Code	$T_{2\,max}$ Nm	d_2	d_1	d_3	D	L_1	L_2	L_3	l	G	$J_{red}10^{-4}$ kg m²	kg
80 81 024	270	20	24	36	50.2	23.0	19.5	7.60	14.0	5 x M5	0.780	0.2
80 83 030	400	25	30	44	60.2	25.0	21.5	9.00	18.0	7 x M5	1.756	0.3
	200	19										
	130	16										
80 84 036	540	28	36	52	72.2	27.5	23.5	10.00	22.5	5 x M6	4.029	0.4
	270	22										
80 80 044	870	33	44	61	80.2	29.5	25.5	11.00	22.0	7 x M6	6.524	0.6
	810	32										
	490	25										
80 85 050	1350	38	50	72	90.2	31.5	27.5	12.00	22.0	9 x M6	11.322	0.8
	1180	36										
	870	32										
	730	30										
80 80 055	1480	44	55	75	100.2	34.5	30.5	13.00	23.0	8 x M6	18.729	1.1
	810	35										
	630	32										
80 86 062	2300	48	62	89	110.2	34.5	30.5	13.00	22.0	12 x M6	27.137	1.3
	1420	40										
80 80 068	1940	50	68	86	115.2	34.5	30.5	13.00	22.0	10 x M6	31.648	1.4
	1490	45										
80 87 080	3240	60	80	100	145.3	38.0	32.5	14.00	22.0	7 x M8	88.870	1.9
	2580	55										
80 80 110	7710	75	110	145	185.2	57.0	50.0	22.00	39.0	10 x M10	351.503	5.9
80 80 125	11080	85	125	160	215.3	61.0	54.6	23.00	42.0	12 x M10	664.000	8.3

Description

The 24-series hardened & ground pinions (pages C-39 to C-41 and pages C-69 to C-74) can be fitted on shafts (tolerance h7) either with key or with compression couplings.

Mounting

Slide compression coupling onto pinion hub (do not tighten the screws before). Push the pinion onto the shaft up to a shoulder or the desired position. Begin uniformly tightening the coupling screws, one after the other in several passes (do not tighten crosswise!) to the correct torque specified in the operation and maintenance instructions. Check the torque with an indicating torque wrench.

Maximum Permissible Feed Forces [1] in kN

These ratings are maximum values under perfect conditions, with proper mounting & alignment of the rack & pinion, using only ATLANTA materials with adequate grease lubrication (i.e. the using our electronic lubrication systems in Chapter D or manual lubrication at least once a day).

The ratings are based on a speed of v = 1.5 m/s, with safety coefficient Sb = 1.0, lifetime factor fn = 1.0 and linear load distribution factor KHb = 1.0.

Calculation of the maximum forces of an application design is always necessary, please see pages C-53 to C-55.

1) For keyway transmission, please make a separate calculation, for torques with compression couplings, please see page C-76

When using the maximum capacity of the teeth, or multiple pinions in contact, the mounting screw holding forces must be checked separately!

Rack Type		UHPR	HPR			PR		BR
ATLANTA Quality		5	6		7	8		10
Rack	Material	Heat-Treatable Steel [2]	Case-Hardened [2]	ATLANTA Standard Heat-Treatable Steel				
	Heat Treatment	Case-Hardened	High-Performance Hardening Process				Quenched & Tempered	High Perf. Hardening
Pinion	Material	16MnCr5						
	Heat Treatment	Case-Hardened						
No. of Pinion Teeth[1]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels)						
	24 mm	3.5 kN	3.5 kN	3.5 kN	3.5 kN	3.5 kN	1.5 kN	2.5 kN
13	26 mm	4.5 kN	4.5 kN	4.5 kN	4.5 kN	4.0 kN	1.5 kN	3.0 kN
14	28 mm	5.5 kN	5.5 kN	5.5 kN	5.5 kN	5.0 kN	2.0 kN	3.5 kN
15	30 mm	6.5 kN	6.5 kN	6.0 kN	6.0 kN	6.0 kN	2.0 kN	4.0 kN
16	32 mm	7.0 kN	7.0 kN	7.0 kN	7.0 kN	6.5 kN	2.5 kN	4.5 kN
17	34 mm	8.0 kN	8.0 kN	7.5 kN	7.5 kN	7.0 kN	2.5 kN	4.5 kN
18	36 mm	9.0 kN	9.0 kN	8.0 kN	8.0 kN	7.5 kN	3.0 kN	5.0 kN
19	38 mm	10.0 kN	10.0 kN	8.5 kN	8.5 kN	8.0 kN	3.0 kN	5.0 kN
20	40 mm	10.5 kN	10.5 kN	9.0 kN	9.0 kN	8.5 kN	3.5 kN	5.5 kN
21	42 mm	11.5 kN	11.5 kN	9.5 kN	9.5 kN	9.0 kN	3.5 kN	5.5 kN
22	44 mm	12.0 kN	12.0 kN	10.0 kN	10.0 kN	9.5 kN	3.5 kN	6.0 kN
23	46 mm	13.0 kN	13.0 kN	10.5 kN	10.5 kN	10.0 kN	4.0 kN	6.0 kN
24	48 mm	13.5 kN	13.5 kN	11.0 kN	11.0 kN	10.5 kN	4.0 kN	6.5 kN
25	50 mm	14.5 kN	14.5 kN	11.5 kN	11.5 kN	11.0 kN	4.0 kN	6.5 kN
26	52 mm	15.0 kN	15.0 kN	12.0 kN	12.0 kN	11.0 kN	4.5 kN	7.0 kN
27	54 mm	16.0 kN	15.0 kN	12.0 kN	12.0 kN	11.5 kN	4.5 kN	7.0 kN
28	56 mm	16.5 kN	15.0 kN	12.0 kN	12.0 kN	11.5 kN	5.0 kN	7.0 kN
29	58 mm	16.5 kN	15.0 kN	12.5 kN	12.5 kN	11.5 kN	5.0 kN	7.0 kN
30	60 mm	16.5 kN	15.0 kN	12.5 kN	12.5 kN	11.5 kN	5.0 kN	7.0 kN
31	62 mm	16.5 kN	15.0 kN	12.5 kN	12.5 kN	11.5 kN	5.5 kN	7.0 kN
32	64 mm	16.5 kN	15.5 kN	12.5 kN	12.5 kN	11.5 kN	5.5 kN	7.0 kN
33	66 mm	16.5 kN	15.5 kN	12.5 kN	12.5 kN	11.5 kN	5.5 kN	7.0 kN
34	68 mm	16.5 kN	15.5 kN	12.5 kN	12.5 kN	12.0 kN	6.0 kN	7.0 kN
35	70 mm	16.5 kN	15.5 kN	12.5 kN	12.5 kN	12.0 kN	6.0 kN	7.0 kN
36	72 mm	17.0 kN	15.5 kN	12.5 kN	12.5 kN	12.0 kN	6.5 kN	7.0 kN
37	74 mm	17.0 kN	15.5 kN	12.5 kN	12.5 kN	12.0 kN	6.5 kN	7.0 kN
38	76 mm	17.0 kN	15.5 kN	12.5 kN	12.5 kN	12.0 kN	6.5 kN	7.0 kN
39	78 mm	17.0 kN	15.5 kN	12.5 kN	12.5 kN	12.0 kN	7.0 kN	7.0 kN
40	80 mm	17.0 kN	15.5 kN	12.5 kN	12.5 kN	12.0 kN	7.0 kN	7.0 kN

1) Check availability
2) According to ATLANTA-Standard

Maximum permissible feed forces – See page C-77 for more information.

All dimensions are in mm

Rack Type		UHPR	HPR			PR		BR
ATLANTA Quality		5	6		7	8		10
Rack	Material	Heat-Treatable Steel [2]	Case-Hardened [2]	ATLANTA Standard Heat-Treatable Steel				
	Heat Treatment	Case-Hardened	High-Performance Hardening Process				Quenched & Tempered	High Perf. Hardening
Pinion	Material	16MnCr5						
	Heat Treatment	Case-Hardened						
No. of Pinion Teeth[1]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels)						
12	36 mm	6.5 kN	6.5 kN	6.5 kN	6.5 kN	6.0 kN	2.5 kN	5.5 kN
13	39 mm	7.5 kN	7.5 kN	7.5 kN	7.5 kN	7.0 kN	3.0 kN	6.5 kN
14	42 mm	9.5 kN	9.5 kN	9.5 kN	9.5 kN	8.5 kN	3.5 kN	8.0 kN
15	45 mm	10.5 kN	11.0 kN	10.5 kN	10.5 kN	9.5 kN	4.0 kN	8.5 kN
16	48 mm	12.0 kN	12.5 kN	12.0 kN	11.5 kN	10.5 kN	4.0 kN	9.5 kN
17	51 mm	13.5 kN	14.5 kN	13.5 kN	13.5 kN	12.0 kN	5.0 kN	10.0 kN
18	54 mm	14.0 kN	16.0 kN	14.0 kN	14.0 kN	13.0 kN	5.0 kN	10.5 kN
19	57 mm	15.0 kN	17.5 kN	15.0 kN	15.0 kN	13.5 kN	5.5 kN	11.0 kN
20	60 mm	16.0 kN	18.5 kN	16.0 kN	16.0 kN	14.5 kN	5.5 kN	11.5 kN
21	63 mm	17.0 kN	20.0 kN	17.0 kN	17.0 kN	15.0 kN	6.0 kN	12.0 kN
22	66 mm	17.5 kN	21.5 kN	17.5 kN	17.5 kN	16.0 kN	6.5 kN	13.0 kN
23	69 mm	18.5 kN	22.5 kN	18.5 kN	18.5 kN	16.5 kN	6.5 kN	13.5 kN
24	72 mm	19.5 kN	24.0 kN	19.5 kN	19.5 kN	17.5 kN	7.0 kN	14.0 kN
25	75 mm	20.0 kN	24.0 kN	20.0 kN	20.0 kN	18.5 kN	7.5 kN	14.5 kN
26	78 mm	21.0 kN	24.5 kN	21.0 kN	21.0 kN	19.0 kN	7.5 kN	15.0 kN
27	81 mm	22.0 kN	24.5 kN	22.0 kN	22.0 kN	20.0 kN	8.0 kN	15.5 kN
28	84 mm	22.5 kN	24.5 kN	22.5 kN	22.5 kN	20.5 kN	8.0 kN	16.0 kN
29	87 mm	22.5 kN	25.0 kN	22.5 kN	22.5 kN	21.0 kN	8.5 kN	16.0 kN
30	90 mm	22.5 kN	25.0 kN	22.5 kN	22.5 kN	21.0 kN	9.0 kN	16.0 kN
31	93 mm	22.5 kN	25.0 kN	22.5 kN	22.5 kN	21.0 kN	9.0 kN	16.0 kN
32	96 mm	23.0 kN	25.0 kN	22.5 kN	22.5 kN	21.5 kN	9.5 kN	16.0 kN
33	99 mm	23.0 kN	25.0 kN	23.0 kN	23.0 kN	21.5 kN	10.0 kN	16.0 kN
34	102 mm	23.0 kN	25.5 kN	23.0 kN	23.0 kN	21.5 kN	10.0 kN	16.0 kN
35	105 mm	23.0 kN	25.5 kN	23.0 kN	23.0 kN	21.5 kN	10.5 kN	16.0 kN
36	108 mm	23.0 kN	25.5 kN	23.0 kN	23.0 kN	21.5 kN	11.0 kN	16.5 kN
37	111 mm	23.0 kN	25.5 kN	23.0 kN	23.0 kN	21.5 kN	11.0 kN	16.5 kN
38	114 mm	23.0 kN	25.5 kN	23.0 kN	23.0 kN	21.5 kN	11.5 kN	16.5 kN
39	117 mm	23.0 kN	25.5 kN	23.0 kN	23.0 kN	21.5 kN	11.5 kN	16.5 kN
40	120 mm	23.5 kN	25.5 kN	23.5 kN	23.0 kN	22.0 kN	12.0 kN	16.5 kN

1) Check availability
2) According to ATLANTA-Standard

Maximum permissible feed forces – See page C-77 for more information.

Rack Type		HPR			PR		BR
ATLANTA Quality		6		7	8		10
Rack	Material	Case-Hardened [2]	ATLANTA Standard Heat-Treatable Steel				
	Heat Treatment	High-Performance Hardening Process				Quenched & Tempered	High Perf. Hardening
Pinion	Material	16MnCr5					
	Heat Treatment	Case-Hardened					
No. of Pinion Teeth [1]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels)					
12	48 mm	12.0 kN	12.0 kN	12.0 kN	11.5 kN	5.5 kN	11.0 kN
13	52 mm	14.5 kN	14.5 kN	14.5 kN	13.5 kN	6.0 kN	13.0 kN
14	56 mm	18.0 kN	18.0 kN	18.0 kN	17.0 kN	7.0 kN	15.0 kN
15	60 mm	20.0 kN	20.0 kN	20.0 kN	18.5 kN	7.5 kN	17.0 kN
16	64 mm	23.0 kN	22.0 kN	22.0 kN	20.5 kN	8.0 kN	18.0 kN
17	68 mm	27.0 kN	24.5 kN	24.5 kN	23.0 kN	9.0 kN	19.0 kN
18	72 mm	30.0 kN	26.5 kN	26.5 kN	25.0 kN	10.0 kN	20.0 kN
19	76 mm	32.5 kN	28.0 kN	28.0 kN	26.0 kN	10.5 kN	21.5 kN
20	80 mm	35.0 kN	30.0 kN	30.0 kN	27.5 kN	11.0 kN	22.5 kN
21	84 mm	37.5 kN	31.5 kN	31.5 kN	29.0 kN	11.5 kN	23.5 kN
22	88 mm	39.5 kN	33.0 kN	33.0 kN	30.5 kN	12.5 kN	24.5 kN
23	92 mm	42.0 kN	34.5 kN	34.5 kN	32.0 kN	13.0 kN	26.0 kN
24	96 mm	44.5 kN	36.0 kN	36.0 kN	33.5 kN	13.5 kN	27.0 kN
25	100 mm	46.5 kN	37.5 kN	37.5 kN	35.0 kN	14.0 kN	28.0 kN
26	104 mm	47.0 kN	39.5 kN	39.5 kN	36.5 kN	14.5 kN	28.5 kN
27	108 mm	47.0 kN	40.0 kN	40.0 kN	37.5 kN	15.5 kN	28.5 kN
28	112 mm	47.5 kN	40.5 kN	40.5 kN	37.5 kN	16.0 kN	28.5 kN
29	116 mm	47.5 kN	40.5 kN	40.5 kN	37.5 kN	16.5 kN	29.0 kN
30	120 mm	48.0 kN	40.5 kN	40.5 kN	38.0 kN	17.0 kN	29.0 kN
31	124 mm	48.0 kN	41.0 kN	41.0 kN	38.0 kN	17.5 kN	29.0 kN
32	128 mm	48.0 kN	41.0 kN	41.0 kN	38.0 kN	18.5 kN	29.0 kN
33	132 mm	48.5 kN	41.0 kN	41.0 kN	38.0 kN	19.0 kN	29.0 kN
34	136 mm	48.5 kN	41.5 kN	41.0 kN	38.5 kN	19.5 kN	29.0 kN
35	140 mm	48.5 kN	41.5 kN	41.5 kN	38.5 kN	20.0 kN	29.5 kN
36	144 mm	49.0 kN	41.5 kN	41.5 kN	38.5 kN	21.0 kN	29.5 kN
37	148 mm	49.0 kN	41.5 kN	41.5 kN	38.5 kN	21.5 kN	29.5 kN
38	152 mm	49.0 kN	42.0 kN	41.5 kN	38.5 kN	22.0 kN	29.5 kN
39	156 mm	49.0 kN	42.0 kN	42.0 kN	39.0 kN	22.5 kN	29.5 kN
40	160 mm	49.0 kN	42.0 kN	42.0 kN	39.0 kN	23.0 kN	29.5 kN

1) Check availability
2) According to ATLANTA-Standard

Maximum permissible feed forces – See page C-77 for more information.

All dimensions are in mm

Rack Type		HPR		PR	BR
ATLANTA Quality		6	7	8	10
Rack	Material	ATLANTA Standard Heat-Treatable Steel			
	Heat Treatment	High-Performance Hardening Process			
Pinion	Material	16MnCr5			
	Heat Treatment	Case-Hardened			
No. of Pinion Teeth[1)]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels)			
12	60 mm	19.0 kN	19.0 kN	18.0 kN	17.5 kN
13	65 mm	23.0 kN	23.0 kN	21.5 kN	20.5 kN
14	70 mm	28.5 kN	28.5 kN	26.5 kN	23.5 kN
15	75 mm	31.5 kN	31.5 kN	29.0 kN	26.5 kN
16	80 mm	35.0 kN	35.0 kN	32.5 kN	28.0 kN
17	85 mm	39.5 kN	39.0 kN	36.5 kN	30.0 kN
18	90 mm	42.0 kN	42.0 kN	39.0 kN	31.5 kN
19	95 mm	44.5 kN	44.5 kN	41.0 kN	33.5 kN
20	100 mm	47.0 kN	47.0 kN	43.5 kN	35.0 kN
21	105 mm	49.5 kN	49.5 kN	45.5 kN	37.0 kN
22	110 mm	52.0 kN	52.0 kN	48.0 kN	39.0 kN
23	115 mm	54.5 kN	54.5 kN	50.5 kN	40.5 kN
24	120 mm	57.0 kN	57.0 kN	52.5 kN	42.5 kN
25	125 mm	59.5 kN	59.5 kN	55.0 kN	44.0 kN
26	130 mm	61.0 kN	61.0 kN	56.5 kN	44.5 kN
27	135 mm	61.0 kN	61.0 kN	56.5 kN	45.0 kN
28	140 mm	61.5 kN	61.5 kN	57.0 kN	45.0 kN
29	145 mm	61.5 kN	61.5 kN	57.0 kN	45.0 kN
30	150 mm	62.0 kN	62.0 kN	57.5 kN	45.5 kN

1) Check availability

Maximum permissible feed forces – See page C-77 for more information.

All dimensions are in mm

Rack Type		HPR	BR
ATLANTA Quality		6	10
Rack	Material	ATLANTA Standard Heat-Treatable Steel	
	Heat Treatment	High-Performance Hardening Process	
Pinion	Material	16MnCr5	
	Heat Treatment	Case-Hardened	
No. of Pinion Teeth[1)]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels)	
12	72 mm	27.5 kN	25.5 kN
13	78 mm	33.5 kN	30.0 kN
14	84 mm	41.5 kN	34.5 kN
15	90 mm	45.5 kN	38.0 kN
16	96 mm	50.5 kN	40.5 kN
17	102 mm	56.5 kN	43.5 kN
18	108 mm	61.0 kN	46.0 kN
19	114 mm	64.5 kN	48.5 kN
20	120 mm	68.0 kN	51.0 kN
21	126 mm	71.5 kN	53.5 kN
22	132 mm	75.0 kN	56.0 kN
23	138 mm	79.0 kN	58.5 kN
24	144 mm	82.5 kN	61.0 kN
25	150 mm	86.0 kN	61.5 kN
26	156 mm	87.5 kN	62.0 kN
27	162 mm	87.5 kN	62.0 kN
28	168 mm	88.0 kN	62.5 kN
29	174 mm	88.5 kN	62.5 kN
30	180 mm	89.0 kN	63.0 kN

1) Check availability

Maximum permissible feed forces – See page C-77 for more information.

Rack Type		HPR	BR
ATLANTA Quality		6	10
Rack	Material	ATLANTA Standard Heat-Treatable Steel	
	Heat Treatment	High-Performance Hardening Process	
Pinion	Material	16MnCr5	
	Heat Treatment	Case-Hardened	
No. of Pinion Teeth[1)]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels)	
12	96 mm	49.5 kN	45.5 kN
13	104 mm	60.0 kN	53.5 kN
14	112 mm	74.5 kN	61.5 kN
15	120 mm	82.0 kN	68.0 kN
16	128 mm	90.0 kN	72.5 kN
17	136 mm	101.5 kN	77.5 kN
18	144 mm	109.0 kN	82.0 kN
19	152 mm	115.5 kN	86.5 kN
20	160 mm	121.5 kN	91.0 kN
21	168 mm	128.0 kN	95.5 kN
22	176 mm	134.5 kN	100.0 kN
23	184 mm	141.0 kN	104.5 kN
24	192 mm	147.5 kN	107.5 kN
25	200 mm	152.5 kN	108.0 kN
26	208 mm	153.0 kN	108.5 kN
27	216 mm	154.0 kN	109.0 kN
28	224 mm	154.5 kN	109.5 kN
29	232 mm	155.0 kN	110.0 kN
30	240 mm	155.5 kN	110.0 kN

1) Check availability

Maximum permissible feed forces – See page C-77 for more information.

All dimensions are in mm

Rack Type		HPR	BR
ATLANTA Quality		6	10
Rack	Material	ATLANTA Standard Heat-Treatable Steel	
	Heat Treatment	High-Performance Hardening Process	
Pinion	Material	16MnCr5	
	Heat Treatment	Case-Hardened	
No. of Pinion Teeth[1)]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels)	
12	120 mm	77.5 kN	71.5 kN
13	130 mm	94.0 kN	84.0 kN
14	140 mm	117.0 kN	96.0 kN
15	150 mm	128.5 kN	107.0 kN
16	160 mm	141.5 kN	114.0 kN
17	170 mm	159.5 kN	121.0 kN
18	180 mm	171.0 kN	128.0 kN
19	190 mm	180.5 kN	135.5 kN
20	200 mm	191.0 kN	142.5 kN
21	210 mm	201.0 kN	149.5 kN
22	220 mm	211.0 kN	156.5 kN
23	230 mm	221.0 kN	163.5 kN
24	240 mm	231.0 kN	165.0 kN
25	250 mm	234.0 kN	166.0 kN

1) Check availability

Maximum permissible feed forces – See page C-77 for more information.

Rack Type		HPR	BR
ATLANTA Quality		6	10
Rack	Material	ATLANTA Standard Heat-Treatable Steel	
	Heat Treatment	High-Performance Hardening Process	
Pinion	Material	16MnCr5	
	Heat Treatment	Case-Hardened	
No. of Pinion Teeth[1)]	Pitch Diameter	Maximum Feed Force (only valid for ATLANTA Standard Steels)	
12	144 mm	111.0 kN	101.44 kN
13	156 mm	134.0 kN	118.78 kN
14	168 mm	167.0 kN	135.98 kN
15	180 mm	183.5 kN	151.06 kN
16	192 mm	203.5 kN	161.12 kN
17	204 mm	225.5 kN	171.32 kN
18	216 mm	243.5 kN	181.35 kN
19	228 mm	258.0 kN	191.36 kN
20	240 mm	272.0 kN	201.28 kN
21	252 mm	286.5 kN	211.18 kN
22	264 mm	300.5 kN	221.28 kN
23	276 mm	315.0 kN	231.19 kN
24	288 mm	329.5 kN	233.54 kN
25	300 mm	333.0 kN	234.78 kN

1) Check availability

Maximum permissible feed forces – See page C-77 for more information.

The values given in the load table are based upon uniform, smooth operation, $K_{H\beta}$=1.0 and reliable grease lubrication. Since, in practice, the applications are very diverse, it is important to consider the given conditions by using appropriate factors S_B, K_A, $L_{KH\beta}$ and f_n (see below).

Formulas for Determining the Tangential Force

$$a = \frac{v}{t_b} \quad [m/s^2]$$

$$F_u = \frac{m \cdot g + m \cdot a}{1000} \text{ (for lifting axle)} \quad [kN]$$

$$F_u = \frac{m \cdot g \cdot \mu + m \cdot a}{1000} \text{ (for driving axle)} \quad [kN]$$

$$F_{u\,perm.} = \frac{F_{u\,Tab}}{K_A \cdot S_B \cdot f_n \cdot L_{KH\beta}} \quad [kN]$$

Formula dimensions see page ZD-3

The Condition $F_u < F_{u\,perm.}$ Must be Fulfilled.

Load Factor K_A

Drive	Type of load from the machines to be driven		
	Uniform	Medium Shocks	Heavy Shocks
Uniform		1.25	1.75
Light Shocks	1.25	1.50	2.00
Medium Shocks	1.50	1.75	2.25

Safety Coefficient S_B

The safety coefficient should be allowed for according to experience (S_B = 1.1 to 1.4).

Life-Time Factor f_n

considering of the peripheral speed of the pinion and lubrication.

Lubrication		Continuous	Daily	Monthly
Peripheral Speed of Gearing				
m/sec	m/min			
0.5	30	0.85	0.95	
1.0	60	0.95	1.10	from
1.5	90	1.00	1.20	3
2.0	120	1.05	1.30	to
3.0	180	1.10	1.50	10
5.0	300	1.25	1.90	

Linear Load Distribution Factor $L_{KH\beta}$

The linear load distribution factor considers the contact stress, while it describes unintegrated load distribution over the tooth width ($L_{KH\beta} = \sqrt{K_{H\beta}}$).

$L_{KH\beta}$ = 1.1 for counter bearing, e.g. Torque Supporter
= 1.2 for preloaded bearings on the output shaft e.g. ATLANTA HT, HP and E servo-worm gear unit, BG bevel-gear unit
= 1.5 for unpreloaded bearings on the output shaft e.g. ATLANTA B servo-worm gear unit

Calculation Example

Values Given

⊗ Travelling Operation

Mass to be Moved	m	=	820 kg
Speed	v	=	2 m/s
Acceleration Time	t_b	=	1 s
Acceleration Due to Gravity	g	=	9.81 m/s²
Coefficient of Friction	μ	=	0.1
Load Factor	K_A	=	1.5
Life-Time Factor	f_n	=	1.05 (cont. lubrication)
Safety Coefficient	S_B	=	1.2
Linear Load Distribution Factor	$L_{KH\beta}$	=	1.5

Calculation Process — Results

$$a = \frac{v}{t_b} \qquad a = \frac{2}{1} = 2 \text{ m/s}^2$$

$$F_u = \frac{m \cdot g \cdot \mu + m \cdot a}{1000}$$

$$F_u = \frac{820 \cdot 9.81 \cdot 0.1 + 820 \cdot 2}{1000} = 2.44 \text{ kN}$$

Assumed feed force: rack C45, ind. hardened, straight tooth, module 3, pinion 16MnCr5, case hardened, 20 teeth, page C-46 with Futab = 11.5 kN

$$F_{u\,zul./per.} = \frac{F_{uTab}}{K_A \cdot S_B \cdot f_n \cdot L_{KH\beta}};$$

$$F_{u\,zul./per.} = \frac{11.5 \text{ kN}}{1.5 \cdot 1.2 \cdot 1.05 \cdot 1.5} = 4.05 \text{ kN}$$

Condition

$F_{u\,zul./per.} > F_u$; 4.05 kN > 2.44 kN => fulfilled

Result: Rack 34 30 100 Page C-64

Pinion 24 35 220 Page C-40

Case-Hardened

Your Calculation

Values Given

⊗ Travelling Operation

Mass to be Moved	m	=	_____ kg
Speed	v	=	_____ m/s
Acceleration Time	t_b	=	_____ s
Acceleration Due to Gravity	g	=	9.81 m/s²
Coefficient of Friction	μ	=	_____
Load Factor	K_A	=	_____
Life-Time Factor	f_n	=	_____
Safety Coefficient	S_B	=	_____
Linear Load Distribution Factor	$L_{KH\beta}$	=	_____

Calculation Process — Results

$$a = \frac{v}{t_b} \qquad a = \_\_\_\_\_ = \_\_\_\_\_ \text{ m/s}^2$$

$$F_u = \frac{m \cdot g \cdot \mu + m \cdot a}{1000}; \quad F_u = \frac{\_\_\_\_\_}{1000} = \_\_\_\_\_ \text{ kN}$$

Permissible Feed Force $F_{u\,Tab}$

$$F_{u\,zul./per.} = \frac{F_{u\,Tab}}{K_A \cdot S_B \cdot f_n \cdot L_{KH\beta}};$$

$$F_{u\,zul./per.} = \_\_\_\_\_ = \_\_\_\_\_ \text{ kN}$$

Condition

$F_{u\,zul./per.} > F_u$; _____ kN > _____ kN => fulfilled

Calculation Example

Values Given

○ Lifting Operation

Mass to be Moved	m	=	300 kg
Speed	v	=	1.08 m/s
Acceleration Time	t_b	=	0.27 s
Acceleration Due to Gravity	g	=	9.81 m/s²
Load Factor	K_A	=	1.2
Life-Time Factor	f_n	=	1.1 (Cont. Lubrication)
Safety Coefficient	S_B	=	1.2
Linear Load Distribution Factor	$L_{KH\beta}$	=	1.2

Calculation Process — Results

$a = \frac{v}{t_b}$ $a = \frac{1.08}{0.27}$ = 4 m/s²

$F_u = \frac{m \cdot g + m \cdot a}{1000}$ $_u = \frac{300 \cdot 9.81 + 300 \cdot 4}{1000}$ = 4.1 kN

Assumed feed force: rack C45, ind. hardened, helical, module 2, pinion 16MnCr5, case hardened, 20 teeth, page C-45 with F_{utab} = 12 kN

$F_{u\ zul./per.} = \frac{F_{u\ Tab}}{K_A \cdot S_B \cdot f_n \cdot L_{KH\beta}}$; $F_{u\ zul./per.} = \frac{11.5\ kN}{1.2 \cdot 1.2 \cdot 1.1 \cdot 1.2}$

= 5.9 kN

Condition

$F_{u\ zul./per.} > F_u$; 6.0 kN > 4.1 kN => fulfilled

Result: Rack 29 20 105 Page C-16

Pinion 24 29 520 Page C-39

Your Calculation

Values Given

○ Lifting Operation

Mass to be Moved	m	=	_____ kg
Speed	v	=	_____ m/s
Acceleration Time	t_b	=	_____ s
Acceleration Due to Gravity	g	=	9.81 m/s²
Load Factor	K_A	=	_____
Life-Time Factor	f_n	=	_____
Safety Coefficient	S_B	=	_____
Linear Load Distribution Factor	$L_{KH\beta}$	=	_____

Calculation Process — Results

$a = \frac{v}{t_b}$ a = _____ = _____ m/s²

$F_u = \frac{m \cdot g + m \cdot a}{1000}$ $F_{u\ erf./req.} = \frac{\_\_\_\_\_}{1000}$ = _____ kN

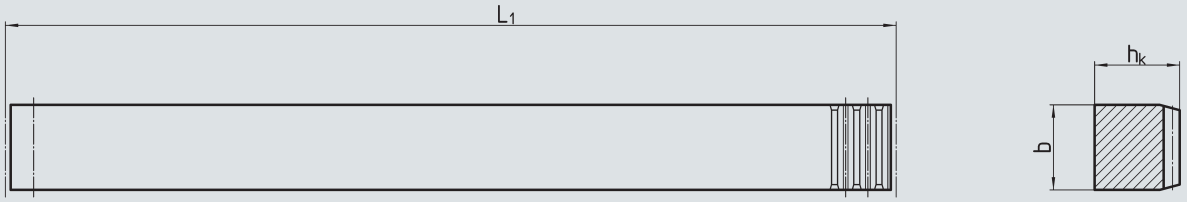
Permissible Feed Force $F_{u\ tab}$

$F_{u\ zul./per.} = \frac{F_{u\ Tab}}{K_A \cdot S_B \cdot f_n \cdot L_{KH\beta}}$; $F_{u\ zul./per.}$ = _____ = _____ kN

Condition

$F_{u\ zul./per.} > F_u$; _____ kN > _____ kN => fulfilled

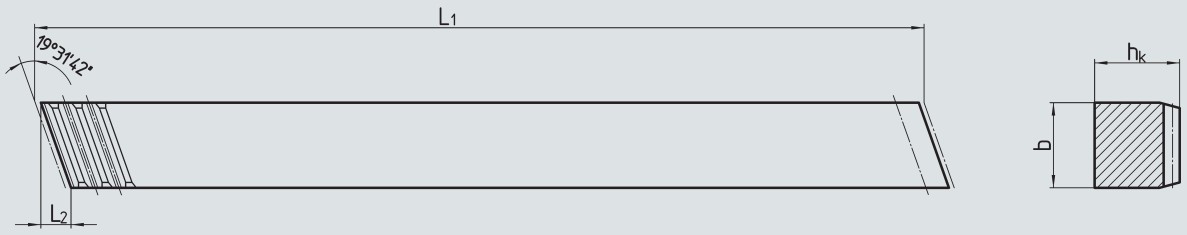
For Straight-Tooth Racks



Order Code	Module	L_1	N° of Teeth	b	h_k	kg
28 11 999	1	141.37	45	15	15	0.25
28 15 999	1.5	141.37	30	17	17	0.29
28 20 999	2	188.49	30	25	24	0.80
28 30 999	3	188.49	20	30	29	1.15
28 40 999	4	188.49	15	40	39	2.07
28 50 999	5	188.49	12	50	39	2.49
28 60 999	6	188.49	10	60	49	3.78
28 80 999	8	201.06	10	80	79	8.90
28 10 999	10	219.91	7	80	79	9.43
28 12 999	12	263.90	7	100	99	17.64

- **Teeth hardened with the ATLANTA High-Performance Hardening Process and ground**
- **Heat-treatable steel according ATLANTA-Standard**

For Helical-Tooth Racks, left-hand for right-hand racks



Order Code	Module	L_1	L_2	N° of Teeth	b	h_k	kg
29 15 999	1.5	150.00	4.90	30	17	17	0.31
29 20 999	2	200.00	8.87	30	25	24	0.85
29 30 999	3	200.00	10.64	20	30	29	1.20
29 40 999	4	200.00	14.19	15	40	39	2.18
29 50 999	5	200.00	17.73	12	50	39	2.65
29 60 999	6	200.00	21.28	10	60	49	4.02
29 80 999	8	213.33	28.37	8	80	79	9.43
29 10 999	10	233.33	28.37	7	80	79	10.03
29 12 999	12	280.00	35.50	7	100	99	18.78

- **Teeth hardened with the ATLANTA High-Performance Hardening Process and ground**
- **Heat-treatable steel according to ATLANTA-Standard**

Continuous Rack Mounting End-To-End

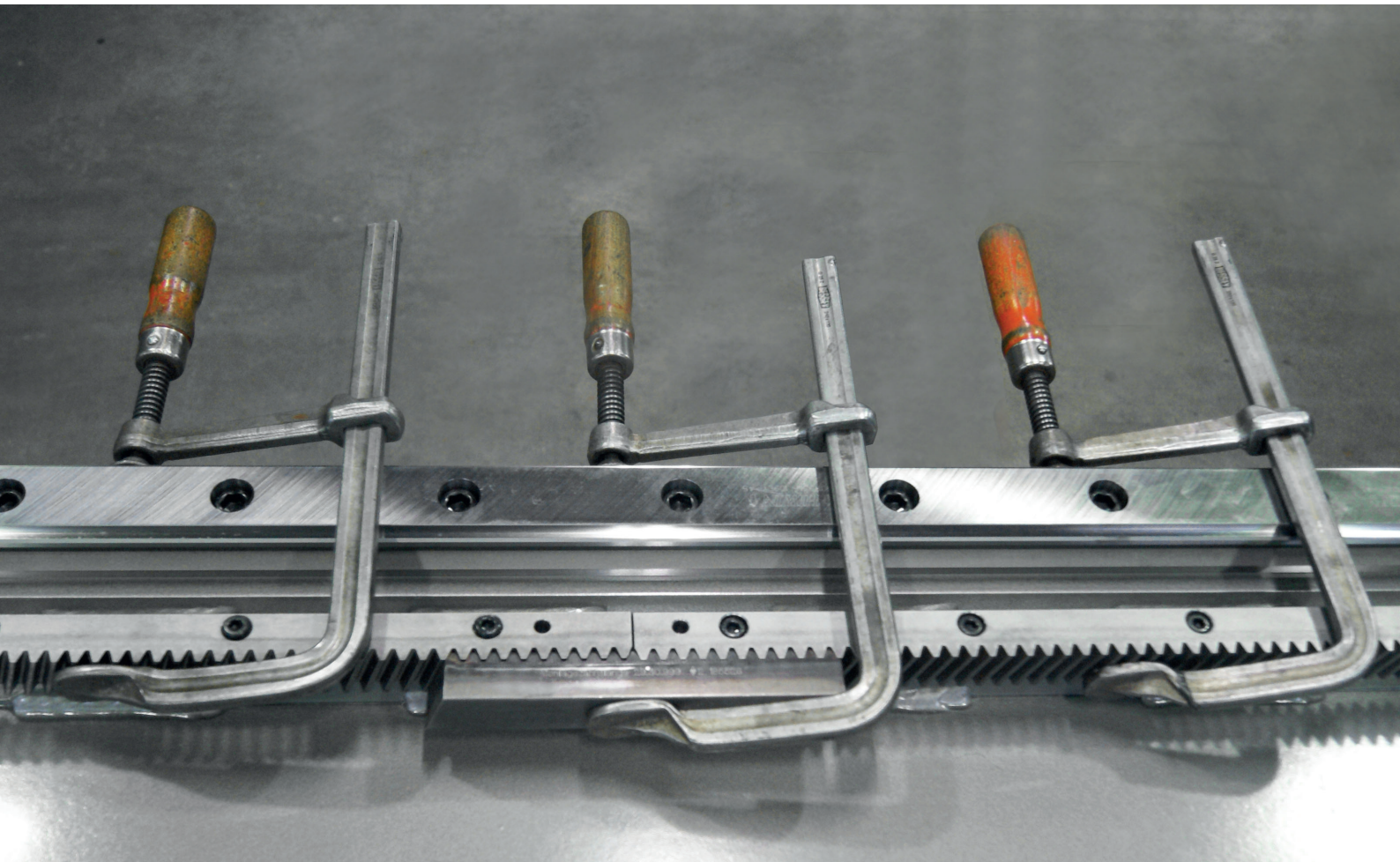
To make it possible to link our racks to form any desired length, the teeth are cut so that there is half a tooth gap at each end of the rack. The picture below shows how racks can be precisely positioned using our companion racks.

Companion racks with teeth cut in the opposite direction are available for linking helical racks. A precision mounting can be achieved by using our Rack Assembly Kit, see page C-96.

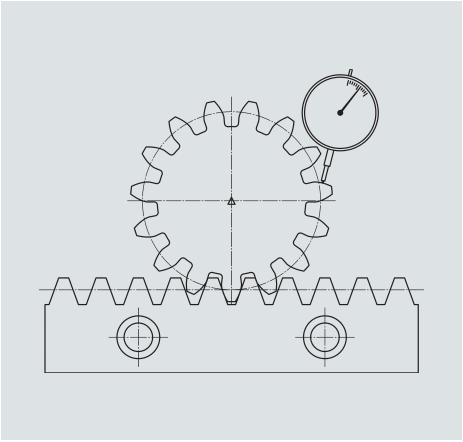
Rack Mounting Screws

The mounting screws must be tightened to the torque of socket head cap screws (12.9) using a torque wrench and below table. For the 0.5 m long racks, it is absolute necessary to use the dowel pin holes. Screws and pins can be found on page C-95.

Thread	M5	M6	M8	M10	M12	M14	M16	M20	M30	M36
Tightening Torque	9 Nm	16 Nm	40 Nm	76 Nm	135 Nm	210 Nm	340 Nm	660 Nm	2300 Nm	4100 Nm



Backlash Adjustment



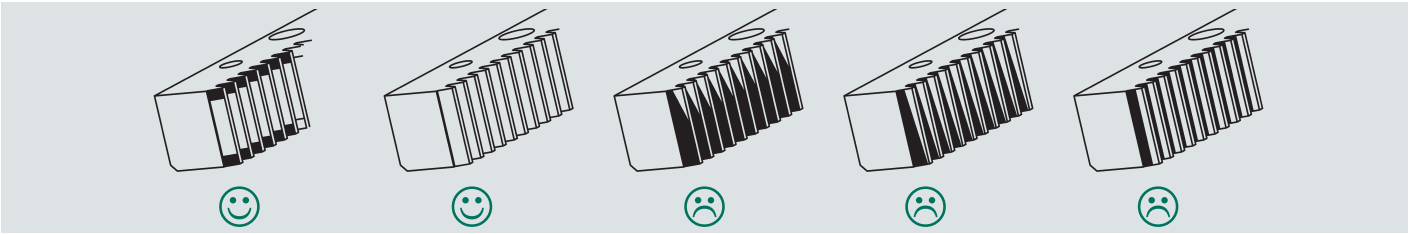
The backlash in between the rack and pinion has to be adjusted at the high point or the rack.
The recommended backlash is as follows:

Q5: min. 0.011
Q6: min. 0.027 (m= 1.5 – 4) / min.0.020 (m= 5 – 6)
Q7: min. 0.037 (m= 1.5 – 4) / min.0.028 (m= 5 – 6)
Q8: min. 0.043 (xx.xx.xx8) / 0.080 (xx.xx.xx0) Q10: min. 0.080

Max: 0.1 x Module 1.5
Max: 0.05 x Module 2 – 12

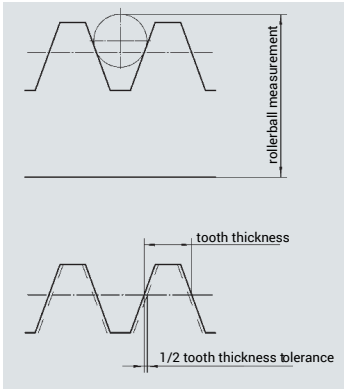
Tooth Contact Patterns

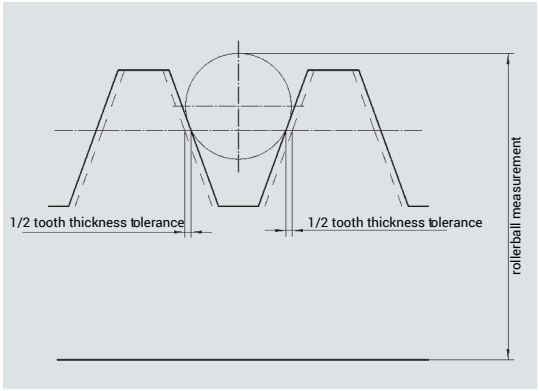
With rack and pinion drives, the pitch lines of pinion and rack have to be parallel. To check this, we recommend to use bluing compound and to check the tooth contact pattern under load conditions (see diagram below).

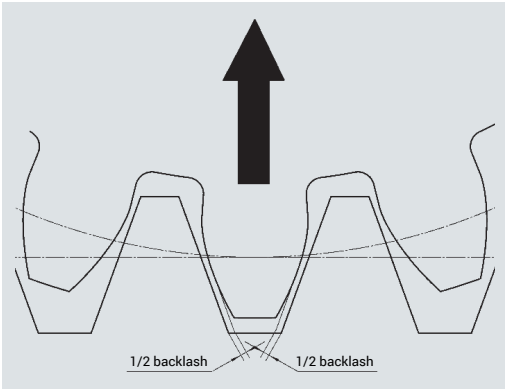


Tooth Thickness And Roller Ball Measurement

The tooth thickness of racks is usually measured via the roller ball measurement as the tooth thickness could not be measured directly. A measuring roller is put into the teeth parallel to the tooth flank line and measured to the back of the rack. The tooth thickness tolerances can be measured by recalculating of the roller ball measurement.







Tooth Thickness Tolerance	Roller Ball Measurement Tolerance
0.01	0.014
0.02	0.027
0.03	0.041
0.04	0.055
0.05	0.069
0.06	0.082
0.07	0.096
0.08	0.110
0.09	0.124
0.10	0.137
0.11	0.151

Backlash	Radial Distance
0.01	0.014
0.02	0.027
0.03	0.041
0.04	0.055
0.05	0.069
0.06	0.082
0.07	0.096
0.08	0.110
0.09	0.124
0.10	0.137
0.11	0.151

Rack Mounting Screws and Dowel Pins

Order Code	Screws	Pins	Rack
28 02 151	M5 x 20	D6 m6 x 24	Module 1.5
28 02 152	M6 x 20	D6 m6 x 28	Module 1.5
28 02 202	M6 x 25	D6 m6 x 30	Module 2
28 02 302	M8 x 30	D8 m6 x 40	Module 3
28 02 402	M8 x 40	D8 m6 x 50	Module 4/xx.40.xxx
28 02 404	M12 x 45	D12 m6 x 55	Module 4/xx.42.xxx
28 02 502	M12 x 55	D12 m6 x 70	Module 5
28 02 602	M16 x 65	D16 m6 x 80	Module 6
28 02 802	M20 x 90	D20 m6 x 100	Module 8
28 02 112	M30 x 110	D20 m6 x 120	Module 10
28 02 122	M36 x 130	D20 m6 x 140	Module 12

Order code contains:

8 Screws & 2 pins for one meter of rack

Screws: DIN EN ISO 4762 Class 12.9

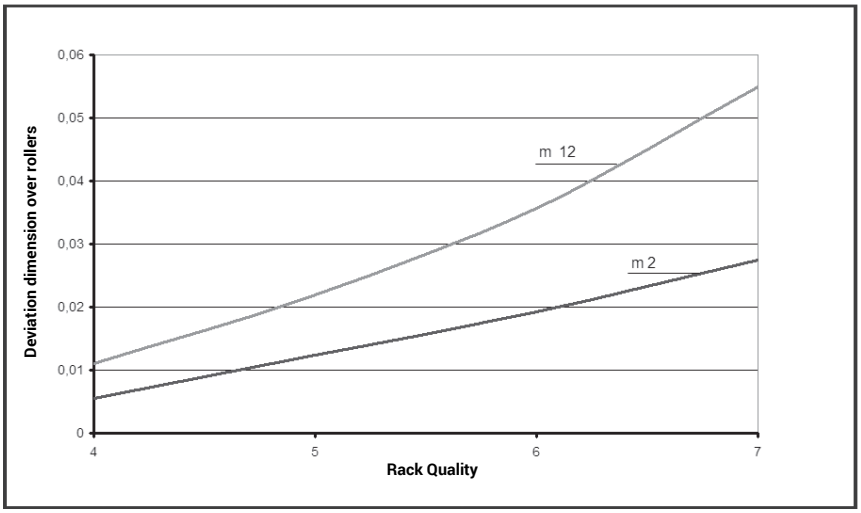
Pins: DIN 7979 (ISO 8735-A)

Deutsches Patent
Nr. 10 2006 008 461.6-52

Order Code	Description		Module	Helical Rack	Straight Rack	kg
29 01 001	Assembly kit, comprised of: 1 x Adjusting device 3 x Magnetic Rollers 1 x Measuring bridge with dial indicator	 2 29 00 002 1 29 00 032 2 28 01 008	1.5	 29 15 xxx 39 15 xxx		
29 01 002	Assembly kit, comprised of: 1 x Adjusting device 3 x Magnetic Rollers 1 x Measuring bridge with dial indicator	 2 29 00 002 1 29 00 042 2 28 01 008	2	29 20 xxx 38 21 xxx 39 20 xxx	28 20 xxx 33 21 xxx 34 20 xxx	0.40
29 01 003	Assembly kit, comprised of: 1 x Adjusting device 3 x Magnetic Rollers 1 x Measuring bridge with dial indicator	 2 29 00 003 1 29 00 050 2 28 01 008	3	29.30.xxx 38.31.xxx 39.30.xxx	28.30.xxx 33.31.xxx 34.30.xxx	0.44
29 01 004	Assembly kit, comprised of: 1 x Adjusting device 3 x Magnetic Rollers 1 x Measuring bridge with dial indicator	 2 29 00 003 1 29 00 070 2 28 01 008	4	29.40.xxx 38.41.xxx 39.40.xxx	28.40.xxx 33.41.xxx 34.40.xxx	0.55
29 01 024	Assembly kit, comprised of: 1 x Adjusting device 3 x Magnetic Rollers 1 x Measuring bridge with dial indicator	 2 29 00 005 1 29 00 070 2 28 01 008	4	29.42.xxx 29.xx.xx7 39.42.xxx 39.40.xx8	28.42.xxx 28.xx.xx7 34.42.xxx 34.40.xx8	0.55
29 01 005	Assembly kit, comprised of: 1 x Adjusting device 3 x Magnetic Rollers 1 x Measuring bridge with dial indicator	 2 29 00 005 1 29 00 090 2 28 01 015	5	29.50.xxx 39.50.xxx	28.50.xxx 34.50.xxx	0.8
29 01 006	Assembly kit, comprised of: 1 x Adjusting device 3 x Magnetic Rollers 1 x Measuring bridge with dial indicator	 2 29 00 006 1 29 00 100 2 28 01 015	6	29.60.xxx 39.60.xxx	28.60.xxx 34.60.xxx	0.90
29 01 008	Assembly kit, comprised of: 1 x Adjusting device 3 x Magnetic Rollers 1 x Measuring bridge with dial indicator	 2 29 00 008 1 29 00 140 2 28 01 015	8 Helical	29.80.xxx		1.35
28 01 008	Assembly kit, comprised of: 1 x Adjusting device 3 x Magnetic Rollers 1 x Measuring bridge with dial indicator	 2 28 00 008 1 29 00 140 2 28 01 015	8 Straight		28.80.xxx	1.15
29 01 010	Assembly kit, comprised of: 1 x Adjusting device 3 x Magnetic Rollers 1 x Measuring bridge with dial indicator	 2 29 00 008 1 29 00 180 2 28 01 015	10	29.10.xxx	28.10.xxx	1.40
29 01 012	Assembly kit, comprised of: 1 x Adjusting device 3 x Magnetic Rollers 1 x Measuring bridge with dial indicator	 2 29 00 008 1 29 00 200 2 28 01 015	12	29.12.xxx	28.12.xxx	1.50

All dimensions are in mm

Over-Roller Tolerances For Rack Joints



Using The Rack Assembly Kit

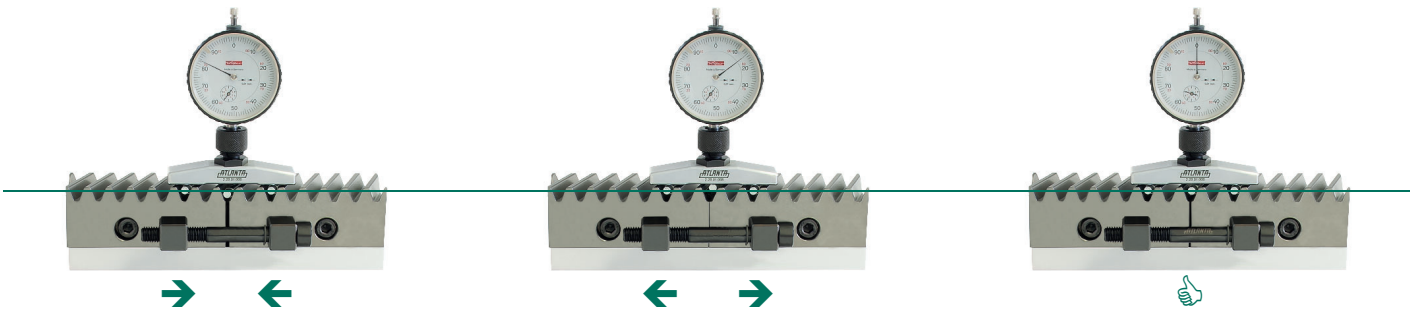
ATLANTA gear racks can be assembled to the correct pitch by means of assembly aids. After positioning the racks for assembly insert the fixing screws of the rack and slightly turn them in by hand.

Arrange the rack adjusting device in the existing pinholes of the racks. The device is held in position on the racks by magnetic force. Any mounting position is possible.

The rollers are inserted in the two adjacent racks and in the gap at the joint. They, too, are held in place in the tooth space by magnetic force and can therefore be used in any mounting position of the racks. It is thus ensured that they are always accurately positioned on the tooth flanks. The tooth gaps must be free from residues or any other foreign matter.

With the measuring bridge set to zero on a measuring plate or another level surface it is now possible to measure the variation of the dimension over the roller. The exact pitch at the joint can then be adjusted by moving the rack with utmost precision in either direction. The diagram above shows the excellent toothing quality obtained based on the variation of the dimension over rollers at the joint of the racks.

It is no longer necessary to adjust the rack by tapping with a hammer. The slightly pre-stressed rack is put in the correct position and held in this position until it is screwed together.



Pitch Too Large

Pitch Too Small

Optimal Pitch

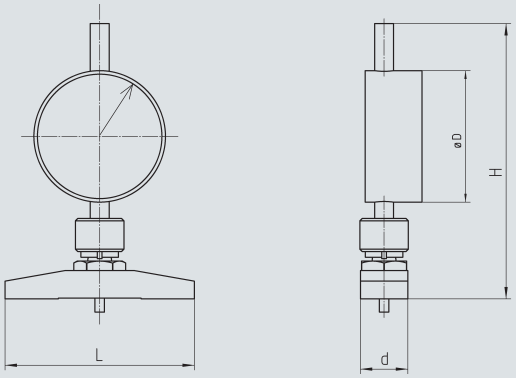
Magnetic Rollers

Deutsches Patent
Nr. 10 2006 008 461.6-52

Material: Hardened Steel

Order Code	Description	Module	L	l	D	g
1 29 00 042	3 x Magnetic rollers	2	28	20	4.2	2
1 29 00 050	3 x Magnetic rollers	3	33	25	5	5
1 29 00 070	3 x Magnetic rollers	4	40	30	7	15
1 29 00 090	3 x Magnetic rollers	5	42	34	9	20
1 29 00 100	3 x Magnetic rollers	6	43	35	10	25
1 29 00 140	3 x Magnetic rollers	8	45	35	14	45
1 29 00 180	3 x Magnetic rollers	10	42	35	18	75
1 29 00 200	3 x Magnetic rollers	12	50	43	20	75

Measuring Bridge With Dial Indicator

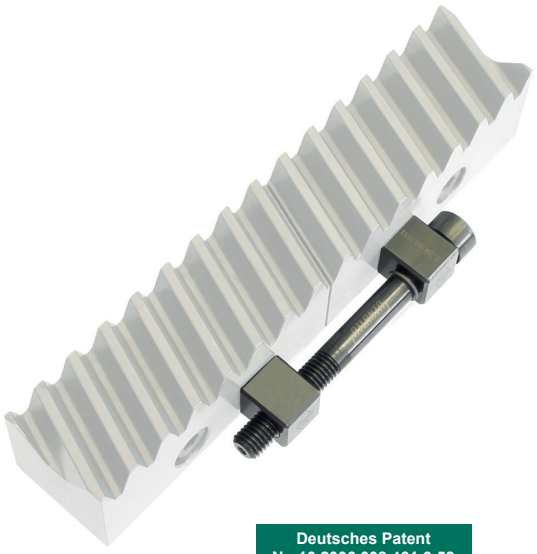


Order Code	Description	Module	L	b	H	D	g
2 28 01 008	Measuring bridge	2 – 4	80	20	115	58	310
2 28 01 015	Measuring bridge	5 – 12	150	20	120	58	420

Usage

The magnetic rollers (patented) are placed in the tooth gaps of the already mounted rack, of the rack to be mounted, and in the gap at the joint. Adjust the measuring bridge on a measuring plate or other level surface to zero. Mount the adjusting device.

By means of the measuring bridge and the adjusting device, it is now possible to adjust the optimal pitch by moving the racks to be assembled. The pointer of the dial indicator should, if possible, reach the pre-set zero value.



Deutsches Patent
Nr. 10 2006 008 461.6-52

Rack Adjusting Device

By fitting the adjusting device (patented) in the pinholes of the toothed rack, it is possible to move the rack to be assembled axially in both directions by turning the screw.

This permits to adjust the correct dimension over rollers and the accurate pitch at the rack joint. The adjusting device is held in place on the rack by means of magnetic force and can be used in any mounting position.

Up to module 6 the wrench sizes correspond to the rack mounting screws.

Order Code	Description	Wrench Size	Module	Helical	Straight	kg
2 29 00 002	Adjusting device	5	1.5 & 2	29.15.105 29.20.xxx	 28.20.xxx	0.12
2 29 00 003	Adjusting device	6	3 & 4	29.30.xxx 29.40.100 29.40.xx5	28.30.xxx 28.40.100 28.40.xx5	0.14
2 29 00 005	Adjusting device	10	4 & 5	29.40.xx7 29.42.xxx 29.40.xx8	28.40.xx7 28.42.xxx 28.40.xx8	0.3
2 29 00 006	Adjusting device	14	6	29.60.xxx	28.60.xxx	0.44
2 29 00 008	Adjusting device	14	8 to 12	29.80.xxx 29.10.xxx 29.12.xxx	 28.10.xxx 28.12.xxx	0.82
2 28 00 008	Adjusting device	14	8 Straight		28.80.xxx 46.80.xxx	0.46

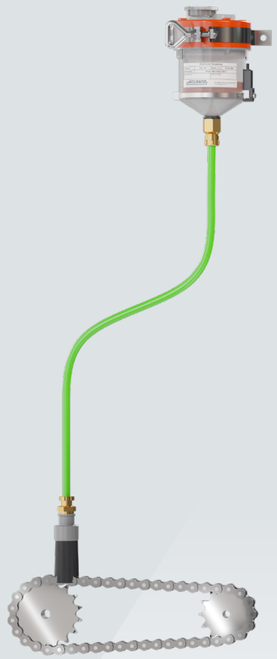
ATLANTA Automatic Lubrication Systems

The innovative lubricant supply for your machine

Adequate lubrication is necessary to maintain the precision of the drive system over the years. Manual lubrication is often unreliable and very expensive, especially in areas that are difficult to access. Central lubrication ensures that the right amount of lubricant supplies the system with the necessary lubricant at the right time.

By using our electronically controlled lubrication systems, the dosing quantity of the lubricant can be individually adjusted to the respective application. In conjunction with our felt gears, our lubrication systems ensure that there is a permanent, thin lubricating film on the tooth flanks. This prevents metal-to-metal contact, which would damage the teeth and thus the entire rack and pinion drive.

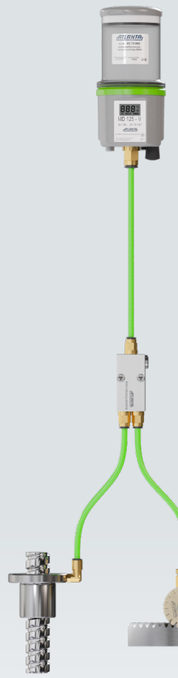
Whether single-point or multi-point lubrication, you increase the performance of your machines and systems with a permanent and controlled supply of the drive with the necessary lubricant.

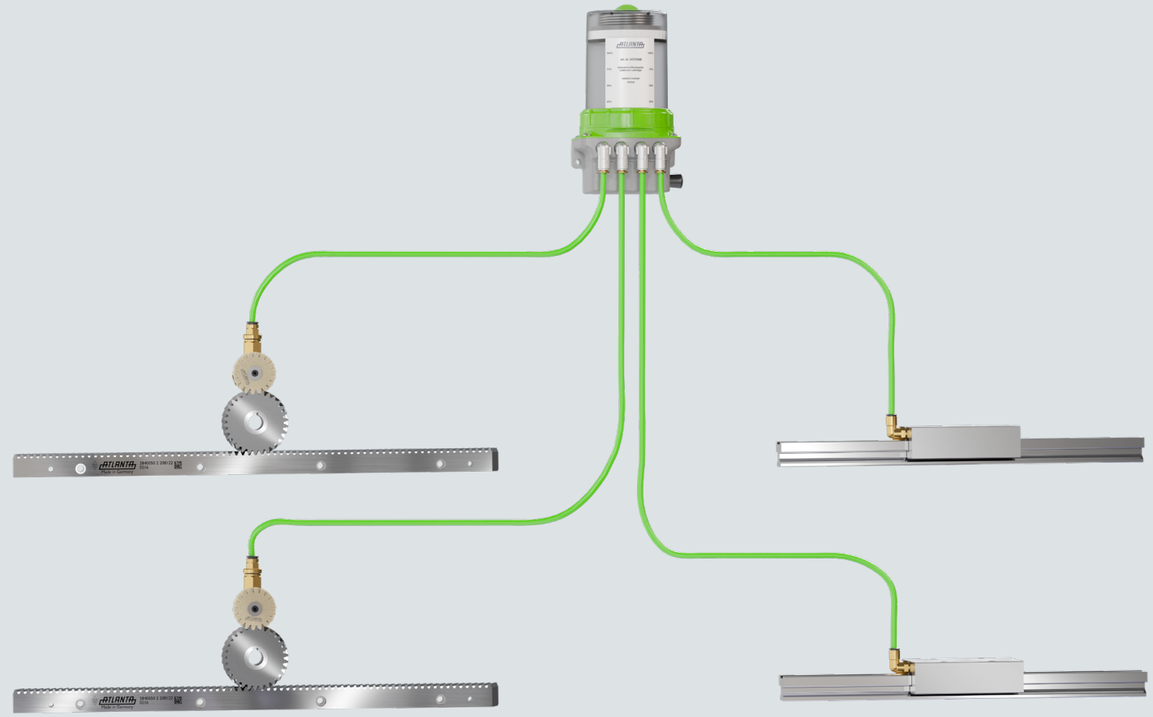


Single-Point Lubrication Systems

Type 125 / 475

Type M60 / M150 / M250





Multi-Point Lubrication Systems

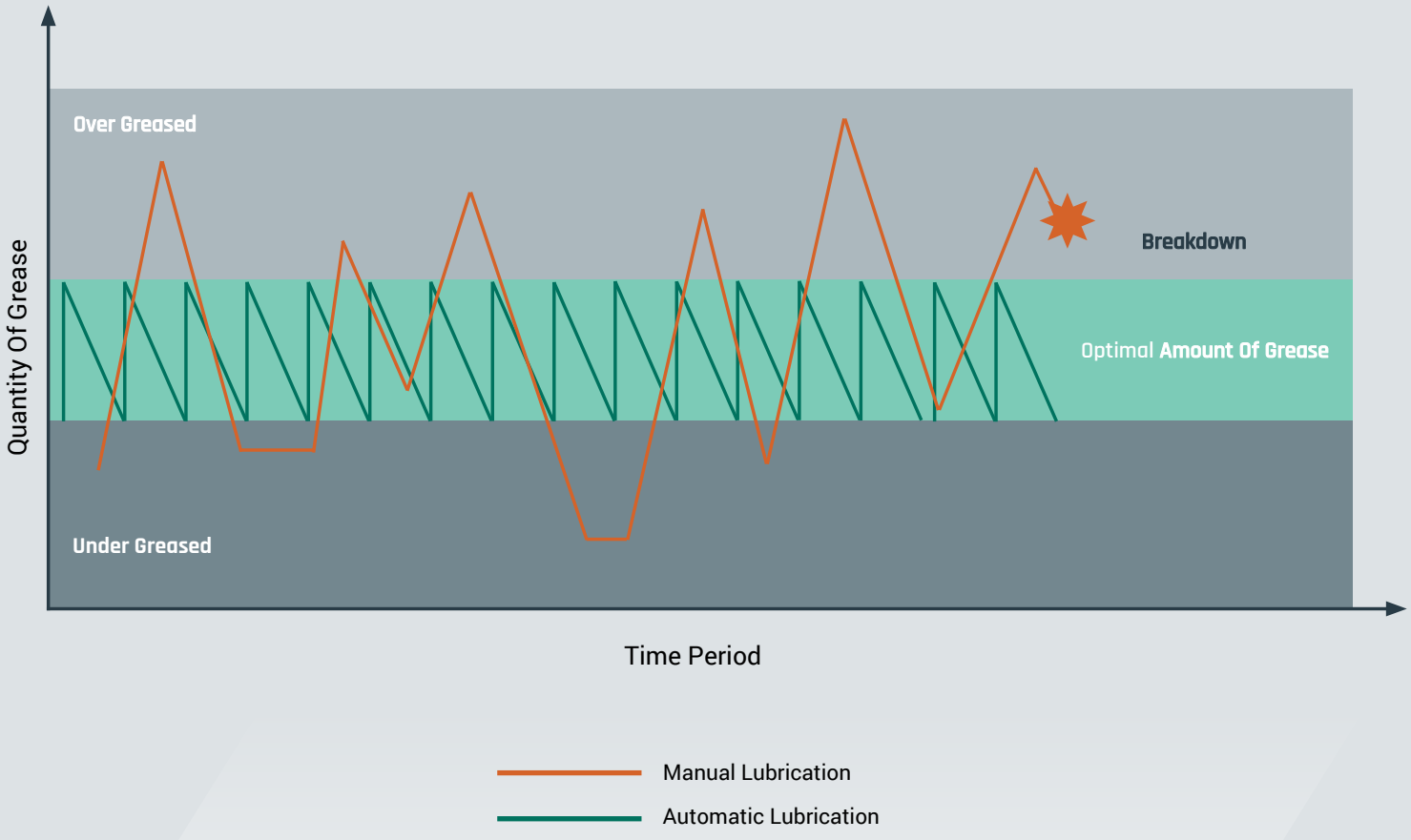
Type MD125

Type MD400

Advantages Of Automatic Lubrication Systems

Compared to manual lubrication, the automatic lubrication system offers a number of advantages:

- Even supply of lubricant to the components
- Less machine downtime and less wear
- Less work and therefore lower maintenance costs
- Effective and economical use of the lubricant
- Reduced risk to staff
- Control & overview of the lubrication process of the system



Automatic Lubricator Overview

Lubricator Model		Setting	Lubricant Volume	Maximum Operating Pressure	Operational Voltage	Refillable	Additional Information	Page
Electro-Chemical Single-Point Lubricator								
	**Type 125** **Type 475**	1-18 month	100 ml 460 ml	3 bar (44 psi)	(4) 1.5V Batteries	Yes	ATEX Optional	D-10 – D-11
Electro-Mechanical Single-Point Lubricator								
	**M60** **M150** **M250**	1-12 month	60 ml 150 ml 250 ml	7.5 bar (108 psi)	6V Batteries or 24 V DC	Yes		D-12 – D-13
	**MD125-B**	1-24 month	125 ml	35 or 15 bar (435 or 218 psi)	4.5V Batteries	No	Delivery Pressure Switchable	D-14 – D-15
Electro-Mechanical Multi-Point Lubricator								
	**MD125-V**	1-24 month Individually Adjustable	125 ml 250 ml	50 or 15 bar (725 or 218 psi)	24 V DC	No	Delivery Pressure Switchable, External Control / PLC	D-14 – D-15
	**MD400-B**	1-36 month	250 ml 400 ml	70 bar (1015 psi)	6V Batteries	No	1-2 Outlets	D-16 – D-18
	**MD400-V**	1 - 36 month Intermittent Operation Possible	250 ml 400 ml	70 bar (1015 psi)	24 V DC	No	1-2 Outlets	D-16 – D-18
	**MD400-D**	Individually Adjustable	250 ml 400 ml	70 bar (1015 psi)	24 V DC	No	1-4 Outlets External Control / PLC	D-16 – D-18

Type 125 / 475 Lubricators

The single-point lubrication system type 125 and type 475 is an electronically controlled lubricator which is based on the grease gun principle. After starting the operation, a nitrogen gas is generated electronically to move a piston.

Type 125 / 475 Long-Term Use

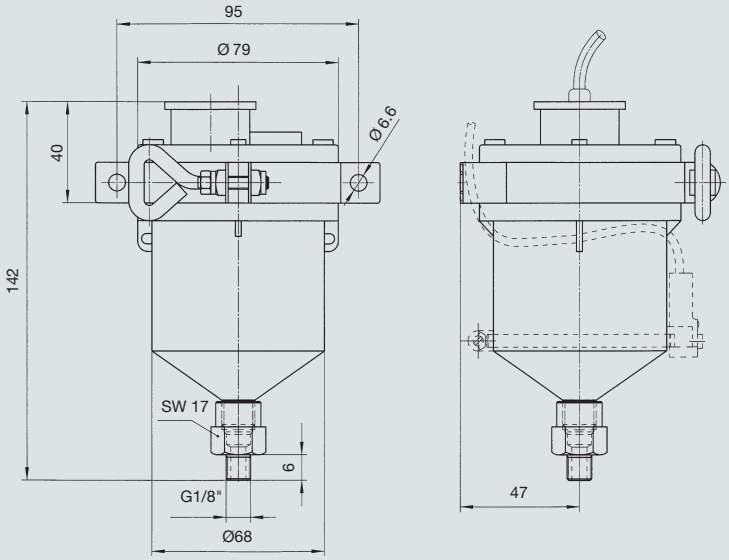
The grease filling by the type 125 and 475 is pressed out evenly (not pulsating) at constant pressure according to the selected dosage. Depending on requirements, a emptying time of 1-18 months can be selected for a grease filling via micro,switches.

The transparent housing, which can be mounted in any position, allows a visual check of the amount of grease still available at any time. After complete emptying, further use is possible by refilling.

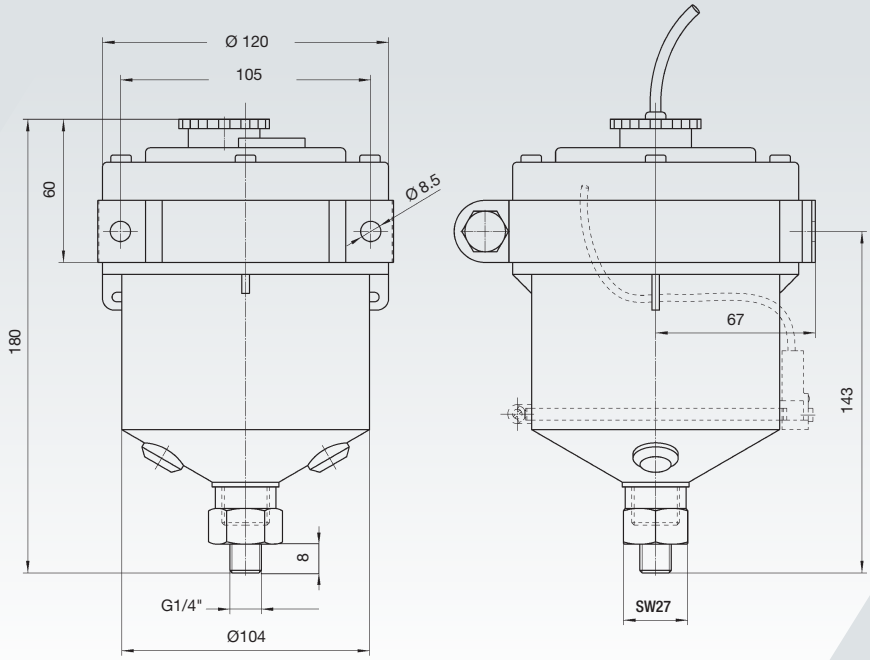
Advantages of Type 125 / 475 Lubricators

- Precise, reliable delivery of lubricant
- Battery operation
- Emptying time 1 - 18 months
- Synchronization with the machine operating time possible
- Visual check of level possible at all times
- Connection of hose line possible *
- Special grease fillings possible
- Delivery of oils and greases up to NLGI-1
- ATEX possible (II 2G Ex ib IIC T4 / T3 Gb)

* Hose length depends on lubricant and application



Type 125



Type 475

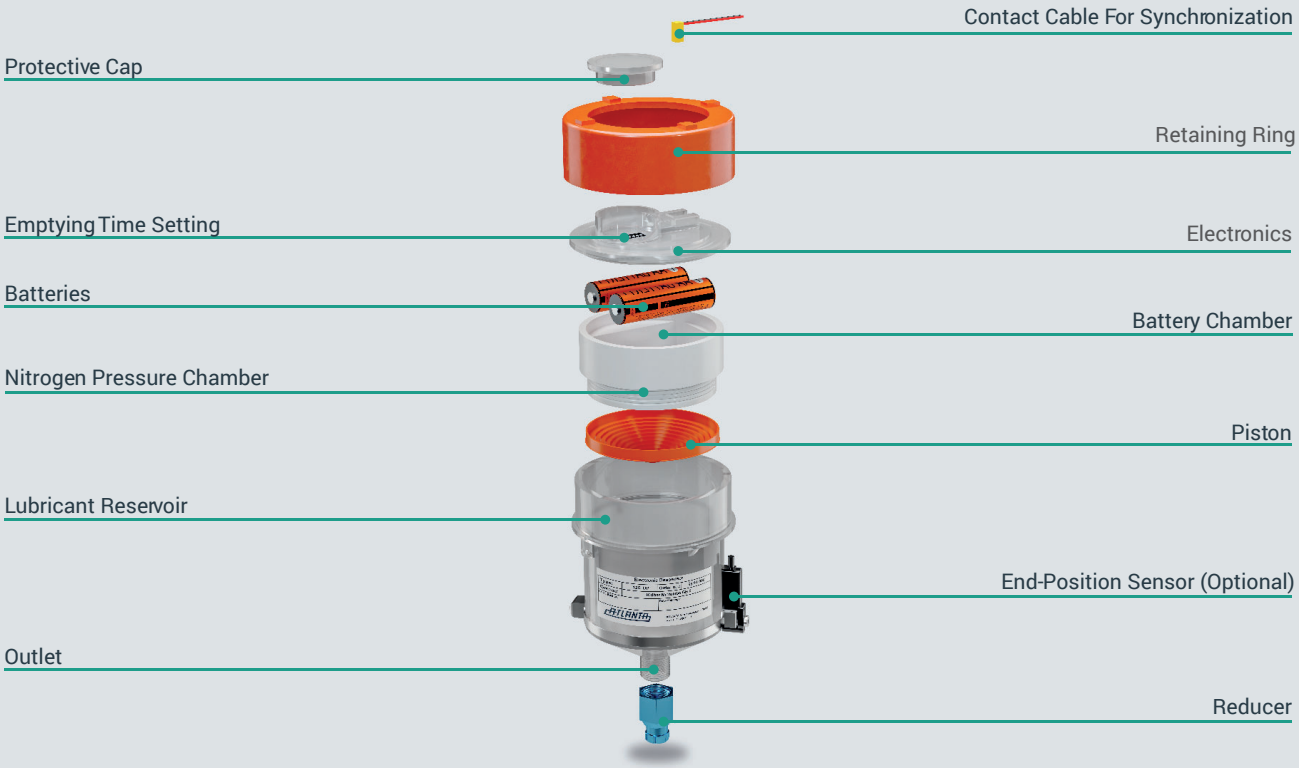
Technical Data

Lubricator Model		Type 125		Type 475	
		Without ATEX	With ATEX	Without ATEX	With ATEX
Order Code	Lubricant Type 1	65 91 000	65 91 006	65 91 007	-
	Lubricant Type 2	65 91 004		65 91 014	
	With Lubricant	65 91 009		65 91 069	
	Lubricant Type 1 + EP Sensor[1)]	65 91 050		65 91 056	
	Lubricant Typ 2 + EP Sensor[1)]	65 91 054		-	
	Without Lubricant + EP Sensor[1)]	65 91 059		-	

Drive	Nitrogen Pressure Chamber	
Operating Pressure	0.2 - 3.0 Bar / 2.9 - 43.5 psi	
Settings	1 - 18 Month	
Time or Pulse Control	Time Mode	
Lubrication Volume	100 ml	460 ml
Lubricating Medium	Oils & Greases Up To NLGI 1	
Temperature Range	- 30 °C to +50 °C	
Operating Voltage	3.0 V Batteries *	
Weight Empty	~ 420 g	~ 600 g
Dimensions H x Ø	100 x 80 mm	150 x 115 mm
Outlet	G1/4 / G1/8	G1/2 / G1/4
Performance Monitoring	LED Red/Green	

1) End-Position Sensor

Components



Spare Parts

Model	Type 125	Type 475
Nitrogen Pressure Chamber	65 91 001 *	65 91 017 *
Assembly Wrench	65 91 030	65 91 032
Mounting Insert	65 91 031	65 91 033

* Batteries are included

Type M60 / M150 / M250 Lubricators

The single-point lubrication system Type M is characterized by its reliable and user-friendly electronic control with an electromechanical drive. With its precise conveyor technology, this system is suitable for automatic lubrication of roller and sliding bearings, gear racks, open gears or chains and much more.

Type M - Reliable Automatic Lubrication

The lubrication system type M has a robust and very precise drive motor, which is powered by a 6V Li high performance battery or externally by means of a 24V adapter. The lubricant cartridge is simply screwed to the drive unit and the drive unit is reusable.

With a delivery pressure of 7.5 bar, type M operates automatically and temperature-independently for up to one year. The emptying time of the dispenser (dosing of the lubricant can be freely selected between 1 - 12 months. It is possible to change the setting or switch off the unit at any time.

The function control of the type M is carried out by a clearly visible LED . In addition, the fill level of the lubricant cartridge is clearly visible at all times through the transparent housing. After complete emptying, further use is possible by refilling.

The Advantages of Type M Lubricators

- Precise, reliable delivery of lubricant
- Battery operation, voltage supply 24V
- Delivery pressure max. 7.5 bar (109 psi)
- Emptying time 1 - 12 months
- Operating temperature -20 °C to +60 °C
- Visual warning of malfunction (LED)
- Visual inspection of the fill level possible at any time
- Flow rate independent of temperature
- Connection of hose line possible *
- Delivery of oils and greases up to NLGI-2
- Can be used outdoors
- Special grease fillings possible

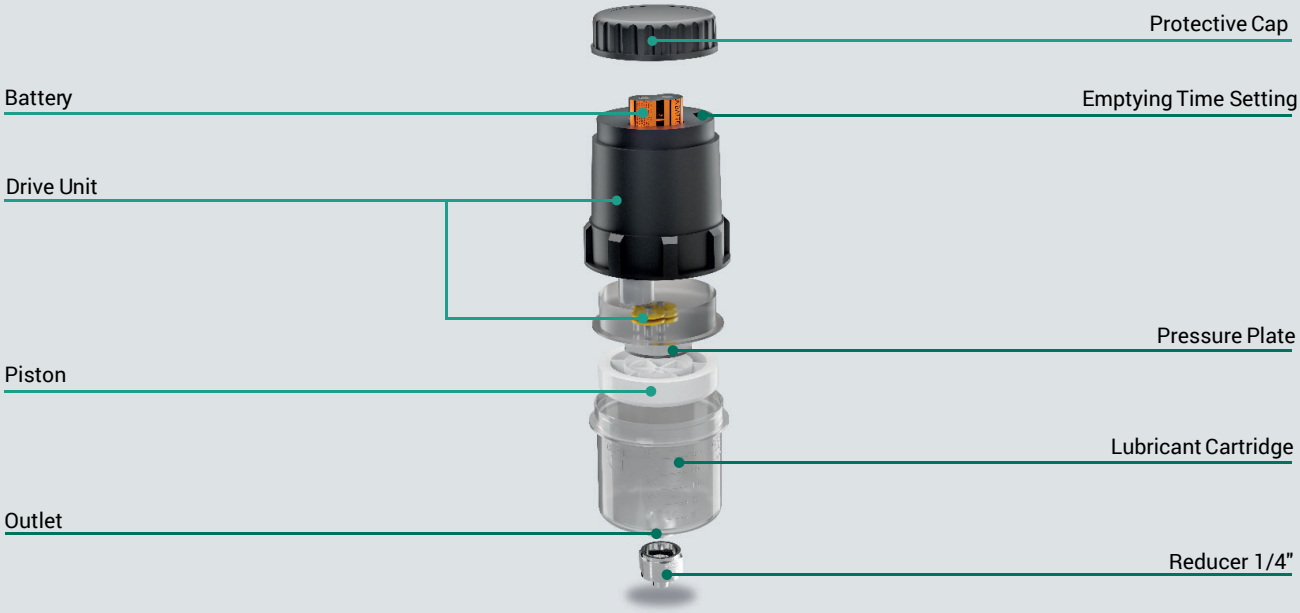
* Hose length depends on lubricant and application

Technical Data

Lubricator Model		Type M60	Type M150	Type M250
Order Code Drive Unit		65 70 000	65 70 010	65 70 020
Lubricant Cartridge Order Code	Lubricant Type 1	65 70 002 (60 ml)	65 70 012 (150 ml)	65 70 022 (250 ml)
	Lubricant Type 2	65 70 004 (60 ml)	65 70 014 (150 ml)	65 70 024 (250 ml)
	Without Lubricant	65 70 006 (60 ml)	65 70 016 (150 ml)	65 70 026 (250 ml)
Drive		Electro-Mechanical (Reusable)		
Operating Pressure		Maximum 7.5 bar (109 psi)		
Settings		1 - 12 Month		
Time or Pulse Control		Time Mode		
Lubrication Volume		60 ml	150 ml	250 ml
Lubricating Medium		Oils & Greases Up To NLGI 2		
Temperature Range		-20 °C to +60°C		
Operating Voltage		6.0 V (Li-Batteries) * or 24 V (Adapter)		
Weight Empty		510 g	570 g	700 g
Dimensions H x Ø		140 x 89 mm	166 x 89 mm	196 x 103 mm
Outlet		G1/2 / G1/4		
Performance Monitoring		LED Red / Green		

* Batteries are included in the drive unit

Components



Adapter For External Power Supply 24V

In addition to classic battery operation, the Type M lubricant dispenser is also available with external 24V power supply. Practical fact: With the 24V adapter even customers who are already using the battery-operated device can easily and inexpensively switch to an external power supply.

The Type M lubricant dispenser cap can be changed in seconds and intermittent machine-dependent operation is possible immediately. The adapter is connected using a two-core connection cable.

The Advantages of Type M

- No batteries so no additional costs
- Type M already in use can be retrofitted

Type MD125 Lubricators

The single-point lubrication system Type MD125 is a reliable and electronically controlled lubrication system with an electromechanical drive. It can also be used as a multi-point lubrication system by using of splitters or progressive distributors, and its extremely compact pump body and low weight make it particularly suitable for areas with limited space.

With its precise conveying technology, this system is suitable for automatic lubrication of roller and sliding bearings, gear racks, open gears, chains, ball screws, spindle drives and much more.

Type MD125 - Flexible & Compact

Type MD125 is available in two model variants: The MD125-B works with a 4.5V battery and an operating pressure of 15 or 35 bar (218 or 508 psi - switchable). The type MD125-V is operated with 24V DC and can optionally be connected to the existing PLC. The higher operating pressure of up to 15 or 50 bar (218 or 725 psi - switchable) opens up even more application possibilities.

In addition to the 125 ml cartridge, a larger 250 ml cartridge can also be screwed onto this model. With the built-in display and micro-controller specifi c lubrication intervals can be programmed. Due to its compact dimensions, the type MD 125 is ideally suited for retrofitting in many applications.

The Advantages of Type MD125 Lubricators

- Precise, reliable delivery of lubricant
- Battery operation, voltage supply 24V or connection to machine control system
- Delivery pressure 15 - 35/50 bar (174 - 508/725 psi) depending on design
- Emptying time 1 - 24 months
- Synchronization with the machine operating time possible
- Operating temperature -15 °C to +60 °C
- Visual warning of malfunction (LED and display)
- Visual inspection of the fill level possible at any time
- Empty report
- Flow rate independent of temperature
- Connection of hose line possible *
- Delivery of oils and greases up to NLGI-2
- Compact dimensions
- Special fillings available
- Adaptable to splitter / distributor

* Hose length depends on lubricant and application

Technical Data

Lubricator Model		Type MD125-B	Type MD125 -V
Lubricator Order Code		65 70 040	65 70 041
Lubricant Cartridge Order Code	Lubricant Type 1 125 ml	65 70 042	
	Lubricant Type 1 250 ml		65 70 043
	Without Lubricant 125 ml	65 70 046	
	Without Lubricant 250 ml		65 70 047
Drive Type		Electro-Mechanical (Reusable)	
Operating Pressure		15 / 35 bar (switchable) 174 / 508 psi (switchable)	15 / 50 bar (switchable) 174 / 725 psi (switchable)
Settings		1 - 24 Month	1 - 24 Month or Individually Adjustable
Time or Pulse Control		Time Mode	Time Mode or Pulse Control Individually Adjustable
Lubrication Volume		125 ml	125 ml / 250 ml
Lubricating Medium		Oils & Greases Up To NLGI 2	
Temperature Range		Al-Battery +15 bis / to +60°C Li-Battery -15 bis / to +60°C	-15 to +60°C
Operating Voltage		4.5 V *	24V DC
Weight Empty		350 g (without cartridge)	
Dimensions H x Ø		152 x 83 mm	
Outlet		M16x1.5 / M10x1	
Performance Monitoring		Display with LED	

* Batteries are not included

Components

Type MD400 Lubricators

The single & multi-point lubrication system Type MD400 is a reliable and easy to use electronic lubrication system. With its precise conveyor technology, this system is suitable for automatic lubrication of roller and sliding bearings, racks, open gears, chains, ball screws, spindle drives and much more.

The type MD400 lubrication system opens a new door in the world of automatic lubrication. With the extremely versatile MD400 lubrication system, both individual lubrication points and a whole group of different types of lubrication points can be continuously and safely supplied with lubricant over a long period of time.

Type MD400 - Flexible Lubrication

The lubrication system type MD400 is an extremely compact and powerful lubrication unit for oils and greases up to NLGI class 2. The lubrication system works either autonomously with a battery pack (3V) or via an external power supply (24V DC). Due to its compact dimensions, type MD400 is ideally suited for retrofitting in many applications.

The Advantages of Type MD400 Lubricators

- Precise, reliable delivery of lubricant
- Battery operation, voltage supply 24V or connection to machine control system
- Delivery pressure up to 70 bar (1015 psi)
- Dispensing period 1 - 36 months
- Synchronization with the machine operating time possible
- Operating temperature -15 °C to +70 °C
- Visual warning of malfunction (LED and display)
- Empty report
- Flow rate independent of temperature
- Visual inspection of the fill level possible at any time
- Connection of hose line possible *
- Delivery of oils and greases up to NLGI-2
- Special grease fillings possible
- Adaptable to splitter / distributor

* Hose length depends on lubricant and application

Technical Data

Lubricator Model	MD400-B		MD400-V		MD400-D			
Number of Outlets	1	2	1	2	1	2	3	4
Lubricator Order Code	65 70 061	65 70 062	65 70 071	65 70 072	65 70 081	65 70 082	-	-
Lubricator Order Code With Two Pumps	-		-		-	65 70 085	65 70 083	65 70 084
	Lubricant Cartridge Order Code							
Lubricant Type 1 250 ml	65 70 063							
Lubricant Typ 1 400 ml	65 70 064							
Without Lubricant 250 ml	65 70 067							
Without Lubricant 400 ml	65 70 068							
Drive Type	Electro-Mechanical (Reusable)							
Operating Pressure	Maximum 70 bar (1015 psi)							
Settings	1 - 36 Month		1 - 36 Month (Intermitten Operation Possible)		Individually Adjustable			
Time Or Pulse Control	Time Mode		Time Mode		Pulse Control			
Lubrication Volume	400 ml							
Lubricating Medium	Oils & Greases Up To NLGI 2							
Temperature Range	-15 °C to +70°C							
Operational Voltage	6.0 V (Li-Battery) *		24 V DC		24 V DC			
Display On The Device	Yes		Yes		No			
Weight Empty	1120 g							
Dimensions L x B x H	112 x 94 x 196 mm							
Outlet	1 - 4 x Ø6 mm							
Performance Monitoring	Display with LED				-			
Operation & Control	Directly On Device				External Control / PLC			

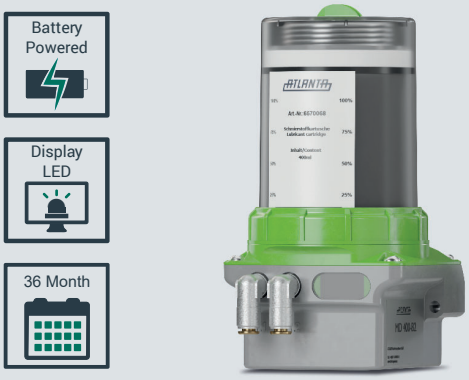
* Batteries are not included

Components

Model Variants

Type MD400-B Lubricators

Single / Multipoint-System With Battery Power



The battery-operated variant of the MD400 lubrication system is always used when a self-sufficent operation is desired or necessary. The highly efficient battery pack can optionally be sent to empty the lubricant cartridge over a period of 1-36 month.

- 1 or 2 outlets, 70 bar (1015 psi) supply pressure
- OLED-Display
- Quick-Check (Back-Pressure Readings)
- Readout of information via display possible

Type MD400-V Lubricators

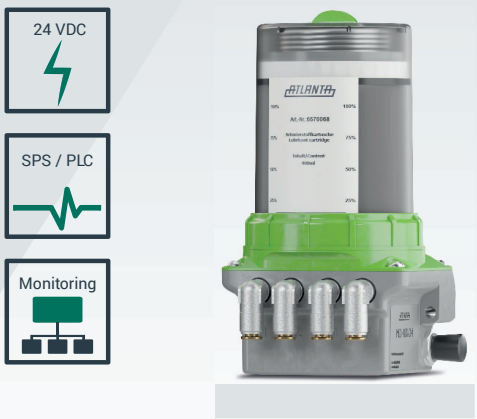
Single / Multipoint-System With Power Supply

The 24V variant of the MD400 lubrication system is always the right choice when a power supply can be simply attached. The MD400 V strengths become particularly apparent during intermittent operations.

- 1 or 2 Outlets, 70 bar (1015 psi) Supply Pressure
- OLED-Display
- Quick-Check (Back-Pressure Readings)
- Readout of information via display possible

Type MD400-D Lubricators

Single / Multipoint-System for PLC



MD400 D is designed for external control and 24 VDC voltage supply. Depending on the model, the MD400 lubrication system type D has 1, 2, 3 or 4 outlets. Connection to the PLC is required.

- 1, 2, 3 or 4 Outlets, 70 Bar (1015 psi) Supply Pressure
- Flexible, individual control by PLC
- Exact control and lubricant dosage
- Feedback to the connected unit

Accessories

On the following pages you can find various accessory components that could be very helpful for the installation of our lubrication systems. Depending on whether the lubrication system is to be attached directly to the lubrication point or indirectly installed to dispense via a hose. Here you will find the right connection parts for the simply and correct installing of our lubrication systems.

Please note that some connectors are only suitable for specific lubricant dispensers.

Fittings

Order Code	Description	Type 125/475	Type M	Type MD125	Type MD400	Material
65 71 000	Thread Adapter M16x1.5 to G1/4"			✓		Stainless Steel
65 71 001	Hose Adapter R1/4" to Ø8 mm	✓	✓			Brass Nickel-Plated
65 71 003	Reducer G1/2" to G1/4"	✓	✓			Brass Nickel-Plated
65 71 041	Reducer G1/4" to M6	✓	✓			Brass Nickel-Plated
65 71 042	Reducer G1/4" to M8	✓	✓			Brass Nickel-Plated
65 71 043	Reducer G1/4" to M8x1	✓	✓			Brass Nickel-Plated
65 71 044	Reducer G1/4" to G1/8"	✓	✓			Brass Nickel-Plated
65 71 061	Elbow Adapter	✓	✓	*	*	Brass Nickel-Plated
65 71 062	T-Adapter	*	*			Brass Nickel-Plated
65 91 025	Check Valve 0.2 bar G1/4" to R1/4"	✓	✓	*	*	Brass Nickel-Plated

* Optionally available

Brackets

Order Code	Description	Type 125/475	Type M	Type MD125	Type MD400	Material
65 70 019	Mounting Bracket	–	✓	–	–	Stainless Steel

Accessories

Lubrication Brush

Order Code	Description	Type 125/475	Type M	Type MD125	Type MD400	Material
65 91 010	Sliding-Type Lubrication Brush, Round	✓	✓	*	*	Stainless Steel

Hoses

Order Code	Description	Type 125/475	Type M	Type MD125	Type MD400	Material
65 71 962	High pressure hose Ø 6/4 mm, length 5m	–	–	✓	✓	PA12
65 71 963	High pressure hose Ø 6/4 mm, length 10m	–	–	✓	✓	PA12
65 71 964	High pressure hose Ø 6/4 mm, length 15m	–	–	✓	✓	PA12
65 71 965	High pressure hose Ø 6/4 mm, length 20m	–	–	✓	✓	PA12
65 71 970	Hose filling adapter for hose 8 mm	–	✓	–	–	Brass Nickel-Plated
65 71 960	Hose filling adapter for hose 6 mm	–	–	✓	✓	Brass Nickel-Plated

Accessories

Hose-Connection Set

Order Code	Description	Type 125/475	Type M	Type MD125	Type MD400	Consisting Of
65 91 020	Hose-connection set complete for connection to mounting shafts, Ø8/6 mm, length 2m , empty	✓	✓	–	–	PE-hose AL-Ø8 to IG G1/4 AL-Ø8 to AG G1/4
65 91 021	Hose-connection set complete for connection to mounting shafts, Ø8/6 mm, length 2m , filled with lubricant type 1	✓	✓	–	–	PE-hose AL-Ø8 to IG G1/4 AL-Ø8 to AG G1/4
65 71 014 **65 71 016** **65 71 962**	Hose-connection set complete for connection to mounting shafts, Ø6/4 mm, length 5m, empty	✓	–	✓	–	Fittings PE-hose
65 71 016 **65 71 963**	Hose-connection set complete for connection to mounting shafts, Ø6/4 mm, length 10m, empty	–	–	–	✓	Fitting PE-hose

Batteries & Adapter

Order Code	Description	Type 125/475	Type M	Type MD125	Type MD400
65 70 009	6V Battery for M60/150/250 Lubricator	–	✓	–	–
65 70 018	24V Adapter for M60/150 Lubricator	–	✓	–	–
65 70 028	24V Adapter for M250 Lubricator	–	✓	–	–
65 70 049	4.5V Al-Battery for MD125 Lubricator	–	–	✓	–
65 70 050	4.5V Li-Battery for MD125 Lubricator	–	–	✓	–
65 70 069	6V Li High Performance Battery for MD400 Lubricator	–	–	–	✓

Accessories For MD125 and MD400 Lubricators

Fittings

The MD125 & MD400 delivers the lubricant to the lubrication point with an operating pressure of up to 70 bar (1,015 psi). Accordingly, all connecting parts must also fulfill these requirements and are designed for pressures of up to 100 bar (1,450 psi).

Order Code	Description	Type MD125	Type MD400	Material
65 71 011	Hose adapter M6	✓	✓	Brass Nickel-Plated
65 71 002	Y-Hose adapter 3 x Ø6	✓	✓	Brass Nickel-Plated
65 71 012	Hose adapter M8	✓	✓	Brass Nickel-Plated
65 71 013	Hose adapter M8 x 1	✓	✓	Brass Nickel-Plated
65 71 014	Hose adapter M10 x 1	✓	✓	Brass Nickel-Plated
65 71 015	Hose adapter G1/8"	✓	✓	Brass Nickel-Plated
65 71 016	Hose adapter G1/4"	✓	✓	Brass Nickel-Plated
65 71 021	Hose adapter elbow M6	✓	✓	Brass Nickel-Plated
65 71 022	Hose adapter elbow M8	✓	✓	Brass Nickel-Plated
65 71 023	Hose adapter elbow M8 x 1	✓	✓	Brass Nickel-Plated
65 71 025	Hose adapter elbow G1/8"	✓	✓	Brass Nickel-Plated
65 71 026	Hose adapter elbow G1/4"	✓	✓	Brass Nickel-Plated

Accessories for MD125 and MD400 Lubricators

Splitter

Splitters portion the lubricant quantity evenly across the outlets and are suitable for greases up to NLGI grade 2. Splitters only work when used with the MD lubrication system piston pumps. The amount of lubricant yielded by the MD125 and MD400 lubrication system can be split into two, three or four parts and then transported to the lubrication point.

Order Code	Description	Type MD125	Type MD400	Material
65 71 902	Splitter, 1:2	✓	✓	Aluminium
65 71 903	Splitter, 1:3	✓	✓	Aluminium
65 71 904	Splitter, 1:4	✓	✓	Aluminium

Progressive Distributor

The progressive distributors for the MD125 and MD400 lubrication system have a variable modular design. Lubricant is progressively distributed via a follow-up piston. In this way, the amount of lubricant yielded by the MD125 and MD400 lubrication system can be split equally. Progressive distributors can be used greases up to NLGI grade 2.

Order Code	Description	Type MD125	Type MD400	Material
65 71 912	Distributor, 2 Outlets	✓	✓	Galvanized Steel
65 71 914	Distributor, 4 Outlets	✓	✓	Galvanized Steel
65 71 916	Distributor, 6 Outlets	✓	✓	Galvanized Steel
65 71 918	Distributor, 8 Outlets	✓	✓	Galvanized Steel

Accessories for MD125 and MD400 Lubricators

Connection Cables for MD125 and MD400 Lubricators

Connection cables are available in various lengths for the MD125 and MD400 lubrication system M12x1 connectors (4-pin, A-coded). The connection cable with LED angled connectors is particularly popular, as its LEDs also provide visual information about the device's operating status.

Order Code	Description	Type MD125	Type MD400
65 70 074	Connection cable, M12x1, opend end, 5 m	✓	✓
65 70 076	Connection cable, M12x1, open end, 10 m	✓	✓
65 70 075	Connection cable, M12x1 with LED angled socket, open end, 5 m	✓	✓
65 70 077	Connection cable, M12x1 with LED angled socket, open end, 10 m	✓	✓

Lubricants

Depending on the application, you will find lubricants that improve the performance and efficiency of your system. Our lubricants offer excellent wear protection, corrosion protection and long-term stability, giving you everything you need to extend the life of your machine and minimize downtime.

Order Code	Description	Brush	Felt Gear	Application
65 90 012	Lubricant Type 1 Cartridge 400 g This is a NLGI class 0 lubricant based on mineral oil and Li-Ca thickener with a temperature range of -20 to 120°C.	✓	✓	Eccentric presses, highly loaded spur and bevel gears, slide and guide rails, sump-lubricated roller bearings, gear lubrication up to peripheral speeds of approx. 3 m/s, trapezoidal spindles.
65 90 003	Lubricant Type 1 Can 1 liter This is a highly viscous mineral oil with temperature range 0 to 120°C	–	✓	Heavy loaded spur and bevel gear boxes, slide and guide rails, gear box lubrication with peripheral speeds of more than 3 m/s

Felt Gear Mounting Shafts

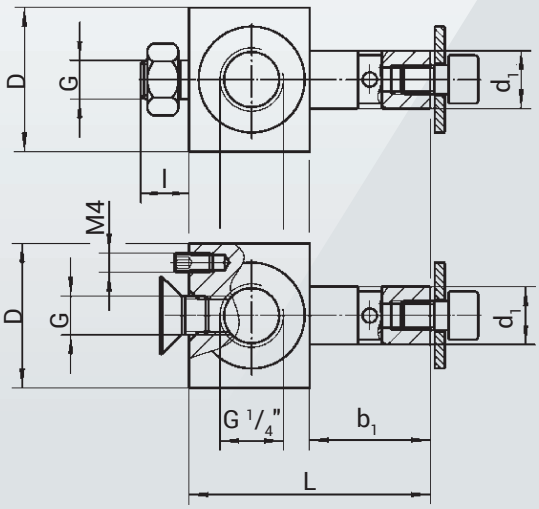


Figure 1

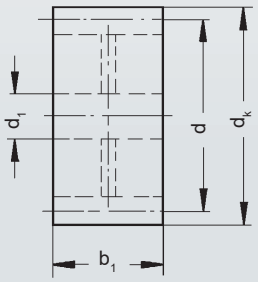
Figure 2

Order Code	Figure	For Modules	D	L	l	b_1	d_1	G	g
65 91 100	1	1, 1.5	30	40	10	15	12	M8	135.0
65 91 200	1	2	30	50	10	25	12	M8	143.0
65 91 210	2	2	30	50	-	25	12	M8	140.0
65 91 220	2	2	30	62	-	25	12	M8	150.0
65 91 300	1	3	30	55	10	30	12	M8	147.0
65 91 310	2	3	30	55	-	30	12	M8	145.0
65 91 320	2	3	30	66	-	30	12	M8	155.0
65 91 400	1	4	30	65	10	40	12	M8	154.0
65 91 410	2	4	30	65	-	40	12	M8	150.0
65 91 420	2	4	30	72	-	40	12	M8	160.0
65 91 500	1	5	50	75	15	50	20	M12	520.0
65 91 510	2	5	40	75	-	50	20	M8	510.0
65 91 520	2	5	40	85	-	50	20	M8	520.0
65 91 600	1	6	50	85	15	60	20	M12	545.0
65 91 610	2	6	40	85	-	60	20	M8	535.0
65 91 620	2	6	40	97	-	60	20	M8	550.0
65 91 800	1	8	50	105	15	80	20	M12	595.0
65 91 810	2	8	50	105	-	80	20	M8	560.0
65 91 820	2	8	50	118	-	80	20	M8	600.0
65 91 101	1	10	50	125	15	100	25	M12	650.0
65 91 111	2	10	50	125	-	100	25	M8	645.0
65 91 102	1	12	50	145	15	100	25	M12	830.0
65 91 112	2	12	50	145	-	100	25	M8	810.0

Felt Lubrication Gears

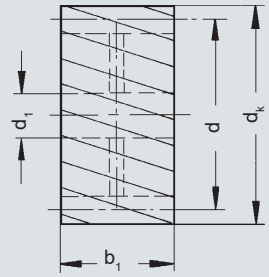
The lubricant passes through the axle and corresponding holes in the felt gear wheel. The felt used stores the lubricant and releases it again under low pressure in very small dosage quantities. Over-lubrication is avoided and wear in prevented.

Order Code	Module	No. of Teeth	d	d_k	d_1	b_1	g
65 91 140	1	40	40.0	42.0	12	15	7.5
65 91 126	1.5	26	39.0	42.0	12	15	7.2
65 91 228	2	19	38.0	42.0	12	25	11.0
65 91 236	2	36	72.0	76.0	12	25	22.0
65 91 328	3	19	57.0	63.0	12	30	37.0
65 91 428	4	19	76.0	84.0	12	40	98.0
65 91 518	5	18	90.0	100.0	20	50	133.0
65 91 618	6	18	108.0	120.0	20	60	234.0
65 91 818	8	18	144.0	160.0	20	80	562.0
65 91 118	10	18	180.0	200.0	25	100	750.0
65 91 115	12	15	180.0	204.0	25	100	800.0



Straight-Tooth

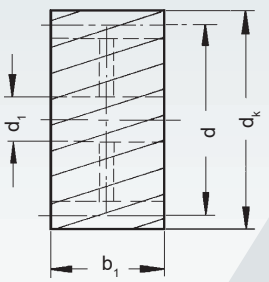
Order Code	Module	No. of Teeth	d	d_k	d_1	b_1	g
65 91 116	1.5	24	38.2	42.0	12	15	7.0
65 91 229	2	18	38.2	42.0	12	25	11.0
65 91 234	2	34	72.2	76.2	12	25	22.0
65 91 329	3	18	57.3	63.0	12	30	36.0
65 91 429	4	18	76.5	84.0	12	40	97.0
65 91 529	5	17	90.2	100.0	20	50	133.0
65 91 629	6	17	108.2	120.0	20	60	234.0
65 91 829	8	17	144.3	160.0	20	80	562.0
65 91 129	10	17	180.4	200.0	25	100	750.0
65 91 124	12	14	178.3	202.0	25	100	800.0



Pinion Lubrication

Helical-Tooth RH

Order Code	Module	No. of Teeth	d	d_k	d_1	b_1	g
65 91 106	1.5	24	38.2	42.0	12	15	7.0
65 91 218	2	18	38.2	42.0	12	25	11.0
65 91 318	3	18	57.3	63.0	12	30	36.0
65 91 418	4	18	76.5	84.0	12	40	97.0
65 91 517	5	17	90.2	100.0	20	50	133.0
65 91 617	6	17	108.2	120.0	20	60	234.0
65 91 817	8	17	144.3	160.0	20	80	562.0
65 91 117	10	17	180.4	200.0	25	100	750.0
65 91 114	12	14	178.3	202.0	25	100	800.0

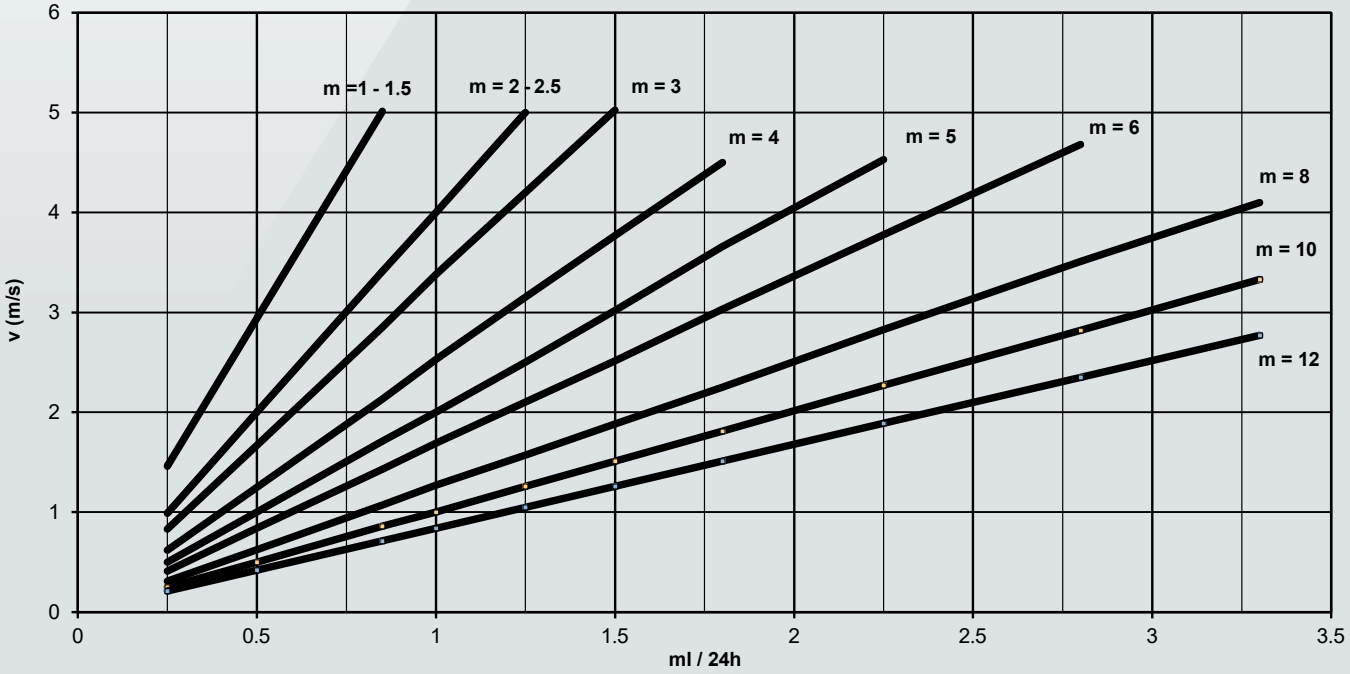


Rack Lubrication

Helical-Tooth LH

Lubrication Of Rack And Pinion Drives

For lubricating rack and pinion drives with a felt gear, the optimal grease supply can be seen from the diagram below. For lubricating with sliding brushes, a larger dosage should be selected. If you have values below 0.25 ml / 24 hours, please extend the corresponding line.



Lubricant Quantity Selection Tables

The tables below show you the optimal amount of lubricant you need for the lubrication system you are using.

Selection for Type 125 / Type 475 Lubricators

Lubricant / Day (ml)		Lubrication cycle (every x hours)	Lubricant per cycle (ml)	Selection Month	DIP-Switch
Type 125	Type 475				
7.14	34.00	Continuous		0.5	1-7
3.33	14.00			1	1+7
1.67	7.50			2	2+7
1.11	4.50			3	3+7
0.55	2.50			6	4+7
0.28	1.20			12	5+7
0.185	0.60			18	6+7

Selection for M60 / M150 / M250 Lubricators

Lubricant / Day (ml)			Lubricant per cycle (ml)			Selection Month	DIP-Switch	Lubrication cycle (every x hours)
M60	M150	M250	M60	M150	M250			
2.00	5.00	8.33	0.167	0.417	0.694	1	1	2
1.00	2.5	4.16				2	2	4
0.67	1.67	2.77				3	1+2	6
0.50	1.25	2.08				4	4	8
0.40	1.00	1.66				5	1+4	10
0.33	0.83	1.38				6	2+4	12
0.29	0.71	1.19				7	1+2+4	14
0.25	0.63	1.04				8	8	16
0.22	0.56	0.90				9	1+8	18
0.20	0.50	0.92				10	2+8	20
0.18	0.45	0.75				11	1+2+8	22
0.17	0.42	0.69				12	4+8	24

Selection for MD125 Lubricators

Lubricant / Day (ml)		Lubricant per cycle (ml)	Selection
MD125			
min. 0.16	max. 8.0	0.15	1-24 Monate / month
min. 0.16	max. 38.4		Zeitsteuerung / time mode
Individually Adjustable			Impulssteuerung / pulse control

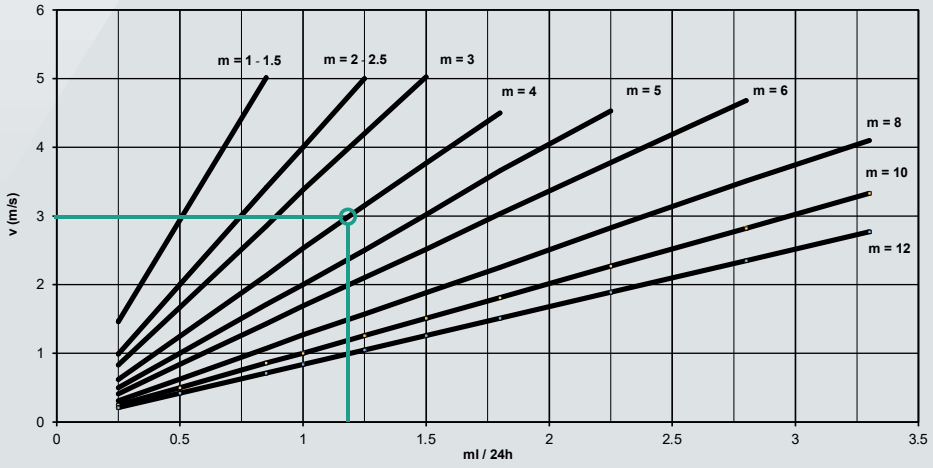
Selection for MD400 Lubricators

Lubricant / Day (ml)		Lubricant per cycle (ml)	Selection
MD125			
min. 0.36	max. 131	0.15	1-36 Month
min. 0.15	max. 108		Time Mode
Individually Adjustable			Pulse Control 1+2

Selection Example Of Lubricant Quantities

To select the required size of the lubrication unit and to set the lubrication for rack and pinion drives, please use the selection diagram on page D-27.

Draw a horizontal line from your required speed v (m/s) to the required module, here in the example module m=4, and draw a vertical line to the required value for the Lubrication ml/24h.



Now you can select the required lubricant quantity and the resulting draining times for the lubrication systems according to the selection tables on page 28.

For types MD125 and MD400 lubricators, you have to calculate the lubricant per cycle.

Here as an example the MD125 lubricator which is operated via the emptying time:

- 1.20ml/24h / 0.16 ml = 7.5 cycles/day, rounded up to 8 cycles/day

Then you should calculate the cyclesper day on the month:

- 0.16ml x 8 cycles/day x 30 days =38.4 ml/month

Now you can calculate the month setting:

- Lubricant cartridge with 125 ml / 38.4 ml/month = 3.2 month
- Here, we can select the setting 3 months.

Optionally you can also control via time control or pulse control.

In the time control, you should select the following setting:

- 24 hours / 8 cycles/day = one cycle every 3 hours

Impulse control should be set up according to the same principle.

Lubrication System Order Example

Please note, the electromechanical lubrication systems always consists of a drive unit and a lubricant cartridge.

Order Example:

MD400 with three outlets and lubrication cartridge lubricant type1

Step 1: Drive unit

In the technical data of the lubrication unit MD400 (page D-17)+
you will find the order code of the respective drive unit (marked blue)

Lubricator Model	MD400-B		MD400-V		MD400-D			
Number of Outlets	1	2	1	2	1	2	3	4
Lubricator Order Code	65 70 061	65 70 062	65 70 071	65 70 072	65 70 081	65 70 082	-	-
Lubricator Order Code With Two Pumps	-		-		-	65 70 085	65 70 083	65 70 084
	Lubricant Cartridge Order Code							
Lubricant type 1 250ml	65 70 063							
Lubricant type 1 400ml	65 70 064							
Without Lubricant 250ml	65 70 067							
Without Lubricant 400ml	65 70 068							

Step 2: Lubricant Cartridge

Our standard lubricant cartridge can be found in the following sections horizontal lines (marked green)

Thus the order consists of:

- The drive unit order code: 65 70 083
- The lubricant cartridge order code: 65 70 064

Accessories such as connecting hoses, fittings, distributors, connecting cables, felt-lubricating gears, and much more can be found on the pages D-19 to D-26.

For battery-operated drive units, additional batteries are still necessary

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