

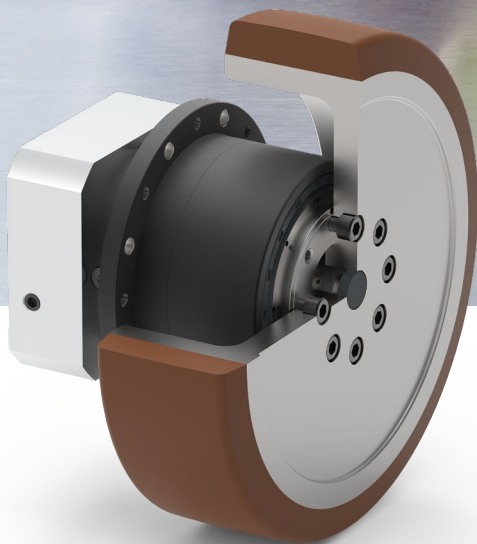


NGV

The planetary gearbox for AGVs.
Compact and highly resilient.

OUR GEARBOX
SOLUTIONS:
AS INDIVIDUAL
AS YOUR AGV.

- + Ideal for high radial loads
- + Extremely space-saving
- + Ease of installation
- + Available in single or multiple units
- + Best price-performance ratio



Whatever the demands that you make of your AGV drive: we can provide you with the ideal gearbox solution for your vehicle.



Every detail counts, so that a gearbox can fulfill application-specific requirements in an optimum way.

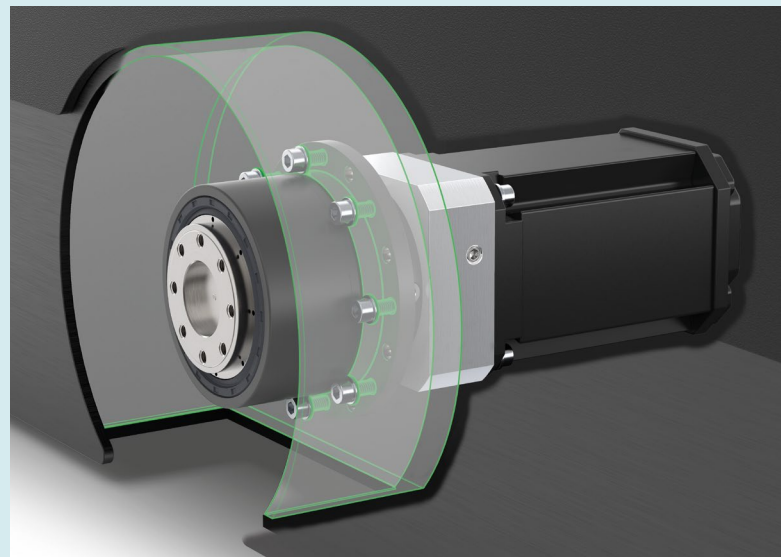
AGVs are designed to transport heavy loads on a continuous basis. The specific structural and mechanical demands are extremely high. However, we fulfill them in a reliable way with our NGV planetary gearboxes. Because the gearboxes impress with their compact design, efficiency and durability, and we have specifically optimized them for use in AGVs.

High efficiency is decisive as far as AGVs are concerned.

The more energy-efficiently an AGV operates, the longer its range will be. This is particularly relevant with battery-operated vehicles. And the higher the efficiency of the drive train, the smaller the energy store of the AGV can be. In this case the NGV gearbox excels thanks to its high-efficiency planetary gearbox concept.

Efficient management of heavy loads.

With AGVs the gearbox usually sits directly in the wheel. In other words, it supports the entire weight of the vehicle and the weight of the payload. When this occurs, extremely high axial loads are applied to the output bearing. In the case of the NGV bearing, it has been positioned so that it reliably withstands these loads. We also use pre-tensioned inclined roller bearings, which can withstand extremely high force levels. The advantage: the wheel does not have to be supported separately, since the bearings support the load directly.





Installation configuration of the NGV gearbox with wheel and motor

Big ideas, compact size.

From a structural point of view, AGVs do not have much room for gearboxes. It is therefore important for them to be very compact. With NGVs, specially developed wheels enclose the gearbox almost completely. In other words, the gearbox is basically outside the vehicle in the wheel, which saves space. If the structural length of the drive train is to be reduced even further, the gearbox can also be installed using so-called direct motor connection. In this case, the sun pinion is attached directly to the motor shaft, and the gearbox housing is bolted directly to the motor. The omission of the motor adapter plate means that the overall length can be reduced.

Ideal for installation.

Our engineers have also optimized the interface between the chassis and the gearbox. This means that the installation flange is so close to the chassis that the gearbox can be fitted there directly. The adapter and the additional bolted connections are not required. This also reduces the costs and the weight. For ease of installation, the gearbox is inserted directly from the inside through the chassis, and bolted on from there. The motor and the gearbox can be installed as a preassembled unit. When doing this, the diameter of the motor can also be significantly bigger than that of the gearbox itself.

Fits any motor.

Having a wide range of adapters makes it possible to attach the NGV gearbox to almost any motor. The advantage for you: you can use motors and controllers that are optimum for your application, because Neugart provides its solutions as a manufacturer that makes only gearboxes, independent of the motor and the controller, available in single or multiple units.

NGV The planetary gearbox for AGVs.

NGV: The perfect gearbox for AGVs.

+ Direct mounting

The mounting interface allows direct mounting of the gearbox to the vehicle. No additional adapters are required.

+ Reduction of installation space

The gearbox is almost completely enclosed by the wheel. The required installation space in the vehicle is therefore reduced to a minimum.

+ High load capacity

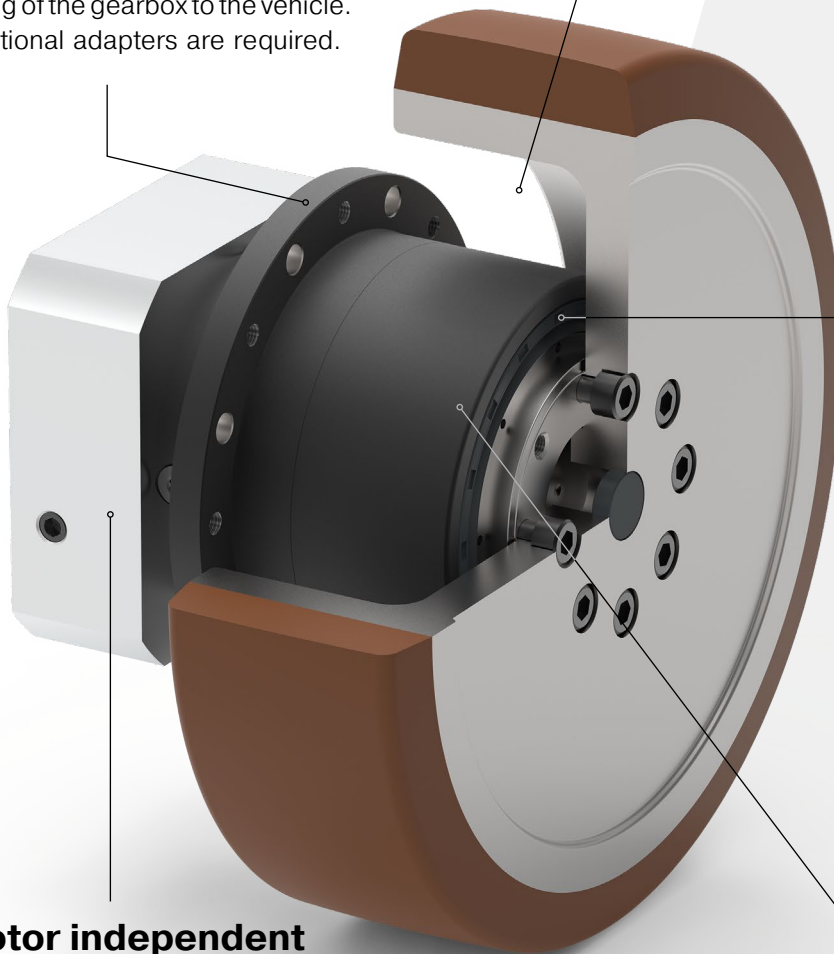
The preloaded, double-designed angular contact roller bearings permit very high radial forces.

+ Motor independent

By using different motor adapters it is possible to mount almost any motor. Direct mounting of the motor is also possible.

+ High efficiency and reliability

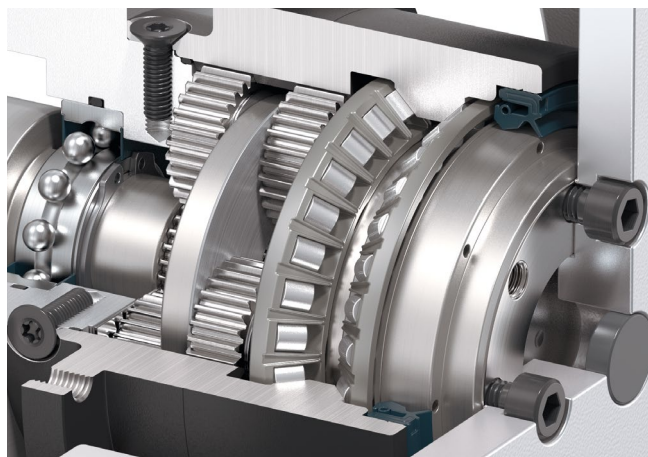
The proven gearbox type from the Neugart Economy series is characterized by a high efficiency. Thanks to its lifetime lubrication, it is also maintenance-free and extremely reliable, even in continuous operation.



We supply the NGV gearbox in three sizes, with maximum support loads from 350 kg to 1075 kg per gearbox. For each gearbox size there is a specially developed heavy-duty wheel with a diameter of 160 mm, 200 mm or 250 mm. Maximum speeds of up to 2 m/s (7.2 km/h) are possible.

+ High load capacity:

Angular contact roller bearing with optimized load application point.



+ Reliability:

Thanks to lifetime lubrication, the NGV gearbox is maintenance-free.

+ Efficient and effective:

The 2-stage planetary gearboxes originate from our economy model series, which has been proving itself for decades. This combines the best efficiency, a long service life and high precision of ≤ 12 arcmin with an outstanding price/performance ratio.

+ Resistance to water and soiling:

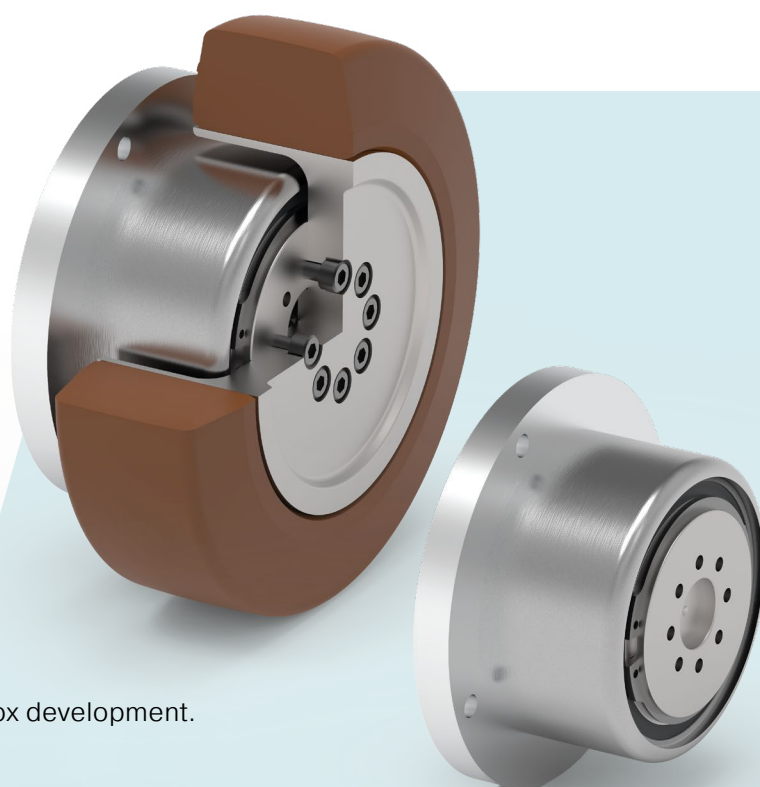
The NGV gearbox is equipped with a special radial shaft seal, and provides IP65 protection class at the output side.

+ Ease of installation:

The gearbox can be fitted directly to the chassis of the vehicle without an adapter. This makes pre-assembly of the motor outside the vehicle possible, and the design of the motor is independently selectable.

Customer-specific AGV gearbox solutions.

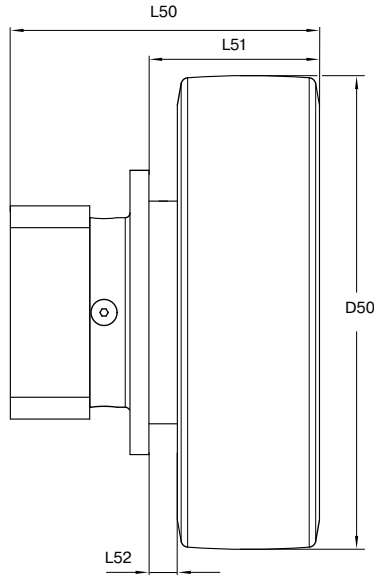
Because of the comprehensive engineering and manufacturing know-how, Neugart is your competent partner for the development and manufacture of customized gearboxes. Also for your vehicle.



Example of a custom gearbox development.

NGV gearbox incl. wheel Technical data and dimensions

| Characteristics (gearbox incl. wheel) | | | NGV064 | NGV090 | NGV110 |
|----------------------------------------------|---|-----------------------|-------------|-------------|-------------|
| Maximum dynamic load capacity ⁽¹⁾ | | kg (lb _m) | 350 (772) | 675 (1488) | 1075 (2370) |
| Max. speed | v | m/s (in/s) | 2 (78.7) | | |
| Positioning precision | | mm (in) | 0.3 (0.012) | 0.4 (0.016) | 0.4 (0.016) |
| Total weight | | kg (lb) | 3.9 (8.6) | 7.7 (17.0) | 16.4 (36.2) |



| Geometry | | | NGV064 | NGV090 | NGV110 |
|----------------------------------------|-----|---------|--------------|---------------|--------------|
| Wheel diameter | D50 | mm (in) | 160 (6.299) | 200 (7.874) | 250 (9.843) |
| Min. total length | L50 | | 98.5 (3.878) | 130.5 (5.138) | 158.0 (6.22) |
| Distance between flange and outer edge | L51 | | 58.0 (2.283) | 72.0 (2.835) | 94.0 (3.701) |
| Distance between flange and inner edge | L52 | | 8.0 (0.315) | 12.0 (0.472) | 14.0 (0.551) |

NGV gearbox Technical data

| Gearbox characteristics | | | NGV064 | NGV090 | NGV110 |
|----------------------------------------------------------------------|-----------|-------------------------------------------|---------------------------------------------------------|----------------------------|----------------------------|
| Ratios | i | | 9; 12; 15; 16; 20; 25; 32; 40; 64 | | |
| Service life (L_{10h}) | t_L | h | 30,000 | | |
| Efficiency at full load ⁽²⁾ | η | % | ≥ 95 | | |
| Min. operating temperature | T_{min} | °C (°F) | -25 (-13) | | |
| Max. operating temperature | T_{max} | | 90 (194) | | |
| Protection class | | | IP65 (at the output side) | | |
| Standard lubrication | | | Grease (lifetime lubrication) | | |
| Food grade lubrication | | | Grease (lifetime lubrication) | | |
| Low temperature lubrication ⁽³⁾ | | | Grease (lifetime lubrication) | | |
| Installation position | | | any | | |
| Standard backlash | j_t | arcmin | ≤ 12 | ≤ 9 | ≤ 9 |
| Torsional stiffness ⁽²⁾ | C_g | Nm/arcmin (lb _i .in/arcmin) | 7.3 - 11.5 (65 - 102) | 19.5 - 38.5 (173 - 341) | 52 - 95 (460 - 841) |
| Gearbox weight ⁽²⁾ | m_G | kg (lb _m) | 1,6 - 1,7 (3.6 - 3.7) | 4,0 (8.8) | 8,5 - 8,7 (18.8 - 19.2) |
| Standard surface | | | Housing: Steel – heat-treated and post-oxidized (black) | | |
| Running noise ⁽⁴⁾ | Q_g | dB(A) | 60 | 62 | 65 |
| Max. bending moment based on the gearbox input flange ⁽⁵⁾ | M_b | Nm (lb _i .in) | 8 (71) | 16 (142) | 40 (354) |

⁽¹⁾ Max. load capacity of NGV gearbox with NGV wheel and dynamic load with nominal torque (T2N). Application-specific design with NCP required. With $F_a=0$

⁽²⁾ The ratio-dependent values can be retrieved in Tec Data Finder – www.neugart.com

⁽³⁾ $T_{min} = -40^\circ\text{C}$. Optimal operating temperature max. 50°C

⁽⁴⁾ Sound pressure level from 1 m, measured on input running at $n_i=3000$ rpm no load; $i=25$

⁽⁵⁾ Max. motor weight* in kg = $0.2 \times M_b / \text{motor length in m}$

* with symmetrically distributed motor weight

* with horizontal and stationary mounting

| Output torques | | | NGV064 | NGV090 | NGV110 | i ⁽¹⁾ |
|--------------------------------------|-------------------|-----------------------------|----------|------------|------------|------------------|
| Nominal output torque ⁽²⁾ | T _{2N} | Nm (lb _r .in) | 44 (389) | 130 (1151) | 210 (1859) | 9 |
| | | | 44 (389) | 120 (1062) | 260 (2301) | 12 |
| | | | 44 (389) | 110 (974) | 230 (2036) | 15 |
| | | | 44 (389) | 120 (1062) | 260 (2301) | 16 |
| | | | 44 (389) | 120 (1062) | 260 (2301) | 20 |
| | | | 40 (354) | 110 (974) | 230 (2036) | 25 |
| | | | 44 (389) | 120 (1062) | 260 (2301) | 32 |
| | | | 40 (354) | 110 (974) | 230 (2036) | 40 |
| | | | 18 (159) | 50 (443) | 120 (1062) | 64 |
| Max. output torque ⁽²⁾ | T _{2max} | Nm (lb _r .in) | 70 (620) | 208 (1841) | 384 (3399) | 9 |
| | | | 70 (620) | 192 (1699) | 416 (3682) | 12 |
| | | | 70 (620) | 176 (1558) | 368 (3257) | 15 |
| | | | 70 (620) | 192 (1699) | 416 (3682) | 16 |
| | | | 70 (620) | 192 (1699) | 416 (3682) | 20 |
| | | | 64 (566) | 176 (1558) | 368 (3257) | 25 |
| | | | 70 (620) | 192 (1699) | 416 (3682) | 32 |
| | | | 64 (566) | 176 (1558) | 368 (3257) | 40 |
| 29 (257) | 80 (708) | 192 (1699) | 64 | | | |

| Output torques | | | NGV064 | NGV090 | NGV110 |
|-----------------------------------------|--------------------|-----------------------------|---------------------|-------------------------|-------------------------|
| Emergency stop torque ⁽³⁾⁽⁴⁾ | T _{2Stop} | Nm (lb _r .in) | 80 - 88 (708 - 779) | 190 - 260 (1682 - 2301) | 380 - 500 (3363 - 4425) |

| Input speeds | | | NGV064 | NGV090 | NGV110 |
|----------------------------------------------------------------------|---------------------|-----|--------|--------|-------------|
| Average thermal input speed at T _{2N} and S1 ⁽²⁾ | n _{1N} | rpm | 4500 | 4000 | 3300 - 3500 |
| Max. mechanical input speed ⁽²⁾ | n _{1Limit} | | 7500 | 7000 | 6500 |

| Output shaft loads | | | NGV064 | NGV090 | NGV110 |
|-----------------------------------------------|-------------------------|-----------------------------|------------|-------------|-------------|
| Radial force for 20,000 h ⁽⁵⁾⁽⁶⁾ | F _{r 20.000 h} | N (lb _f) | 2300 (517) | 4100 (922) | 5150 (1158) |
| Axial force for 20,000 h ⁽⁵⁾⁽⁶⁾ | F _{a 20.000 h} | | 2850 (641) | 5450 (1225) | 6450 (1450) |
| Radial force for 30,000 h ⁽⁵⁾⁽⁶⁾ | F _{r 30.000 h} | | 2000 (450) | 3650 (821) | 4550 (1023) |
| Axial force for 30,000 h ⁽⁵⁾⁽⁶⁾ | F _{a 30.000 h} | | 2500 (562) | 4800 (1079) | 5600 (1259) |
| Maximum radial force ⁽⁶⁾⁽⁷⁾ | F _{r Stat} | | 2700 (607) | 4950 (1113) | 7200 (1618) |
| Maximum axial force ⁽⁶⁾⁽⁷⁾ | F _{a Stat} | | 2850 (641) | 5450 (1225) | 6450 (1450) |
| Tilting moment for 20,000 h ⁽⁵⁾⁽⁷⁾ | M _{k 20.000 h} | Nm (lb _r .in) | 110 (25) | 278 (62) | 407 (91) |
| Tilting moment for 30,000 h ⁽⁵⁾⁽⁷⁾ | M _{k 30.000 h} | | 96 (22) | 248 (56) | 360 (81) |

| Moment of inertia | | | NGV064 | NGV090 | NGV110 |
|---------------------------------------|---|-----------------------------------------------------------------------------|----------------------------------|----------------------------------|------------------------------------|
| Mass moment of inertia ⁽³⁾ | J | kgcm ² (lb _r .in.s ² 10 ⁻⁴) | 0.066 - 0.132 (0.939 - 1.877) | 0.367 - 0.667 (5.220 - 9.487) | 1.416 - 2.432 (20.140 - 34.591) |

⁽¹⁾ Ratios (i=n₁/n₂)

⁽²⁾ Ratio-dependent. Application-specific speed configurations with NCP – www.neugart.com.

⁽³⁾ The ratio-dependent values can be retrieved in Tec Data Finder – www.neugart.com

⁽⁴⁾ Permitted 1000 times

⁽⁵⁾ These values are based on an output shaft speed of n₂=100 rpm

⁽⁶⁾ Based on the end of the output shaft

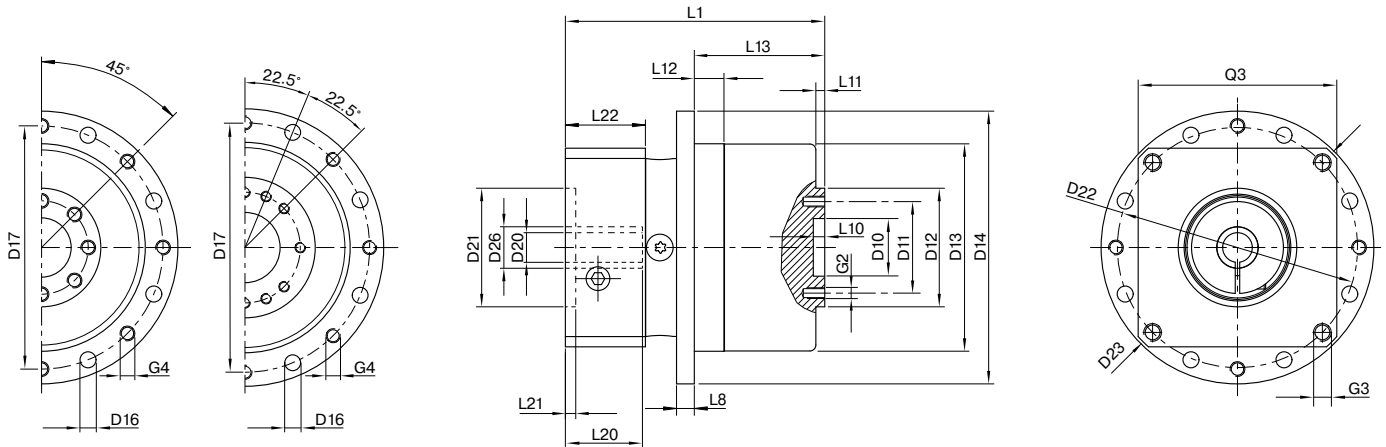
⁽⁷⁾ Other (sometimes higher) values following changes to T_{2N}, F_r, F_a, cycle, and service life of bearing. Application specific configuration with NCP – www.neugart.com

NGV gearbox Dimensions



NGV064
NGV090

NGV110



| Geometry ⁽¹⁾ | | | NGV064 | NGV090 | NGV110 |
|-------------------------------------|-----|----|----------------------------|----------------------------|--------------------------|
| Centering diameter output shaft | D10 | H7 | 20 (0.787) | 31.5 (1.240) | 40 (1.575) |
| Pitch circle diameter output shaft | D11 | | 31.5 (1.240) | 50 (1.969) | 63 (2.480) |
| Centering diameter output shaft | D12 | h7 | 40 (1.575) | 63 (2.480) | 80 (3.150) |
| Centering diameter output flange | D13 | h9 | 70 (2.756) | 94 (3.701) | 120 (4.724) |
| Flange diameter output | D14 | h9 | 92 (3.622) | 120 (4.724) | 158 (6.220) |
| Mounting bore output | D16 | | Ø 5.4 8x45° (Ø 0.21 8x45°) | Ø 6.6 8x45° (Ø 0.26 8x45°) | Ø 9 8x45° (Ø 0.35 8x45°) |
| Pitch circle diameter output flange | D17 | | 82 (3.328) | 108 (4.252) | 142 (5.591) |
| Min. total length | L1 | | 84.5 (3.327) | 118 (4.646) | 144 (5.669) |
| Flange thickness output | L8 | | 6 (0.236) | 8 (0.315) | 10 (0.394) |
| Centering depth output shaft | L10 | | 4 (0.157) | 6 (0.236) | 6 (0.236) |
| | L11 | | 3 (0.118) | 6 (0.236) | 6.5 (0.256) |
| Centering depth output flange | L12 | | 10 (0.394) | 15 (0.591) | 21 (0.827) |
| Output flange length | L13 | | 44 (1.732) | 59.5 (2.343) | 80 (3.150) |
| Clamping system diameter input | D26 | | 11 (0.433) | 19 (0.748) | 24 (0.945) |
| | | | 14 (0.551) | 24 (0.945) | 35 (1.378) |
| | | | 19 (0.748) | - | - |
| Motor shaft diameter j6/k6* | D20 | | 5 - 19 (0.197 - 0.748) | 8 - 24 (0.315 - 0.945) | 11 - 35 (0.433 - 1.378) |
| Permissible motor shaft length | L20 | | | | |
| Centering diameter input | D21 | | | | |
| Centering depth input | L21 | | | | |
| Pitch circle diameter input | D22 | | | | |
| Motor flange length | L22 | | | | |
| Diagonal dimension input | D23 | | | | |
| Mounting thread x depth | G3 | 4x | | | |
| Flange cross section input | Q3 | ■ | | | |
| Number x thread x depth | G2 | | 8 x M5x7 (8 x M5x0.27) | 8 x M6x10 (8 x M6x0.39) | 12 x M6x12 (8 x M6x0.47) |
| Number x thread | G4 | | 8 x M5 | 8 x M6 | 8 x M8 |

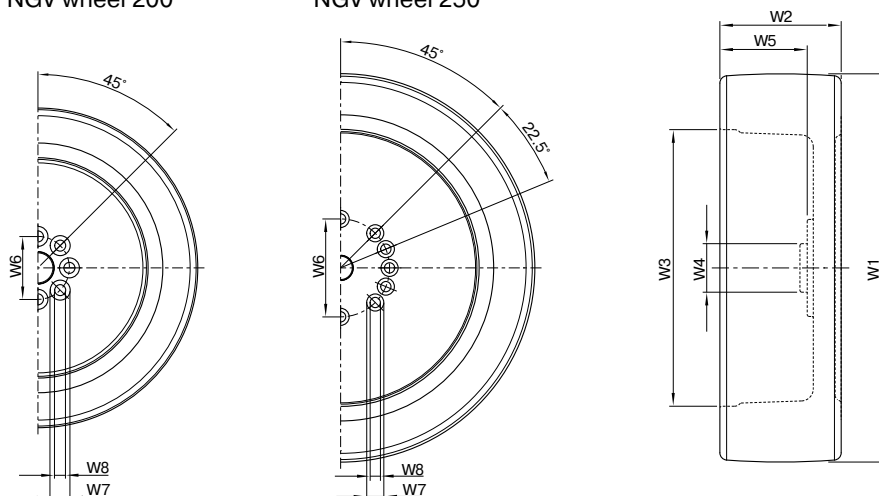
*The dimensions vary with the motor/gearbox flange. The input flange dimensions can be retrieved for each specific motor in Tec Data Finder at www.neugart.com

⁽¹⁾ Dimensions in mm

NGV wheel Dimensions

NGV wheel 160
NGV wheel 200

NGV wheel 250



| Geometry NGV wheel ⁽¹⁾ | | | NGV wheel 160 | NGV wheel 200 | NGV wheel 250 |
|----------------------------------------|-----|-----|---------------------------|----------------------------|---------------------------|
| Outer diameter of wheel | W 1 | | 160 ± 1,2 (6.299 ± 0.047) | 200 ± 1,2 (7.874 ± 0.047) | 250 ± 1,2 (9.843 ± 0.047) |
| Width of wheel | W 2 | | 50 ± 0,5 (1.969 ± 0.020) | 60 ± 0,5 (2.362 ± 0.020) | 80 ± 0,5 (3.150 ± 0.020) |
| Inner diameter of rim | W 3 | | 114 (4.488) | 155 (6.102) | 183 (7.205) |
| Centering outside diameter | W 4 | h7 | 20 (0.787) | 31.5 (1.240) | 40 (1.575) |
| Rim depth | W 5 | | 36 ± 0,2 (1.417 ± 0.008) | 47.5 ± 0,2 (1.870 ± 0.008) | 66 ± 0,2 (2.598 ± 0.008) |
| Screw connection pitch circle diameter | W 6 | | 31.5 (1.240) | 50 (1.969) | 63 (2.480) |
| Screw connection head diameter | W 7 | H13 | 8 x Ø 10 (8 x Ø 0.394) | 8 x Ø 11 (8 x Ø 0.433) | 12 x Ø 11 (12 x Ø 0.472) |
| Screw connection diameter | W 8 | H13 | 8 x Ø 5.5 (8 x Ø 0.217) | 8 x Ø 6.6 (8 x Ø 0.260) | 12 x Ø 6.6 (12 x Ø 0.260) |

Scope of delivery: NGV wheel incl. screws and closure cap

NGV wheel Technical data

| Characteristics NGV wheel | | | NGV wheel 160 | NGV wheel 200 | NGV wheel 250 |
|----------------------------------------------------------------|----------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|
| Specifications of wheel manufacturer Blickle | | | | | |
| Weight | | kg (lb _m) | ca. 2.3 (5.1) | ca. 3.7 (8.2) | ca. 7.6 (16.8) |
| Mass inertia | J _R | kgcm ² (lb _r .in.s ² 10 ⁻⁴) | 74 (16.636) | 203 (45.636) | 644 (144.777) |
| Roll resistance ⁽²⁾ | | N (lb _r) | 65 (14.6) | 95 (21.4) | 165 (37.1) |
| Friction coefficient (static friction) ⁽³⁾ | μ | | > 0.25 | | |
| Floor protection (corresponds to surface pressure of wheel) | | N/mm ² (lb _r /in ²) | 8.0 (113.786) | | |
| Temperature range | | | -30°C (-22°F) to +70°C (+158°F), up to +90°C (+194°F) for short periods. The load-bearing capacity is reduced at ambient temperatures higher than +40°C (+104°F). | | |
| Tread | | | Blickle Besthane® | | |
| Tread color | | | Brown | | |
| Tread hardness | | | 92° Shore A | | |
| Wheel unit | | | Gray cast iron | | |
| Wheel unit color | | | Silver | | |
| Corrosion protection | | | Wheel unit, painted | | |
| Tread characteristics (according to tread manufacturer) | | | Low-noise operation, extremely low rolling resistance, high dynamic loading capability, floor protecting, extremely abrasion resistant, high degree of cutting and tear resistance, traceless, contact coloration-free. | | |

⁽¹⁾ Dimensions in mm

⁽²⁾ Empirical values. At 4 km/h and with maximum load.

⁽³⁾ Friction coefficient depending on subsurface. Specification μ=0.25 with NGV wheel on ground, dry steel rail.



Do you have any questions or need further information?

We are happy to advise you on all topics relating to drive technology.

You can find your personal contact at: www.neugart.com

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