

Instruction manual

BA 6700 CAVEX EN 05.12

CAVEX® worm wheel set models CARE,
CALE, CORE, COLE, CMRE, CMLE, size 63 to 630
Duplex Worm wheel set type CD...
and special design CAVEX worm wheel sets

Instruction manual



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1. Technical data

1.1 Model

The model of the CAVEX worm gear sets corresponds with the catalogue CRS 11 specified in the order or the specific customer drawings specified in the purchase order.

For DUPLEX worm gear sets and special design worm gear sets the specific customer drawings specified in the purchase order apply.

1.2 Weights of CAVEX worm gear sets

Size	63	80	100	120	140	160	180	200	225	250	280	315	355	400	450	500	560	630
Worm shaft with pre-turned shafts	1,5-1,7	2,3-2,9	4,4-5,3	6,6-8,1	4,5-11,4	14-17,5	18,7-25,2	24,7-31,3	32,2-42,4	43,2-55,1	59-74	78-96	103-124	133-160	187-235	238-293	296-376	372-483
Worm shaft with finished shafts	0,8-0,9	1,2-1,3	2,2-2,5	3,9-4,2	5,2-6,0	7,9-8,6	11,0-11,9	14,5-15,8	19,2-20,6	25,3-27,2	35-38	48-52	60-68	74-92	-	-	-	-
Worm wheel	0,9-1,0	2,0-2,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rim	-	-	2,3-2,5	3,9-4,2	5,9-6,3	8,1-8,7	12-12,9	15,1-16,2	21,1-23,7	27,4-31,5	39-43	53-58	74-81	107-114	114-157	157-218	204-275	296-401
Hub	-	-	2	3,8	6	8,3	12,9	17,2	24,5	37,2	47	70	102	165	243-263	341-377	412-446	648-710
Hollow shaft	-	-	5	7,1	11,2	14,8	22,2	26	40,5	50,2	71	96	129	215	-	-	-	-

Table 1.1: Weights in kg

Note: All weights specified in table 1.1 are approximate weights and apply to standard worm gear sets per catalogue CRS11.
Please refer to the respective production drawings for weight specifications for worm gear sets in special design and DUPLEX worm gear sets.

2. General information

2.1 Introduction

This instruction manual is part of the gear set and should always be kept near the gear set.

Attention!

Every person involved in the assembly, operation, maintenance and repair of the worm gear set must have read, understand and follow the instruction manual. We are not liable for damages and failures resulting from non-compliance with the instruction manual.

The **CAVEX®** worm gear set described herein have been manufactured according recognized safety regulations and correspond with the state of technology at the time the instruction manual was printed.

In the interest of further development we reserve the right to make changes deemed beneficial to increase performance and safety whilst maintaining the main features.

2.2 Copyright

The copyright in this instruction manual is reserved to **CAVEX GmbH & Co. KG**.

This instruction manual may not be used for competitive purposes or made available to third parties, in whole or in part, without our approval.

Please direct all technical questions to our factory:

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or one of our customer service locations. A list of customer service locations is available on our website at www.cavex-gmbh.de

3. Safety information

3.1 Intended use

- The **CAVEX**® worm gear set is manufactured according to state-of-the-art technology. Unauthorized modifications, installations and modifications impacting safety are prohibited.
- The **CAVEX**® worm gear set may only be used and operated under the conditions defined in the delivery contract.

3.2 General obligations

- The operator must ensure all persons involved in the assembly, operation, maintenance and service as well as start-up have read and understand the instruction manual, and follow all items to:

- avoid danger to life and limb of the user and third parties
- ensure the operational safety of the worm gear set

and

- eliminate downtimes and environmental effects due to incorrect handling.
- Follow the applicable provisions on occupational safety and environmental protection during transport, assembly, disassembly, operation, as well as maintenance and care.
- The gear unit may only be operated, serviced and repaired by authorized, trained and instructed personnel.
- Do not use a pressure washer to clean the unit.
- All work must be performed with care and with “safety” in mind.
- Only perform work on the CAVEX worm gear set with the worm gear set stopped. The drive unit must be secured from accidental start-up. Attach a sign to the switch indicating work is being performed on the CAVEX worm gear set.
- Immediately shut off the drive unit if changes to the gear set are detected during operation, e.g. elevated operating temperature or change of gear noises.
- Exposed moving drive parts must be secured against contact with the appropriate safety devices.
- When installing the **CAVEX**® worm gear set in devices or units, the manufacturer of the devices or units is obligated to incorporate the regulations, information and descriptions from this instruction manual in his instruction manual.

Always obtain spare parts from **CAVEX GmbH & Co. KG**.

3.3 Environmental protection

- Always follow the relevant regulations and guidelines, e.g. ISO 14001, and the laws of the countries and states. This particularly applies to the use of lubricants, corrosion protectors and detergents. Always follow the manufacturer’s instructions of operating supplies, process materials and tools.

3.4 Special dangers

- Depending on the operating conditions a gear unit, a mechanism or a mechanical drive unit with **CAVEX®** gear set may generate high surface temperatures. **Risk of burns!**
- When changing lubricants the hot lubricant draining from the device poses a scalding hazard.

3.5 Warnings and symbols used in this instruction manual



This symbol indicates safety measures which must be followed to avoid **personal injury**.



This symbol indicates safety measures which must be followed to avoid **damage to the gear unit**.

Note:

This symbol indicates general **operating instructions** which must specifically be followed.

4. Transport and Storage

Note:

Follow the instructions in Chapter 3. "Safety information".

4.1 Scope of delivery

The delivery contents are listed in the shipping documents. Check contents for completeness upon receipt. Any transport damage and/or missing parts must immediately be reported in writing.

4.2 Transport

Only use hoisting devices and load lifting equipment with adequate load bearing capacity!

Packaging of the **CAVEX®** gear set varies by transport method and size. Unless otherwise agreed the packaging corresponds to **HPE packaging guidelines**.

Always observe the symbols on the packaging. They mean:




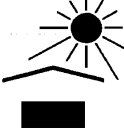



						
this side up	fragile goods	protect from moisture	protect from heat	centre of gravity	No hooks	fasten well

image-transport



Take adequate care when transporting the CAVEX worm gear set to avoid damage to the CAVEX worm gear set.

4.3 Storing the CAVEX worm gear set

Store the CAVEX worm gear set in a location protected from weather. Be sure to protect from moisture and foreign substances.



Never stack CAVEX worm gear set.

4.4 Standard corrosion protection

The CAVEX worm gear set is corrosion protected for storage in a location as per 4.3 for a period of 6 months. For extended temporary storage (>6 months) check the corrosion protection and reapply as necessary.

5. Technical description

5.1 General information

The worm gear sets are CAVEX worm gear sets or DUPLEX worm gear sets

5.2 Worm gear set design

- Pre-turned worm gear shafts are unhardened and have guide points for reworking.
- worm gear sets are suitable for both directions of rotation
- On worm gear sets with DUPLEX profile, the flank clearance is adjustable by sliding the worm shaft axially.

5.3 Efficiency, self-locking, deceleration and braking

5.3.1 Factors influencing the efficiency

Generally the efficiency increases with increasing sliding speed at the teeth flanks, increasing lead angle and increasing worm gear set size.

Additionally, the surface finish of tooth flanks, the flank profile, the material combination and the lubrication are important.

The efficiency applies to well running-in and properly lubricated worm gear sets with approximate rated load and driving worm shaft. With the worm wheel driving, the „efficiency“ η' is always lower.

5.3.2 “Starting efficiency”

The efficiency at a speed near 0 with an acceleration from 0 is referred to as “starting”. The “starting efficiency” η_A is less than the operating efficiency η . Starting up under loads requires a higher speed.

5.3.3 Self-locking

If a worm set can not be started up from standstill with the worm set propelling it is “self-locking”. The impact of vibration and thrusting allows the worm gear set to move. Therefore self-locking worm set cogging used at capacity can't replace a brake or return stop.

5.3.4 Self-braking from running

Per VDI directive 2158, a worm gear set is self-braking from running if the worm gear set comes to a standstill wheel driving with the worm.

5.3.5 Deceleration and braking

When propelling parts of high mass moments of inertia with low system friction an adequately calculated deceleration time after shutting off the drive unit must be allowed for. Do not overload the drive parts.

Avoid self-braking during deceleration to reduce the risk of high peak loads.

5.3.6 Inspection hole inside the housing

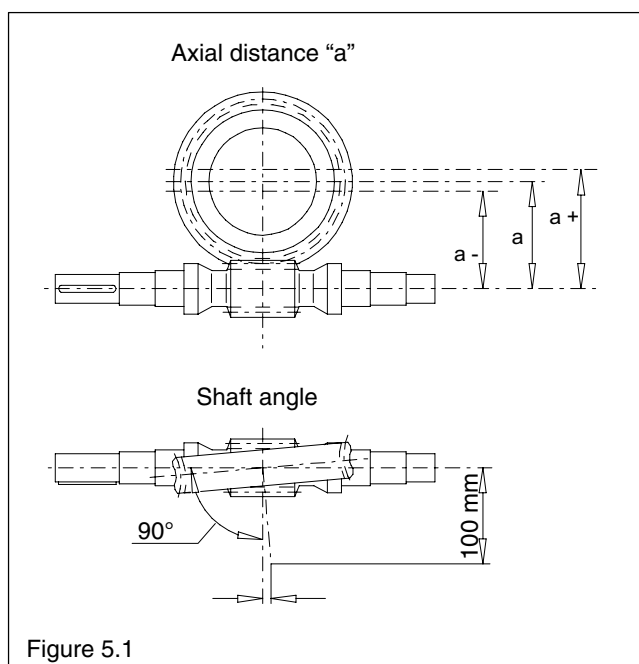
The housing should have an inspection hole in a suitable location to allow the worm gear set and the contact pattern to be inspected visually.

5.3.7 Reworking worm gear shafts

When reworking the worm gear shafts, especially when shortening and recentering be sure to maintain true running. Do not allow the radial guide point deviations to exceed a maximum of 0.02 to 0.04 mm depending on the worm gear set size.

5.3.8 Conditions for installing worm gear set

Note: To ensure the worm gear set being installed runs smoothly always maintain the tolerances in Table 5.1 when manufacturing the housing.
When high accuracies are required, especially if small gear ratios are used, the permissible housing size thresholds may need to be reduced.



Axial distances and shaft angle tolerances		
Axial distance	Approx. axial distance tolerances	Approx. shaft angle tolerances
63	± 0.020	± 0.022
80	± 0.022	± 0.022
100	± 0.025	± 0.022
120	± 0.028	± 0.022
140 + 160	± 0.032	± 0.022
180	± 0.036	± 0.020
200 + 225	± 0.040	± 0.020
250	± 0.045	± 0.020
280 + 315	± 0.050	± 0.020
355	± 0.056	± 0.020
400	± 0.063	± 0.020
450 + 500	± 0.071	± 0.018
560	± 0.080	± 0.018
630	± 0.090	± 0.018

Table 5.1: Axial distances and shaft angle tolerances

6. Assembly

Note: Follow the instructions in Chapter 3. "Safety information".

6.1 General assembly information

The unit must be assembled by experts according to Chapter 3. Any results due to improper assembly will void the warranty.

Be sure sufficient hoisting device is available when starting assembly work.

6.2 Description of the assembly

- Remove corrosion protection paint on the worm gear sets and connecting surfaces with cleaning agents.



When using cleaning agents follow the relevant regulations and directives, e.g. ISO 14001 and the laws of the countries and states. Follow the instructions of the manufacturer of the cleaning agent.

- Similar worm shafts and worm wheels can be assembled as desired.
- Related parts are marked and must be assembled together.

6.2.1 Attaching the rim

The rim must be heated before attaching onto the hub. The temperature difference to the hub must be min. 50 °C and max. 120 °C. After this, ream the shoulder screw holes on the rim and hub jointly and insert the shoulder screws from the rim side.

It is important to use washers under the screw heads on the rim connector.

Be sure to secure the shoulder screw connection. Cementing the thread with liquid plastics has shown good results.

To achieve adequate pretension, tighten the shoulder screw connections to the following torques:

Strength class	Thread	Tightening torque of shoulder screws in Nm for thread size							
		M 8	M 10	M 12	M 14	M 16	M 20	M 24	M 30
8.8	Degreased	30	60	105	165	255	500	870	1.750
	Greased	25	49	86	135	210	410	710	1.450
10.9	Degreased	40	84	145	230	360	710	1.200	2.450
	Degreased	35	69	120	190	295	580	1.000	2.000

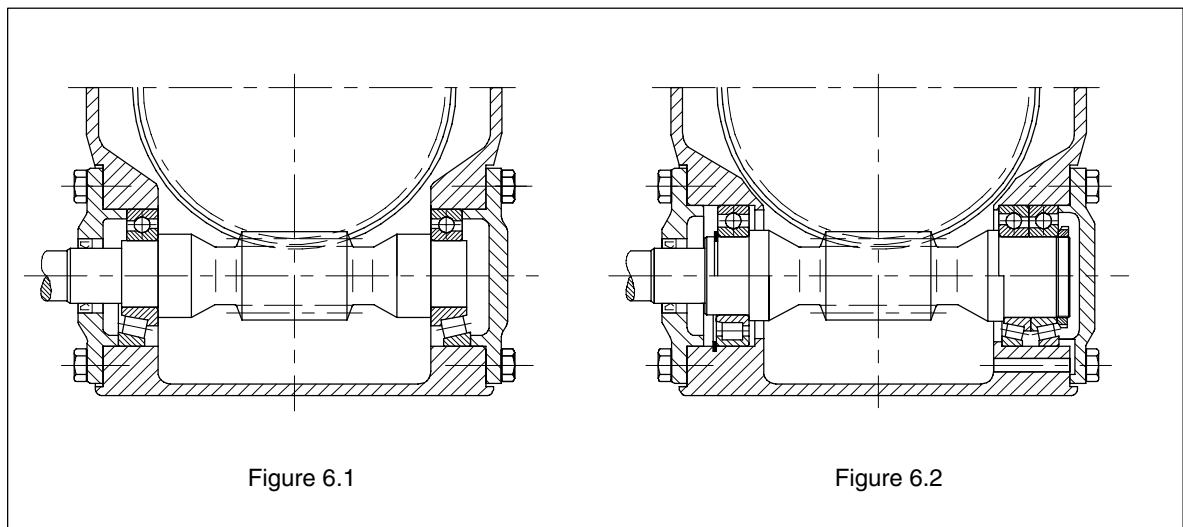
Table 6.1: Tightening torques of shoulder screws in Nm

Use Shoulder screws strength class 10.9 and the corresponding nuts.

6.2.2 Installing the worm shaft

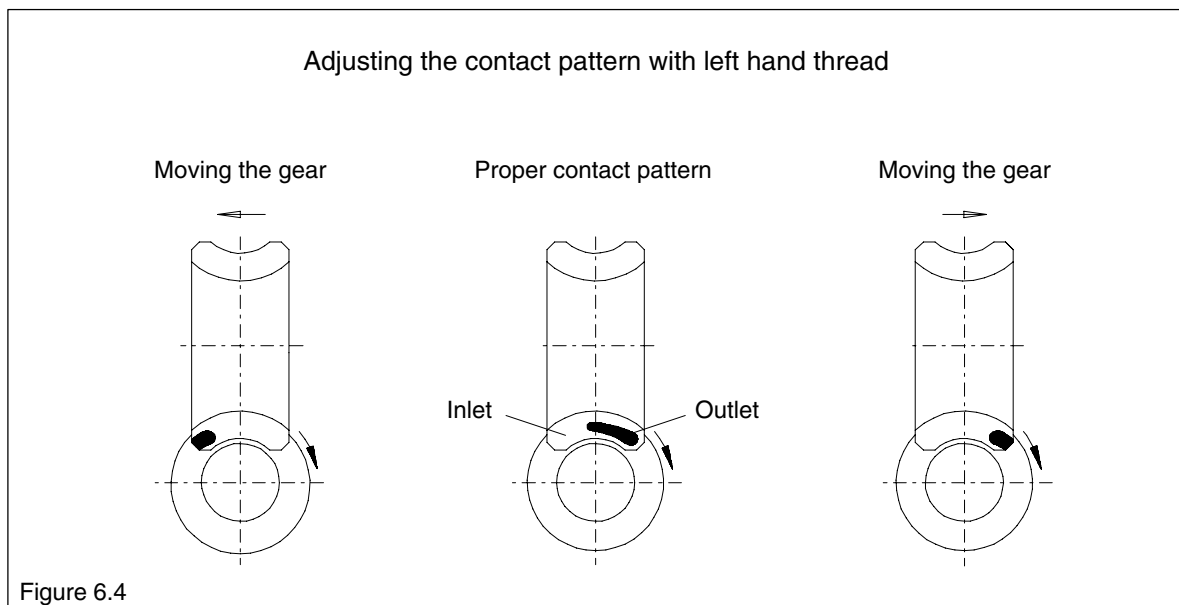
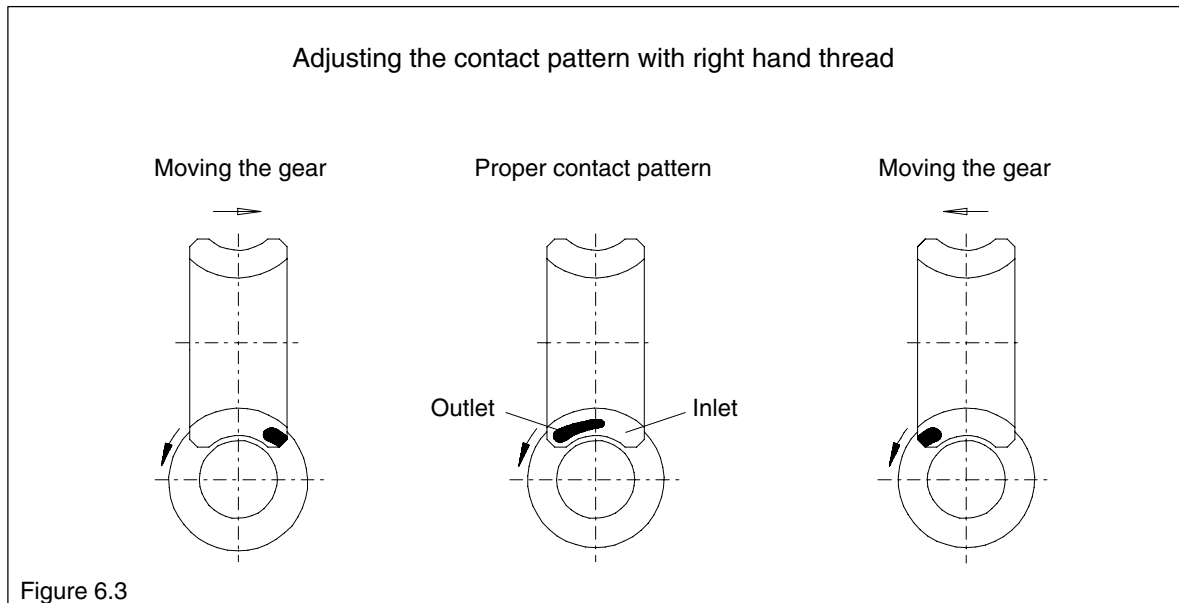
When installing the worm shaft, depending on the worm gear set size, axial deviations of 1 to 5 mm from the center are acceptable.

To apply bearing according to Figure 6.1 and 6.2 follow the bearing manufacturer’s guidelines with respect to design, assembly and operation.



6.2.3 Installing the worm wheel

Make the suitable adjustment to the contact pattern. The contact pattern should always be on the outlet side at both surfaces at each tooth. Be sure the contact pattern is symmetric to the two surfaces at each tooth.



After adjusting the contact pattern the worm wheel should be installed axially without play. Follow the bearing manufacturer's guidelines with respect to design, installing the bearings and operation.

During the running period the contact pattern of the worm gear will gradually shift toward the inlet or spread across the entire flange surface.

6.2.4 DUPLEX worm gear sets

DUPLEX worm gear sets allow the backlash to be set or adjusted.

6.2.4.1 Mode of operation

On the DUPLEX cylindrical worm the right and left faces have different modules, thus different lead angles. This results in the thickness of the worm shaft tooth to increase uniformly across the length of the worm thread.

The worm wheel teething is also interconnected with the different modules of the worm shaft teething and the resulting lead angles between the right and left edges. Contrary to the worm gear the tooth thicknesses or tooth spaces remain constant in circumferential direction.

Shifting the DUPLEX cylindrical worm shaft axially changes the backlash. The backlash can be adjusted. Increased backlash from wear can be reduced by shifting the worm shaft axially.

6.2.4.2 Installation situation

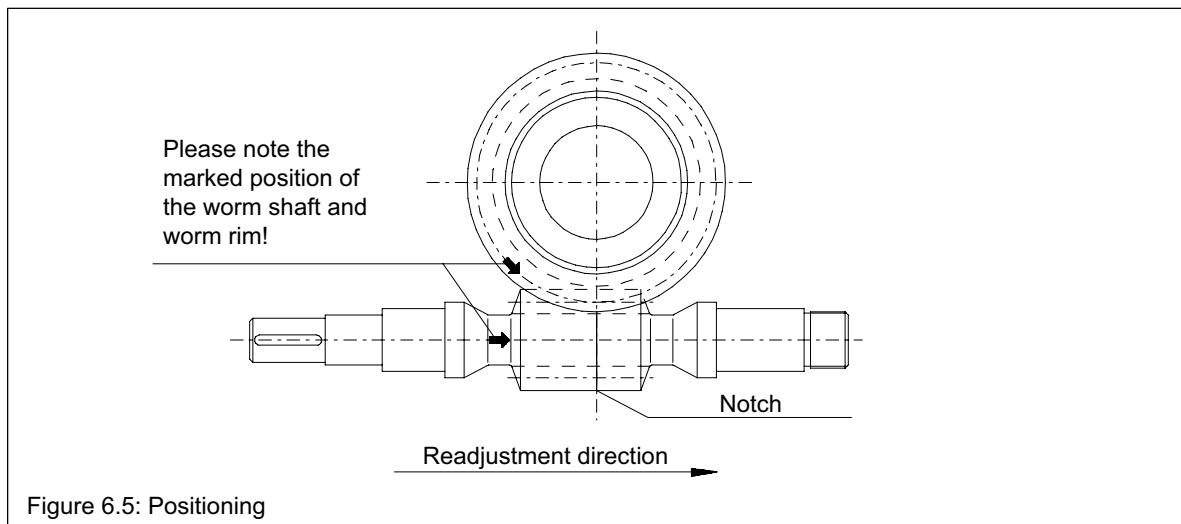
Due to the various models of right and left-hand tooth surface DUPLEX worm gear sets can only be assembled with the allocation determined.

CAVEX GmbH & Co. KG marks the location of the worm shaft and worm wheel rim on the finished worm gear set with arrows per Figure 6.5. In addition the arrow on the worm shaft specifies the readjustment direction which reduces backlash.

Note: The arrows are not related to the direction of rotation.

The worm gear set is properly installed if the arrows on the worm shaft and worm wheel rim point in the same direction, see Figure 6.5.

The initial position of the DUPLEX worm gear in assembly is marked by a notch on the outside diameter of the worm shaft tooth.



Note: The backlash adjustment depends on the respective operating conditions. The backlash decreases as the temperature rises. When warmed up the minimum back-seize & need for sufficient of the teething.

7. Start up

Note: Follow the instructions in Chapter 3. "Safety information".

7.1 Measures prior to start up

Attention! Check the oil level prior to start-up.

7.2 Lubrication

When designing the worm gear set the lubricant type - synthetic oil or mineral oil, type of lubrication - splash or pressure lubrication, viscosity and oil volume are already determined. Considering this specified data, be sure to add sufficient lubricant to the worm gear set prior to start-up. Synthetic oil should generally be used for lubrication. Preferably use oils according to the lubricant list in Chapter 10 or per the lubricant list on the **CAVEX GmbH & Co. KG** website.

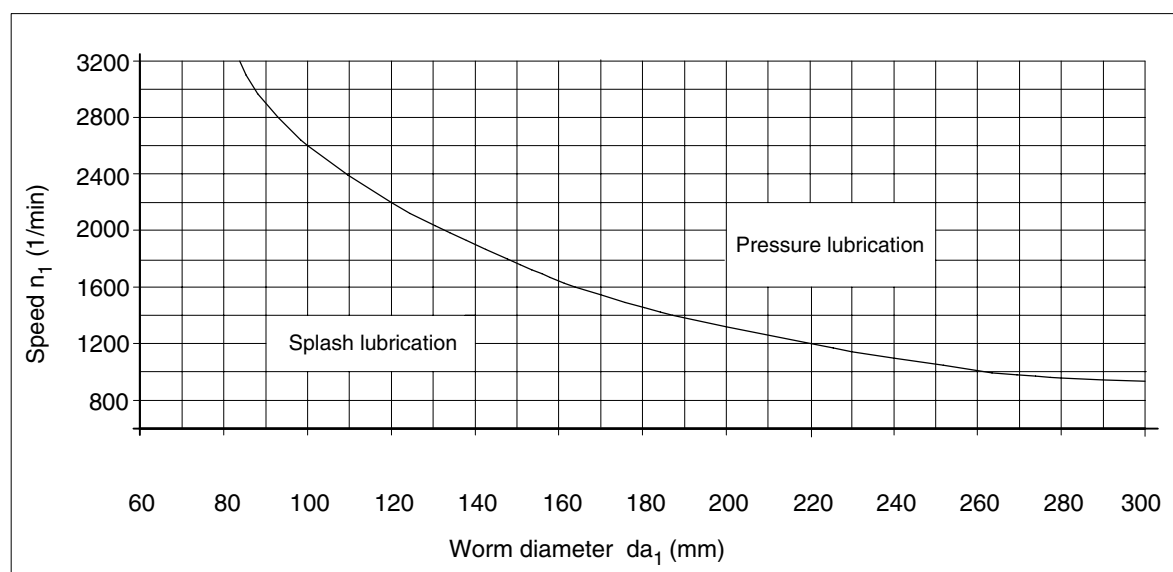
Using oils not specified in the lubricant list may void our warranty obligation. We explicitly state that every oil manufacturer or supplier is responsible for the quality of their product. When using a different viscosity than that specified in 7.2.5 or using an oil not listed in the lubricant list, the operator of the worm gear set is responsible for the technical adequacy of the oil.

7.2.1 Splash lubrication

Proper lubrication with simultaneous cooling are vital. Immerse a minimum of 2/3 of either the worm shaft or the worm wheel rim in the oil bath. A higher oil level is typically beneficial.

7.2.2 Limitations of splash lubrication

In the following illustration splash lubrication will suffice below the graph. Above the graph pressure lubrication should be used.



7.2.3 Pressure lubrication

Conveniently, lubricant is injected directly into the tooth meshing on both sides of the worm, parallel to the screw axis.

Additional immersing of the worm shaft or worm gear wheel rim would be wise if the pressure lubrication is at risk of failing.

Notes: With pressure lubrication, the injection rate per 1cm length of worm thread should at least be 0.5 l/min. The oil should be returned to the injection no sooner than 2 minutes. The injection pressure should be 1.5 bar.

7.2.4 Selecting the viscosity

The viscosity of the gear oil is based on the sliding velocity V_g .

Sliding velocity V_g	> 2 m/s	> 2 ... 4,5 m/s	> 4,5 ... 7 m/s	> 7 ... 10 m/s	> 10 m/s
ISO-VG DIN 51519 at 40°C (mm²/s)	VG 1.000 ○	VG 680 □	VG 460 ▼	VG 320 ●	VG 220 ■

7.2.5 Assigning the viscosity to the worm gear set size

n_1 1/min	worm gear set size																	
	63	80	100	120	140	160	180	200	225	250	280	315	355	400	450	500	560	630
3.000	▼	▼	●	●	●	■	■	■										
2.400	□	▼	▼	▼	●	●	●	■	■	■								
1.800	□	□	▼	▼	▼	▼	●	●	●	●	■	■	■					
1.500	□	□	□	□	▼	▼	▼	▼	●	●	●	●	■	■	■	■		
1.200	○	□	□	□	□	□	▼	▼	▼	▼	▼	●	●	●	●	■	■	■
1.000	○	○	□	□	□	□	□	▼	▼	▼	▼	▼	▼	●	●	●	●	■
750	○	○	○	□	□	□	□	□	□	□	□	▼	▼	▼	▼	▼	●	●
500	○	○	○	○	○	○	□	□	□	□	□	□	□	□	□	▼	▼	▼
300	○	○	○	○	○	○	○	○	○	○	○	○	□	□	□	□	□	□
150	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

7.2.6 Selecting the gear oil

The lubrication list under Chapter 10 and the lubrication list on the **CAVEX GmbH & Co. KG** website indicate the recommended oils.

Using oils not specified in the lubricant list may void our warranty obligation. We explicitly state that every oil manufacturer or supplier is responsible for the quality of their product. When using a different viscosity than that specified in 7.2.5 or when using an oil not listed in the lubricant list the operator of the worm gear set is responsible for the technical adequacy of the oil.

7.3 Final work

After start up, it is advisable to first load the worm gear set in intermittent operation, i.e. a few minutes at regular operating load alternating with breaks lasting some multiple of operating time. The duty cycle can slowly be increased to standard operation, but the operating temperature must be monitored. Operating temperatures of approx. 100°C are acceptable.

8. Operation

Note: Follow the information in Chapter 3, "Safety information".

8.1 General operating data

During operation check the CAVEX worm gear set for:
excessive operating temperature, change in noise, gear box leakage

Note: Operating temperatures of approx. 100°C are acceptable.

Attention!

If abnormalities are detected during operation immediately shut off the drive unit. Determine the cause of the defect using the troubleshooting table (Chapter 9). The troubleshooting table contains possible defects, their causes and suggested solutions.

If the cause cannot be determined or you are unable to repair the unit yourself we recommend contacting CAVEX GmbH & Co. KG.

9. Faults, causes and solution

Note: Follow the instructions in Chapter 3. "Safety information".

9.1 General fault information

Note: Defects requiring repair of the gear set that occur during the warranty period must be repaired by **CAVEX GmbH & Co. KG** customer services. We also recommend contacting our customer service department even if the warranty period has expired. In the event of improper use of the worm gear set and unauthorized modifications to the worm gear set, **CAVEX GmbH & Co. KG** will not assume any warranty for the continued use of the worm gear set.



When repairing defects the worm gear set must always be shut down. Secure the drive unit against accidental start-up. Attach a sign to the switch.

9.2 Possible defects

Defects	Causes	Solution
Change in gear unit noise	Increased bearing tolerance	Contact customer service.
	Defective bearing	Contact customer service.
	Damage to the gearing	Contact customer service.
	Gear box mounting is loose, other parts have loosened or are defective	Tighten screws / nuts with the indicated torque. Replace damaged screws / nuts / parts.
Increased operating temperature	Filled with non-approved oil	Use approved oil
	Oil level inside the gear box too high or too low	Check oil level at room temperature If necessary adjust oil level
	Old oil	Change oil. See Chapter 10.
	Highly contaminated oil Inadequate cooling	Change oil. See Chapter 10. Cool adequately
	Defective bearing	Check bearing, replace if necessary

Table 9.1: Fault information

10. Maintenance and repair

Note: Follow the instructions in Chapter 3. "Safety information".

10.1 General maintenance specifications

Note: All maintenance and repairs must be performed with care and only by well trained personnel.

Adherence to the inspection intervals is part of the warranty terms.

Measures	Deadline	Remarks
Monitor oil temperature and noise	Continuously	In case of change see Table 9.1
Check oil level	Every 3 months	In case of change see Table 9.1
First oil change	After approx. 1,000 2,000 operating hours	See items 7.2 and 10.2
Further oil changes	After approx. 6,000 12,000 operating hours, no later than after 5 years	See items 7.2 and 10.2

Table 10.1: Inspection intervals

10.2 Oil change

Note: When using oils follow the relevant regulations and guidelines, e.g. ISO 14001, as well as the laws of the countries and states. Follow the directions of the oil manufacturer.



Secure drive unit against accidental start up. Attach a sign to the switch.



Burning hazard due to hot oil. Always allow the oil to cool down to below +30 °C before performing work.



Immediately clean any oil spills with oil binding agents in an environmentally friendly manner.

Attention!

When changing the oil, the gear unit should be filled with the same oil type previously used. Never mix different types or makes of oil. Only use lubricants according to the lubricant list in Chapter 10 or according to the lubricating list on the CAVEX GmbH & Co. KG website. Using oils not specified in the lubricant list may void our warranty obligation. We explicitly state that every oil manufacturer or oil supplier is responsible for the quality of his product. When using a viscosity not specified under 7.2.5 or when using an oil not listed in the lubricant list the operator of the worm gear set is responsible for the technical adequacy of the oil.

Note: The oil must be drained promptly after shutting down the gear unit, whilst the oil is still warm. Allow adequate time for the oil to drain to also remove sludge, abrasion and residual oil.

10.3 Lubricants

Attention! Please refer to the list below for the different makes of oil to use. Our website at www.cavex-gmbh.com always contains the latest specifications on all lubricants approved by **CAVEX GmbH & Co. KG**.

If you decide not to follow our recommendation for any reason of importance to you, you are responsible for the technical adequacy of the lubricant.

We therefore recommend our customers select a lubricant from the list. Determine the viscosity according to Chapter 7.

Note: Using gear oils not meeting the quality requirements above could potentially void our warranty obligations. We explicitly state that every oil manufacturer or oil supplier is responsible for the quality of his product.

When using a viscosity or gear oil not recommended here the operator assumes responsibility for the technical adequacy of the lubricant.

10.3.1 Oil types

- Synthetic oils (polyglycols)
for polyglycols about -20 °C to +100 °C (briefly +110 °C).

Note: The upper and lower usage temperatures (flashpoint, pour point) of individual gear oils may vary greatly from the specified values. These and other data and properties of the gear oil are always specified in the technical data sheets of the oil manufacturers.

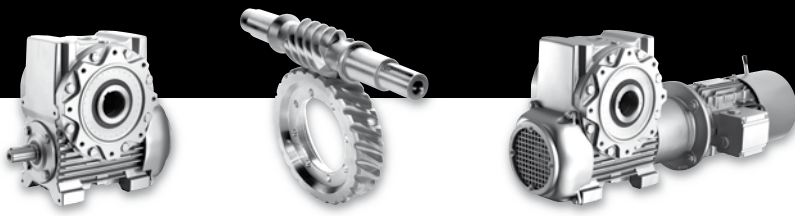
Lubricant	Viscosity ISO-VG DIN 51519 at 40 °C (mm ² /s)			
Polyglycols (PG-oil)	VG 1000	RENOLIN PG 1000	Klübersynth GH6-1000	Tribol 800/1000
	VG 680	RENOLIN PG 680	Klübersynth GH6-680	Tribol 800/680
	VG 460	RENOLIN PG 460	Klübersynth GH6-460	Tribol 800/460; Tribol 1300/460
	VG 320	RENOLIN PG 320	Klübersynth GH6-320	Tribol 800/320
	VG 220	RENOLIN PG 220	Klübersynth GH6-220	Tribol 800/220; Tribol 1300/220
	VG 150	RENOLIN PG 150	Klübersynth GH6-150	Tribol 800/150

11. Spare parts storage

We only guarantee original spare parts supplied by us.

Attention!

We explicitly state spare parts not supplied by us are also not inspected or approved by us. Installing and / or using such products may therefore negatively affect the specified design engineering properties, thus effecting active and / or passive safety. CAVEX GmbH & Co. KG assumes no liability and warranty for the use of non-original spare parts.



CAVEX®

German Drive Technology

Declaration of Incorporation according to Directive 2006/42/EG, Appendix II, Part 1, Section B

The manufacturer

CAVEX GmbH & Co. KG
Tübinger Straße 2
D-72131 Offerdingen

declares as follows:

The declaration applies to CAVEX worm gear units models CARE, CALE, CORE, COLE, CMRE, CMLE size 63 to 630, to Duplex worm gear units model CD.. and to specially designed CAVEX worm gear units. The aforementioned worm gear units are an incomplete machine pursuant to Directive 2006/42/EC. The specific technical documentation pursuant to Directive 2006/42/EC, Appendix VII B, has been created. The following general safety and health requirements pursuant to Directive 2006/42/EC, Appendix I, are applied and maintained.

1.1.1., 1.1.2., 1.1.3., 1.1.5., 1.3.2., 1.3.6., 1.5.4., 1.5.13., 1.6.1., 1.6.2., 1.7.1., 1.7.1.1., 1.7.4., 1.7.4.1., 1.7.4.2., 1.7.4.3.

The manufacturer agrees to provide individual state offices with the specific documentation pursuant to Directive 2006/42/EC, Appendix VII B, upon reasoned request. The documents will be transmitted in electronic format.

The incomplete machine CAVEX worm gear units models CARE, CALE, CORE, COLE, CMRE, CMLE size 63 to 630, Duplex worm gear units model CD.. and specially designed CAVEX worm gear units may only be taken into operation once, if applicable, the machine into which the incomplete machine CAVEX worm gear units models CARE, CALE, CORE, COLE, CMRE, CMLE size 63 to 630, Duplex Worm gear units model CD.. and specially designed CAVEX worm gear units are to be installed, has been determined to comply with Directive 2006/42/EC.

The following person is authorized to prepare the relevant technical documents:

Jens Heilemann, Design & Development Manager, CAVEX GmbH Co. KG, Tübinger Straße 2, D-72131 Offerdingen

D-72131 Offerdingen, 6/18/2012

Jens Heilemann
Head of design & development

Andy Schäfer
chief operating officer

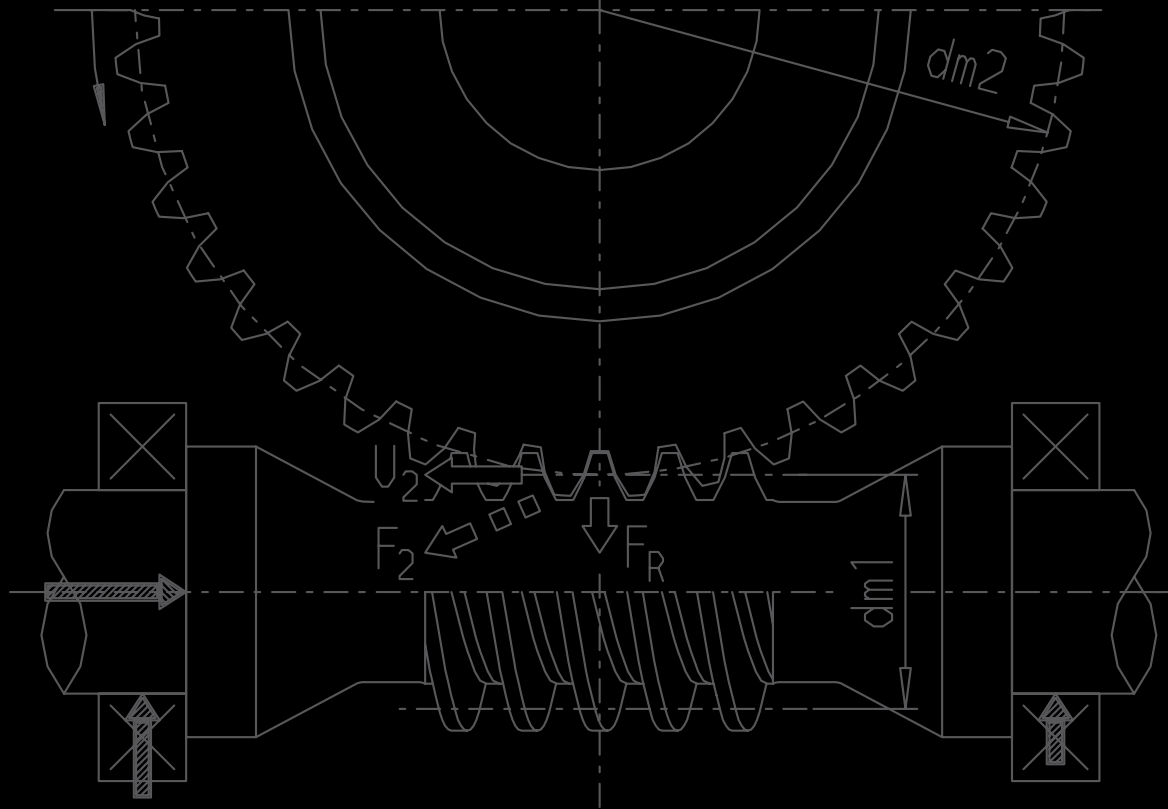
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Gerichtsstand:
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Pers. haftende Gesellschaft CAVEX Verwaltungs-GmbH
Amtsgericht Stuttgart HRB 737611
Geschäftsführer: Dr.-Ing. Peter Leoni

Bankverbindung:
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