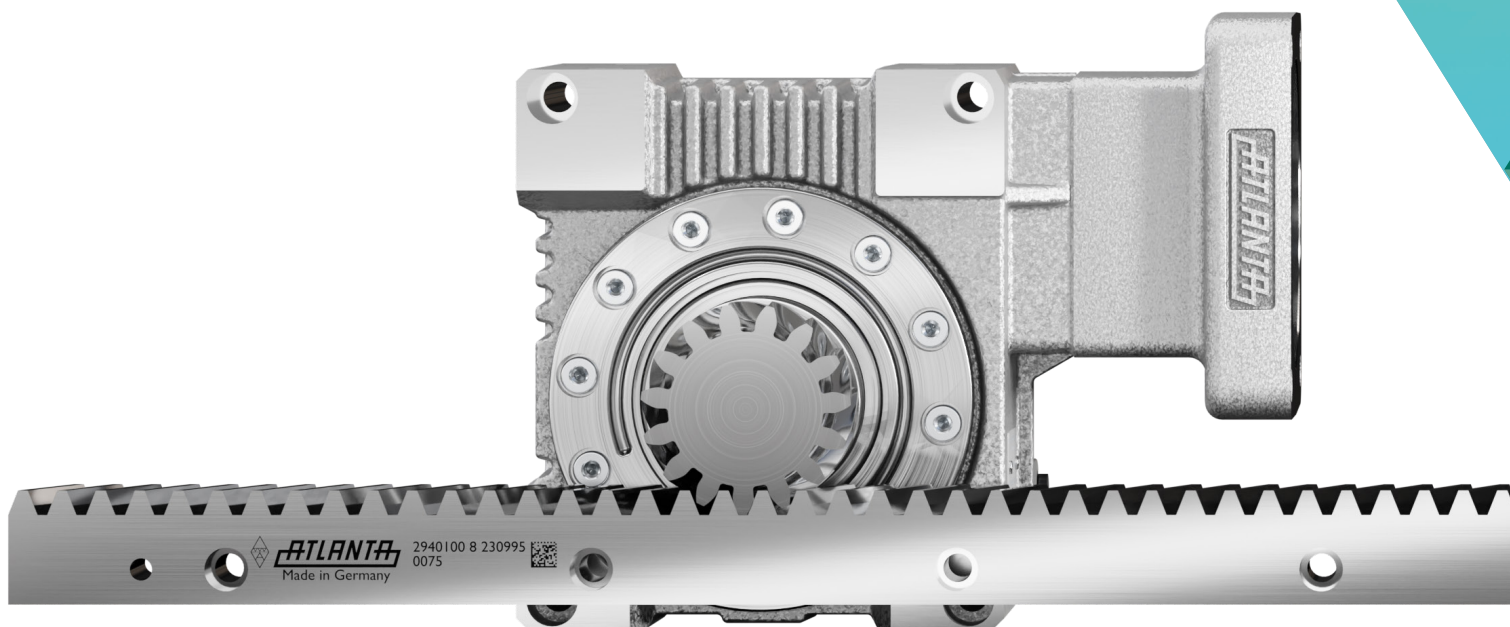




# Servo Drive Systems

**ATLANTA**

|                                 | Chapter |
|---------------------------------|---------|
| <b>Innovative Drive Systems</b> | A       |
| <b>Servo-Worm Gearboxes</b>     | B       |
| <b>Rack &amp; Pinions</b>       | C       |
| <b>Lubrication Systems</b>      | D       |





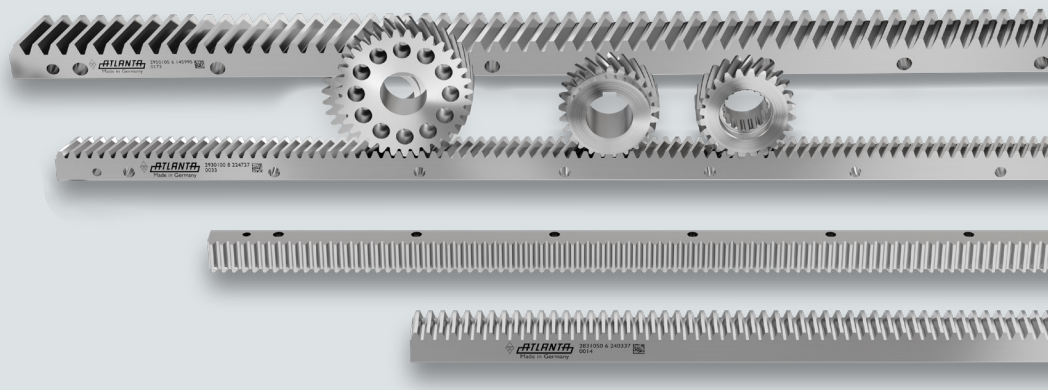
# Innovative Drive Systems for the Highest Demands

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.



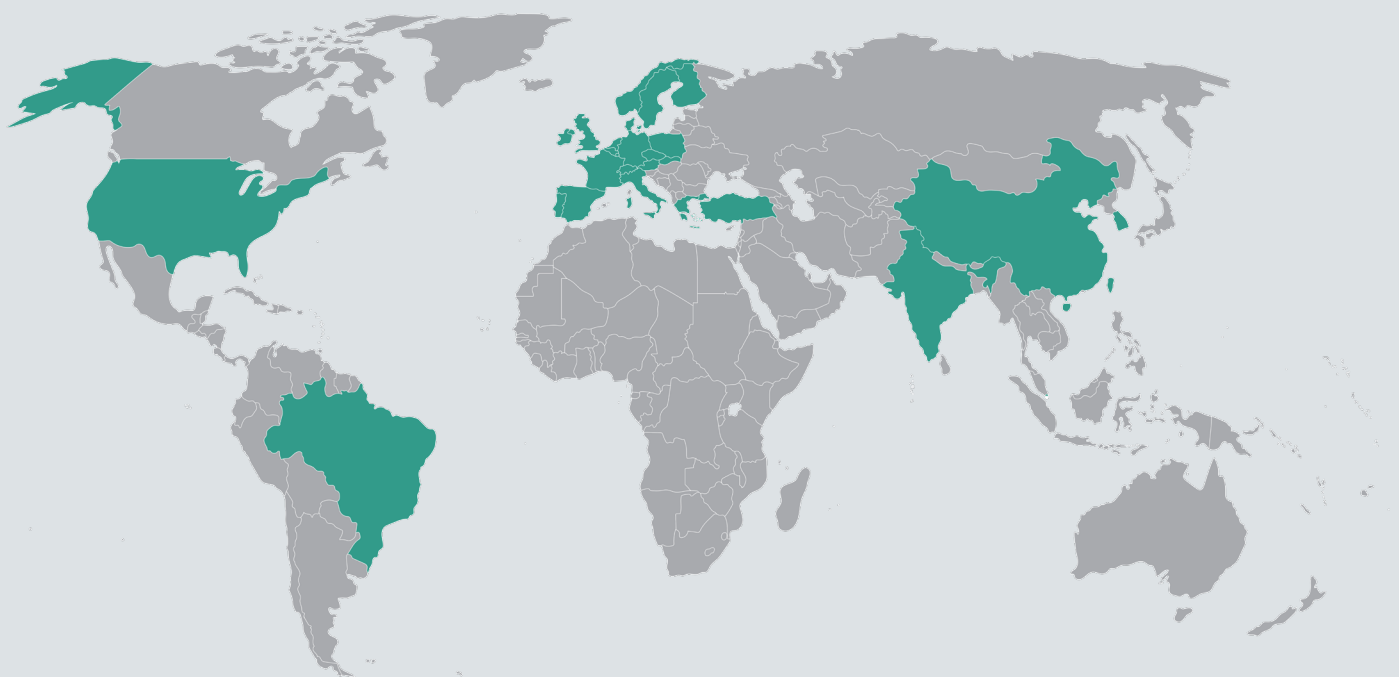




## Qualified Staff And Modern Production Technologies Are The Guarantee For Our Success

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.

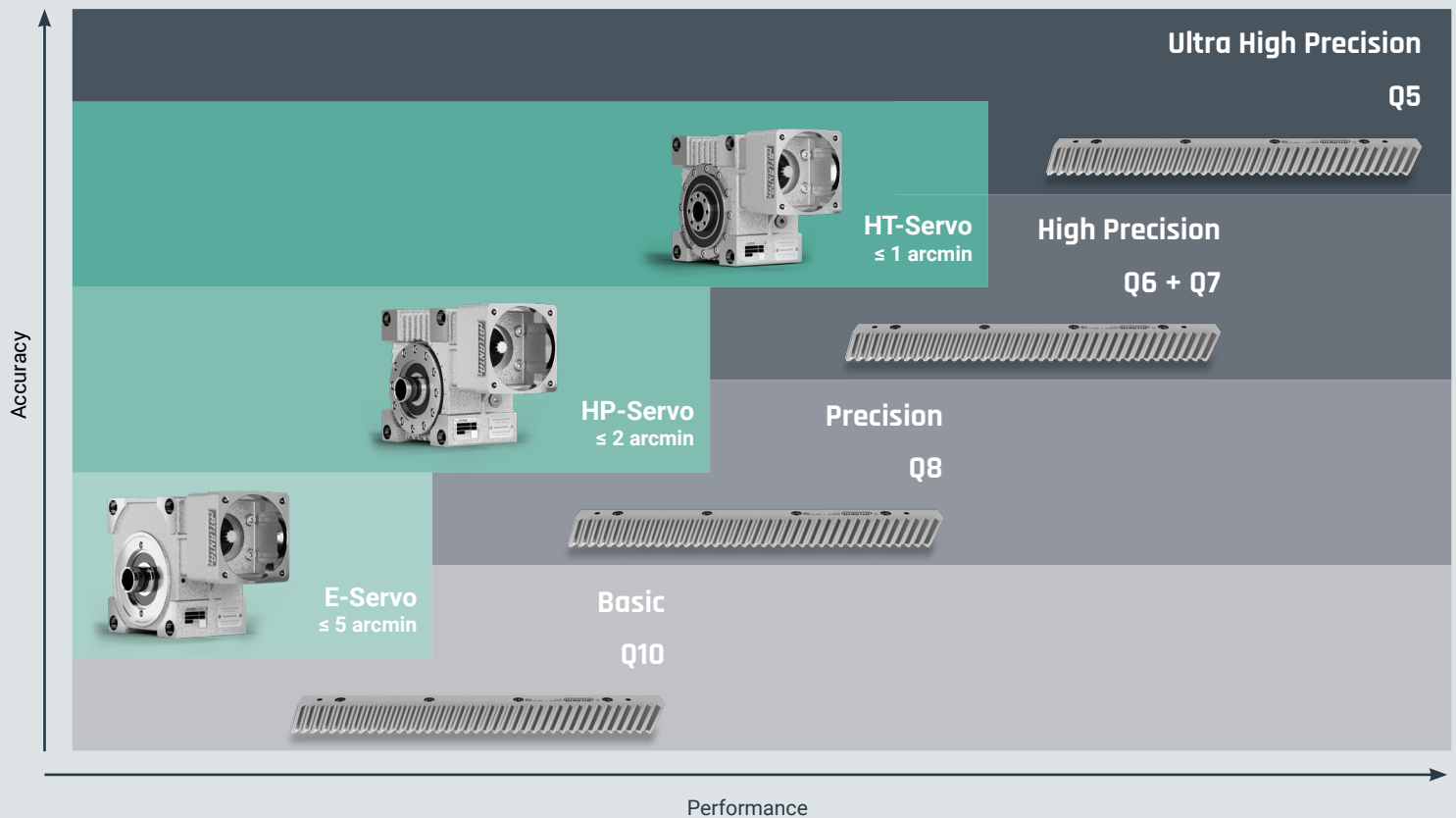
## Industry Specific Drive Solutions

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.

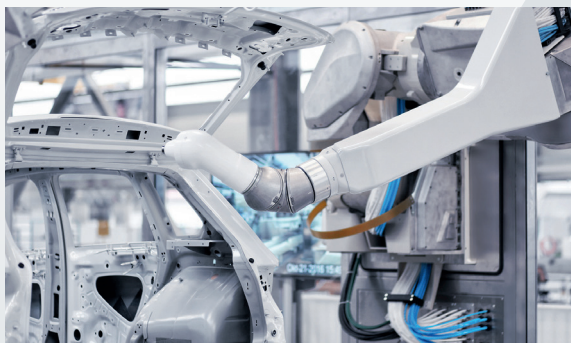
**Trust In The Well-Known Premium Quality From ATLANTA!**





## Robotics

Foto: Dürr AG



## Material Handling

Foto: Vansichen Lineartechnik Belgium



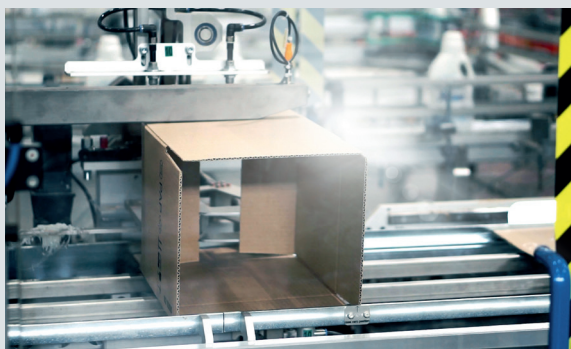
## Automation



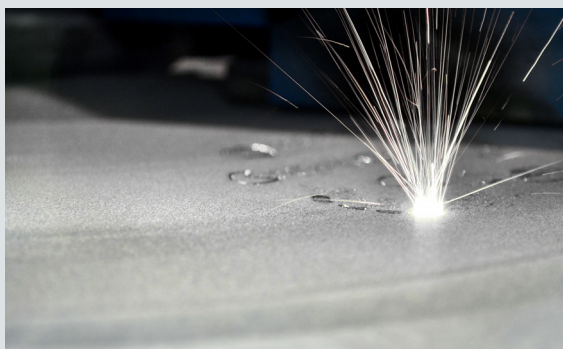
## Machine Tools



## Packaging Machinery



## Additive Manufacturing



## Conveyor Technology



## Measuring Technology

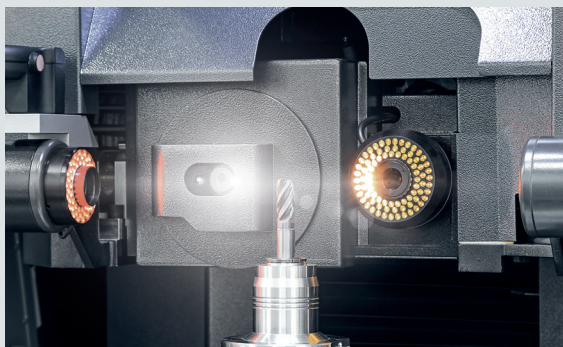


Foto: E. ZOLLER GmbH & Co. KG

## 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

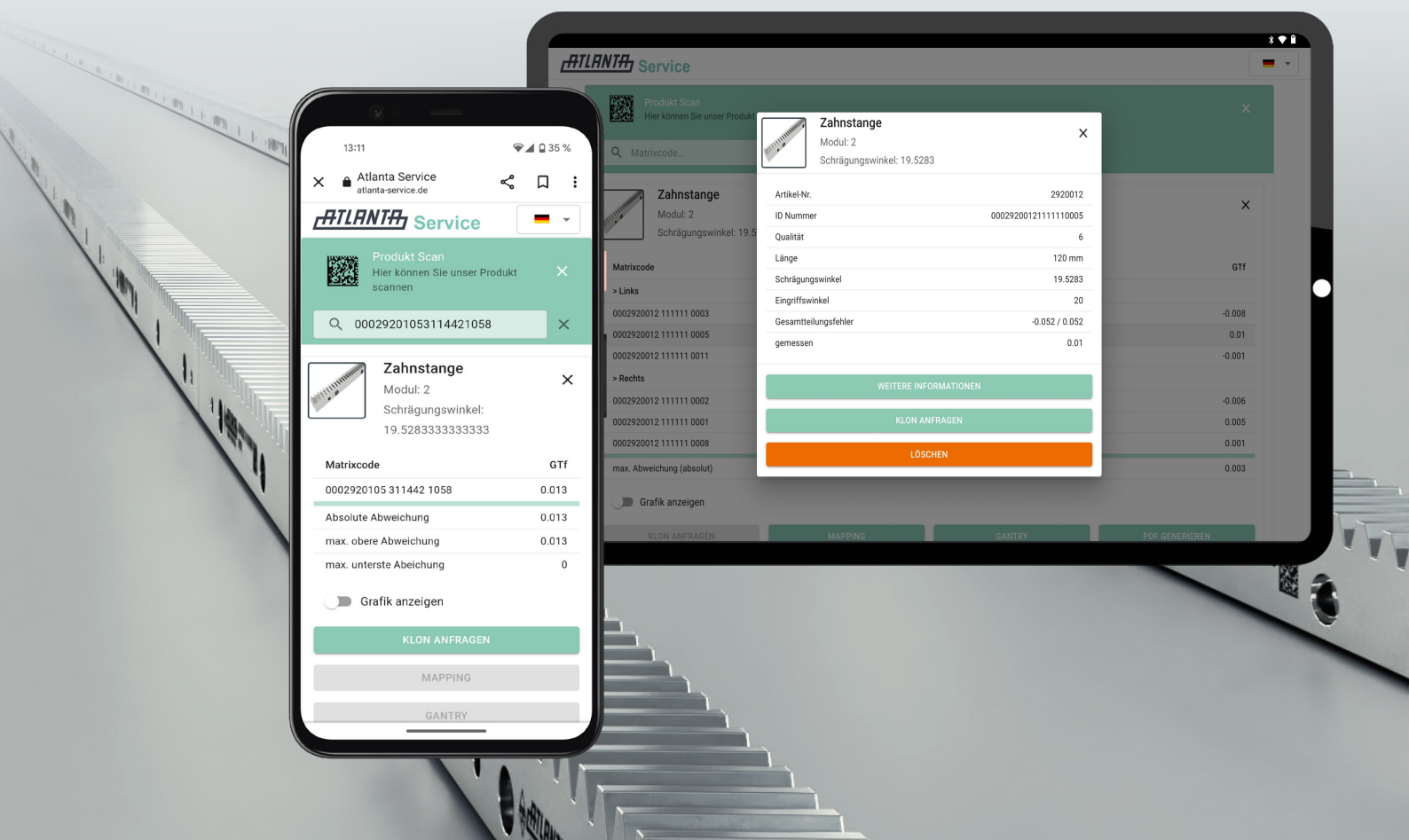
#### Digital Twin

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](http://www.atlanta-service.com)



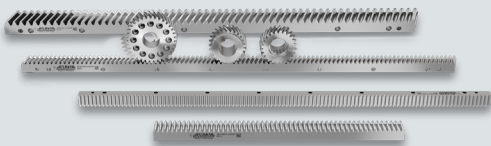
## Product Range

### Servo-Worm Gearboxes



- ✱ Three Variations (High Torque, High Performance and Economy)
- ✱ Backlash from  $\leq 1$  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  $\leq 0.022$  mm per meter
- ✱ Tooth Thickness Tolerances to 15  $\mu\text{m}$
- ✱ Feed Forces up to 409 kN

### Automatic Lubrication Systems

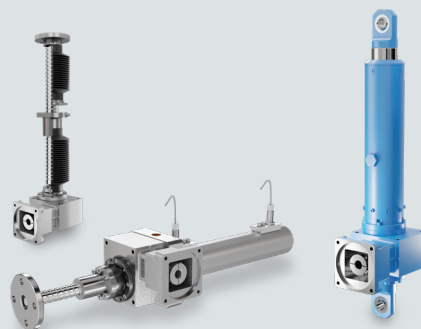


- ✱ Four different electronic lubrication systems
- ✱ For single and multi-point lubrication
- ✱ Felt lubrication pinion for an even supply of lubricant
- ✱ Individually adjustable emptying time up to 36 months
- ✱ Up to 70 bar (1,015 psi) delivery pressure for long supply routes

### Special Gearboxes & Parts



### Linear Actuators



Further information can be found at:  
**[www.atlantadrives.com](http://www.atlantadrives.com)**



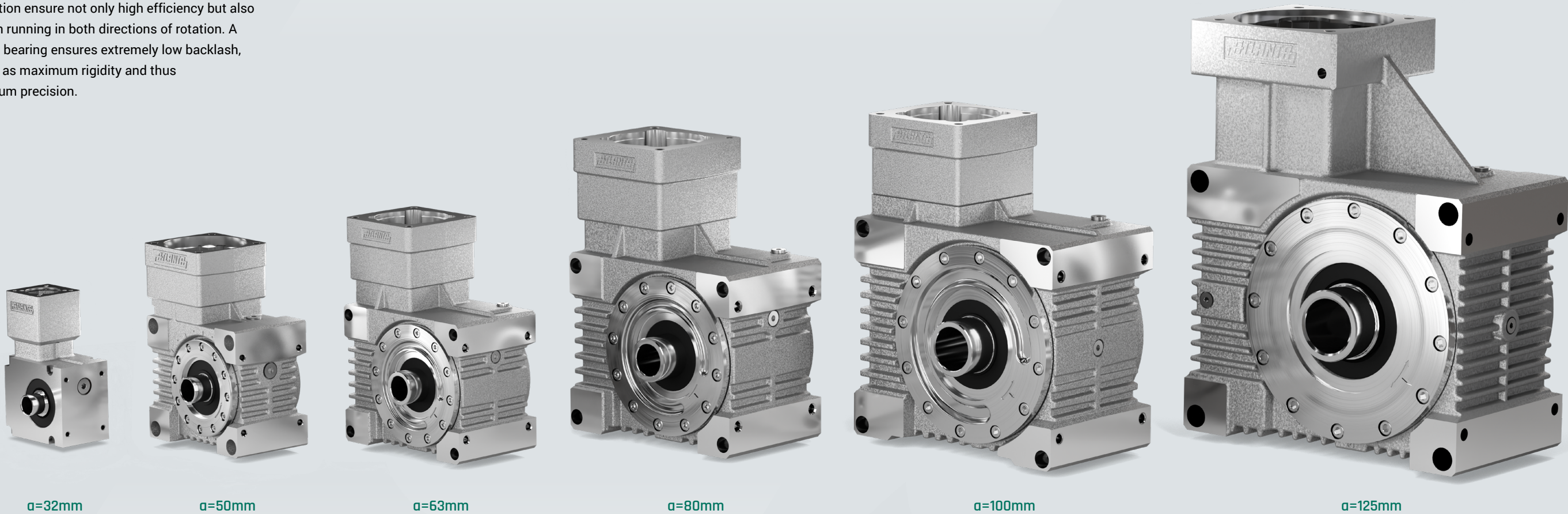
|                                                   | Page        |
|---------------------------------------------------|-------------|
| <b>ATLANTA Servo-Worm Gearboxes</b>               | B-4 – B-7   |
| <b>Overview ATLANTA Servo Worm Gearbox Family</b> | B-8 – B-9   |
| <b>High-Torque (HT) Servo-Worm Gearboxes</b>      | B-11 – B-22 |
| <b>High-Performance (HP) Servo-Worm Gearboxes</b> | B-23 – B-36 |
| <b>Economy (E) Servo-Worm Gearboxes</b>           | B-37 – B-50 |
| <b>Gearbox Calculation and Selection</b>          | B-52 – B-53 |
| <b>Input Couplings</b>                            | B-54 – B-55 |
| <b>Output Compression Couplings</b>               | B-56        |
| <b>Pinion Shafts for Servo-Worm Gearboxes</b>     | B-57 – B-60 |
| <b>Preload Split-Pinion Shafts</b>                | B-61 – B-63 |



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.

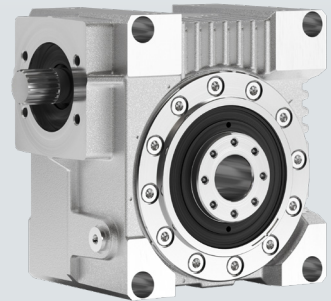
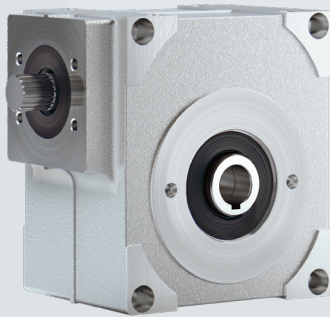
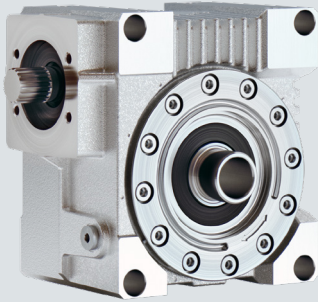


The Right Size For Every Application

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.

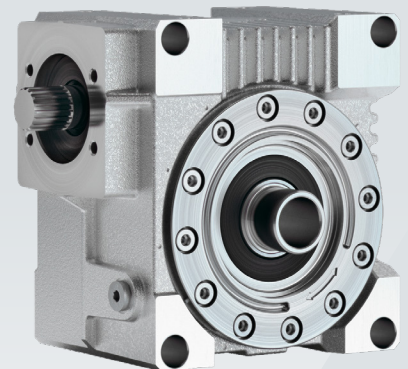
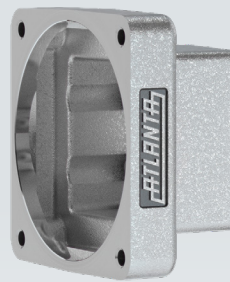
## Output

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.

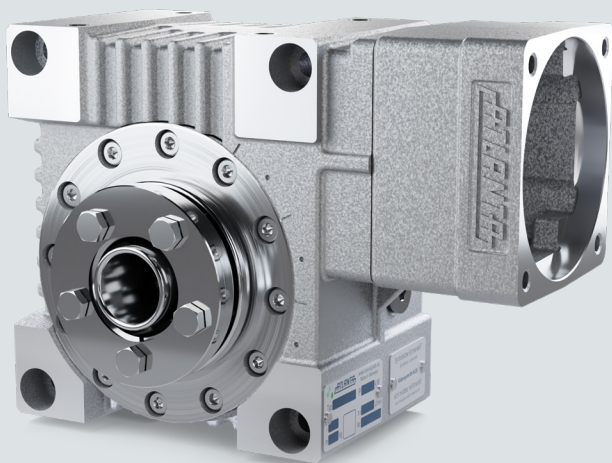




## Input & Output Couplings

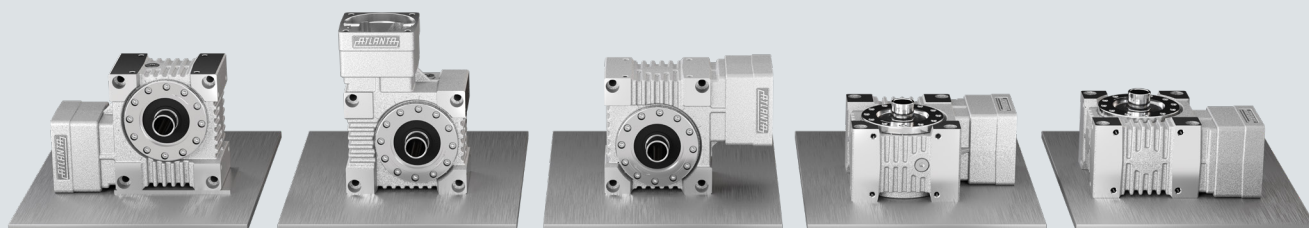
To ensure a backlash-free drive and maximum power transmission, the connection between our servo-worm gearboxes and a drive motor is made by a special input coupling, the internal teeth of which, together with the drive shaft of the gearbox, correspond to the gear hub profile analogous to DIN 5480.

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.

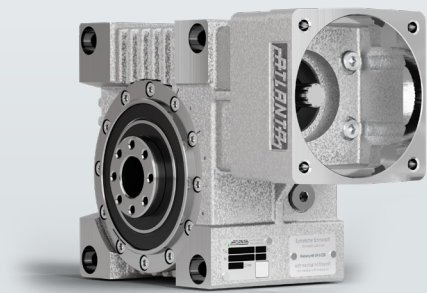


## Installation In All Positions

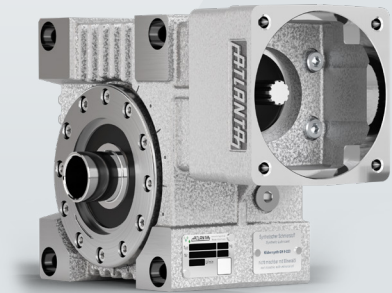
For the assembly of our worm gearboxes, 5 machined mounting surfaces with fixing and threaded holes are available for tension-free assembly in all mounting positions.



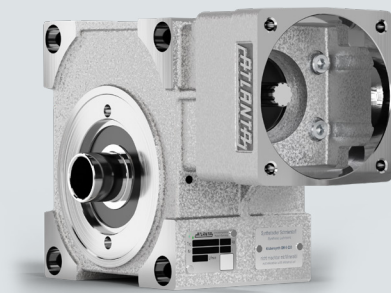
Servo-Worm Gearboxes Range Overview



HT High-Torque  
Servo-Worm Gearboxes



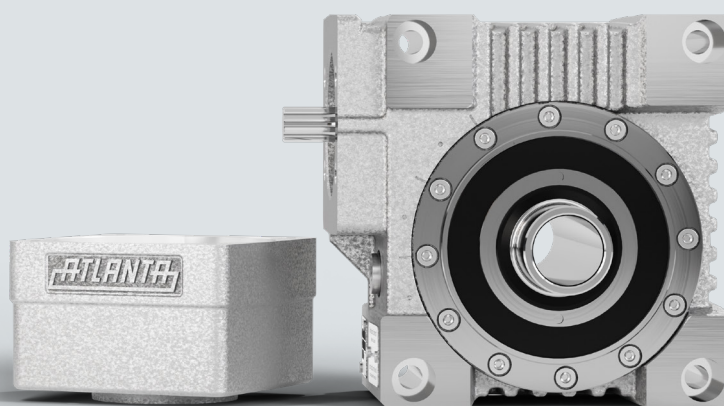
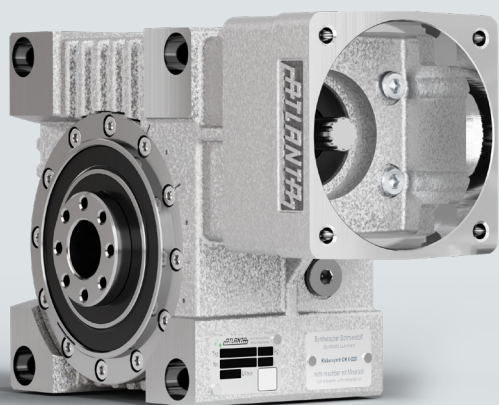
HP High-Performance  
Servo-Worm Gearboxes



E Economy  
Servo-Worm Gearboxes

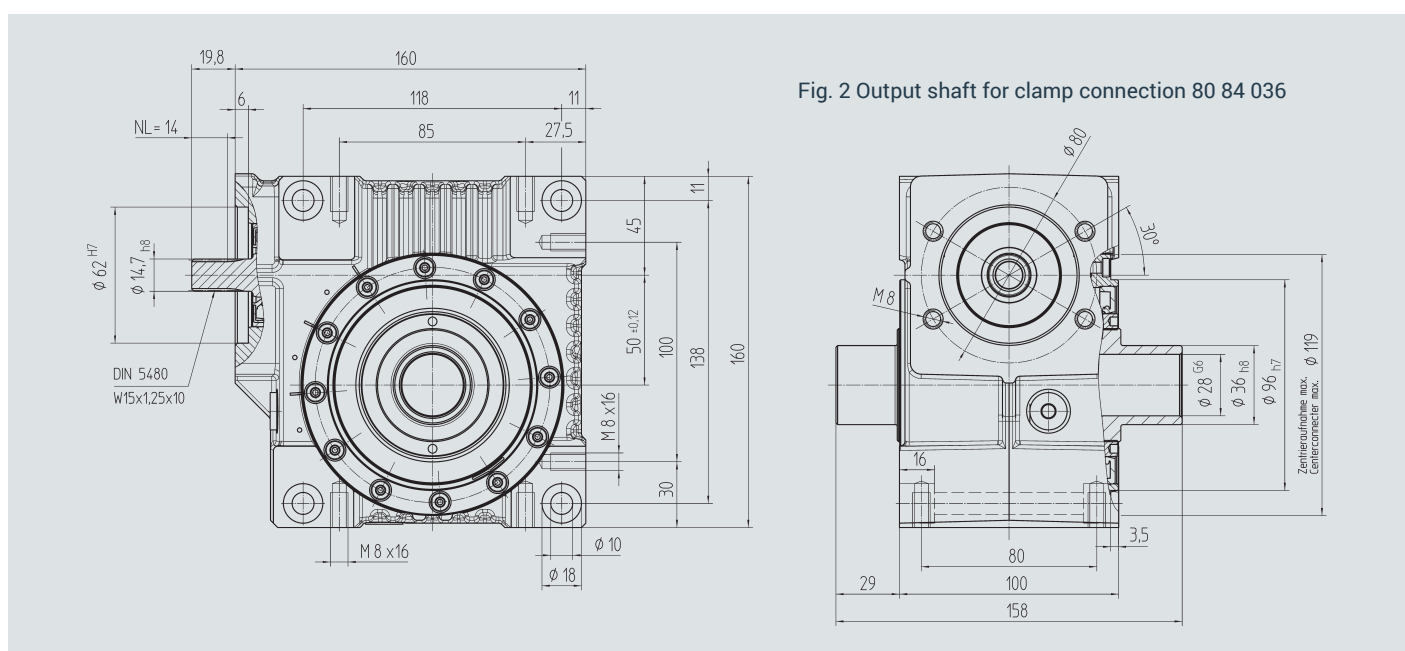
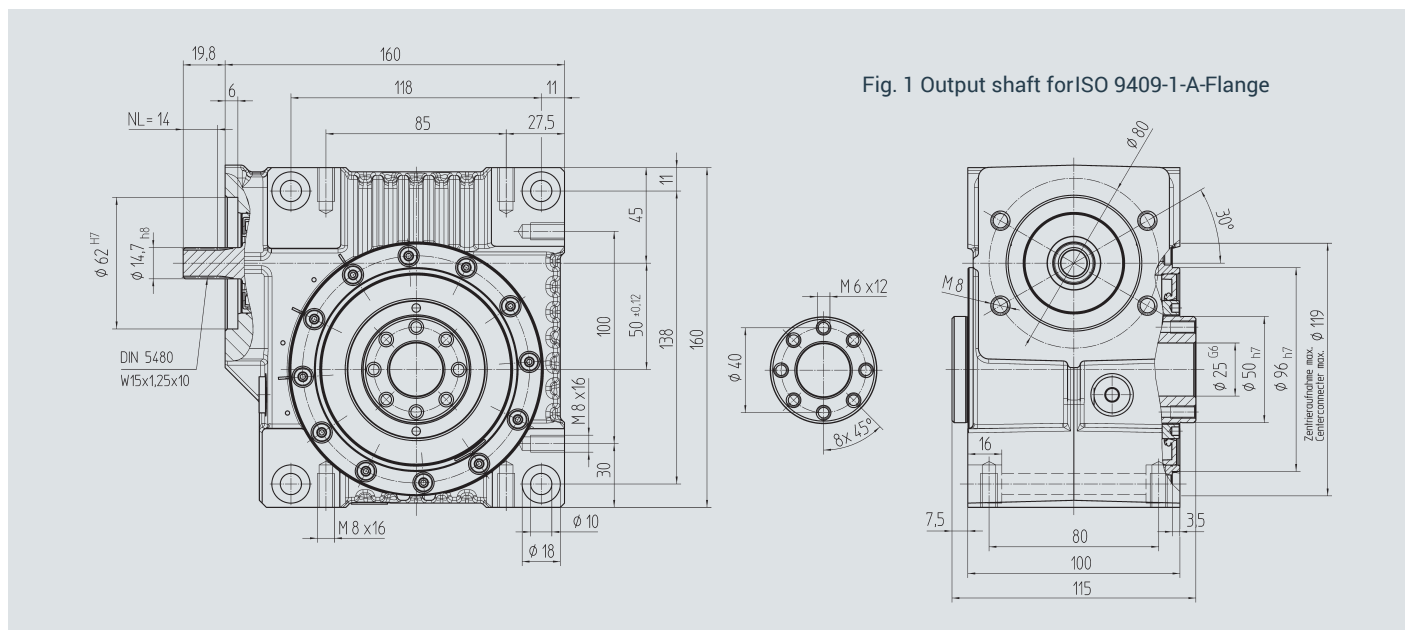
|                               |                                                |                                                |                                                |
|-------------------------------|------------------------------------------------|------------------------------------------------|------------------------------------------------|
| 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                                      |

|                        | Page        |
|------------------------|-------------|
| Center Distance 50 mm  | B-12 – B-13 |
| Center Distance 63 mm  | B-14 – B-15 |
| Center Distance 80 mm  | B-16 – B-17 |
| Center Distance 100 mm | B-18 – B-19 |
| Selection and Ratings  | B-20 – B-22 |





Center Distance  $a_0 = 50$  mm

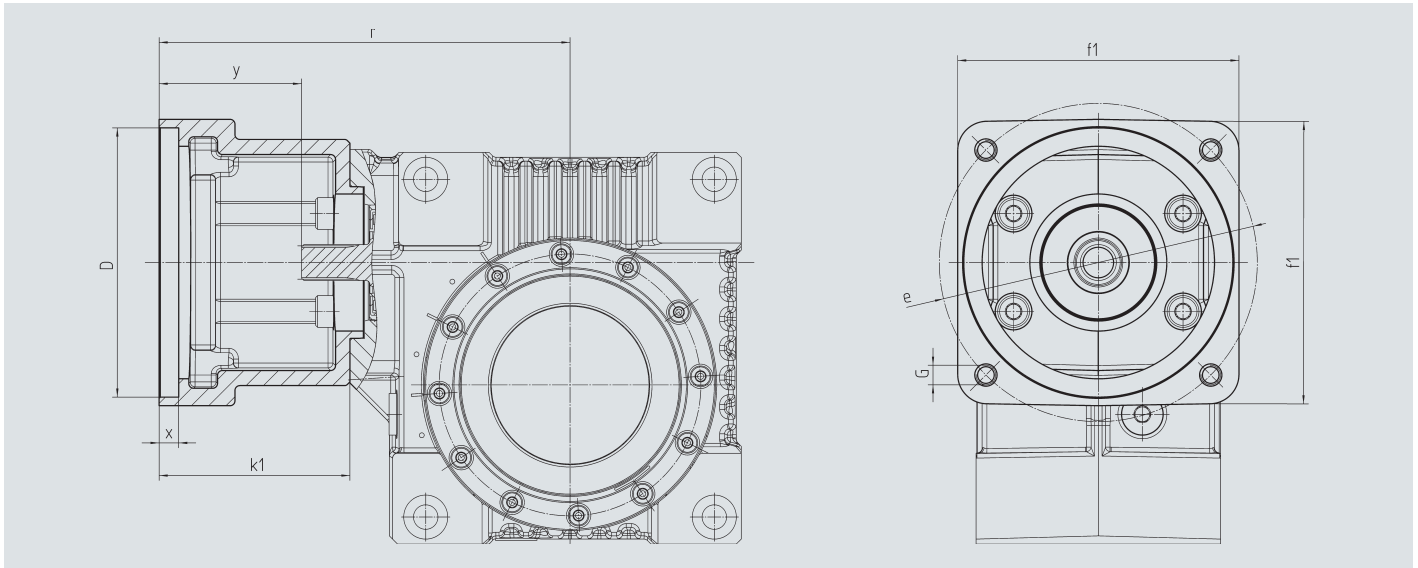


| Order Code<br>Fig. 1 | Fig. 2    | Ratio $i$ | $J_{red}$ kg | $J_{red}$ $10^{-4}$ kg m <sup>2</sup> |
|----------------------|-----------|-----------|--------------|---------------------------------------|
| 98 03 005            | 98 13 005 | 4.75      | 7.0          | 0.8280                                |
| 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 1xx / 98 13 1xx

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

## Motor Flange



Center Distance  $a_0 = 50 \text{ mm}$

| Order Code | D <sup>67</sup> | k <sub>1</sub> | r   | x    | y   | f <sub>1</sub> | 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  $a_0 = 63 \text{ mm}$

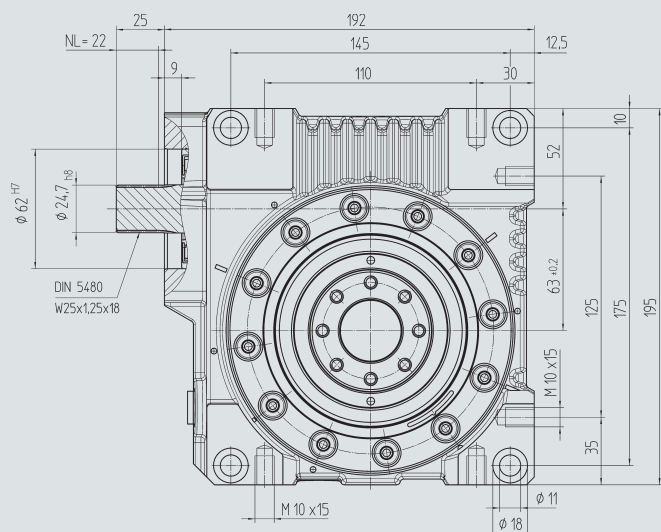


Fig. 1 Output shaft with ISO 9409-1-A-50 flange

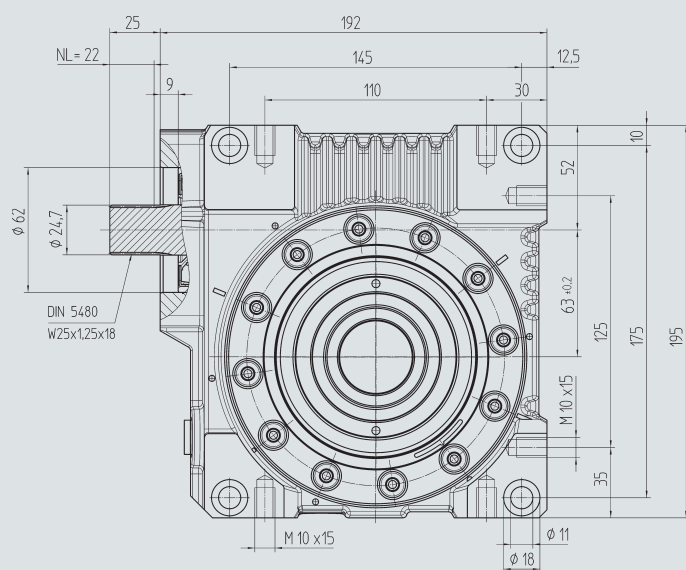
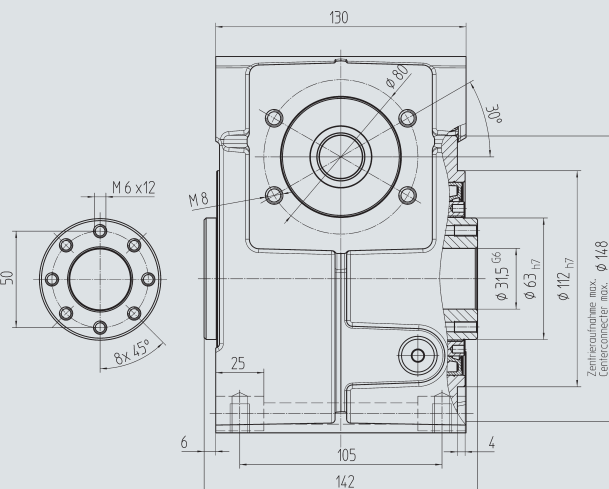
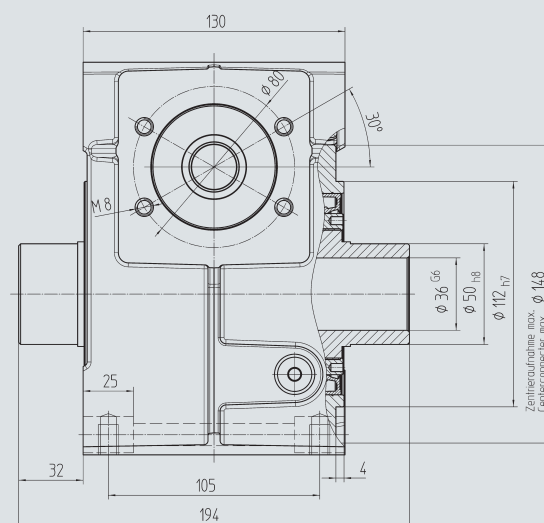


Fig. 2 Output shaft for clamp connection 80 85 050



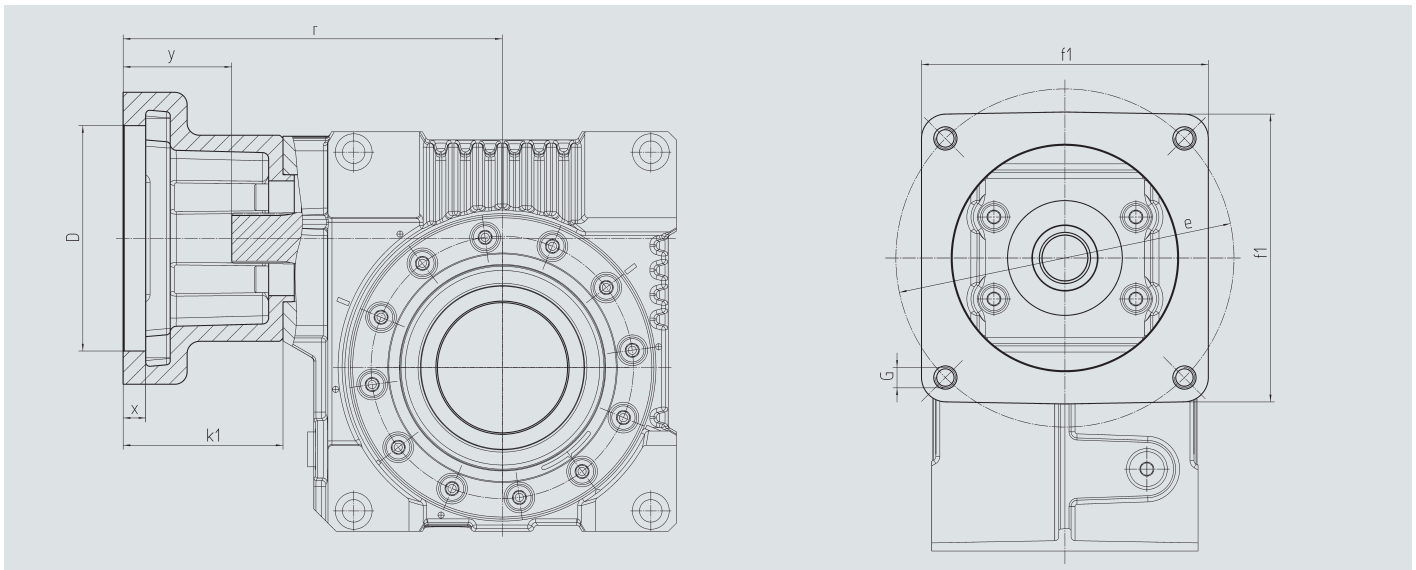
| Order Code<br>Fig. 1 | Fig. 2    | Ratio i |  | J <sub>red</sub> 10 <sup>-4</sup> kg m <sup>2</sup> |
|----------------------|-----------|---------|---------------------------------------------------------------------------------------|-----------------------------------------------------|
| 98 04 005            | 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 1xx / 98 14 1xx

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



## Motor Flange

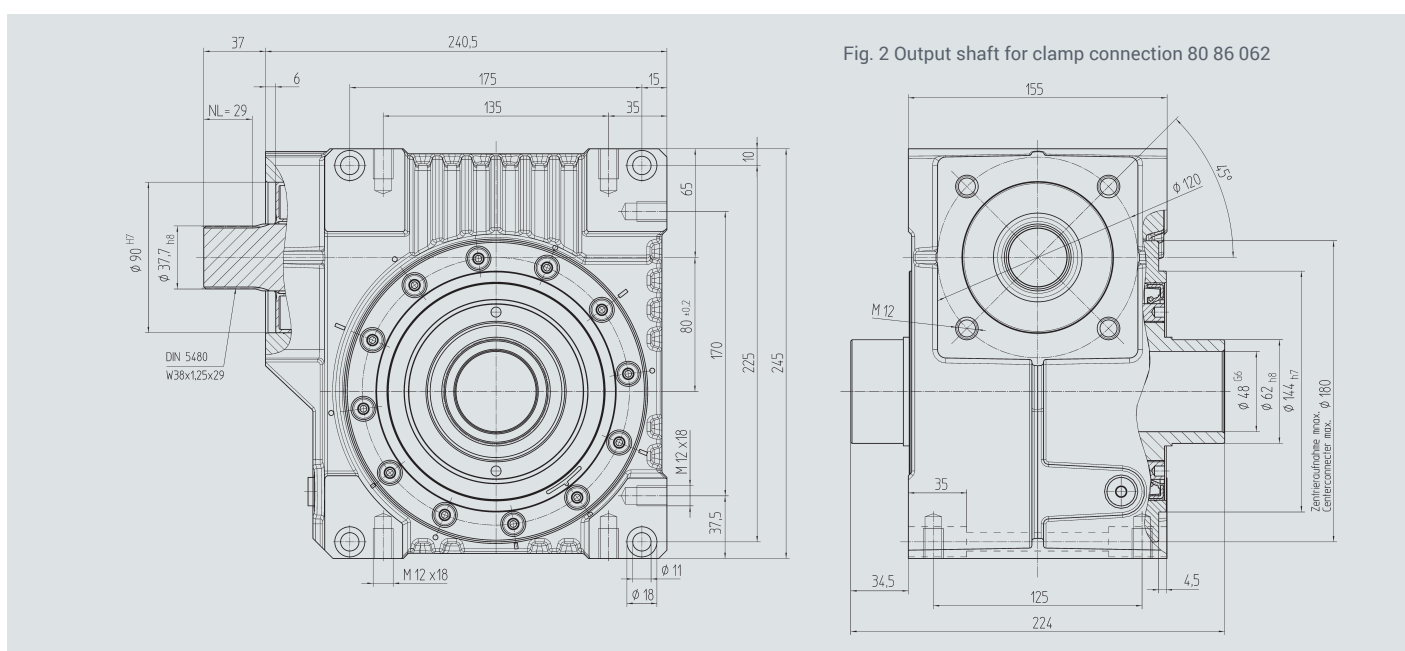
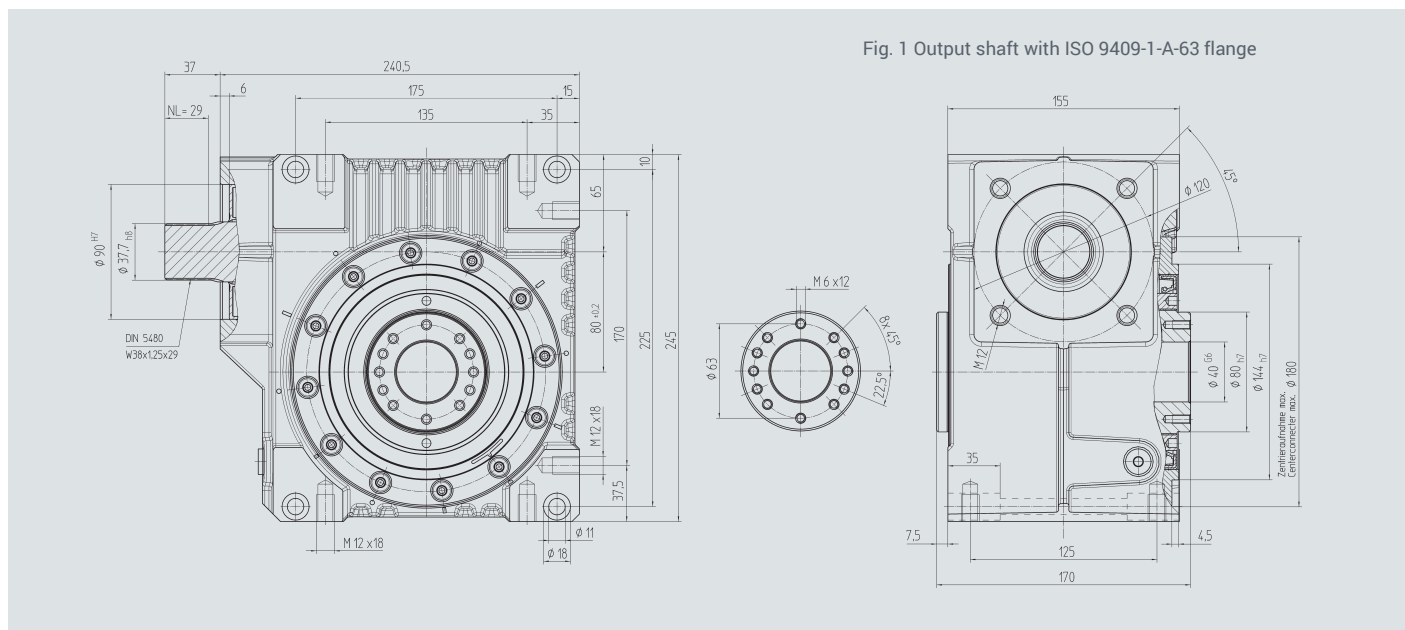


Center Distance  $a_0 = 63 \text{ mm}$

| Order Code | D <sup>G7</sup> | k <sub>1</sub> | r   | x    | y   | f <sub>1</sub> | 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  $a_0 = 80 \text{ mm}$

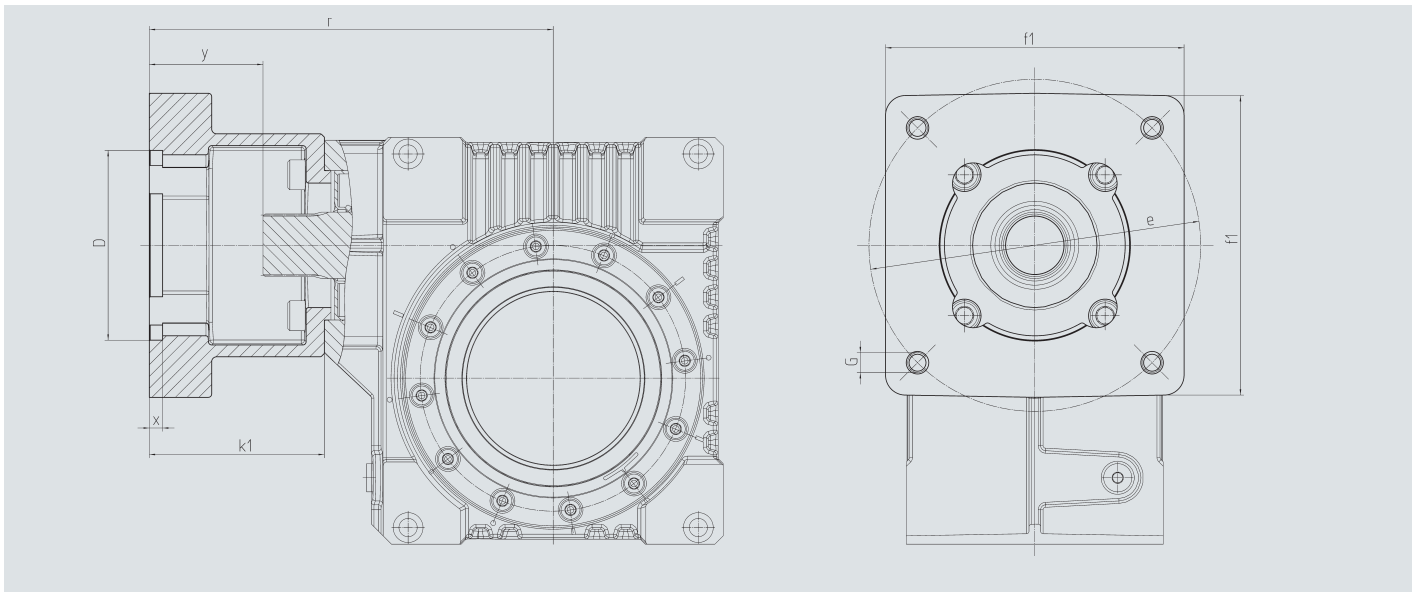


| Order Code<br>Fig. 1 | Fig.2     | Ratio i |  $J_{red}$ $10^{-4} \text{ kg m}^2$ |
|----------------------|-----------|---------|--------------------------------------------------------------------------------------------------------------------------|
| 98 05 005            | 98 15 005 | 4.75    | 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 1xx / 98 15 1xx

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

## Motor Flange



Center Distance  $a_0 = 80 \text{ mm}$

| Order Code | D <sup>G7</sup> | k <sub>1</sub> | r     | x    | y     | f <sub>1</sub> | 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

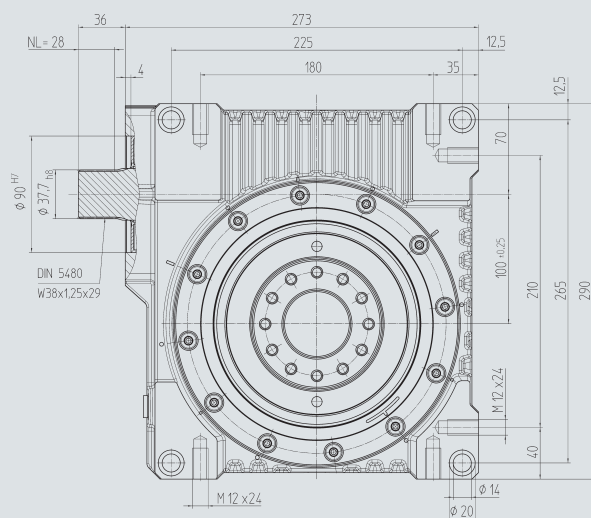


Fig. 1 Output shaft with ISO 9409-1-A-80 flange

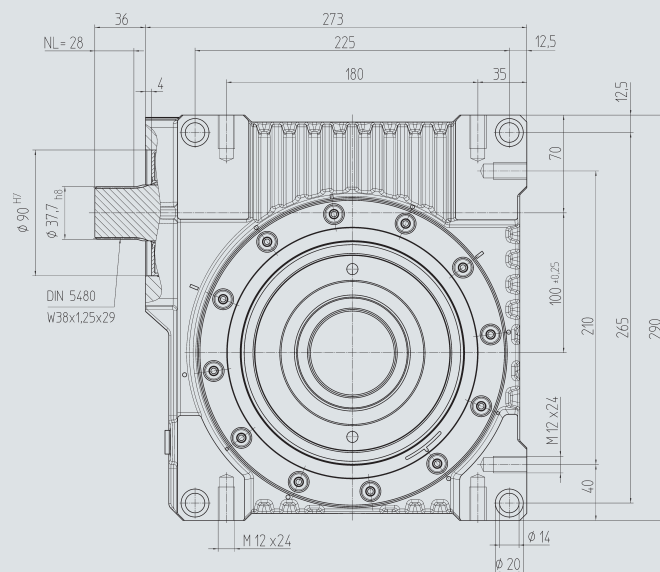
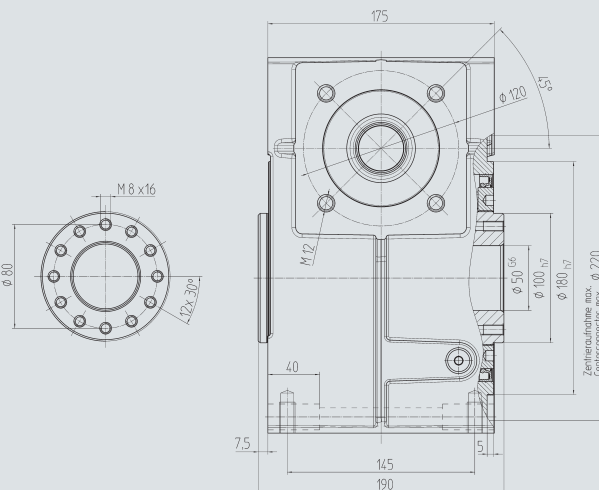
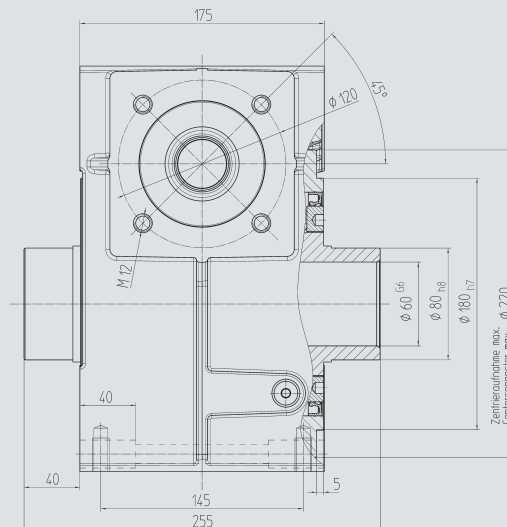


Fig. 2 Output shaft for clamp connection 80 87 080



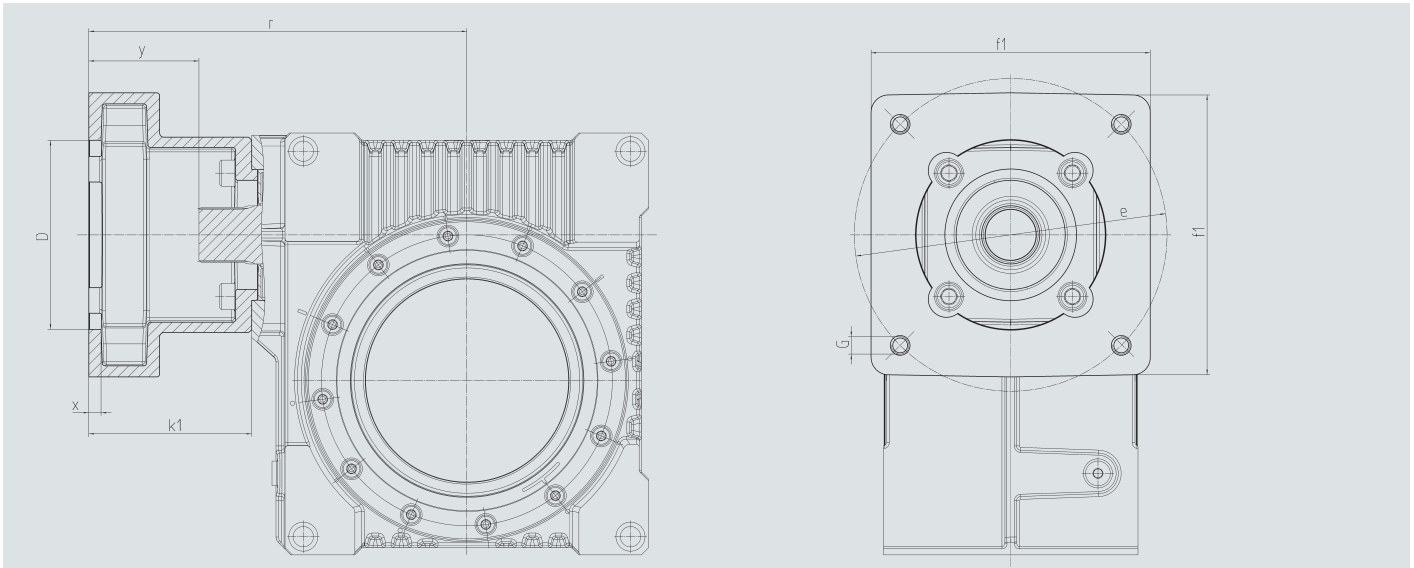
| Order Code<br>Fig. 1 | Fig. 2    | Ratio i |  kg | J <sub>red</sub> 10 <sup>-4</sup> kg m <sup>2</sup> |
|----------------------|-----------|---------|------------------------------------------------------------------------------------------|-----------------------------------------------------|
| 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 1xx / 98 16 1xx

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



## Motor Flange



Center Distance  $a_o = 100$  mm

| Order Code | D <sup>G7</sup> | k <sub>1</sub> | r     | x    | y     | f <sub>1</sub> | 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](http://www.atlantadrives.com). With continuous full-load operation it may be necessary to consider temperature limits! Please ask us if in doubt.

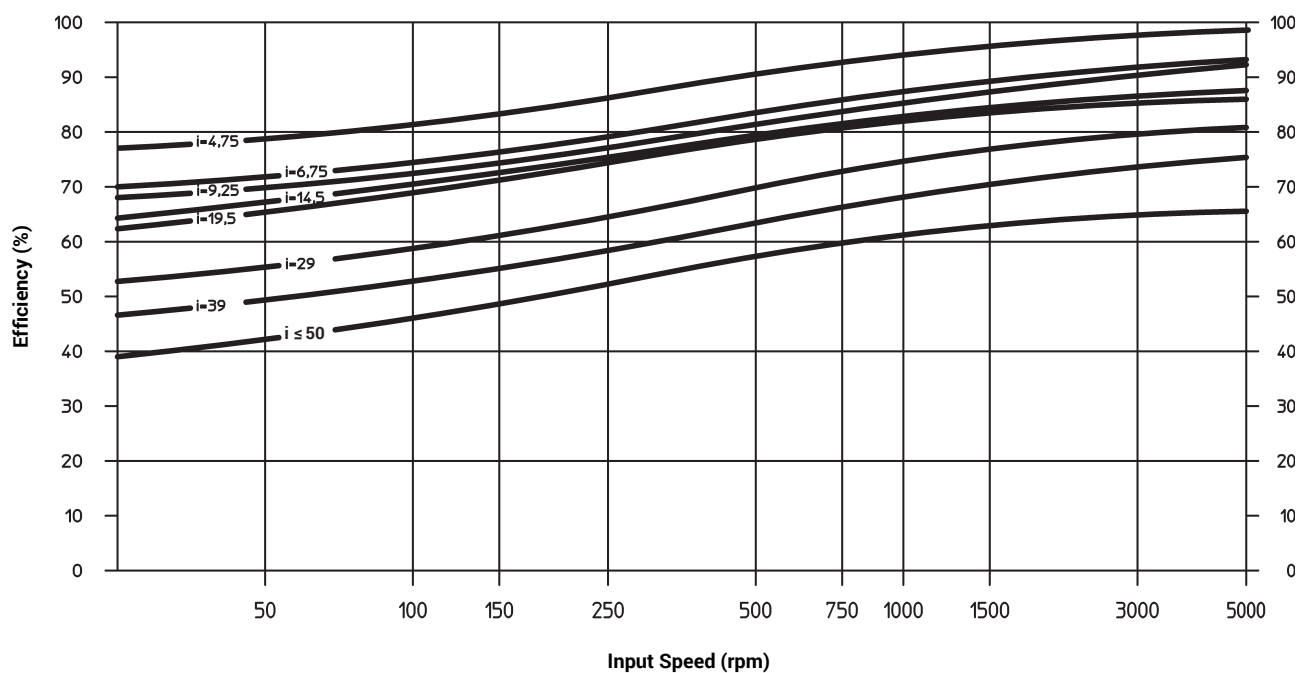
$T_{2max}$  = static torque to avoid tooth fracture,  $T_1$  = input torque in Nm,  $T_2$  = output torque in Nm.

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

\* On Request

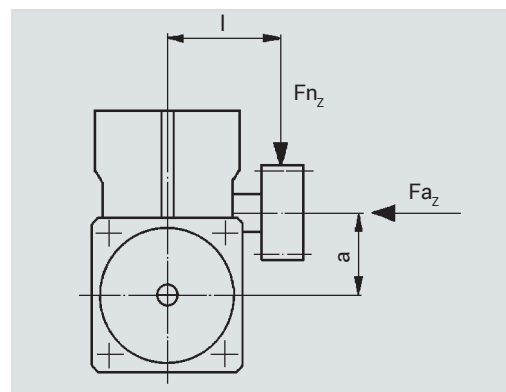
| Input Speed $n_1$ (rpm) |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |
|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| 2500                    |                        | 3000                   |                        | 3500                   |                        | 4000                   |                        | 4500                   |                        | 5000                   |                        | 5500                   |                        | 6000                   |                        |
| T <sub>1</sub><br>(Nm)  | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(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 |
| I (mm)                                              |               | 71   | 105   | 86   | 120   | 103   | 135   | 118   | 162   |
| <b>Max. additional load:</b>                        |               |      |       |      |       |       |       |       |       |
| Radial $F_{n_z}$                                    | [N]           | 6800 | 4600  | 9600 | 7000  | 15300 | 11700 | 17800 | 13200 |
| Axial $F_{a_z}$                                     | [N]           | 2700 | 2700  | 3800 | 3800  | 6000  | 6000  | 7500  | 7500  |
| Only Axial Load ( $F_n=0$ )                         | $F_{a_z}$ [N] | 5000 |       | 8000 |       | 15000 |       | 35000 |       |



|                               | Page        |
|-------------------------------|-------------|
| <b>Center Distance 50 mm</b>  | B-24 – B-25 |
| <b>Center Distance 63 mm</b>  | B-26 – B-27 |
| <b>Center Distance 80 mm</b>  | B-28 – B-29 |
| <b>Center Distance 100 mm</b> | B-30 – B-31 |
| <b>Center Distance 125 mm</b> | B-32 – B-33 |
| <b>Selection And Ratings</b>  | B-34 – B-36 |

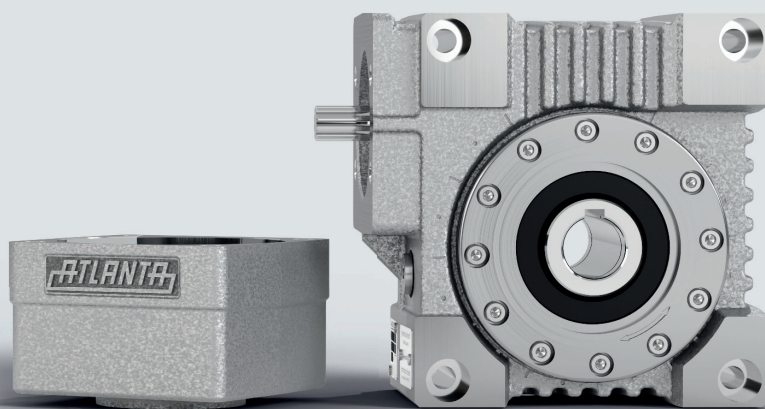
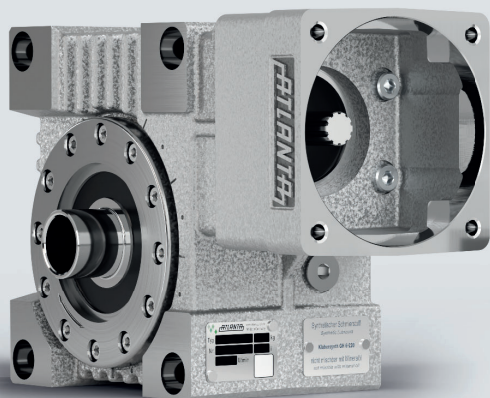
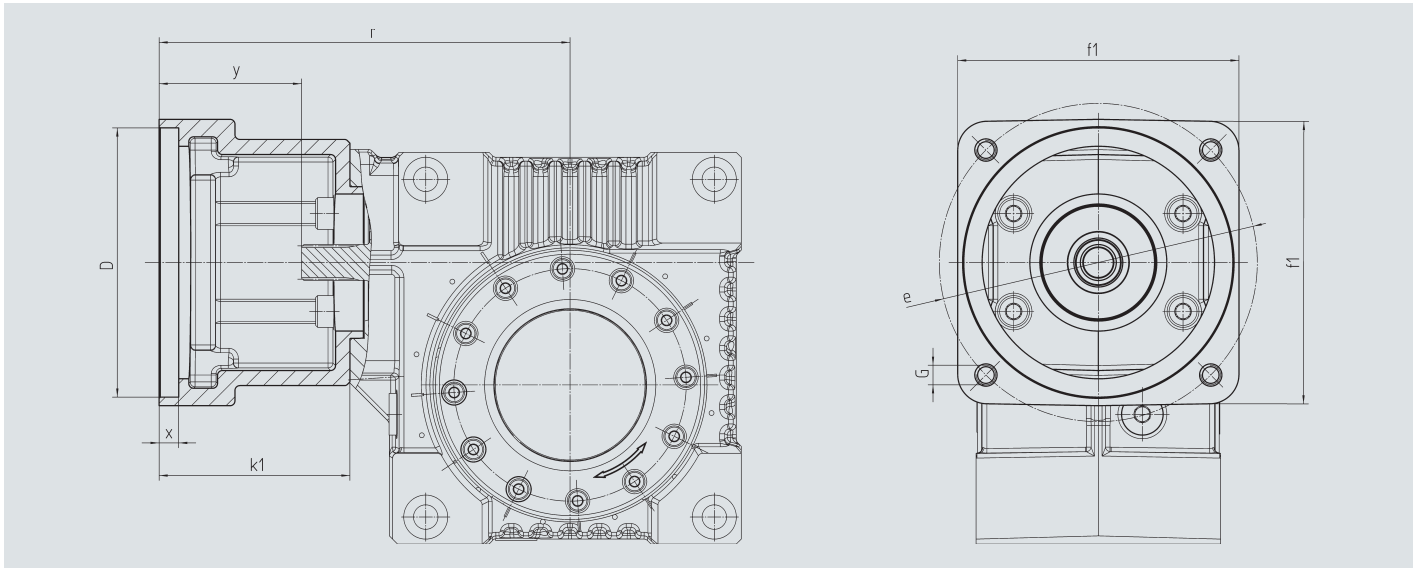


Fig. 1 Output shaft with key connection

| Order Code |           |         |  |                                                     |
|------------|-----------|---------|---------------------------------------------------------------------------------------|-----------------------------------------------------|
| Fig. 1     | Fig. 2    | Ratio i |                                                                                       | J <sub>red</sub> 10 <sup>-4</sup> kg m <sup>2</sup> |
| 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 1xx / 58 13 1xx  
In ATEX with food grade oil: Order Code 58 03 2xx / 58 13 2xx

## Motor Flange



Center Distance  $a_o = 50 \text{ mm}$

| Order Code | D <sup>G7</sup> | k <sub>1</sub> | r   | x    | y   | f <sub>1</sub> | 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  $a_0 = 63 \text{ mm}$

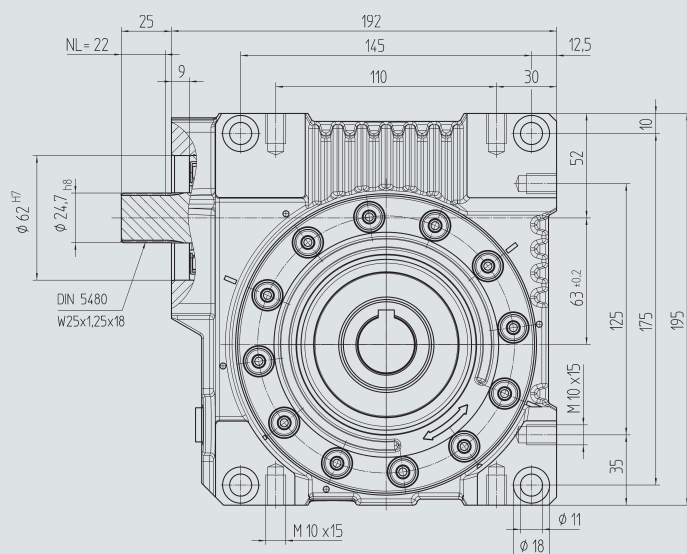


Fig. 1 Output shaft with key connection

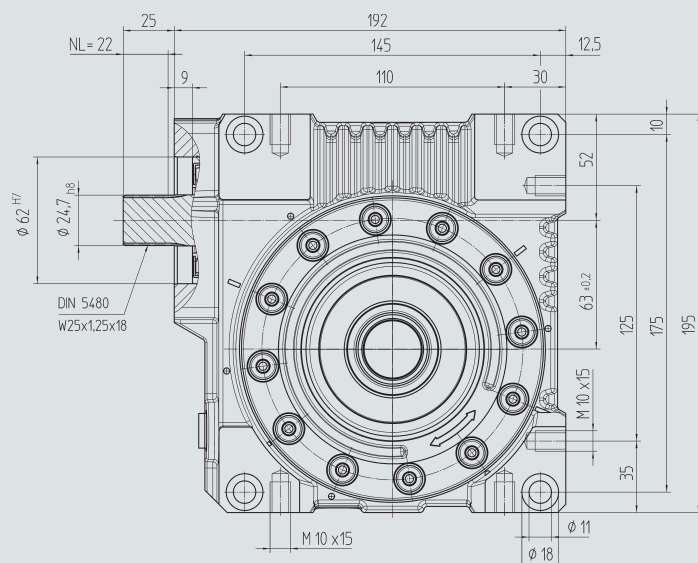
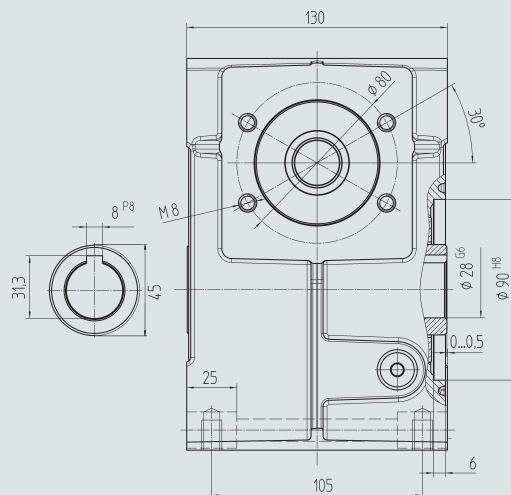
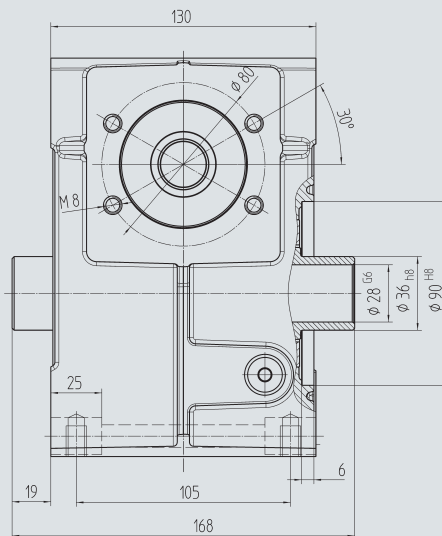


Fig. 2 Output shaft for clamp connection 80 84 036

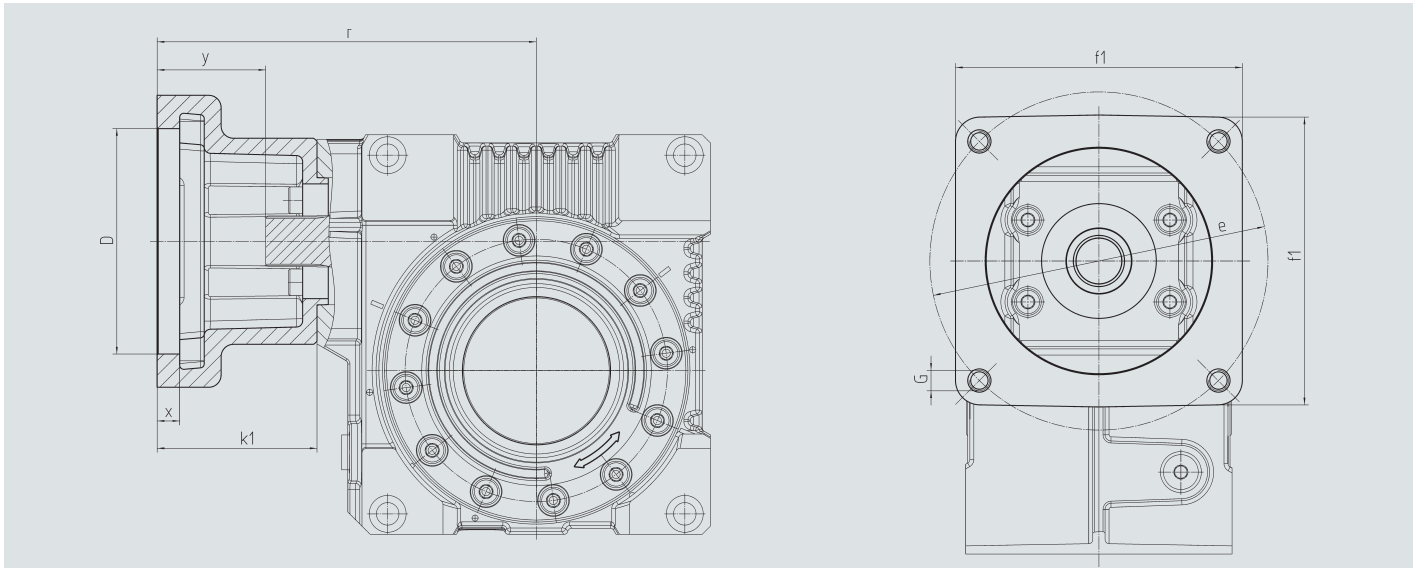


| Order Code |           |         |                                                                                       |                                        |
|------------|-----------|---------|---------------------------------------------------------------------------------------|----------------------------------------|
| Fig. 1     | Fig. 2    | Ratio i |  | $J_{red} \cdot 10^{-4} \text{ kg m}^2$ |
| 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 1xx / 58 14 1xx

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

## Motor Flange



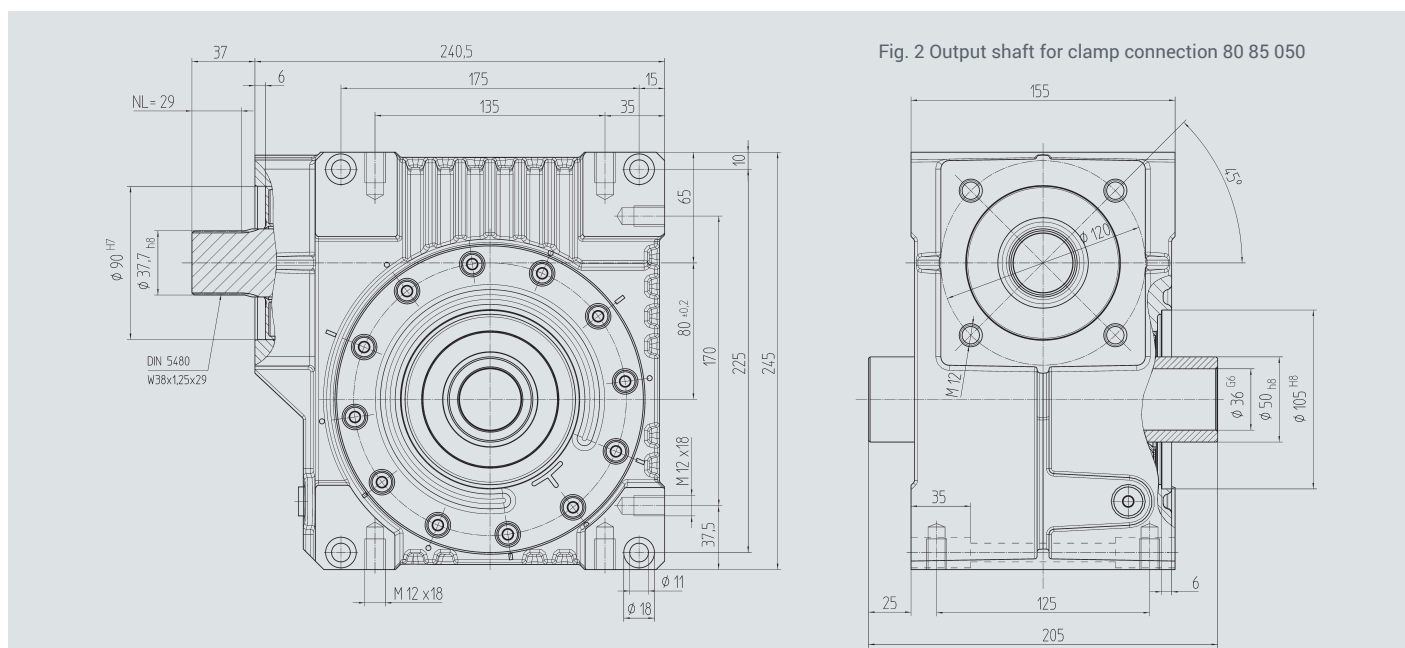
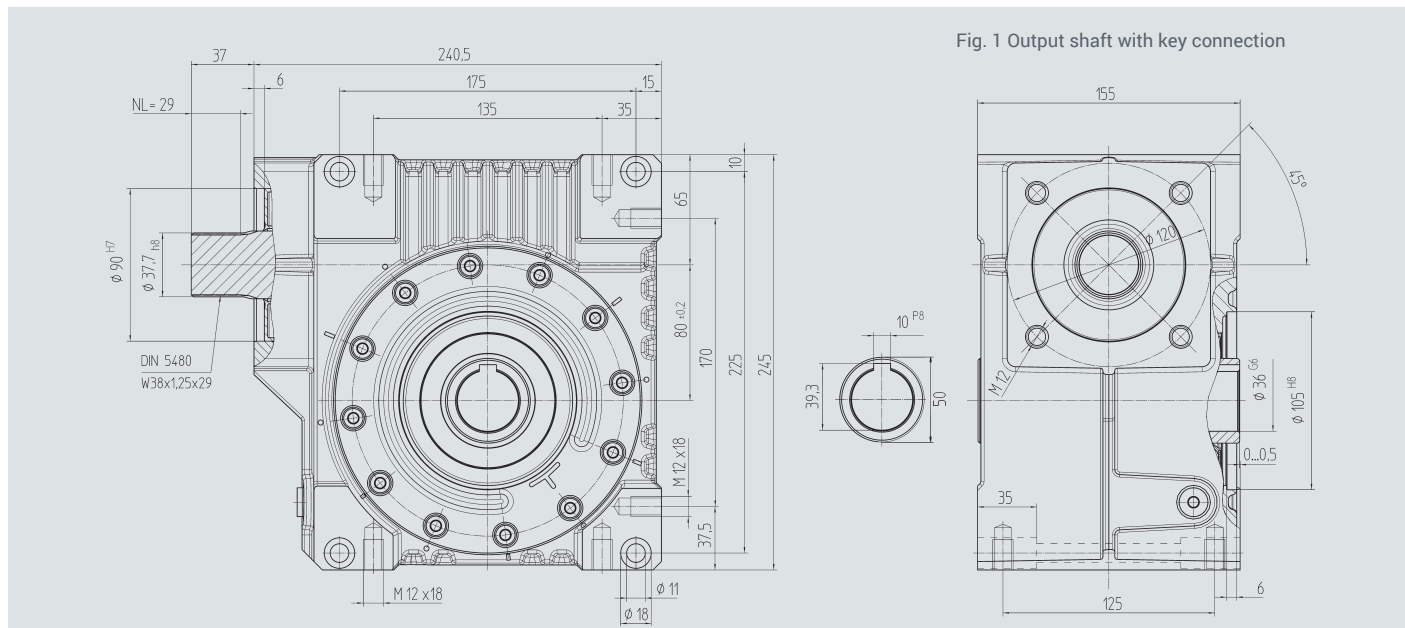
Center Distance  $a_o = 63 \text{ mm}$

| Order Code | D <sup>G7</sup> | k <sub>1</sub> | r   | x    | y   | f <sub>1</sub> | 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  $a_0 = 80 \text{ mm}$

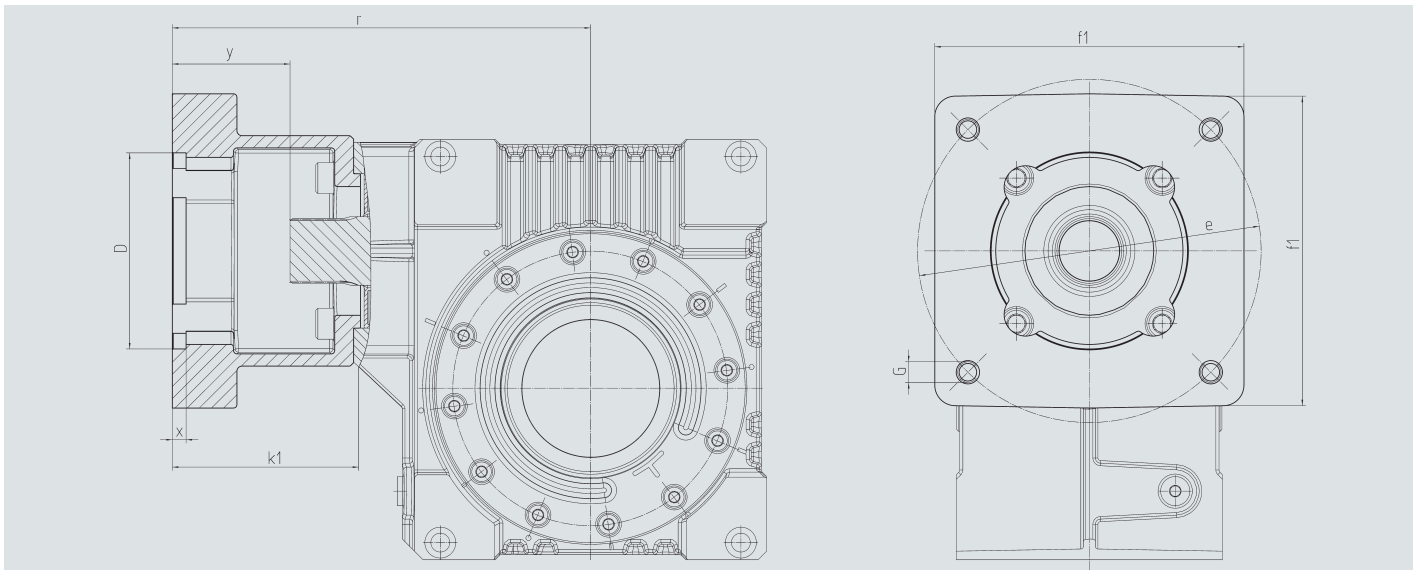


| Order Code |           |         |                                                                                       |                                                     |
|------------|-----------|---------|---------------------------------------------------------------------------------------|-----------------------------------------------------|
| Fig. 1     | Fig. 2    | Ratio i |  | J <sub>red</sub> 10 <sup>-4</sup> kg m <sup>2</sup> |
| 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 1xx / 58 15 1xx

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

## Motor Flange

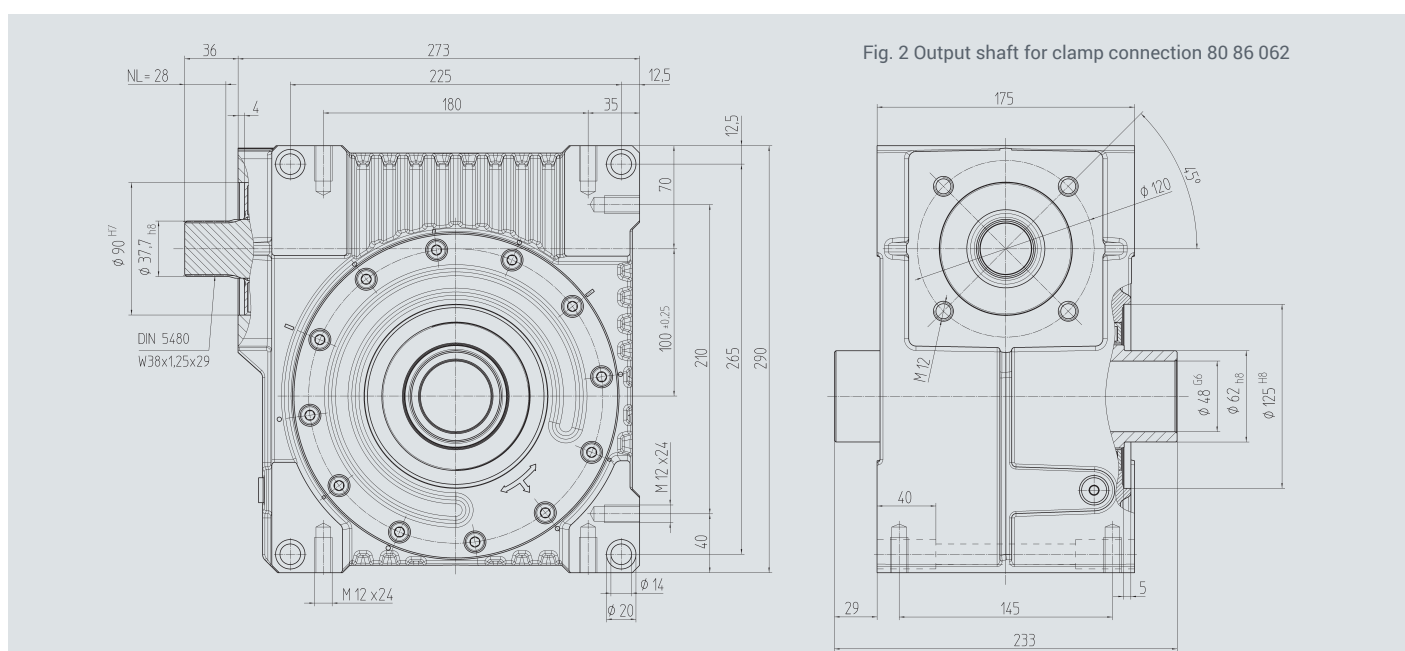
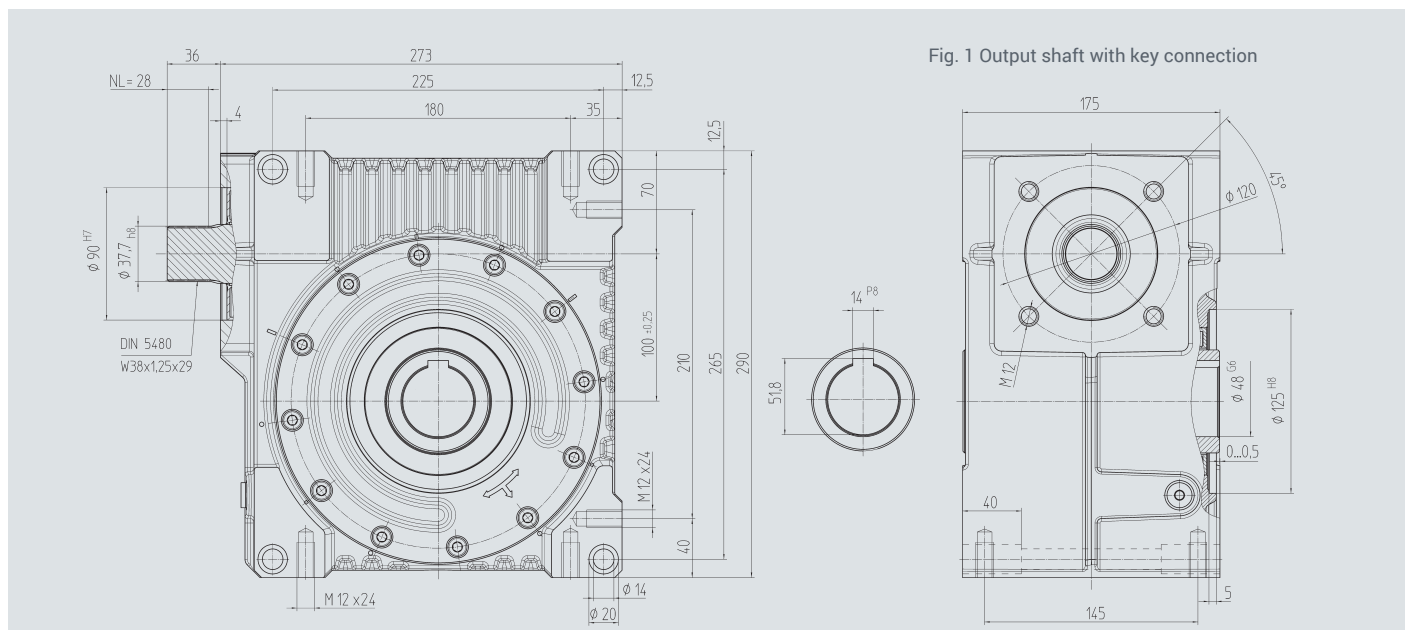


Center Distance  $a_o = 80$  mm

| Order Code | D <sup>67</sup> | k <sub>1</sub> | r     | x    | y     | f <sub>1</sub> | 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

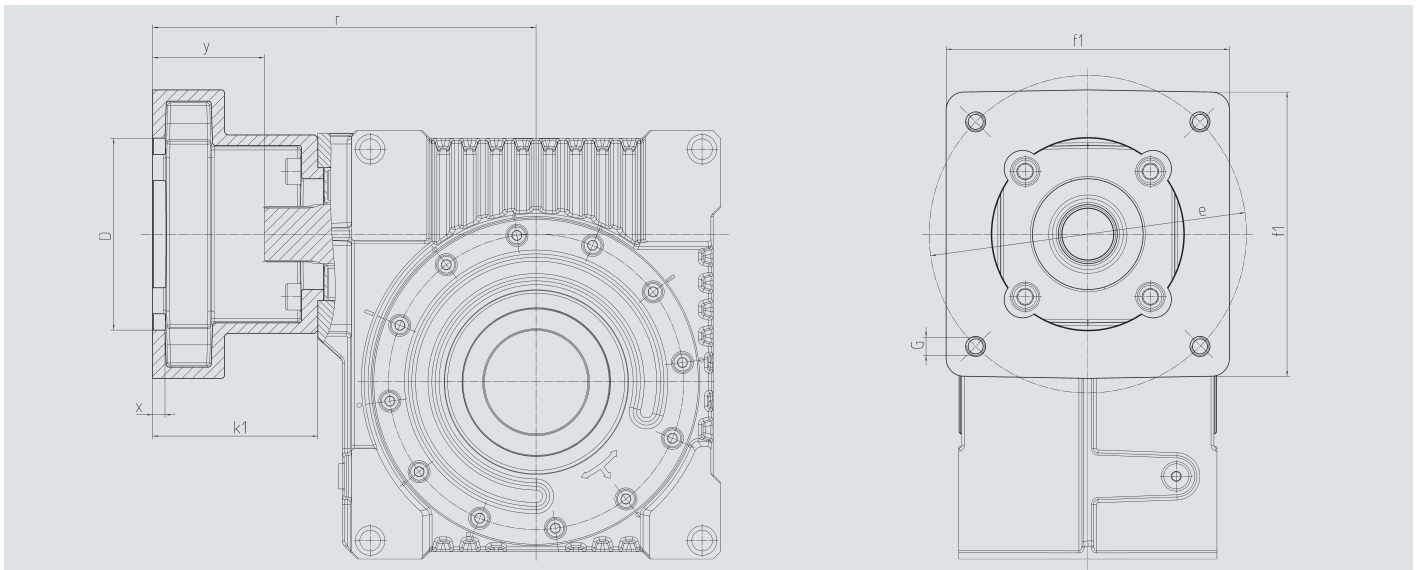


| Order Code<br>Fig. 1 | Fig. 2    | Ratio i |  kg | $J_{red}$ 10 <sup>-4</sup> kg m <sup>2</sup> |
|----------------------|-----------|---------|------------------------------------------------------------------------------------------|----------------------------------------------|
| 58 06 005            | 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 1xx / 58 16 1xx

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

## Motor Flange

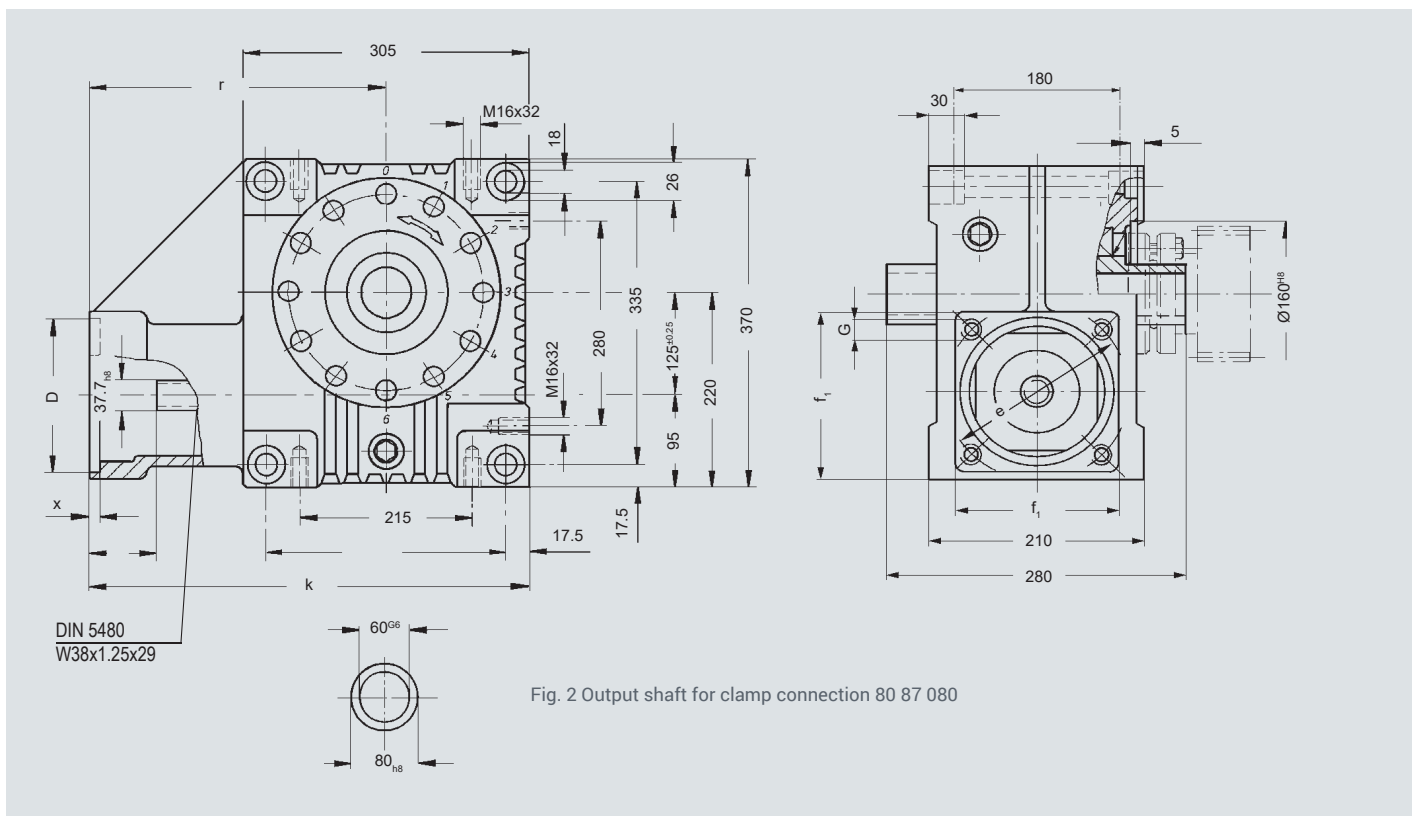
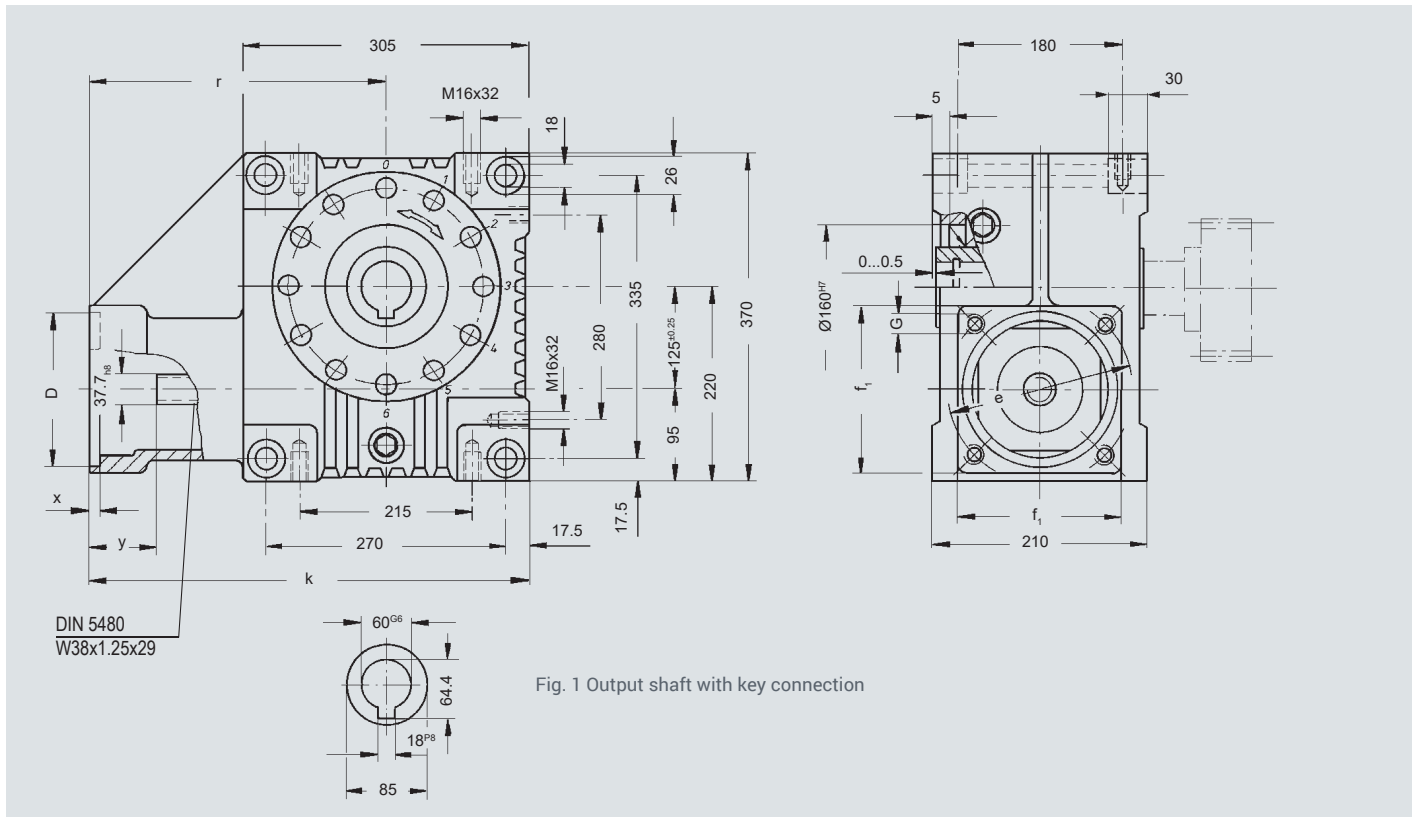


Center Distance  $a_0 = 100 \text{ mm}$

| Order Code | D <sup>G7</sup> | k <sub>1</sub> | r     | x    | y     | f <sub>1</sub> | 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  $a_0 = 125 \text{ mm}$





Center Distance  $a_0 = 125 \text{ mm}$

| Order Code<br>Fig.1 | Fig. 2    | Ratio i | $D^{G7}$ | k   | r     | x | y  | $f_1$ | e   | G   |  | $J_{rod} 10^{-4} \text{ kg m}^2$ |
|---------------------|-----------|---------|----------|-----|-------|---|----|-------|-----|-----|-------------------------------------------------------------------------------------|----------------------------------|
| 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](http://www.atlantadrives.com). With continuous full-load operation it may be necessary to consider temperature limits! Please ask us if in doubt.

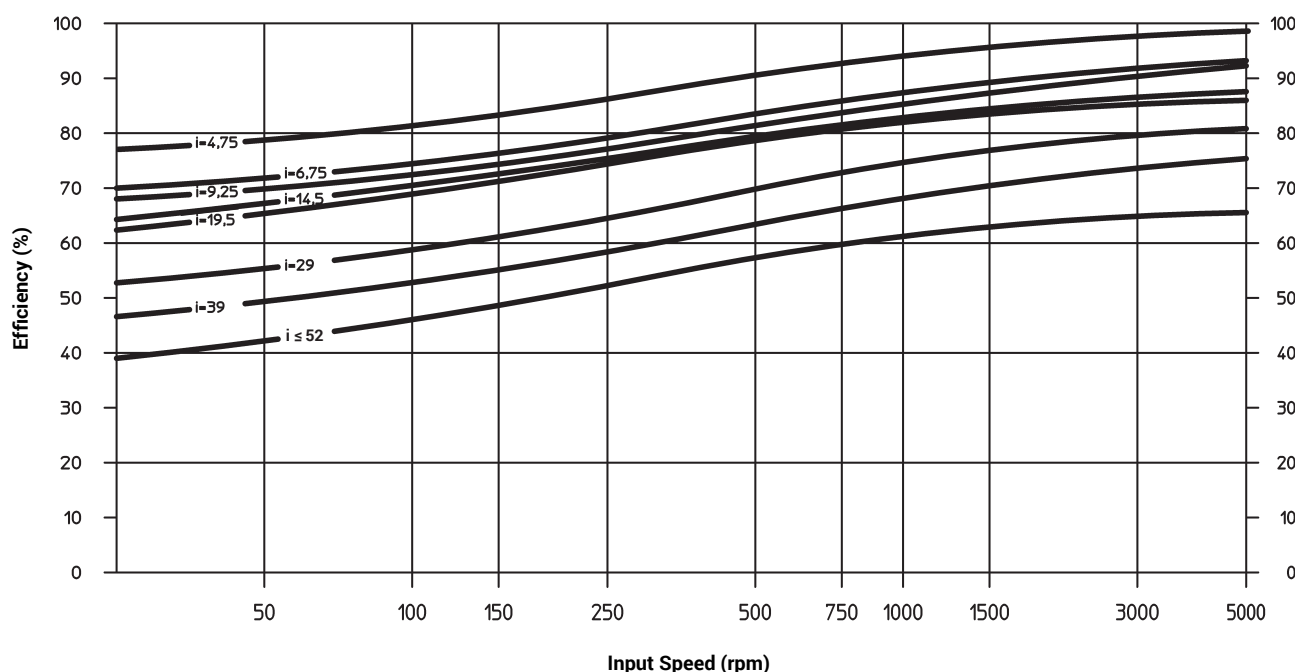
$T_{2max}$  = static torque to avoid tooth fracture,  $T_1$  = input torque in Nm,  $T_2$  = output torque in Nm.

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

\* on request

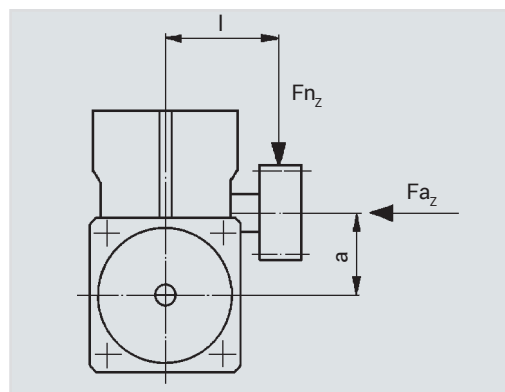
| Input Speed n <sub>i</sub> (rpm) |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |
|----------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| 2500                             |                        | 3000                   |                        | 3500                   |                        | 4000                   |                        | 4500                   |                        | 5000                   |                        | 5500                   |                        | 6000                   |                        |
| T <sub>1</sub><br>(Nm)           | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(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.



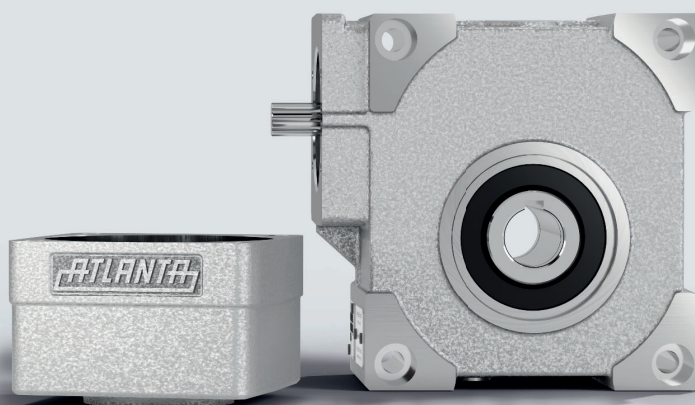
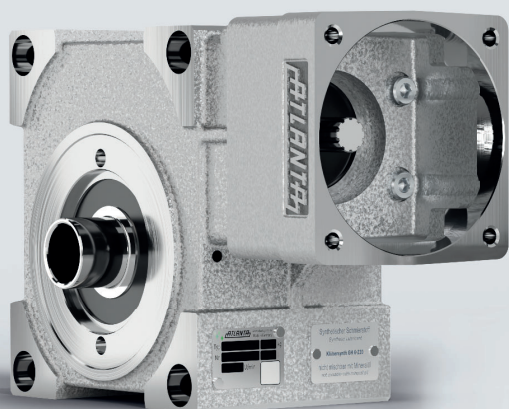
## Additional Loads On Gearbox Output

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 |               |      |      |      |      |       |      |       |      |       |       |
| I (mm)                                              |               | 90   | 140  | 110  | 160  | 125   | 175  | 140   | 190  | 175   | 220   |
| Max. Additional Load:                               |               |      |      |      |      |       |      |       |      |       |       |
| Radial $F_{n_z}$                                    | [N]           | 3600 | 2300 | 5000 | 3500 | 8400  | 6000 | 10000 | 7500 | 21000 | 16000 |
| Axial $F_{a_z}$                                     | [N]           | 1800 | 1800 | 2500 | 2500 | 4000  | 4000 | 5000  | 5000 | 10000 | 10000 |
| Only Axial Load<br>( $F_n=0$ )                      | $F_{a_z}$ [N] | 3000 |      | 5000 |      | 12000 |      | 15000 |      | 25000 |       |

|                        | Page        |
|------------------------|-------------|
| Center Distance 32 mm  | B-38 – B-39 |
| Center Distance 50 mm  | B-40 – B-41 |
| Center Distance 63 mm  | B-42 – B-43 |
| Center Distance 80 mm  | B-44 – B-45 |
| Center Distance 100 mm | B-46 – B-47 |
| Selection And Ratings  | B-48 – B-50 |





Center Distance  $a_0 = 32 \text{ mm}$

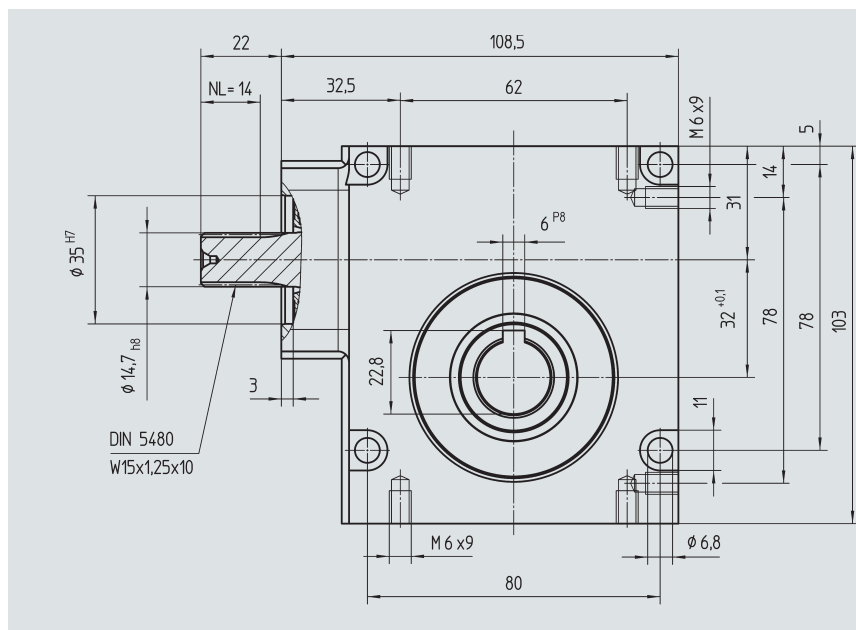


Fig. 1 Output shaft with key connection

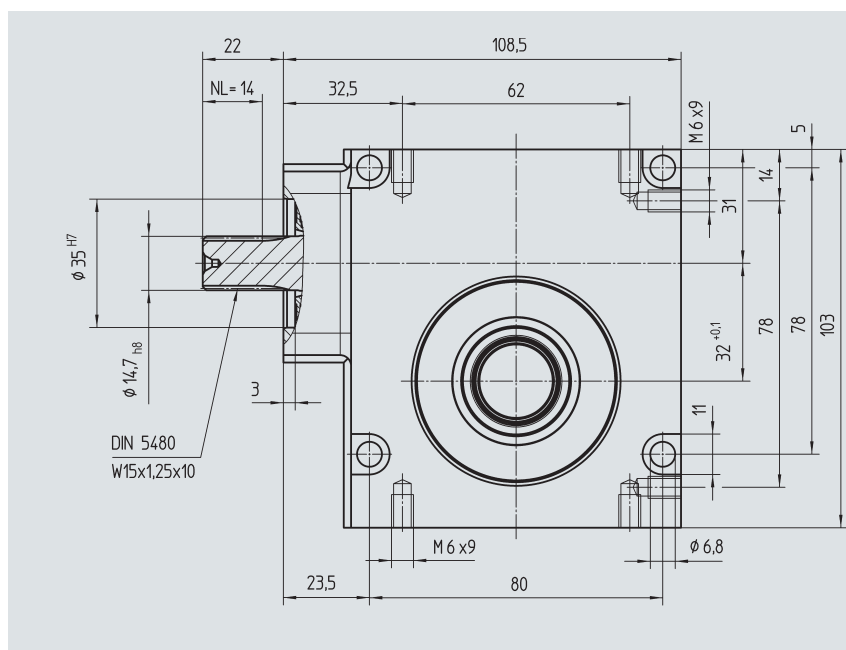
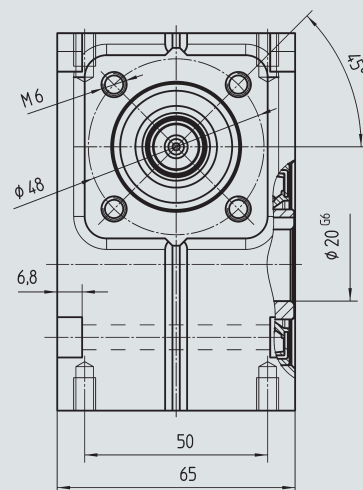
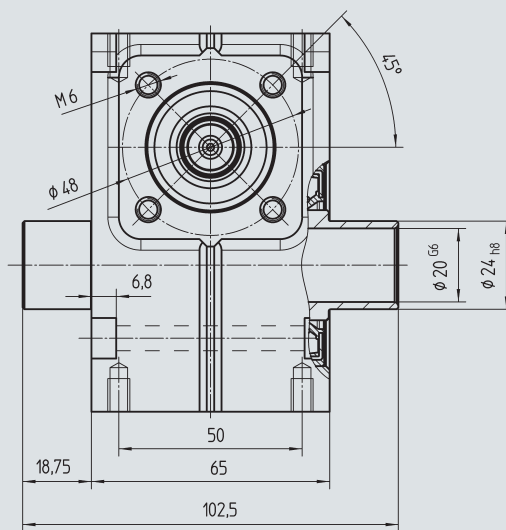


Fig. 2 Output shaft for clamp connection 80 81 024

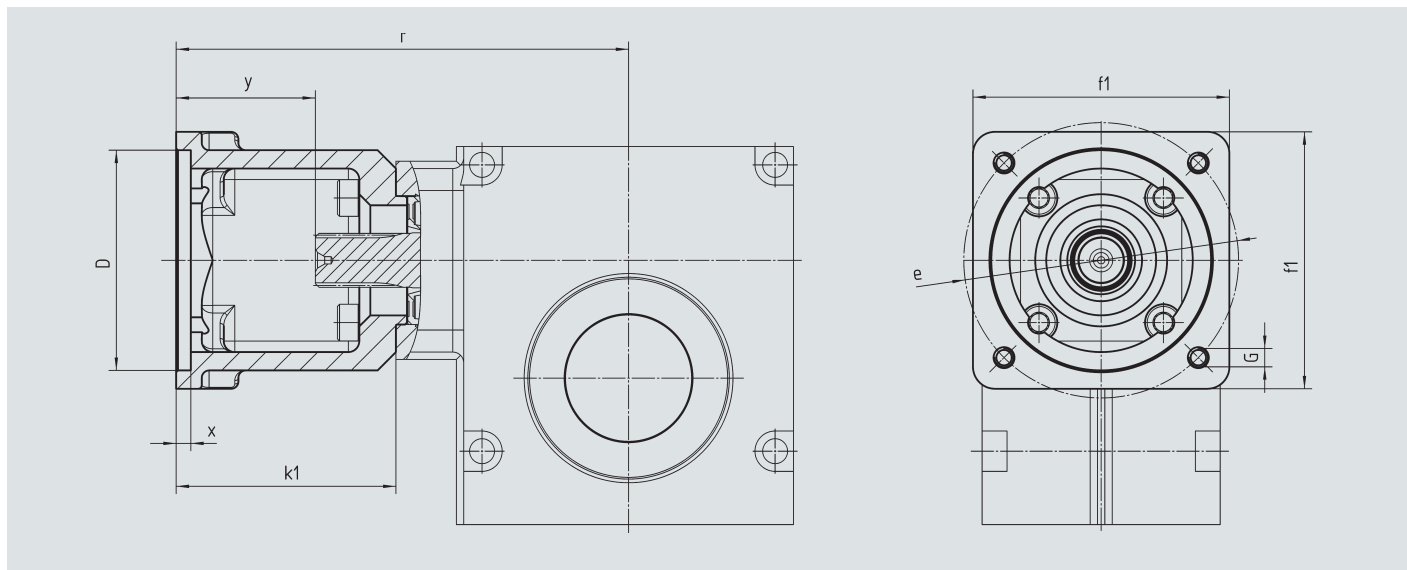


| Order Code |           |         |  |                                                     |
|------------|-----------|---------|---------------------------------------------------------------------------------------|-----------------------------------------------------|
| Fig. 1     | Fig. 2    | Ratio i |                                                                                       | J <sub>red</sub> 10 <sup>-4</sup> kg m <sup>2</sup> |
| 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 1xx / 59 11 1xx

In ATEX with food grade oil: Order Code 59 01 2xx / 59 112xx

## Motor Flange



Center Distance  $a_0 = 32 \text{ mm}$

| Order Code       | D <sup>G7</sup> | k <sub>1</sub> | r     | x   | y    | f <sub>1</sub> | e   | G  |  |
|------------------|-----------------|----------------|-------|-----|------|----------------|-----|----|---------------------------------------------------------------------------------------|
| <b>65 59 101</b> | 40.0            | 56.5           | 120.0 | 2.5 | 34.5 | 60             | 63  | M5 | 0.26                                                                                  |
| <b>65 59 102</b> | 50.0            | 64.0           | 127.5 | 4.0 | 42.0 | 60             | 70  | M5 | 0.29                                                                                  |
| <b>65 59 103</b> | 60.0            | 60.0           | 123.5 | 3.5 | 38.0 | 70             | 75  | M5 | 0.28                                                                                  |
| <b>65 59 104</b> | 80.0            | 64.0           | 127.5 | 4.5 | 42.0 | 85             | 100 | M6 | 0.30                                                                                  |
| <b>65 59 105</b> | 60.0            | 64.0           | 127.5 | 4.5 | 42.0 | 85             | 90  | M5 | 0.30                                                                                  |
| <b>65 59 107</b> | 40.0            | 56.5           | 120.0 | 2.5 | 34.5 | 60             | 63  | M4 | 0.31                                                                                  |
| <b>65 59 108</b> | 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  $a_0 = 50 \text{ mm}$

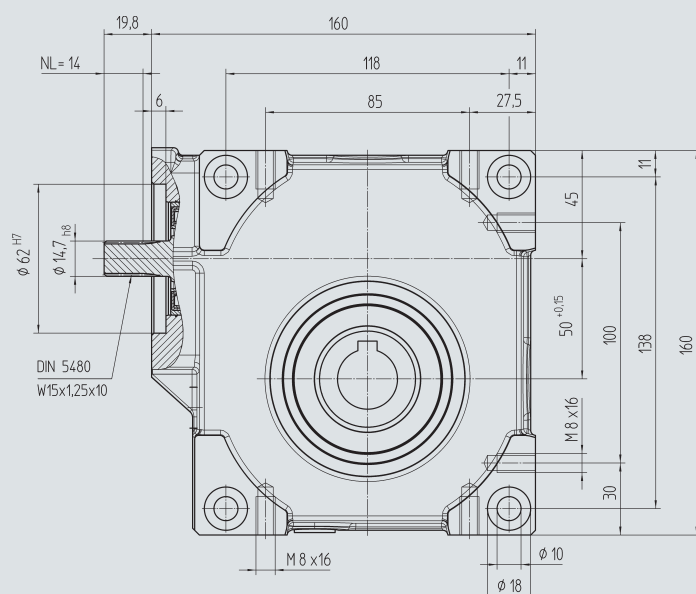


Fig. 1 Output shaft with key connection

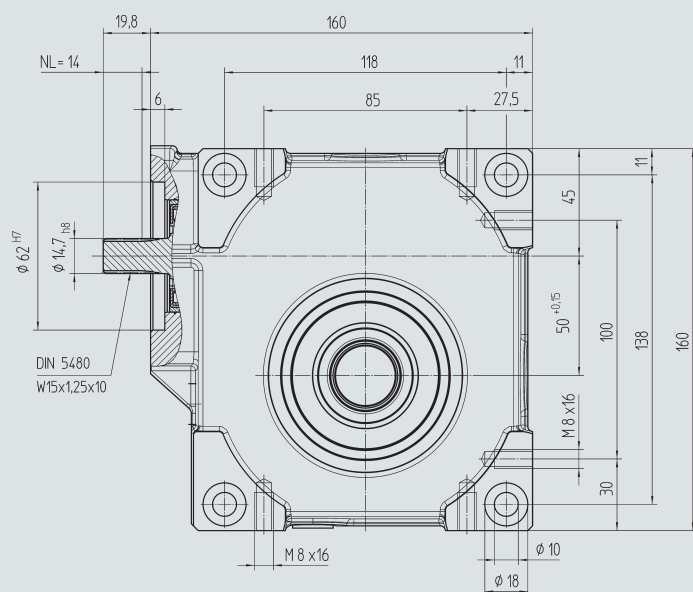
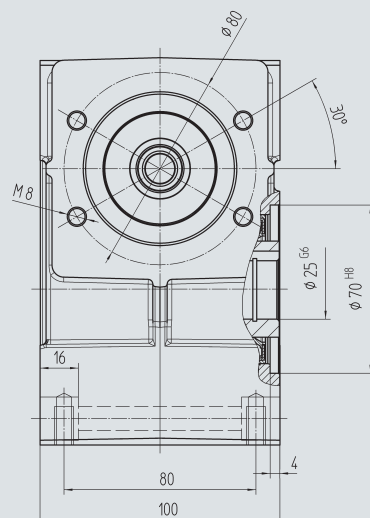
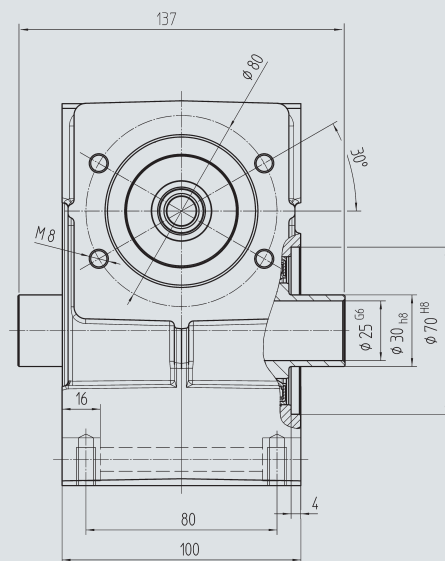


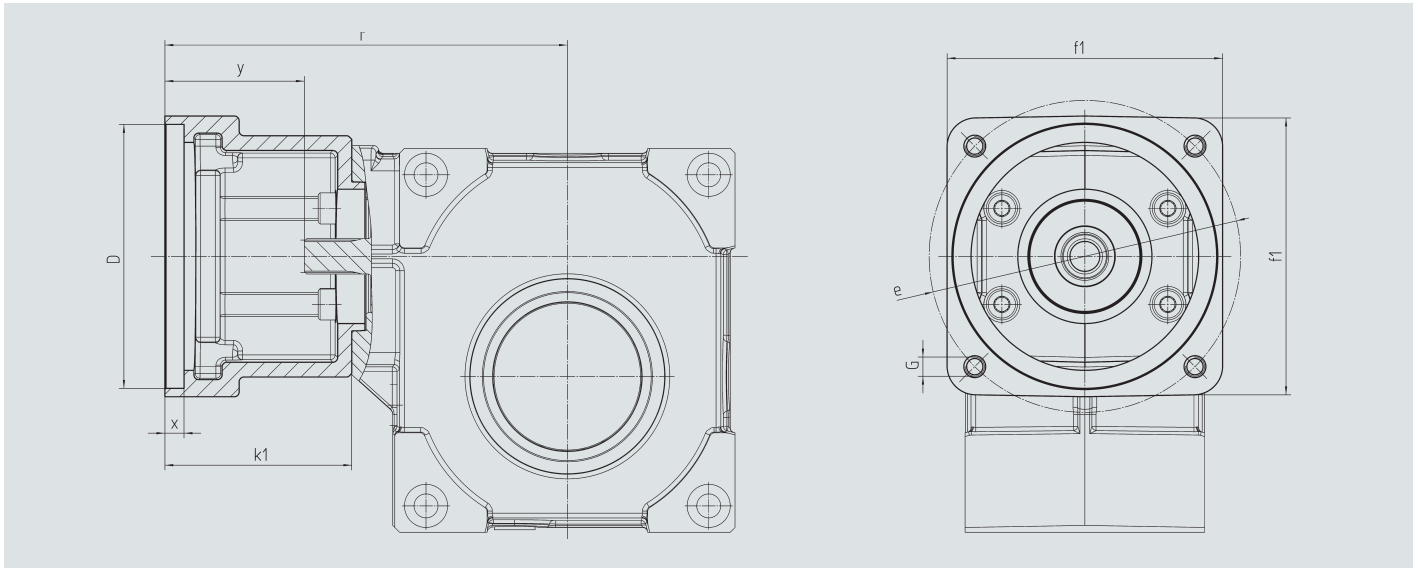
Fig. 2 Output shaft for clamp connection 80 83 030



| Order Code<br>Fig. 1 | Fig. 2    | Ratio i |  kg | J <sub>red</sub> 10 <sup>-4</sup> kg m <sup>2</sup> |
|----------------------|-----------|---------|------------------------------------------------------------------------------------------|-----------------------------------------------------|
| 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 1xx / 59 13 1xx  
In ATEX with food grade oil: Order Code 59 03 2xx / 59 13 2xx

## Motor Flange



Center Distance  $a_0 = 50 \text{ mm}$

| Order Code | $D^{67}$ | $k_1$ | $r$ | $x$  | $y$ | $f_1$ | $e$         | $G$        | $\text{kg}$ |
|------------|----------|-------|-----|------|-----|-------|-------------|------------|-------------|
| 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  $a_o = 63 \text{ mm}$

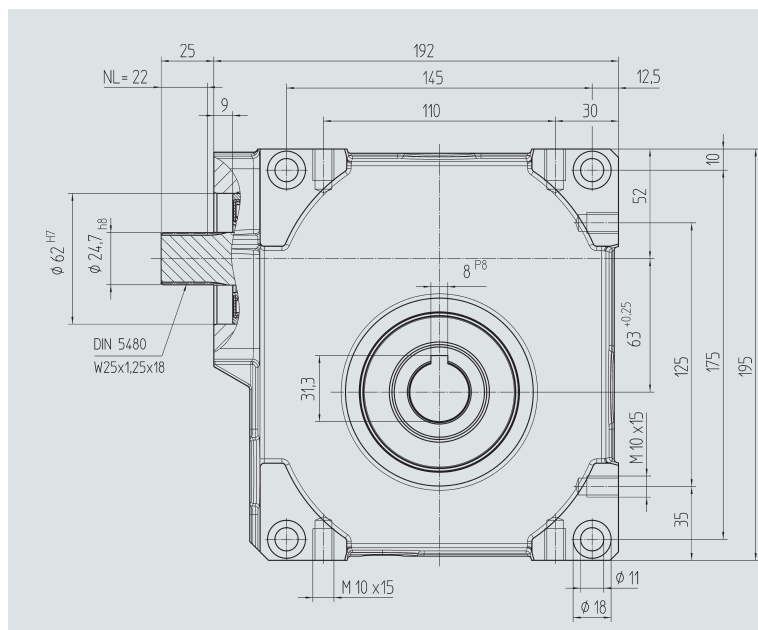


Fig. 1 Output shaft with key connection

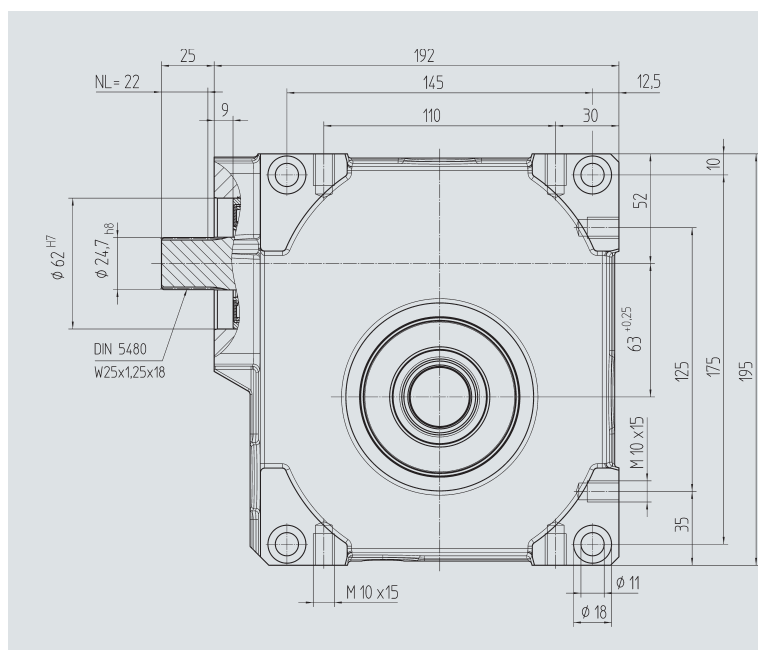
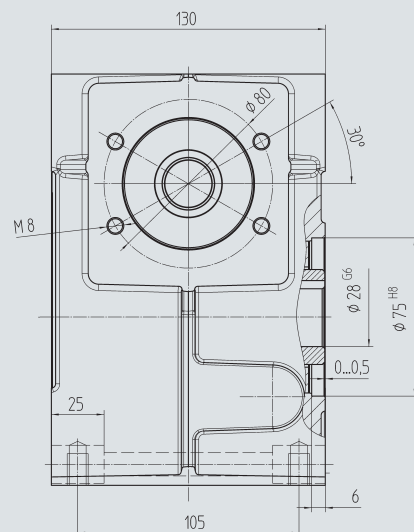
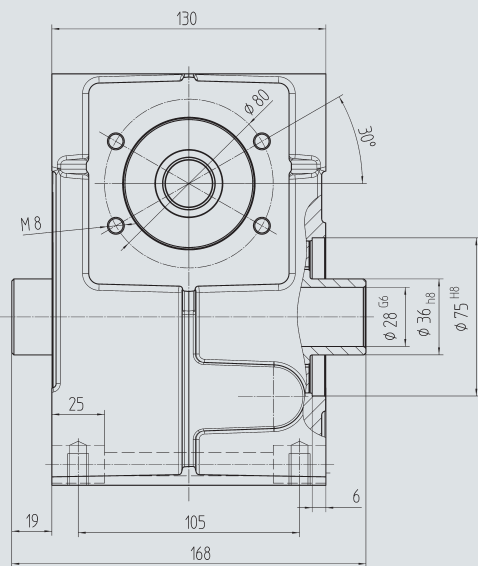


Fig. 2 Output shaft for clamp connection 80 84 036



### Order Code

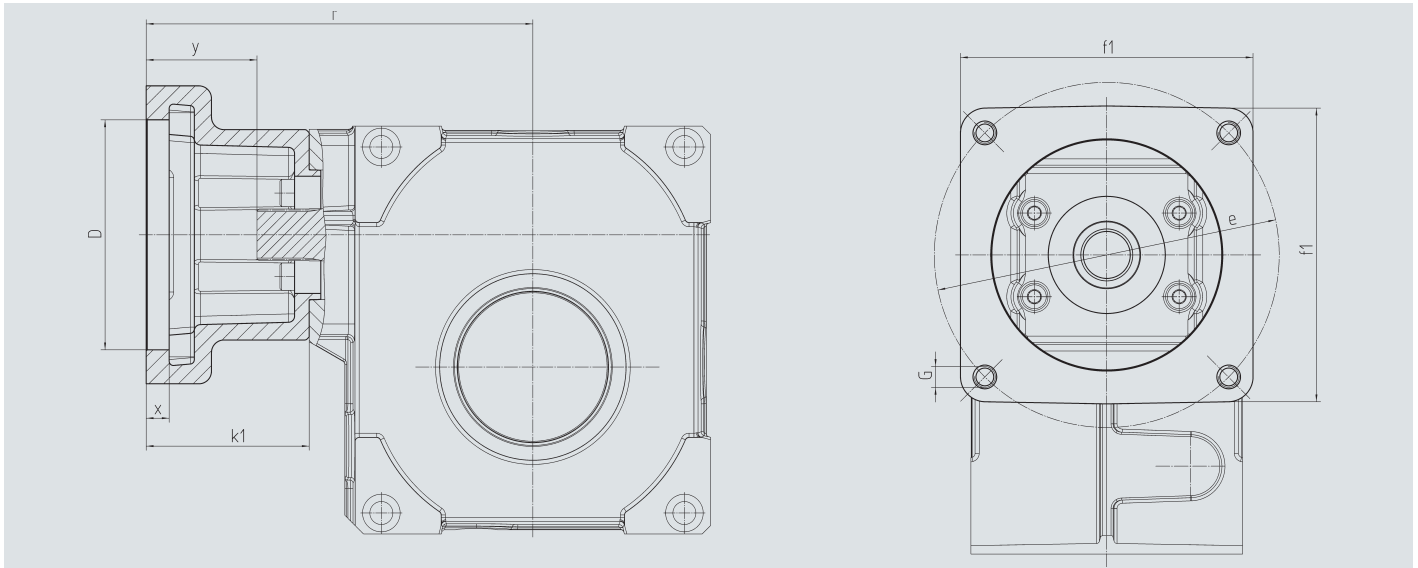
| Fig. 1    | Fig. 2    | Ratio i |  | $J_{red} \cdot 10^{-4} \text{ kg m}^2$ |
|-----------|-----------|---------|---------------------------------------------------------------------------------------|----------------------------------------|
| 59 04 005 | 59 14 005 | 4.75    | 11.5                                                                                  | 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 1xx / 59 14 1xx

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



## Motor Flange



Center Distance  $a_0 = 63 \text{ mm}$

| Order Code | $D^{67}$ | $k_1$ | $r$ | $x$  | $y$ | $f_1$ | $e$         | $G$        | $\frac{T}{kg}$ |
|------------|----------|-------|-----|------|-----|-------|-------------|------------|----------------|
| 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

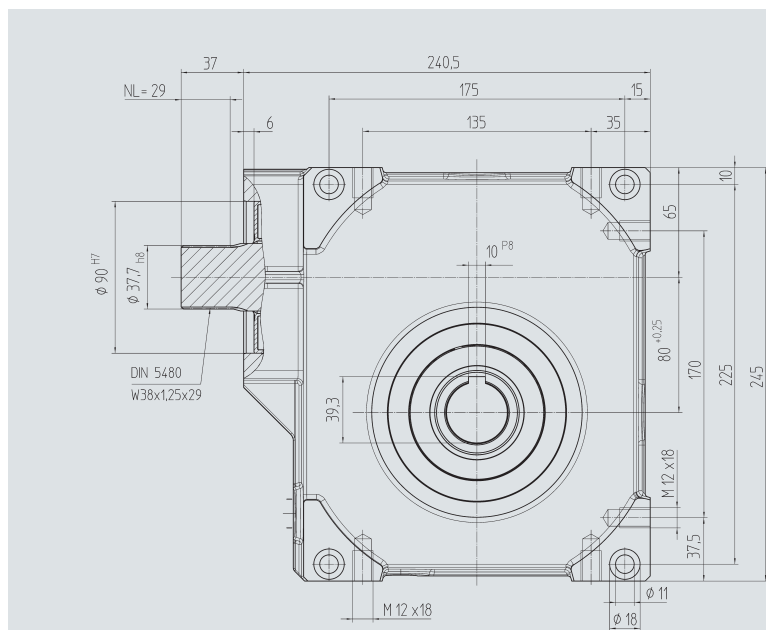


Fig. 1 Output shaft with key connection

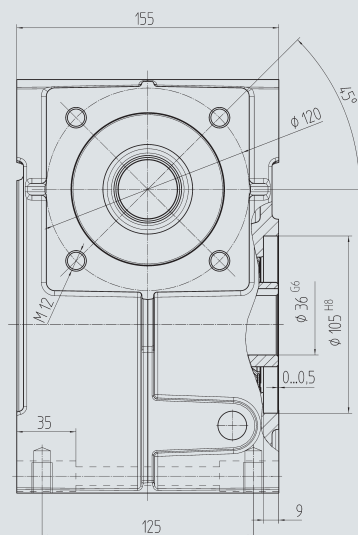
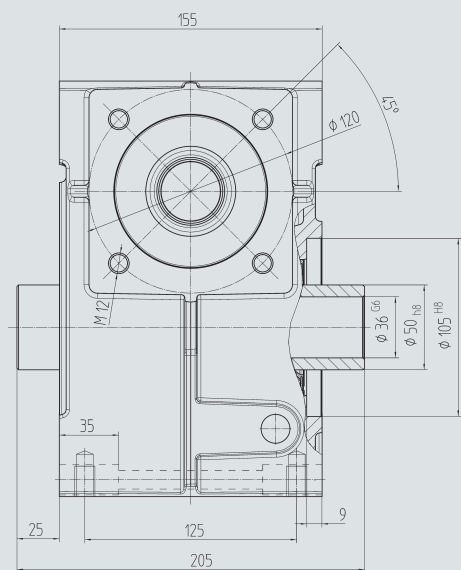
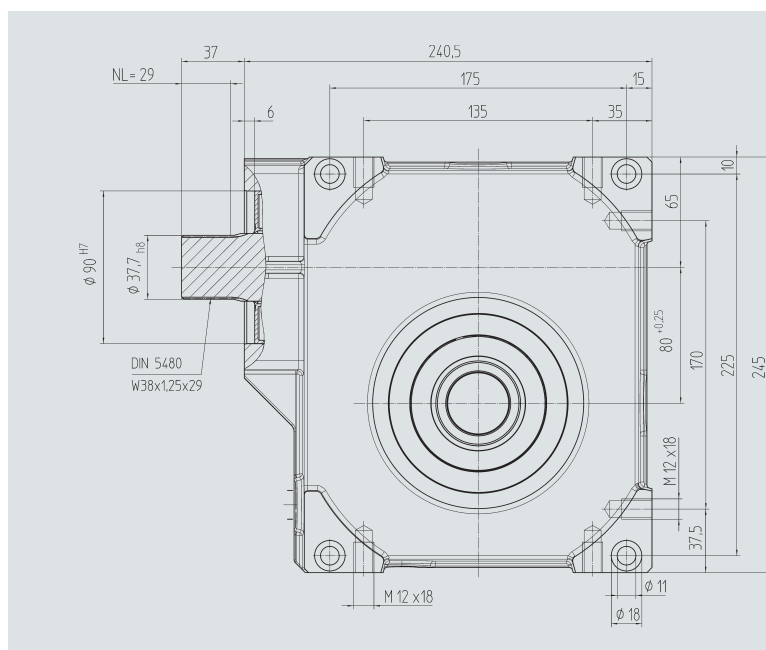


Fig. 2 Output shaft for clamp connection 80 85 050



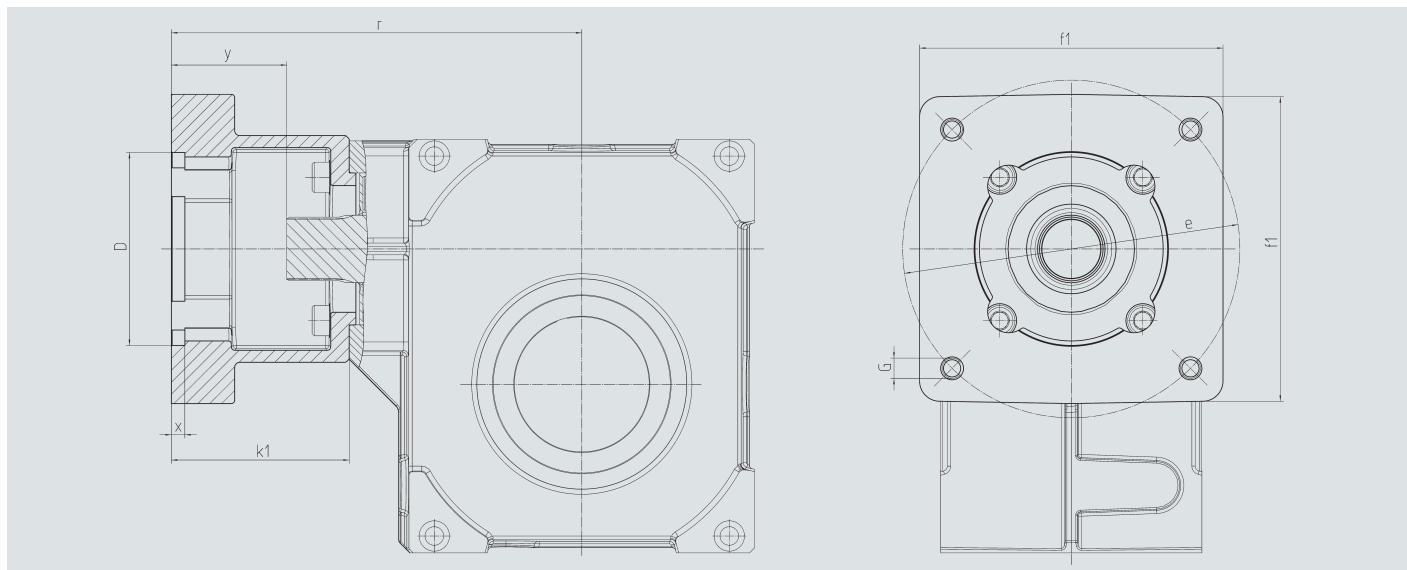
### Order Code

| Fig. 1    | Fig. 2    | Ratio i |  kg | $J_{red} 10^{-4} \text{ kg m}^2$ |
|-----------|-----------|---------|------------------------------------------------------------------------------------------|----------------------------------|
| 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 1xx / 59 15 1xx

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

## Motor Flange



Center Distance  $a_o = 80$  mm

| Order Code | D <sup>G7</sup> | k <sub>1</sub> | r     | x    | y     | f <sub>1</sub> | 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

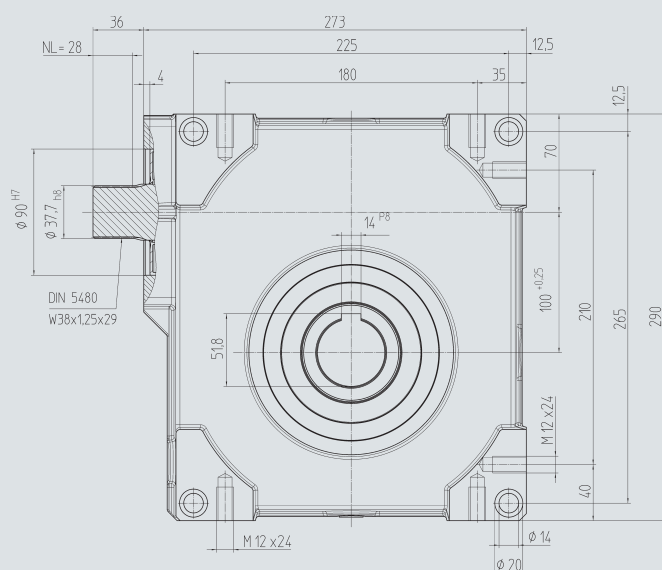


Fig. 1 Output shaft with key connection

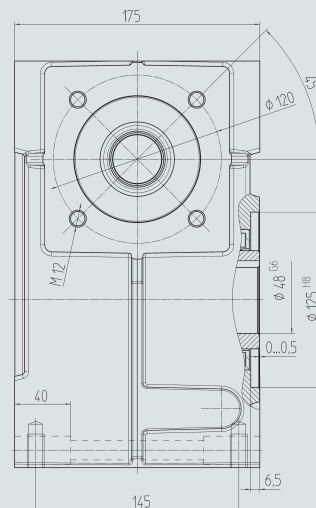
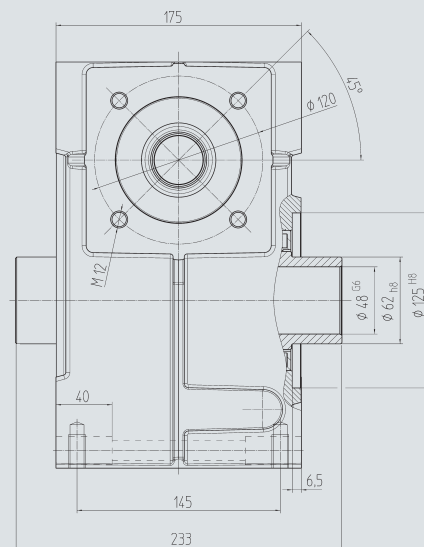
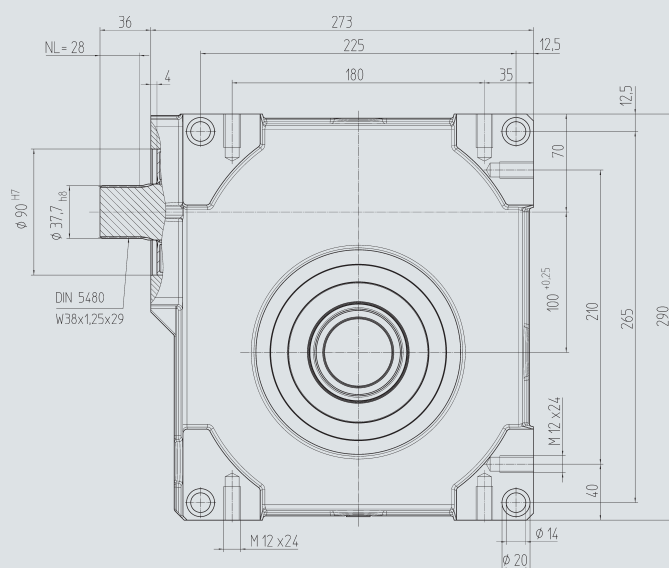


Fig. 2 Output shaft for clamp connection 80 86 062



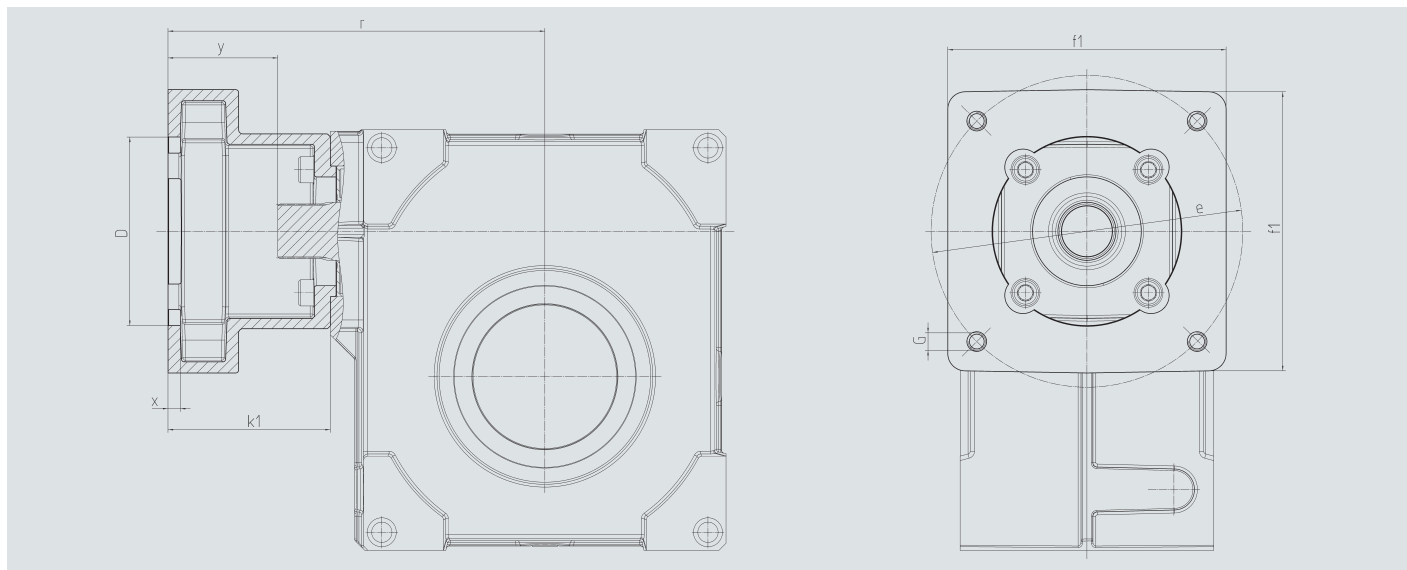
### Order Code

| Fig. 1    | Fig. 2    | Ratio i |  | $J_{red} 10^{-4} \text{ kg m}^2$ |
|-----------|-----------|---------|---------------------------------------------------------------------------------------|----------------------------------|
| 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 1xx / 59 16 1xx

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

## Motor Flange



Center Distance  $a_0 = 100$  mm

| Order Code | D <sup>67</sup> | k <sub>1</sub> | r     | x    | y     | f <sub>1</sub> | 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](http://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.

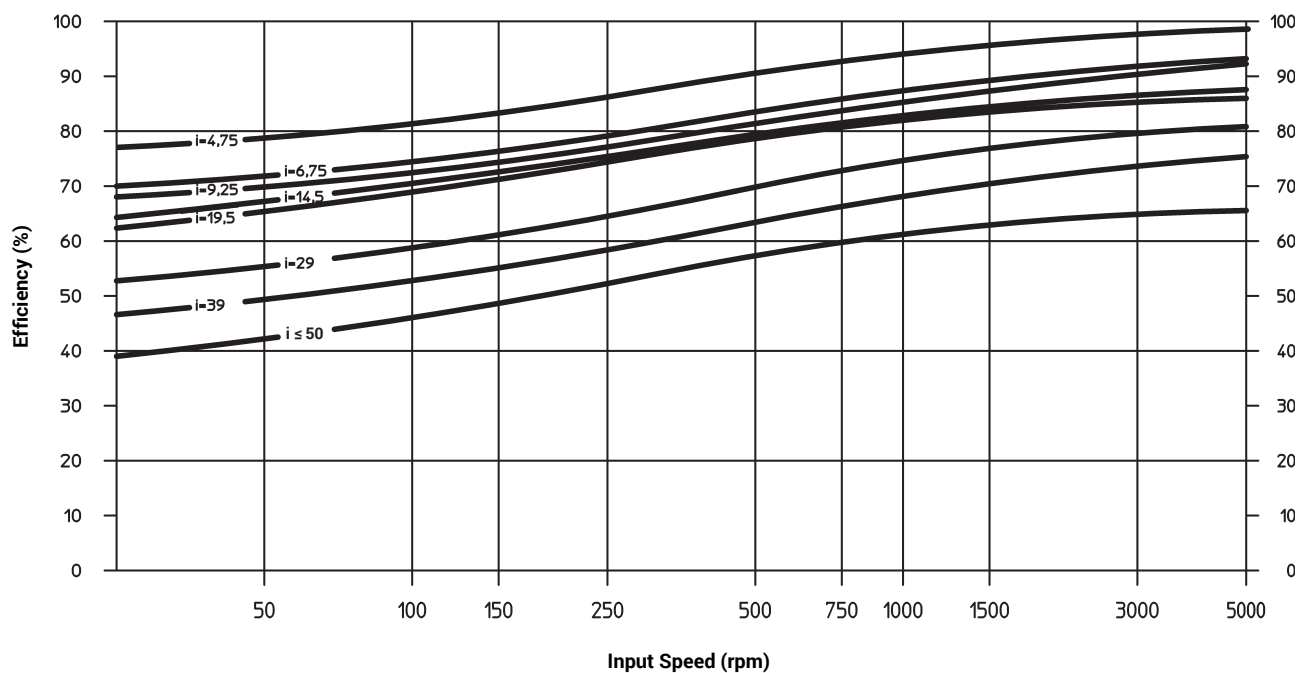
| Order Code |           | $a_0$<br>(mm) | i     | $T_{2max}$ | Input Speed $n_1$ (rpm) |               |               |               |               |               |               |               |               |               |               |               |
|------------|-----------|---------------|-------|------------|-------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
|            |           |               |       |            | 250                     |               | 500           |               | 750           |               | 1000          |               | 1500          |               | 2000          |               |
|            |           |               |       |            | $T_1$<br>(Nm)           | $T_2$<br>(Nm) | $T_1$<br>(Nm) | $T_2$<br>(Nm) | $T_1$<br>(Nm) | $T_2$<br>(Nm) | $T_1$<br>(Nm) | $T_2$<br>(Nm) | $T_1$<br>(Nm) | $T_2$<br>(Nm) | $T_1$<br>(Nm) | $T_2$<br>(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



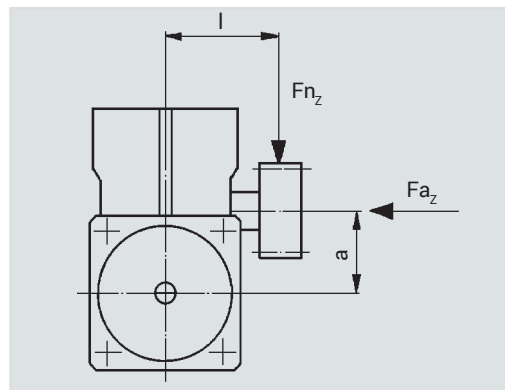
| Input Speed n <sub>1</sub> (rpm) |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |                        |
|----------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| 2500                             |                        | 3000                   |                        | 3500                   |                        | 4000                   |                        | 4500                   |                        | 5000                   |                        | 5500                   |                        | 6000                   |                        |
| T <sub>1</sub><br>(Nm)           | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(Nm) | T <sub>1</sub><br>(Nm) | T <sub>2</sub><br>(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 |               |      |      |      |      |      |      |       |      |       |      |
| I (mm)                                              |               | 70   | 100  | 90   | 140  | 110  | 160  | 125   | 175  | 140   | 190  |
| Max. Additional Load:                               |               |      |      |      |      |      |      |       |      |       |      |
| Radial $F_{n_z}$                                    | [N]           | 2250 | 1600 | 3600 | 2300 | 5000 | 3500 | 8400  | 6000 | 10000 | 7500 |
| Axial $F_{a_z}$                                     | [N]           | 1500 | 1500 | 1800 | 1800 | 2500 | 2500 | 4000  | 4000 | 5000  | 5000 |
| Only Axial Load<br>( $F_n=0$ )                      | $F_{a_z}$ [N] | 3000 |      | 3000 |      | 5000 |      | 12000 |      | 15000 |      |

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:

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

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

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

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

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

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

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

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

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

## 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   | ( $\text{m/s}^2$ )       |
| $b_B$  | = operating time factor          |                          |
| $d$    | = pinion pitch-circle diameter   | (mm)                     |
| $g$    | = acceleration due to gravity    | ( $9.81 \text{ m/s}^2$ ) |
| $m$    | = 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)                     |
| $\eta$ | = gearbox efficiency             |                          |
| $\mu$  | = coefficient of friction        |                          |
| $\pi$  | = 3.14159                        |                          |

## Calculation Example

### Values Given

|                                            |                                                    |
|--------------------------------------------|----------------------------------------------------|
| <input type="radio"/> Travelling Operation | <input checked="" type="radio"/> Lifting Operation |
| Mass to be Moved                           | $m = 300 \text{ kg}$                               |
| Speed                                      | $v = 1.08 \text{ m/s}$                             |
| Acceleration Time                          | $t_b = 0.27 \text{ s}$                             |
| Acceleration Due to Gravity                | $g = 9.81 \text{ m/s}^2$                           |
| Coefficient of Friction                    | $\mu = \text{—}$                                   |
| Pitch-Circle Dia. of Pinion                | $d = 63.66 \text{ mm}$                             |
| Load Factor                                | $K_A = 1.25$                                       |
| Operation Time Factor                      | $b_B = 1.2$                                        |
| Safety Coefficient                         | $S = 1.2$                                          |
| Motor rpm                                  | $n_1 = 3000 \text{ rpm}$                           |
| Motor Type                                 |                                                    |
| Motor Manufacturer                         |                                                    |

### Calculation Process

### Results

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

$$F_u = m \cdot g + m \cdot a \quad F_u = 300 \cdot 9.81 + 300 \cdot 4 = 4,143 \text{ N}$$

$$F_u = m \cdot g \cdot \mu + m \cdot a \quad \text{only Travelling Operation}$$

$$T_{2\text{erf.}} = \frac{F_u \cdot d}{2000} \quad T_{2\text{erf.}} = \frac{4143 \cdot 63.66}{2000} = 132 \text{ Nm}$$

$$n_2 = \frac{v}{d \cdot \pi} \cdot 60,000 \quad n_2 = \frac{1.08}{63.66 \cdot \pi} \cdot 60000 = 324 \text{ rpm}$$

$$i_{\text{Getr.}} = \frac{n_1}{n_2} \quad i_{\text{Getr.}} = \frac{3000}{325} \cong 9.25$$

Permissible Gear Torque  $T_{2\text{table}}$  see page B-34 & B-35  
assumed 58\_5\_09 with  $T_2=280 \text{ Nm}$  at 3,000 rpm

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

### Condition

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

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

## Your Calculation

### Values Given

|                                           |                                         |
|-------------------------------------------|-----------------------------------------|
| <input type="radio"/> Traveling Operation | <input type="radio"/> Lifting Operation |
| Mass to be Moved                          | $m = \text{—}$ kg                       |
| Speed                                     | $v = \text{—}$ m/s                      |
| Acceleration Time                         | $t_b = \text{—}$ s                      |
| Acceleration Due to Gravity               | $g = 9.81 \text{ m/s}^2$                |
| Coefficient of Friction                   | $\mu = \text{—}$                        |
| Pitch-Circle Dia. of Pinion               | $d = \text{—}$ mm                       |
| Load Factor                               | $K_A = \text{—}$                        |
| Operation Time Factor                     | $b_B = \text{—}$                        |
| Safety Coefficient                        | $S = \text{—}$                          |
| Motor rpm                                 | $n_1 = \text{—}$ rpm                    |
| Motor Type                                | $\text{—}$                              |
| Motor Manufacturer                        | $\text{—}$                              |

### Calculation Process

### Results

$$a = \frac{v}{t_b} \quad a = \text{—} = \text{—} \text{ m/s}^2$$

$$F_u = m \cdot g + m \cdot a \quad F_u = \text{—} = \text{—} \text{ N}$$

$$F_u = m \cdot g \cdot \mu + m \cdot a \quad F_u = \text{—} = \text{—} \text{ N}$$

$$T_{2\text{erf.}} = \frac{F_u \cdot d}{2000} \quad T_{2\text{erf.}} = \text{—} = \text{—} \text{ Nm}$$

$$n_2 = \frac{v}{d \cdot \pi} \cdot 60000 \quad n_2 = \text{—} \cdot 60000 = \text{—} \text{ rpm}$$

$$i_{\text{Getr.}} = \frac{n_1}{n_2} \quad i_{\text{Getr.}} = \text{—} \cong \text{—}$$

Permissible Gear Torque  $T_{2\text{table}}$  see page ...

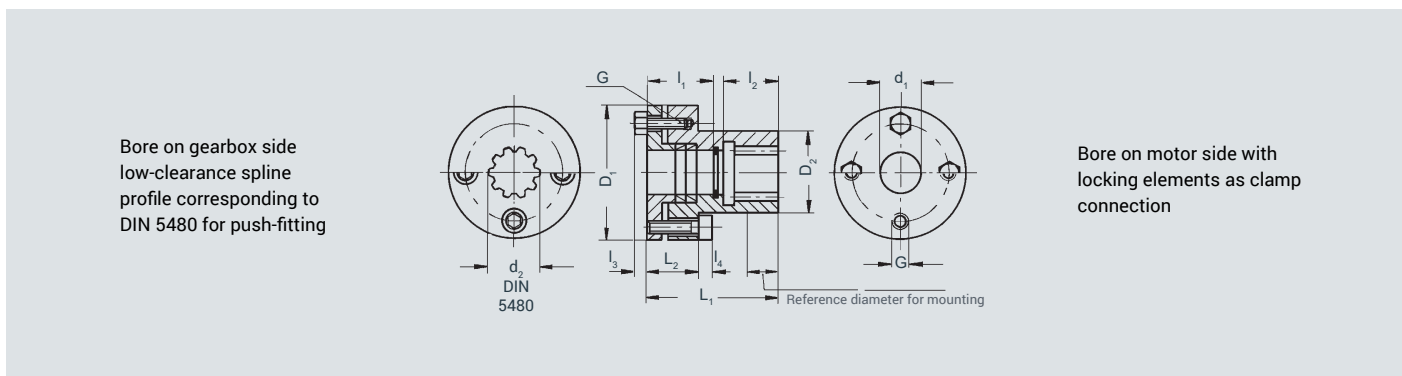
$$T_{2\text{zul.}} = \frac{T_{2\text{Table}}}{K_A \cdot S \cdot b_B} \quad T_{2\text{zul.}} = \text{—} = \text{—} \text{ Nm}$$

### Condition

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

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

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



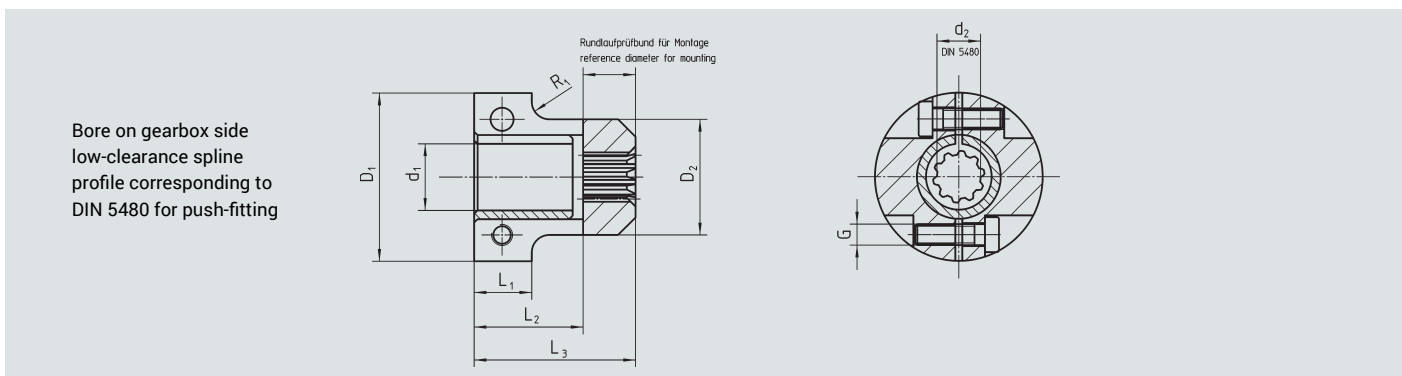
| Order Code | 1)          | d <sub>1</sub> | d <sub>2</sub> | D <sub>1</sub> | D <sub>2</sub> | I <sub>1</sub> | I <sub>2</sub> | I <sub>3</sub> | I <sub>4</sub> | L <sub>1</sub> | L <sub>2</sub> | G    | J <sub>red</sub><br>10 <sup>-4</sup> kg m <sup>2</sup> | T<br>kg |
|------------|-------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------|--------------------------------------------------------|---------|
| 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.



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



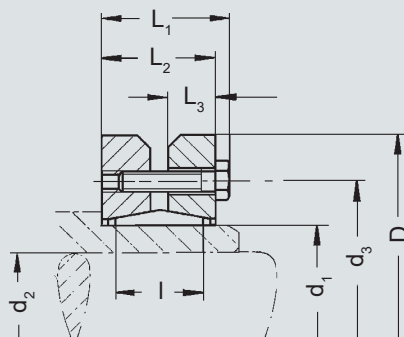
| Order Code | $d_1$ | $d_2$      | $D_1$ | $D_2$ | $L_1$ | $L_3$ | $R_1$ | G  | $L_2$ | $J_{red}$<br>$10^{-4} \text{ kg m}^2$ | $\bar{I}$<br>kg |
|------------|-------|------------|-------|-------|-------|-------|-------|----|-------|---------------------------------------|-----------------|
| 65 51 008  | 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

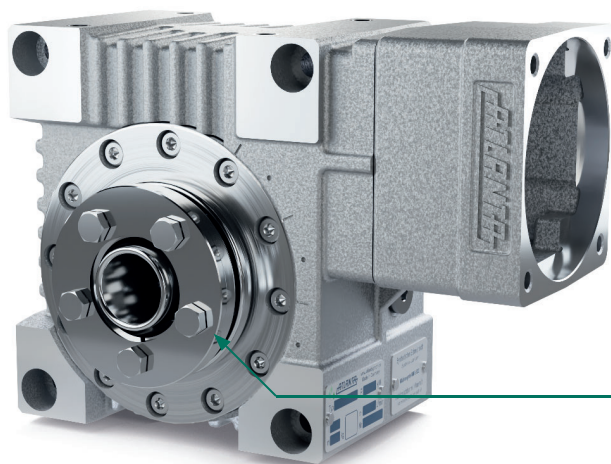
Supplied as complete set



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

| Order Code | Gearbox a <sub>0</sub> mm |      | T <sub>2 max</sub><br>Nm | d <sub>2</sub> | d <sub>1</sub> | d <sub>3</sub> | D     | L <sub>1</sub> | L <sub>2</sub> | L <sub>3</sub> | l    | G       | J <sub>red</sub> 10 <sup>-4</sup> kg m <sup>2</sup> | kg  |
|------------|---------------------------|------|--------------------------|----------------|----------------|----------------|-------|----------------|----------------|----------------|------|---------|-----------------------------------------------------|-----|
|            | HT                        | HP/E |                          |                |                |                |       |                |                |                |      |         |                                                     |     |
| 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

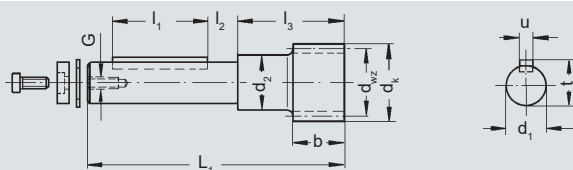


Output compression coupling for each size of hollow shaft

|                                                  | Page        |
|--------------------------------------------------|-------------|
| <b>Pinion Shafts For Keyed Connection Pinion</b> | B-58        |
| <b>Shafts for Compression Connection</b>         | B-59        |
| <b>Preloaded Split-Pinion Shafts</b>             | B-61 – B-63 |



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



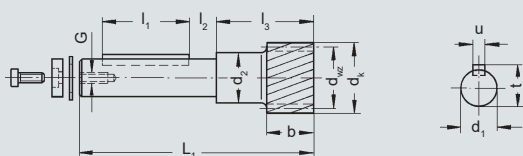
16MnCr5. 1.7131

### Case-Hardened

Quality  
6 e 25

| Order Code | Gearbox<br>ao |        | Number<br>of teeth | x     | d <sup>1)</sup> | d <sub>wz</sub> <sup>2)</sup> | d <sub>k</sub> | b  | d <sub>1h6</sub> | d <sub>2</sub> | L <sub>1</sub> | l <sub>1</sub> | l <sub>2</sub> | l <sub>3</sub> | u  | t    | G    | a     |  |
|------------|---------------|--------|--------------------|-------|-----------------|-------------------------------|----------------|----|------------------|----------------|----------------|----------------|----------------|----------------|----|------|------|-------|-------------------------------------------------------------------------------------|
|            | HP / E        | Module |                    |       |                 |                               |                |    |                  |                |                |                |                |                |    |      |      |       |                                                                                     |
| 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   |        | Number of Teeth | x      | d <sup>1)</sup> | d <sub>wz</sub> <sup>2)</sup> | d <sub>k</sub> | b  | d <sub>th6</sub> | d <sub>2</sub> | L <sub>1</sub> | l <sub>1</sub> | l <sub>2</sub> | l <sub>3</sub> | u  | t    | G    | a     |  |
|------------|-----------|--------|-----------------|--------|-----------------|-------------------------------|----------------|----|------------------|----------------|----------------|----------------|----------------|----------------|----|------|------|-------|---------------------------------------------------------------------------------------|
|            | ao HP / E | Module |                 |        |                 |                               |                |    |                  |                |                |                |                |                |    |      |      |       |                                                                                       |
| 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

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

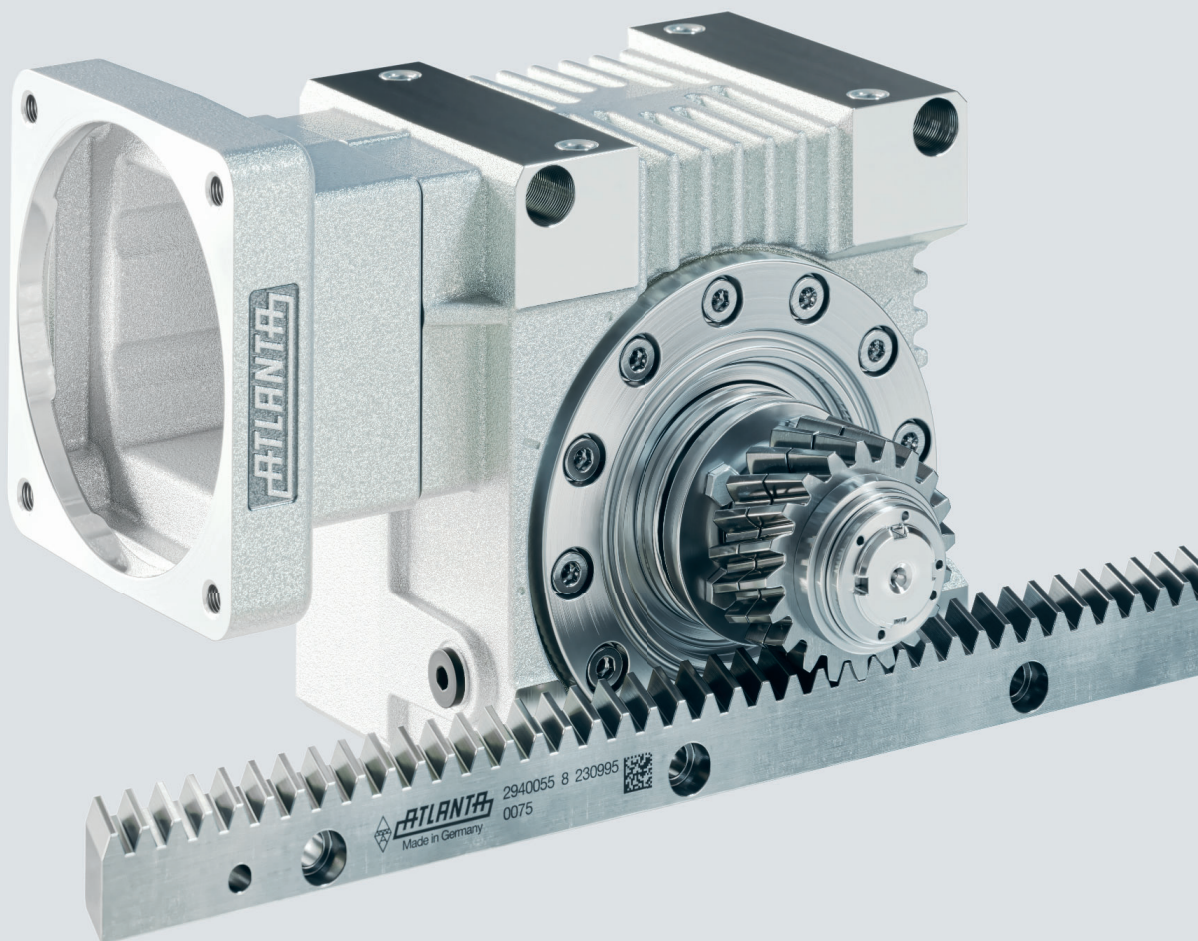
- 1)  $d$  = Reference Pitch Diameter
- 2)  $d_{wz}$  = Working Pitch Diameter
- x) Not suitable for gearboxes

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

### Description of Operation

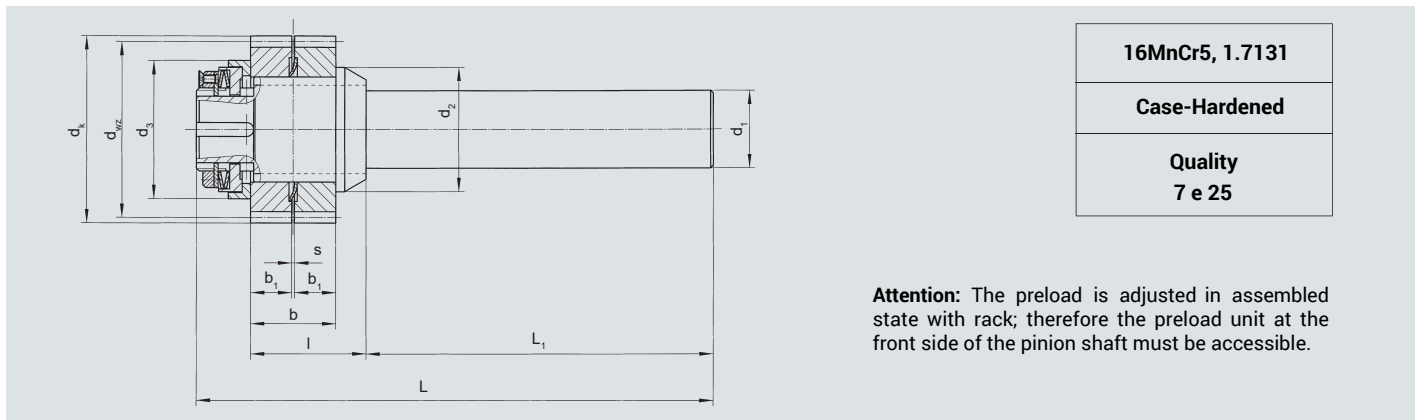
Preloaded split-pinion shafts consist of an output shaft, a helical split-pinion set and a preload unit. The split-pinion is manufactured as a set with an axial distance between the pinion halves of 1 mm (modules 2 to 4) and 2 mm (modules 5 to 8).

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



| Order Code | Gearbox Size |     |     | Output Coupling | T <sub>2</sub> * (Nm) |                   | Number of Teeth | d <sup>1)</sup> | d <sub>wz</sub> <sup>2)</sup> | d <sub>k</sub> | b  | b <sub>1</sub> | d <sub>1h6</sub> | d <sub>2</sub> | d <sub>3</sub> | s | l    | L <sub>1</sub> | L     | kg   |
|------------|--------------|-----|-----|-----------------|-----------------------|-------------------|-----------------|-----------------|-------------------------------|----------------|----|----------------|------------------|----------------|----------------|---|------|----------------|-------|------|
|            | Module       | HT  | HP  |                 | Without Preload       | With Max. Preload |                 |                 |                               |                |    |                |                  |                |                |   |      |                |       |      |
| 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<sub>wz</sub> = Working Pitch Diameter

x) Not suitable for gearboxes

\* Torques based on using hardened and ground racks

## Maximum Preload Torque T<sub>v max</sub>

| Module | T <sub>v max.</sub> | 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<sub>v max</sub> 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.

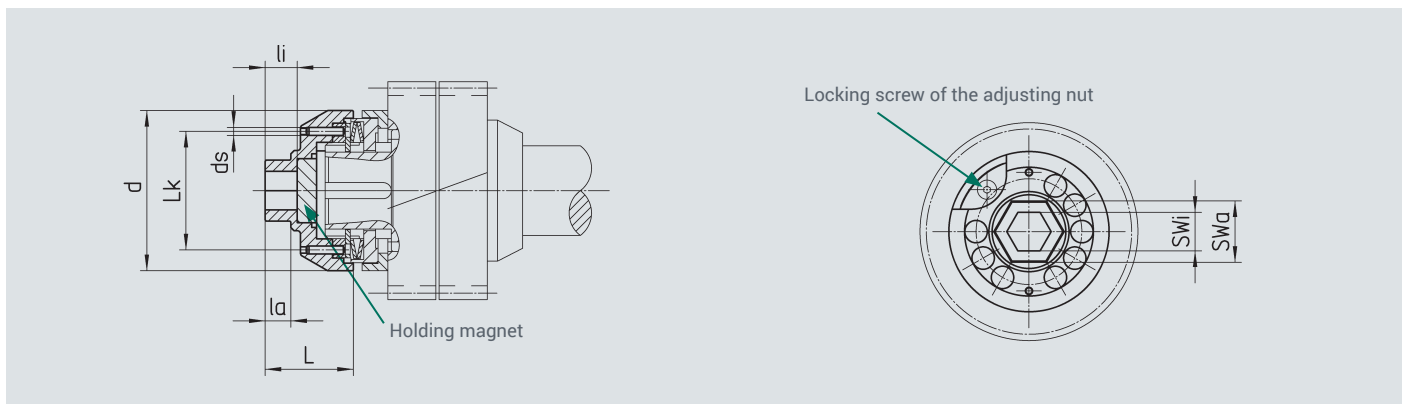
## Calculation of Center Distance 'a' Between Pinion And Rack

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

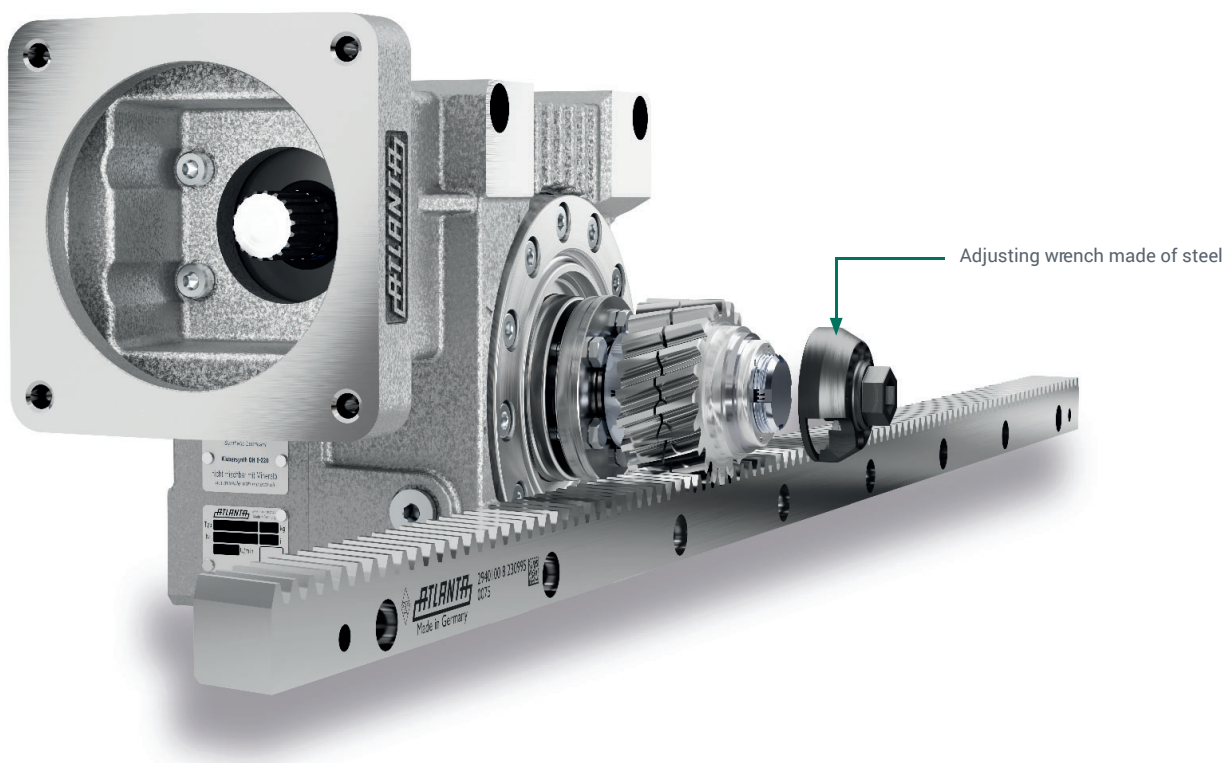
| m | a <sub>o</sub> | x   | h <sub>o</sub> |
|---|----------------|-----|----------------|
| 2 | 53.83          | —   | 22             |
| 3 | 57.83          | —   | 26             |
| 4 | 66.83          | —   | 35             |
| 5 | 76.29          | 0.5 | 34             |
| 6 | 87.38          | 0.5 | 43             |
| 8 | 125.93         | 0.5 | 71             |



## Preload Adjusting Wrench



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



|                                                | Page        |
|------------------------------------------------|-------------|
| ATLANTA Gear Racks                             | C-4 – C-11  |
| Helical Rack and Pinion Drives                 | C-12 – C-55 |
| Straight Rack and Pinion Drives                | C-56 – C-85 |
| Rack & Pinion Drive Calculations and Selection | C-87 – C-89 |
| Rack Assembly                                  | C-91 – C-99 |

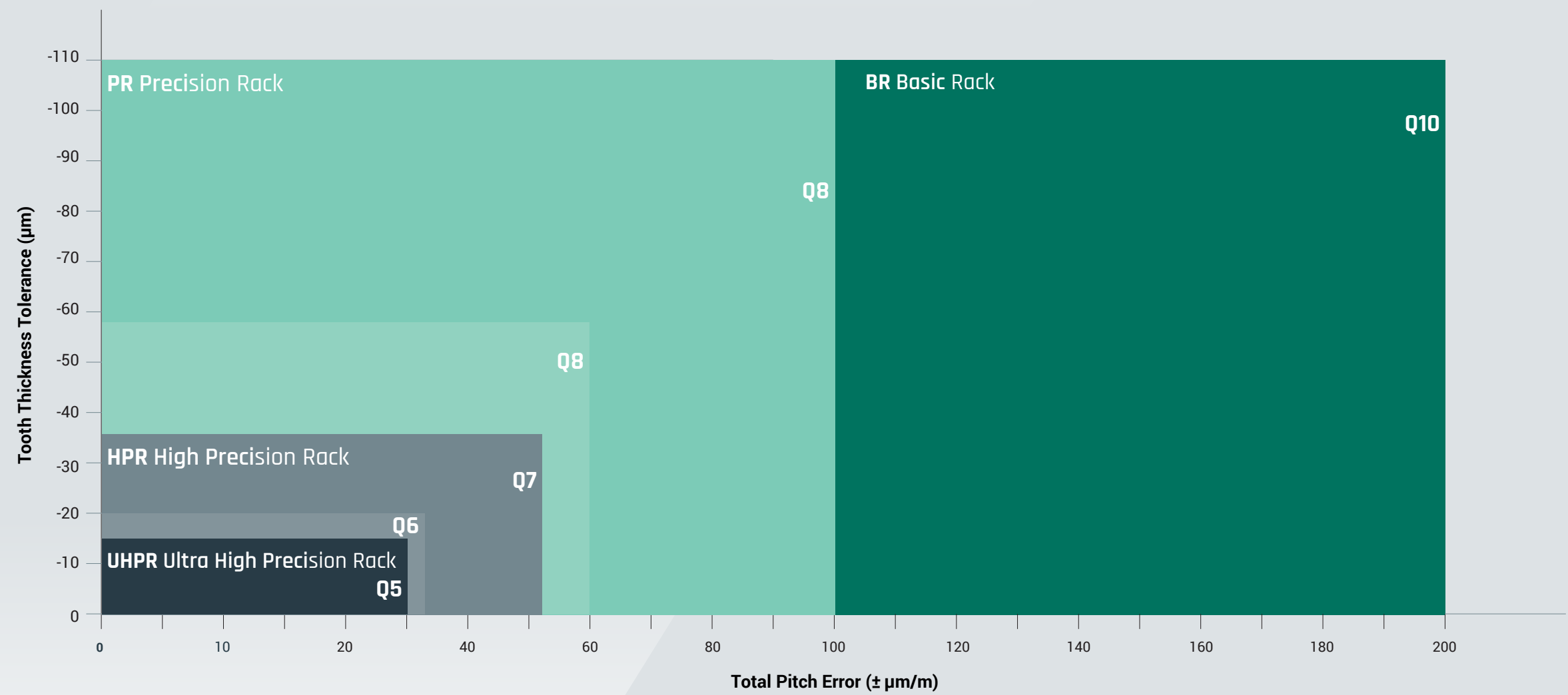


# Welcome To The World's Widest Range Of High-Quality Racks & Pinions

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.

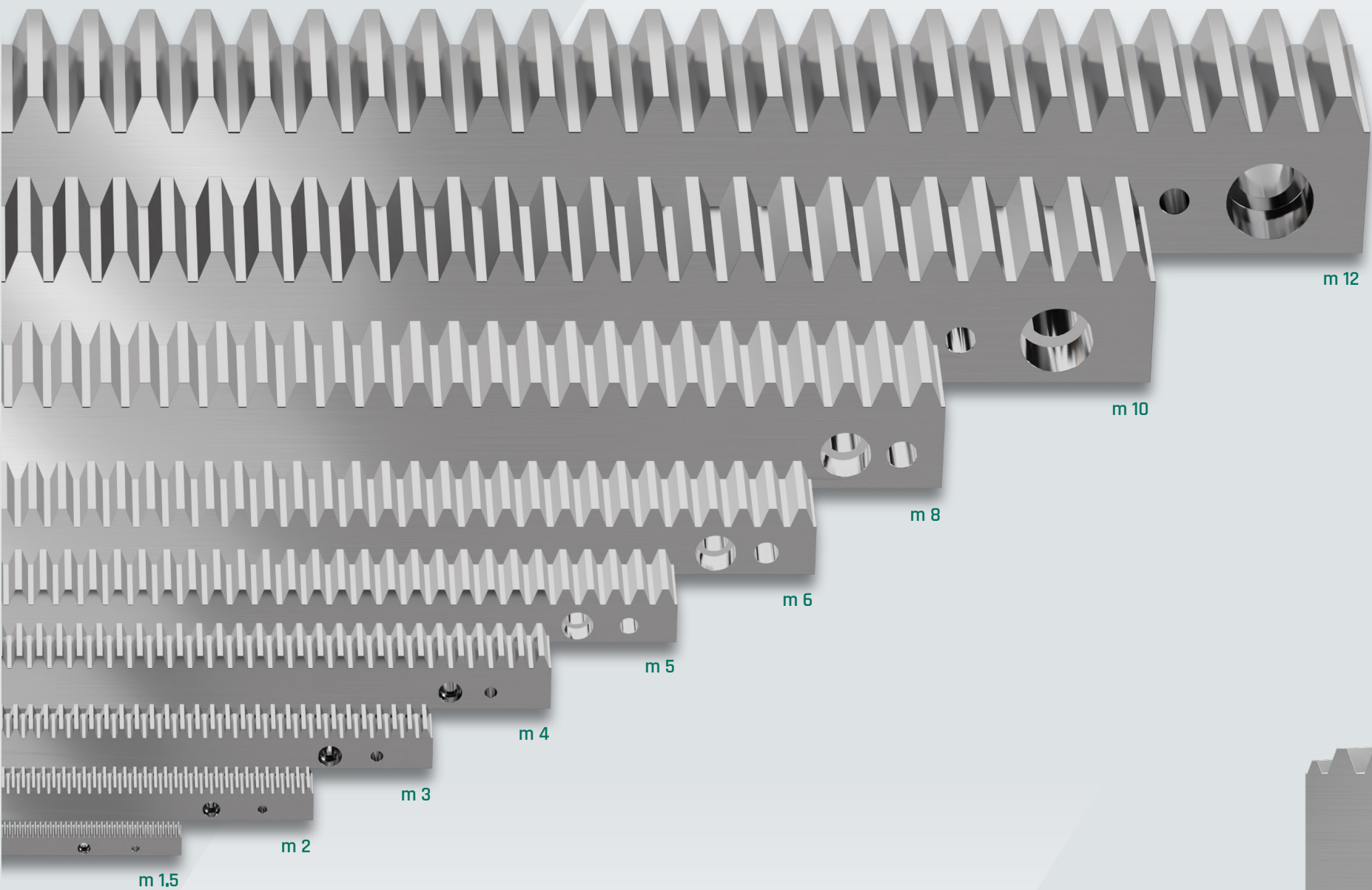


## The Right Rack For Every Application

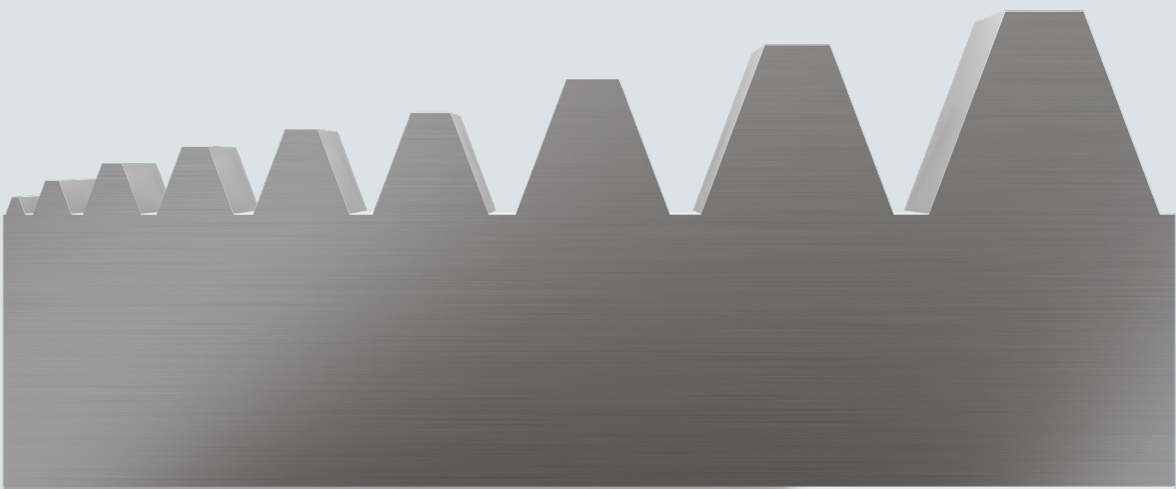
Depending on the application and the machine accuracy requirements, you can choose from a wide variety of different racks with quality levels from 5 to 10 and lengths of up to 2,000 mm.

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

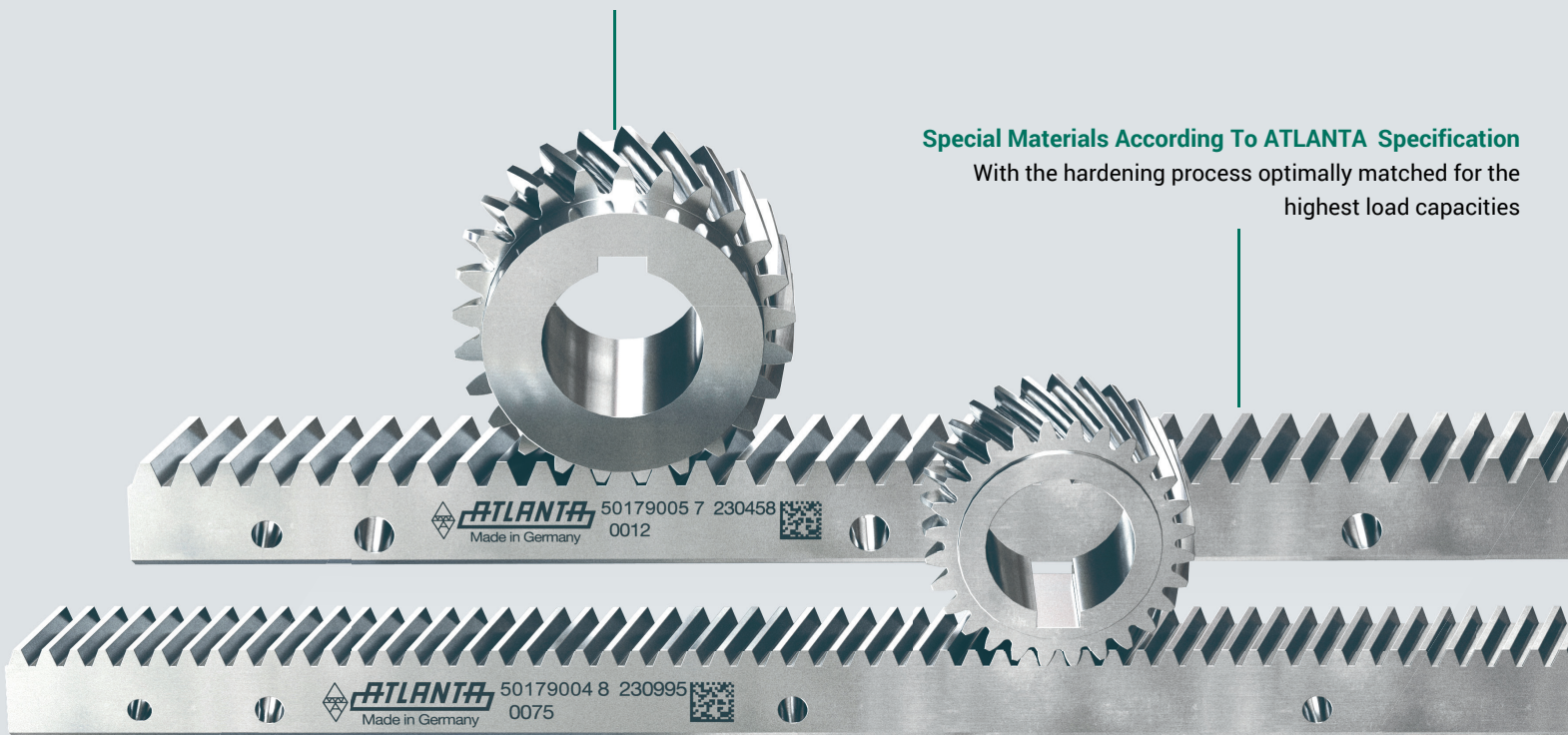
We produce racks and gears at the highest level. Only materials that meet the highest requirements of our ATLANTA specification are used in production. Together with our hardening process, this creates the well-known **ATLANTA Premium Quality** for the highest loads and the lowest tolerances within a 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  $Q_{joint} = 25 \mu m$ )  
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:  $3 \times 16 = 48$  screws      Number of Joints: 2      Pins: 0  
Rack Accuracy:               $GT_r: 44 \mu m$   
Maximum Pitch Error:  $3 \times 44 \mu m + 2 \times 25 \mu m = 182 \mu m$

Using 6 Pieces Of One Meter Racks



Time:                      Number of Screws:  $6 \times 8 = 48$  Screws      Number of Joints: 5      Pins: 0  
Rack Accuracy:               $GT_r: 34 \mu m$   
Maximum Pitch Error:  $6 \times 34 \mu m + 5 \times 25 \mu m = 329 \mu m$

Using 12 Pieces Of Half Meter Racks



Time:                      Number of Screws:  $12 \times 4 = 48$  Screws      Number of Joints: 11      Pins:  $12 \times 2 = 24$   
Rack Accuracy:               $GT_r: 26 \mu m$   
Maximum Pitch Error:  $12 \times 26 \mu m + 11 \times 25 \mu m = 587 \mu m$



| Class                                    | ATLANTA Quality                         | Module | Total Pitch Error <sup>1)</sup><br>(± µm/m) | Tooth Thickness Tolerance<br>(µm) | Maximum Length<br>(mm) | Maximum Feed Force Per Pinion Contact <sup>2)</sup><br>(kN) | Application Examples                                                                                                  |
|------------------------------------------|-----------------------------------------|--------|---------------------------------------------|-----------------------------------|------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>UHPR</b><br>Ultra High Precision Rack | <b>5</b><br>Hardened & Ground           | 2      | 30                                          | -15                               | 1000                   | 19.5                                                        | High-precision machine tools, Laser cutting systems, CNC cutting machines                                             |
|                                          |                                         | 3      | 30                                          | -15                               | 1000                   | 28.5                                                        |                                                                                                                       |
| <b>HPR</b><br>High Precision Rack        | <b>6</b><br>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                                                        |                                                                                                                       |
|                                          | <b>6</b><br>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                                                       |                                                                                                                       |
|                                          | <b>7</b><br>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                                                       |                                                                                                                       |
| <b>PR</b><br>Precision Rack              | <b>8</b><br>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                                                        |                                                                                                                       |
|                                          | <b>8</b><br>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                                                        |                                                                                                                       |
| <b>BR</b><br>Basic Rack                  | <b>10</b><br>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                                                       |                                                                                                                       |

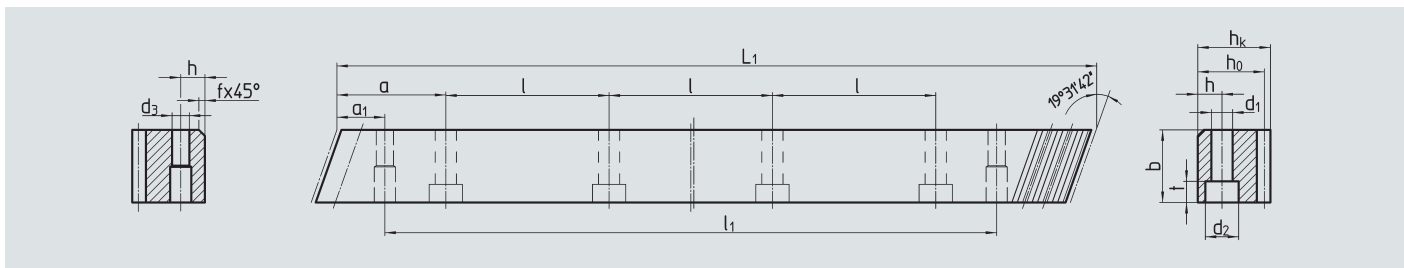
1) Values are for rack lengths of 1,000 mm. For total pitch errors values for other rack lengths, please see the respective catalog pages.

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<br>5                      | 6                           | HPR<br>6                       | 7                              | PR<br>8                        |                                | BR<br>10                       |
|-----------------|------------------|--------------------|--------------------------------|-----------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Material        |                  |                    | Heat-Treat Steel <sup>1)</sup> | Case-Hardened <sup>1)</sup> | Heat-Treat Steel <sup>1)</sup> | Heat-Treat Steel <sup>1)</sup> | Heat-Treat Steel <sup>1)</sup> | Heat-Treat Steel <sup>1)</sup> | Heat-Treat Steel <sup>1)</sup> |
| 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<br>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                      |
|                 | ✓<br>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                    |

### ATLANTA Quality 5



| Order Code | Module | L <sub>1</sub> | N° of Teeth | b <sup>+0.4</sup> | h <sub>k</sub> | h <sub>0</sub> | f | a    | l   | N° of Holes | h | d <sub>1</sub> | d <sub>2</sub> | t | a <sub>1</sub> | l <sub>1</sub> | d <sub>3</sub> | 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:**  $GT_f / 1000 \leq 0.030 \text{ mm}$

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

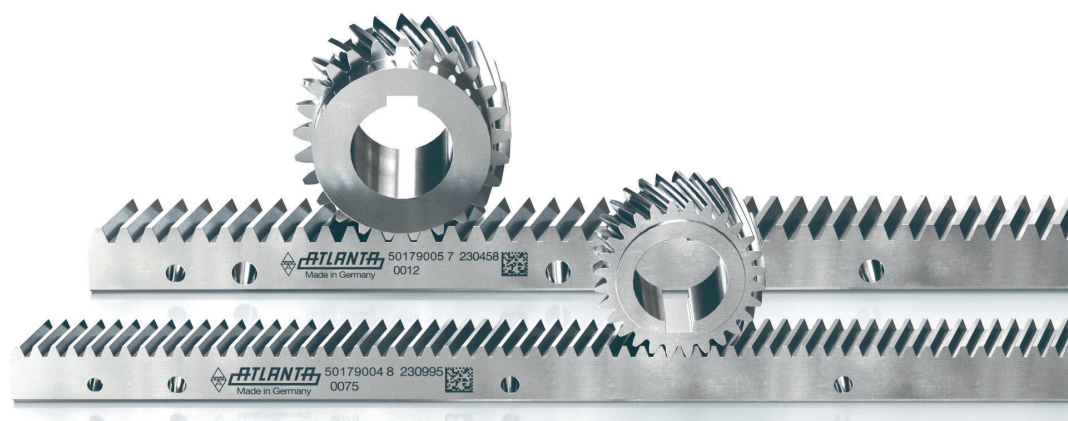
For information on mounting racks, see page C-92.

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

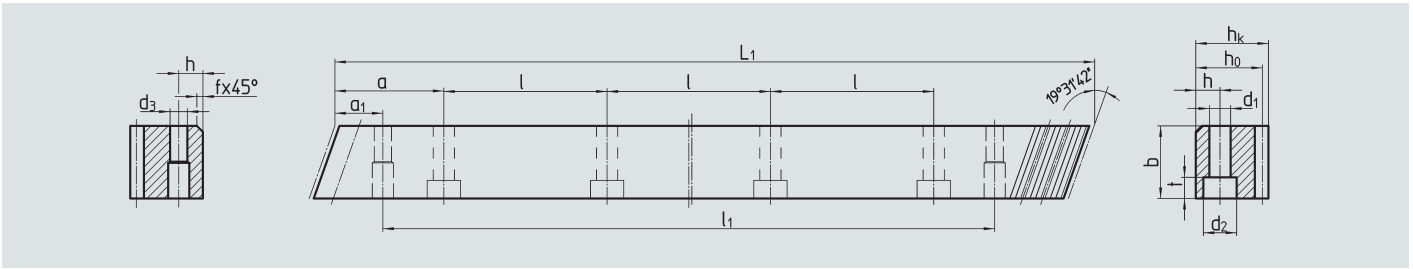
For lubrication of racks & pinions, we recommend our electronic lubrication systems, see Chapter D.

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 <sub>1</sub> | N° of Teeth z | b* <sup>0.4</sup> | h <sub>k</sub> | h <sub>0</sub> | f | a                      | l   | N° of Holes | h  | d <sub>1</sub> | d <sub>2</sub> | t  | a <sub>1</sub> | l <sub>1</sub> | d <sub>3</sub> | kg    |
|---------------------------|--------|----------------|---------------|-------------------|----------------|----------------|---|------------------------|-----|-------------|----|----------------|----------------|----|----------------|----------------|----------------|-------|
| 29 20 050 <sup>2)</sup>   | 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 <sup>2)</sup>   | 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 <sup>1)2)</sup> | 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 L<sub>1</sub> = 1,000 mm

**Total Pitch Error:**  $GT_f / 500 \leq 0.026 \text{ mm}$   
 $GT_f / 1000 \leq 0.034 \text{ mm}$

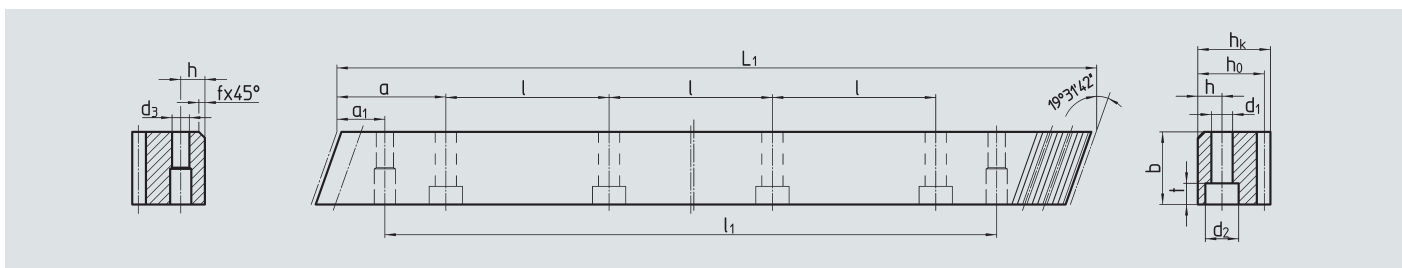
- ⊗ Teeth hardened with the ATLANTA High-Performance hardening process and ground
- ⊗ Heat-treatable steel according to ATLANTA-Standard
- ⊗ Ground on all sides after hardening

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 <sub>1</sub> | N° of Teeth z | b <sup>+0.4</sup> | h <sub>k</sub> | h <sub>0</sub> | f   | a    | l                      | N° of Holes | h  | d <sub>1</sub> | d <sub>2</sub> | t  | a <sub>1</sub> | l <sub>1</sub> | d <sub>3</sub> |  |
|-------------------------|--------|----------------|---------------|-------------------|----------------|----------------|-----|------|------------------------|-------------|----|----------------|----------------|----|----------------|----------------|----------------|-------------------------------------------------------------------------------------|
| 29 15 055 <sup>2)</sup> | 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 <sup>2)</sup> | 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 <sup>2)</sup> | 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 <sup>1)</sup> | 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 <sup>2)</sup> | 5      | 500.00         | 30            | 49                | 49             | 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                | 49             | 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                | 49             | 34             | 2.5 |      | without mounting holes |             |    |                |                |    |                |                |                | 13.00                                                                               |
| 29 50 205               | 5      | 2000.00        | 120           | 49                | 49             | 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                | 49             | 34             | 2.5 |      | without mounting holes |             |    |                |                |    |                |                |                | 26.00                                                                               |
| 29 60 055 <sup>2)</sup> | 6      | 500.00         | 25            | 59                | 59             | 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                | 59             | 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                | 59             | 43             | 2.5 |      | without mounting holes |             |    |                |                |    |                |                |                | 18.10                                                                               |
| 29 60 205               | 6      | 2000.00        | 100           | 59                | 59             | 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                | 59             | 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 <sup>3)</sup> | 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 <sup>3)</sup> | 10     | 1000.00        | 30            | 99                | 99             | 89             | 2.5 |      | without mounting holes |             |    |                |                |    |                |                |                | 68.72                                                                               |
| 29 10 155 <sup>3)</sup> | 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 <sup>3)</sup> | 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 <sup>3)</sup> | 12     | 1000.00        | 25            | 120               | 120            | 108            | 2.5 |      | without mounting holes |             |    |                |                |    |                |                |                | 111.00                                                                              |

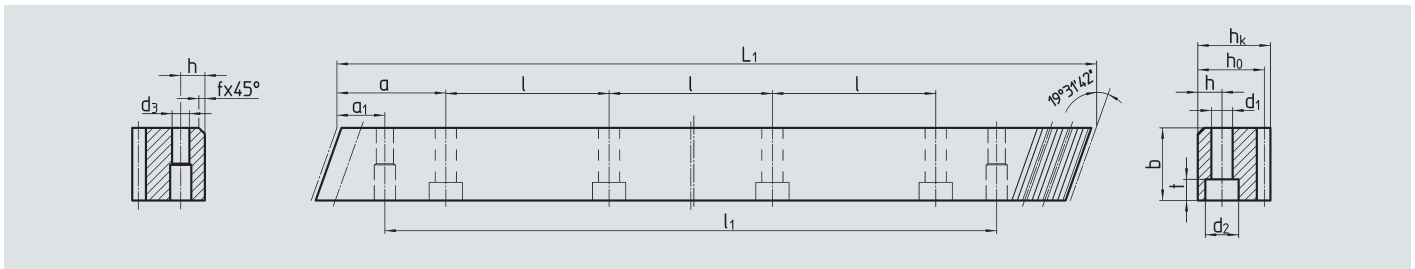
- 1) This rack can only be used for continuous linking with the left side
- 2) Due to the screw connection, the feed force is max. 50 % of the value for racks with L<sub>1</sub> = 1,000 mm
- 3) On Request

**Total Pitch Error:**

- GT<sub>f</sub> / 500 ≤ 0.026 mm
- GT<sub>f</sub> / 1000 ≤ 0.034 mm
- GT<sub>f</sub> / 1500 ≤ 0.041 mm (± 0.027 mm / 1000)
- GT<sub>f</sub> / 2000 ≤ 0.044 mm (± 0.022 mm / 1000)

For further information see next page

### ATLANTA Quality 7



| Order Code              | Module | L <sub>1</sub> | N° of Teeth | b <sup>+0.4</sup> | h <sub>k</sub> | h <sub>0</sub> | f   | a    | l   | N° of Holes | h  | d <sub>1</sub> | d <sub>2</sub> | t  | a <sub>1</sub> | l <sub>1</sub> | d <sub>3</sub> | 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 <sup>1)</sup> | 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:**  $GT_f/1000 \leq 0.052 \text{ mm}$   
 $GT_f/1500 \leq 0.062 \text{ mm } (\triangleq 0.042 \text{ mm} / 1000)$   
 $GT_f/2000 \leq 0.068 \text{ mm } (\triangleq 0.034 \text{ mm} / 1000)$

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

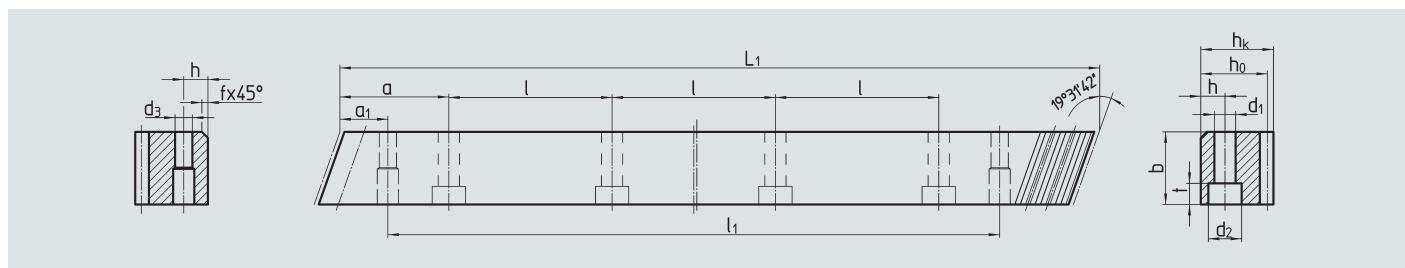
For information on mounting racks, see page C-92.

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 <sub>1</sub> | N° of Teeth | b <sup>*0.4</sup> | h <sub>k</sub> | h <sub>0</sub> | f   | a    | l   | N° of Holes | h  | d <sub>1</sub> | d <sub>2</sub> | t  | a <sub>1</sub> | l <sub>1</sub> | d <sub>3</sub> | 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 <sup>1)</sup> | 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:**  $GT_f/1000 \leq 0.060 \text{ mm}$   
 $GT_f/1500 \leq 0.072 \text{ mm} (\triangle 0.048 \text{ mm} / 1000)$   
 $GT_f/2000 \leq 0.078 \text{ mm} (\triangle 0.039 \text{ mm} / 1000)$

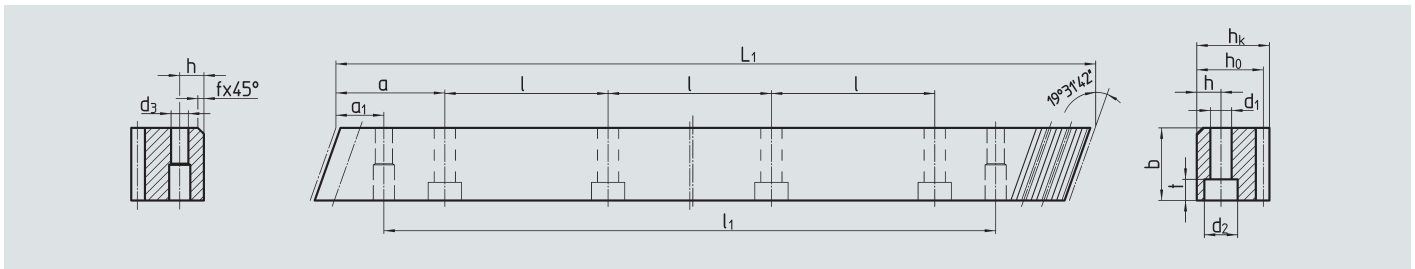
- ⊗ Teeth hardened with the ATLANTA High-Performance hardening process and ground
- ⊗ Heat-treatable steel according to ATLANTA-Standard
- ⊗ Ground on all sides after hardening

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 <sub>1</sub> | N° of Teeth | b <sup>+0.4</sup> | h <sub>k</sub> | h <sub>0</sub> | f | a                      | l   | N° of Holes | h  | d <sub>1</sub> | d <sub>2</sub> | t | a <sub>1</sub> | l <sub>1</sub> | d <sub>3</sub> | kg    |
|-------------------------|--------|----------------|-------------|-------------------|----------------|----------------|---|------------------------|-----|-------------|----|----------------|----------------|---|----------------|----------------|----------------|-------|
| 38 21 050 <sup>2)</sup> | 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 <sup>2)</sup> | 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 L<sub>1</sub> = 1,000 mm

**Total Pitch Error:**  $GT_f / 500 \leq 0.050 \text{ mm}$   
 $GT_f / 1000 \leq 0.100 \text{ mm}$   
 $GT_f / 2000 \leq 0.200 \text{ mm}$

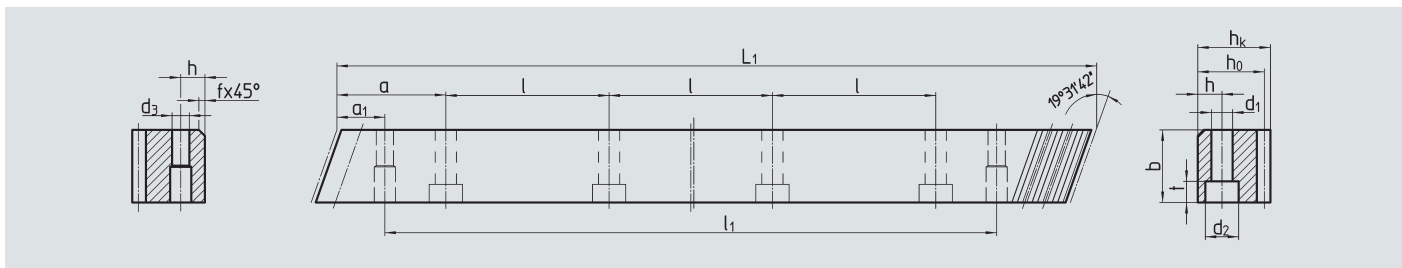
- ⊗ Teeth milled, quenched & tempered
- ⊗ Heat-treatable steel according to ATLANTA-Standard
- ⊗ Backside machined

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 <sub>1</sub> | N° of Teeth | b <sup>+0.4</sup> | h <sub>k</sub> | h <sub>0</sub> | f   | a                      | l   | N° of Holes | h  | d <sub>1</sub> | d <sub>2</sub> | t  | a <sub>1</sub> | l <sub>1</sub> | d <sub>3</sub> | kg    |
|---------------------------|--------|----------------|-------------|-------------------|----------------|----------------|-----|------------------------|-----|-------------|----|----------------|----------------|----|----------------|----------------|----------------|-------|
| 39 15 050 <sup>2)</sup>   | 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 <sup>2)</sup>   | 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 <sup>2)</sup>   | 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 <sup>1)2)</sup> | 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 L<sub>1</sub> = 1,000 mm

**Total Pitch Error:**

- GT<sub>f</sub> / 500 ≤ 0.100 mm
- GT<sub>f</sub> / 1000 ≤ 0.200 mm
- GT<sub>f</sub> / 1500 ≤ 0.300 mm
- GT<sub>f</sub> / 2000 ≤ 0.400 mm

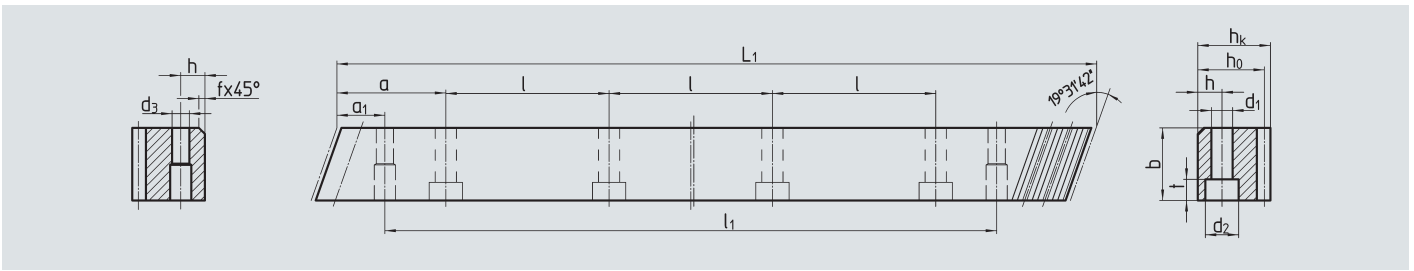
- ⊗ Teeth hardened with the ATLANTA High-Performance hardening process and ground
- ⊗ Heat-treatable steel according to ATLANTA-Standard
- ⊗ Ground on all sides after hardening

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            | $h$ | $d_1$ | $d_2$ | $t$ | $a_1$ | $l_1$ | $d_3$ |  |
|------------|--------|---------|-------------|------------|-------|-------|-----|-----|-----|------------------------|-----|-------|-------|-----|-------|-------|-------|-------------------------------------------------------------------------------------|
| 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:  $GT_f/1000 \leq 0.200 \text{ mm}$   
 $GT_f/2000 \leq 0.400 \text{ mm}$

- ⊗ 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.

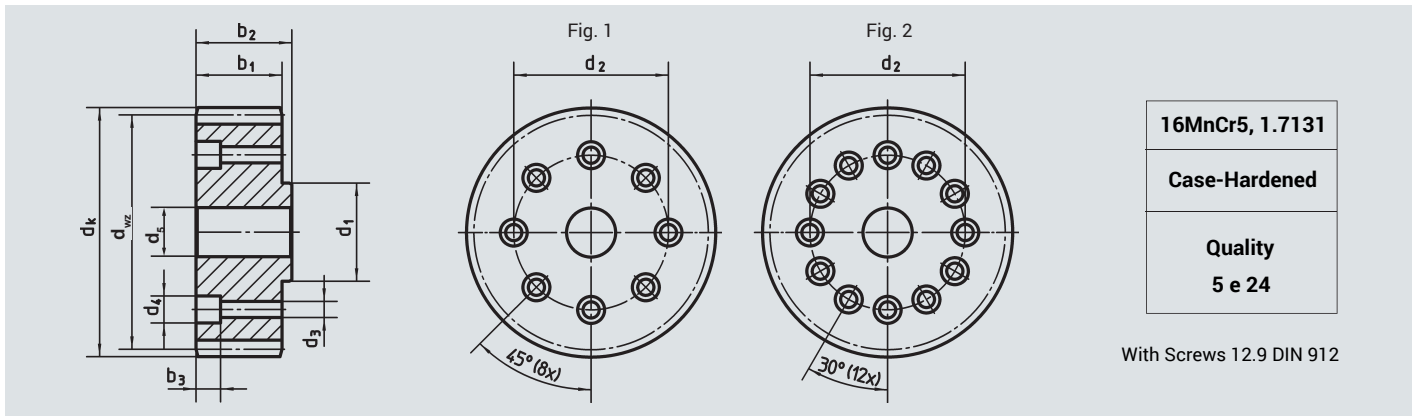
To achieve precision rack joints, we recommend our patented rack assembly kit, see page C-96. For lubrication of racks & pinions, we recommend our electronic lubrication systems, see Chapter D. For the calculation and selection of the rack & pinion drive, see pages C-44 to C-55.

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

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

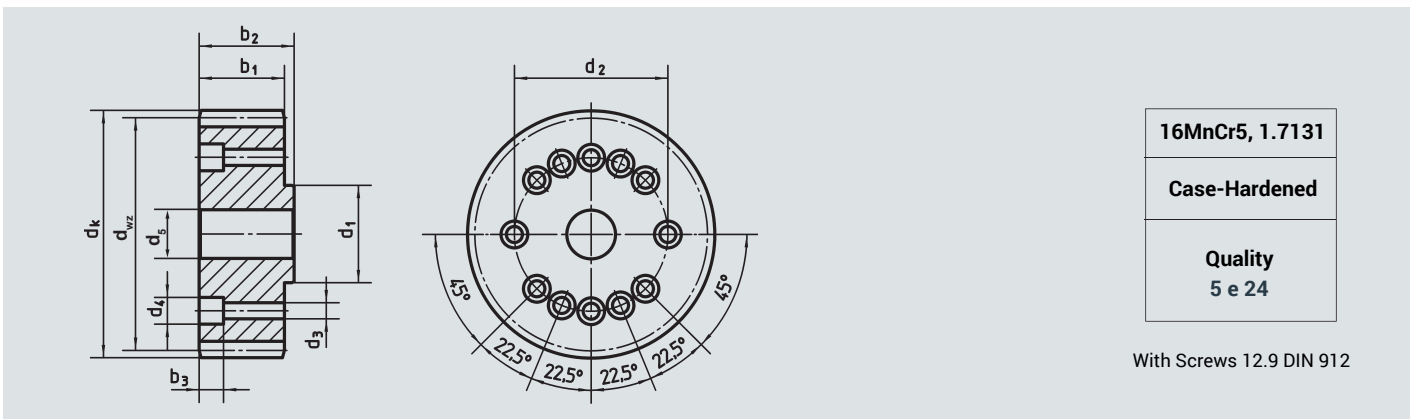


## Helical-Tooth, 19° 31' 42" left-hand, A-31.5 to A-63 flange



| Order Code | Fig. | Module | N° of Teeth z | x <sup>(1)</sup> | d <sub>0</sub> | d <sub>wz</sub> | d <sub>k</sub> | d <sub>1h6</sub> | d <sub>2</sub> | d <sub>3</sub> | d <sub>4</sub> | d <sub>5</sub> <sup>H6</sup> | b <sub>1</sub> | b <sub>2</sub> | b <sub>3</sub> | L=PI*d |                                                                                     |               |
|------------|------|--------|---------------|------------------|----------------|-----------------|----------------|------------------|----------------|----------------|----------------|------------------------------|----------------|----------------|----------------|--------|-------------------------------------------------------------------------------------|---------------|
|            |      |        |               |                  |                |                 |                |                  |                |                |                |                              |                |                |                | L      |  | 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   |

<sup>(1)</sup> Profile Modification Factor

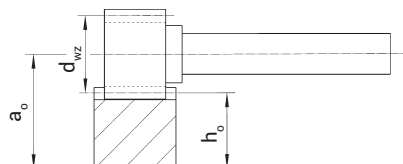


| L=PI*d     |        |               |                  |                |                 |                |                  |                |                |                |                              |                |                |                |        |                                                                                          |               |
|------------|--------|---------------|------------------|----------------|-----------------|----------------|------------------|----------------|----------------|----------------|------------------------------|----------------|----------------|----------------|--------|------------------------------------------------------------------------------------------|---------------|
| Order Code | Module | N° of Teeth z | x <sup>(1)</sup> | d <sub>0</sub> | d <sub>wz</sub> | d <sub>k</sub> | d <sub>1h6</sub> | d <sub>2</sub> | d <sub>3</sub> | d <sub>4</sub> | d <sub>5</sub> <sup>H6</sup> | b <sub>1</sub> | b <sub>2</sub> | b <sub>3</sub> | 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   |

<sup>(1)</sup> Profile Modification Factor

The maximum torque is limited by the threaded connection

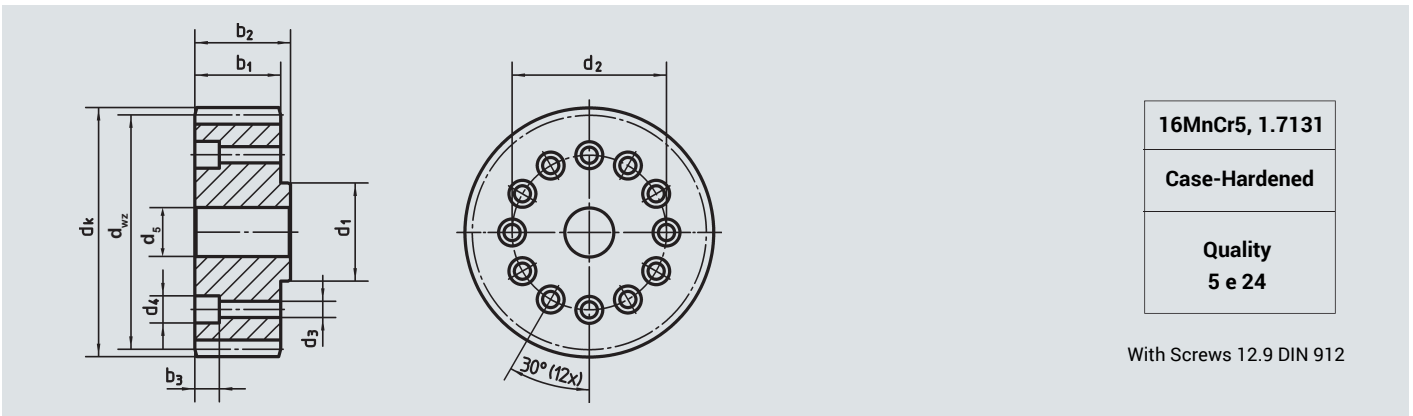
Calculation of center distance 'a' between pinion and rack.



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



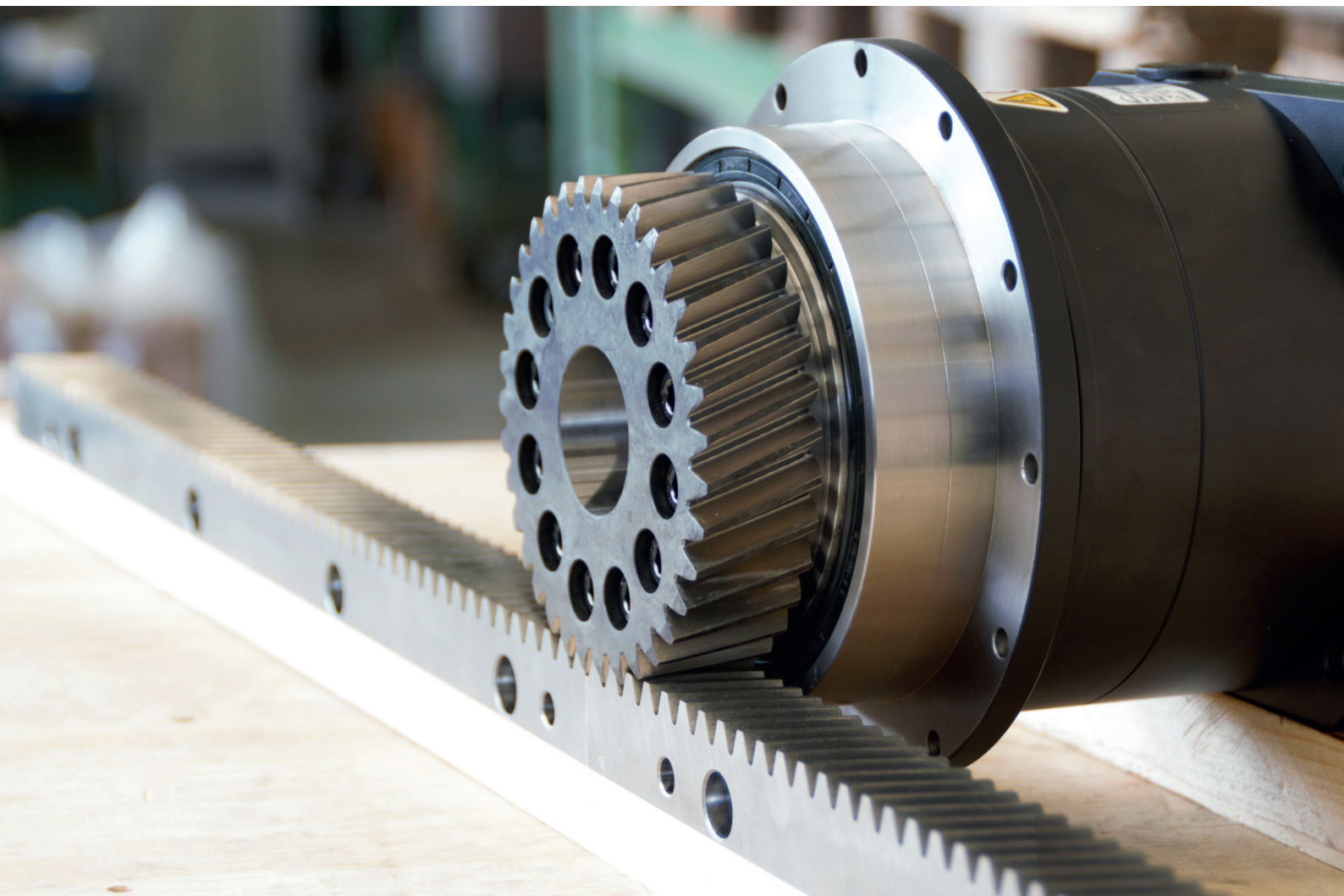
Helical-Tooth, 19° 31' 42" left-hand, A-80 to A-125 flange



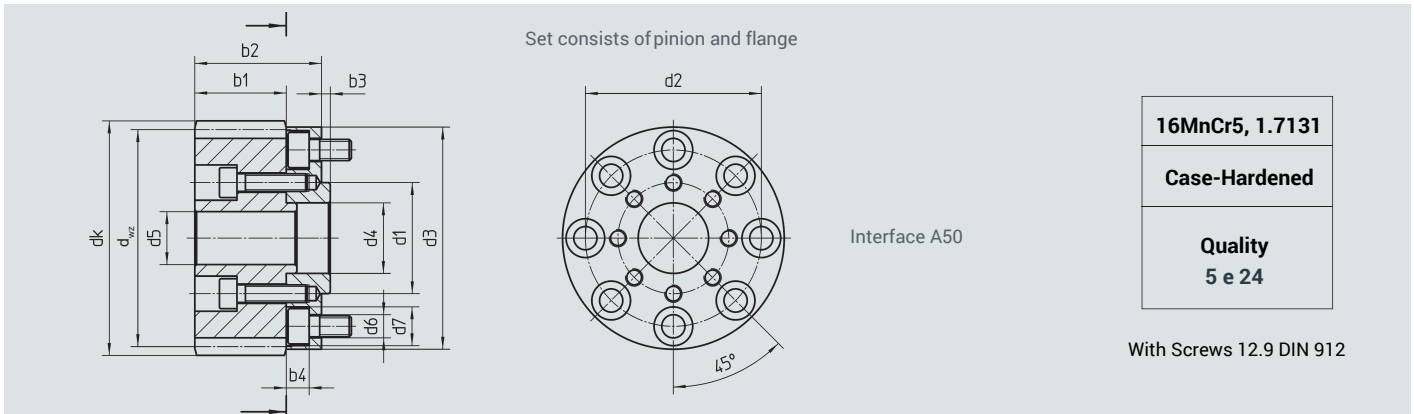
| Order Code | Module | N° of Teeth z | x <sup>(1)</sup> | d <sub>0</sub> | d <sub>wz</sub> | d <sub>k</sub> | d <sub>1h6</sub> | d <sub>2</sub> | d <sub>3</sub> | d <sub>4</sub> | d <sub>5H6</sub> | b <sub>1</sub> | b <sub>2</sub> | b <sub>3</sub> | L=Pl*d |                                                                                     | ISO Interface |
|------------|--------|---------------|------------------|----------------|-----------------|----------------|------------------|----------------|----------------|----------------|------------------|----------------|----------------|----------------|--------|-------------------------------------------------------------------------------------|---------------|
|            |        |               |                  |                |                 |                |                  |                |                |                |                  |                |                |                | L      |  |               |
| 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  |

<sup>(1)</sup> Profile Modification Factor

The max. torque is limited by the threaded connection.

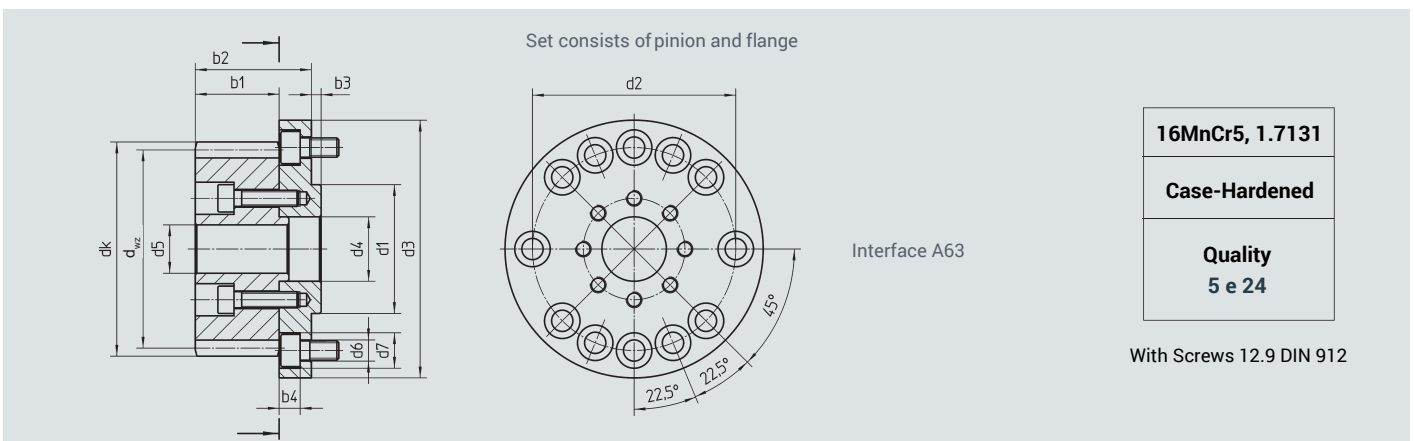


## Helical-Tooth, 19° 31' 42" left-hand, A-50 to A-63 flange



| Order Code<br>Pinion | Order Code<br>Flange | Module | N° of<br>Teeth z | x <sup>(1)</sup> | L=Pl*d         |                 |       |                  |    |    |    |    |     |    |    |    |     |     |        |     | kg               | ISO Interface |
|----------------------|----------------------|--------|------------------|------------------|----------------|-----------------|-------|------------------|----|----|----|----|-----|----|----|----|-----|-----|--------|-----|------------------|---------------|
|                      |                      |        |                  |                  | d <sub>0</sub> | d <sub>wz</sub> | dk    | d <sub>1h6</sub> | d2 | d3 | d4 | d5 | d6  | d7 | b1 | b2 | b3  | b4  | L      |     |                  |               |
| 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 |               |

<sup>(1)</sup> Profile Modification Factor

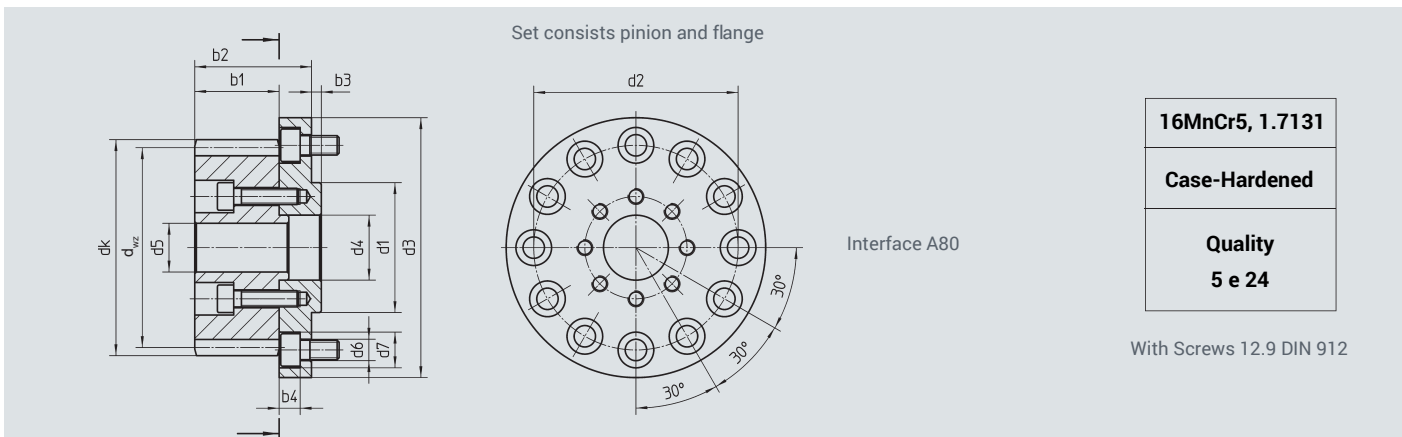


| Order Code | Order Code  | N° of<br>Module | Teeth z | x <sup>(1)</sup> | d.    | d <sub>wz</sub> | dk    | d <sub>1h6</sub> | d2 | d3 | d4 | d5 | d6  | d7 | b1 | b2 | b3 | b4  | L=PI*d |     | T<br>kg          | ISO Interface |
|------------|-------------|-----------------|---------|------------------|-------|-----------------|-------|------------------|----|----|----|----|-----|----|----|----|----|-----|--------|-----|------------------|---------------|
| Pinion     | Flange      |                 |         |                  |       |                 |       |                  |    |    |    |    |     |    |    |    |    |     | L      |     |                  |               |
| 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 |               |

<sup>(1)</sup> Profile Modification Factor

The maximum torque is limited by the threaded connection

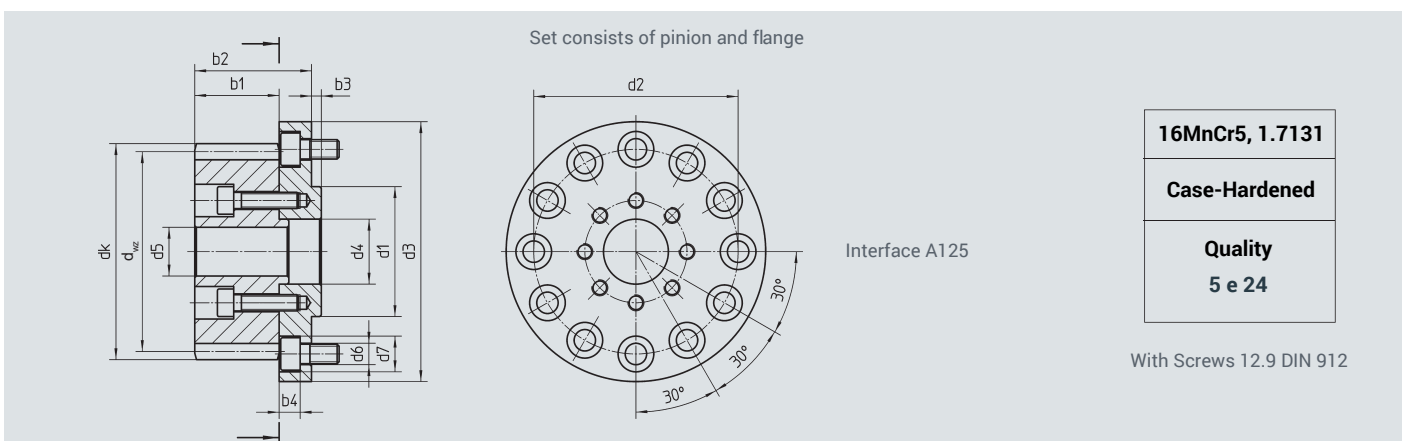
## Helical-Tooth, 19° 31' 42" left-hand, A-80 to A-125 flange



| Order Code Pinion | Order Code Flange          | Module | N° of Teeth z | $x^{(1)}$ | $d_0$ | $d_{wz}$ | $d_k$  | $d_{1h6}$ | $d_2$ | $d_3$ | $d_4$ | $d_5$ | $d_6$ | $d_7$ | $b_1$ | $b_2$ | $b_3$ | $b_4$ | $L=PI \cdot d$<br>L | $\frac{kg}{kg}$ | ISO Interface       |
|-------------------|----------------------------|--------|---------------|-----------|-------|----------|--------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------------|-----------------|---------------------|
| 78 20 526         | 2 65 78 001 <sup>(2)</sup> | 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 <sup>(2)</sup> |        |               |           |       |          |        |           |       |       |       |       |       |       |       |       |       |       |                     |                 |                     |
| 78 20 527         | 2 65 78 001 <sup>(2)</sup> | 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 <sup>(2)</sup> |        |               |           |       |          |        |           |       |       |       |       |       |       |       |       |       |       |                     |                 |                     |
| 78 20 529         | 2 65 78 001 <sup>(2)</sup> | 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 <sup>(2)</sup> |        |               |           |       |          |        |           |       |       |       |       |       |       |       |       |       |       |                     |                 |                     |
| 78 20 535         | 2 65 78 001 <sup>(2)</sup> | 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 <sup>(2)</sup> |        |               |           |       |          |        |           |       |       |       |       |       |       |       |       |       |       |                     |                 |                     |
| 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      |

<sup>(1)</sup> Profile Modification Factor

<sup>(2)</sup> Uses two flanges



| Order Code Pinion | Order Code Flange          | Module | N° of Teeth z | $x^{(1)}$ | $d_0$  | $d_{wz}$ | $d_k$  | $d_{1h6}$ | $d_2$ | $d_3$ | $d_4$ | $d_5$ | $d_6$ | $d_7$ | $b_1$ | $b_2$ | $b_3$ | $b_4$ | $L=PI \cdot d$<br>L | $\frac{kg}{kg}$ | ISO Interface      |
|-------------------|----------------------------|--------|---------------|-----------|--------|----------|--------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------------|-----------------|--------------------|
| 78 31 531         | 2 65 78 003 <sup>(2)</sup> | 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 <sup>(2)</sup> |        |               |           |        |          |        |           |       |       |       |       |       |       |       |       |       |       |                     |                 |                    |
| 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     |

<sup>(1)</sup> Profile Modification Factor

<sup>(2)</sup> 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.

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.



German Patent  
Nr. 10 2008 024 070.2



## 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:  $m = 10000 \text{ kg}$   
 Speed:  $v = 0.7 \text{ m/s}$   
 Acceleration time:  $t_b = 0.67 \text{ s}$   
 Coefficient of friction:  $\mu = 0.05$   
 Motor rpm:  $n_{\text{Mot}} = 1500 \text{ min}^{-1}$

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

### Acceleration:

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

### Tangential force at the pinion:

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

### TR-Pinion

Module:  $m = 5$   
 Number of teeth:  $z = 12$   
 Pitch diameter  $\varnothing$  of pinion:  $d = 63.66 \text{ mm}$

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

$$n_{\text{pinion}} = 60000 \cdot \frac{v}{\pi \cdot d} = 60000 \cdot \frac{0.7}{\pi \cdot 63.66} = 210 \text{ min}^{-1}$$

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

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

### Conventional Pinion

Module:  $m = 5$   
 Number of teeth:  $z = 36$   
 Pitch diameter  $\varnothing$  of pinion:  $d = 190.99 \text{ mm}$

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

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

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

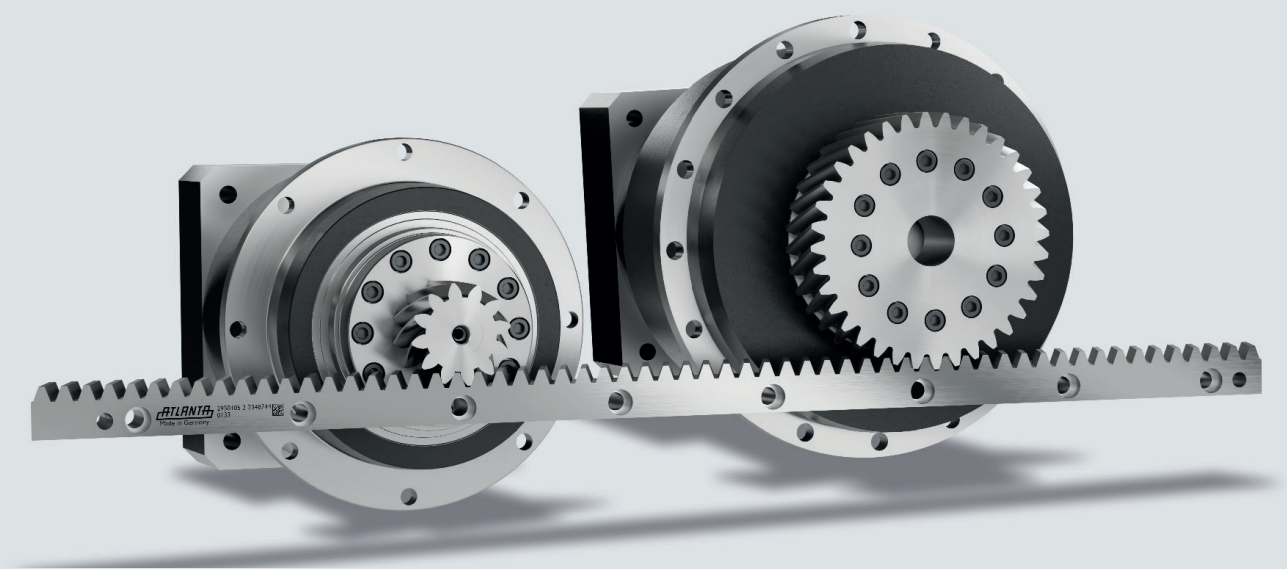
$$i_{\text{max-gearbox}} = \frac{n_{\text{Motor}}}{n_{\text{Ritzel / pinion}}} = \frac{1500}{67.1} = 22.3$$



## Comparison Results

| Pinion Used                | TR-Pinion<br>m = 5 z = 12 | Conventional Pinion<br>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)                  |

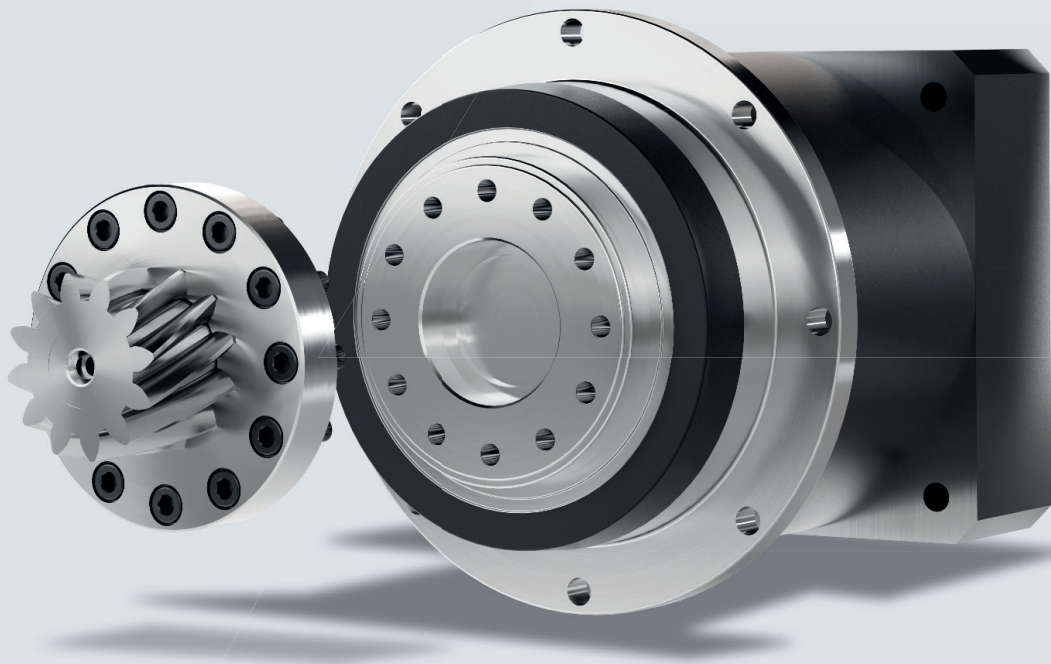
By using a TR-pinion with a smaller pitch diameter, the required torque in this example was reduced by ~66%, allowing a smaller gearbox size to be used and reducing the reduction ratio so only a single stage gearbox is needed.



Size Comparison When Using A TR Pinion And A Conventional Pinion

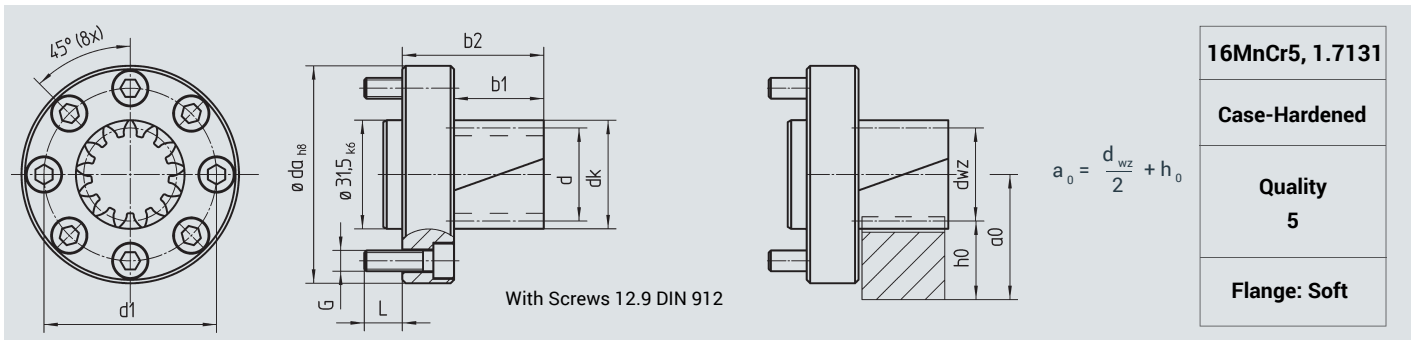
## ATLANTA TR and TRS Pinions Offer A Variety Of Advantages:

- ✱ **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.



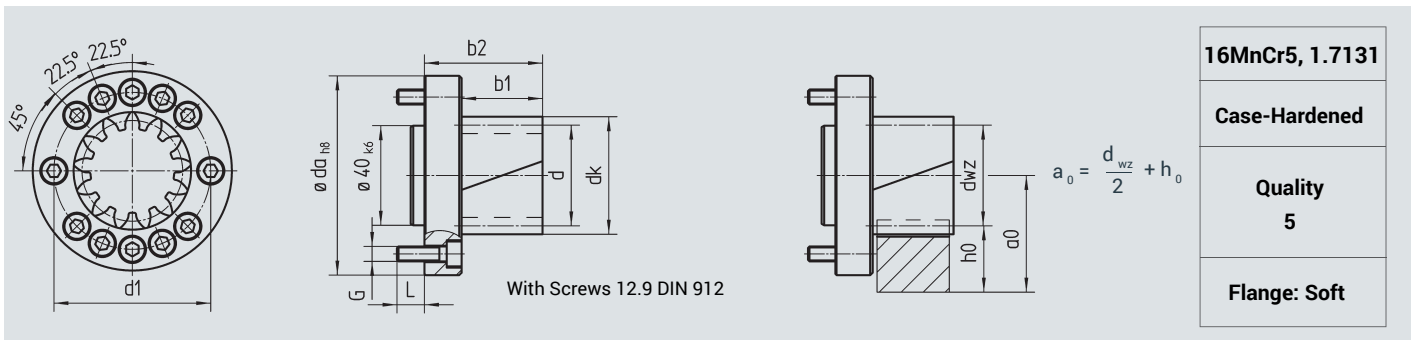


## Helical-Tooth Pinion, 19° 31' 42" left-hand, A-50 flange



| Order Code      | No. of Teeth<br>z | Profile Modification<br>Factor x | d     | d <sub>wz</sub> | dk    | b1   | b2 | a0    | ISO Interface | d1 | G  | da <sub>h8</sub> | L  | kg  |
|-----------------|-------------------|----------------------------------|-------|-----------------|-------|------|----|-------|---------------|----|----|------------------|----|-----|
| <b>Module 2</b> |                   |                                  |       |                 |       |      |    |       |               |    |    |                  |    |     |
| 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 |

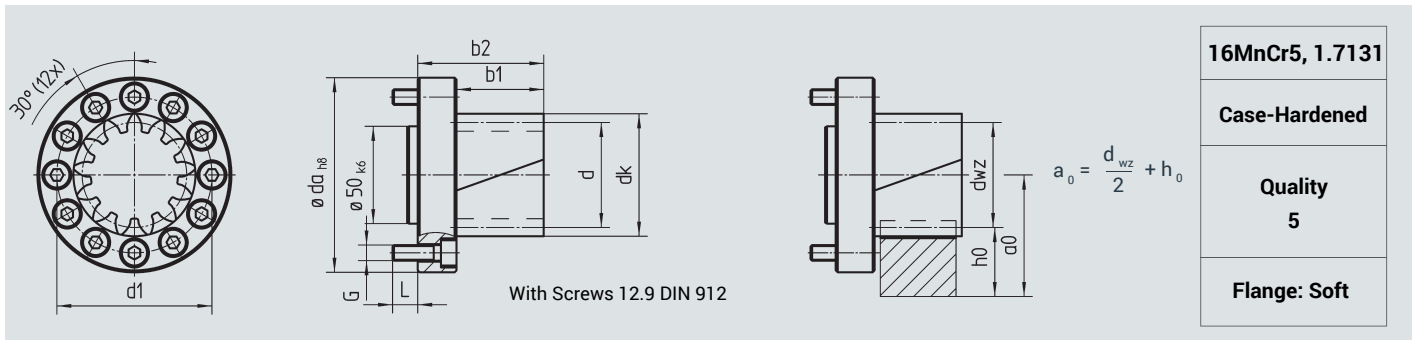
## Helical-Tooth Pinion, 19° 31' 42" left-hand, A-63 flange



| Order Code      | No. of Teeth<br>z | Profile Modification<br>Factor x | d     | d <sub>wz</sub> | dk   | b1   | b2   | a0    | ISO Interface | d1 | G  | da <sub>h8</sub> | L  | kg  |
|-----------------|-------------------|----------------------------------|-------|-----------------|------|------|------|-------|---------------|----|----|------------------|----|-----|
| <b>Module 2</b> |                   |                                  |       |                 |      |      |      |       |               |    |    |                  |    |     |
| 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 |
| <b>Module 3</b> |                   |                                  |       |                 |      |      |      |       |               |    |    |                  |    |     |
| 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.

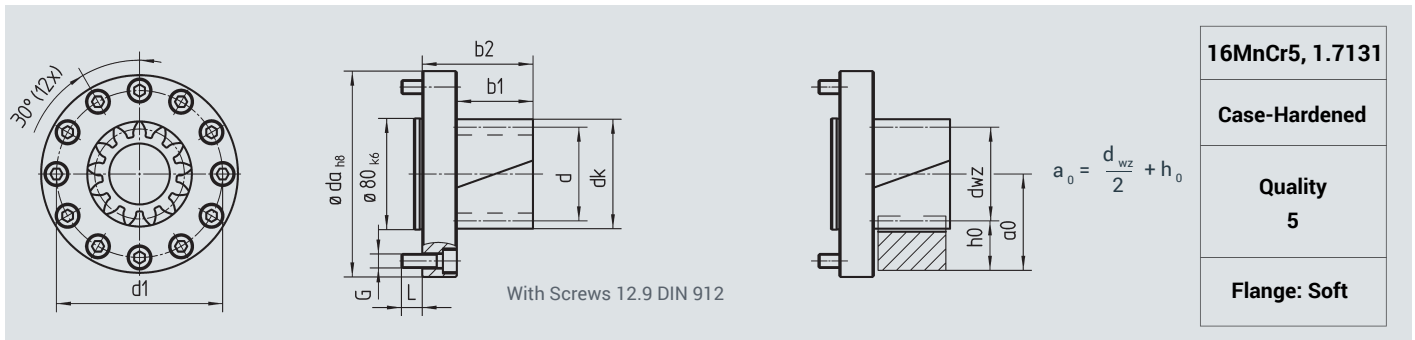
## Helical-Tooth Pinion, 19° 31' 42" left-hand, A-80 flange



| Order Code      | No. of Teeth<br>z | Profile Modification<br>Factor x | d     | d <sub>wz</sub> | dk   | b1   | b2   | a0    | ISO Interface | d1 | G  | da <sub>h8</sub> | L  | kg  |
|-----------------|-------------------|----------------------------------|-------|-----------------|------|------|------|-------|---------------|----|----|------------------|----|-----|
| <b>Module 2</b> |                   |                                  |       |                 |      |      |      |       |               |    |    |                  |    |     |
| 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 |
| <b>Module 3</b> |                   |                                  |       |                 |      |      |      |       |               |    |    |                  |    |     |
| 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 |
| <b>Module 4</b> |                   |                                  |       |                 |      |      |      |       |               |    |    |                  |    |     |
| 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 |

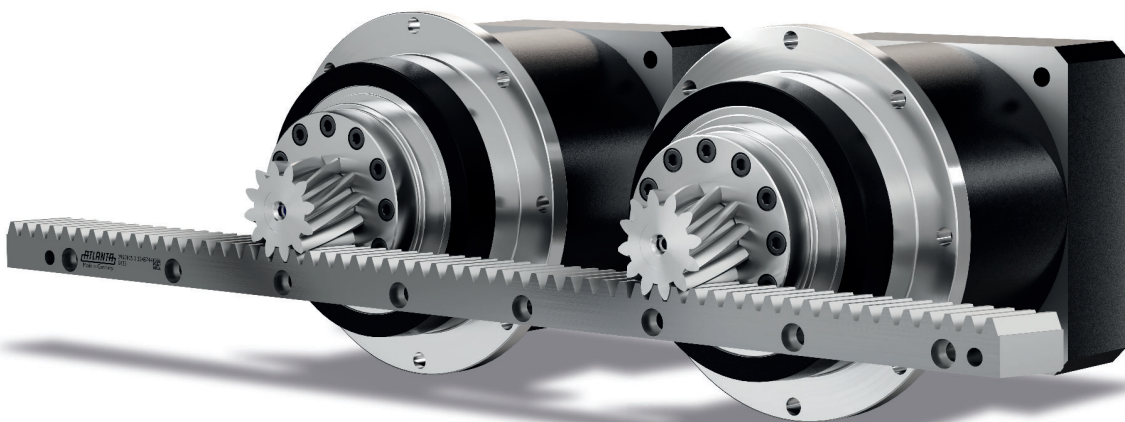
Note: The rack and pinion drive must be installed with backlash present, not pressed into engagement with no backlash! Please refer to the ATLANTA operating manual MPZ 001e.

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



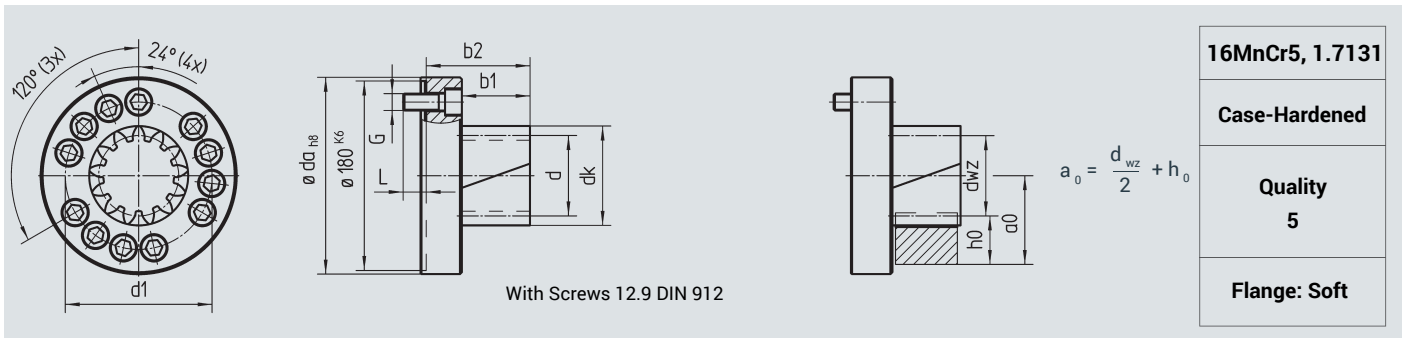
| Order Code      | No. of Teeth<br>z | Profile Modification<br>Factor x | d      | d <sub>wz</sub> | dk     | b1   | b2   | a0    | ISO Interface | d1  | G   | da <sub>h8</sub> | L  | kg  |
|-----------------|-------------------|----------------------------------|--------|-----------------|--------|------|------|-------|---------------|-----|-----|------------------|----|-----|
| <b>Module 3</b> |                   |                                  |        |                 |        |      |      |       |               |     |     |                  |    |     |
| 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 |
| <b>Module 4</b> |                   |                                  |        |                 |        |      |      |       |               |     |     |                  |    |     |
| 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 |
| <b>Module 5</b> |                   |                                  |        |                 |        |      |      |       |               |     |     |                  |    |     |
| 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 |
| <b>Module 6</b> |                   |                                  |        |                 |        |      |      |       |               |     |     |                  |    |     |
| 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.



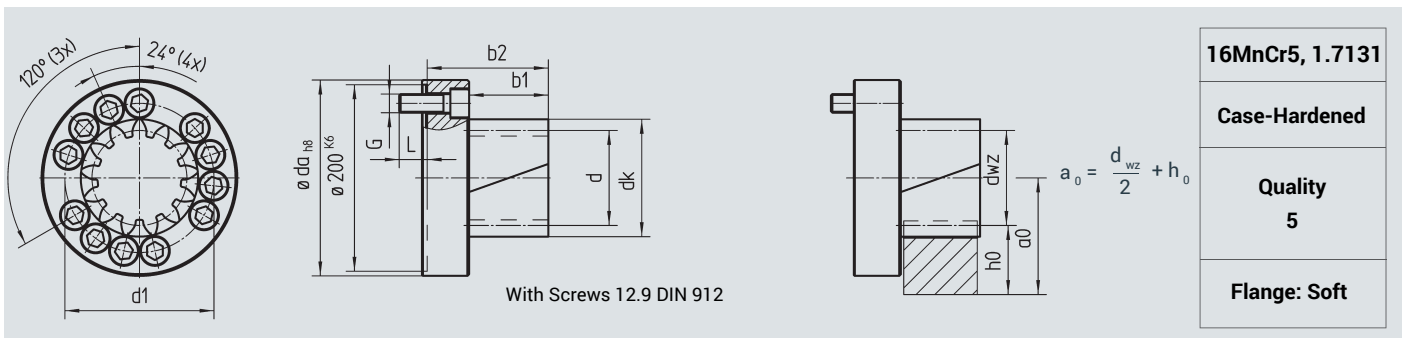
Multiple Pinion Contact For Electrical Preloading

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



| Order Code      | No. of Teeth<br>z | Profile Modification<br>Factor x | d      | d <sub>wz</sub> | dk     | b1 | b2 | a0    | ISO Interface | d1  | G   | da <sub>h8</sub> | L  | kg   |
|-----------------|-------------------|----------------------------------|--------|-----------------|--------|----|----|-------|---------------|-----|-----|------------------|----|------|
| <b>Module 4</b> |                   |                                  |        |                 |        |    |    |       |               |     |     |                  |    |      |
| 78 46 919       | 19                | 0.11                             | 80.64  | 81.52           | 89.50  | 45 | 79 | 75.76 |               | 140 | M16 | 187              | 22 | 9.1  |
| <b>Module 5</b> |                   |                                  |        |                 |        |    |    |       |               |     |     |                  |    |      |
| 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 |
| <b>Module 6</b> |                   |                                  |        |                 |        |    |    |       |               |     |     |                  |    |      |
| 78 66 916       | 16                | 0                                | 101.86 | 101.86          | 113.90 | 65 | 99 | 93.93 | —             | 140 | M16 | 187              | 22 | 11.3 |

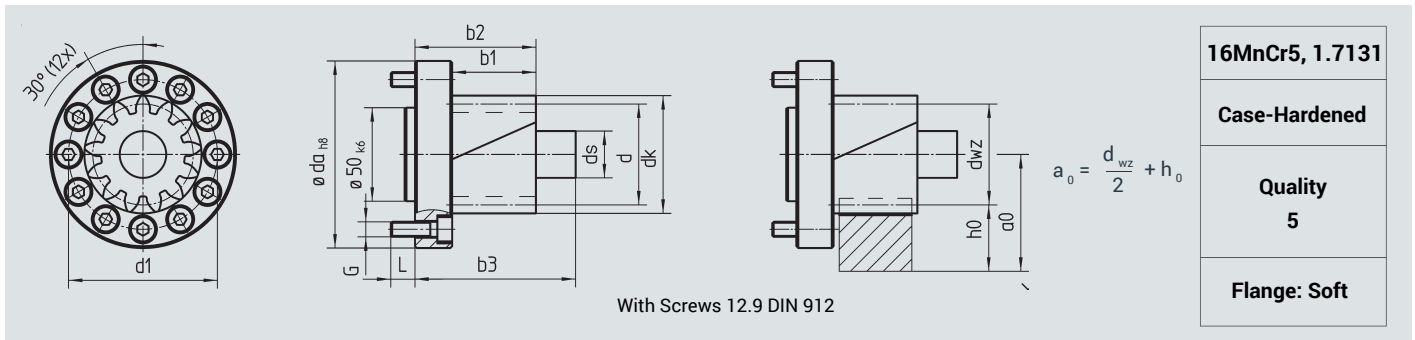
## Helical-Tooth Pinion, 19° 31' 42" left-hand, A-160 flange



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

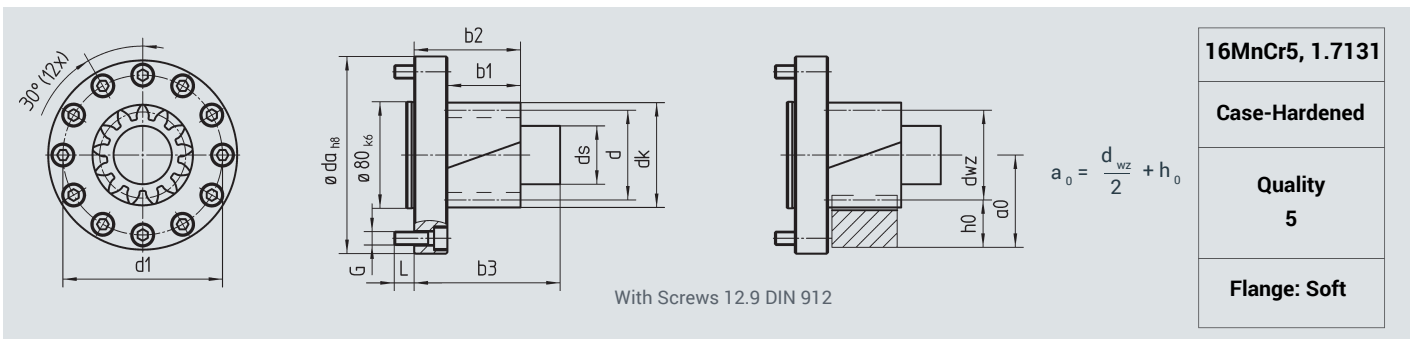
Note: The rack and pinion drive must be installed with backlash present, not pressed into engagement with no backlash! Please refer to the ATLANTA operating manual MPZ 001e.

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



| Order Code      | No. of Teeth<br>z | Profile Modification<br>Factor x | d     | d <sub>wz</sub> | dk   | b1   | b2   | b <sub>3</sub> | d <sub>s</sub> | a0    | ISO Interface | d1 | G  | d <sub>a</sub> h8 | L  | kg  |
|-----------------|-------------------|----------------------------------|-------|-----------------|------|------|------|----------------|----------------|-------|---------------|----|----|-------------------|----|-----|
| <b>Module 2</b> |                   |                                  |       |                 |      |      |      |                |                |       |               |    |    |                   |    |     |
| 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 |
| <b>Module 3</b> |                   |                                  |       |                 |      |      |      |                |                |       |               |    |    |                   |    |     |
| 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 |

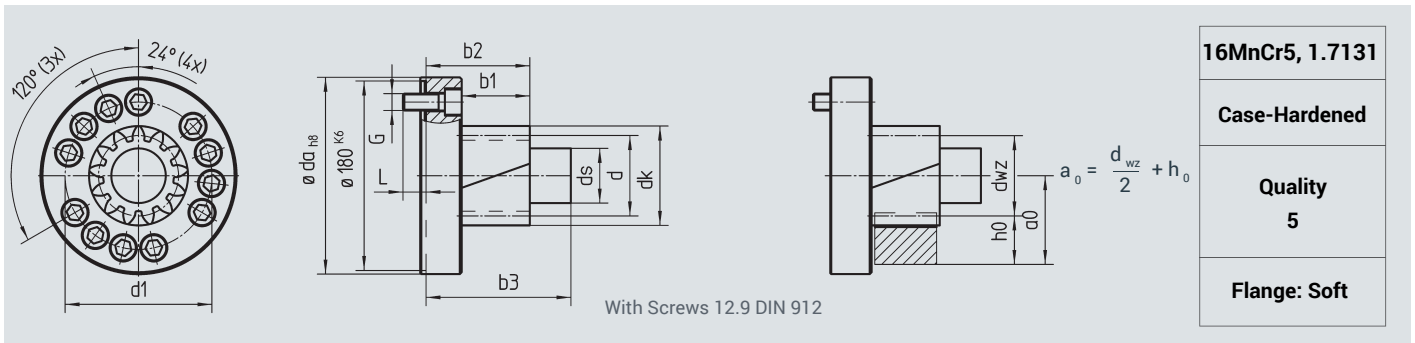
## Helical-Tooth Pinion, 19° 31' 42" left-hand, A-125 flange



| Order Code      | No. of Teeth<br>z | Profile Modification<br>Factor x | d      | d <sub>wz</sub> | dk     | b1 | b2 | b <sub>3</sub> | d <sub>s</sub> | a0                   | ISO Interface | d1  | G   | d <sub>a</sub> h8 | L  | kg  |
|-----------------|-------------------|----------------------------------|--------|-----------------|--------|----|----|----------------|----------------|----------------------|---------------|-----|-----|-------------------|----|-----|
| <b>Module 3</b> |                   |                                  |        |                 |        |    |    |                |                |                      |               |     |     |                   |    |     |
| 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 |
| <b>Module 4</b> |                   |                                  |        |                 |        |    |    |                |                |                      |               |     |     |                   |    |     |
| 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 |
| <b>Module 5</b> |                   |                                  |        |                 |        |    |    |                |                |                      |               |     |     |                   |    |     |
| 2 78 00 804     | 16                | 0                                | 84.88  | 84.88           | 94.90  | 55 | 80 | 106            | 48.024         | 76.44 <sup>(1)</sup> | 9409-1-A-125  | 125 | M10 | 148               | 15 | 6.0 |

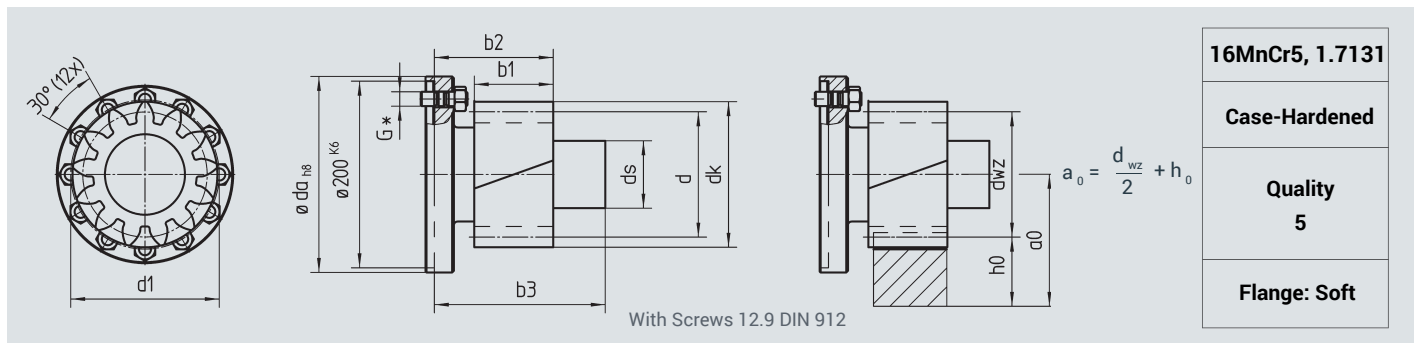
Note: The rack and pinion drive must be installed with backlash present, not pressed into engagement with no backlash! Please refer to the ATLANTA operating manual MPZ 001e.

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



| Order Code         | No. of Teeth z | Profile Modification Factor x | d      | d <sub>wz</sub> | dk     | b1 | b2 | b <sub>3</sub> | d <sub>s</sub> | a0    | ISO Interface | d1  | G   | d <sub>a</sub> h8 | L  | kg   |
|--------------------|----------------|-------------------------------|--------|-----------------|--------|----|----|----------------|----------------|-------|---------------|-----|-----|-------------------|----|------|
| <b>Module 5</b>    |                |                               |        |                 |        |    |    |                |                |       |               |     |     |                   |    |      |
| <b>2 78 00 901</b> | 20             | 0                             | 106.10 | 106.10          | 116.1  | 55 | 89 | 131            | 50.026         | 87.05 | –             | 140 | M16 | 187               | 22 | 10.3 |
| <b>Module 6</b>    |                |                               |        |                 |        |    |    |                |                |       |               |     |     |                   |    |      |
| <b>2 78 00 902</b> | 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

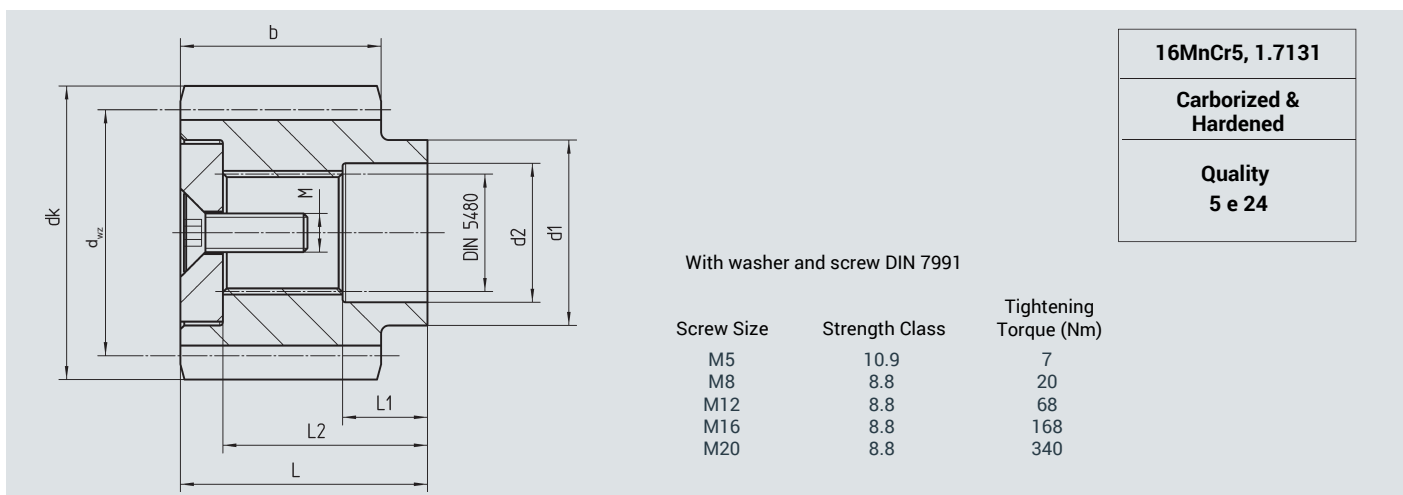


| Order Code         | No. of Teeth z | Profile Modification Factor x | d      | d <sub>wz</sub> | dk     | b1  | b2  | b <sub>3</sub> | d <sub>s</sub> | a0     | ISO Interface | d1  | G   | d <sub>a</sub> h8 | L  | kg   |
|--------------------|----------------|-------------------------------|--------|-----------------|--------|-----|-----|----------------|----------------|--------|---------------|-----|-----|-------------------|----|------|
| <b>Module 8</b>    |                |                               |        |                 |        |     |     |                |                |        |               |     |     |                   |    |      |
| <b>2 78 00 101</b> | 19             | 0                             | 161.28 | 161.28          | 177.28 | 100 | 157 | 205            | 55.026         | 151.64 | –             | 170 | M20 | 210               | 25 | 26.7 |
| <b>Module 10</b>   |                |                               |        |                 |        |     |     |                |                |        |               |     |     |                   |    |      |
| <b>2 78 00 102</b> | 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.



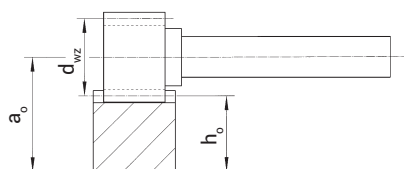
## Helical-Tooth Pinion, 19° 31' 42" left-hand, splined bore



| Order Code | N° of Teeth | Module | Profile Modification Factor x | Fu Tab. | d      | d <sub>wz</sub> | 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



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

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

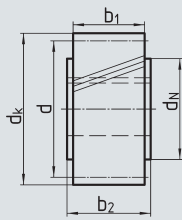


Fig. 1

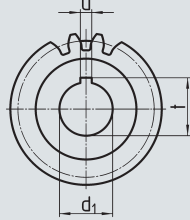


Fig. 1 + 3 Keyway middle of tooth gap

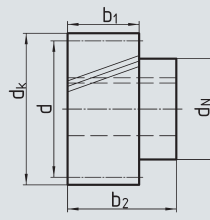


Fig. 3

16MnCr5, 1.7131

Case-Hardened

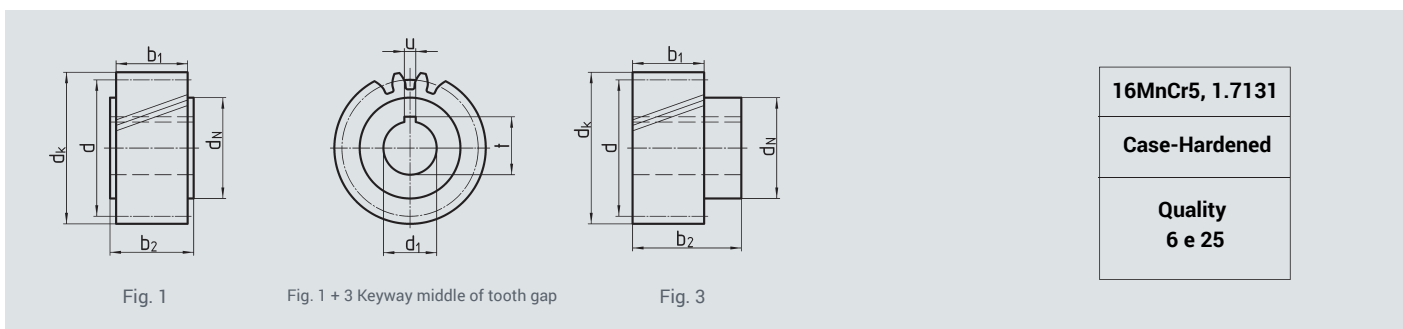
Quality  
6 e 25

| Order Code              | Fig. | N° of Teeth z | d (=d <sub>wz</sub> ) | d*PI   | d <sub>k</sub> | d <sub>1</sub> <sup>H6</sup> | d <sub>N</sub> | b <sub>1</sub> | b <sub>2</sub> | u  | t    | kg   | Couplings on<br>Page C-76 |
|-------------------------|------|---------------|-----------------------|--------|----------------|------------------------------|----------------|----------------|----------------|----|------|------|---------------------------|
| <b>Module 1.5</b>       |      |               |                       |        |                |                              |                |                |                |    |      |      |                           |
| 24 11 520 <sup>1)</sup> | 1    | 20            | 31.83                 | 100.00 | 34.83          | 11                           | 25             | 20             | 22             | 4  | 12.8 | 0.13 |                           |
| 24 14 520 <sup>1)</sup> | 1    | 20            | 31.83                 | 100.00 | 34.83          | 14                           | 25             | 20             | 22             | 5  | 16.3 | 0.13 |                           |
| 24 16 520 <sup>1)</sup> | 1    | 20            | 31.83                 | 100.00 | 34.83          | 16                           | 25             | 20             | 22             | 5  | 18.3 | 0.13 |                           |
| 24 16 321 <sup>1)</sup> | 3    | 21            | 33.42                 | 105.00 | 36.42          | 16                           | 30             | 20             | 46             | 5  | 18.3 | 0.15 | 80 83 030                 |
| <b>Module 2</b>         |      |               |                       |        |                |                              |                |                |                |    |      |      |                           |
| 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

<sup>1)</sup> Tooth quality 6 f 24

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



| Order Code      | Fig. | N° of Teeth z | d (=d <sub>wz</sub> ) | d*PI   | d <sub>k</sub> | d <sub>1</sub> <sup>H6</sup> | d <sub>N</sub> | b <sub>1</sub> | b <sub>2</sub> | u  | t    |  | Couplings on<br>Page C-76 |
|-----------------|------|---------------|-----------------------|--------|----------------|------------------------------|----------------|----------------|----------------|----|------|-------------------------------------------------------------------------------------|---------------------------|
| <b>Module 3</b> |      |               |                       |        |                |                              |                |                |                |    |      |                                                                                     |                           |
| 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

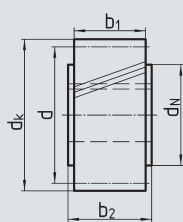


Fig. 1

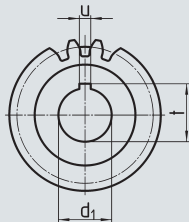


Fig. 1 + 3 Keyway middle of tooth gap

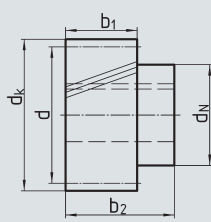


Fig. 3

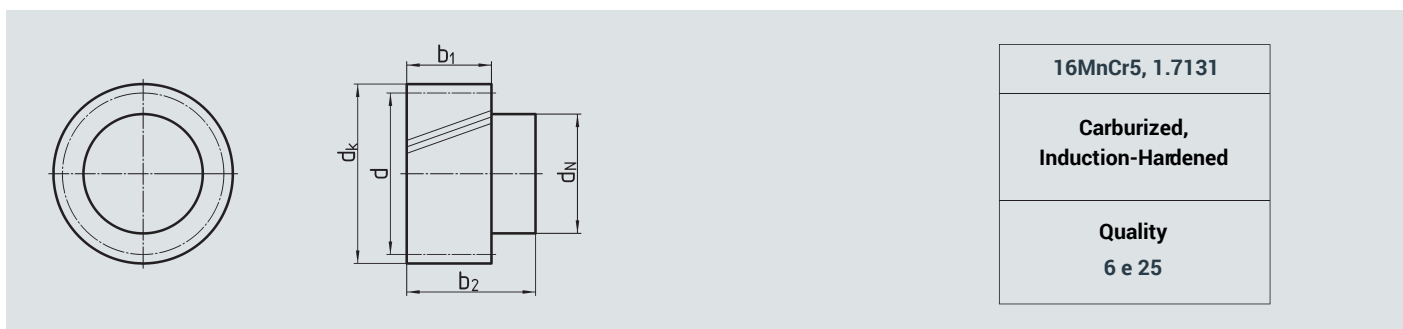
16MnCr5, 1.7131

Case-Hardened

Quality  
6 e 25

| Order Code       | Fig. | N° of Teeth z | d (=d <sub>wz</sub> ) | d*PI   | d <sub>k</sub> | d <sub>1</sub> <sup>H6</sup> | d <sub>N</sub> | b <sub>1</sub> | b <sub>2</sub> | u  | t    | kg   | Couplings on<br>Page C-76 |
|------------------|------|---------------|-----------------------|--------|----------------|------------------------------|----------------|----------------|----------------|----|------|------|---------------------------|
| <b>Module 4</b>  |      |               |                       |        |                |                              |                |                |                |    |      |      |                           |
| 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                 |
| <b>Module 5</b>  |      |               |                       |        |                |                              |                |                |                |    |      |      |                           |
| 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                 |
| <b>Module 6</b>  |      |               |                       |        |                |                              |                |                |                |    |      |      |                           |
| 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                 |
| <b>Module 8</b>  |      |               |                       |        |                |                              |                |                |                |    |      |      |                           |
| 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                 |
| <b>Module 10</b> |      |               |                       |        |                |                              |                |                |                |    |      |      |                           |
| 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



| Order Code              | Module | N° of Teeth z | d (=d <sub>wz</sub> ) | d*PI   | d <sub>k</sub> | d <sub>N</sub> | b <sub>1</sub> | b <sub>2</sub> | kg   | Couplings on<br>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 <sup>1)</sup> | 8      | 20            | 169.77                | 533.33 | 185.8          | 125            | 80             | 145            | 19.4 | 80 80 125                 |

<sup>1)</sup> With bore Ø 40<sup>H7</sup>

The pinion could be fixed at d<sub>k</sub> or d<sub>N</sub> to be reworked.

Maximum bore diameter of the pinion on request.



## Helical Rack & Pinion Drive Calculations & Selection - Module 1.5

| 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 <sup>1)</sup> | 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             |

### Maximum Permissible Feed Forces <sup>1)</sup> 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  $S_b = 1.0$ , lifetime factor  $f_n = 1.0$  and linear load distribution factor  $K_Hb = 1.0$ .

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!**

1) Check availability





## Helical Rack & Pinion Drive Calculations & Selection - Module 2

| Rack Type                         |                | UHPR                                                        | HPR                                |                                       |         | PR      |                     | BR                   |
|-----------------------------------|----------------|-------------------------------------------------------------|------------------------------------|---------------------------------------|---------|---------|---------------------|----------------------|
| ATLANTA Quality                   |                | 5                                                           | 6                                  |                                       | 7       | 8       |                     | 10                   |
| Rack                              | Material       | Heat-Treatable Steel <sup>2)</sup>                          | Case-Hardened <sup>2)</sup>        | 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 <sup>1)</sup> | 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



## Helical Rack & Pinion Drive Calculations & Selection - Module 3

| Rack Type                         |                | UHPR                                                        | HPR                                |                                       |         | PR      |                     | BR                   |
|-----------------------------------|----------------|-------------------------------------------------------------|------------------------------------|---------------------------------------|---------|---------|---------------------|----------------------|
| ATLANTA Quality                   |                | 5                                                           | 6                                  |                                       | 7       | 8       |                     | 10                   |
| Rack                              | Material       | Heat-Treatable Steel <sup>2)</sup>                          | Case-Hardened <sup>2)</sup>        | 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 <sup>1)</sup> | 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.



## Helical Rack & Pinion Drive Calculations & Selection - Module 4

| Rack Type                         |                | HPR                                                         |                                       |         | PR                  |         | BR                   |
|-----------------------------------|----------------|-------------------------------------------------------------|---------------------------------------|---------|---------------------|---------|----------------------|
| ATLANTA Quality                   |                | 6                                                           |                                       | 7       | 8                   |         | 10                   |
| Rack                              | Material       | Case-Hardened <sup>2)</sup>                                 | 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 <sup>1)</sup> | 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.



| 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 <sup>1)</sup> | 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.

| 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 <sup>1)</sup> | 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.



| 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 <sup>1)</sup> | 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

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 <sup>1)</sup> | 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.



| 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 <sup>1)</sup> | Pitch Diameter | Maximum Feed Force<br>(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

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

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

#### Formulas for Determining the Tangential Force

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

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

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

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

Formula dimensions see page ZD-3

**The Condition  $F_u < F_{u \text{ perm.}}$  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  | from<br>3<br>to<br>10 |
| 1.0                         | 60    | 0.95       | 1.10  |                       |
| 1.5                         | 90    | 1.00       | 1.20  |                       |
| 2.0                         | 120   | 1.05       | 1.30  |                       |
| 3.0                         | 180   | 1.10       | 1.50  |                       |
| 5.0                         | 300   | 1.25       | 1.90  |                       |

#### Linear Load Distribution Factor $L_{KHB}$

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

$L_{KHB} = 1.1$  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 <sub>b</sub>   | = | 1 s                      |
| Acceleration Due to Gravity g   |                  | = | 9.81 m/s <sup>2</sup>    |
| Coefficient of Friction         | μ                | = | 0.1                      |
| Load Factor                     | K <sub>A</sub>   | = | 1.5                      |
| Life-Time Factor                | f <sub>n</sub>   | = | 1.05 (cont. lubrication) |
| Safety Coefficient              | S <sub>B</sub>   | = | 1.2                      |
| Linear Load Distribution Factor | L <sub>KHβ</sub> | = | 1.5                      |

### Calculation Process

### Results

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

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

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

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

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

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

### Condition

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

|         |        |           |               |
|---------|--------|-----------|---------------|
| 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 <sub>b</sub>   | = | _____ s               |
| Acceleration Due to Gravity g   |                  | = | 9.81 m/s <sup>2</sup> |
| Coefficient of Friction         | μ                | = | _____                 |
| Load Factor                     | K <sub>A</sub>   | = | _____                 |
| Life-Time Factor                | f <sub>n</sub>   | = | _____                 |
| Safety Coefficient              | S <sub>B</sub>   | = | _____                 |
| Linear Load Distribution Factor | L <sub>KHβ</sub> | = | _____                 |

### Calculation Process

### Results

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

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

Permissible Feed Force F<sub>uTab</sub>

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

$$F_{u \text{ zul./per.}} = \frac{\quad}{\quad} = \quad \text{kN}$$

### Condition

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

## Calculation Example

### Values Given

☐ Lifting Operation

Mass to be Moved  $m = 300 \text{ kg}$   
 Speed  $v = 1.08 \text{ m/s}$   
 Acceleration Time  $t_b = 0.27 \text{ s}$   
 Acceleration Due to Gravity  $g = 9.81 \text{ m/s}^2$   
 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

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

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

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

$$F_{u \text{ zul./per.}} = \frac{F_{u \text{ Tab}}}{K_A \cdot S_B \cdot f_n \cdot L_{KH\beta}} ; F_{u \text{ zul./per.}} = \frac{11.5 \text{ kN}}{1.2 \cdot 1.2 \cdot 1.1 \cdot 1.2} = 5.9 \text{ kN}$$

### Condition

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

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  $m = \underline{\hspace{2cm}} \text{ kg}$   
 Speed  $v = \underline{\hspace{2cm}} \text{ m/s}$   
 Acceleration Time  $t_b = \underline{\hspace{2cm}} \text{ s}$   
 Acceleration Due to Gravity  $g = \underline{9.81} \text{ m/s}^2$   
 Load Factor  $K_A = \underline{\hspace{2cm}}$   
 Life-Time Factor  $f_n = \underline{\hspace{2cm}}$   
 Safety Coefficient  $S_B = \underline{\hspace{2cm}}$   
 Linear Load Distribution Factor  $L_{KH\beta} = \underline{\hspace{2cm}}$

### Calculation Process

### Results

$$a = \frac{v}{t_b} \quad a = \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ m/s}^2$$

$$F_u = \frac{m \cdot g + m \cdot a}{1000} \quad F_{u \text{ erf./req.}} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ kN}$$

Permissible Feed Force  $F_{u \text{ tab}}$

$$F_{u \text{ zul./per.}} = \frac{F_{u \text{ Tab}}}{K_A \cdot S_B \cdot f_n \cdot L_{KH\beta}} ; F_{u \text{ zul./per.}} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ kN}$$

### Condition

$$F_{u \text{ zul./per.}} > F_u ; \underline{\hspace{2cm}} \text{ kN} > \underline{\hspace{2cm}} \text{ kN} \Rightarrow \text{fulfilled}$$

| Class                                    | ATLANTA Quality                         | Module | Total Pitch Error <sup>1)</sup><br>(± µm/m) | Tooth Thickness Tolerance<br>(µm) | Maximum Length<br>(mm) | Maximum Feed Force Per Pinion Contact <sup>2)</sup><br>(kN) | Application Examples                                                                                                  |
|------------------------------------------|-----------------------------------------|--------|---------------------------------------------|-----------------------------------|------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>UHPR</b><br>Ultra High Precision Rack | <b>5</b><br>Hardened & Ground           | 2      | 30                                          | -15                               | 1005                   | 19.5                                                        | High-precision machine tools, Laser cutting systems, CNC cutting machines                                             |
|                                          |                                         | 3      | 30                                          | -15                               | 1017                   | 28.5                                                        |                                                                                                                       |
| <b>HPR</b><br>High Precision Rack        | <b>6</b><br>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                                                        |                                                                                                                       |
|                                          | <b>6</b><br>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                                                       |                                                                                                                       |
|                                          | <b>7</b><br>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                                                        |                                                                                                                       |
| <b>PR</b><br>Precision Rack              | <b>8</b><br>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                                                        |                                                                                                                       |
|                                          | <b>8</b><br>Quenched & Tempered, Milled | 2      | 100                                         | -110                              | 2011                   | 7.0                                                         | Material handling, Robots, Automation                                                                                 |
|                                          |                                         | 3      | 100                                         | -110                              | 2036                   | 12.0                                                        |                                                                                                                       |
| <b>BR</b><br>Basic Rack                  | <b>10</b><br>Induction-Hardened Milled  | 4      | 100                                         | -110                              | 2011                   | 23.0                                                        | Lifting axis, Material handling, Welding robots                                                                       |
|                                          |                                         | 1      | 200                                         | -110                              | 999                    | 2.0                                                         |                                                                                                                       |
|                                          |                                         | 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.

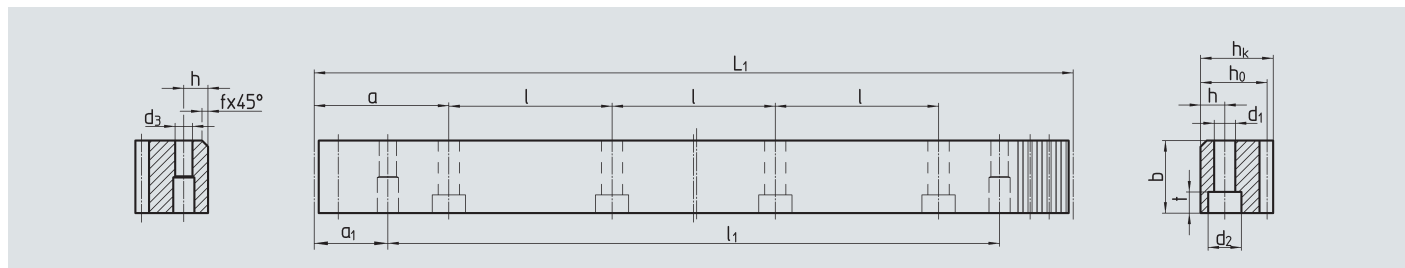
2) Values are only valid for special steel according ATLANTA-Standard.

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<br>5                      | 6                           | HPR<br>6                       | 7                              | PR<br>8                        |                                | BR<br>10                       |
|-----------------|------------------|-----------------|--------------------------------|-----------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Material        |                  |                 | Heat-Treat Steel <sup>1)</sup> | Case-Hardened <sup>1)</sup> | Heat-Treat Steel <sup>1)</sup> | Heat-Treat Steel <sup>1)</sup> | Heat-Treat Steel <sup>1)</sup> | Heat-Treat Steel <sup>1)</sup> | Heat-Treat Steel <sup>1)</sup> |
| 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                      |
|                 | ✓<br>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                           |



### 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:**  $GT_f / 1000 \leq 0.030 \text{ mm}$

- ⊗ 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.

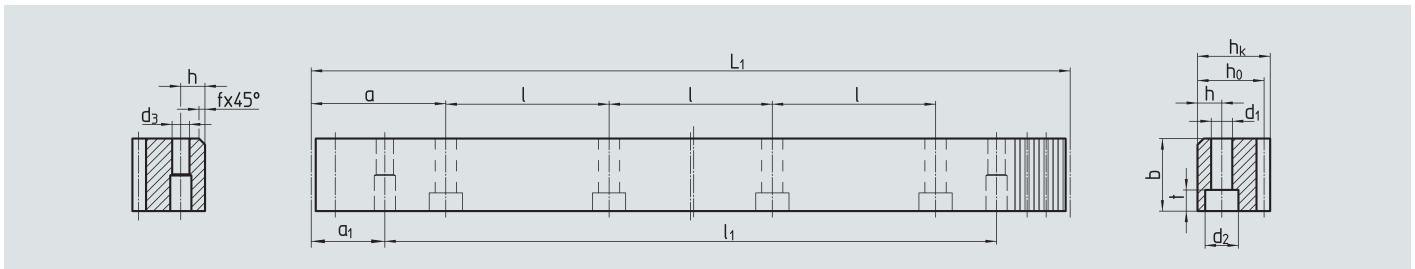
To achieve precision rack joints, we recommend our patented rack assembly kit, see page C-96.

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 <sup>2)</sup> | 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 <sup>2)</sup> | 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 <sup>2)</sup> | 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:**

- $GT_f / 250 \leq 0.020$  mm
- $GT_f / 500 \leq 0.026$  mm
- $GT_f / 1000 \leq 0.034$  mm

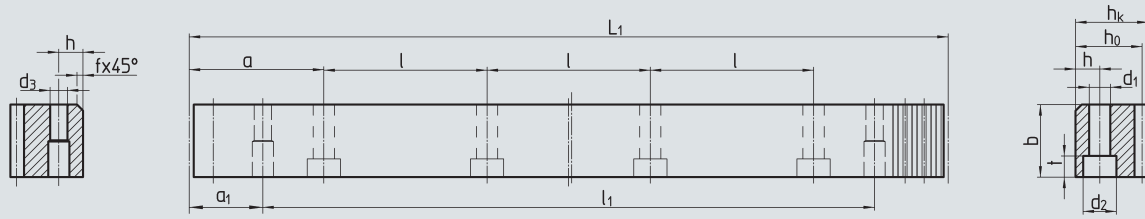
- ⊗ Teeth hardened with the ATLANTA High-Performance hardening process and ground
- ⊗ Heat-treatable steel according to ATLANTA-Standard
- ⊗ Ground on all sides after hardening

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 <sub>1</sub> | N° of Teeth z | b <sup>+0.4</sup> | h <sub>k</sub> | h <sub>0</sub> | f   | a     | l      | N° of Holes            | h  | d <sub>1</sub> | d <sub>2</sub> | t  | a <sub>1</sub> | l <sub>1</sub> | d <sub>3</sub> | 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   | 62.8  | 125.66 | without mounting holes |    | 7              | 11             | 7  | 31.4           | 942.70         | 5.7            | 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   | 62.8  | 125.66 | without mounting holes |    | 7              | 11             | 7  | 31.4           | 1948.00        | 5.7            | 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   | 63.6  | 127.23 | without mounting holes |    | 10             | 15             | 9  | 34.4           | 949.10         | 7.7            | 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   | 63.6  | 127.23 | without mounting holes |    | 10             | 15             | 9  | 34.4           | 1967.00        | 7.7            | 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   | 62.8  | 125.66 | without mounting holes |    | 10             | 15             | 9  | 37.5           | 930.30         | 7.7            | 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   | 62.8  | 125.66 | without mounting holes |    | 10             | 15             | 9  | 37.5           | 1935.60        | 7.7            | 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                | 49             | 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                | 49             | 34             | 2.5 | 62.8  | 125.66 | without mounting holes |    | 14             | 20             | 13 | 30.1           | 945.00         | 11.7           | 13.40  |
| 28 50 205               | 5      | 2010.62        | 128           | 49                | 49             | 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                | 49             | 34             | 2.5 | 62.8  | 125.66 | without mounting holes |    | 14             | 20             | 13 | 30.1           | 1950.40        | 11.7           | 26.80  |
| 28 60 105               | 6      | 1017.88        | 54            | 59                | 59             | 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                | 59             | 43             | 2.5 | 63.6  | 127.23 | without mounting holes |    | 18             | 26             | 17 | 31.4           | 955.00         | 15.7           | 18.50  |
| 28 60 205               | 6      | 2035.75        | 108           | 59                | 59             | 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                | 59             | 43             | 2.5 | 63.6  | 127.23 | without mounting holes |    | 18             | 26             | 17 | 31.4           | 1973.00        | 15.7           | 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 | 62.8  | 125.66 | without mounting holes |    | 22             | 33             | 21 | 26.6           | 952.00         | 19.7           | 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 | 62.8  | 125.66 | without mounting holes |    | 22             | 33             | 21 | 26.6           | 1957.30        | 19.7           | 89.50  |
| 28 10 105 <sup>1)</sup> | 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 <sup>1)</sup> | 10     | 1005.30        | 32            | 99                | 99             | 89             | 2.5 | 62.83 | 125.66 | without mounting holes |    | 33             | 48             | 32 | 125.66         | 753.96         | 19.7           | 68.72  |
| 28 12 105 <sup>1)</sup> | 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 <sup>1)</sup> | 12     | 1017.90        | 27            | 120               | 120            | 108            | 2.5 | 63.60 | 127.23 | without mounting holes |    | 39             | 58             | 38 | 127.23         | 763.40         | 19.7           | 111.00 |

1) On request

Other lengths available on request

**Total Pitch Error:**  $GT_f/1000 \leq 0.034 \text{ mm}$   
 $GT_f/1500 \leq 0.041 \text{ mm} (\pm 0.027 \text{ mm} / 1000)$   
 $GT_f/2000 \leq 0.044 \text{ mm} (\pm 0.022 \text{ mm} / 1000)$

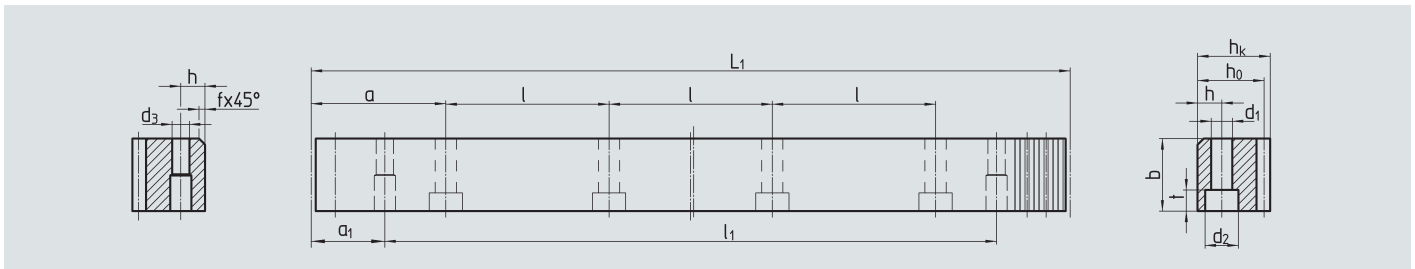
- ⊗ Teeth hardened with the ATLANTA High-Performance hardening process and ground
- ⊗ Heat-treatable steel according to ATLANTA-Standard
- ⊗ Ground on all sides after hardening

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 <sub>1</sub> | N° of Teeth z | b <sup>+0.4</sup> | h <sub>k</sub> | h <sub>0</sub> | f   | a    | l      | N° of Holes | h  | d <sub>1</sub> | d <sub>2</sub> | t  | a <sub>1</sub> | l <sub>1</sub> | d <sub>3</sub> | 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:**  $GT_f/1000 \leq 0.052 \text{ mm}$   
 $GT_f/2000 \leq 0.068 \text{ mm} (\triangleq 0.034 \text{ mm} / 1000)$

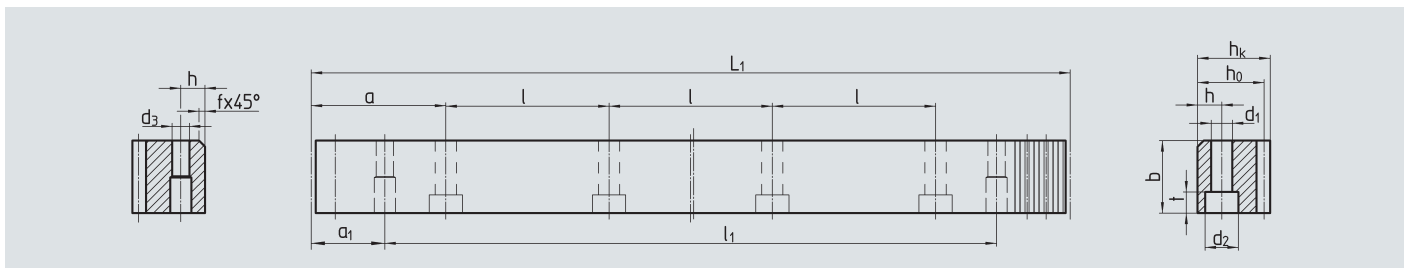
- ⊗ Teeth hardened with the ATLANTA High-Performance hardening process and ground
- ⊗ Heat-treatable steel according to ATLANTA-Standard
- ⊗ Ground on all sides after hardening

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 | $h$ | $d_1$ | $d_2$ | $t$ | $a_1$ | $l_1$  | $d_3$ | $\bar{T}$<br>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:**  $GT_f/1000 \leq 0.060 \text{ mm}$   
 $GT_f/2000 \leq 0.078 \text{ mm} (\triangleq 0.039 \text{ mm} / 1000)$

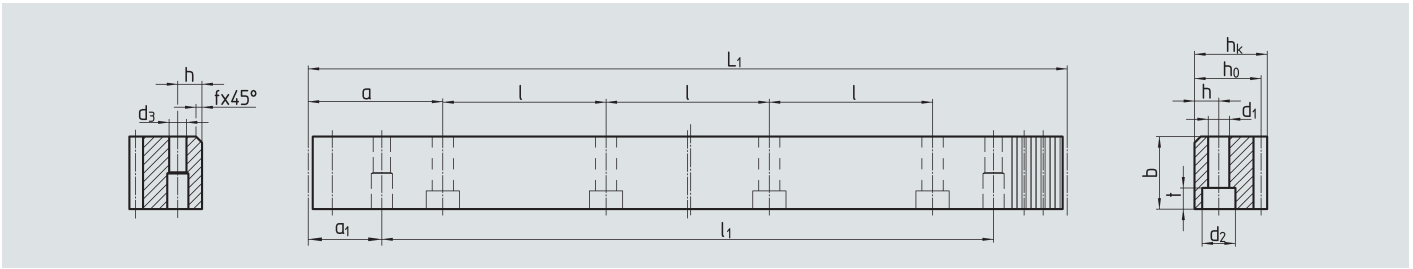
- ⊗ Teeth hardened with the ATLANTA High-Performance hardening process and ground
- ⊗ Heat-treatable steel according to ATLANTA-Standard
- ⊗ Ground on all sides after hardening

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 <sup>2)</sup> | 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 <sup>2)</sup> | 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:**  $GT_f / 500 \leq 0.050$  mm  
 $GT_f / 1000 \leq 0.100$  mm  
 $GT_f / 2000 \leq 0.200$  mm

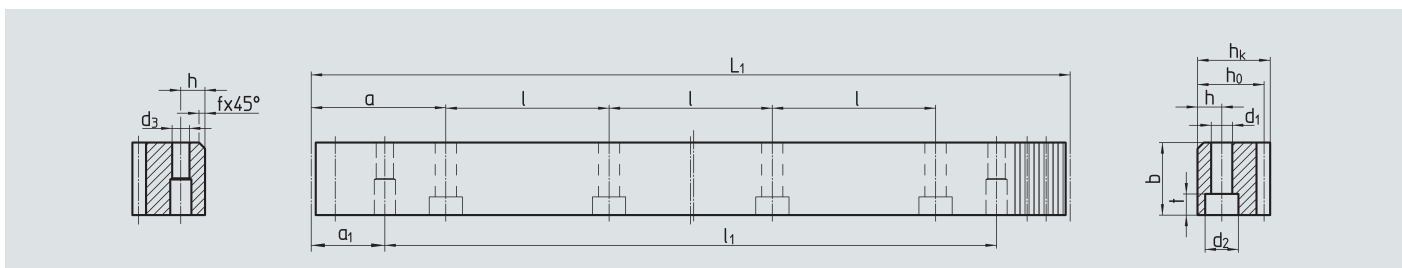
- ⊗ Teeth quenched & tempered, milled
- ⊗ Heat-treatable steel according to ATLANTA-Standard
- ⊗ Bright steel, backside machined

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 <sup>2)</sup> | 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 <sup>2)</sup> | 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:**

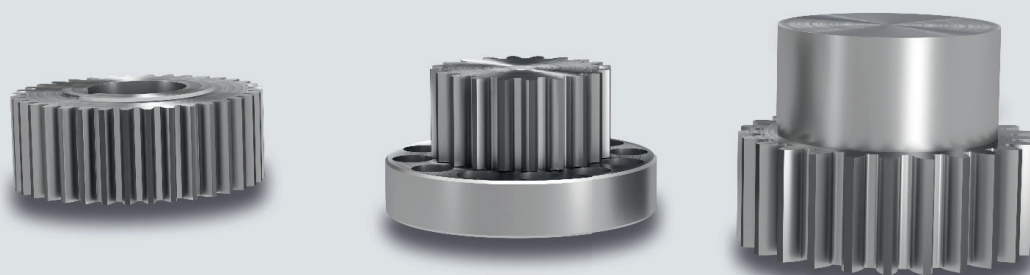
- $GT_f/500 \leq 0.100$  mm
- $GT_f/1000 \leq 0.200$  mm
- $GT_f/1500 \leq 0.300$  mm
- $GT_f/2000 \leq 0.400$  mm

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

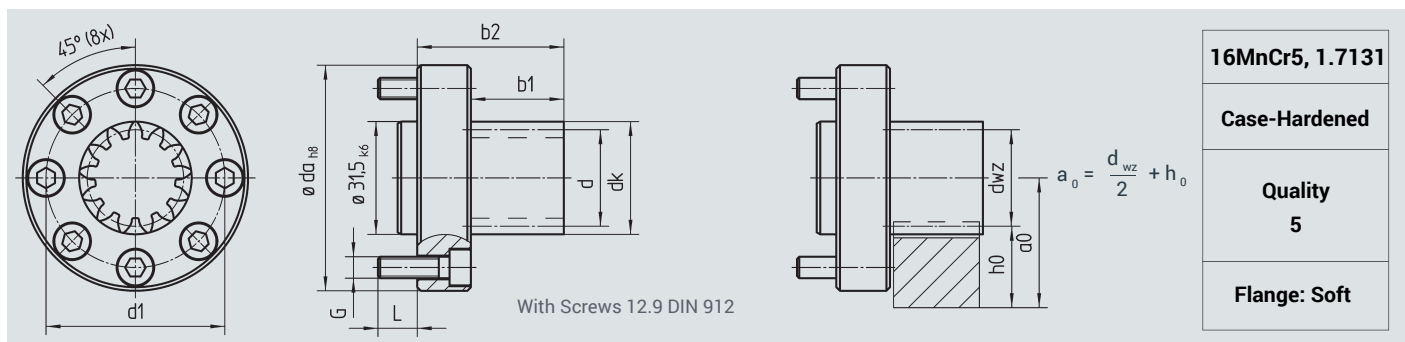
For further information, see previous page.



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

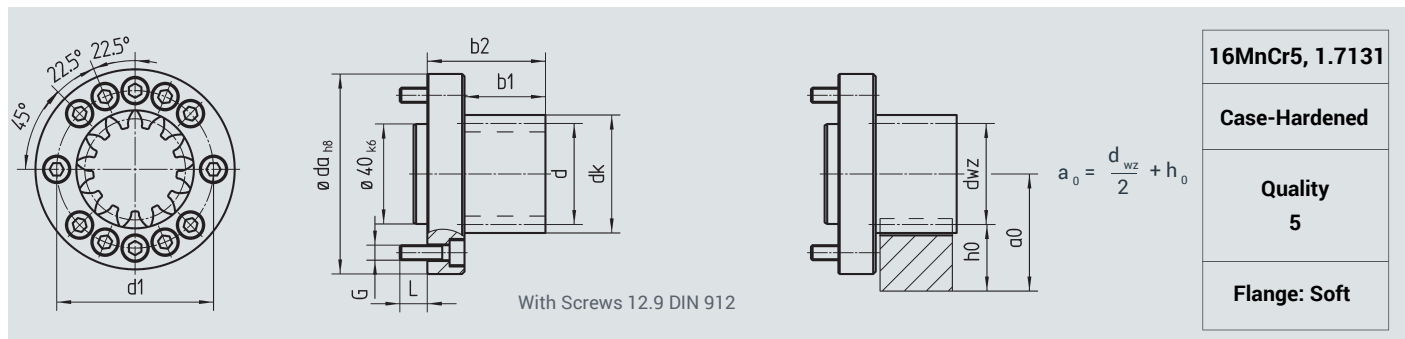


## Straight Pinion, A-50 flange



| Order Code      | No. of Teeth z | Profile Modification Factor x | d     | d <sub>wz</sub> | dk   | b1 | b2 | a0    | ISO Interface | d1 | G  | da <sub>h8</sub> | L  | kg  |
|-----------------|----------------|-------------------------------|-------|-----------------|------|----|----|-------|---------------|----|----|------------------|----|-----|
| <b>Module 2</b> |                |                               |       |                 |      |    |    |       |               |    |    |                  |    |     |
| 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 |

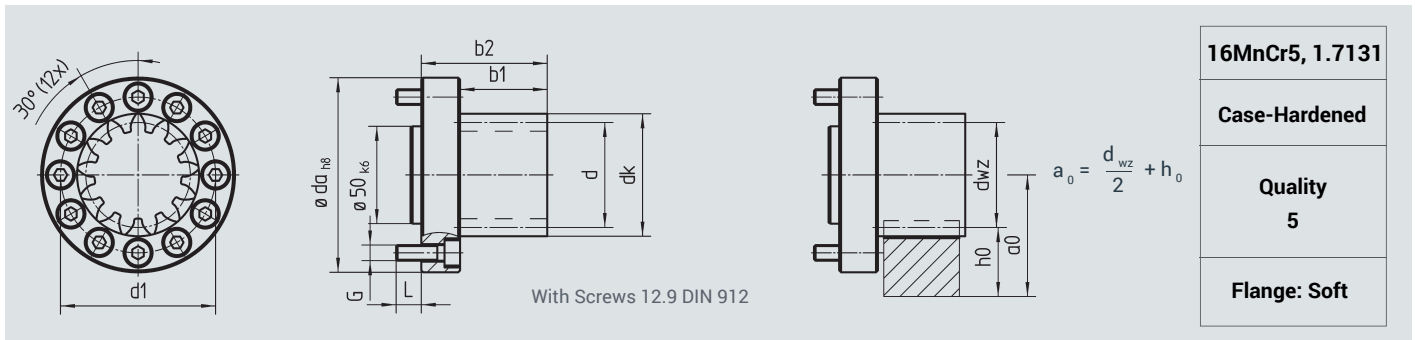
## Straight Pinion, A-63 flange



| Order Code      | No. of Teeth z | Profile Modification Factor x | d     | d <sub>wz</sub> | dk   | b1   | b2   | a0    | ISO Interface | d1 | G  | da <sub>h8</sub> | L  | kg  |
|-----------------|----------------|-------------------------------|-------|-----------------|------|------|------|-------|---------------|----|----|------------------|----|-----|
| <b>Module 2</b> |                |                               |       |                 |      |      |      |       |               |    |    |                  |    |     |
| 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 |
| <b>Module 3</b> |                |                               |       |                 |      |      |      |       |               |    |    |                  |    |     |
| 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 |

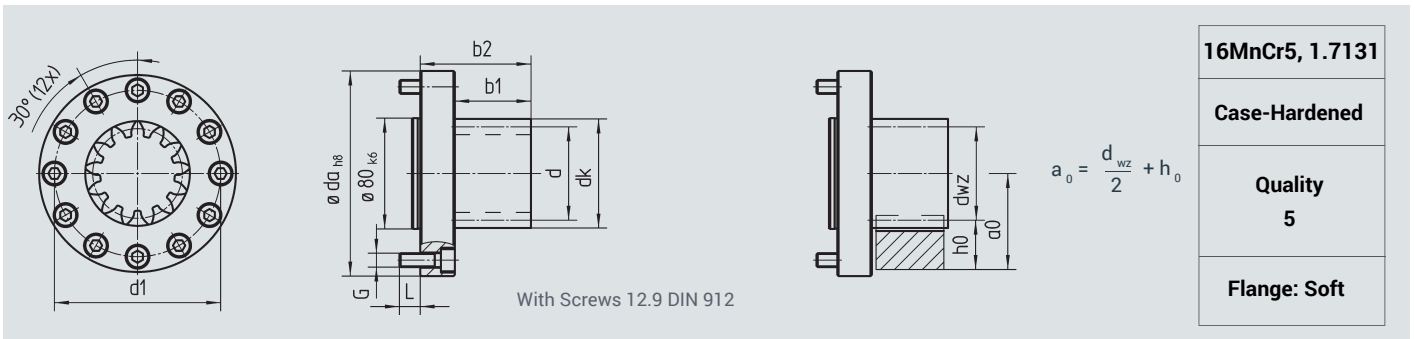
Note: The rack and pinion drive must be installed with backlash present, not pressed into engagement with no backlash! Please refer to the ATLANTA operating manual MPZ 001e.

## Straight Pinion, A-80 flange



| Order Code      | No. of Teeth z | Profile Modification Factor x | d     | d <sub>wz</sub> | dk   | b1   | b2   | a0    | ISO Interface | d1 | G  | da <sub>h8</sub> | L  | kg  |
|-----------------|----------------|-------------------------------|-------|-----------------|------|------|------|-------|---------------|----|----|------------------|----|-----|
| <b>Module 2</b> |                |                               |       |                 |      |      |      |       |               |    |    |                  |    |     |
| 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 |
| <b>Module 3</b> |                |                               |       |                 |      |      |      |       |               |    |    |                  |    |     |
| 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 |
| <b>Module 4</b> |                |                               |       |                 |      |      |      |       |               |    |    |                  |    |     |
| 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 |

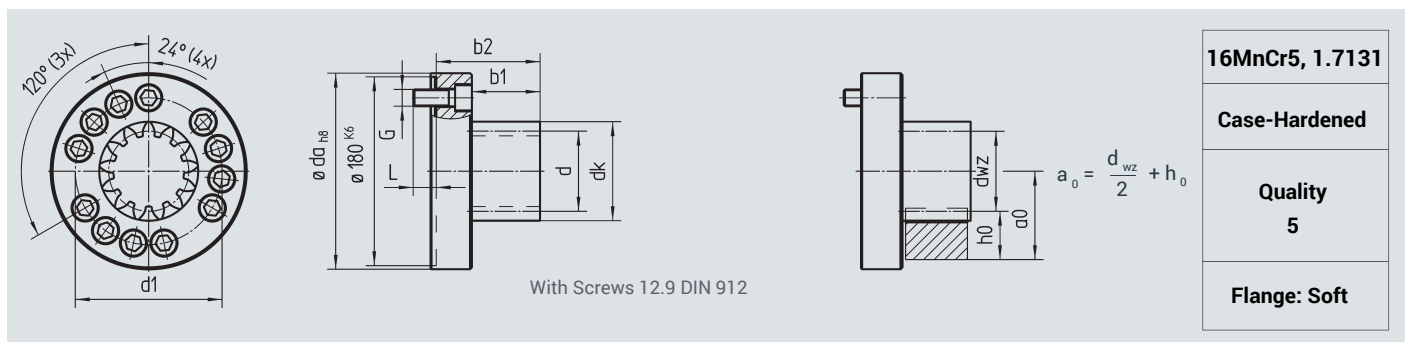
## Straight Pinion, A-125 flange



| Order Code      | No. of Teeth z | Profile Modification Factor x | d      | d <sub>wz</sub> | dk    | b1   | b2   | a0    | ISO Interface | d1  | G   | da <sub>h8</sub> | L  | kg  |
|-----------------|----------------|-------------------------------|--------|-----------------|-------|------|------|-------|---------------|-----|-----|------------------|----|-----|
| <b>Module 3</b> |                |                               |        |                 |       |      |      |       |               |     |     |                  |    |     |
| 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 |
| <b>Module 4</b> |                |                               |        |                 |       |      |      |       |               |     |     |                  |    |     |
| 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 |
| <b>Module 5</b> |                |                               |        |                 |       |      |      |       |               |     |     |                  |    |     |
| 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 |
| <b>Module 6</b> |                |                               |        |                 |       |      |      |       |               |     |     |                  |    |     |
| 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 |

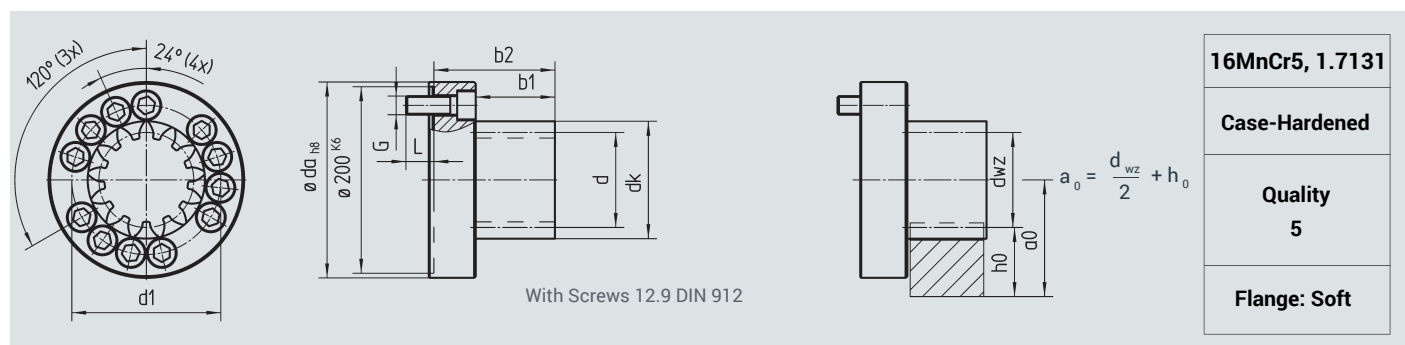
Note: The rack and pinion drive must be installed with backlash present, not pressed into engagement with no backlash! Please refer to the ATLANTA operating manual MPZ 001e.

## Straight Pinion, A-140 flange



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

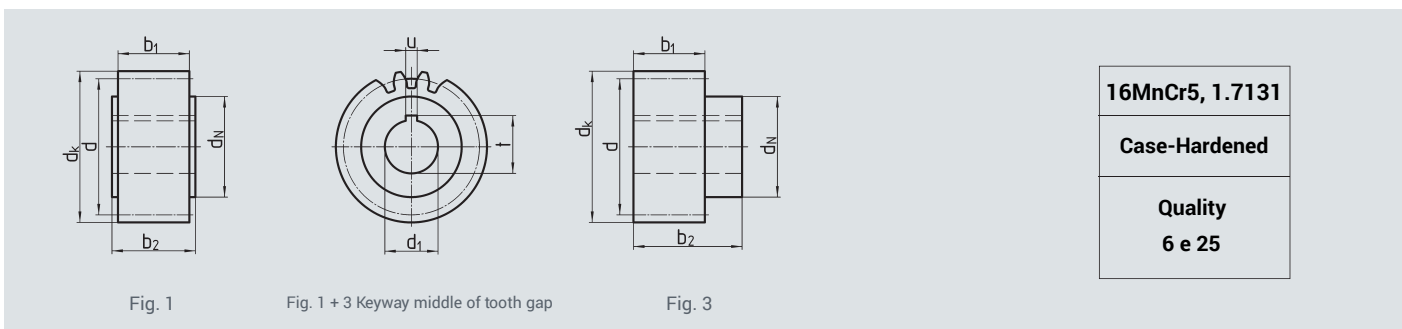
## Straight Pinion, A-160 flange



| Order Code      | No. of Teeth z | Profile Modification Factor x | d      | d <sub>wz</sub> | dk    | b1 | b2  | a0     | ISO Interface | d1  | G   | da <sub>h8</sub> | L  | kg   |
|-----------------|----------------|-------------------------------|--------|-----------------|-------|----|-----|--------|---------------|-----|-----|------------------|----|------|
| <b>Module 8</b> |                |                               |        |                 |       |    |     |        |               |     |     |                  |    |      |
| 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.

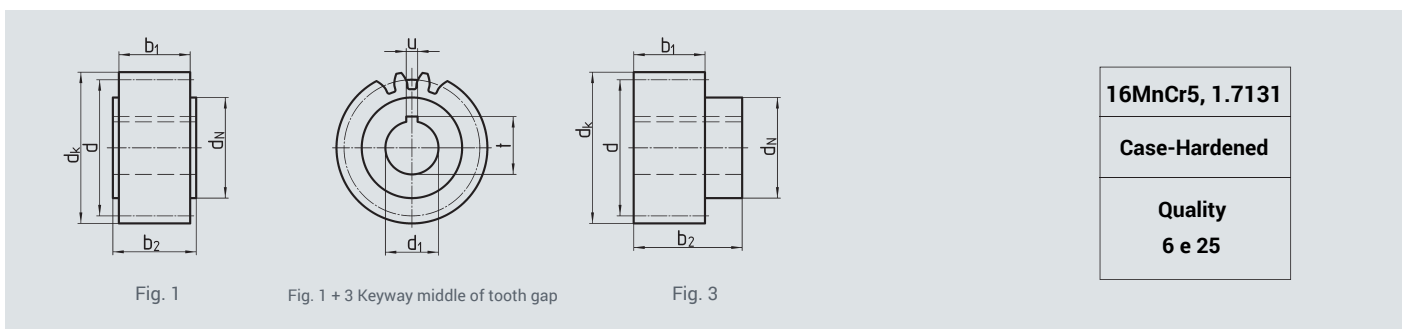
**Straight Pinion**, with bore ØH6 and keyway according to DIN 6885



| Order Code      | Fig. | N° of Teeth z | d (=d <sub>wz</sub> ) | d <sub>k</sub> | d <sub>1</sub> <sup>H6</sup> | d <sub>N</sub> | b <sub>1</sub> | b <sub>2</sub> | u  | t    | kg  | Coupling<br>on Page C-76 |
|-----------------|------|---------------|-----------------------|----------------|------------------------------|----------------|----------------|----------------|----|------|-----|--------------------------|
| <b>Module 2</b> |      |               |                       |                |                              |                |                |                |    |      |     |                          |
| 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



| Order Code      | Fig. | N° of Teeth z | d (=d <sub>wz</sub> ) | d <sub>k</sub> | d <sub>1</sub> <sup>H6</sup> | d <sub>N</sub> | b <sub>1</sub> | b <sub>2</sub> | u  | t    | kg   | Coupling<br>on Page C-76 |
|-----------------|------|---------------|-----------------------|----------------|------------------------------|----------------|----------------|----------------|----|------|------|--------------------------|
| <b>Module 2</b> |      |               |                       |                |                              |                |                |                |    |      |      |                          |
| 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

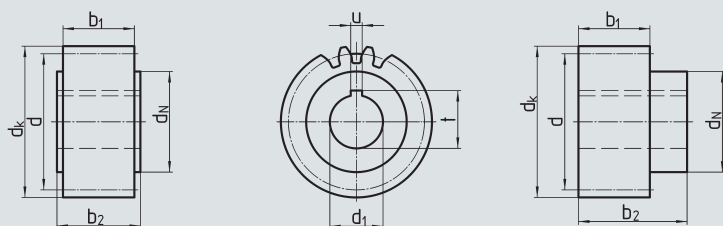


Fig. 1

Fig. 1 + 3 Keyway middle of tooth gap

Fig. 3

**16MnCr5, 1.7131**

**Case-Hardened**

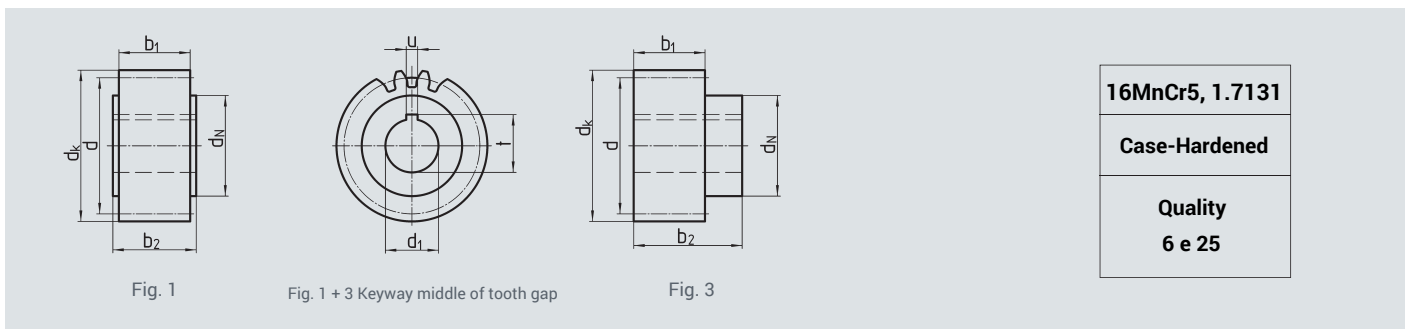
**Quality  
6 e 25**

| Order Code      | Fig. | N° of Teeth z | d (=d <sub>wz</sub> ) | d <sub>k</sub> | d <sub>1</sub> <sup>H6</sup> | d <sub>N</sub> | b <sub>1</sub> | b <sub>2</sub> | u  | t    | kg  | Coupling<br>on Page C-76 |
|-----------------|------|---------------|-----------------------|----------------|------------------------------|----------------|----------------|----------------|----|------|-----|--------------------------|
| <b>Module 3</b> |      |               |                       |                |                              |                |                |                |    |      |     |                          |
| 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

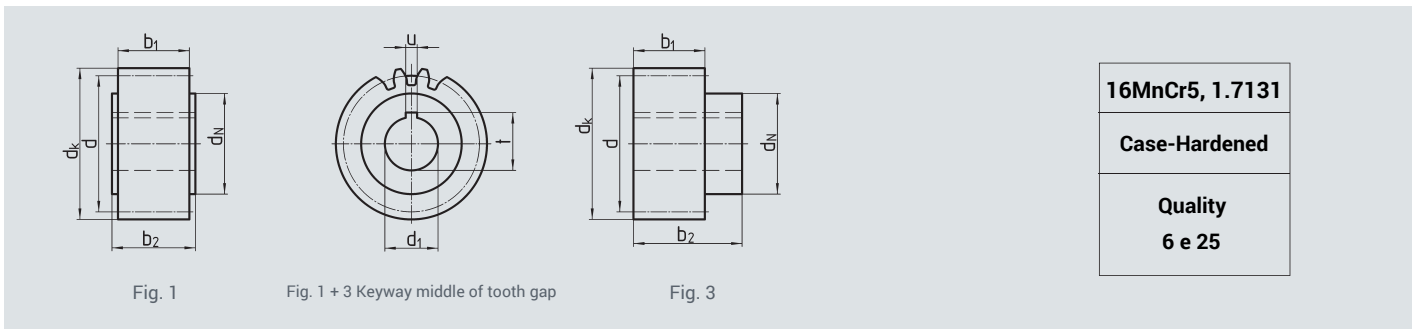


**Straight Pinion**, with bore  $\varnothing H6$  and keyway according to DIN 6885



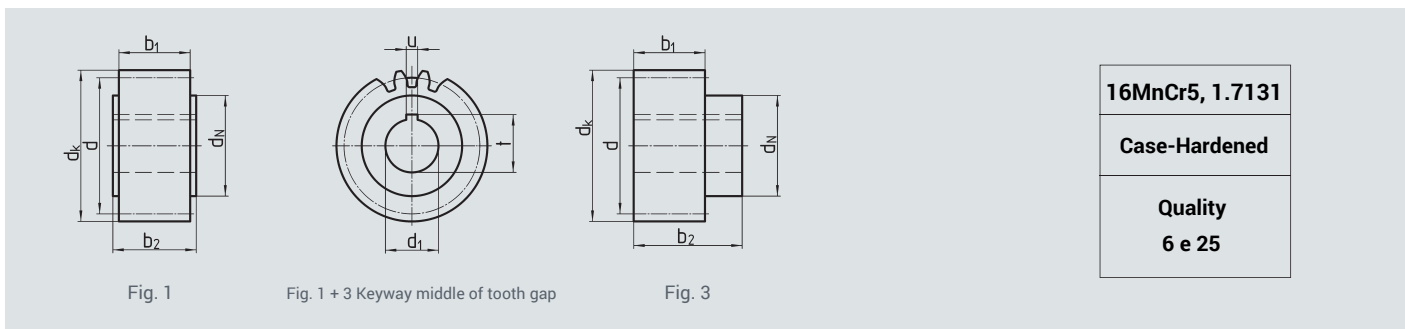
| Order Code       | Fig. | N° of Teeth z | d (=d <sub>wz</sub> ) | d <sub>k</sub> | d <sub>1</sub> <sup>H6</sup> | d <sub>N</sub> | b <sub>1</sub> | b <sub>2</sub> | u  | t    |  kg |
|------------------|------|---------------|-----------------------|----------------|------------------------------|----------------|----------------|----------------|----|------|----------------------------------------------------------------------------------------|
| <b>Module 3</b>  |      |               |                       |                |                              |                |                |                |    |      |                                                                                        |
| <b>24 39 245</b> | 1    | 45            | 135                   | 141            | 60                           | 80             | 28             | 30.0           | 18 | 64.4 | 2.4                                                                                    |
| <b>24 35 250</b> | 1    | 50            | 150                   | 156            | 35                           | 48             | 28             | 30.0           | 10 | 38.3 | 3.6                                                                                    |
| <b>24 37 250</b> | 1    | 50            | 150                   | 156            | 45                           | 58             | 28             | 30             | 14 | 48.8 | 3.5                                                                                    |
| <b>24 37 256</b> | 1    | 56            | 168                   | 174            | 45                           | 58             | 28             | 30.0           | 14 | 48.8 | 4.4                                                                                    |
| <b>24 37 263</b> | 1    | 63            | 189                   | 195            | 45                           | 58             | 28             | 30.0           | 14 | 48.8 | 5.4                                                                                    |
| <b>24 39 263</b> | 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



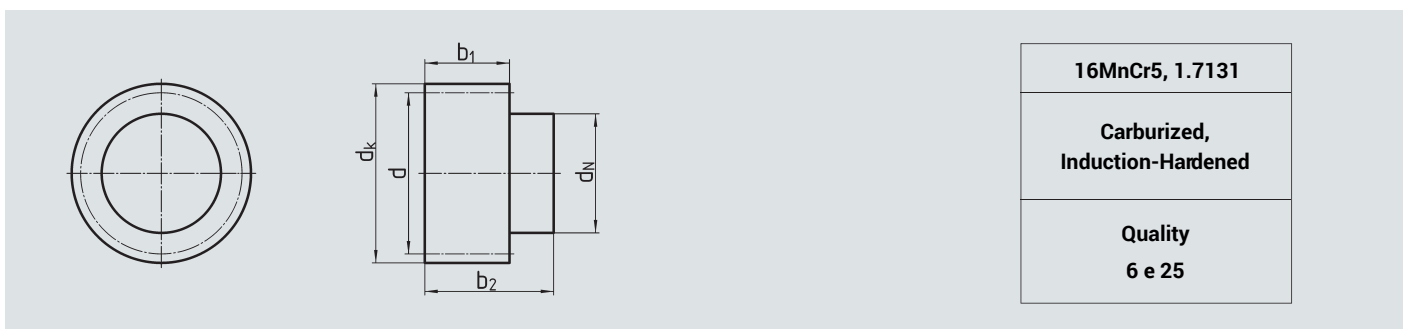
| Order Code      | Fig. | N° of Teeth z | d (=d <sub>wz</sub> ) | d <sub>k</sub> | d <sub>1</sub> <sup>H6</sup> | d <sub>N</sub> | b <sub>1</sub> | b <sub>2</sub> | u  | t    |  kg | Coupling<br>on Page C-76 |
|-----------------|------|---------------|-----------------------|----------------|------------------------------|----------------|----------------|----------------|----|------|----------------------------------------------------------------------------------------|--------------------------|
| <b>Module 4</b> |      |               |                       |                |                              |                |                |                |    |      |                                                                                        |                          |
| 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  $\varnothing H6$  and keyway according to DIN 6885



| Order Code       | Fig. | N° of Teeth z | d (=d <sub>wz</sub> ) | d <sub>k</sub> | d <sub>1</sub> <sup>H6</sup> | d <sub>N</sub> | b <sub>1</sub> | b <sub>2</sub> | u  | t    |  | Coupling<br>on Page C-76 |
|------------------|------|---------------|-----------------------|----------------|------------------------------|----------------|----------------|----------------|----|------|-------------------------------------------------------------------------------------|--------------------------|
| <b>Module 5</b>  |      |               |                       |                |                              |                |                |                |    |      |                                                                                     |                          |
| <b>24 56 421</b> |      | 21            | 105                   | 115            | 45                           | 68             | 50             | 85.0           | 14 | 48.8 | 3.7                                                                                 | 80 80 068                |
| <b>24 57 421</b> |      | 21            | 105                   | 115            | 55                           | 80             | 50             | 90.0           | 16 | 59.3 | 3.7                                                                                 | 80 87 080                |
| <b>24 56 425</b> |      | 25            | 125                   | 135            | 45                           | 68             | 50             | 85.0           | 14 | 48.8 | 5.2                                                                                 | 80 80 068                |
| <b>24 57 425</b> |      | 25            | 125                   | 135            | 55                           | 80             | 50             | 90.0           | 16 | 59.3 | 5.1                                                                                 | 80 87 080                |
| <b>24 58 425</b> |      | 25            | 125                   | 135            | 75                           | 110            | 50             | 110.0          | 20 | 80.4 | 4.7                                                                                 | 80 80 110                |
| <b>Module 6</b>  |      |               |                       |                |                              |                |                |                |    |      |                                                                                     |                          |
| <b>24 67 421</b> |      | 21            | 126                   | 138            | 55                           | 80             | 60             | 100.0          | 16 | 59.3 | 5.6                                                                                 | 80 87 080                |
| <b>24 68 421</b> |      | 21            | 126                   | 138            | 75                           | 110            | 60             | 120.0          | 20 | 79.9 | 4.7                                                                                 | 80 80 110                |
| <b>24 67 425</b> |      | 25            | 150                   | 162            | 55                           | 80             | 60             | 100.0          | 16 | 59.3 | 8.0                                                                                 | 80 87 080                |
| <b>24 68 425</b> |      | 25            | 150                   | 162            | 75                           | 110            | 60             | 120.0          | 20 | 79.9 | 7.1                                                                                 | 80 80 110                |
| <b>Module 8</b>  |      |               |                       |                |                              |                |                |                |    |      |                                                                                     |                          |
| <b>24 88 420</b> |      | 20            | 160                   | 176            | 75                           | 110            | 80             | 140            | 20 | 79.9 | 12.0                                                                                | 80 80 110                |
| <b>24 89 420</b> |      | 20            | 160                   | 176            | 85                           | 125            | 80             | 145            | 22 | 90.4 | 12.1                                                                                | 80 80 125                |
| <b>Module 10</b> |      |               |                       |                |                              |                |                |                |    |      |                                                                                     |                          |
| <b>24 09 620</b> |      | 20            | 200                   | 220            | 85                           | 125            | 100            | 165            | 22 | 90.4 | 23                                                                                  | 80 80 125                |

## Straight-Tooth Pinion, with plain bore



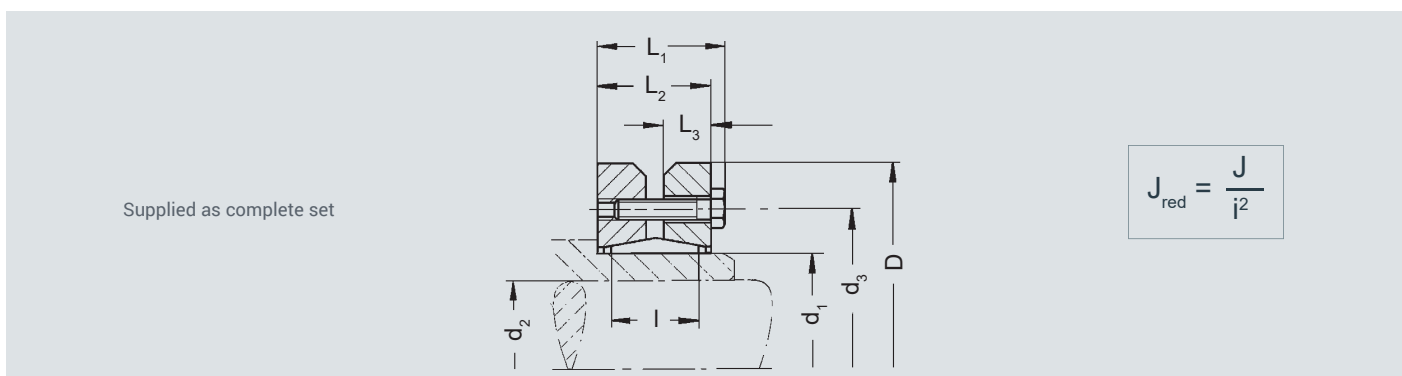
| Order Code              | Module | N° of Teeth<br>z | d (=d <sub>wz</sub> ) | d <sub>k</sub> | d <sub>N</sub> | b <sub>1</sub> | b <sub>2</sub> | kg   | Coupling<br>on page C-76 |
|-------------------------|--------|------------------|-----------------------|----------------|----------------|----------------|----------------|------|--------------------------|
| 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 <sup>1)</sup> | 8      | 20               | 160                   | 176            | 125            | 80             | 145            | 18.5 | 80 80 125                |

<sup>1)</sup> With bore Ø 40<sup>H7</sup>

The pinion could be fixed at d<sub>k</sub> or d<sub>N</sub> to be reworked.

Maximum bore diameter of the pinion on request.

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



| Order Code | T <sub>2max</sub><br>Nm | d <sub>2</sub> | d <sub>1</sub> | d <sub>3</sub> | D     | L <sub>1</sub> | L <sub>2</sub> | L <sub>3</sub> | l    | G        | J <sub>red</sub> 10 <sup>-4</sup> kg m <sup>2</sup> | 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 <sup>1)</sup> 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  $v = 1.5 \text{ m/s}$ , with safety coefficient  $S_b = 1.0$ , lifetime factor  $f_n = 1.0$  and linear load distribution factor  $K_{Hb} = 1.0$ .

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!**



## Straight Rack & Pinion Drive Calculations & Selection - Module 2

| Rack Type                         |                | UHPR                                                        | HPR                                |                                       |         | PR      |                     | BR                   |
|-----------------------------------|----------------|-------------------------------------------------------------|------------------------------------|---------------------------------------|---------|---------|---------------------|----------------------|
| ATLANTA Quality                   |                | 5                                                           | 6                                  |                                       | 7       | 8       |                     | 10                   |
| Rack                              | Material       | Heat-Treatable Steel <sup>2)</sup>                          | Case-Hardened <sup>2)</sup>        | 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 <sup>1)</sup> | 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.



| Rack Type                         |                | UHPR                                                        | HPR                                |                                       |         | PR      |                     | BR                   |
|-----------------------------------|----------------|-------------------------------------------------------------|------------------------------------|---------------------------------------|---------|---------|---------------------|----------------------|
| ATLANTA Quality                   |                | 5                                                           | 6                                  |                                       | 7       | 8       |                     | 10                   |
| Rack                              | Material       | Heat-Treatable Steel <sup>2)</sup>                          | Case-Hardened <sup>2)</sup>        | 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 <sup>1)</sup> | 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.



## Straight Rack & Pinion Drive Calculations & Selection - Module 4

| Rack Type                         |                | HPR                                                         |                                       |         | PR                  |         | BR                   |
|-----------------------------------|----------------|-------------------------------------------------------------|---------------------------------------|---------|---------------------|---------|----------------------|
| ATLANTA Quality                   |                | 6                                                           |                                       | 7       | 8                   |         | 10                   |
| Rack                              | Material       | Case-Hardened <sup>2)</sup>                                 | 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 <sup>1)</sup> | 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.

| 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 <sup>1)</sup> | 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.



| 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 <sup>1)</sup> | Pitch Diameter | Maximum Feed Force<br>(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 <sup>1)</sup> | Pitch Diameter | Maximum Feed Force<br>(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.



| 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 <sup>1)</sup> | Pitch Diameter | Maximum Feed Force<br>(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 <sup>1)</sup> | Pitch Diameter | Maximum Feed Force<br>(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,  $K_{HB}=1.0$  and reliable grease lubrication. Since, in practice, the applications are very diverse, it is important to consider the given conditions by using appropriate factors  $S_B$ ,  $K_A$ ,  $L_{KHB}$  and  $f_n$  (see below).

#### Formulas for Determining the Tangential Force

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

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

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

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

Formula dimensions see page ZD-3

**The Condition  $F_u < F_{u \text{ perm.}}$  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  | from<br>3<br>to<br>10 |
| 1.0                         | 60    | 0.95       | 1.10  |                       |
| 1.5                         | 90    | 1.00       | 1.20  |                       |
| 2.0                         | 120   | 1.05       | 1.30  |                       |
| 3.0                         | 180   | 1.10       | 1.50  |                       |
| 5.0                         | 300   | 1.25       | 1.90  |                       |

#### Linear Load Distribution Factor $L_{KHB}$

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

$L_{KHB} = 1.1$  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                | $m = 820 \text{ kg}$                     |
| Speed                           | $v = 2 \text{ m/s}$                      |
| Acceleration Time               | $t_b = 1 \text{ s}$                      |
| Acceleration Due to Gravity $g$ | $= 9.81 \text{ m/s}^2$                   |
| Coefficient of Friction         | $\mu = 0.1$                              |
| Load Factor                     | $K_A = 1.5$                              |
| Life-Time Factor                | $f_n = 1.05 \text{ (cont. lubrication)}$ |
| Safety Coefficient              | $S_B = 1.2$                              |
| Linear Load Distribution Factor | $L_{KH\beta} = 1.5$                      |

### Calculation Process

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

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

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

Assumed feed force: rack C45, ind. hardened, straight tooth, module 3, pinion 16MnCr5, case hardened, 20 teeth, page C-46 with  $F_{uTab} = 11.5 \text{ kN}$

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

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

### Condition

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

|         |        |           |               |
|---------|--------|-----------|---------------|
| 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                | $m = \underline{\hspace{2cm}} \text{ kg}$  |
| Speed                           | $v = \underline{\hspace{2cm}} \text{ m/s}$ |
| Acceleration Time               | $t_b = \underline{\hspace{2cm}} \text{ s}$ |
| Acceleration Due to Gravity $g$ | $= \underline{9.81} \text{ m/s}^2$         |
| Coefficient of Friction         | $\mu = \underline{\hspace{2cm}}$           |
| Load Factor                     | $K_A = \underline{\hspace{2cm}}$           |
| Life-Time Factor                | $f_n = \underline{\hspace{2cm}}$           |
| Safety Coefficient              | $S_B = \underline{\hspace{2cm}}$           |
| Linear Load Distribution Factor | $L_{KH\beta} = \underline{\hspace{2cm}}$   |

### Calculation Process

$$a = \frac{v}{t_b} \quad a = \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ m/s}^2$$

$$F_u = \frac{m \cdot g \cdot \mu + m \cdot a}{1000} ; F_u = \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ kN}$$

Permissible Feed Force  $F_{uTab}$

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

$$F_{u \text{ zul./per.}} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ kN}$$

### Condition

$$F_{u \text{ zul./per.}} > F_u ; \underline{\hspace{2cm}} \text{ kN} > \underline{\hspace{2cm}} \text{ kN} \quad = > \text{ fulfilled}$$

## Calculation Example

### Values Given

☐ Lifting Operation

Mass to be Moved  $m = 300 \text{ kg}$   
 Speed  $v = 1.08 \text{ m/s}$   
 Acceleration Time  $t_b = 0.27 \text{ s}$   
 Acceleration Due to Gravity  $g = 9.81 \text{ m/s}^2$   
 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

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

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

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

$$F_{u \text{ zul./per.}} = \frac{F_{u \text{ Tab}}}{K_A \cdot S_B \cdot f_n \cdot L_{KH\beta}} ; F_{u \text{ zul./per.}} = \frac{11.5 \text{ kN}}{1.2 \cdot 1.2 \cdot 1.1 \cdot 1.2} = 5.9 \text{ kN}$$

### Condition

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

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  $m = \underline{\hspace{2cm}} \text{ kg}$   
 Speed  $v = \underline{\hspace{2cm}} \text{ m/s}$   
 Acceleration Time  $t_b = \underline{\hspace{2cm}} \text{ s}$   
 Acceleration Due to Gravity  $g = \underline{9.81} \text{ m/s}^2$   
 Load Factor  $K_A = \underline{\hspace{2cm}}$   
 Life-Time Factor  $f_n = \underline{\hspace{2cm}}$   
 Safety Coefficient  $S_B = \underline{\hspace{2cm}}$   
 Linear Load Distribution Factor  $L_{KH\beta} = \underline{\hspace{2cm}}$

### Calculation Process

### Results

$$a = \frac{v}{t_b} \quad a = \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ m/s}^2$$

$$F_u = \frac{m \cdot g + m \cdot a}{1000} \quad F_{u \text{ erf./req.}} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ kN}$$

Permissible Feed Force  $F_{u \text{ tab}}$

$$F_{u \text{ zul./per.}} = \frac{F_{u \text{ Tab}}}{K_A \cdot S_B \cdot f_n \cdot L_{KH\beta}} ; F_{u \text{ zul./per.}} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ kN}$$

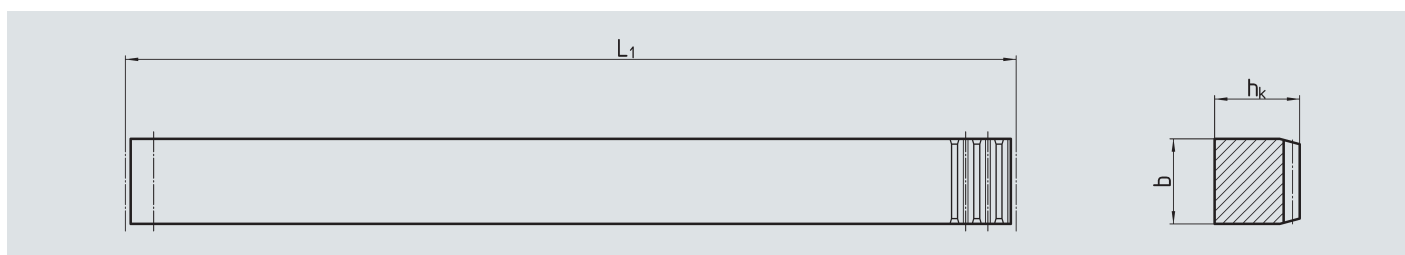
### Condition

$$F_{u \text{ zul./per.}} > F_u ; \underline{\hspace{2cm}} \text{ kN} > \underline{\hspace{2cm}} \text{ kN} \Rightarrow \text{fulfilled}$$

|                                        | Page        |
|----------------------------------------|-------------|
| Companion Racks                        | C-92        |
| Rack Mounting                          | C-95        |
| Rack Assembly Kits                     | C-96 – C-97 |
| Magnetic Rollers and Measuring Bridges | C-97        |
| Rack Adjusting Device                  | C-99        |



## 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

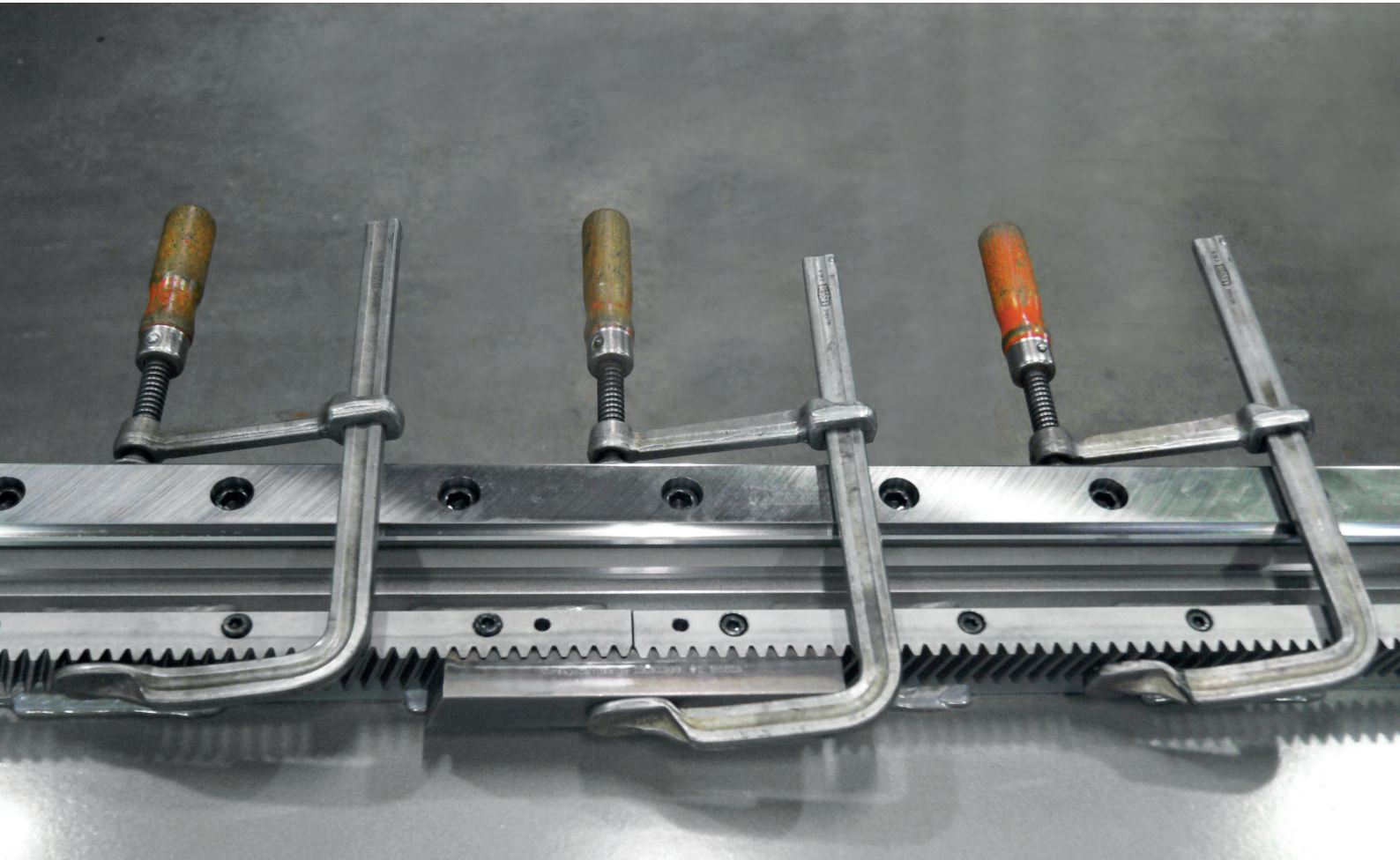
To make it possible to link our racks to form any desired length, the teeth are cut so that there is half a tooth gap at each end of the rack. The picture below shows how racks can be precisely positioned using our companion racks.

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

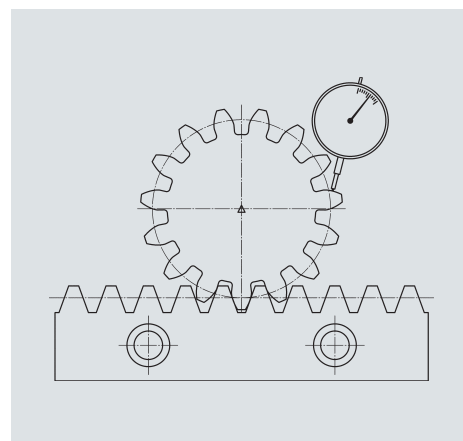
Q6: min. 0.027 (m= 1.5 – 4) / min.0.020 (m= 5 – 6)

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

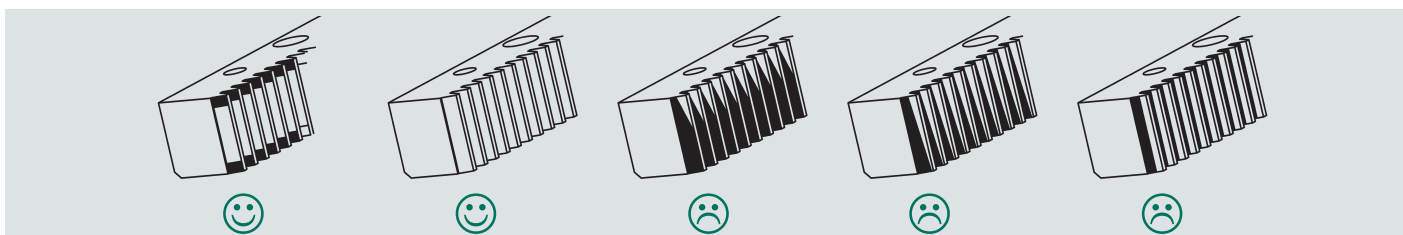
Max: 0.1 x Module 1.5

Max: 0.05 x Module 2 – 12



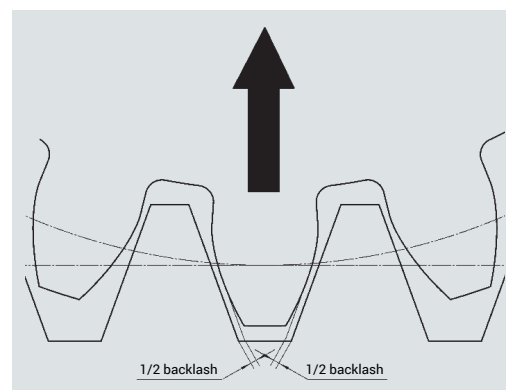
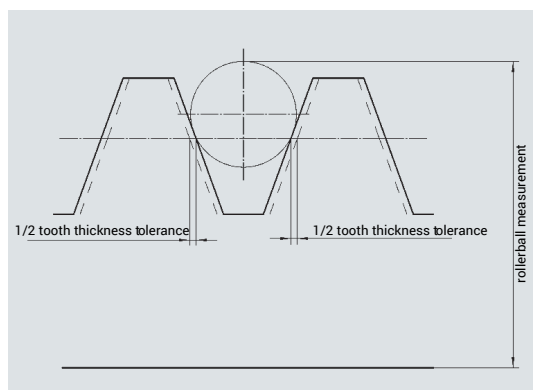
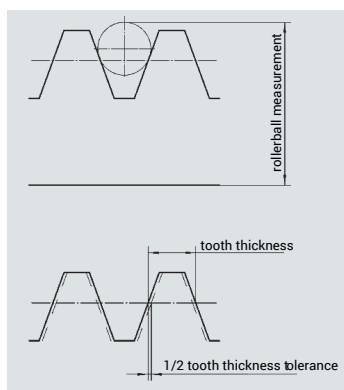
### Tooth Contact Patterns

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

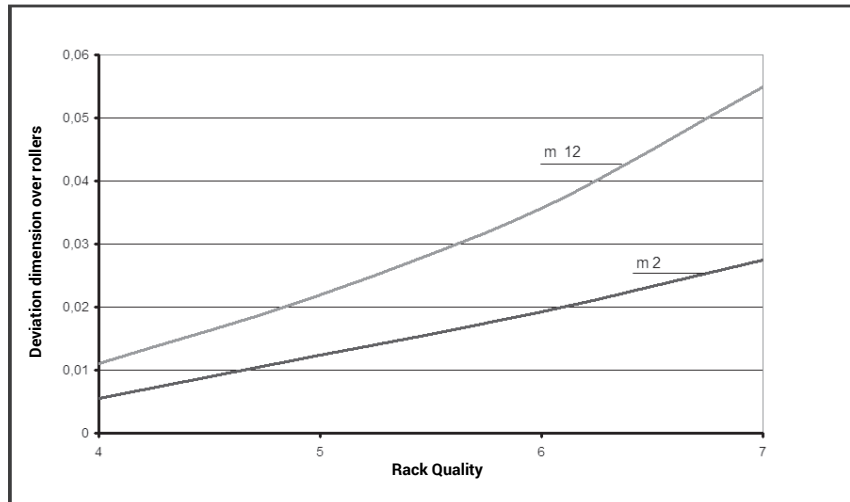
Pins: DIN 7979 (ISO 8735-A)



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

### 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.

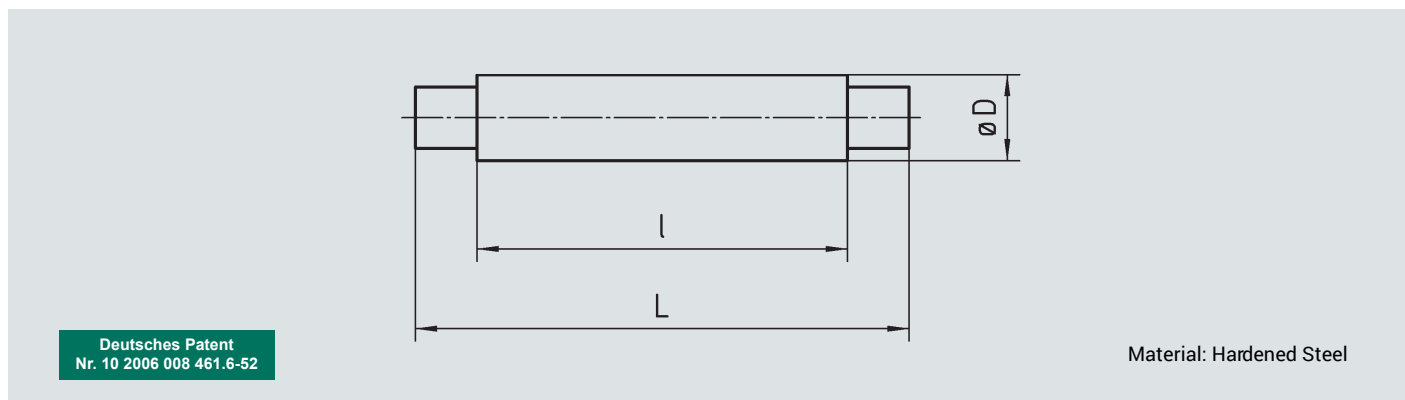
The rollers are inserted in the two adjacent racks and in the gap at the joint. They, too, are held in place in the tooth space by magnetic force and can therefore be used in any mounting position of the racks. It is thus ensured that they are always accurately positioned on the tooth flanks. The tooth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

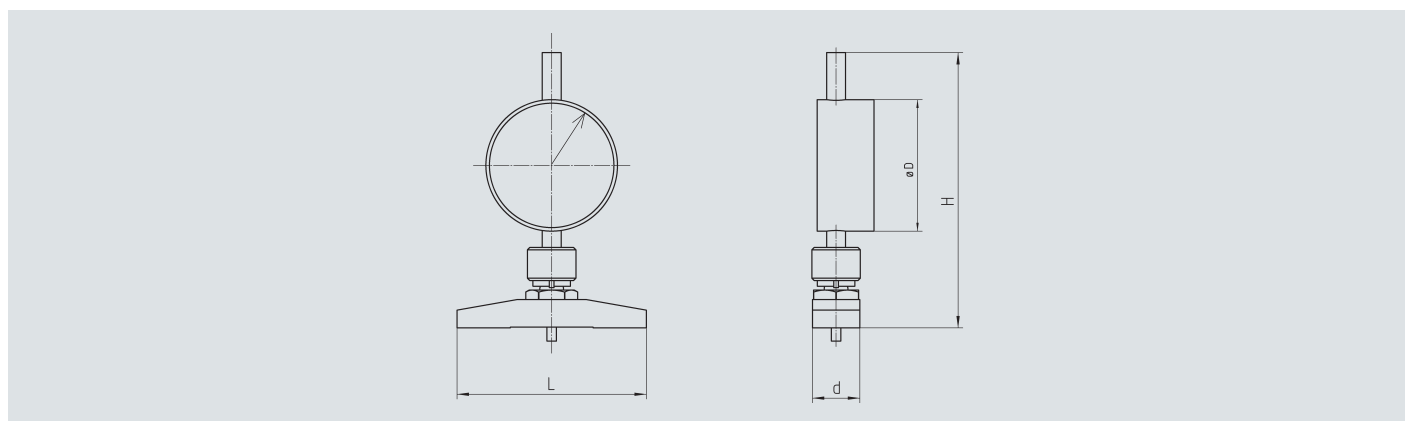


### Magnetic Rollers



| Order Code  | Description          | Module | L  | l  | D   |  |
|-------------|----------------------|--------|----|----|-----|-------------------------------------------------------------------------------------|
| 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  |  |
|-------------|------------------|--------|-----|----|-----|----|---------------------------------------------------------------------------------------|
| 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.



### 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<br>29.20.xxx              | 28.20.xxx                           | 0.12 |
| 2 29 00 003 | Adjusting device | 6           | 3 & 4         | 29.30.xxx<br>29.40.100<br>29.40.xx5 | 28.30.xxx<br>28.40.100<br>28.40.xx5 | 0.14 |
| 2 29 00 005 | Adjusting device | 10          | 4 & 5         | 29.40.xx7<br>29.42.xxx<br>29.40.xx8 | 28.40.xx7<br>28.42.xxx<br>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<br>29.10.xxx<br>29.12.xxx | 28.10.xxx<br>28.12.xxx              | 0.82 |
| 2 28 00 008 | Adjusting device | 14          | 8<br>Straight |                                     | 28.80.xxx<br>46.80.xxx              | 0.46 |

|                                                      | Page        |
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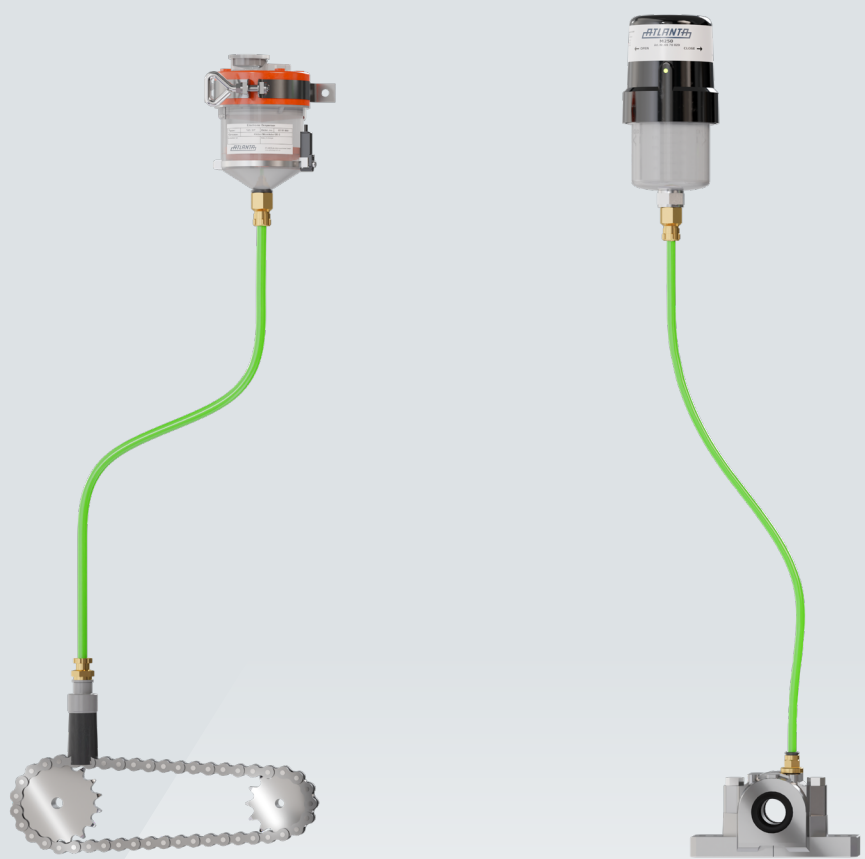
# ATLANTA Automatic Lubrication Systems

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.

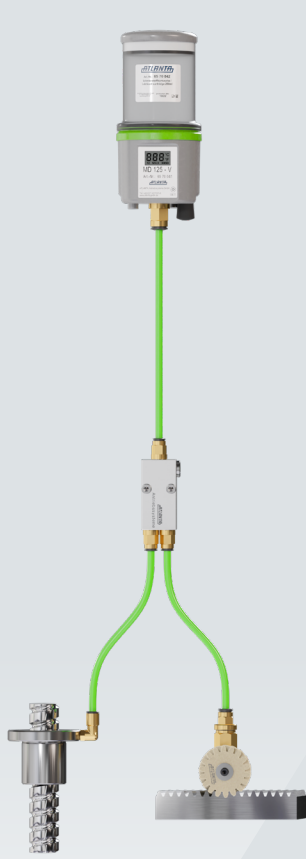
Whether single-point or multi-point lubrication, you increase the performance of your machines and systems with a permanent and controlled supply of the drive with the necessary lubricant.



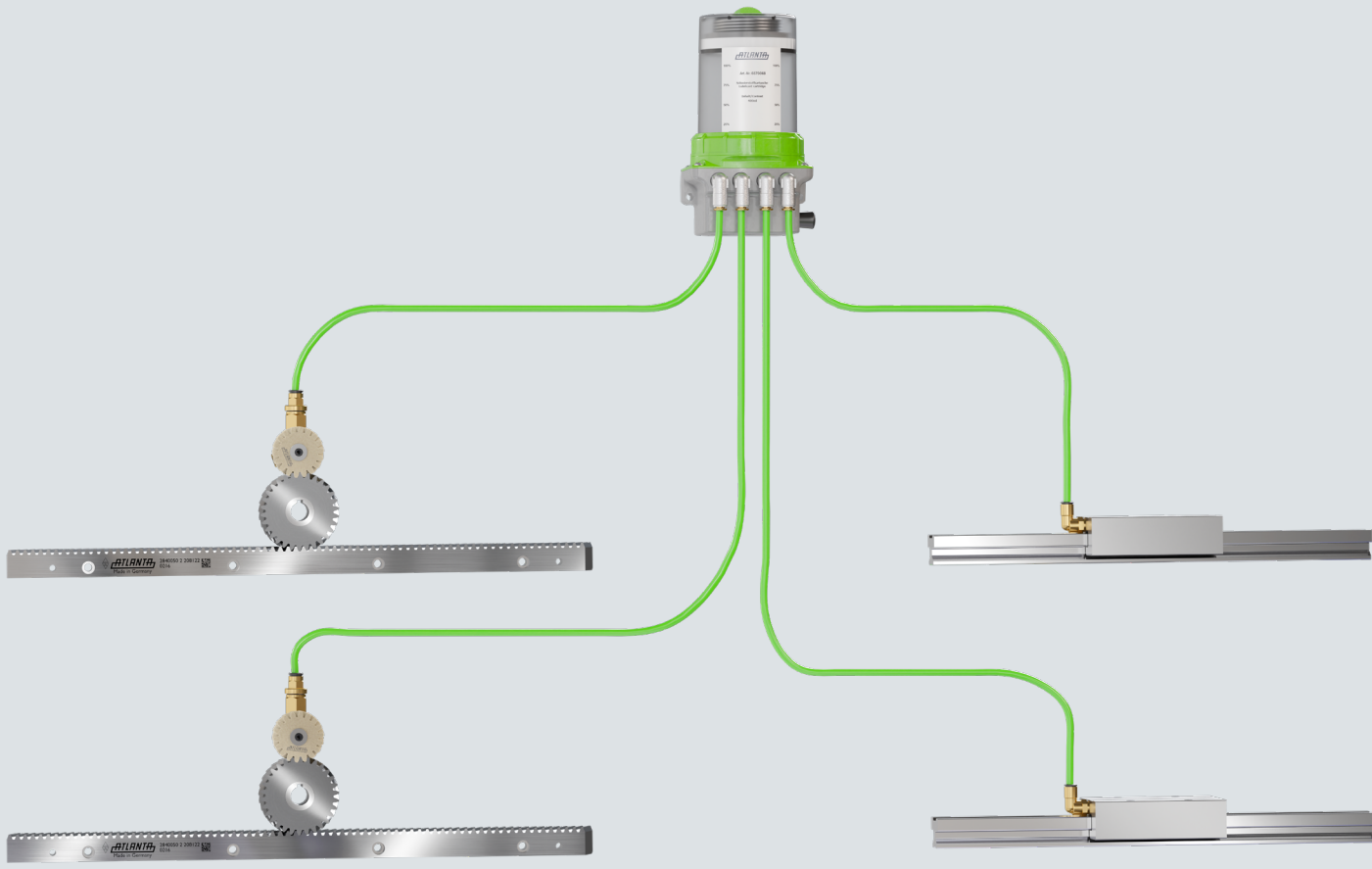
Single-Point Lubrication Systems

Type 125 / 475

Type M60 / M150 / M250



Type MD125



Multi-Point Lubrication Systems

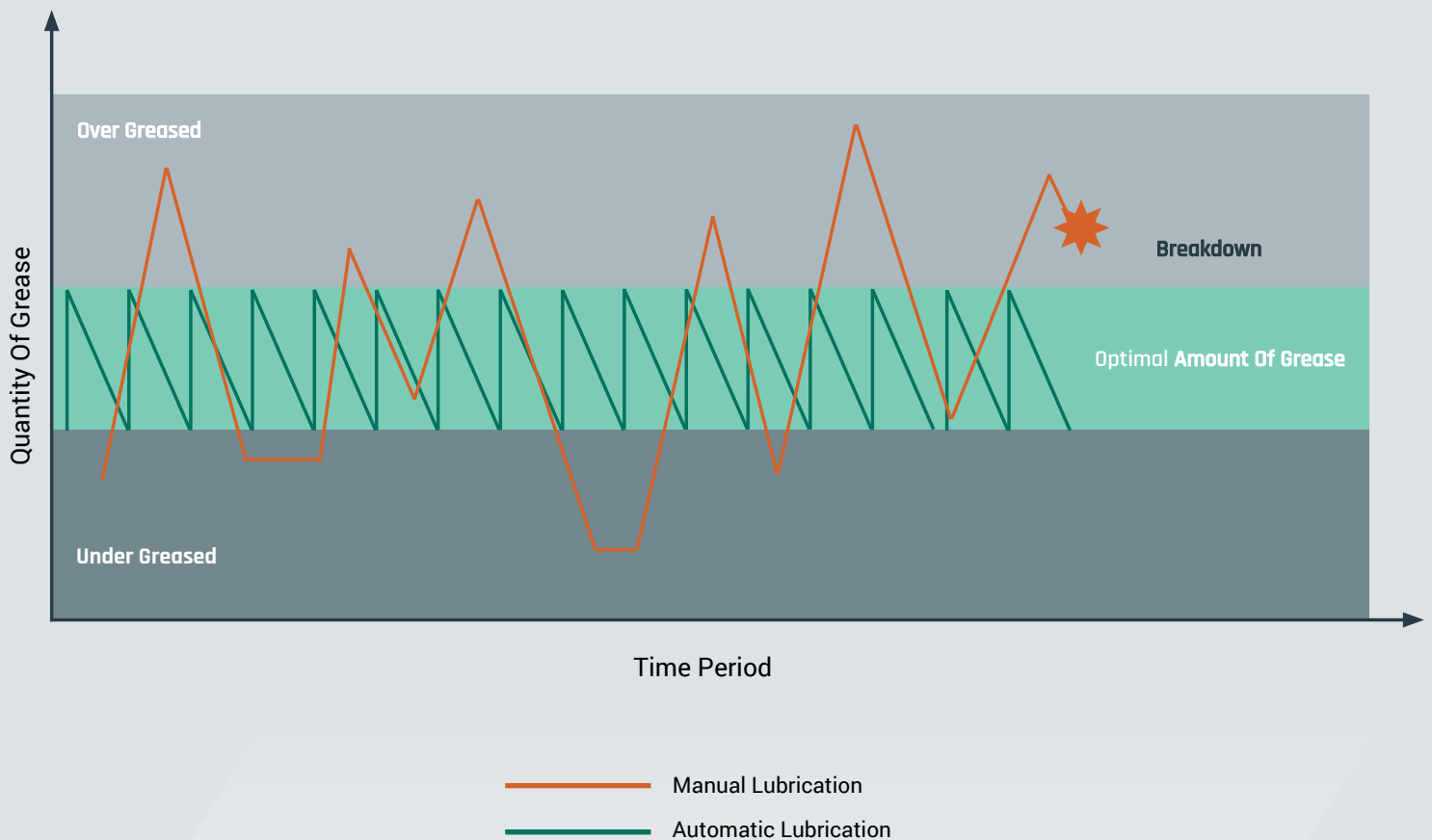
Type MD400



## 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<br>Type 475 | 1-18 month                                         | 100 ml<br>460 ml           | 3 bar<br>(44 psi)                | (4) 1.5V Batteries            | Yes                    | ATEX<br>Optional                                           | D-10 – D-11 |
| Electro-Mechanical Single-Point Lubricator                                          |                      |                                                    |                            |                                  |                               |                        |                                                            |             |
|    | M60<br>M150<br>M250  | 1-12 month                                         | 60 ml<br>150 ml<br>250 ml  | 7.5 bar<br>(108 psi)             | 6V Batteries<br>or<br>24 V DC | Yes                    |                                                            | D-12 – D-13 |
|   | MD125-B              | 1-24 month                                         | 125 ml                     | 35 or 15 bar<br>(435 or 218 psi) | 4.5V Batteries                | No                     | Delivery Pressure<br>Switchable                            | D-14 – D-15 |
| Electro-Mechanical Multi-Point Lubricator                                           |                      |                                                    |                            |                                  |                               |                        |                                                            |             |
|  | MD125-V              | 1-24 month<br>Individually<br>Adjustable           | 125 ml<br>250 ml           | 50 or 15 bar<br>(725 or 218 psi) | 24 V DC                       | No                     | Delivery Pressure<br>Switchable, External<br>Control / PLC | D-14 – D-15 |
|  | MD400-B              | 1-36 month                                         | 250 ml<br>400 ml           | 70 bar<br>(1015 psi)             | 6V Batteries                  | No                     | 1-2 Outlets                                                | D-16 – D-18 |
|  | MD400-V              | 1 - 36 month<br>Intermittent Operation<br>Possible | 250 ml<br>400 ml           | 70 bar<br>(1015 psi)             | 24 V DC                       | No                     | 1-2 Outlets                                                | D-16 – D-18 |
|  | MD400-D              | Individually<br>Adjustable                         | 250 ml<br>400 ml           | 70 bar<br>(1015 psi)             | 24 V DC                       | No                     | 1-4 Outlets<br>External Control /<br>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, an emptying time of 1-18 months can be selected for a grease filling via microswitches.

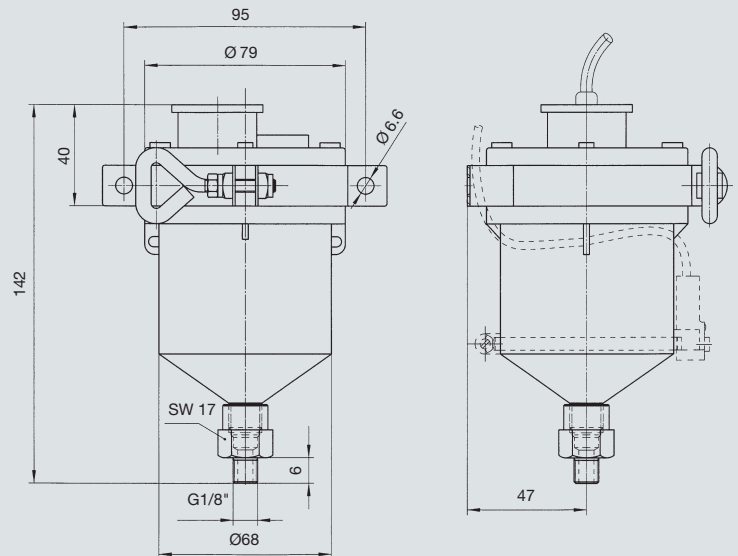
The transparent housing, which can be mounted in any position, allows a visual check of the amount of grease still available at any time. After complete emptying, further use is possible by refilling.



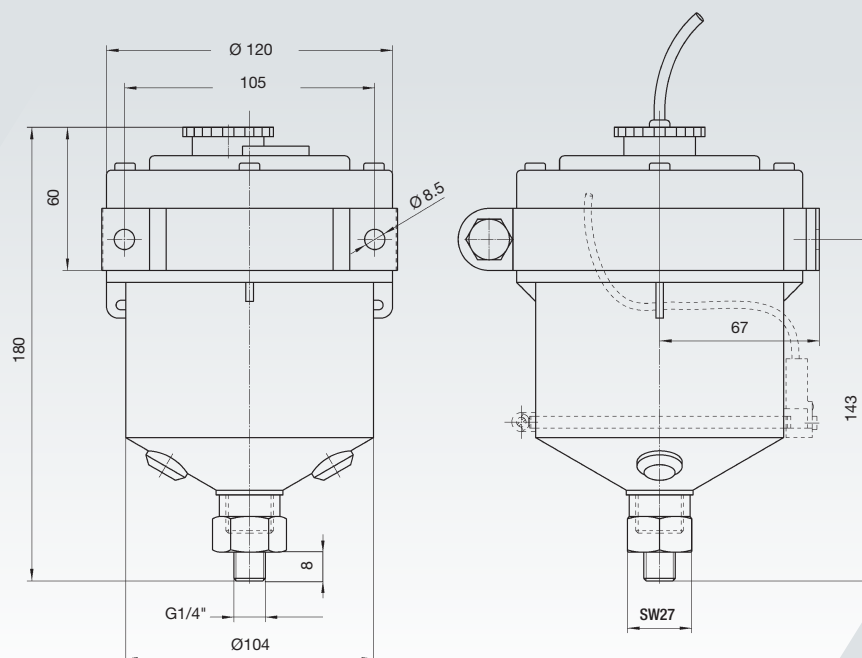
### Advantages of Type 125 / 475 Lubricators

- ✱ 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



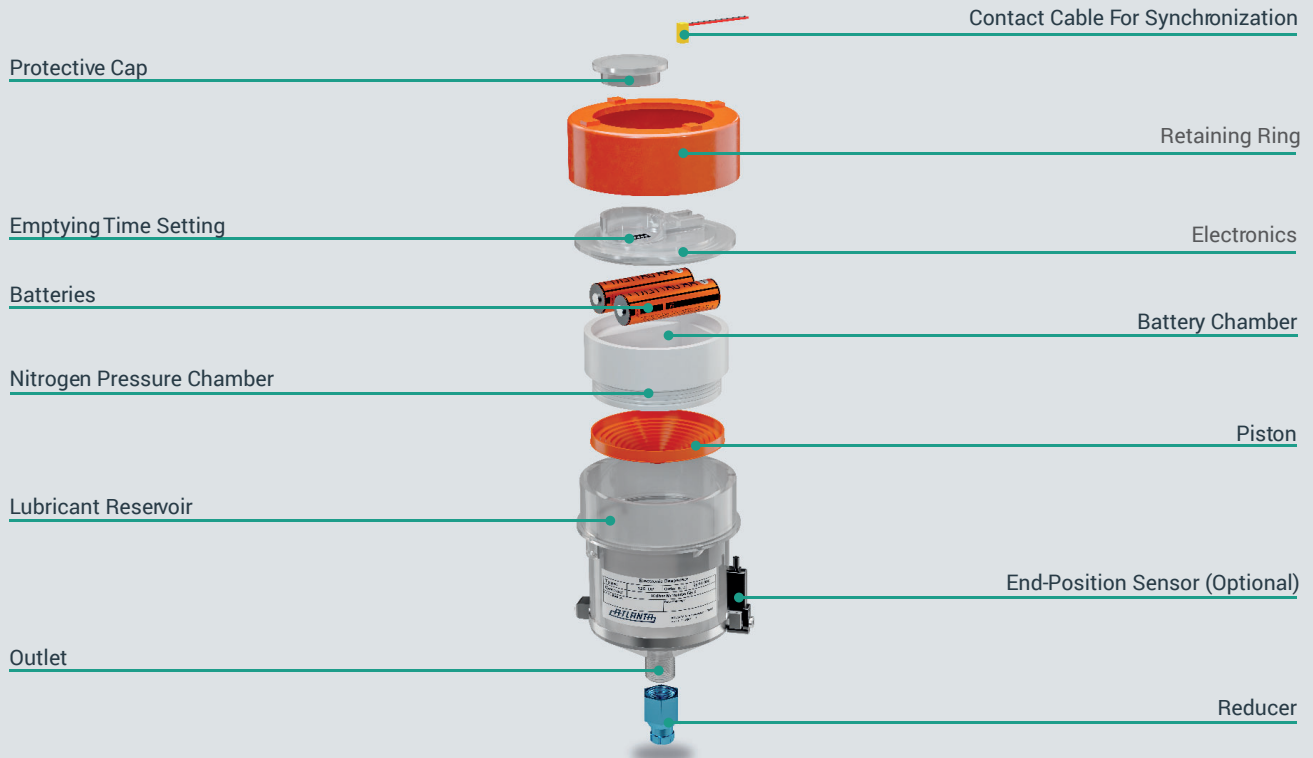
Type 475

## 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 <sup>1)</sup>  | 65 91 050                      |           | 65 91 056    |           |
|                        | Lubricant Typ 2 + EP Sensor <sup>1)</sup>   | 65 91 054                      |           | -            |           |
|                        | Without Lubricant + EP Sensor <sup>1)</sup> | 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

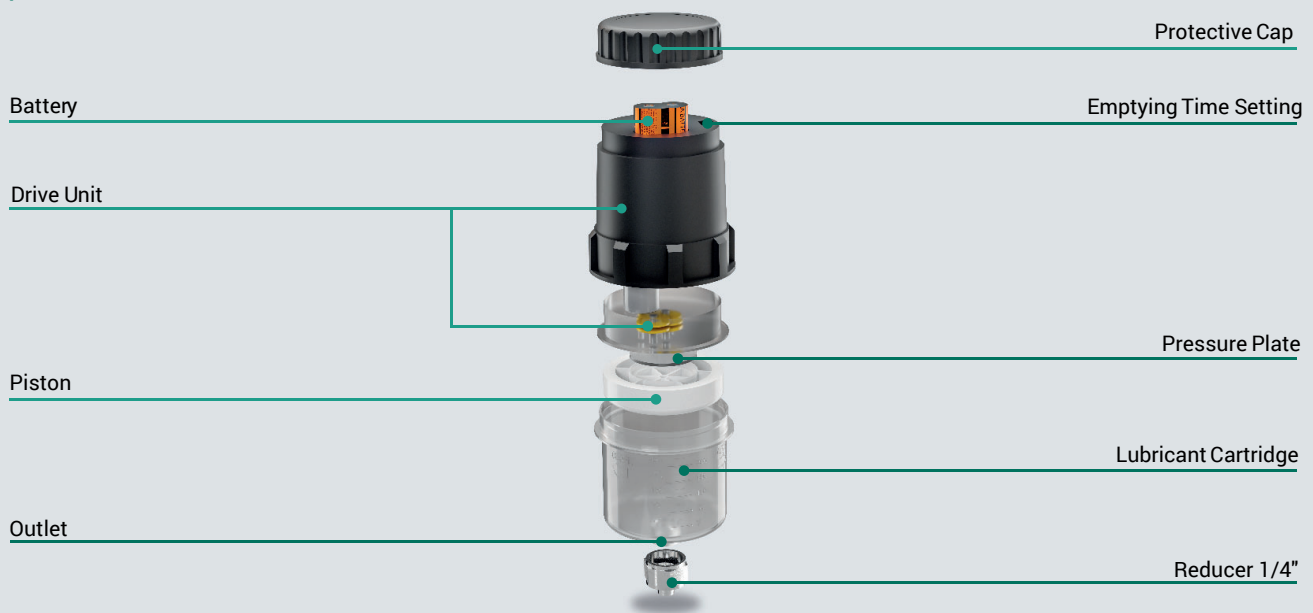
\* Hose length depends on lubricant and application

## 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 specific 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)<br>174 / 508 psi (switchable)               | 15 / 50 bar (switchable)<br>174 / 725 psi (switchable) |
| Settings                       |                          | 1 - 24 Month                                                         | 1 - 24 Month<br>or Individually Adjustable             |
| Time or Pulse Control          |                          | Time Mode                                                            | Time Mode or Pulse Control<br>Individually Adjustable  |
| Lubrication Volume             |                          | 125 ml                                                               | 125 ml / 250 ml                                        |
| Lubricating Medium             |                          | Oils & Greases Up To NLGI 2                                          |                                                        |
| Temperature Range              |                          | Al-Battery<br>+15 bis / to +60°C<br>Li-Battery<br>-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 greases up to NLGI-2 and oil viscosities from 15 to 1,000 mm<sup>2</sup>/s
- ✱ 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 Type 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<br>(Intermittent 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 Or PLC      |           |                                                   |           |                         | External Control / PLC |           |           |

\* Batteries are not included

## Components



## Technical Data

|                                      |                                              |           |                                                   |           |                         |                        |           |           |
|--------------------------------------|----------------------------------------------|-----------|---------------------------------------------------|-----------|-------------------------|------------------------|-----------|-----------|
| Lubricator Model                     | MD400-B-Oil                                  |           | MD400-V-Oil                                       |           | MD400-D-Oil             |                        |           |           |
| Number of Outlets                    | 1                                            | 2         | 1                                                 | 2         | 1                       | 2                      | 3         | 4         |
| Lubricator Order Code                | 65 70 091                                    | 65 70 092 | 65 70 101                                         | 65 70 102 | 65 70 111               | 65 70 112              | -         | -         |
| Lubricator Order Code With Two Pumps | -                                            |           | -                                                 |           | -                       | 65 70 115              | 65 70 113 | 65 70 114 |
| Drive Type                           | Electro-Mechanical (Reusable)                |           |                                                   |           |                         |                        |           |           |
| Operating Pressure                   | Maximum 70 bar (1015 psi)                    |           |                                                   |           |                         |                        |           |           |
| Settings                             | 1 - 36 Month                                 |           | 1 - 36 Month<br>(Intermittent Operation Possible) |           | Individually Adjustable |                        |           |           |
| Time Or Pulse Control                | Time Mode                                    |           | Time Mode                                         |           | Pulse Control           |                        |           |           |
| Lubrication Volume                   | 450 ml                                       |           |                                                   |           |                         |                        |           |           |
| Lubricating Medium                   | Oil Viscosities From 15 mm²/s To 1,000 mm2/s |           |                                                   |           |                         |                        |           |           |
| Temperature Range                    | -15 °C to +60°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                                |           |                                                   |           |                         |                        |           |           |
| Volume Per Stroke                    | 0.15 ml                                      |           |                                                   |           |                         |                        |           |           |
| Performance Monitoring               | Display with LED                             |           |                                                   |           |                         | -                      |           |           |
| Operation & Control                  | Directly On Device Or PLC                    |           |                                                   |           |                         | External Control / PLC |           |           |

\* Batteries are not included

## Components

Activation Magnet

Housing

Lubricant Reservoir

Retaining Ring

Drive Unit

Display

Outlets

M12x1 Connector

Activation Pad



## 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-sufficient 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<br>125/475 | Type<br>M | Type<br>MD125 | Type<br>MD400 | Material            |
|------------|---------------------------------------|-----------------|-----------|---------------|---------------|---------------------|
| 65 71 000  | Thread Adapter<br>M16x1.5 to G1/4"    |                 |           | ✓             |               | Stainless Steel     |
| 65 71 001  | Hose Adapter<br>R1/4" to Ø8 mm        | ✓               | ✓         |               |               | Brass Nickel-Plated |
| 65 71 003  | Reducer<br>G1/2" to G1/4"             | ✓               | ✓         |               |               | Brass Nickel-Plated |
| 65 71 041  | Reducer<br>G1/4" to M6                | ✓               | ✓         |               |               | Brass Nickel-Plated |
| 65 71 042  | Reducer<br>G1/4" to M8                | ✓               | ✓         |               |               | Brass Nickel-Plated |
| 65 71 043  | Reducer<br>G1/4" to M8x1              | ✓               | ✓         |               |               | Brass Nickel-Plated |
| 65 71 044  | Reducer<br>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<br>G1/4" to R1/4" | ✓               | ✓         | *             | *             | Brass Nickel-Plated |

\* Optionally available

## Brackets

| Order Code | Description      | Type<br>125/475 | Type<br>M | Type<br>MD125 | Type<br>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<br>125/475 | Type<br>M | Type<br>MD125 | Type<br>MD400 | Consisting Of                                   |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------|-----------|---------------|---------------|-------------------------------------------------|
| 65 91 020                           | Hose-connection set complete for connection to mounting shafts, Ø8/6 mm, length 2m , empty                        | ✓               | ✓         | —             | —             | PE-hose<br>AL-Ø8 to IG G1/4<br>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<br>AL-Ø8 to IG G1/4<br>AL-Ø8 to AG G1/4 |
| 65 71 014<br>65 71 016<br>65 71 962 | Hose-connection set complete for connection to mounting shafts, Ø6/4 mm, length 5m, empty                         | ✓               | —         | ✓             | —             | Fittings<br>PE-hose                             |
| 65 71 016<br>65 71 963              | Hose-connection set complete for connection to mounting shafts, Ø6/4 mm, length 10m, empty                        | —               | —         | —             | ✓             | Fitting<br>PE-hose                              |

### Batteries & Adapter

| Order Code | Description                                         | Type<br>125/475 | Type<br>M | Type<br>MD125 | Type<br>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<br>MD125 | Type<br>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, open 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 | ✓          | ✓          |

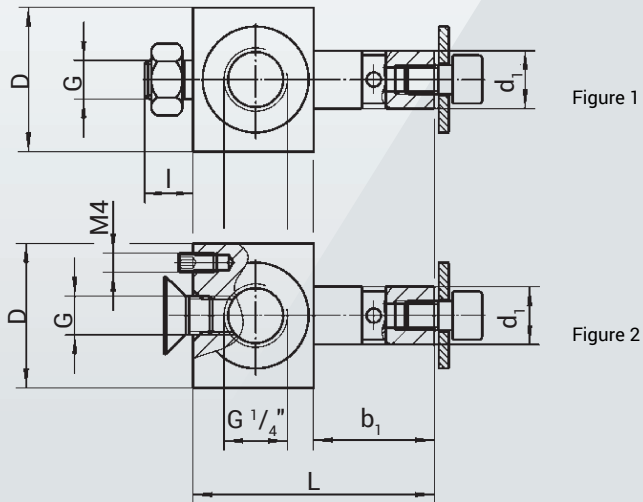
### Lubricants

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<br>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<br>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                                                                   |

## Mounting Shafts & Lubrication Gears

### Felt Gear Mounting Shafts



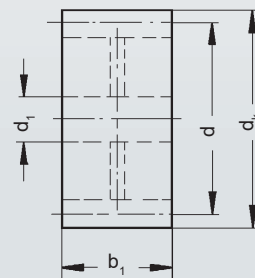
| Order Code | Figure | For Modules | D  | L   | I  | b <sub>1</sub> | d <sub>1</sub> | G   |  g |
|------------|--------|-------------|----|-----|----|----------------|----------------|-----|-----------------------------------------------------------------------------------------|
| 65 91 100  | 1      | 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                                                                                   |

## Mounting Shafts & Lubrication Gears

### Felt Lubrication Gears

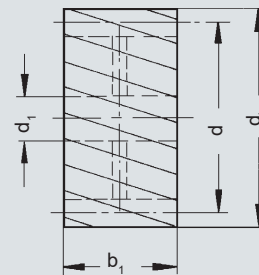
The lubricant passes through the axle and corresponding holes in the felt gear wheel. The felt used stores the lubricant and releases it again under low pressure in very small dosage quantities. Over-lubrication is avoided and wear is prevented.

| Order Code | Module | No. of Teeth | d     | d <sub>k</sub> | d <sub>1</sub> | b <sub>1</sub> |  |
|------------|--------|--------------|-------|----------------|----------------|----------------|-----------------------------------------------------------------------------------|
| 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                                                                             |



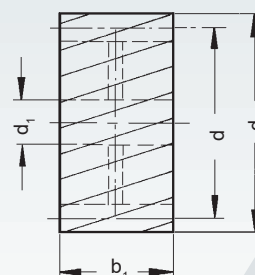
Straight-Tooth

| Order Code | Module | No. of Teeth | d     | d <sub>k</sub> | d <sub>1</sub> | b <sub>1</sub> |  |
|------------|--------|--------------|-------|----------------|----------------|----------------|-------------------------------------------------------------------------------------|
| 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

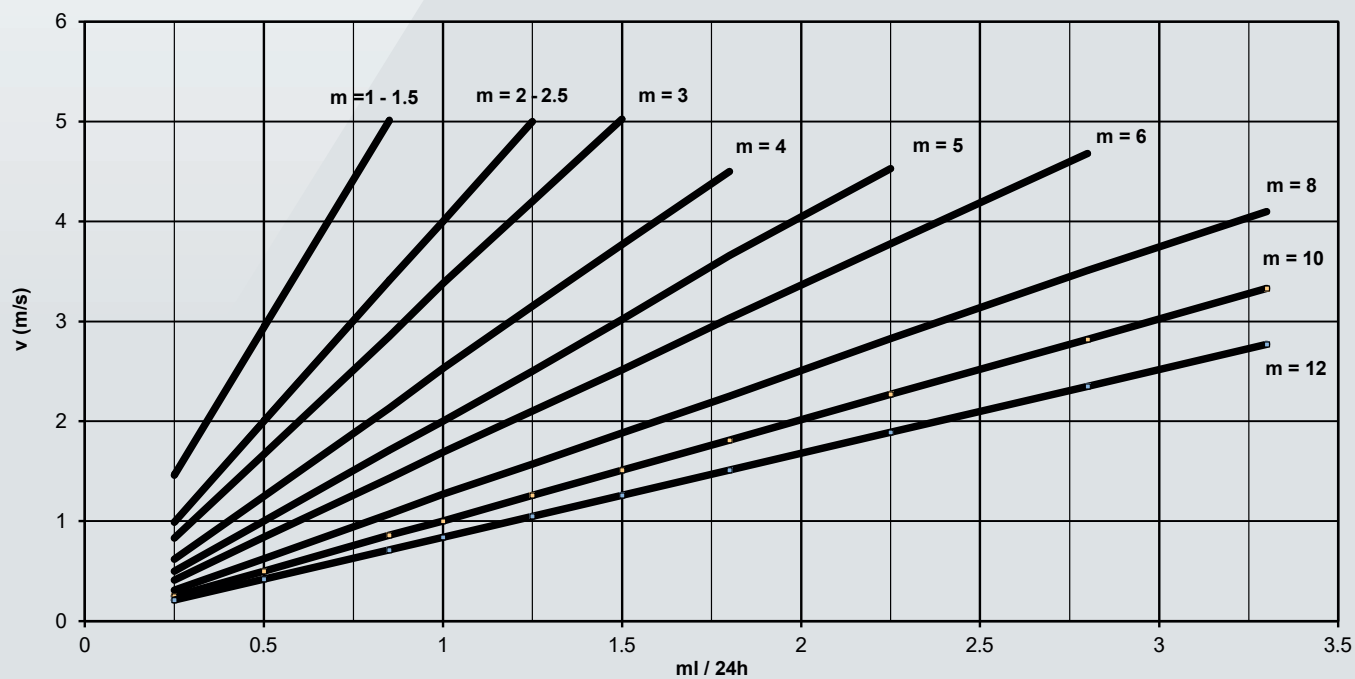
| Order Code | Module | No. of Teeth | d     | d <sub>k</sub> | d <sub>1</sub> | b <sub>1</sub> |  |
|------------|--------|--------------|-------|----------------|----------------|----------------|-------------------------------------------------------------------------------------|
| 65 91 106  | 1.5    | 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<br>(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<br>(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 |  |

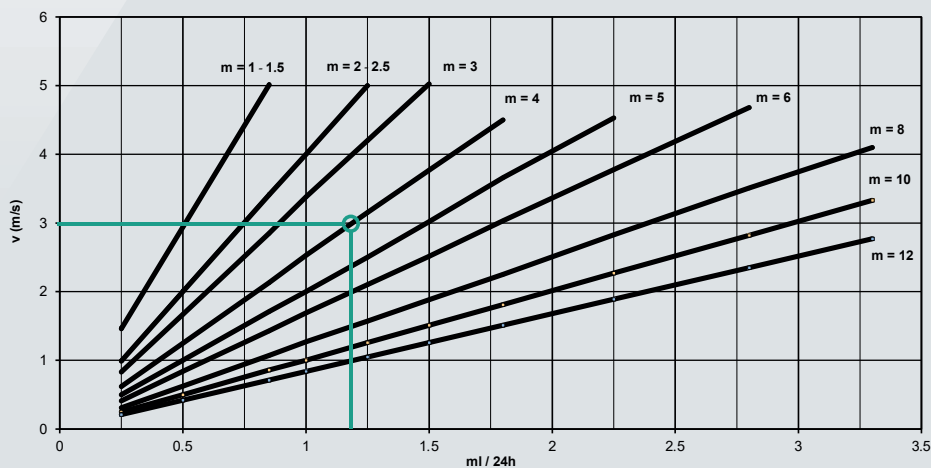
| Selection for MD400 Lubricators |          |                          |                   |  |
|---------------------------------|----------|--------------------------|-------------------|--|
| Lubricant / Day (ml)            |          | Lubricant per cycle (ml) | Selection         |  |
| MD125                           |          |                          |                   |  |
| 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:

$$- 1.20 \text{ ml/24h} / 0.16 \text{ ml} = 7.5 \text{ cycles/day, rounded up to 8 cycles/day}$$

Then you should calculate the cycles per day on the month:

$$- 0.16 \text{ ml} \times 8 \text{ cycles/day} \times 30 \text{ days} = 38.4 \text{ ml/month}$$

Now you can calculate the month setting:

$$- \text{Lubricant cartridge with } 125 \text{ ml} / 38.4 \text{ ml/month} = 3.2 \text{ month}$$

- 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:

$$- 24 \text{ hours} / 8 \text{ cycles/day} = \text{one cycle every 3 hours}$$

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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