

Worm gear sets.

Catalogue worm gear sets and customised worm gear sets.



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Advanced production methods combined with years of experience in manufacturing gears and providing customers with sound advice have made Framo Morat's worm gear sets a byword for quality. In recent decades Framo Morat worm gear sets have won appreciable market shares both in Germany and abroad. Besides our catalogue worm gear sets (made to the Framo Morat standard), which we keep in stock in moderate quantities, we also manufacture customised worm gear sets in compliance with customer specifications. Our catalogue worm gear sets are generally available in a wide range of centre distances and transmission ratios directly from stock. Our factory can calculate and manufacture centre distances and transmission ratios deviating from the Framo Morat standard, although it will not always be possible to use available gear cutting tools.

The worm gear sets are usually right-handed but can be produced left-handed on request. Depending on the transmission ratio, tooling will have to be procured first.

Pressure Angle

Due to the manufacturing process, the teeth have a K flank shape. The pressure angle is generally 15° and therefore deviates from the DIN standard of 20°. A pressure angle of 15° allows more favourable radial force component conditions. This reduces the bending stress of the worm shaft and the pushing away of the associated worm gear, reducing the noise and increasing the service life. The efficiency differences due to the modification of the pressure angle are negligible.

Metric conversion table

Our standard worm gear sets are primarily designed in metric scales. The catalog data can be converted into 'English measures' by using the following conversion table:

| Metric units | Factor | English units |
|---------------|-----------|---------------|
| Torque (Nm) | x 8.85 | in.lb. |
| Distance (mm) | x 0.03937 | in. |

ISO-tolerances

The worm gear drawings show ISO-tolerances like $\text{Ø}32^{\text{H7}}$. If you are not familiar with ISO-tolerances please call Framo Morat or the local distributor to get the precise dimensions.

Construction materials

Worms made of steel

The worms are made of case hardened steel with ground bore and worm profile.

Brass worm gears

The worm gears are made of a special alloy (copper-zinc alloy with additives of aluminum, silicon and manganese). It is treated for better sliding characteristics. The chemical resistance is very high due to aluminum additives.

Brass worm gears have good corrosion resistance, high strength, good sliding properties and high wear resistance.

Note:

The lead content in worms and worm gears made of brass is ≤ 0.1 percent by weight.

Plastic worm gears

Plastic worm gears are suitable for low sliding speeds (< 1.5 m/s) and medium tooth pressure due to their bad thermal conductivity. Worms have to be hardened and ground.

The thermal expansion coefficient is appr. 4 times higher than with brass. Therefore the backlash shouldn't be too small.

Bronze worm gears

Cu Sn 12 DIN EN 1982

Comparatively soft material with good wear resistance, suitable for high sliding speeds.

Cu Sn 12 Ni DIN EN 1982

Comparatively soft material with very good wear resistance, suitable for very high sliding speeds.

CuAl10Fe5Ni5 DIN EN 1982

Comparatively hard material for high torque and low speed.

Cast iron worm wheels

EN-GJS-400-15 DIN EN 1563 / EN-GJL-250 DIN EN 1561

Only suitable for low planing speeds.

Torque factor

The catalog torque ratings are based on 2,800 rpm worm speed. The following table shows the torque factors for different worm speeds:

| | | | | | | | |
|--------------|----------|----------|---------|---------|---------|---------|---------|
| n_1 | 2800 rpm | 1400 rpm | 950 rpm | 700 rpm | 500 rpm | 250 rpm | 125 rpm |
| factor n_1 | 1 | 1,12 | 1,2 | 1,26 | 1,33 | 1,49 | 1,67 |

Lifetime factor

The catalog torque ratings are based on 3000 hours expected lifetime. The following table shows the torque ratings for different lifetimes:

| | | | |
|--------------|--------------|--------------|--------------|
| life time | appr. 3000 h | appr. 1500 h | appr. 6000 h |
| factor L_h | 1 | 1,4 | 0,71 |

1. Calculation example (without consideration of the operating conditions)

worm gear set A40 U35, lubrication with mineral oil,
worm speed 700 min⁻¹, life time 1500 h

Question: What's the expected maximum torque?

$$\begin{aligned} \text{Output torque:} &= T_2 (\text{Mineral oil}) \times n_1 (\text{Factor}) \times L_h (\text{Factor}) \\ &= 37,2 \text{ Nm} \times 1,26 \times 1,4 \\ &= 65,6 \text{ Nm} \end{aligned}$$

T_2 see tables from page 7

Attention! The torque is limited by the tooth strength of the gear. The tooth strength is reached at approx. 300% of the catalog specification for synthetic oil (T SO). 2 EXAMPLE: Breaking point for A40 U35 = 46,5 Nm x 3 = 139,5 Nm.

Application factors

Due to the wide range of applications the following factors are recommendations which enable the customer to choose the correct configuration. The case temperature shouldn't exceed 80°C.

| | | | |
|--------------------|------|----------|-------|
| shocks | none | moderate | heavy |
| shock factor f_1 | 1 | 1,2 | 1,5 |

| | | | |
|--------------------|------|------|-------|
| No. of starts | 10/h | 60/h | 360/h |
| start factor f_2 | 1 | 1,1 | 1,2 |

| | | | |
|-------------------------|-------|-------|--------|
| duty cycle | <40 % | <70 % | <100 % |
| duty cycle factor f_3 | 1 | 1,15 | 1,3 |

2. Calculation example (with consideration of the operating conditions)

worm gear set A40 Ü35; $T_2 = 65,6 \text{ Nm}$ (see above), but with the following operating conditions:

- heavy shocks
- 360 starts / h
- 100 % duty cycle

$$\begin{aligned} \text{Output torque} &= \frac{T_2}{f_1 \times f_2 \times f_3} \\ &= \frac{65,6 \text{ Nm}}{1,5 \times 1,2 \times 1,3} \\ &= 28 \text{ Nm} \end{aligned}$$

The relationship between life time, speed and torque can be calculated by these simplified formulas

Calculation of the life time ($L_{h \text{ neu}}$) with given torque ($T_{2 \text{ neu}}$)

$$L_{h \text{ neu}} = \left(\frac{T_{2 \text{ Nenn}} \times \text{Factor } n_1}{T_{2 \text{ neu}}} \right)^2 \times L_{h \text{ Nenn}}$$

$T_{2 \text{ Nenn}}$ = Output torque (catalog specification)
 $L_{h \text{ Nenn}}$ = Life time (catalog specification ca. 3000 h)

Calculation of the torque ($T_{2 \text{ neu}}$) with given life time ($L_{h \text{ neu}}$)

$$T_{2 \text{ neu}} = \frac{T_{2 \text{ Nenn}} \times \text{Factor } n_1}{\sqrt{\frac{L_{h \text{ neu}}}{L_{h \text{ Nenn}}}}}$$

Self locking

Self-locking is affected by lead angle, surface quality, running speed, lubrication and temperature. A distinction must be made between dynamic (from motion) and static (standstill) self-locking.

Dynamic self locking: lead angle up to 3° with grease lubrication; lead angle up to 2,5° with synthetic oil lubrication.

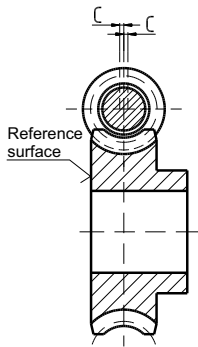
Static self locking: lead angle from 3° up to 5° with grease lubrication; lead angle from 2,5° up to 4,5° with synthetic oil lubrication.

Lead angles above 4,5° or 5° are not self locking.

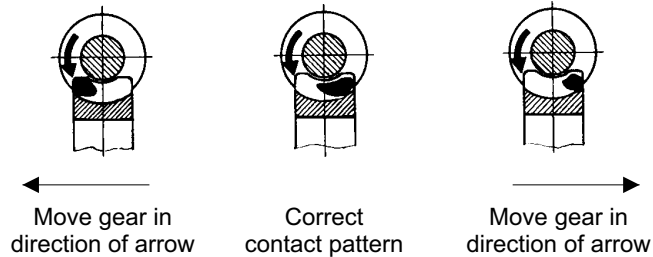
Shocks or vibrations can neutralize self-locking.

A number of factors associated with lubrication, running speed and loading can favour slip characteristics to such an extent that self-locking is counteracted. Therefore it is impossible for us to accept warranty obligations in respect to self-locking.

Mounting of the worm gear



Use the reference surface for lateral adjustment. The lateral tolerance "c" must not exceed 0,15 mm regardless of the center distance.



The contact pattern shows installation errors. The contact pattern should tend to the outgoing side. In case of reversing operation the contact pattern should tend to the center of the worm gear.

Efficiency

Generally efficiency depends on the following conditions:

- lead angle of the worm,
- running speed,
- lubrication,
- surface quality,
- mounting conditions.

The efficiency increases with growing center distance. The use of plain bearings with high coefficients of friction may affect the overall efficiency. The stated efficiency values apply for optimum mounting conditions.

Starting efficiency

The lubricating film between the flanks is not formed until the gear is running. That is the reason for a lower starting efficiency (approx. 30% below running efficiency).

Efficiency with driving worm gear

The efficiency with driving worm gear is smaller than with driving worm. The following formula can be used:

$$\eta' = 2 - \frac{1}{\eta}$$

with: η' => efficiency with driving worm gear
 η => efficiency with driving worm (specified in catalog)

if η' is negative, self locking is likely.

Customer-Specific Worm Gear Sets

Customised worm gear sets can be manufactured in compliance with customer specifications in various versions and materials.

Framo Morat supplies customised worm gear sets in a centre distance range from 17 to 125 mm, with a max. worm gear diameter of 200 mm. If necessary, Framo Morat calculates the toothing data, defines the materials and surface treatment, and provides advice for lubrication and torque loads.

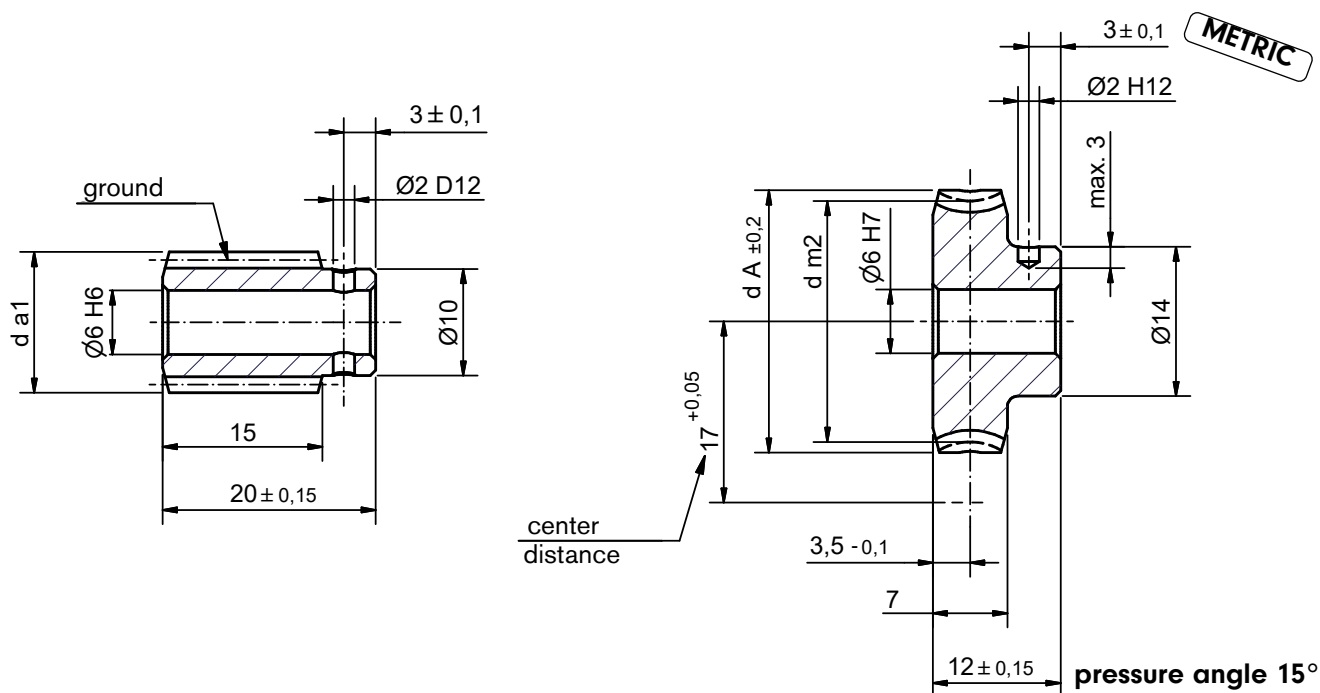
We use to that purpose a calculation programme based on the DIN standard. Framo Morat's vast experience gained all along 60 years of worm gear sets production has shown that, especially in the case of short delivery times and small quantities, our customer mainly opt for existing gear cutting tools. The production method must then be examined on a case-by-case basis.

Crossed helical gears

Crossed helical gears are nothing but a spur gear, which helix angle meets the lead angle of the worm. The gliding surface is only a point. The result is reduced torque or reduced life time compared with conventional worm gear sets.

Subject to technical changes

A17 (17 mm center distance)



i = gear ratio

γ_m = lead angle m

m = module

z_1 = number of threads (worm)

d_{m1} = pitch diameter (worm)

d_{a1} = tip diameter (worm)

z_2 = No. of teeth (worm gear)

d_{m2} = pitch diameter (worm gear)

d_A = max. diameter (worm gear)

T_2 = output torque

MG = mineral grease

MO = mineral oil / synthetic grease

SO = synthetic oil

| Catalog | i | γ_m | m | z_1 | worm | | wormgear | | | T_2 [Nm]No. | | | Phe- nolic |
|---------|------|------------|------|-------|----------|----------|----------|----------|-------|---------------|-------------|-----|---------------|
| | | | | | d_{m1} | d_{a1} | z_2 | d_{m2} | d_A | MF | Brass MO | SO | |
| A17U2* | 2,25 | 48°15' | 0,9 | 8 | 10,15 | 11,95 | 18 | 23,85 | 25,63 | 1,1 | 1,3 | 1,6 | 0,4 |
| A17U4 | 4,5 | 21°50' | 0,75 | 6 | 12,1 | 13,6 | 27 | 21,9 | 24,6 | 1,7 | 2,0 | 2,6 | 0,7 |
| A17U5 | 5 | 21°37' | 0,7 | 6 | 11,4 | 12,8 | 30 | 22,6 | 24,6 | 1,8 | 2,2 | 2,7 | 0,7 |
| A17U7 | 7 | 14°4' | 1 | 3 | 12,34 | 14,34 | 21 | 21,66 | 24,6 | 1,6 | 1,9 | 2,4 | 0,6 |
| A17U9 | 9 | 9°40' | 0,75 | 3 | 13,4 | 14,9 | 27 | 20,6 | 22,7 | 1,5 | 1,8 | 2,2 | 0,6 |
| A17U10 | 10 | 11°48' | 0,75 | 3 | 11,0 | 12,5 | 30 | 23,0 | 24,6 | 1,9 | 2,3 | 2,8 | 0,8 |
| A17U15 | 15 | 7°38' | 0,75 | 2 | 11,3 | 12,8 | 30 | 22,7 | 24,6 | 1,9 | 2,3 | 2,8 | 0,8 |
| A17U25 | 25 | 4°32' | 0,9 | 1 | 11,4 | 13,2 | 25 | 22,6 | 24,6 | 1,8 | 2,2 | 2,7 | 0,7 |
| A17U30 | 30 | 3°45' | 0,75 | 1 | 11,45 | 12,95 | 30 | 22,55 | 24,6 | 1,9 | 2,3 | 2,8 | 0,8 |
| A17U40 | 40 | 2°3' | 0,5 | 1 | 13,98 | 14,98 | 40 | 20,02 | 21,6 | 1,4 | 1,7 | 2,1 | 0,6 |
| A17U50 | 50 | 3°12' | 0,5 | 1 | 8,95 | 9,95 | 50 | 25,05 | 27,2 | 1,0 | 1,2 | 1,5 | 0,4 |
| A17U60 | 60 | 2°18' | 0,4 | 1 | 9,95 | 10,75 | 60 | 24,05 | 26,0 | 1,6 | 1,9 | 2,4 | 0,6 |
| A17U75 | 75 | 1°28' | 0,3 | 1 | 11,74 | 12,34 | 75 | 22,26 | 24,6 | 1,5 | 1,8 | 2,2 | 0,5 |
| A17U80 | 80 | 1°43' | 0,3 | 1 | 10,0 | 10,84 | 80 | 24,0 | 25,1 | 1,5 | 1,8 | 2,2 | 0,5 |

* Worm gear set A17U2 only available with polished worm profile and crossed helical gear.

** The hub diameter of the A17U50 worm is 9 mm.

All worms and worm gears stocked right hand only.

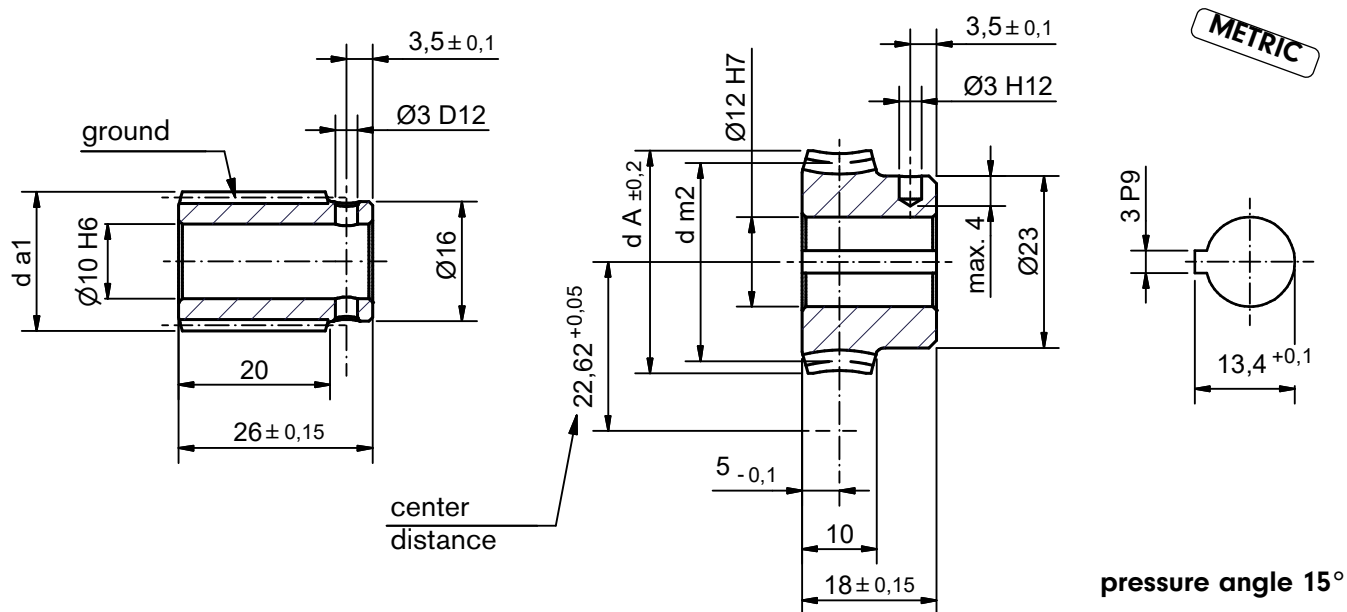
Worm made of case hardened and ground steel (HV 620 - 700). Lead content is ≤ 0.1 percent by weight.

Worm gear made of CuZn37Mn3Al2Si. Lead content is ≤ 0.1 percent by weight.

Phenolic worm gears do not have the pre-drilled start for a pin. The outside diameter of the phenolic gear hub is 18 mm.

On request worm gears can be made of plastic or HGW 2083.

A22 (22.62 mm center distance)



i = gear ratio

γ_m = lead angle m

m = module

z_1 = number of threads (worm)

d_{m1} = pitch diameter (worm)

d_{a1} = tip diameter (worm)

z_2 = No. of teeth (worm gear)

d_{m2} = pitch diameter (worm gear)

d_A = max. diameter (worm gear)

T_2 = output torque

MG = mineral grease

MO = mineral oil / synthetic grease

SO = synthetic oil

| Catalog | i | γ_m | m | worm | | | wormgear | | | MF | T_2 [Nm]No. | | |
|---------|--------|------------|------|-------|----------|----------|----------|----------|-------|-----|---------------|-----|-----|
| | | | | z_1 | d_{m1} | d_{a1} | z_2 | d_{m2} | d_A | | Brass | MO | SO |
| A22U3 | 3:1 | 17°36' | 1,0 | 7 | 23,15 | 25,15 | 21 | 22,09 | 24,8 | 2,2 | 2,6 | 3,3 | 0,9 |
| A22U4 | 4:1 | 19°32' | 1,25 | 5 | 18,7 | 21,2 | 20 | 26,54 | 29,8 | 3,6 | 4,3 | 5,4 | 1,4 |
| A22U7 | 7:1 | 11°46' | 1,25 | 3 | 18,4 | 20,9 | 21 | 26,84 | 29,8 | 3,6 | 4,3 | 5,4 | 1,4 |
| A22U11 | 10,5:1 | 7°41' | 1,25 | 2 | 18,7 | 21,2 | 21 | 26,54 | 29,8 | 3,4 | 4,1 | 5,1 | 1,4 |
| A22U21 | 21:1 | 3°48' | 1,25 | 1 | 18,9 | 21,4 | 21 | 26,34 | 29,8 | 3,4 | 4,1 | 5,1 | 1,4 |
| A22U30 | 30:1 | 2°50' | 0,9 | 1 | 18,2 | 20 | 30 | 27,04 | 29,8 | 3,6 | 4,3 | 5,4 | 1,4 |
| A22U40 | 40:1 | 2°20' | 0,7 | 1 | 17,2 | 18,6 | 40 | 28,04 | 29,8 | 3,9 | 4,7 | 5,8 | 1,6 |

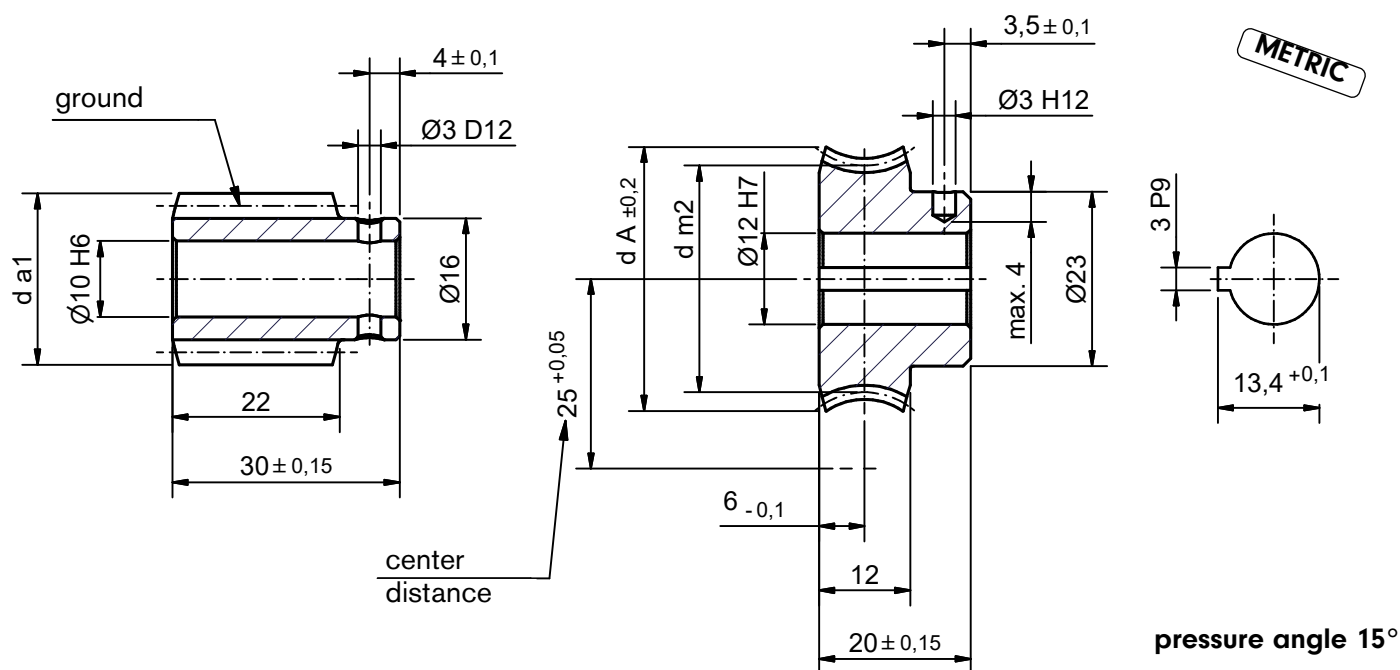
All worms and worm gears stocked right hand only.

Worm made of case hardened and ground steel (HV 620 - 700). Lead content is ≤0.1 percent by weight.

Worm gear made of CuZn37Mn3Al2Si. Lead content is ≤0.1 percent by weight.

On request worm gears can be made of plastic or HGW 2083.

A25 (25 mm center distance)



i = gear ratio

γ_m = lead angle m

m = module

z_1 = number of threads (worm)

d_{m1} = pitch diameter (worm)

d_{a1} = tip diameter (worm)

z_2 = No. of teeth (worm gear)

d_{m2} = pitch diameter (worm gear)

d_A = max. diameter (worm gear)

T_2 = output torque

MG = mineral grease

MO = mineral oil / synthetic grease

SO = synthetic oil

| Catalog | i | γ_m | m | z_1 | worm | | wormgear | | | MF | T_2 [Nm]No. | | |
|---------|-------|------------|------|-------|----------|----------|----------|----------|-------|-----|---------------|-----|-----|
| | | | | | d_{m1} | d_{a1} | z_2 | d_{m2} | d_A | | Brass | MO | SO |
| A25U4 | 4:1 | 20°29' | 1,4 | 5 | 20 | 22,8 | 20 | 30,0 | 33,5 | 5,1 | 6,1 | 7,6 | 2,0 |
| A25U5 | 5:1 | 19°15' | 1,5 | 4 | 18,2 | 21,2 | 20 | 31,8 | 34,8 | 6,5 | 7,8 | 9,7 | 2,6 |
| A25U6 | 6,5:1 | 13°52' | 1,15 | 4 | 19,2 | 21,5 | 26 | 30,8 | 34,8 | 6 | 7,2 | 9 | 2,4 |
| A25U10 | 10:1 | 8°48' | 1,5 | 2 | 19,6 | 22,6 | 20 | 30,4 | 34,8 | 5,9 | 7,1 | 8,8 | 2,4 |
| A25U15 | 15:1 | 6°29' | 1,0 | 2 | 17,7 | 19,7 | 30 | 32,3 | 34,8 | 5,7 | 6,8 | 8,5 | 2,3 |
| A25U20 | 20:1 | 4°19' | 1,5 | 1 | 19,9 | 22,9 | 20 | 30,1 | 34,8 | 5,8 | 7,0 | 8,7 | 2,3 |
| A25U25 | 25:1 | 2°18' | 1,0 | 1 | 24,96 | 26,96 | 25 | 25,04 | 27,8 | 4,1 | 4,9 | 6,1 | 1,6 |
| A25U30 | 30:1 | 2°53' | 1,0 | 1 | 19,9 | 21,9 | 30 | 30,1 | 33,5 | 5,9 | 7,1 | 8,8 | 2,4 |
| A25U40 | 40:1 | 2°33' | 0,8 | 1 | 17,96 | 19,56 | 40 | 32,04 | 34,8 | 6,2 | 7,4 | 9,3 | 2,5 |
| A25U50 | 50:1 | 1°43' | 0,6 | 1 | 19,96 | 21,16 | 50 | 30,04 | 33,5 | 5,1 | 6,1 | 7,6 | 2,0 |

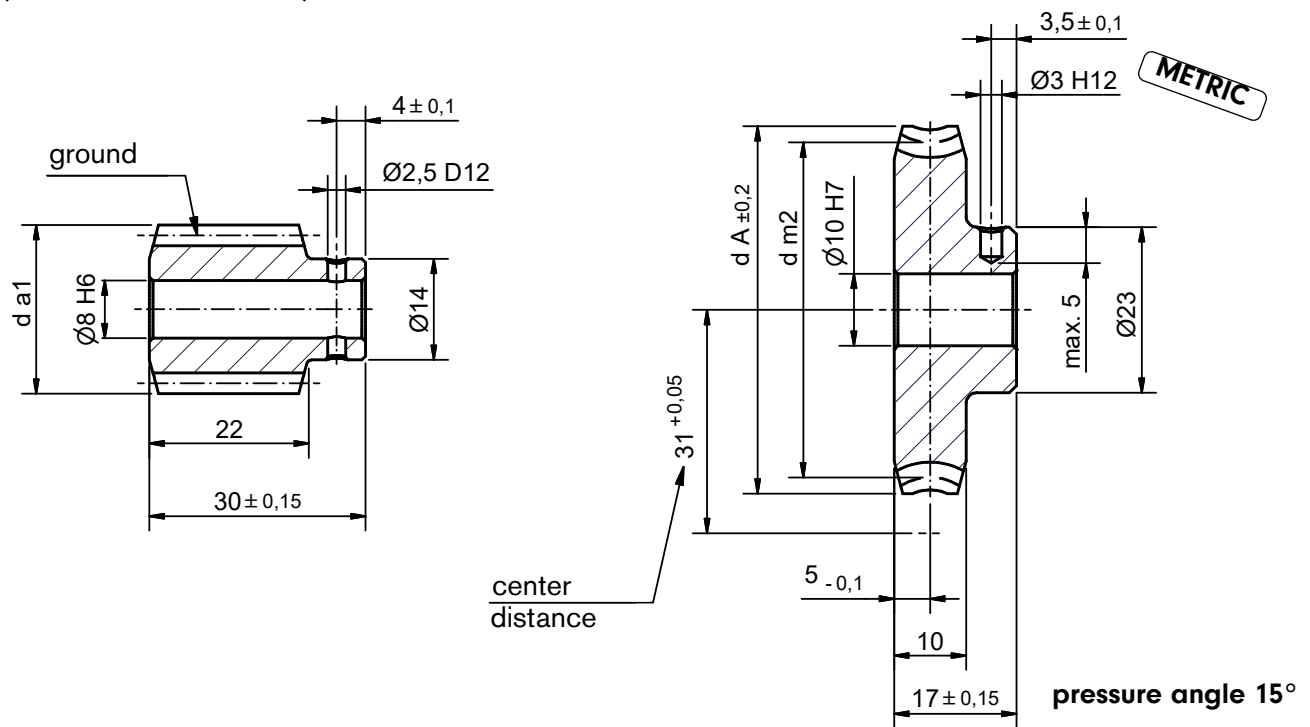
All worms and worm gears stocked right hand only.

Worm made of case hardened and ground steel (HV 620 - 700). Lead content is ≤ 0.1 percent by weight.

Worm gear made of CuZn37Mn3Al2Si. Lead content is ≤ 0.1 percent by weight.

On request worm gears can be made of plastic or HGW 2083.

A31 (31 mm center distance)



i = gear ratio

γ_m = lead angle m

m = module

z_1 = number of threads (worm)

d_{m1} = pitch diameter (worm)

d_{a1} = tip diameter (worm)

z_2 = No. of teeth (worm gear)

d_{m2} = pitch diameter (worm gear)

d_A = max. diameter (worm gear)

T_2 = output torque

MG = mineral grease

MO = mineral oil / synthetic grease

SO = synthetic oil

| Catalog | i | γ_m | m | z_1 | worm | | wormgear | | | MF | T_2 [Nm]No. | | |
|-------------|--------|------------|------|-------|----------|----------|----------|----------|-------|------|---------------|------|-----|
| | | | | | d_{m1} | d_{a1} | z_2 | d_{m2} | d_A | | Brass | MO | SO |
| A31U2* | 2,5:1 | 45°15' | 1,25 | 10 | 17,6 | 20,1 | 25 | 44,4 | 46,9 | 4,4 | 5,3 | 6,6 | 1,7 |
| A31U3 | 3:1 | 35°10' | 1,15 | 10 | 19,97 | 22,27 | 30 | 42,03 | 44,5 | 4,5 | 5,4 | 6,7 | 1,8 |
| A31U4 | 4,28:1 | 25°24' | 1,25 | 7 | 20,4 | 22,9 | 30 | 41,6 | 45 | 9 | 10,8 | 13,5 | 3,6 |
| A31U5 | 5:1 | 23°46' | 1,3 | 6 | 19,35 | 21,95 | 30 | 42,65 | 46,5 | 9,5 | 11,4 | 14,2 | 3,8 |
| A31U6 | 6:1 | 18°13' | 1,3 | 5 | 20,8 | 23,4 | 30 | 41,2 | 45 | 7,6 | 9,1 | 11,4 | 3,0 |
| A31U7 | 7:1 | 20°32' | 1,5 | 4 | 17,1 | 20,1 | 28 | 44,9 | 48,8 | 9,7 | 11,6 | 14,5 | 3,9 |
| A31U8 | 8,33:1 | 19°49' | 1,75 | 3 | 15,5 | 19 | 25 | 46,5 | 51 | 10 | 12 | 15 | 4,0 |
| A31U10 | 10:1 | 12°50' | 1,4 | 3 | 18,9 | 21,7 | 30 | 43,1 | 47 | 9,5 | 11,4 | 14,2 | 3,8 |
| A31U12 | 12:1 | 13°55' | 1,25 | 3 | 15,6 | 18,1 | 36 | 46,4 | 50 | 12,1 | 14,5 | 18,1 | 4,8 |
| A31U15 | 15:1 | 10°40' | 1,5 | 2 | 16,2 | 19,2 | 30 | 45,8 | 50 | 10,7 | 12,8 | 16 | 4,3 |
| A31U18/1,25 | 18:1 | 8°44' | 1,25 | 2 | 16,46 | 18,96 | 36 | 45,54 | 48,8 | 10,3 | 12,4 | 15,4 | 4,1 |
| A31U20/0,75 | 20:1 | 7°49' | 0,75 | 3 | 16,54 | 18,04 | 60 | 45,46 | 48 | 8,3 | 10 | 12,4 | 3,3 |
| A31U20/1,15 | 20:1 | 8°33' | 1,15 | 2 | 15,47 | 17,77 | 40 | 46,53 | 50 | 10,3 | 12,4 | 15,4 | 4,1 |
| A31U22 | 22:1 | 6°29' | 1 | 2 | 17,7 | 19,7 | 44 | 44,3 | 48 | 9,6 | 11,5 | 14,4 | 3,8 |
| A31U23 | 23:1 | 7°29' | 2 | 1 | 15,35 | 19,35 | 23 | 46,65 | 52 | 10,5 | 12,6 | 15,7 | 4,2 |
| A31U24 | 24:1 | 5°4' | 1,75 | 1 | 19,8 | 23,3 | 24 | 42,2 | 47 | 9,2 | 11 | 13,8 | 3,7 |

* Worm gear set only available with polished worm profile and crossed helical gear.

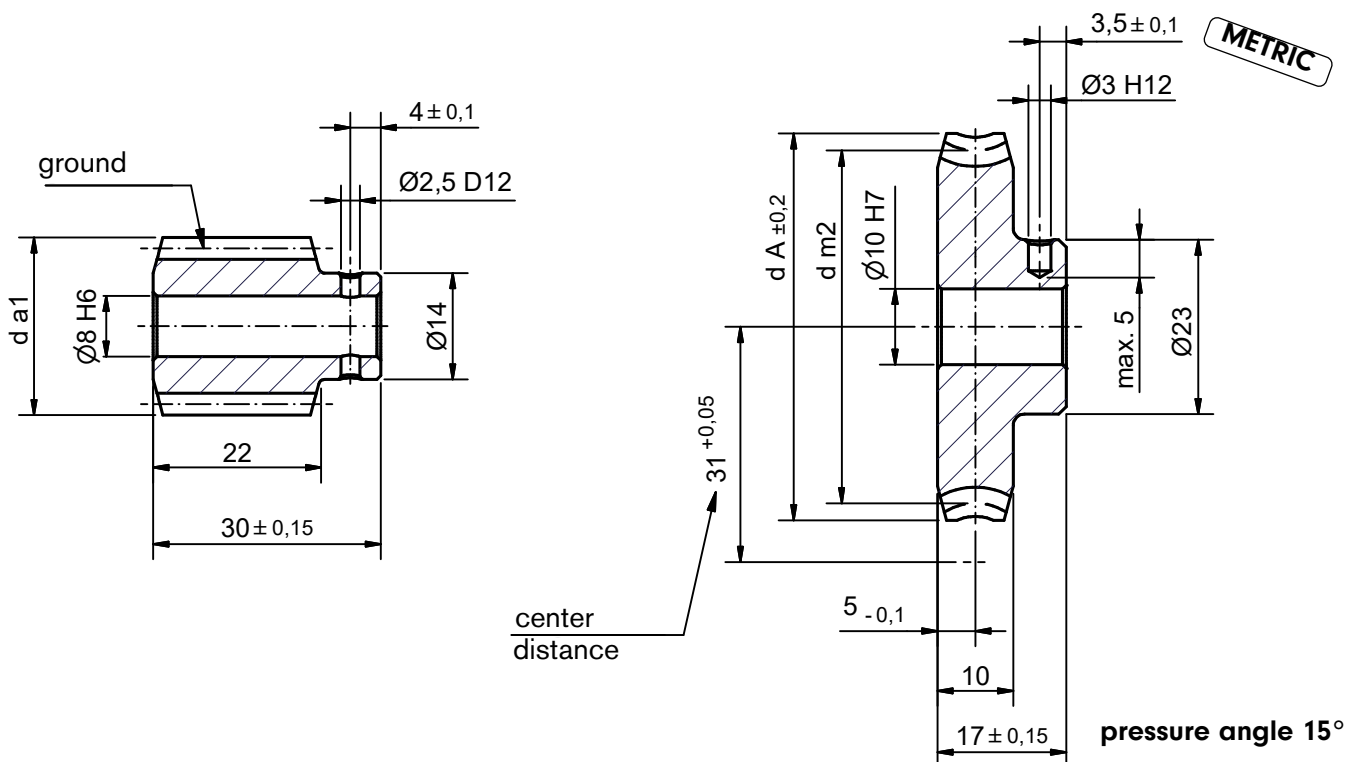
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 d_{m1} = pitch diameter (worm)

d_{a1} = tip diameter (worm)
 z_2 = No. of teeth (worm gear)
 d_{m2} = pitch diameter (worm gear)
 d_A = max. diameter (worm gear)
 T_2 = output torque

MG = mineral grease
 MO = mineral oil / synthetic grease
 SO = synthetic oil

| Catalog | i | γ_m | m | worm | | | wormgear | | | MF | T_2 [Nm]No. | | |
|---------|-------|------------|------|-------|----------|----------|----------|----------|-------|------|---------------|------|-----|
| | | | | z_1 | d_{m1} | d_{a1} | z_2 | d_{m2} | d_A | | Brass | MO | SO |
| A31U25 | 25:1 | 5°35' | 1,75 | 1 | 18 | 21,5 | 25 | 44 | 48,5 | 9,6 | 11,5 | 14,4 | 3,8 |
| A31U28 | 28:1 | 4°20' | 1,5 | 1 | 19,85 | 22,85 | 28 | 42,15 | 46,5 | 9,1 | 10,9 | 13,6 | 3,6 |
| A31U30 | 30:1 | 5°7' | 1,5 | 1 | 16,8 | 19,8 | 30 | 45,2 | 48,8 | 10,3 | 12,4 | 15,4 | 4,1 |
| A31U32 | 32:1 | 4°45' | 1,4 | 1 | 16,9 | 19,7 | 32 | 45,1 | 48,8 | 10,2 | 12,2 | 15,3 | 4,1 |
| A31U38 | 38:1 | 5°1' | 1,25 | 1 | 14,3 | 16,8 | 38 | 47,7 | 51,2 | 11,4 | 13,7 | 17,1 | 4,6 |
| A31U45 | 45:1 | 3°23' | 1 | 1 | 16,93 | 18,93 | 45 | 45,07 | 48 | 9,5 | 11,4 | 14,2 | 3,8 |
| A31U50 | 50:1 | 3°3' | 0,9 | 1 | 16,9 | 18,7 | 50 | 45,1 | 48 | 9 | 10,8 | 13,5 | 3,6 |
| A31U55 | 55:1 | 4°12' | 0,9 | 1 | 12,3 | 14,1 | 55 | 49,7 | 52 | 10,4 | 12,5 | 15,6 | 4,2 |
| A31U60 | 60:1 | 2°33' | 0,75 | 1 | 16,9 | 18,4 | 60 | 45,1 | 48 | 8,2 | 9,8 | 12,3 | 3,3 |
| A31U70 | 70:1 | 3°7' | 0,7 | 1 | 12,9 | 14,3 | 70 | 49,1 | 52 | 9 | 10,8 | 13,5 | 3,6 |
| A31U75 | 75:1 | 2°2' | 0,6 | 1 | 16,9 | 18,1 | 75 | 45,1 | 47 | 7,3 | 8,8 | 10,9 | 2,9 |
| A31U90 | 90:1 | 1°41' | 0,5 | 1 | 17 | 18 | 90 | 45 | 48 | 6,4 | 7,7 | 9,6 | 2,6 |
| A31U100 | 100:1 | 2°24' | 0,5 | 1 | 11,96 | 12,96 | 100 | 50,04 | 52,7 | 7,4 | 8,9 | 11,1 | 3,0 |

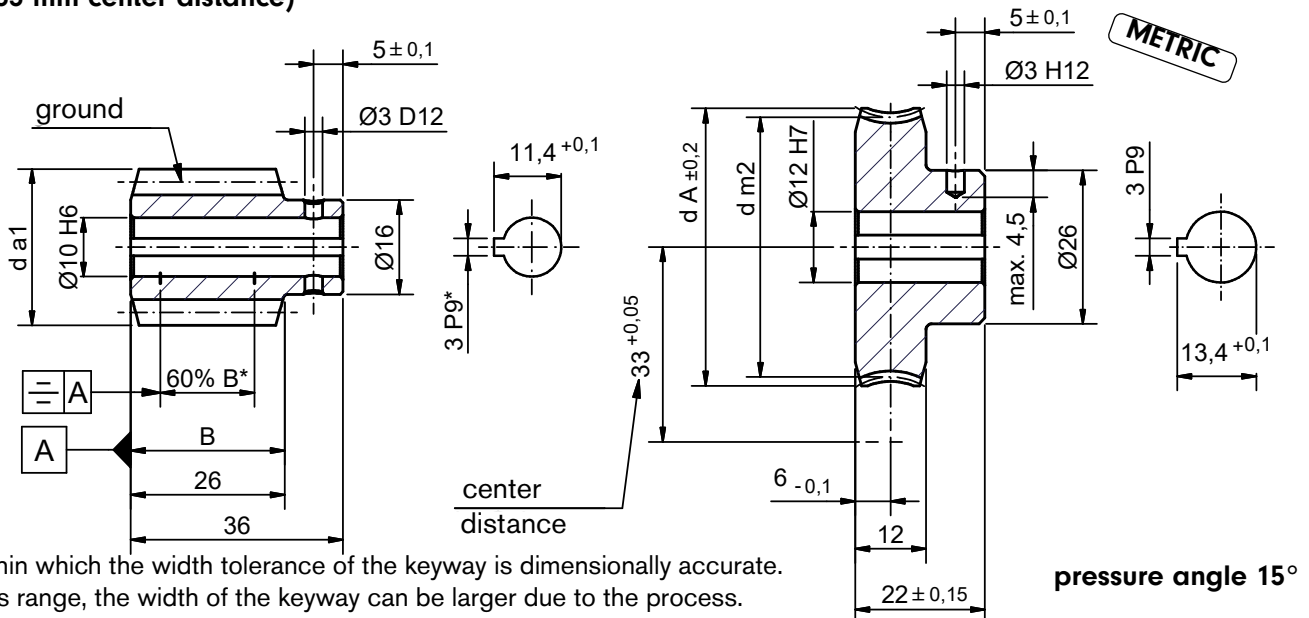
All worms and worm gears stocked right hand only.

Worm made of case hardened and ground steel (HV 620 - 700). Lead content is ≤ 0.1 percent by weight.

Worm gear made of CuZn37Mn3Al2Si. Lead content is ≤ 0.1 percent by weight.

On request worm gears can be made of plastic or HGW 2083.

A33 (33 mm center distance)



*Range within which the width tolerance of the keyway is dimensionally accurate. Outside this range, the width of the keyway can be larger due to the process.

i = gear ratio

γ_m = lead angle m

m = module

z_1 = number of threads (worm)

d_{m1} = pitch diameter (worm)

Catalog

d_{a1} = tip diameter (worm)

z_2 = No. of teeth (worm gear)

d_{m2} = pitch diameter (worm gear)

d_A = max. diameter (worm gear)

T_2 = output torque

MG = mineral grease

MO = mineral oil / synthetic grease

SO = synthetic oil

| Catalog | i | γ_m | m | worm | | | wormgear | | | MF | T_2 [Nm]No. | | |
|---------|---------|------------|------|-------|----------|----------|----------|----------|-------|------|---------------|------|-----|
| | | | | z_1 | d_{m1} | d_{a1} | z_2 | d_{m2} | d_A | | Brass | MO | SO |
| A33U3 | 3,5:1 | 25°57' | 1,75 | 6 | 24 | 27,5 | 21 | 42 | 47 | 10,1 | 12,1 | 15,1 | 4,0 |
| A33U5 | 5:1 | 20°50' | 2 | 4 | 22,5 | 26,5 | 20 | 43,5 | 49 | 10,6 | 12,7 | 15,9 | 4,2 |
| A33U7 | 7:1 | 15°32' | 1,5 | 4 | 22,4 | 25,4 | 28 | 43,6 | 48 | 12,2 | 14,6 | 18,3 | 4,9 |
| A33U10 | 10:1 | 13°10' | 1,5 | 3 | 19,75 | 22,75 | 30 | 46,25 | 51 | 13,3 | 16 | 19,9 | 5,3 |
| A33U11 | 11,33:1 | 10°42' | 1,3 | 3 | 21 | 23,6 | 34 | 45 | 49,2 | 13,3 | 16 | 19,9 | 5,3 |
| A33U12 | 12:1 | 11°14' | 1,9 | 2 | 19,5 | 23,3 | 24 | 46,5 | 52 | 13,5 | 16,2 | 20,2 | 5,4 |
| A33U14 | 14:1 | 7°20' | 1,5 | 2 | 23,5 | 26,5 | 28 | 42,5 | 47 | 11,4 | 13,7 | 17,1 | 4,6 |
| A33U15 | 15:1 | 8°25' | 1,5 | 2 | 20,5 | 23,5 | 30 | 45,5 | 50 | 13 | 15,6 | 19,5 | 5,2 |
| A33U16 | 16:1 | 10°1' | 1,5 | 2 | 17,24 | 20,24 | 32 | 48,76 | 53 | 14 | 16,8 | 21 | 5,6 |
| A33U17 | 17:1 | 9°3' | 1,4 | 2 | 17,8 | 20,6 | 34 | 48,2 | 52,5 | 14,2 | 17 | 21,3 | 5,7 |
| A33U18 | 18:1 | 6°57' | 1,25 | 2 | 20,65 | 23,15 | 36 | 45,35 | 49,2 | 12,6 | 15,1 | 18,9 | 5,0 |
| A33U20 | 20:1 | 6°43' | 1,15 | 2 | 19,66 | 21,96 | 40 | 46,34 | 50,5 | 12,7 | 15,2 | 19 | 5,1 |
| A33U24 | 24:1 | 5°27' | 1,9 | 1 | 20 | 23,8 | 24 | 46 | 51 | 13,2 | 15,8 | 19,8 | 5,3 |
| A33U28 | 28:1 | 3°36' | 1,5 | 1 | 23,9 | 26,9 | 28 | 42,1 | 46,6 | 11,2 | 13,4 | 16,8 | 4,5 |
| A33U30 | 30:1 | 4°8' | 1,5 | 1 | 20,85 | 23,85 | 30 | 45,15 | 50 | 12,7 | 15,2 | 19 | 5,1 |
| A33U32 | 32:1 | 4°50' | 1,5 | 1 | 17,8 | 20,8 | 32 | 48,2 | 52,5 | 13,5 | 16,2 | 20,2 | 5,4 |
| A33U38 | 38:1 | 3°55' | 1,25 | 1 | 18,26 | 20,76 | 38 | 47,74 | 51,6 | 13,9 | 16,7 | 20,8 | 5,6 |
| A33U50 | 50:1 | 2°27' | 0,9 | 1 | 21 | 22,8 | 50 | 45 | 48 | 10 | 12 | 15 | 4,0 |
| A33U56 | 56:1 | 2°10' | 0,8 | 1 | 21,15 | 22,75 | 56 | 44,85 | 48 | 10,1 | 12,1 | 15,1 | 4,0 |
| A33U60 | 60:1 | 2°33' | 0,8 | 1 | 17,96 | 19,56 | 60 | 48,04 | 51,5 | 11,4 | 13,7 | 17,1 | 4,6 |
| A33U72 | 72:1 | 1°30' | 0,6 | 1 | 22,8 | 24 | 72 | 43,2 | 46 | 8,4 | 10,01 | 12,6 | 3,4 |
| A33U75 | 75:1 | 1°41' | 0,6 | 1 | 20,5 | 21,7 | 75 | 45,5 | 48 | 9 | 10,8 | 13,5 | 3,6 |

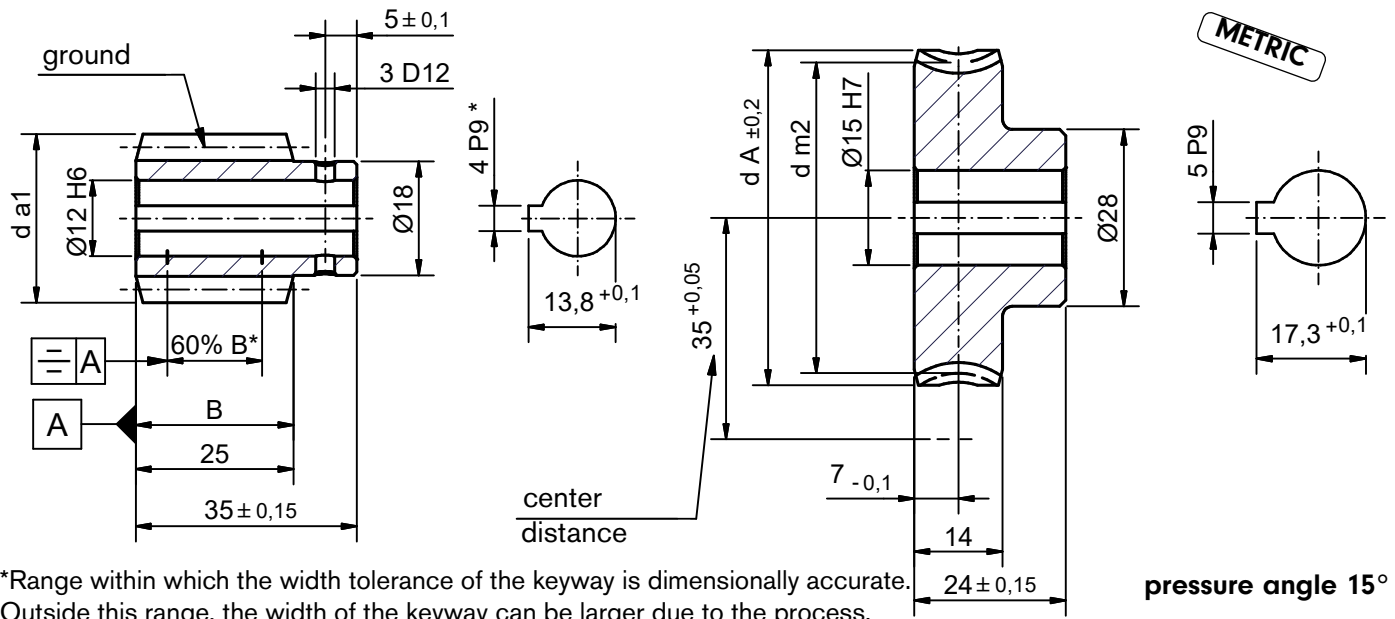
All worms and worm gears stocked right hand only.

Worm made of case hardened and ground steel (HV 620 - 700). Lead content is ≤ 0.1 percent by weight.

Worm gear made of CuZn37Mn3Al2Si. Lead content is ≤ 0.1 percent by weight.

On request worm gears can be made of plastic or HGW 2083.

A35 (35 mm center distance)



*Range within which the width tolerance of the keyway is dimensionally accurate. Outside this range, the width of the keyway can be larger due to the process.

pressure angle 15°

i = gear ratio

γ_m = lead angle m

m = module

z_1 = number of threads (worm)

d_{m1} = pitch diameter (worm)

d_{a1} = tip diameter (worm)

z_2 = No. of teeth (worm gear)

d_{m2} = pitch diameter (worm gear)

d_A = max. diameter (worm gear)

T_2 = output torque

MG = mineral grease

MO = mineral oil / synthetic grease

SO = synthetic oil

| Catalog. | i | γ_m | m | worm | | | wormgear | | | T_2 [Nm] No. | | |
|----------|--------|------------|------|-------|----------|----------|----------|----------|-------|----------------|------|------|
| | | | | z_1 | d_{m1} | d_{a1} | z_2 | d_{m2} | d_A | Brass | | |
| | | | | | | | | | | MF | MO | SO |
| A35U3* | 2,78:1 | 31°01' | 1,5 | 9 | 26,2 | 29,2 | 25 | 43,8 | 46,76 | 6,6 | 8,2 | 10,2 |
| A35U5 | 5:1 | 22°52' | 1,75 | 5 | 22,52 | 26,02 | 25 | 47,48 | 53 | 15,3 | 18,4 | 22,9 |
| A35U7 | 7,25:1 | 13°47' | 1,5 | 4 | 25,18 | 28,18 | 29 | 44,82 | 50 | 14,7 | 17,6 | 22 |
| A35U8 | 8:1 | 14°25' | 1,9 | 3 | 22,89 | 26,69 | 24 | 47,11 | 53 | 16,7 | 20 | 25 |
| A35U10 | 10:1 | 10°43' | 1,5 | 3 | 24,2 | 27,2 | 30 | 45,8 | 51 | 16 | 19,2 | 24 |
| A35U11 | 11:1 | 10°32' | 1,4 | 3 | 22,98 | 25,78 | 33 | 47,02 | 52 | 16,7 | 20 | 25 |
| A35U12 | 12:1 | 9°11' | 1,9 | 2 | 23,8 | 27,6 | 24 | 46,2 | 52 | 16,1 | 19,3 | 24 |
| A35U15 | 15:1 | 7° | 1,5 | 2 | 24,62 | 27,62 | 30 | 45,38 | 50 | 15,3 | 18,4 | 22,9 |
| A35U20 | 20:1 | 5°33' | 1,15 | 2 | 23,78 | 26,08 | 40 | 46,22 | 50,5 | 14,8 | 17,8 | 22,2 |
| A35U25 | 25:1 | 4°9' | 0,9 | 2 | 24,87 | 26,67 | 50 | 45,13 | 49 | 12,9 | 15,5 | 19,3 |
| A35U30 | 30:1 | 3°27' | 1,5 | 1 | 24,92 | 27,92 | 30 | 45,08 | 50 | 15 | 18 | 22,5 |
| A35U35 | 35:1 | 3°51' | 1,4 | 1 | 20,85 | 23,65 | 35 | 49,15 | 53 | 17,1 | 20,5 | 25,6 |
| A35U40 | 40:1 | 2°45' | 1,15 | 1 | 23,91 | 26,21 | 40 | 46,09 | 50,5 | 14,7 | 17,6 | 22 |
| A35U50 | 50:1 | 2°4' | 0,9 | 1 | 24,93 | 26,73 | 50 | 45,07 | 49 | 12,9 | 15,5 | 19,3 |
| A35U58 | 58:1 | 2°21' | 0,85 | 1 | 20,65 | 22,35 | 58 | 49,35 | 53 | 14,5 | 17,4 | 21,7 |
| A35U90 | 90:1 | 1°9' | 0,5 | 1 | 25 | 26 | 90 | 45 | 49 | 9,1 | 10,9 | 13,6 |

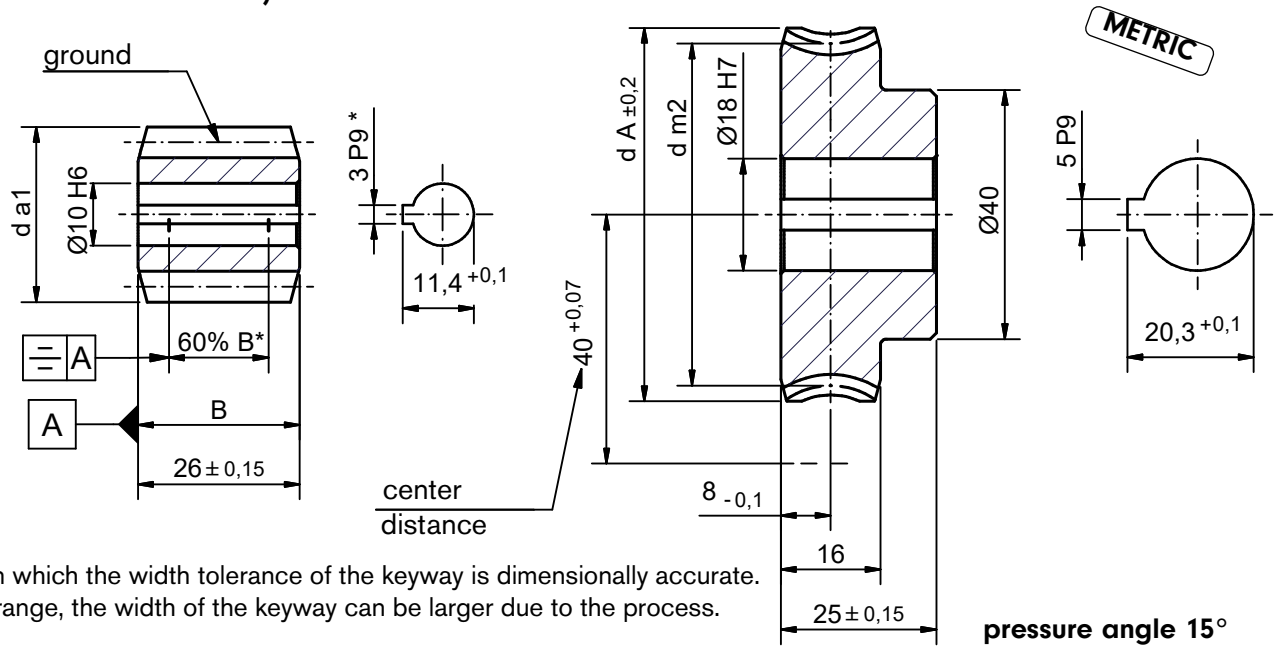
All worms and worm gears stocked right hand only.

Worm made of case hardened and ground steel (HV 620 - 700). Lead content is ≤0.1 percent by weight.

Worm gear made of CuZn37Mn3Al2Si. Lead content is ≤0.1 percent by weight.

On request worm gears can be made of plastic or HGW 2083.

A40 (40 mm center distance)



*Range within which the width tolerance of the keyway is dimensionally accurate. Outside this range, the width of the keyway can be larger due to the process.

i = gear ratio

γ_m = lead angle m

m = module

z_1 = number of threads (worm)

d_{m1} = pitch diameter (worm)

d_{a1} = tip diameter (worm)

z_2 = No. of teeth (worm gear)

d_{m2} = pitch diameter (worm gear)

d_A = max. diameter (worm gear)

T_2 = output torque

MG = mineral grease

MO = mineral oil / synthetic grease

SO = synthetic oil

| Catalog. | i | γ_m | m | z_1 | worm | | wormgear | | | T_2 [Nm]No. | | |
|----------|--------|------------|------|-------|----------|----------|----------|----------|-------|---------------|------|------|
| | | | | | d_{m1} | d_{a1} | z_2 | d_{m2} | d_A | Brass | | |
| | | | | | | | | | | MF | MO | SO |
| A40U7 | 6,75:1 | 21°19' | 2 | 4 | 22 | 26 | 27 | 58 | 64 | 29,5 | 35,4 | 44,2 |
| A40U8 | 8:1 | 16°35' | 2,25 | 3 | 23,64 | 28,14 | 24 | 56,36 | 62,5 | 27,5 | 33 | 41,2 |
| A40U10 | 10:1 | 16°1' | 1,9 | 3 | 20,66 | 24,46 | 30 | 59,34 | 65 | 29,5 | 35,4 | 44,2 |
| A40U12 | 12:1 | 10°21' | 1,5 | 3 | 25,05 | 28,05 | 36 | 54,95 | 60 | 25,2 | 30,2 | 37,8 |
| A40U15 | 15:1 | 9°53' | 1,9 | 2 | 22,14 | 25,94 | 30 | 57,86 | 64 | 28 | 33,6 | 42 |
| A40U20 | 20:1 | 8°59' | 1,5 | 2 | 19,2 | 22,2 | 40 | 60,8 | 66 | 28,9 | 34,6 | 43,3 |
| A40U25 | 25:1 | 5°58' | 1,15 | 2 | 22,15 | 24,45 | 50 | 57,85 | 62 | 24,4 | 29,2 | 36,6 |
| A40U28 | 28:1 | 4°47' | 2 | 1 | 24 | 28 | 28 | 56 | 61,5 | 28,4 | 34 | 42,6 |
| A40U30 | 30:1 | 5°50' | 2 | 1 | 19,68 | 23,68 | 30 | 60,32 | 66 | 30,1 | 36,1 | 45,1 |
| A40U35 | 35:1 | 5°26' | 1,75 | 1 | 18,48 | 21,98 | 35 | 61,52 | 67 | 31 | 37,2 | 46,5 |
| A40U36 | 36:1 | 3°19' | 1,5 | 1 | 25,91 | 28,91 | 36 | 54,09 | 59 | 23,9 | 28,6 | 35,8 |
| A40U40 | 40:1 | 4°20' | 1,5 | 1 | 19,83 | 22,83 | 40 | 60,17 | 65 | 28,3 | 33,9 | 42,4 |
| A40U50 | 50:1 | 4°8' | 1,25 | 1 | 17,3 | 19,8 | 50 | 62,7 | 68 | 27 | 32,4 | 40,5 |
| A40U56 | 56:1 | 2°23' | 1 | 1 | 24 | 26 | 56 | 56 | 59 | 21,9 | 26,2 | 32,8 |
| A40U60 | 60:1 | 1°59' | 0,9 | 1 | 25,92 | 27,72 | 60 | 54,08 | 57,5 | 19,3 | 23,1 | 28,9 |
| A40U70 | 70:1 | 3°3' | 0,9 | 1 | 16,91 | 18,71 | 70 | 63,09 | 67 | 24,1 | 28,9 | 36,1 |
| A40U75 | 75:1 | 1°48' | 0,75 | 1 | 23,75 | 25,25 | 75 | 56,26 | 60 | 18,8 | 22,5 | 28,2 |
| A40U80 | 80:1 | 2°10' | 0,75 | 1 | 19,9 | 21,4 | 80 | 60,1 | 64 | 20,1 | 24,1 | 30,1 |
| A40U90 | 90:1 | 2°22' | 0,7 | 1 | 16,95 | 18,35 | 90 | 63,05 | 67 | 19,1 | 22,9 | 28,6 |

All worms and worm gears stocked right hand only.

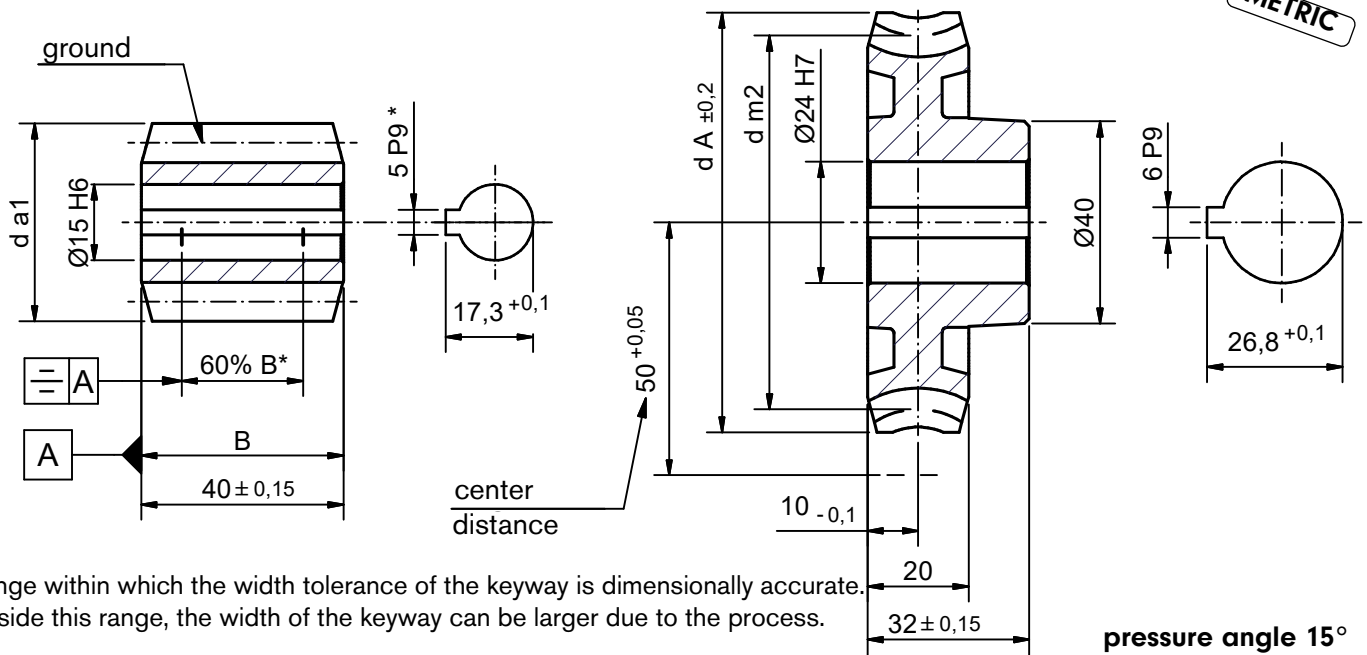
Worm made of case hardened and ground steel (HV 620 - 700). Lead content is ≤ 0.1 percent by weight.

Worm gear made of CuZn37Mn3Al2Si. Lead content is ≤ 0.1 percent by weight.

On request worm gears can be made of plastic or HGW 2083.

A50 (50 mm center distance)

METRIC



*Range within which the width tolerance of the keyway is dimensionally accurate. Outside this range, the width of the keyway can be larger due to the process.

pressure angle 15°

i = gear ratio

γ_m = lead angle m

m = module

z_1 = number of threads (worm)

d_{m1} = pitch diameter (worm)

d_{a1} = tip diameter (worm)

z_2 = No. of teeth (worm gear)

d_{m2} = pitch diameter (worm gear)

d_A = max. diameter (worm gear)

T_2 = output torque

MG = mineral grease

MO = mineral oil / synthetic grease

SO = synthetic oil

| Catalog. | i | γ_m | m | z_1 | worm | | wormgear | | | T_2 [Nm]No. | | |
|----------|--------|------------|------|-------|----------|----------|----------|----------|-------|---------------|------|-------|
| | | | | | d_{m1} | d_{a1} | z_2 | d_{m2} | d_A | MF | MO | SO |
| A50U4 | 4,25:1 | 25°51' | 3,5 | 4 | 32,1 | 39,1 | 17 | 67,9 | 77 | 34 | 40,8 | 51 |
| A50U6 | 6:1 | 19°17' | 3,5 | 3 | 31,8 | 38,8 | 18 | 68,2 | 77 | 52 | 62,4 | 78 |
| A50U9 | 8,66:1 | 13°52' | 2,5 | 3 | 31,29 | 36,29 | 26 | 68,71 | 77 | 64,3 | 77,1 | 96,4 |
| A50U12 | 12:1 | 10°23' | 2,75 | 2 | 30,5 | 36 | 24 | 69,5 | 77 | 66,4 | 79,6 | 99,6 |
| A50U14 | 13,5:1 | 9°38' | 2,5 | 2 | 29,9 | 34,9 | 27 | 70,1 | 77 | 62,8 | 75,4 | 94,2 |
| A50U19 | 19:1 | 6°17' | 3,5 | 1 | 32 | 39 | 19 | 68 | 77 | 78,2 | 93,8 | 117,3 |
| A50U23 | 23:1 | 5°38' | 3 | 1 | 30,58 | 36,58 | 23 | 69,42 | 77 | 71,1 | 85,3 | 106,6 |
| A50U27 | 27:1 | 4°40' | 2,5 | 1 | 30,73 | 35,73 | 27 | 69,27 | 77 | 64,5 | 77,4 | 96,7 |
| A50U35 | 35:1 | 3°51' | 2 | 1 | 29,78 | 33,78 | 35 | 70,22 | 77 | 56,7 | 68 | 85 |
| A50U46 | 46:1 | 2°47' | 1,5 | 1 | 30,85 | 33,85 | 46 | 69,15 | 74 | 50,6 | 60,7 | 75,9 |
| A50U55 | 55:1 | 2°19' | 1,25 | 1 | 30,9 | 33,4 | 55 | 69,1 | 74 | 46,2 | 55,4 | 69,3 |
| A50U69 | 69:1 | 1°51' | 1 | 1 | 30,9 | 32,9 | 69 | 69,1 | 74 | 41,4 | 49,6 | 62,8 |

All worms and worm gears stocked right hand only.

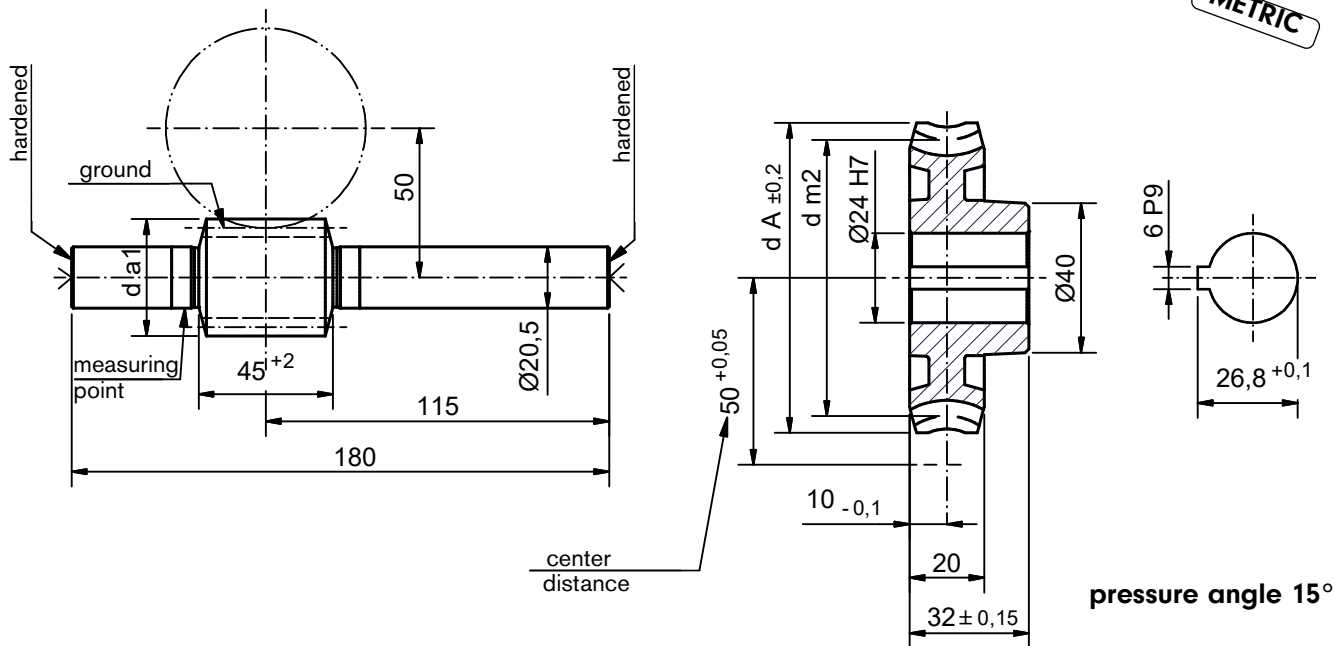
Worm made of case hardened and ground steel (HV 620 - 700). Lead content is ≤ 0.1 percent by weight.

Worm gear made of CuZn37Mn3Al2Si. Lead content is ≤ 0.1 percent by weight.

On request worm gears can be made of plastic or HGW 2083.

A50 (50 mm center distance)

METRIC



i = gear ratio

γ_m = lead angle m

m = module

z_1 = number of threads (worm)

d_{m1} = pitch diameter (worm)

d_{a1} = tip diameter (worm)

z_2 = No. of teeth (worm gear)

d_{m2} = pitch diameter (worm gear)

d_A = max. diameter (worm gear)

T_2 = output torque

MG = mineral grease

MO = mineral oil / synthetic grease

SO = synthetic oil

| Catalog. | i | γ_m | m | z_1 | worm | | wormgear | | | T_2 [Nm] No. | | |
|----------|--------|------------|------|-------|----------|----------|----------|----------|-------|----------------|------|-------|
| | | | | | d_{m1} | d_{a1} | z_2 | d_{m2} | d_A | MF | MO | SO |
| A50U4 | 4,25:1 | 25°51' | 3,5 | 4 | 32,1 | 39,1 | 17 | 67,9 | 77 | 34 | 40,8 | 51 |
| A50U6 | 6:1 | 19°17' | 3,5 | 3 | 31,8 | 38,8 | 18 | 68,2 | 77 | 52 | 62,4 | 78 |
| A50U9 | 8,66:1 | 13°52' | 2,5 | 3 | 31,29 | 36,29 | 26 | 68,71 | 77 | 64,3 | 77,1 | 96,4 |
| A50U12 | 12:1 | 10°23' | 2,75 | 2 | 30,5 | 36 | 24 | 69,5 | 77 | 66,4 | 79,6 | 99,6 |
| A50U14 | 13,5:1 | 9°38' | 2,5 | 2 | 29,9 | 34,9 | 27 | 70,1 | 77 | 62,8 | 75,4 | 94,2 |
| A50U19 | 19:1 | 6°17' | 3,5 | 1 | 32 | 39 | 19 | 68 | 77 | 78,2 | 93,8 | 117,3 |
| A50U23 | 23:1 | 5°38' | 3 | 1 | 30,58 | 36,58 | 23 | 69,42 | 77 | 71,1 | 85,3 | 106,6 |
| A50U27 | 27:1 | 4°40' | 2,5 | 1 | 30,73 | 35,73 | 27 | 69,27 | 77 | 64,5 | 77,4 | 96,7 |
| A50U35 | 35:1 | 3°51' | 2 | 1 | 29,78 | 33,78 | 35 | 70,22 | 77 | 56,7 | 68 | 85 |
| A50U46 | 46:1 | 2°47' | 1,5 | 1 | 30,85 | 33,85 | 46 | 69,15 | 74 | 50,6 | 60,7 | 75,9 |
| A50U55 | 55:1 | 2°19' | 1,25 | 1 | 30,9 | 33,4 | 55 | 69,1 | 74 | 46,2 | 55,4 | 69,3 |
| A50U69 | 69:1 | 1°51' | 1 | 1 | 30,9 | 32,9 | 69 | 69,1 | 74 | 41,4 | 49,6 | 62,8 |

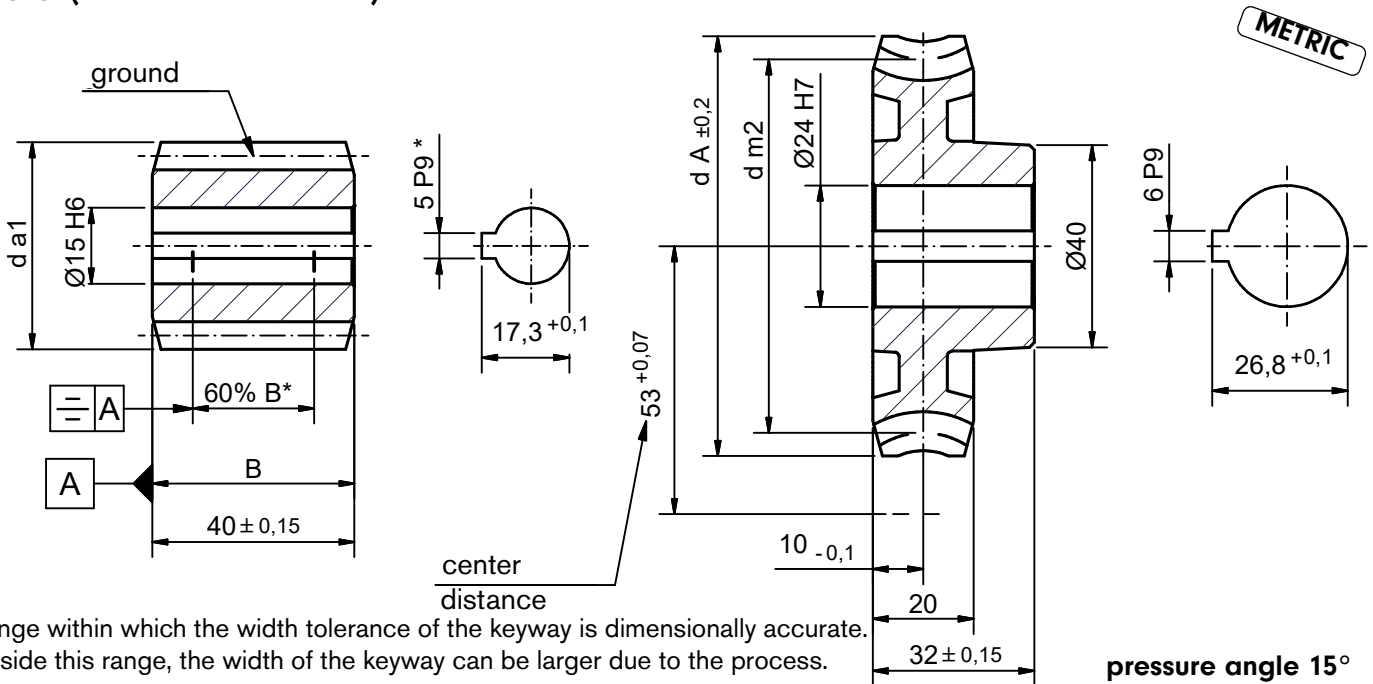
All worms and worm gears stocked right hand only.

Worm made of case hardened and ground steel (HV 620 - 700). Lead content is ≤ 0.1 percent by weight.

Worm gear made of CuZn37Mn3Al2Si. Lead content is ≤ 0.1 percent by weight.

On request worm gears can be made of plastic or HGW 2083.

A53 (53 mm center distance)



*Range within which the width tolerance of the keyway is dimensionally accurate. Outside this range, the width of the keyway can be larger due to the process.

i = gear ratio

γ_m = lead angle m

m = module

z_1 = number of threads (worm)

d_{m1} = pitch diameter (worm)

d_{a1} = tip diameter (worm)

z_2 = No. of teeth (worm gear)

d_{m2} = pitch diameter (worm gear)

d_A = max. diameter (worm gear)

T_2 = output torque

MG = mineral grease

MO = mineral oil / synthetic grease

SO = synthetic oil

pressure angle 15°

| Catalog. | i | γ_m | m | worm | | | wormgear | | | T_2 [Nm]No. | | |
|----------|--------|----------------|------|-------|----------|----------|----------|----------|-------|---------------|-----|------|
| | | | | z_1 | d_{m1} | d_{a1} | z_2 | d_{m2} | d_A | Brass | | |
| | | | | | | | | | | MF | MO | SO |
| A53U5 | 4,75:1 | $25^\circ 51'$ | 3,5 | 4 | 32,1 | 39,1 | 19 | 73,9 | 83 | 45 | 54 | 67,5 |
| A53U7 | 6,67:1 | $19^\circ 17'$ | 3,5 | 3 | 31,8 | 38,8 | 20 | 74,2 | 84 | 67 | 81 | 101 |
| A53U10 | 9,67:1 | $13^\circ 52'$ | 2,5 | 3 | 31,29 | 36,29 | 29 | 74,71 | 82 | 77 | 93 | 116 |
| A53U14 | 13,5:1 | $10^\circ 23'$ | 2,75 | 2 | 30,5 | 36 | 27 | 75,5 | 84 | 80 | 96 | 120 |
| A53U15 | 15:1 | $9^\circ 38'$ | 2,5 | 2 | 29,9 | 34,9 | 30 | 76,1 | 83 | 75 | 90 | 113 |
| A53U21 | 21:1 | $6^\circ 17'$ | 3,5 | 1 | 32 | 39 | 21 | 74 | 83 | 94 | 113 | 141 |
| A53U25 | 25:1 | $5^\circ 38'$ | 3 | 1 | 30,58 | 36,58 | 25 | 75,42 | 84 | 84 | 101 | 127 |
| A53U28 | 28:1 | $3^\circ 59'$ | 2,5 | 1 | 36 | 41 | 28 | 70 | 77,5 | 87 | 104 | 130 |
| A53U30 | 30:1 | $4^\circ 40'$ | 2,5 | 1 | 30,73 | 35,73 | 30 | 75,27 | 83 | 77 | 93 | 116 |
| A53U38 | 38:1 | $3^\circ 51'$ | 2 | 1 | 29,78 | 33,78 | 38 | 76,21 | 83 | 68 | 81 | 102 |
| A53U50 | 50:1 | $2^\circ 47'$ | 1,5 | 1 | 30,85 | 33,85 | 50 | 75,15 | 81 | 60 | 72 | 90 |
| A53U60 | 60:1 | $2^\circ 19'$ | 1,25 | 1 | 30,9 | 33,4 | 60 | 75,1 | 80 | 55 | 66 | 82 |
| A53U75 | 75:1 | $1^\circ 51'$ | 1 | 1 | 30,9 | 32,9 | 75 | 75,1 | 78 | 49 | 59 | 74 |

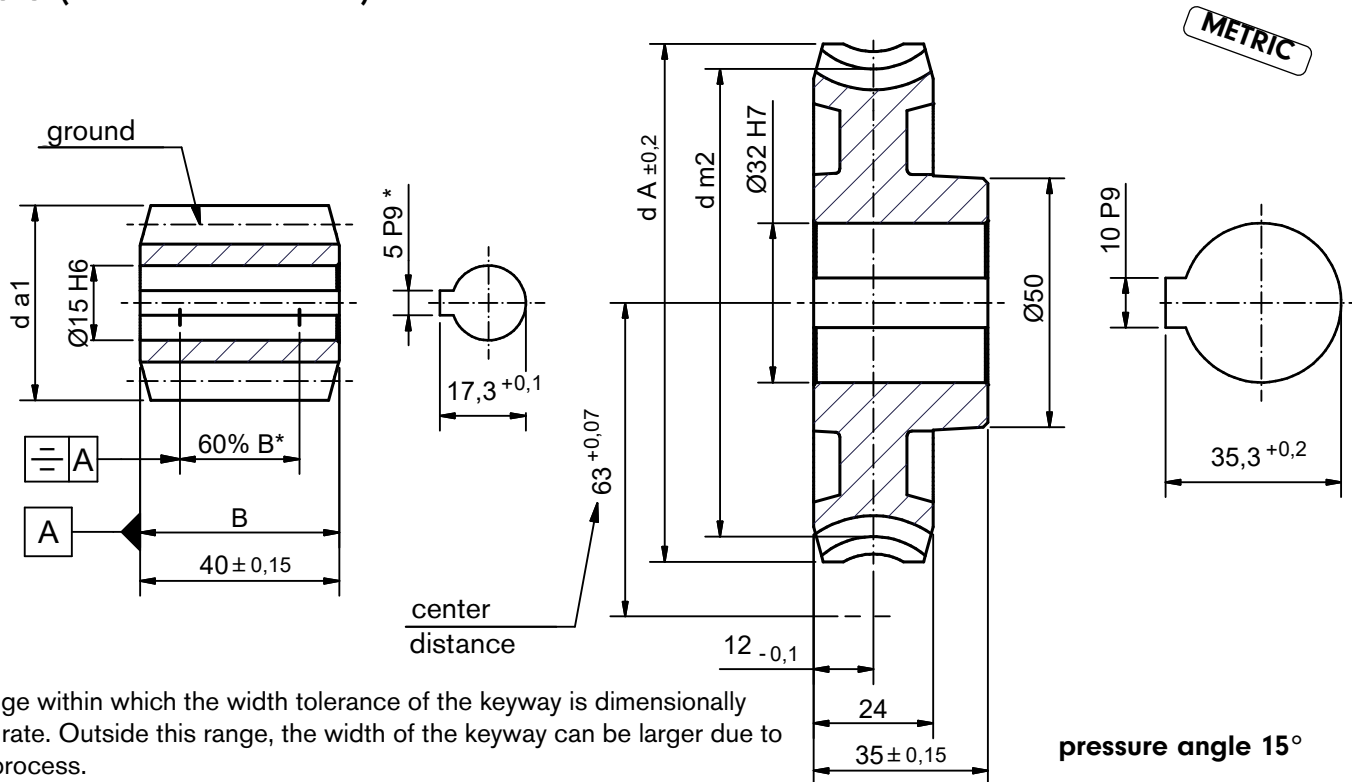
All worms and worm gears stocked right hand only.

Worm made of case hardened and ground steel (HV 620 - 700). Lead content is ≤ 0.1 percent by weight.

Worm gear made of CuZn37Mn3Al2Si. Lead content is ≤ 0.1 percent by weight.

On request worm gears can be made of plastic or HGW 2083.

A63 (63 mm center distance)



*Range within which the width tolerance of the keyway is dimensionally accurate. Outside this range, the width of the keyway can be larger due to the process.

i = gear ratio

γ_m = lead angle m

m = module

z_1 = number of threads (worm)

d_{m1} = pitch diameter (worm)

d_{a1} = tip diameter (worm)

z_2 = No. of teeth (worm gear)

d_{m2} = pitch diameter (worm gear)

d_A = max. diameter (worm gear)

T_2 = output torque

MG = mineral grease

MO = mineral oil / synthetic grease

SO = synthetic oil

| Catalog. | i | γ_m | m | z_1 | worm | | wormgear | | | T_2 [Nm]No. | | |
|----------|------|------------|------|-------|----------|----------|----------|----------|-------|---------------|-----|-----|
| | | | | | d_{m1} | d_{a1} | z_2 | d_{m2} | d_A | Brass | | |
| | | | | | | | | | | MF | MO | SO |
| A63U6 | 6:1 | 25°51' | 3,5 | 4 | 32,1 | 39,1 | 24 | 93,9 | 104 | 89 | 107 | 134 |
| A63U12 | 12:1 | 13°52' | 2,5 | 3 | 31,29 | 36,29 | 36 | 94,71 | 104 | 141 | 170 | 212 |
| A63U19 | 19:1 | 10°8' | 2,5 | 2 | 28,4 | 33,4 | 38 | 97,6 | 104 | 133 | 159 | 199 |
| A63U26 | 26:1 | 6°17' | 3,5 | 1 | 32 | 39 | 26 | 94 | 104 | 172 | 206 | 258 |
| A63U34 | 34:1 | 5°9' | 2,75 | 1 | 30,6 | 36,1 | 34 | 95,4 | 104 | 148 | 178 | 222 |
| A63U48 | 48:1 | 3°51' | 2 | 1 | 29,78 | 33,78 | 48 | 96,22 | 104 | 125 | 150 | 187 |
| A63U63 | 63:1 | 2°47' | 1,5 | 1 | 30,85 | 33,85 | 63 | 95,15 | 101 | 111 | 133 | 166 |
| A63U70 | 70:1 | 1°59' | 1,25 | 1 | 36,1 | 38,6 | 70 | 89,9 | 97 | 112 | 135 | 169 |

All worms and worm gears stocked right hand only.

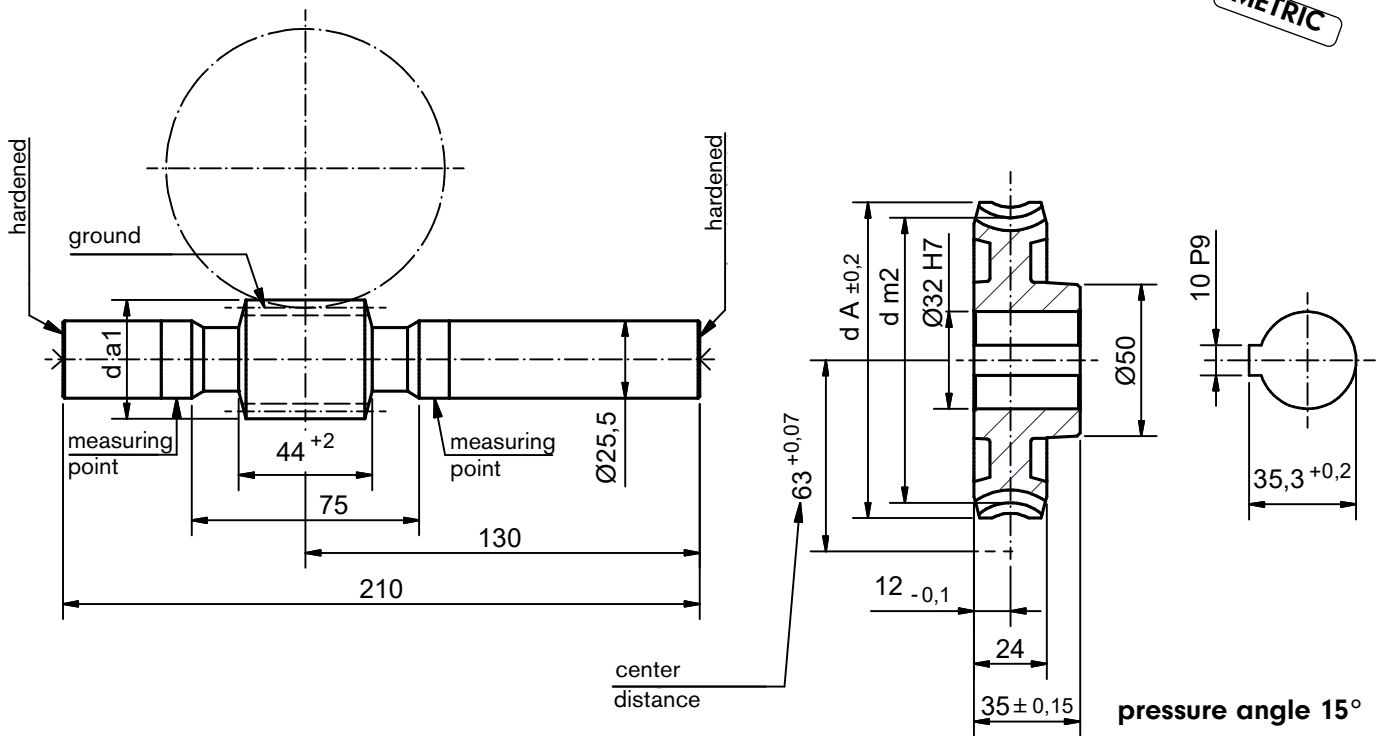
Worm made of case hardened and ground steel (HV 620 - 700). Lead content is ≤ 0.1 percent by weight.

Worm gear made of CuZn37Mn3Al2Si. Lead content is ≤ 0.1 percent by weight.

On request worm gears can be made of plastic or HGW 2083.

A63 (63 mm center distance)

METRIC



i = gear ratio

γ_m = lead angle m

m = module

z_1 = number of threads (worm)

d_{m1} = pitch diameter (worm)

d_{a1} = tip diameter (worm)

z_2 = No. of teeth (worm gear)

d_{m2} = pitch diameter (worm gear)

d_A = max. diameter (worm gear)

T_2 = output torque

MG = mineral grease

MO = mineral oil / synthetic grease

SO = synthetic oil

| Catalog. | i | γ_m | m | worm | | | wormgear | | | T_2 [Nm]No. | | |
|----------|------|------------|------|-------|----------|----------|----------|----------|-------|---------------|-----|-----|
| | | | | z_1 | d_{m1} | d_{a1} | z_2 | d_{m2} | d_A | MF | MO | SO |
| A63U6 | 6:1 | 25°51' | 3,5 | 4 | 32,1 | 39,1 | 24 | 93,9 | 104 | 89 | 107 | 134 |
| A63U12 | 12:1 | 13°52' | 2,5 | 3 | 31,29 | 36,29 | 36 | 94,71 | 104 | 141 | 170 | 212 |
| A63U19 | 19:1 | 10°8' | 2,5 | 2 | 28,4 | 33,4 | 38 | 97,6 | 104 | 133 | 159 | 199 |
| A63U26 | 26:1 | 6°17' | 3,5 | 1 | 32 | 39 | 26 | 94 | 104 | 172 | 206 | 258 |
| A63U34 | 34:1 | 5°9' | 2,75 | 1 | 30,6 | 36,1 | 34 | 95,4 | 104 | 148 | 178 | 222 |
| A63U48 | 48:1 | 3°51' | 2 | 1 | 29,78 | 33,78 | 48 | 96,22 | 104 | 125 | 150 | 187 |
| A63U63 | 63:1 | 2°47' | 1,5 | 1 | 30,85 | 33,85 | 63 | 95,15 | 101 | 111 | 133 | 166 |
| A63U70 | 70:1 | 1°59' | 1,25 | 1 | 36,1 | 38,6 | 70 | 89,9 | 97 | 112 | 135 | 169 |

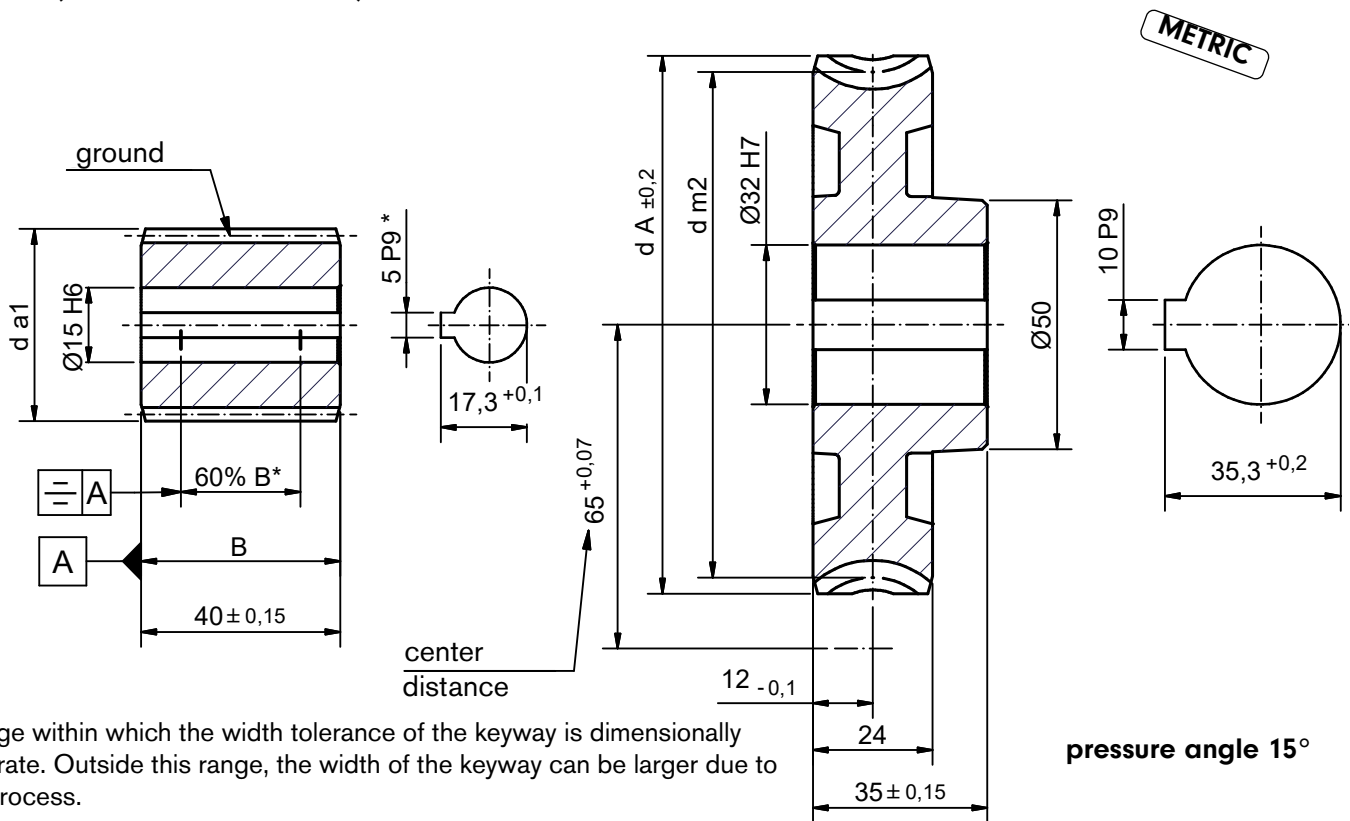
All worms and worm gears stocked right hand only.

Worm made of case hardened and ground steel (HV 620 - 700). Lead content is ≤ 0.1 percent by weight.

Worm gear made of CuZn37Mn3Al2Si. Lead content is ≤ 0.1 percent by weight.

On request worm gears can be made of plastic or HGW 2083.

A65 (65 mm center distance)



*Range within which the width tolerance of the keyway is dimensionally accurate. Outside this range, the width of the keyway can be larger due to the process.

i = gear ratio

γ_m = lead angle m

m = module

z_1 = number of threads (worm)

d_{m1} = pitch diameter (worm)

d_{a1} = tip diameter (worm)

z_2 = No. of teeth (worm gear)

d_{m2} = pitch diameter (worm gear)

d_A = max. diameter (worm gear)

T_2 = output torque

MG = mineral grease

MO = mineral oil / synthetic grease

SO = synthetic oil

| Catalog. | i | γ_m | m | worm | | | wormgear | | | T_2 [Nm]No. | | |
|----------|---------|------------|------|-------|----------|----------|----------|----------|-------|---------------|-----|-----|
| | | | | z_1 | d_{m1} | d_{a1} | z_2 | d_{m2} | d_A | Brass | | |
| | | | | | | | | | | MF | MO | SO |
| A65U6 | 6,25:1 | 25°51' | 3,5 | 4 | 32,1 | 39,1 | 25 | 97,9 | 108 | 101 | 121 | 151 |
| A65U13 | 12,66:1 | 13°52' | 2,5 | 3 | 31,29 | 36,29 | 38 | 98,71 | 108 | 156 | 187 | 234 |
| A65U20 | 20:1 | 10°8' | 2,5 | 2 | 28,4 | 33,4 | 40 | 101,6 | 108 | 146 | 176 | 220 |
| A65U28 | 28:1 | 6°17' | 3,5 | 1 | 32 | 39 | 28 | 98 | 108 | 192 | 230 | 288 |
| A65U36 | 36:1 | 5°9' | 2,75 | 1 | 30,6 | 36,1 | 36 | 99,4 | 108 | 164 | 197 | 246 |
| A65U50 | 50:1 | 3°51' | 2 | 1 | 29,78 | 33,78 | 50 | 100,22 | 108 | 137 | 164 | 205 |
| A65U66 | 66:1 | 2°47' | 1,5 | 1 | 30,85 | 33,85 | 66 | 99,15 | 107 | 122 | 146 | 183 |
| A65U75 | 75:1 | 1°59' | 1,25 | 1 | 36,1 | 38,6 | 75 | 93,9 | 100 | 125 | 150 | 188 |

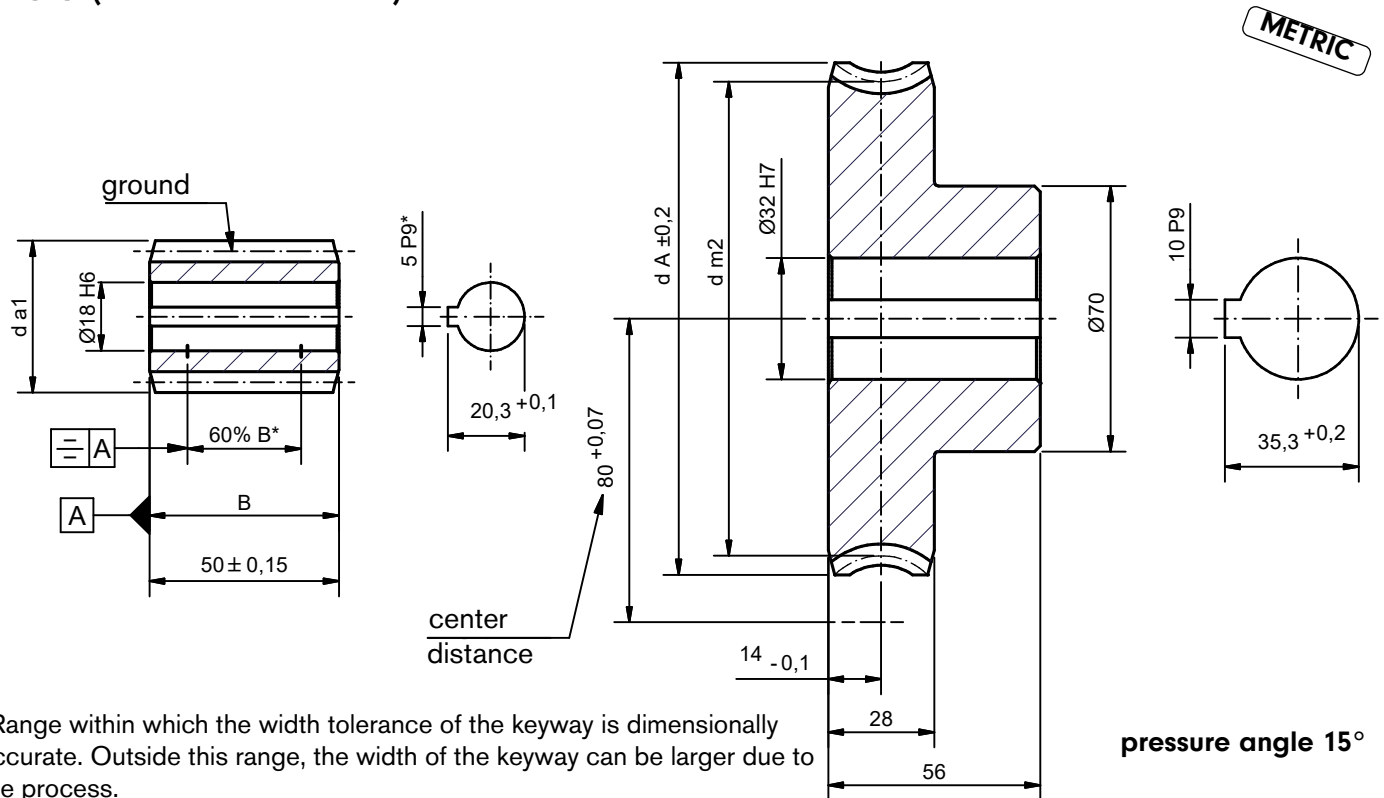
All worms and worm gears stocked right hand only.

Worm made of case hardened and ground steel (HV 620 - 700). Lead content is ≤ 0.1 percent by weight.

Worm gear made of CuZn37Mn3Al2Si. Lead content is ≤ 0.1 percent by weight.

On request worm gears can be made of plastic or HGW 2083.

A80 (80 mm center distance)



*Range within which the width tolerance of the keyway is dimensionally accurate. Outside this range, the width of the keyway can be larger due to the process.

i = gear ratio

γ_m = lead angle m

m = module

z_1 = number of threads (worm)

d_{m1} = pitch diameter (worm)

d_{a1} = tip diameter (worm)

z_2 = No. of teeth (worm gear)

d_{m2} = pitch diameter (worm gear)

d_A = max. diameter (worm gear)

T_2 = output torque

MG = mineral grease

MO = mineral oil / synthetic grease

SO = synthetic oil

| Catalog. | i | γ_m | m | z_1 | worm | | wormgear | | | T_2 [Nm]No. | | |
|----------|--------|------------|-----|-------|----------|----------|----------|----------|-------|---------------|-----|-----|
| | | | | | d_{m1} | d_{a1} | z_2 | d_{m2} | d_A | Brass | | |
| | | | | | | | | | | MF | MO | SO |
| A80Ü7 | 6,75:1 | 23°35' | 4 | 4 | 40 | 48 | 27 | 120 | 132 | 150 | 180 | 225 |
| A80Ü12 | 12:1 | 16°36' | 2,5 | 4 | 35 | 40 | 48 | 125 | 132,5 | 243 | 290 | 365 |
| A80Ü20 | 20:1 | 8°58' | 3 | 2 | 38,5 | 44,5 | 40 | 121,5 | 130,5 | 290 | 348 | 435 |
| A80Ü30 | 30:1 | 5°44' | 4 | 1 | 40 | 48 | 30 | 120 | 132,5 | 348 | 417 | 522 |
| A80Ü50 | 50:1 | 4°6' | 2,5 | 1 | 35 | 40 | 50 | 125 | 132,5 | 248 | 297 | 372 |
| A80Ü80 | 80:1 | 2°9' | 1,5 | 1 | 40 | 43 | 80 | 120 | 124,5 | 213 | 255 | 320 |

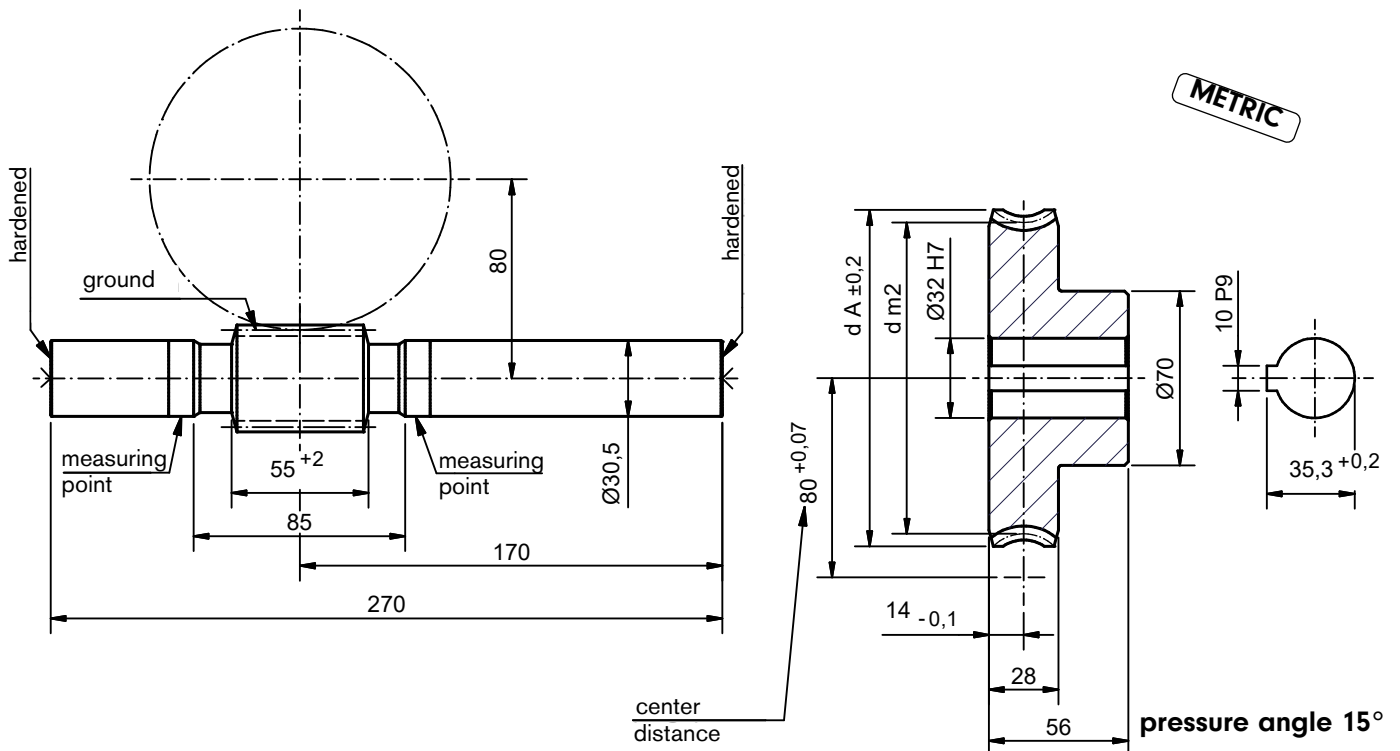
All worms and worm gears stocked right hand only.

Worm made of case hardened and ground steel (HV 620 - 700). Lead content is ≤ 0.1 percent by weight.

Worm gear made of CuZn37Mn3Al2Si. Lead content is ≤ 0.1 percent by weight.

On request worm gears can be made of plastic or HGW 2083.

A80 (80 mm center distance)



i = gear ratio

γ_m = lead angle m

m = module

z_1 = number of threads (worm)

d_{m1} = pitch diameter (worm)

d_{a1} = tip diameter (worm)

z_2 = No. of teeth (worm gear)

d_{m2} = pitch diameter (worm gear)

d_A = max. diameter (worm gear)

T_2 = output torque

MG = mineral grease

MO = mineral oil / synthetic grease

SO = synthetic oil

| Catalog. | i | γ_m | m | z_1 | worm | | wormgear | | | T_2 [Nm] No. | | |
|----------|--------|------------|-----|-------|----------|----------|----------|----------|-------|----------------|-----|-----|
| | | | | | d_{m1} | d_{a1} | z_2 | d_{m2} | d_A | MF | MO | SO |
| A80U7 | 6,75:1 | 23°35' | 4 | 4 | 40 | 48 | 27 | 120 | 132 | 150 | 180 | 225 |
| A80U12 | 12:1 | 16°36' | 2,5 | 4 | 35 | 40 | 48 | 125 | 132,5 | 243 | 290 | 365 |
| A80U20 | 20:1 | 8°58' | 3 | 2 | 38,5 | 44,5 | 40 | 121,5 | 130,5 | 290 | 348 | 435 |
| A80U30 | 30:1 | 5°44' | 4 | 1 | 40 | 48 | 30 | 120 | 132,5 | 348 | 417 | 522 |
| A80U50 | 50:1 | 4°6' | 2,5 | 1 | 35 | 40 | 50 | 125 | 132,5 | 248 | 297 | 372 |
| A80U80 | 80:1 | 2°9' | 1,5 | 1 | 40 | 43 | 80 | 120 | 124,5 | 213 | 255 | 320 |

All worms and worm gears stocked right hand only.

Worm made of 16MnCr5, case-hardened HV 620 - 700, soft shafts.. Lead content is ≤ 0.1 percent by weight.

Worm gear made of CuZn37Mn3Al2Si. Lead content is ≤ 0.1 percent by weight.

On request worm gears can be made of plastic or HGW 2083.

Efficiency factors

Efficiency factors depending on input (worm) speed and lubrication (mineral grease 'MG', mineral oil 'MO' or synthetic grease, synthetic oil 'SO')

A17

| | $n_1 = 2800 \text{ rpm}$ | | | $n_1 = 1400 \text{ rpm}$ | | | $n_1 = 950 \text{ rpm}$ | | | $n_1 = 700 \text{ rpm}$ | | | $n_1 = 500 \text{ rpm}$ | | |
|-----|--------------------------|------|------|--------------------------|------|------|-------------------------|------|------|-------------------------|------|------|-------------------------|------|------|
| | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO |
| U2 | 0,8 | 0,84 | 0,87 | 0,77 | 0,81 | 0,85 | 0,76 | 0,8 | 0,84 | 0,76 | 0,8 | 0,84 | 0,76 | 0,8 | 0,84 |
| U4 | 0,75 | 0,79 | 0,83 | 0,72 | 0,76 | 0,8 | 0,7 | 0,75 | 0,79 | 0,7 | 0,74 | 0,79 | 0,7 | 0,74 | 0,79 |
| U5 | 0,74 | 0,79 | 0,82 | 0,71 | 0,76 | 0,8 | 0,7 | 0,75 | 0,79 | 0,69 | 0,74 | 0,79 | 0,69 | 0,74 | 0,79 |
| U7 | 0,68 | 0,73 | 0,77 | 0,64 | 0,7 | 0,75 | 0,63 | 0,68 | 0,73 | 0,62 | 0,68 | 0,73 | 0,62 | 0,68 | 0,73 |
| U9 | 0,61 | 0,66 | 0,71 | 0,57 | 0,63 | 0,68 | 0,55 | 0,61 | 0,66 | 0,54 | 0,6 | 0,66 | 0,54 | 0,6 | 0,66 |
| U10 | 0,64 | 0,69 | 0,74 | 0,6 | 0,66 | 0,71 | 0,59 | 0,65 | 0,7 | 0,59 | 0,64 | 0,7 | 0,59 | 0,64 | 0,7 |
| U15 | 0,54 | 0,6 | 0,65 | 0,51 | 0,57 | 0,62 | 0,49 | 0,55 | 0,61 | 0,49 | 0,55 | 0,61 | 0,49 | 0,55 | 0,61 |
| U25 | 0,42 | 0,48 | 0,53 | 0,38 | 0,44 | 0,5 | 0,37 | 0,43 | 0,48 | 0,37 | 0,42 | 0,48 | 0,37 | 0,42 | 0,48 |
| U30 | 0,37 | 0,43 | 0,49 | 0,34 | 0,4 | 0,45 | 0,33 | 0,38 | 0,44 | 0,33 | 0,38 | 0,44 | 0,33 | 0,38 | 0,44 |
| U40 | 0,26 | 0,3 | 0,36 | 0,23 | 0,27 | 0,32 | 0,22 | 0,26 | 0,31 | 0,21 | 0,25 | 0,3 | 0,21 | 0,25 | 0,3 |
| U50 | 0,33 | 0,38 | 0,44 | 0,3 | 0,35 | 0,41 | 0,29 | 0,34 | 0,4 | 0,29 | 0,34 | 0,4 | 0,29 | 0,34 | 0,4 |
| U60 | 0,26 | 0,31 | 0,36 | 0,24 | 0,28 | 0,33 | 0,23 | 0,27 | 0,32 | 0,23 | 0,27 | 0,32 | 0,23 | 0,27 | 0,32 |
| U75 | 0,19 | 0,23 | 0,27 | 0,17 | 0,21 | 0,25 | 0,16 | 0,2 | 0,24 | 0,16 | 0,19 | 0,23 | 0,16 | 0,19 | 0,23 |
| U80 | 0,21 | 0,25 | 0,3 | 0,19 | 0,23 | 0,27 | 0,18 | 0,22 | 0,26 | 0,18 | 0,22 | 0,26 | 0,18 | 0,22 | 0,26 |

A22

| | $n_1 = 2800 \text{ rpm}$ | | | $n_1 = 1400 \text{ rpm}$ | | | $n_1 = 950 \text{ rpm}$ | | | $n_1 = 700 \text{ rpm}$ | | | $n_1 = 500 \text{ rpm}$ | | |
|-------|--------------------------|------|------|--------------------------|------|------|-------------------------|------|------|-------------------------|------|------|-------------------------|------|------|
| | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO |
| U3 | 0,74 | 0,79 | 0,82 | 0,71 | 0,76 | 0,8 | 0,69 | 0,74 | 0,79 | 0,68 | 0,73 | 0,78 | 0,67 | 0,72 | 0,77 |
| U4 | 0,75 | 0,79 | 0,83 | 0,72 | 0,76 | 0,8 | 0,7 | 0,75 | 0,79 | 0,69 | 0,74 | 0,78 | 0,68 | 0,73 | 0,77 |
| U7 | 0,66 | 0,71 | 0,76 | 0,63 | 0,68 | 0,73 | 0,61 | 0,66 | 0,71 | 0,6 | 0,65 | 0,7 | 0,59 | 0,64 | 0,69 |
| U10,5 | 0,57 | 0,63 | 0,68 | 0,53 | 0,59 | 0,65 | 0,51 | 0,57 | 0,63 | 0,5 | 0,56 | 0,62 | 0,49 | 0,55 | 0,61 |
| U21 | 0,4 | 0,46 | 0,52 | 0,37 | 0,42 | 0,48 | 0,35 | 0,4 | 0,46 | 0,34 | 0,39 | 0,45 | 0,33 | 0,38 | 0,44 |
| U30 | 0,34 | 0,39 | 0,45 | 0,3 | 0,35 | 0,41 | 0,29 | 0,34 | 0,39 | 0,27 | 0,32 | 0,38 | 0,27 | 0,32 | 0,37 |
| U40 | 0,29 | 0,34 | 0,4 | 0,26 | 0,31 | 0,36 | 0,25 | 0,29 | 0,34 | 0,24 | 0,28 | 0,33 | 0,23 | 0,28 | 0,33 |

A25

| | $n_1 = 2800 \text{ rpm}$ | | | $n_1 = 1400 \text{ rpm}$ | | | $n_1 = 950 \text{ rpm}$ | | | $n_1 = 700 \text{ rpm}$ | | | $n_1 = 500 \text{ rpm}$ | | |
|------|--------------------------|------|------|--------------------------|------|------|-------------------------|------|------|-------------------------|------|------|-------------------------|------|------|
| | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO |
| U4 | 0,76 | 0,8 | 0,84 | 0,73 | 0,77 | 0,81 | 0,71 | 0,76 | 0,8 | 0,7 | 0,75 | 0,79 | 0,69 | 0,74 | 0,78 |
| U5 | 0,75 | 0,79 | 0,83 | 0,71 | 0,76 | 0,8 | 0,7 | 0,75 | 0,79 | 0,69 | 0,74 | 0,78 | 0,68 | 0,73 | 0,77 |
| U6,5 | 0,7 | 0,74 | 0,79 | 0,66 | 0,71 | 0,76 | 0,64 | 0,7 | 0,75 | 0,63 | 0,68 | 0,73 | 0,62 | 0,67 | 0,72 |
| U10 | 0,61 | 0,66 | 0,71 | 0,57 | 0,62 | 0,68 | 0,55 | 0,61 | 0,66 | 0,53 | 0,59 | 0,65 | 0,52 | 0,58 | 0,64 |
| U15 | 0,53 | 0,59 | 0,64 | 0,49 | 0,55 | 0,61 | 0,47 | 0,53 | 0,59 | 0,46 | 0,52 | 0,58 | 0,45 | 0,51 | 0,57 |
| U20 | 0,44 | 0,5 | 0,55 | 0,4 | 0,46 | 0,51 | 0,38 | 0,44 | 0,5 | 0,37 | 0,42 | 0,48 | 0,36 | 0,41 | 0,47 |
| U25 | 0,3 | 0,36 | 0,41 | 0,27 | 0,32 | 0,38 | 0,26 | 0,3 | 0,35 | 0,25 | 0,29 | 0,34 | 0,23 | 0,28 | 0,33 |
| U30 | 0,34 | 0,4 | 0,46 | 0,31 | 0,36 | 0,42 | 0,29 | 0,34 | 0,4 | 0,28 | 0,33 | 0,38 | 0,27 | 0,32 | 0,37 |
| U40 | 0,31 | 0,36 | 0,42 | 0,28 | 0,33 | 0,38 | 0,26 | 0,31 | 0,37 | 0,25 | 0,3 | 0,35 | 0,25 | 0,29 | 0,35 |
| U50 | 0,24 | 0,28 | 0,33 | 0,21 | 0,25 | 0,3 | 0,2 | 0,24 | 0,28 | 0,19 | 0,23 | 0,27 | 0,18 | 0,22 | 0,26 |

The stated values are approximate values.

Efficiency factors

Efficiency factors depending on input (worm) speed and lubrication (mineral grease 'MG', mineral oil 'MO' or synthetic grease, synthetic oil 'SO')

A31

| | $n_1 = 2800 \text{ rpm}$ | | | $n_1 = 1400 \text{ rpm}$ | | | $n_1 = 950 \text{ rpm}$ | | | $n_1 = 700 \text{ rpm}$ | | | $n_1 = 500 \text{ rpm}$ | | |
|-------|--------------------------|------|------|--------------------------|------|------|-------------------------|------|------|-------------------------|------|------|-------------------------|------|------|
| | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO |
| U2,5 | 0,82 | 0,85 | 0,88 | 0,79 | 0,83 | 0,86 | 0,78 | 0,82 | 0,85 | 0,77 | 0,81 | 0,85 | 0,76 | 0,8 | 0,84 |
| U3 | 0,81 | 0,85 | 0,87 | 0,78 | 0,82 | 0,86 | 0,77 | 0,81 | 0,85 | 0,76 | 0,8 | 0,84 | 0,75 | 0,79 | 0,83 |
| U4,28 | 0,79 | 0,82 | 0,86 | 0,76 | 0,8 | 0,83 | 0,74 | 0,78 | 0,82 | 0,73 | 0,77 | 0,81 | 0,72 | 0,76 | 0,81 |
| U5 | 0,78 | 0,82 | 0,85 | 0,75 | 0,79 | 0,83 | 0,73 | 0,78 | 0,82 | 0,72 | 0,77 | 0,81 | 0,71 | 0,76 | 0,8 |
| U6 | 0,74 | 0,79 | 0,82 | 0,71 | 0,76 | 0,8 | 0,7 | 0,74 | 0,79 | 0,68 | 0,73 | 0,78 | 0,67 | 0,72 | 0,77 |
| U7 | 0,75 | 0,79 | 0,83 | 0,72 | 0,77 | 0,81 | 0,71 | 0,75 | 0,8 | 0,69 | 0,74 | 0,79 | 0,69 | 0,74 | 0,78 |
| U8,33 | 0,74 | 0,79 | 0,82 | 0,71 | 0,76 | 0,8 | 0,7 | 0,75 | 0,79 | 0,69 | 0,74 | 0,78 | 0,68 | 0,73 | 0,78 |
| U10 | 0,68 | 0,73 | 0,77 | 0,64 | 0,7 | 0,75 | 0,63 | 0,68 | 0,73 | 0,61 | 0,67 | 0,72 | 0,6 | 0,66 | 0,71 |
| U12 | 0,69 | 0,74 | 0,78 | 0,65 | 0,7 | 0,75 | 0,64 | 0,69 | 0,74 | 0,62 | 0,68 | 0,73 | 0,62 | 0,67 | 0,72 |
| U15 | 0,64 | 0,69 | 0,74 | 0,6 | 0,66 | 0,71 | 0,58 | 0,64 | 0,69 | 0,57 | 0,63 | 0,68 | 0,56 | 0,62 | 0,68 |
| U18 | 0,59 | 0,65 | 0,7 | 0,56 | 0,61 | 0,67 | 0,54 | 0,6 | 0,65 | 0,53 | 0,58 | 0,64 | 0,52 | 0,58 | 0,63 |
| U20* | 0,57 | 0,63 | 0,68 | 0,53 | 0,59 | 0,64 | 0,51 | 0,57 | 0,63 | 0,5 | 0,56 | 0,62 | 0,49 | 0,55 | 0,61 |
| U20** | 0,59 | 0,64 | 0,69 | 0,55 | 0,61 | 0,66 | 0,53 | 0,59 | 0,64 | 0,52 | 0,58 | 0,63 | 0,51 | 0,57 | 0,63 |
| U22 | 0,53 | 0,59 | 0,64 | 0,49 | 0,55 | 0,61 | 0,47 | 0,53 | 0,59 | 0,46 | 0,52 | 0,58 | 0,45 | 0,51 | 0,57 |
| U23 | 0,56 | 0,61 | 0,67 | 0,52 | 0,58 | 0,63 | 0,5 | 0,56 | 0,61 | 0,49 | 0,55 | 0,6 | 0,48 | 0,54 | 0,6 |
| U24 | 0,48 | 0,54 | 0,59 | 0,44 | 0,49 | 0,55 | 0,42 | 0,48 | 0,54 | 0,4 | 0,46 | 0,52 | 0,39 | 0,45 | 0,51 |
| U25 | 0,49 | 0,55 | 0,61 | 0,45 | 0,51 | 0,57 | 0,44 | 0,5 | 0,55 | 0,42 | 0,48 | 0,54 | 0,41 | 0,47 | 0,53 |
| U28 | 0,44 | 0,5 | 0,56 | 0,4 | 0,46 | 0,51 | 0,38 | 0,44 | 0,5 | 0,37 | 0,42 | 0,48 | 0,36 | 0,41 | 0,47 |
| U30 | 0,47 | 0,53 | 0,59 | 0,43 | 0,49 | 0,55 | 0,41 | 0,47 | 0,53 | 0,4 | 0,46 | 0,52 | 0,39 | 0,45 | 0,51 |
| U32 | 0,45 | 0,51 | 0,57 | 0,41 | 0,47 | 0,53 | 0,4 | 0,45 | 0,51 | 0,38 | 0,44 | 0,5 | 0,38 | 0,43 | 0,49 |
| U38 | 0,46 | 0,52 | 0,57 | 0,42 | 0,48 | 0,54 | 0,4 | 0,46 | 0,52 | 0,39 | 0,45 | 0,51 | 0,39 | 0,45 | 0,51 |
| U45 | 0,37 | 0,43 | 0,49 | 0,34 | 0,39 | 0,45 | 0,32 | 0,37 | 0,43 | 0,31 | 0,36 | 0,42 | 0,3 | 0,36 | 0,41 |
| U50 | 0,35 | 0,4 | 0,46 | 0,31 | 0,37 | 0,42 | 0,3 | 0,35 | 0,4 | 0,29 | 0,34 | 0,39 | 0,28 | 0,33 | 0,39 |
| U55 | 0,4 | 0,46 | 0,52 | 0,37 | 0,43 | 0,48 | 0,36 | 0,41 | 0,47 | 0,35 | 0,41 | 0,46 | 0,35 | 0,41 | 0,46 |
| U60 | 0,31 | 0,36 | 0,42 | 0,28 | 0,32 | 0,38 | 0,26 | 0,31 | 0,36 | 0,25 | 0,3 | 0,35 | 0,25 | 0,29 | 0,34 |
| U70 | 0,34 | 0,39 | 0,45 | 0,31 | 0,36 | 0,41 | 0,29 | 0,34 | 0,4 | 0,29 | 0,34 | 0,39 | 0,29 | 0,34 | 0,39 |
| U75 | 0,26 | 0,31 | 0,36 | 0,23 | 0,28 | 0,33 | 0,22 | 0,26 | 0,31 | 0,21 | 0,25 | 0,3 | 0,21 | 0,25 | 0,3 |
| U90 | 0,23 | 0,27 | 0,32 | 0,2 | 0,24 | 0,29 | 0,19 | 0,23 | 0,27 | 0,18 | 0,22 | 0,26 | 0,18 | 0,22 | 0,26 |
| U100 | 0,28 | 0,33 | 0,38 | 0,25 | 0,3 | 0,35 | 0,24 | 0,29 | 0,34 | 0,24 | 0,28 | 0,33 | 0,24 | 0,28 | 0,33 |

The stated values are approximate values.

* module $m = 0,75$

** module $m = 1,15$

Efficiency factors

Efficiency factors depending on input (worm) speed and lubrication (mineral grease 'MG', mineral oil 'MO' or synthetic grease, synthetic oil 'SO')

A33

| | n ₁ = 2800 rpm | | | n ₁ = 1400 rpm | | | n ₁ = 950 rpm | | | n ₁ = 700 rpm | | | n ₁ = 500 rpm | | |
|------|---------------------------|------|------|---------------------------|------|------|--------------------------|------|------|--------------------------|------|------|--------------------------|------|------|
| | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO |
| U3,5 | 0,79 | 0,83 | 0,86 | 0,77 | 0,81 | 0,84 | 0,75 | 0,79 | 0,83 | 0,74 | 0,78 | 0,82 | 0,72 | 0,77 | 0,81 |
| U5 | 0,77 | 0,81 | 0,84 | 0,74 | 0,78 | 0,82 | 0,72 | 0,76 | 0,81 | 0,71 | 0,75 | 0,8 | 0,69 | 0,74 | 0,79 |
| U7 | 0,72 | 0,77 | 0,81 | 0,69 | 0,74 | 0,78 | 0,67 | 0,72 | 0,77 | 0,66 | 0,71 | 0,76 | 0,65 | 0,7 | 0,75 |
| U10 | 0,69 | 0,74 | 0,78 | 0,65 | 0,7 | 0,75 | 0,64 | 0,69 | 0,74 | 0,62 | 0,68 | 0,73 | 0,61 | 0,67 | 0,72 |
| U11 | 0,65 | 0,7 | 0,75 | 0,61 | 0,67 | 0,72 | 0,6 | 0,65 | 0,7 | 0,58 | 0,64 | 0,69 | 0,57 | 0,63 | 0,68 |
| U12 | 0,66 | 0,71 | 0,75 | 0,62 | 0,67 | 0,72 | 0,6 | 0,66 | 0,71 | 0,59 | 0,64 | 0,7 | 0,58 | 0,63 | 0,69 |
| U14 | 0,57 | 0,63 | 0,68 | 0,53 | 0,59 | 0,65 | 0,51 | 0,57 | 0,63 | 0,5 | 0,56 | 0,62 | 0,49 | 0,54 | 0,6 |
| U15 | 0,6 | 0,65 | 0,7 | 0,56 | 0,62 | 0,67 | 0,54 | 0,6 | 0,65 | 0,53 | 0,58 | 0,64 | 0,51 | 0,57 | 0,63 |
| U16 | 0,63 | 0,68 | 0,73 | 0,59 | 0,64 | 0,7 | 0,57 | 0,63 | 0,68 | 0,56 | 0,62 | 0,67 | 0,55 | 0,61 | 0,66 |
| U17 | 0,61 | 0,66 | 0,71 | 0,57 | 0,62 | 0,68 | 0,55 | 0,61 | 0,66 | 0,54 | 0,6 | 0,65 | 0,53 | 0,59 | 0,64 |
| U18 | 0,55 | 0,61 | 0,67 | 0,51 | 0,57 | 0,63 | 0,5 | 0,55 | 0,61 | 0,48 | 0,54 | 0,6 | 0,47 | 0,53 | 0,59 |
| U20 | 0,54 | 0,6 | 0,66 | 0,5 | 0,56 | 0,62 | 0,49 | 0,54 | 0,6 | 0,47 | 0,53 | 0,59 | 0,46 | 0,52 | 0,58 |
| U24 | 0,49 | 0,55 | 0,61 | 0,45 | 0,51 | 0,57 | 0,44 | 0,5 | 0,55 | 0,42 | 0,48 | 0,54 | 0,41 | 0,47 | 0,53 |
| U28 | 0,4 | 0,46 | 0,52 | 0,37 | 0,42 | 0,48 | 0,35 | 0,4 | 0,46 | 0,33 | 0,39 | 0,45 | 0,32 | 0,38 | 0,43 |
| U30 | 0,43 | 0,49 | 0,55 | 0,39 | 0,45 | 0,51 | 0,37 | 0,43 | 0,49 | 0,36 | 0,42 | 0,47 | 0,35 | 0,4 | 0,46 |
| U32 | 0,46 | 0,52 | 0,58 | 0,42 | 0,48 | 0,54 | 0,4 | 0,46 | 0,52 | 0,39 | 0,45 | 0,51 | 0,38 | 0,44 | 0,5 |
| U38 | 0,41 | 0,47 | 0,53 | 0,37 | 0,43 | 0,49 | 0,36 | 0,41 | 0,47 | 0,34 | 0,4 | 0,46 | 0,33 | 0,39 | 0,45 |
| U50 | 0,31 | 0,36 | 0,42 | 0,28 | 0,33 | 0,38 | 0,26 | 0,31 | 0,38 | 0,25 | 0,3 | 0,35 | 0,24 | 0,29 | 0,34 |
| U56 | 0,29 | 0,34 | 0,39 | 0,25 | 0,3 | 0,35 | 0,24 | 0,29 | 0,34 | 0,23 | 0,27 | 0,32 | 0,22 | 0,26 | 0,31 |
| U60 | 0,31 | 0,36 | 0,42 | 0,28 | 0,33 | 0,38 | 0,26 | 0,31 | 0,37 | 0,25 | 0,3 | 0,35 | 0,25 | 0,29 | 0,35 |
| U72 | 0,22 | 0,26 | 0,31 | 0,19 | 0,23 | 0,28 | 0,18 | 0,22 | 0,26 | 0,17 | 0,21 | 0,25 | 0,17 | 0,2 | 0,24 |
| U75 | 0,24 | 0,28 | 0,33 | 0,21 | 0,25 | 0,29 | 0,2 | 0,24 | 0,28 | 0,19 | 0,23 | 0,27 | 0,18 | 0,22 | 0,26 |

The stated values are approximate values.

Efficiency factors

Efficiency factors depending on input (worm) speed and lubrication (mineral grease 'MG', mineral oil 'MO' or synthetic grease, synthetic oil 'SO')

A35

| | $n_1 = 2800 \text{ rpm}$ | | | $n_1 = 1400 \text{ rpm}$ | | | $n_1 = 950 \text{ rpm}$ | | | $n_1 = 700 \text{ rpm}$ | | | $n_1 = 500 \text{ rpm}$ | | |
|-------|--------------------------|------|------|--------------------------|------|------|-------------------------|------|------|-------------------------|------|------|-------------------------|------|------|
| | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO |
| U2,78 | 0,81 | 0,85 | 0,87 | 0,79 | 0,83 | 0,86 | 0,77 | 0,81 | 0,84 | 0,76 | 0,8 | 0,84 | 0,75 | 0,79 | 0,83 |
| U5 | 0,78 | 0,82 | 0,85 | 0,75 | 0,79 | 0,83 | 0,73 | 0,78 | 0,82 | 0,72 | 0,77 | 0,81 | 0,71 | 0,76 | 0,8 |
| U7,25 | 0,71 | 0,75 | 0,8 | 0,68 | 0,73 | 0,77 | 0,65 | 0,71 | 0,75 | 0,64 | 0,69 | 0,74 | 0,63 | 0,68 | 0,73 |
| U8 | 0,71 | 0,76 | 0,8 | 0,68 | 0,73 | 0,77 | 0,66 | 0,71 | 0,76 | 0,65 | 0,7 | 0,75 | 0,63 | 0,69 | 0,74 |
| U10 | 0,66 | 0,71 | 0,76 | 0,62 | 0,68 | 0,73 | 0,6 | 0,66 | 0,71 | 0,59 | 0,64 | 0,7 | 0,57 | 0,63 | 0,68 |
| U11 | 0,65 | 0,7 | 0,75 | 0,62 | 0,67 | 0,72 | 0,6 | 0,65 | 0,7 | 0,58 | 0,64 | 0,69 | 0,57 | 0,63 | 0,68 |
| U12 | 0,63 | 0,68 | 0,73 | 0,59 | 0,64 | 0,7 | 0,57 | 0,62 | 0,68 | 0,55 | 0,61 | 0,66 | 0,54 | 0,6 | 0,65 |
| U15 | 0,57 | 0,62 | 0,68 | 0,53 | 0,59 | 0,64 | 0,5 | 0,56 | 0,62 | 0,49 | 0,55 | 0,61 | 0,48 | 0,54 | 0,59 |
| U20 | 0,51 | 0,57 | 0,62 | 0,47 | 0,53 | 0,59 | 0,45 | 0,51 | 0,56 | 0,43 | 0,49 | 0,55 | 0,42 | 0,48 | 0,54 |
| U25 | 0,44 | 0,5 | 0,56 | 0,4 | 0,46 | 0,52 | 0,38 | 0,44 | 0,5 | 0,37 | 0,42 | 0,48 | 0,35 | 0,41 | 0,47 |
| U30 | 0,4 | 0,45 | 0,51 | 0,36 | 0,42 | 0,47 | 0,34 | 0,39 | 0,45 | 0,33 | 0,38 | 0,44 | 0,31 | 0,37 | 0,42 |
| U35 | 0,41 | 0,47 | 0,53 | 0,37 | 0,43 | 0,49 | 0,36 | 0,41 | 0,47 | 0,34 | 0,4 | 0,46 | 0,33 | 0,39 | 0,44 |
| U40 | 0,34 | 0,4 | 0,45 | 0,31 | 0,36 | 0,42 | 0,29 | 0,34 | 0,4 | 0,28 | 0,33 | 0,38 | 0,27 | 0,32 | 0,37 |
| U50 | 0,28 | 0,33 | 0,39 | 0,25 | 0,3 | 0,35 | 0,24 | 0,28 | 0,33 | 0,23 | 0,27 | 0,32 | 0,22 | 0,26 | 0,31 |
| U58 | 0,3 | 0,35 | 0,41 | 0,27 | 0,32 | 0,37 | 0,26 | 0,3 | 0,35 | 0,24 | 0,29 | 0,34 | 0,24 | 0,28 | 0,33 |
| U90 | 0,18 | 0,22 | 0,26 | 0,16 | 0,19 | 0,23 | 0,15 | 0,18 | 0,22 | 0,14 | 0,17 | 0,21 | 0,13 | 0,16 | 0,2 |

The stated values are approximate values.

Efficiency factors

Efficiency factors depending on input (worm) speed and lubrication (mineral grease 'MG', mineral oil 'MO' or synthetic grease, synthetic oil 'SO')

A40

| | $n_1 = 2800 \text{ rpm}$ | | | $n_1 = 1400 \text{ rpm}$ | | | $n_1 = 950 \text{ rpm}$ | | | $n_1 = 700 \text{ rpm}$ | | | $n_1 = 500 \text{ rpm}$ | | |
|-------|--------------------------|------|------|--------------------------|------|------|-------------------------|------|------|-------------------------|------|------|-------------------------|------|------|
| | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO |
| U6,75 | 0,77 | 0,81 | 0,84 | 0,74 | 0,78 | 0,82 | 0,72 | 0,77 | 0,81 | 0,71 | 0,76 | 0,8 | 0,7 | 0,75 | 0,79 |
| U8 | 0,74 | 0,78 | 0,82 | 0,7 | 0,75 | 0,79 | 0,68 | 0,73 | 0,78 | 0,67 | 0,72 | 0,77 | 0,66 | 0,71 | 0,76 |
| U10 | 0,72 | 0,77 | 0,81 | 0,69 | 0,74 | 0,78 | 0,67 | 0,72 | 0,77 | 0,66 | 0,71 | 0,76 | 0,65 | 0,7 | 0,75 |
| U12 | 0,65 | 0,7 | 0,75 | 0,62 | 0,67 | 0,72 | 0,6 | 0,65 | 0,7 | 0,58 | 0,64 | 0,69 | 0,57 | 0,62 | 0,68 |
| U15 | 0,64 | 0,69 | 0,74 | 0,6 | 0,65 | 0,71 | 0,58 | 0,64 | 0,69 | 0,57 | 0,62 | 0,68 | 0,55 | 0,61 | 0,66 |
| U20 | 0,61 | 0,66 | 0,71 | 0,57 | 0,63 | 0,68 | 0,55 | 0,61 | 0,66 | 0,54 | 0,6 | 0,65 | 0,53 | 0,59 | 0,64 |
| U25 | 0,52 | 0,58 | 0,64 | 0,48 | 0,54 | 0,6 | 0,46 | 0,52 | 0,58 | 0,45 | 0,51 | 0,56 | 0,43 | 0,49 | 0,55 |
| U28 | 0,47 | 0,53 | 0,59 | 0,43 | 0,49 | 0,55 | 0,41 | 0,47 | 0,53 | 0,4 | 0,46 | 0,52 | 0,39 | 0,44 | 0,5 |
| U30 | 0,51 | 0,57 | 0,62 | 0,47 | 0,53 | 0,59 | 0,45 | 0,51 | 0,57 | 0,44 | 0,5 | 0,55 | 0,43 | 0,48 | 0,54 |
| U35 | 0,49 | 0,55 | 0,6 | 0,45 | 0,51 | 0,57 | 0,43 | 0,49 | 0,55 | 0,42 | 0,48 | 0,54 | 0,41 | 0,47 | 0,53 |
| U36 | 0,39 | 0,45 | 0,5 | 0,35 | 0,41 | 0,47 | 0,33 | 0,39 | 0,44 | 0,32 | 0,37 | 0,43 | 0,31 | 0,36 | 0,42 |
| U38 | 0,41 | 0,47 | 0,53 | 0,37 | 0,43 | 0,49 | 0,36 | 0,41 | 0,47 | 0,34 | 0,4 | 0,45 | 0,33 | 0,38 | 0,44 |
| U40 | 0,44 | 0,5 | 0,56 | 0,4 | 0,46 | 0,52 | 0,38 | 0,44 | 0,5 | 0,37 | 0,43 | 0,48 | 0,36 | 0,41 | 0,47 |
| U50 | 0,42 | 0,48 | 0,54 | 0,38 | 0,44 | 0,5 | 0,37 | 0,42 | 0,48 | 0,35 | 0,41 | 0,47 | 0,35 | 0,4 | 0,46 |
| U56 | 0,31 | 0,36 | 0,42 | 0,28 | 0,33 | 0,38 | 0,26 | 0,31 | 0,36 | 0,25 | 0,3 | 0,35 | 0,24 | 0,29 | 0,34 |
| U60 | 0,28 | 0,33 | 0,38 | 0,25 | 0,29 | 0,34 | 0,23 | 0,28 | 0,32 | 0,22 | 0,26 | 0,31 | 0,21 | 0,25 | 0,3 |
| U70 | 0,35 | 0,4 | 0,46 | 0,31 | 0,37 | 0,42 | 0,3 | 0,35 | 0,4 | 0,29 | 0,34 | 0,39 | 0,28 | 0,33 | 0,39 |
| U75 | 0,25 | 0,3 | 0,35 | 0,23 | 0,27 | 0,32 | 0,21 | 0,25 | 0,3 | 0,2 | 0,24 | 0,29 | 0,19 | 0,23 | 0,28 |
| U80 | 0,28 | 0,33 | 0,39 | 0,25 | 0,3 | 0,35 | 0,24 | 0,28 | 0,33 | 0,23 | 0,27 | 0,32 | 0,22 | 0,26 | 0,31 |
| U90 | 0,29 | 0,34 | 0,4 | 0,36 | 0,31 | 0,36 | 0,25 | 0,29 | 0,35 | 0,24 | 0,28 | 0,33 | 0,23 | 0,28 | 0,33 |

A50

| | $n_1 = 2800 \text{ rpm}$ | | | $n_1 = 1400 \text{ rpm}$ | | | $n_1 = 950 \text{ rpm}$ | | | $n_1 = 700 \text{ rpm}$ | | | $n_1 = 500 \text{ rpm}$ | | |
|-------|--------------------------|------|------|--------------------------|------|------|-------------------------|------|------|-------------------------|------|------|-------------------------|------|------|
| | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO |
| U4,25 | 0,8 | 0,84 | 0,87 | 0,78 | 0,82 | 0,85 | 0,76 | 0,8 | 0,84 | 0,75 | 0,79 | 0,83 | 0,74 | 0,78 | 0,82 |
| U6 | 0,77 | 0,81 | 0,84 | 0,74 | 0,78 | 0,82 | 0,72 | 0,77 | 0,81 | 0,71 | 0,76 | 0,8 | 0,7 | 0,74 | 0,79 |
| U8 | 0,72 | 0,76 | 0,8 | 0,69 | 0,74 | 0,78 | 0,67 | 0,72 | 0,76 | 0,65 | 0,7 | 0,75 | 0,64 | 0,69 | 0,74 |
| U12 | 0,66 | 0,71 | 0,76 | 0,63 | 0,68 | 0,73 | 0,61 | 0,66 | 0,71 | 0,59 | 0,65 | 0,7 | 0,58 | 0,63 | 0,69 |
| U13,5 | 0,65 | 0,7 | 0,74 | 0,61 | 0,67 | 0,72 | 0,59 | 0,64 | 0,7 | 0,57 | 0,63 | 0,68 | 0,56 | 0,62 | 0,67 |
| U19 | 0,55 | 0,61 | 0,66 | 0,52 | 0,57 | 0,63 | 0,49 | 0,55 | 0,61 | 0,48 | 0,54 | 0,59 | 0,46 | 0,52 | 0,58 |
| U23 | 0,52 | 0,58 | 0,64 | 0,49 | 0,55 | 0,6 | 0,46 | 0,52 | 0,58 | 0,45 | 0,51 | 0,57 | 0,43 | 0,49 | 0,55 |
| U27 | 0,48 | 0,54 | 0,59 | 0,44 | 0,5 | 0,56 | 0,42 | 0,48 | 0,54 | 0,4 | 0,46 | 0,52 | 0,39 | 0,45 | 0,51 |
| U35 | 0,43 | 0,49 | 0,55 | 0,4 | 0,45 | 0,51 | 0,37 | 0,43 | 0,49 | 0,36 | 0,41 | 0,47 | 0,34 | 0,4 | 0,46 |
| U46 | 0,36 | 0,41 | 0,47 | 0,32 | 0,38 | 0,43 | 0,3 | 0,36 | 0,41 | 0,29 | 0,34 | 0,4 | 0,28 | 0,33 | 0,38 |
| U55 | 0,31 | 0,37 | 0,42 | 0,29 | 0,34 | 0,39 | 0,27 | 0,31 | 0,37 | 0,25 | 0,3 | 0,35 | 0,24 | 0,29 | 0,34 |
| U69 | 0,27 | 0,32 | 0,37 | 0,24 | 0,29 | 0,34 | 0,23 | 0,27 | 0,32 | 0,21 | 0,26 | 0,3 | 0,2 | 0,25 | 0,29 |

The stated values are approximate values.

Efficiency factors

Efficiency factors depending on input (worm) speed and lubrication (mineral grease 'MG', mineral oil 'MO' or synthetic grease, synthetic oil 'SO')

A53

| | $n_1 = 2800 \text{ rpm}$ | | | $n_1 = 1400 \text{ rpm}$ | | | $n_1 = 950 \text{ rpm}$ | | | $n_1 = 700 \text{ rpm}$ | | | $n_1 = 500 \text{ rpm}$ | | |
|-------|--------------------------|------|------|--------------------------|------|------|-------------------------|------|------|-------------------------|------|------|-------------------------|------|------|
| | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO |
| U4,75 | 0,8 | 0,84 | 0,87 | 0,78 | 0,82 | 0,85 | 0,76 | 0,8 | 0,84 | 0,75 | 0,79 | 0,83 | 0,74 | 0,78 | 0,82 |
| U6,67 | 0,77 | 0,81 | 0,84 | 0,74 | 0,78 | 0,82 | 0,72 | 0,77 | 0,81 | 0,71 | 0,76 | 0,8 | 0,7 | 0,74 | 0,79 |
| U9,67 | 0,72 | 0,76 | 0,8 | 0,69 | 0,74 | 0,78 | 0,67 | 0,72 | 0,76 | 0,65 | 0,7 | 0,75 | 0,64 | 0,69 | 0,74 |
| U13,5 | 0,66 | 0,71 | 0,76 | 0,63 | 0,68 | 0,73 | 0,61 | 0,66 | 0,71 | 0,59 | 0,65 | 0,7 | 0,58 | 0,63 | 0,69 |
| U15 | 0,65 | 0,7 | 0,74 | 0,61 | 0,67 | 0,72 | 0,59 | 0,64 | 0,7 | 0,57 | 0,63 | 0,68 | 0,56 | 0,62 | 0,67 |
| U21 | 0,55 | 0,61 | 0,66 | 0,52 | 0,57 | 0,63 | 0,49 | 0,55 | 0,61 | 0,48 | 0,54 | 0,59 | 0,46 | 0,52 | 0,58 |
| U25 | 0,52 | 0,58 | 0,64 | 0,49 | 0,55 | 0,6 | 0,46 | 0,52 | 0,58 | 0,45 | 0,51 | 0,57 | 0,43 | 0,49 | 0,55 |
| U28 | 0,44 | 0,5 | 0,56 | 0,41 | 0,47 | 0,53 | 0,39 | 0,45 | 0,51 | 0,37 | 0,43 | 0,49 | 0,36 | 0,42 | 0,47 |
| U30 | 0,48 | 0,54 | 0,59 | 0,44 | 0,5 | 0,56 | 0,42 | 0,48 | 0,54 | 0,4 | 0,46 | 0,52 | 0,39 | 0,45 | 0,51 |
| U38 | 0,43 | 0,49 | 0,55 | 0,4 | 0,45 | 0,51 | 0,37 | 0,43 | 0,49 | 0,36 | 0,41 | 0,47 | 0,34 | 0,4 | 0,46 |
| U50 | 0,36 | 0,41 | 0,47 | 0,32 | 0,38 | 0,43 | 0,3 | 0,36 | 0,41 | 0,29 | 0,34 | 0,4 | 0,28 | 0,33 | 0,38 |
| U60 | 0,31 | 0,37 | 0,42 | 0,29 | 0,34 | 0,39 | 0,27 | 0,31 | 0,37 | 0,25 | 0,3 | 0,35 | 0,24 | 0,29 | 0,34 |
| U75 | 0,27 | 0,32 | 0,37 | 0,24 | 0,29 | 0,34 | 0,23 | 0,27 | 0,32 | 0,21 | 0,26 | 0,3 | 0,2 | 0,25 | 0,29 |

A63

| | $n_1 = 2800 \text{ rpm}$ | | | $n_1 = 1400 \text{ rpm}$ | | | $n_1 = 950 \text{ rpm}$ | | | $n_1 = 700 \text{ rpm}$ | | | $n_1 = 500 \text{ rpm}$ | | |
|-----|--------------------------|------|------|--------------------------|------|------|-------------------------|------|------|-------------------------|------|------|-------------------------|------|------|
| | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO |
| U6 | 0,8 | 0,84 | 0,87 | 0,78 | 0,82 | 0,85 | 0,76 | 0,8 | 0,84 | 0,75 | 0,79 | 0,83 | 0,74 | 0,78 | 0,82 |
| U12 | 0,72 | 0,76 | 0,8 | 0,69 | 0,74 | 0,78 | 0,67 | 0,72 | 0,76 | 0,65 | 0,7 | 0,75 | 0,64 | 0,69 | 0,74 |
| U19 | 0,65 | 0,71 | 0,75 | 0,62 | 0,67 | 0,72 | 0,6 | 0,65 | 0,7 | 0,58 | 0,64 | 0,69 | 0,57 | 0,62 | 0,68 |
| U26 | 0,55 | 0,61 | 0,66 | 0,52 | 0,57 | 0,63 | 0,49 | 0,55 | 0,61 | 0,48 | 0,54 | 0,59 | 0,46 | 0,52 | 0,58 |
| U34 | 0,5 | 0,56 | 0,62 | 0,47 | 0,53 | 0,58 | 0,44 | 0,5 | 0,56 | 0,43 | 0,49 | 0,54 | 0,41 | 0,47 | 0,53 |
| U48 | 0,43 | 0,49 | 0,55 | 0,4 | 0,45 | 0,51 | 0,37 | 0,43 | 0,49 | 0,36 | 0,41 | 0,47 | 0,34 | 0,4 | 0,46 |
| U63 | 0,36 | 0,41 | 0,47 | 0,32 | 0,38 | 0,43 | 0,3 | 0,36 | 0,41 | 0,29 | 0,34 | 0,4 | 0,28 | 0,33 | 0,38 |
| U70 | 0,29 | 0,34 | 0,39 | 0,26 | 0,31 | 0,36 | 0,24 | 0,29 | 0,34 | 0,23 | 0,28 | 0,32 | 0,22 | 0,26 | 0,3 |

The stated values are approximate values.

Efficiency factors

Efficiency factors depending on input (worm) speed and lubrication (mineral grease 'MG', mineral oil 'MO' or synthetic grease, synthetic oil 'SO')

A65

| | $n_1 = 2800 \text{ rpm}$ | | | $n_1 = 1400 \text{ rpm}$ | | | $n_1 = 950 \text{ rpm}$ | | | $n_1 = 700 \text{ rpm}$ | | | $n_1 = 500 \text{ rpm}$ | | |
|--------|--------------------------|------|------|--------------------------|------|------|-------------------------|------|------|-------------------------|------|------|-------------------------|------|------|
| | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO |
| U6,25 | 0,8 | 0,84 | 0,87 | 0,78 | 0,82 | 0,85 | 0,76 | 0,8 | 0,84 | 0,75 | 0,79 | 0,83 | 0,74 | 0,78 | 0,82 |
| U12,66 | 0,72 | 0,76 | 0,8 | 0,69 | 0,74 | 0,78 | 0,67 | 0,72 | 0,76 | 0,65 | 0,7 | 0,75 | 0,64 | 0,69 | 0,74 |
| U20 | 0,65 | 0,71 | 0,75 | 0,62 | 0,67 | 0,72 | 0,6 | 0,65 | 0,7 | 0,58 | 0,64 | 0,69 | 0,57 | 0,62 | 0,68 |
| U28 | 0,55 | 0,61 | 0,66 | 0,52 | 0,57 | 0,63 | 0,49 | 0,55 | 0,61 | 0,48 | 0,54 | 0,59 | 0,46 | 0,52 | 0,58 |
| U36 | 0,5 | 0,56 | 0,62 | 0,47 | 0,53 | 0,58 | 0,44 | 0,5 | 0,56 | 0,43 | 0,49 | 0,54 | 0,41 | 0,47 | 0,53 |
| U50 | 0,43 | 0,49 | 0,55 | 0,4 | 0,45 | 0,51 | 0,37 | 0,43 | 0,49 | 0,36 | 0,41 | 0,47 | 0,34 | 0,4 | 0,46 |
| U66 | 0,36 | 0,41 | 0,47 | 0,32 | 0,38 | 0,43 | 0,3 | 0,36 | 0,41 | 0,29 | 0,34 | 0,4 | 0,28 | 0,33 | 0,38 |
| U75 | 0,29 | 0,34 | 0,39 | 0,26 | 0,31 | 0,36 | 0,24 | 0,29 | 0,34 | 0,23 | 0,28 | 0,32 | 0,22 | 0,26 | 0,31 |

A80

| | $n_1 = 2800 \text{ rpm}$ | | | $n_1 = 1400 \text{ rpm}$ | | | $n_1 = 950 \text{ rpm}$ | | | $n_1 = 700 \text{ rpm}$ | | | $n_1 = 500 \text{ rpm}$ | | |
|-------|--------------------------|------|------|--------------------------|------|------|-------------------------|------|------|-------------------------|------|------|-------------------------|------|------|
| | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO | MF | MO | SO |
| U6,75 | 0,79 | 0,83 | 0,86 | 0,78 | 0,82 | 0,85 | 0,76 | 0,8 | 0,84 | 0,75 | 0,79 | 0,83 | 0,73 | 0,78 | 0,82 |
| U12 | 0,75 | 0,79 | 0,83 | 0,72 | 0,77 | 0,81 | 0,7 | 0,75 | 0,79 | 0,69 | 0,74 | 0,78 | 0,68 | 0,73 | 0,77 |
| U20 | 0,63 | 0,69 | 0,74 | 0,61 | 0,66 | 0,71 | 0,59 | 0,64 | 0,7 | 0,57 | 0,63 | 0,68 | 0,55 | 0,61 | 0,67 |
| U30 | 0,53 | 0,59 | 0,64 | 0,51 | 0,57 | 0,62 | 0,49 | 0,55 | 0,6 | 0,47 | 0,53 | 0,58 | 0,45 | 0,51 | 0,57 |
| U50 | 0,45 | 0,51 | 0,57 | 0,42 | 0,48 | 0,53 | 0,4 | 0,45 | 0,51 | 0,38 | 0,44 | 0,49 | 0,37 | 0,42 | 0,48 |
| U80 | 0,3 | 0,35 | 0,41 | 0,28 | 0,33 | 0,38 | 0,27 | 0,31 | 0,37 | 0,25 | 0,3 | 0,35 | 0,24 | 0,28 | 0,33 |

The stated values are approximate values.

Tolerance

Backlash tolerances for worm gears (valid for gears with a pressure angle of 15°)

β_0 corresponds to γ_m of the worm

| Pitch diameter of the worm gear | Module m_n | Backlash tol. at pitch diameter [mm] | | | |
|------------------------------------|-----------------|--------------------------------------|-------|------------------|-------|
| | | β up to 24° | | β over 24° | |
| | | min. | max. | min. | max. |
| over 12 up to 25 | 0,4 - 0,6 | 0,07 | 0,092 | 0,077 | 0,102 |
| | >0,6 - 1,3 | 0,075 | 0,099 | 0,083 | 0,109 |
| | >1,3 - 2,0 | 0,08 | 0,106 | 0,089 | 0,117 |
| over 25 up to 50 | 0,4 - 0,6 | 0,075 | 0,099 | 0,083 | 0,108 |
| | >0,6 - 1,3 | 0,08 | 0,106 | 0,089 | 0,117 |
| | >1,3 - 2,0 | 0,086 | 0,114 | 0,095 | 0,125 |
| | >2,0 - 4,0 | 0,094 | 0,124 | 0,103 | 0,137 |
| over 50 up to 100 | 0,4 - 0,6 | 0,08 | 0,106 | 0,089 | 0,117 |
| | >0,6 - 1,3 | 0,086 | 0,114 | 0,095 | 0,125 |
| | >1,3 - 2,0 | 0,094 | 0,124 | 0,103 | 0,137 |
| | >2,0 - 4,0 | 0,102 | 0,134 | 0,112 | 0,148 |

The backlash values are based on an ideal center distance. More backlash will appear if the center distance is actually at the upper tolerance. 0.05mm above ideal center distance will result in 0.027 mm more backlash.

Lubrication

Lubrication has an essential influence on efficiency, heat generation and life time. A good choice is a synthetic oil on the basis of polyglykol and synthetic oil or grease on the basis of polyalphaolefin.

Moreover polyalphaolefin has a high compatibility to common sealing materials.

High viscosity synthetic oils (ISO VG 680 bzw. ISO VG 1000) are used preferably for worm gear sets.

In case of smaller center distances mineral or synthetic grease in consistency-class 0 up to 00 can be used as well.

Comparison of the different basis oils

| Characteristics | Mineral oil | Polyalphaolefin synth. | Polyglykol synth. |
|--------------------------------|-------------|---------------------------|----------------------|
| Viscosity at low temp. | 4 | 3 | 3 |
| Wear protection | 4 | 2 | 1 |
| Frictional behaviour | 3 | 2 | 1 |
| High temp. Oxidation stability | 4 | 2 | 1 |
| Water seperation ability | 4 | 2 | 5 |
| Air release ability | 3 | 2 | 4 |
| Rust protection | 1 | 1 | 3 |
| Mix with mineral oil | - | 1 | 5 |
| Laquer compatibility | 1 | 1 | 3 |
| Seal compatibility | 1 | 1 | 3 |
| Low evaporation losses | 4 | 1 | 3 |

1=excellent

2=very good

3=good

4=sufficient

5=bad

Subject to technical changes