

CAVEX[®] compact

Lightweight, efficient and flexible
The perfect combination



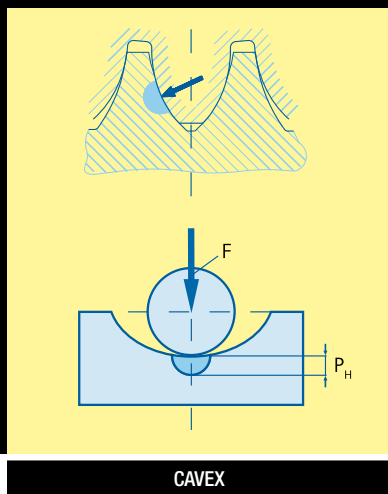
CAVEX[®]

German Drive Technology

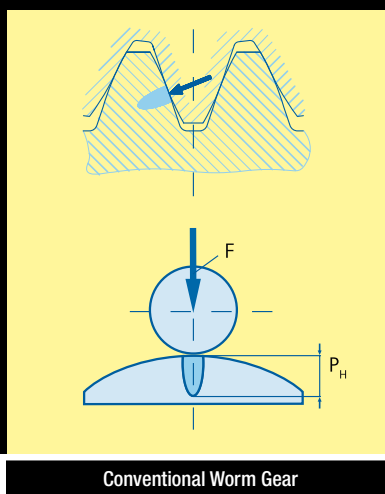
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Excellent in efficiency, torque and durability

A worm gearbox quite unlike any other. This is what CAVEX® has been proving time and again in a great variety of industrial sectors all over the world for more than 50 years. Our unique gearing system is far superior to standard worm gearboxes.



CAVEX



Conventional Worm Gear

CAVEX®

German Drive Technology

Intelligent Gearing System

The name CAVEX® says it all, composed from the Latin word concavus, the profile on the worm, and convexus, the profile on the worm wheel. Thanks to worm teeth with a concave flank profile (concave worm) paired with convex worm wheels, CAVEX® worm gearboxes are far superior to comparable worm gearboxes of an equal size. This combination of teeth ensures better osculation of the flanks and leads to a lower flank pressure (Hertzian stress). The result: A higher torque transmission in relation to its size, optimum efficiency and an increase in service life due to lower wear and tear.

CAVEX GmbH & Co. KG offers you the complete range of CAVEX® worm gearboxes:

- Nominal output torque from 60 Nm to 1.200.000 Nm
- Housing made from steel, stainless steel or aluminium
- Single-stage or multi-stage
- Standard, industry-specific or custom

CAVEX® offers you many advantages:

- Excellent torque and efficiency and a long service life due to our unique gearing system
- High ratios
- High overloading capacity
- Robust design
- Low noise emission
- Custom and industry specific solutions
- ATEX conformity

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1 Introduction

1.1 Overview

CAVEX® gearboxes have for decades impressed with their sophisticated technology and long service life. Our new CAVEX® compact range has been developed with an emphasis on making the gearboxes lightweight, easy-to-clean and highly efficient.

In comparison to our previous industrial worm gearbox, CAVEX®compact offers the same performance levels with considerably lower weight.

As there are no cooling fins, there are hardly any areas for dust and dirt to adhere to. By using a thinner housing than in our classical CAVEX® worm gearbox, temperatures inside the housing are not increased.

Our original CAVEX® wheel sets achieve unequalled reliability and efficiency rates of up to 97%.

There are many areas of application for CAVEX®compact. Possible applications include the following:

- Centrifuges and centrifuge drives
- Cranes and stage technology
- Paper and printing machines
- Packaging machines
- Water treatment
- Conveyor drives

CAVEX® worm gearboxes are extremely robust, shock-resistant, low maintenance and have a low noise emission. If our standard range does not meet your requirements, we also offer customer-specific solutions.

We look forward to hearing from you!

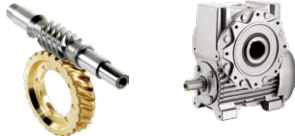
1.2 About CAVEX®



In August 2011 CAVEX GmbH & Co. KG took over the worm gearbox range from Siemens AG (Flender CAVEX® worm gearboxes). The CAVEX® gearing that was developed by Flender provides unparalleled durability and reliability in the worm gearbox sector. We are continuing on this long tradition of quality and are still producing the complete range of Flender CAVEX® gearboxes. Our success story continues with our new CAVEX®compact and CAVEX®HD worm gearboxes which set a new standard in the areas of compactness, flexibility and cleanliness. With an efficiency ratio of up to 97%, these gearboxes are effective and sustainable; and all this at highly competitive prices.

2 Applications for CAVEX® product solutions

Table 1: Applications

Industry solutions	Examples	Matching CAVEX® product
Automotive	• Vehicle bodies • Hydraulic platforms	
Construction	• Brick production • Cement production • Asphalt mixing plants • Concrete mixing plants	
Chemical and pharmaceutical industry	• Reactors • Mixers • Mixer drives • Lauter tubs • Water treatment	
Energy	• Generators • Gas turbines • Trackers for solar panels • Wind turbines	
Conveyor and Hoisting Technology	• Lifts • Escalators • Passenger conveyors • Cranes • Stage technology • Conveyor belts	
Food industry	• Filling machines • Cutting machines • Bakery machines • Mixers • Worm conveyors • Grinders • Door drives • Multi-head weighers	

2 Applications for CAVEX® product solutions

Table 1: Applications

Industry solutions	Examples	Matching CAVEX® product
Machine and plant engineering	• Pellet plants • Centrifuges • Lock drives • Different types of machines • Shredding technology • Book binding machines	
Medical engineering	• Operating tables • Medical handling • Drives for examination tables and patient beds	
Paper and printing industry	• Printing machines • Paper machines • Money printing machines • Reel changers	
Steel and roller mills	• Roll adjustments • Cooling bed drives • Bending machines • Casting technology	
Packaging technology	• Packaging machines • Can production • Film and foil production	
Machine tools	• Tool changer • Presses • Broaching machines • Sanding machines • Cutting presses • Cam controls	

3 Product range

Image 1: CAVEX®compact basic design

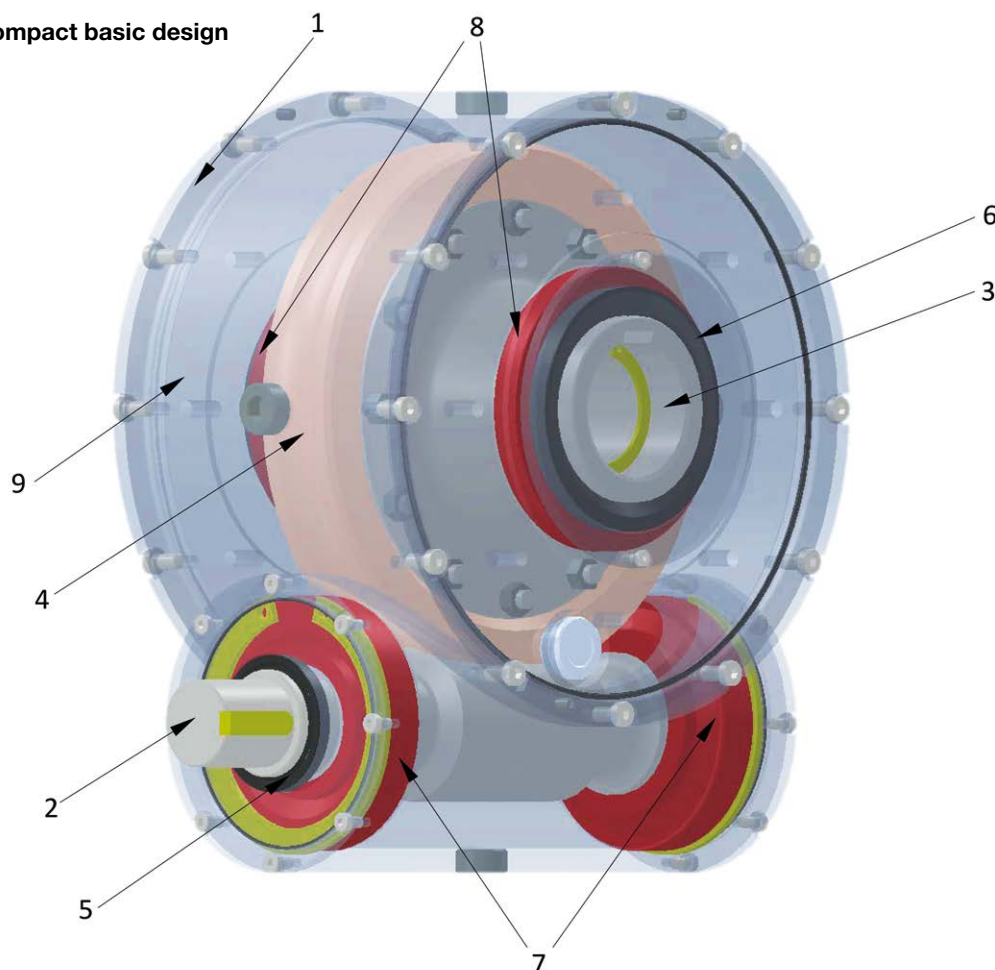


Table 2: Basic components of the CAVEX®compact gearbox and their main features

Part Number	Description	Main feature
1	Housing	standard material steel - P355 also available in aluminium or stainless steel
2	Input shaft	material steel, with CAVEX® gearing
3	Output shaft	hollow shaft on both sides
4	Worm wheel rim	material bronze, with CAVEX® gearing
5	Input shaft seal	standard VITON, NBR
6	Output shaft seal	standard VITON, NBR
7	Input shaft bearing	tapered roller bearing
8	Output shaft bearing	grooved ball bearing
9	Oil	Polyglycol

With its variable flank geometry, the CAVEX® gearing (based on ZC gearing according to DIN 3975), can be adapted for the desired application in the most effective way.

4 Technical data and maintenance

4.1 Technical data

You will find detailed performance data in our “Worm Gear Units” catalogue on pages 2-4. This catalogue can also be downloaded on our website.

Table 3: Performance data for our CAVEX®compact gearboxes

Size	Center distance a in mm	Ratio n_1 / n_2	Input speed n_1 in min^{-1}	Output torque T_2 in Nm	Gearbox efficiency η in %
80	80	5 - 140	0 - 3000	450	≤ 97
120	120	5 - 140	0 - 3000	1300	≤ 97
160	160	5 - 140	0 - 3000	2700	≤ 97
200	200	5 - 140	0 - 3000	4700	≤ 97
250	250	5 - 140	0 - 3000	8000	≤ 97
315	315	5 - 140	0 - 3000	13000	≤ 97
355	355	5 - 140	0 - 3000	17000	≤ 97
Ambient temperatures: -10°C up to +30°C (for lower or higher temperatures requirements please contact us)					
Lubricant: Gearbox: Oil polyglycol (The unit is delivered without any oil)					
Protection against immersion of particles and water: protection class IP 65					

4.2 Maintenance

The maintenance of CAVEX®compact gearboxes consists of just a few simple procedures which are listed in table 4.

Table 4: Maintenance procedures for CAVEX®compact gearboxes / gearmotors

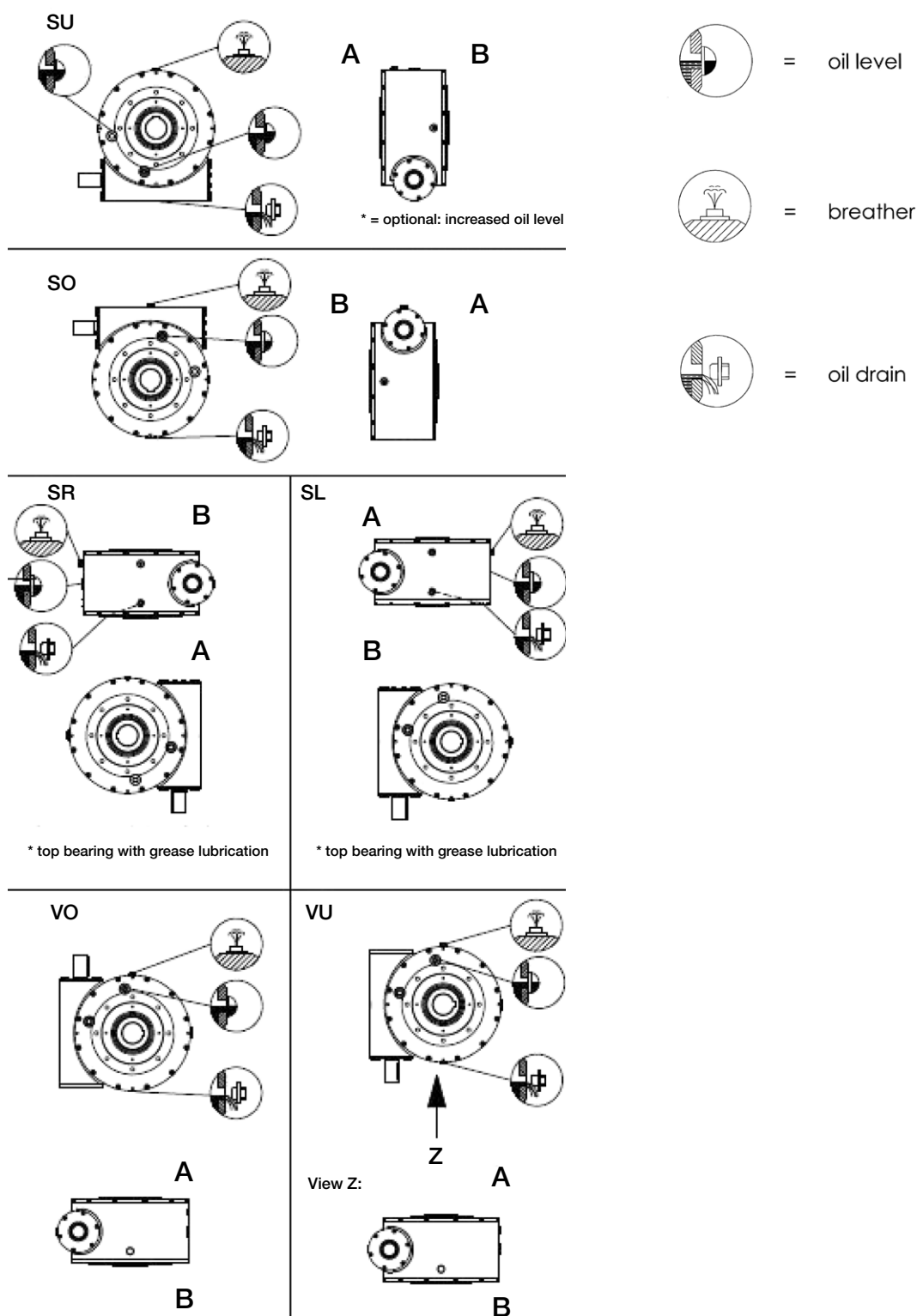
Procedures	Time Frame
Monitoring of oil temperature, gear noise and leakage test	continuously
Oil change	Oil change after approx. 6,000 – 12,000 operating hours or no later than 5 years
Clean housing	when dirty
Check fixing screws for tightness	continuously

4 Technical data and maintenance

4.3 Mounting positions

The different mounting positions of the CAVEX®compact gearboxes allow for various assembly options (cf. image 2).

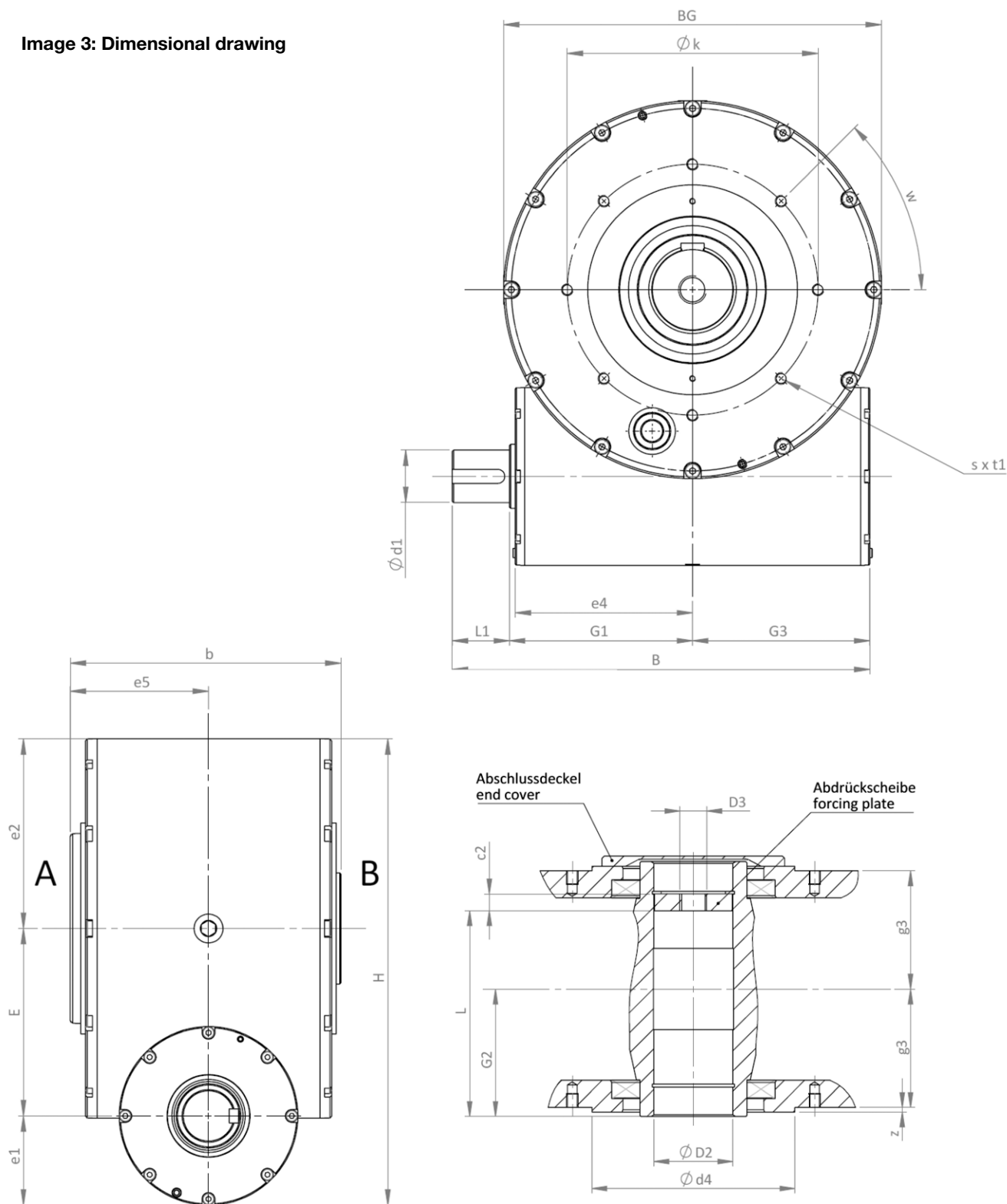
Image 2: The following mounting positions are possible



5 Dimensional drawing

Below are the dimensional drawings of CAVEX®compact gearboxes and gearmotors. Tables 5+6 list the overall length and mass of each CAVEX®compact gearbox and gearmotor.

Image 3: Dimensional drawing



5 Dimensional drawing

Table 5: measurements in mm

Sizes	80	120	160	200	250	315	355
b	169	198,5	242	285,5	348,5	333	375
B	236,5	346	436	532,5	641	602	674
B₆	197,45	272	349	451	567	622	711
c₂	10	12	15	17	20	24	27
d₁	22 m6	32 m6	42 m6	55 m6	65 m6	80 m6	85 m6
d₄	110 h8	130 h8	180 h8	250 h8	300 h8	300 h8	300 h8
D₂	40 ^{H7}	60 ^{H7}	75 ^{H7}	95 ^{H7}	115 ^{H7}	110 ^{H7}	140 ^{H7}
D₃	M20	M24	M24	M30	M30	M36	M36
e₁	47	63	79	87,2	105,5	114,5	120,5
e₂	109	146	185	235,5	293,5	311	355,5
e₄	94,5	141	177	214,5	260	256	289
e₅	89	105,5	129	148	181,5	171	193
E	80	120	160	200	250	315	355
g₃	75,5	88	108	126	155,5	150	169
G₁	102	145	184	223	270	261	294
G₂	80	93	113	137,5	167	162	182
G₃	94,5	146	182	219,5	266	256	289
H	236	329	424	522,7	649	740,5	831
k	130	165	215	300	350	350	350
L	140	161	198	243	299	244	274
L₁	40	55	70	90	105	85	91
S x t₁	6xM12x18	6xM12x18	6xM16x24	8xM20x30	8xM20x30	12xM12x16/24	12xM12x24/33
w	60°	60°	60°	45°	45°	30°	30°
z	4,5	5	5	11,5	11,5	5	5

Table 6: Mass of individual CAVEX®compact gearboxes and weight of possible attachments

Size	Weight					
	Basic model	Torque arm	Foot mounted flange	Console	Lantern	Solid shaft
80	27 kg	*	*	*	*	*
120	61 kg	*	*	*	*	*
160	118 kg	*	*	*	*	*
200	210 kg	*	*	*	*	*
250	380 kg	*	*	*	*	*
315	N. A.	*	*	*	*	*
355	N. A.	*	*	*	*	*

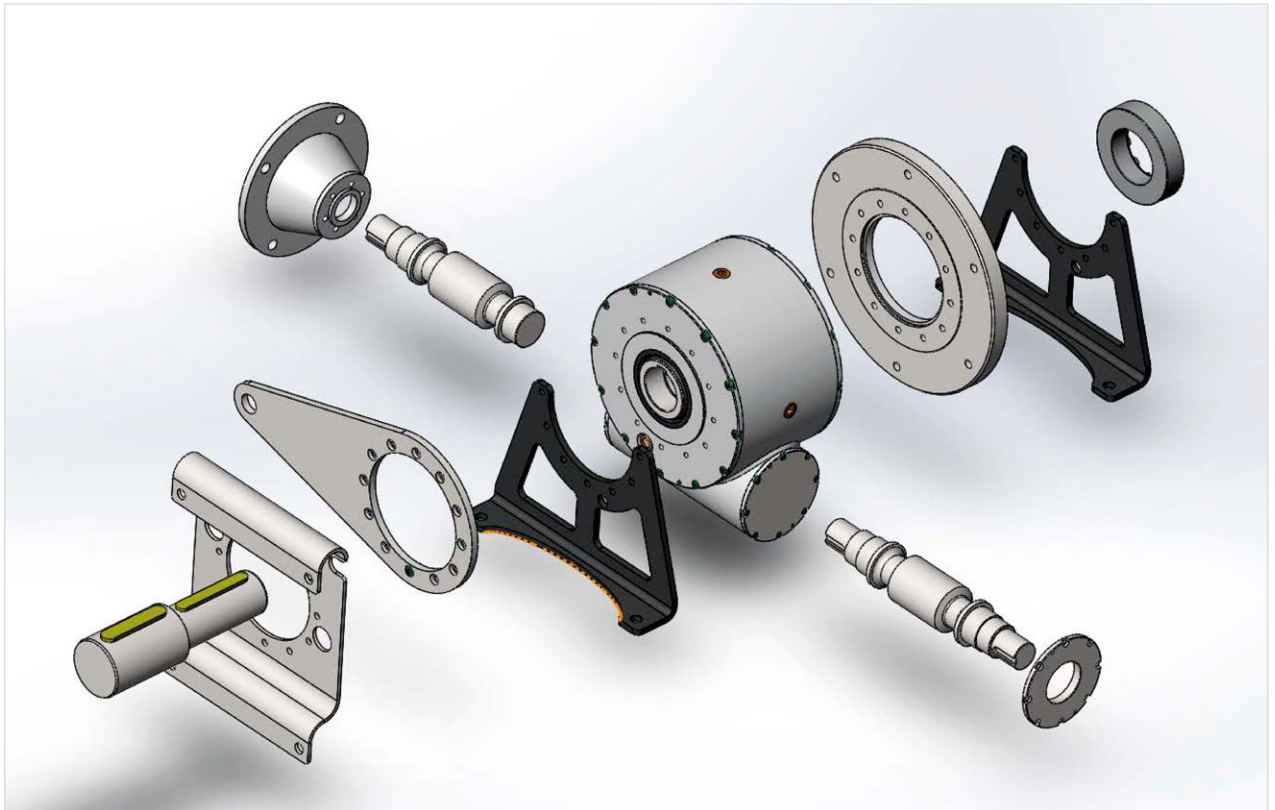
* depending on model

6 Gearboxes and attachments

6.1 Modular design

All CAVEX®compact gearboxes are based on a basic design. Our modular design offers many options to adapt the gearbox so that it can be fitted to your existing installations.

Image 4: Modular design - CAVEX®compact



6 Gearboxes and attachments

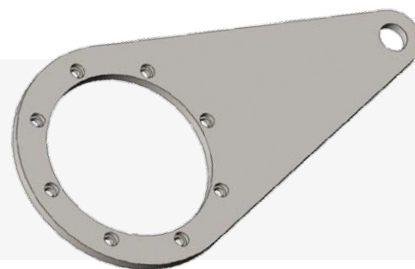
6.2 Various options of CAVEX®compact gearboxes

- One shaft end on input shaft
- Two shaft ends on input shaft
- Brake on input shaft
- Brake on output shaft
- Hollow shaft open on both sides, side A and B
- Hollow shaft open on one side, side A or B

6.3 Attachments

- Torque arm:

The torque arm can be fitted to the housing cover.
The mounting positions of the torque arm allow for eight different options: 0°, 45°, 90°, 135°, 180°, 225°, 270° und 315°.



- Foot-mounted flange:

The foot-mounted flange can be fitted to the housing cover.



- Console:

The console can be fitted to the housing cover.



6 Gearboxes and attachments

- Solid shaft:

On request the gearbox is also available with a solid shaft.

There are two options:

- Solid shaft with one shaft end on side A or B
- Solid shaft with two shaft ends on side A and B



- Output flange:

The output flange can be fitted to the housing cover. Different pitch circle diameters and pitch circles to the machine flange are possible.



- Lantern:

Lantern for the installation of IEC motors.
The lantern can be fitted to the drive cover.



The basic configuration of **CAVEX®compact** gearboxes is shown in the dimensional drawings in chapter 5.

Table 7: Additional options for CAVEX®compact gearmotors

Options	Components
Speed measurement	Shaft encoder on motor shaft
Brakes on motor shaft	Electromagnetic brake on motor shaft
Variable motor speed	Converter
Complete gearmotor	E-Motor

7 Appendix

7.1 Symbols, terms and units

Table 9: Symbols, terms and units

Symbol	Term	Unit
a	Centre distance	mm
A	Output on side A	-
B	Output on side B	-
ϕd_1	Maximum diameter of input shaft	mm
ϕD_2	Maximum diameter of output shaft	mm
F	Force	N
n_1	Input speed	min ⁻¹
n_2	Output speed	min ⁻¹
n_1/n_2	Ratio	-
P_H	Hertzian stress	N/mm ²
SL	Worm on left	-
SO	Worm above	-
SR	Worm on right	-
SU	Worm below	-
T_2	Output torque	Nm
VO	Worm vertically above	-
VU	Worm vertically below	-
η	Efficiency	%

7 Appendix

7.2 Selcection checklist: CAVEX® worm gearboxes

Erforderliche Angaben für eine Getriebeauswahl

Checkliste

An CAVEX GmbH & Co. KG
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D-72131 Ofterdingen

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Fax:

Von
From

CAVEX /

Tel.:

Telefax:
Fax:

Datum:
Date:

Name:

Projekt:
Project

Stückzahl:
No. of pieces:

Firma:
Company

Ansprechpartner:
Contact person:

Tel.:
E-mail:

Getriebedaten	Gear unit data	
Bauart	Unit type	
Größe	Size	
Abtriebsmoment T_2	Output torque T_2	[Nm]
max. Abtriebsmoment T_{2max}	max. Output torque T_{2max}	[Nm]
geplante Antriebsleistung (P1)	planned input power (P1)	[kW]
Antriebsdrehzahl n_1	Input speed	[min ⁻¹]
Übersetzung i	Ratio	
Einbaulage	Mounting position	
Abtriebswelle auf Seite	Output shaft on side	
Flansch auf Seite	Flange on side	
Drehmomentstütze auf Seite / Stellung mit / ohne Endscheibe	Torque arm on side / in position with or without end plate	
Antriebswelle in Stellung	Input shaft on side	
Umgebungstemperatur	Ambient temperaures	[°C]
Einschaltdauer ED	Operating cycle ED	[h/day]

Verbindung Getriebe-Motor	Mounting of IEC motor at the gear unit	
Motor-Baugröße	Size of the motor	
Kupplungs-Baugröße	Size of the coupling	
Art der Kupplung	Type of coupling	

Motordaten	Electric motor data	
Größe	Size	
Bauform	Mounting position	
Schutzart	Type of protection	
Nennleistung	Nominal input power rating	[kW]
Drehzahl	Rated motor speed	[min ⁻¹]
Nennspannung	Rated motor voltage	[V]
Frequenz	Rated motor frequency	[s ⁻¹]
Zusatzausstattungen	Additional features	

Beschreibung der Belastungs- und Umgebungsverhältnisse / zusätzliche Informationen

Additional description of load requirements and ambient ambient conditions

7 Appendix

ATEX-Anwendungen bei CAVEX®

CAVEX®-Getriebe können auch konform der Explosionsrichtlinie 94/9/EG (ATEX) geliefert werden.

Die Getriebe sind vorgesehen für den Einsatz in den Zonen 1 und 2 (Gas) bei den Temperaturklassen T1 - T4 und den Zonen 21 und 22 (Staub) bei einer maximalen Oberflächentemperatur von 120°C.

Abhängig von den Einsatzbedingungen können sich Einschränkungen für den Betrieb in explosionsgefährdeten Bereichen ergeben. Für die Projektierung von Getrieben, welche konform der Explosionsrichtlinie ausgeführt werden sollen, sind die erforderlichen Angaben auf einer Checkliste, siehe nächste Seite, aufgeführt.

Basierend auf diesen Angaben erfolgt die Prüfung und ein Angebot.

ATEX applications with CAVEX®

CAVEX® gear units can also be supplied in accordance with Directive on Explosion protection 94/9/EC (ATEX).

The gear units are provided for use in the 1 and 2 zones (gas) at temperature classes T1 - T4 and the 21 and 22 zones (dust) at a maximum surface temperature of 120 °C.

Depending on the conditions of use, restrictions may arise on operation in potentially explosive environments. For the project planning of gear units which are to be constructed in accordance with the Explosion Directive the necessary data are given in a check list (see next page). These data will be used as a basis for the examination and the quotation.

Ex-Atmosphäre / Zone Ex-atmosphere / Zone				Kategorie Category	Häufigkeit Frequency
G (Gase und Dämpfe/ Gases and vapours)	0	D (Stäube / Dust)	20	1	Ständig oder langfristig Constant or long-term
	1		21	2	Gelegentlich Occasional
	2		22	3	Selten oder kurzfristig Infrequent or short-term

7 Appendix

ATEX-Checkliste Rev. 1

ATEX-Checklist Rev. 1

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Fax:

Von	CAVEX /	Tel.:	Telefax:
From			Fax:
	Datum: Date:	Name:	
	Projekt: Project	Stückzahl: No. of pieces:	
	Firma: Company	Ansprechpartner:	Tel.: E-mail:

In der Tabelle sind die erforderlichen Fragen aufgelistet, die beantwortet werden müssen, um das Getriebe entsprechend der Explosionsschutzrichtlinie EU 94/9/EG (ATEX) projektieren zu können.

Listed in the table are the necessary questions which have to be answered to enable the gear unit to be planned in accordance with Directive on Explosion Explosion protection 94/9/EC (ATEX).

Fragen	Questions	Kundeninformation Customer Information	Standard
Welche Zone?	Which zone?		1, 2, 21 22
Welche Temperaturklasse?	Which temperature class?		T4 (135°), T3 (200°C) für Gase/for Gases 120°C für Staub/for dust
Umgebungstemperatur	Ambient temperature		-20°C bis / to +40°C
Ölstandsüberwachung durch Messstab	Oil level monitoring by dipstick		Überwachung durch Betreiber / observation by user
Ölstandsüberwachung durch Ölschauglas	Oil level monitoring by oil sight glass		
Elektrische Ölstandsüberwachung	Electrical oil level monitoring		
Temperaturüberwachung	Temperature monitoring		Indirekt, über Leistungsmessung am Motor durch Betreiber Indirect, by measuring the output on the motor by the operator

In der folgenden Tabelle sind die technischen Daten aufgeführt, die für die Berechnung der maximal auftretenden Getriebetemperatur, sowie für die Beurteilung des zulässigen Drehzahlbereiches für die Rücklaufsperrung notwendig sind.

The following table shows the technical data needed for calculation of the maximum gear unit temperatures occurring and for assessment of the permitted speed range for the backstop.

Fragen	Questions	Kundeninformation / Customer Information
Bauart	Type	
Baugröße	Size	
Baulage	Mounting Position	
Stellung der Antriebswelle (nur bei Doppelgetriebe)	Position of the drive shaft (double gear unit only)	
Übersetzung	Ratio	
Abtriebsdrehmoment (T2)	Output torque (T2)	
Geplante Antriebsleistung (P1)	planned driving power (P1)	
Max. Antriebsdrehzahl (n1)	Max. Input speed (n1)	
Min. Antriebsdrehzahl (n1)	Min. Input speed (n1)	

Durch den Einbau des Getriebes in die Anlage muss sichergestellt sein, dass das Getriebe nicht mit aus dem Prozess frei werdenden Flüssigkeiten oder Medien in Berührung kommen, die die Betriebssicherheit gefährden.

The gear unit must be installed in the system in such a way that it does not come into contact with liquids or media released by the process which could impair operational reliability and safety.

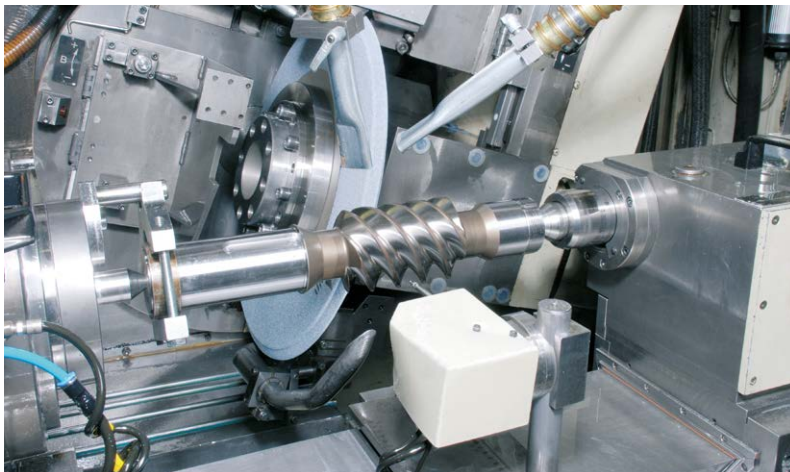
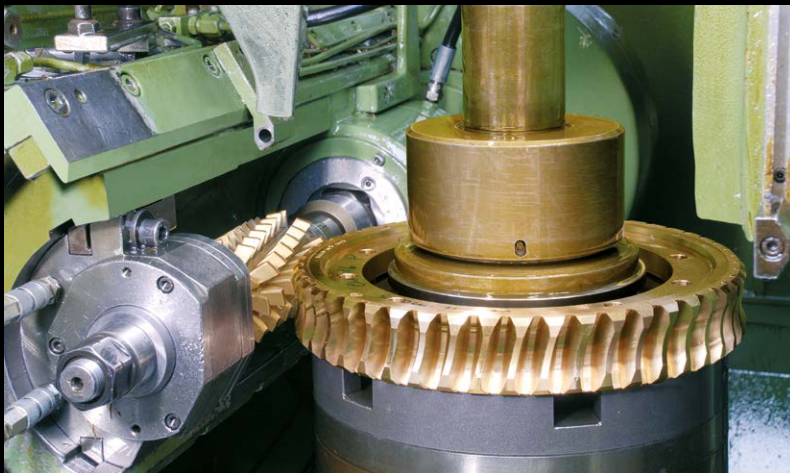
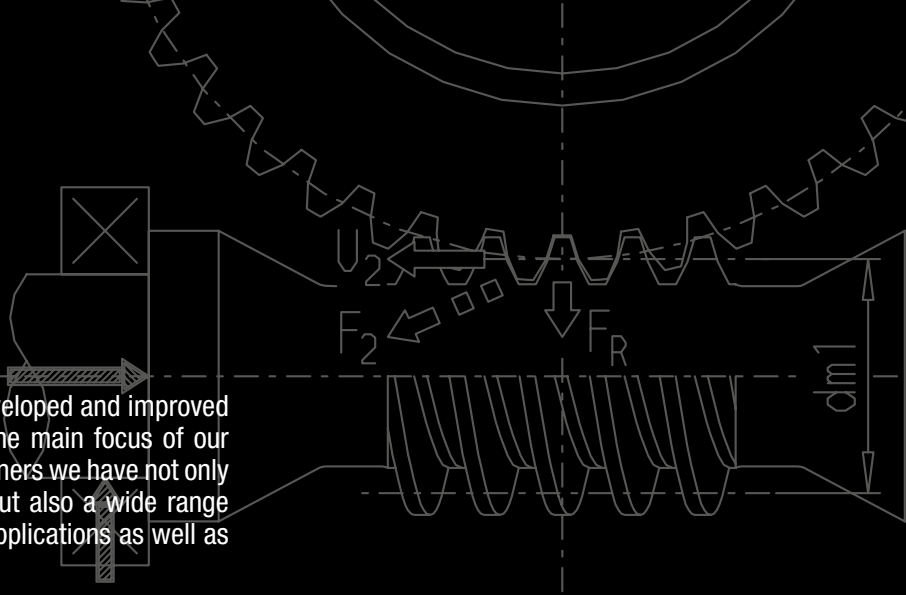
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Datum / Date

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Unterschrift Kunde / Signature Customer

Drive Technology - Made in Germany

The right solution for any application

CAVEX worm gear units have been continuously developed and improved for over 50 years. Your requirements are always the main focus of our efforts. In close cooperation with our clients and partners we have not only developed our up-to-date CAVEX standard range but also a wide range of individual solutions - for our customer specific applications as well as individual industries.



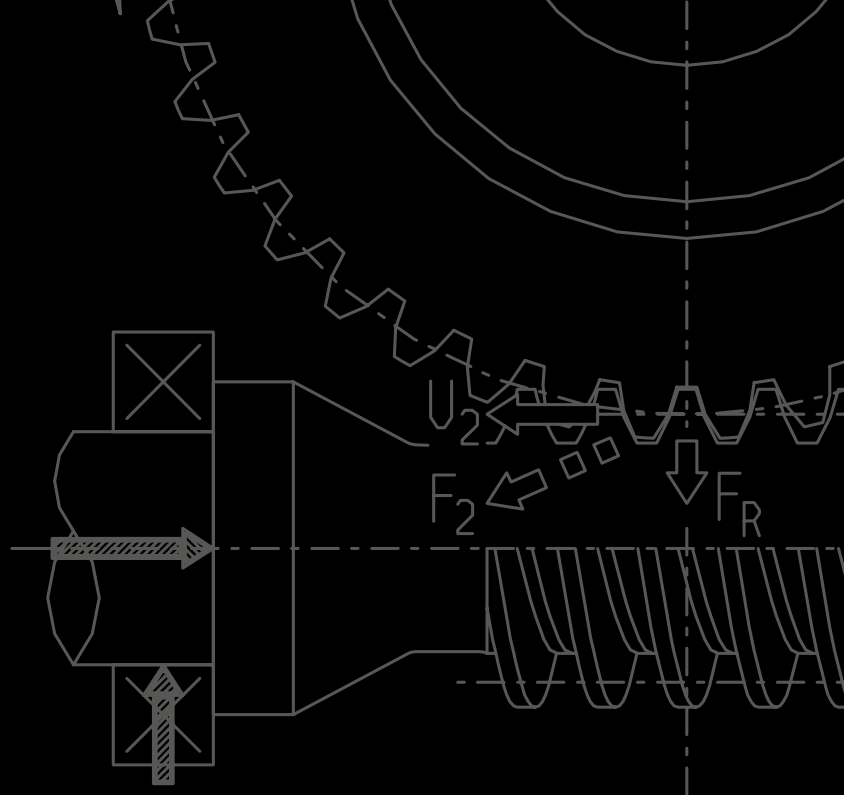
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Typical designs

- Solid and hollow shaft at output
- Input or output shafts on both sides
- Output with reinforced bearing
- Hollow shaft with feather key groove or shrink disk
- Labyrinth shaft seals
- Housing in grey cast iron (GG-20) or spheroidal cast iron (GGG-40)
- Worm and wheel sets with superior accuracy (e.g. DUPLEX gearing)

www.CAVEX-GmbH.de



CAVEX[®]

German Drive Technology

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