dertec®

Designed to Perform

Stainless Steel

Helical Bevel Gearbox.

FKA

FKA Helical bevelgearbox

FKA series bevel gearboxes have been developed to achieve high torque, low energy use and less surface heat.
The high efficiency of the drive reduces the energy consumption and the case hardened gears ensure a long lifetime and smooth running.
Duplex stainless steel secundary shafts with PNS hardening contributes to a longer service life of the drive.
Gearbox footprint, centerheight and shaftdiameters are interchangeable with common standards.

The design of Dertec gearboxes is round and smooth making the gearboxes extremely applicable in the food industry.
The FKA bevel gearboxes offer high ratios up to 197,37 : 1, with a maximum output torque of 2700 Nm.
Like all Dertec gearboxes, the FKA series is equipped with food grade lubrication.

Main Features

Made of high quality carefully electro polished Stainless Steel AISI 316 (mirror polished on request). The smooth design gives the gearbox a nice appearance, ready to suit all kinds of stainless steel machinery for the food industry.

Hardened shaft

All hollow shafts are produced in duplex stainless steel AISI 2205. The special PNS surface treatment ensures enough hardness to collaborate with our special high temperature resistant blue shaft seals.
The PNS treatment increases the lifetime of shaft / seal cooperation and helps to reduce wear on the shaft surface.
The gearbox achieves a longer drip free operation compared to standard shaft / seal combinations made of AISI 304 with NBR or FKM.
The use of above combination offers all the positive characteristics of stainless steel and the surface hardness of a hardened shaft.

Blue shaft seals

Our high performance engineered shaft seals have a blue colour.
It is a well overthought feature for food industry applications.
It might be clear that the colour “blue” is a not existing organic colour.
In the context of food safety it is a common use to embed blue colours as these are very visible and easily to be recognised by vision scanning systems.

Foodgrade lubrication

All gearboxes are standard equipped with NSH H1 certified synthetic foodgrade lubrication.
On request it can be supplied with a halal, kosher or nut free certification.

Laser engraved tagplate

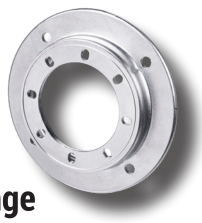
To avoid dirt traps under the commonly used motor identification tag plate,
all our motors and gearboxes are being equipped with a laser engraved tag plate.
Besides for the food safety this also prevents against possible loss of information because of taking away the tag plate or loosing the tag plate from the driveparts.

As a part of our standard procedure every drive is tested in our production facility in the Netherlands to ensure correct functioning.

General specifications

- Standard ratio’s 3,98 : 1 to 197,37 : 1
- IEC motor adaption versions (AM)
- Integrated motor versions (B5T..)
- Standard hollow shafts 30, 35, 40, 50 & 60 mm
- Extra hygienic optional shaft covers. (open and closed version)
- Easy clean torque arm with built in elastic element to reduce mis alignment.
- High efficiency of 94%
- Optional output flanges available
- Stainless Steel AISI316
- Duplex stainless steel 2205 output shaft
- Interchangeable with euro sizes
- Designed and produced in the Netherlands

Torque arms



Flange

Open & Closed covers

Product Characteristics

FKA 38	
Ratio's	From 3.98 : 1
	To 106.38 : 1
Standard shaft	30mm
Max. Torque	200 Nm
Max. Power	3.0 kW

FKA 48	
Ratio's	From 8.56 : 1
	To 131.87 : 1
Standard shaft	35 mm
Max. Torque	400 Nm
Max. Power	3.0 kW

FKA 68	
Ratio's	From 5.20 : 1
	To 144.79 : 1
Standard shaft	40 mm
Max. Torque	820 Nm
Max. Power	5.5 kW

FKA 78	
Ratio's	From 7.24 : 1
	To 192.18 : 1
Standard shaft	50 mm
Max. Torque	1550 Nm
Max. Power	7.5 kW

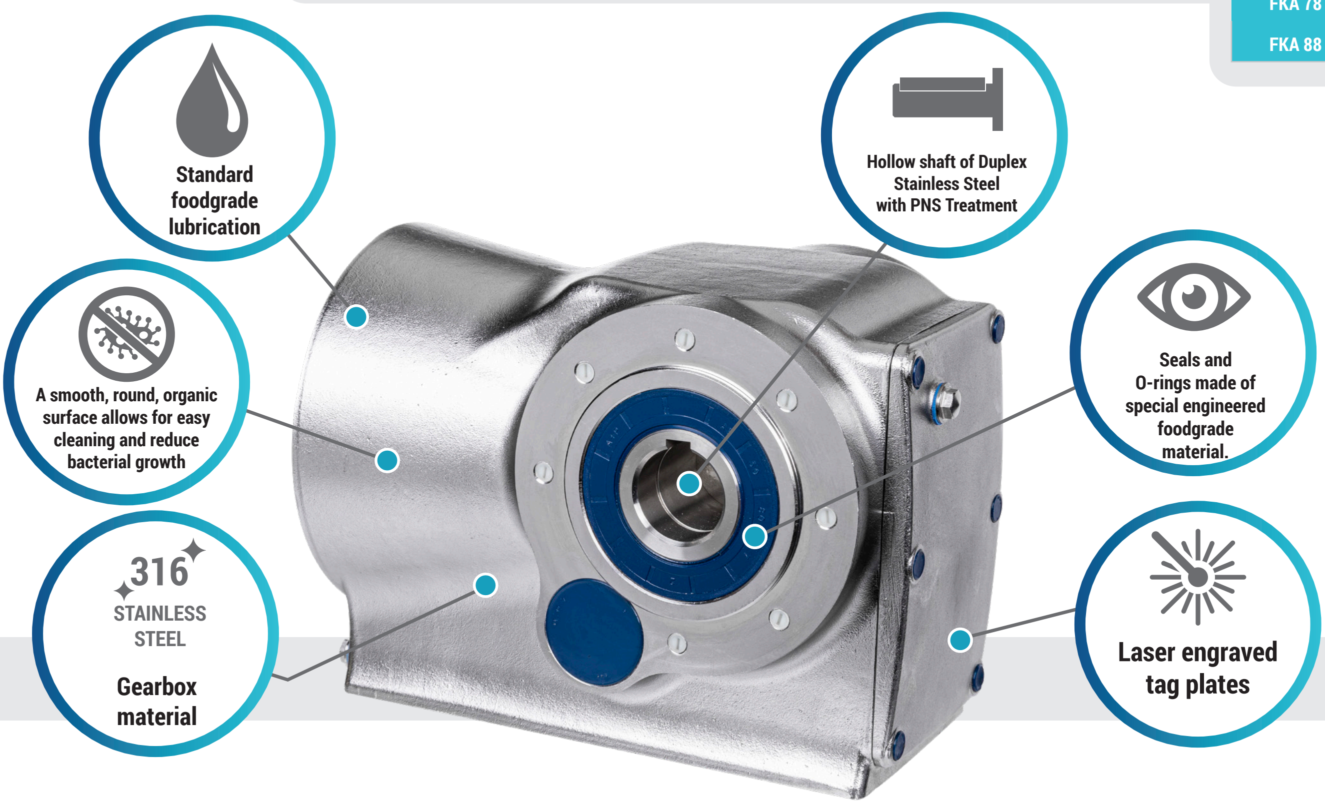
FKA 88	
Ratio's	From 7,21 : 1
	To 197.37 : 1
Standard shaft	60 mm
Max. Torque	2700 Nm
Max. Power	7.5 kW

Output Flanges	
FKA 38	SS 095 FL 160
FKA 48	SS 115 FL 200
FKA 68	SS 130 FL 250
FKA 78	SS 140 FL 250
FKA 78	SS 140 FL 300

Easy Clean Open Cover	
FKA 38	SS 095 CO Ø30
FKA 48	SS 115 CO Ø35
FKA 68	SS 130 CO Ø40
FKA 78	SS 140 CO Ø50
FKA 88	SS 178 CO Ø60

Easy Clean Closed Cover	
FKA 38	SS 095 CC
FKA 48	SS 115 CC
FKA 68	SS 130 CC
FKA 78	SS 140 CC
FKA 88	SS 178 CC

Torque Arms	
FKA 38	SS 095 MS L130S
	SS 095 MS L150
FKA 48	SS 115 MS L160S
	SS 115 MS L200
FKA 68	SS 130 MS L200
FKA 78	SS 140 MS L250
FKA 88	SS 178 MS L300



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Project planning

Basic Parameters

Power P

The input power can be found in the **"Gearbox Selection Tables"** , it represents the amount of kilowatts [kW] that can be safely transmitted into the gearbox.

$$P_1 = \frac{P_2}{\eta}$$

P_1 = Input power (kW)
P_2 = Output power (kW)
η = Gearbox efficiency (%)

Rotation speed *n* and gear ratio *i*

The gear ratio can be calculated with the input and output speed

$$i = \frac{n_1}{n_2}$$

i = Gear ratio
n_1 = Input speed in (rpm)
n_2 = Output speed in (rpm)

Torque *M*

The output torque can be calculated with the input power, the efficiency and the output speed.

$$M_2 = \frac{9550 \cdot P_1 \cdot \eta}{n_2}$$

$$M_{2max} \geq M_2 \cdot fs_{gearbox}$$

M_2 = Output torque (Nm)
M_{2max} = Maximum output torque (Nm)
P_1 = Input power (kW)
n_2 = Output speed (rpm)
η = Gearbox efficiency (%)
$fs_{gearbox}$ = Service factor

Mass acceleration factor f_a

The mass acceleration factor is calculated with all the external mass moments of inertia and the mass moment of inertia from the motor.

$$f_a = \frac{J_c}{J_m}$$

f_a = Mass acceleration factor
J_c = All external mass moments of inertia [kg m^2]
J_m = Mass moment of inertia on the motor end [kg m^2]

⚠ **If the mass acceleration factor $f_a \geq 10$, please contact us.**

Efficiency of gearboxes η

The efficiency of gearboxes is mainly determined by the gear type, the gear ratio and the bearing friction. The efficiency of the gears at start-up and at sub-optimal operating speed is always lower than when the gears are running at the optimal operating speed. The gear shape of worm- and helical worm gearboxes causes more friction, thus a lower total efficiency. As a result of the higher friction, the temperature of worm gearboxes might also be higher than gearboxes with other gear types.

The efficiency of the different gear types can be found in the **"Possible Geometrical Combinations".**

For an approximate approach the following values can be used for the efficiency of gears at their (optimal) operational speed, beware these are generalized and can be different depending on the factors as discussed before.
For bevel-, helical- and parallel shaft gears the efficiency is in-between 94% (3-stage) and 96% (2-stage).
The efficiency of hypoid bevel gears is 90% (3-stage) and 92% (2-stage). For worm- and helical worm gears the efficiency depends on the gear ratio, incoming rotational speed and the temperature of the worm gearbox, the efficiency of the gears is between 40% and 90%.

To ensure the efficiency of the gears is optimal it is recommended but not limited to: Regularly change oil, use the optimal mounting position and use the gearbox at the optimal operating speed.
Choosing the right size gearbox for the application is recommended to achieve a better efficiency, at speeds below- and over the optimal operating speed the efficiency is lower than at optimal speeds and conditions.

Service factor fs_{min} and $fs_{gearbox}$

The service factor is a method to determine the effects of the driven machine or other application on the gearbox, with a sufficient level of accuracy for most applications. The minimal service factor **(fs_{min})** for a machine can be determined using the **"Service factor graph"**. This minimum service factor is only an approximation, for the service factor for each gearbox, see the **"Gearbox Selection Tables"**.

⚠ **The minimal service factor (fs_{min}) should always be lower than or equal to the actual service factor of the gearbox ($fs_{gearbox}$).**

$$fs_{min} \leq fs_{gearbox}$$

fs_{min} = Minimal determined service factor **"Service factor graph"**
$fs_{gearbox}$ = Actual service factor for the gearbox **"Gearbox Selection Tables"**

⚠ **The service factor for each gearbox ($fs_{gearbox}$) is the critical service factor, and should always be equal to or higher than the minimum service factor (fs_{min}) !**

Switching frequency

The switching frequency determines how often an application switches per hour.
The switching consists of: **turning on/off, changing of speeds, changing of loads and braking**

z = Switching frequency [1/h]

Load classification

There are three load classifications to be considered, they depend on the mass acceleration factor.
The mass acceleration factor can be calculated, see **"Mass acceleration factor f_a"**

f_a = Mass acceleration factor

The load classifications are split in three groups with each examples of the common applications for each load classification.

A: Uniform load, a mass acceleration factor of **$f_a \leq 0{,}3$**
Examples of applications: Screw feeders for light materials, fans, assembly lines, conveyer belts for light materials, small mixers, light application elevators, cleaning machines, fillers, control machines.

B: Moderate shock load, mass acceleration of **$f_a \leq 3$**
Examples of applications: Winding devices, woodworking machine feeders, medium application elevators, balancers, medium mixers, conveyer belts for heavy materials, winches, sliding doors, fertilizer scrapers, packing machines, concrete mixers, crane mechanisms, milling cutters, folding machines, gear pumps.

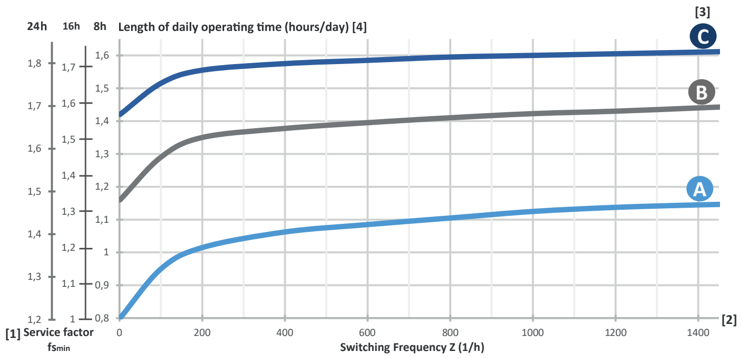
C: Heavy shock load, mass acceleration factor of **$f_a \leq 10$**.Examples of applications: Mixers for heavy materials, shears, presses, centrifuges, rotating supports, winches and lifts for heavy materials, heavy application elevators, grinding lathes, stone mills, bucket elevators, drilling machines, hammer mills, cam presses, folding machines, turntables, tumbling barrels, vibrators, shredders.

Service factor graph

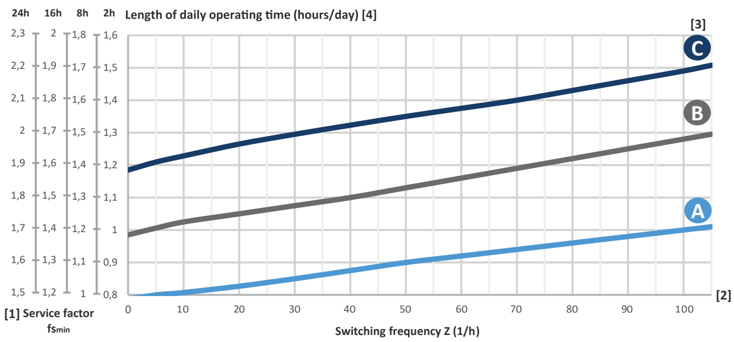
The determined Minimum **[1]** service factor is based on **[2]** switching frequency, **[3]** load classification and **[4]** length of daily operating time.

To get the expected service life from the gearbox, $fs_{min} \leq fs_{gearbox}$
see the "Gearbox Selection Tables" for the gearbox service factor

Service factor for a high Switching frequency [Z], used for all gearboxes:



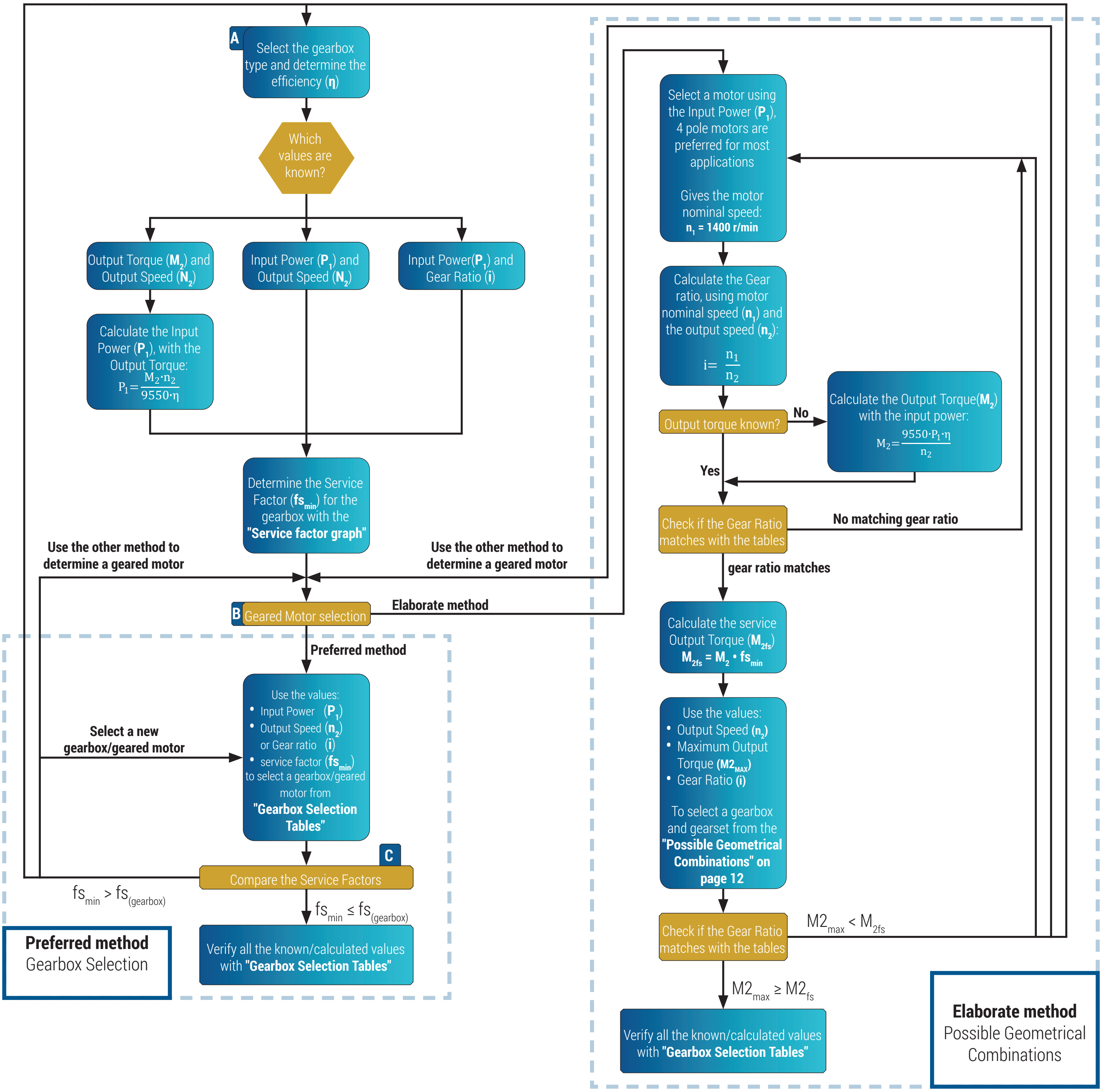
Service factor for low Switching frequency (Z), used mostly for worm- and helical worm gearboxes:



For worm gearboxes the ambient temperature has more influence on the service factor, the service factor should be adjusted as following:

Ambient temperature:
=30~40˚C, f_s•1,1 ~ 1,2
=40~50˚C, f_s•1,3 ~ 1,4
=50~60˚C, f_s•1,5 ~ 1,6

Flowchart



A

Gearbox types by gear type:

- Worm gear
- Helical worm gear
- Helical bevel gear
- Hypoid bevel gear
- Parallel shaft gear
- (Compact) Helical gear

B

Geared motor selection, there are 2 methods of selecting a geared motor:

- The elaborate method is used to select a geared motor based on calculations.
- The preferred method is based on a quick and accurate decision with our tables.

C

The service factor, is a value to determine the effect of a driven machine on the gearbox. With **"Gearbox Selection Tables"** the minimum expected service factor (**fs_{min}**) can be determined.

The gearboxes themselves have a maximum service factor that varies per gearbox (**$fs_{gearbox}$**), always make sure that: **$fs_{min} \leq fs_{(gearbox)}$**

To get the expected service life from the gearbox.

Explanation of the flowchart

Gearbox selection type
To select a gearbox the values for efficiency and the service factor are needed. These can be predicted by choosing the type of gearbox, **"Possible Geometrical Combinations"**

Which values are known?
There are three sets of values that can be known and which can be used to select the right gearbox and geared motor.
These three sets of values are:

- **Output torque and speed**
- **Input power and speed**
- **Input power and gear ratio**

For only knowing the output torque- and speed it is necessary to determine the input power with the following equation:

$$P_1 = \frac{M_2 \cdot n_2}{9550 \cdot \eta}$$

P_1	Input power [kW]
M_2	Output torque [Nm]
η	Gearbox efficiency [%]
n_2	Rotational speed [rpm]

Determine the service factor
Use the **"Service factor graph"** to determine the service factor.

Select a geared motor
There are two methods to select a gearbox and a geared motor:

The preferred method: This method is accurate and quick, this method only needs a basic calculation in when the input power is unknown.

The elaborate method: This method gives more insight and a more hands on approach in the selection process for a gearbox and geared motor. There are a few calculations that have to be done in this method.

If both methods don't give the correct results it can be possible that the gearbox and or motor are not correct for this application!

Preferred method:

Use the "Gearbox Selection Tables"
Use the Input power, output speed or gear ratio and the service factor to select the gearbox/geared motor.

Note: that the output torque is sufficiticated to your application

Check the service factor
Check if the determined service factor fs_{min} is smaller or equal to the service factor from the **"Gearbox Selection Tables"** $fs_{min} \leq fs_{gearbox}$.

If $fs_{min} > fs_{gearbox}$ a different gearbox/geared motor should be selected if that is not possible then it is advised to check the other gearbox types..

If $fs_{min} \leq fs_{gearbox}$ go to the next step and verify the results.

Verify the results
If the service factor fs_{min} and $fs_{gearbox}$ gives a valid result, verify the rest of the results with the tables from **"Gearbox Selection Tables"**.

Elaborate method:

Select a motor
Select a motor from in the **(Motor documentation)**.
4-pole motors are preferred for most applications. The given nominal motor speed of a 4-pole motor is **n_1=1400 rpm**.

Calculate the gear ratio
If the gear ratio is known, the output speed **n_2** needs to be calculated.

$$n_2 = \frac{n_1}{i}$$

With the nominal speed from the selected motor and known output speed the gear ratio can be calculated.

$$i = \frac{n_1}{n_2}$$

i = Gear ratio [-]
n_1 = Gearbox input speed [rpm] (equal to motor speed)
n_2 = Gearbox output speed [rpm]

Check if the output torque is known
If the output torque is known go to the next step.
If the output torque is unknown use the following calculation to determine the output torque:

$$P_1 = \frac{M_2 \cdot n_2}{9550 \cdot \eta}$$

P_1 = Input power [kW]
M_2 = Output torque [Nm]
η = Gearbox efficiency [%]
n_2 = Rotational speed [rpm]

Check the gear ratio
With the known or calculated gear ratio and the **"Possible Geometrical Combinations"**, the gear ratio can be checked.
If the needed gear ratio is not in the list a different motor or gearbox should be selected.

Calculate the service output torque
With the determined service factor and the output torque, calculate the service output torque.

$$M_{2fs} = M_2 \cdot fs_{min}$$

M_{2fs} = Service output torque [Nm]
M_2 = Output torque [Nm]
fs_{min} = Service Factor

Use the Possible Geometrical Combinations tables
Use the Output speed, Service output torque and gear ratio to determine a gearbox and gearset with the tables from the **"Possible Geometrical Combinations"**.

Check the maximum output torque
Check if the maximum output torque in these tables matches the calculated service output torque. If the maximum torque is lower than the calculated service torque: **$M_{2max} < M_{2fs}$** it is advised to select a different motor or gearbox.

If **$M_{2max} \geq M_{2fs}$** go to the next step and verify the results.

Verify the results
If the maximum output torque matches the tables and gives a valid result, then verify the values from the tables with the calculated values and make a selection for the gearbox/geared motor.

Example 1: Preferred method

This example uses a different gearbox type but is generally applicable

Known parameters:

M_2	Nominal output torque [Nm]	= **110 Nm**
n_2	Rotational speed [rpm]	= **29 rpm**

Moderate shock load, operational **16 hours a day**, Switching frequency of **200 times per hour.**

Gearbox selection type

A hypoid bevel gearbox is selected. The estimated efficiency ***η≈90% to 94%***. For a more accurate efficiency look it up in the **"Possible Geometrical Combinations"**.

When in doubt use the lowest estimated efficiency.

Which values are known?

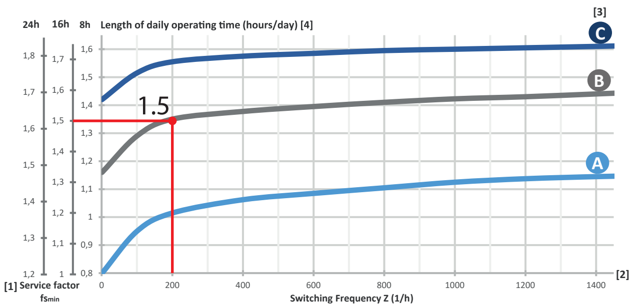
- Output torque- and speed
- ~~Input power- and speed~~
- ~~Input power and gear ratio~~

M_2 = **110Nm**
n_2 = **29 rpm**

Looking up the output speed and output torque in the **"Possible Geometrical Combinations" on page 15** tables gives an efficiency of: **η≈92%**
With the output torque- and speed it is necessary to determine the input power with the following equation:

$$P_1 = \frac{M_2 \cdot n_2}{9550 \cdot \eta} = \frac{110 \cdot 29}{9550 \cdot 0{,}92} = 0{,}363 \text{ kW}$$

Determine the safety factor



Select the *'Elaborate method'* or the *'Preferred method'*

Preferred method is chosen.

P_{1n} [kW]	n_2 min⁻¹	M_{2n} [Nm]	i	F_{r2} [N]	fs		
0.37	23	140	60.50	3430	1.40		
	29	113	48.71	3190	1.80		
	36	91	39.29	2970	2.00		
	46	70	30.31	2720	2.80	FK38B IEC71	712-4 B14a
	57	57	24.44	2530	3.20		
	69	47	20.25	2380	3.20		
	95	34	14.67	2130	3.20		

Check the service factor

fs_{min}=**1,5**
$fs_{(gearbox)}$=**1,8**

Check if the following is true

$fs_{min} \leq fs_{gearbox}$
Yes, because **1,5 < 1,8**

Verify the results

Needed Torque: **110 Nm**, available torque in selected gearbox: **113 Nm**
Needed output speed: **29 rpm**, available output speed in selected gearbox: **29 rpm**
Calculated Input power: **0,363 kW**, available input power in selected gearbox: **0.37 kW**

Service factor: $fs_{min} \leq$ fs(gearbox) = **1,5<1,8**
So the choice of gearbox/geared motor is: **FK38B IEC71 / 712-4 B14a.**

It is recommended to select a gearbox or geared motor that fits the application. Choosing a gearbox or geared motor that is too light or too heavy can cause damage (to the machine) and shorten the expected service life of the gearbox/geared motor!

Example 2: Eleborate method

This example uses a different gearbox type but is generally applicable

Known parameters:

P1 Input power [kW] = **0.55kW** **i** gear ratio = **30:1**
Heavy shock load, operational **24 hours a day**, switching frequency of **800 times per hour.**

Gearbox selection type
A hypoid bevel gearbox is selected. The estimated efficiency ***η≈90% to 94%***. For a more accurate efficiency look it up in the **"Possible Geometrical Combinations"**

When in doubt use the lowest estimated efficiency.

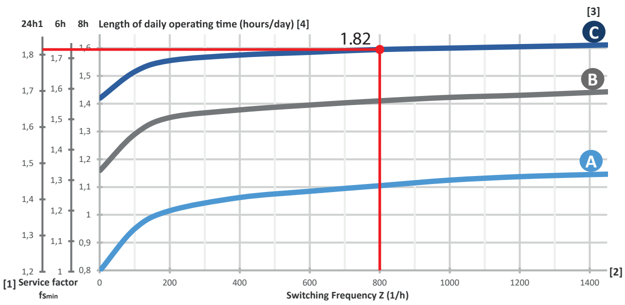
Which values are known?

- ~~Output torque- and speed~~
- ~~Input power- and speed~~
- Input power and gear ratio

P_1 = **0.55 kW**
i = **30:1**

Looking up the output speed and output torque in the **"Possible Geometrical Combinations"** tables gives an efficiency of: **η≈94%**

Determine the safety factor



Select the elaborate or the Simple method
Elaborate method is chosen

Select a motor
Check the **"Possible Geometrical Combinations"**, which motor is preferred. In this example an IEC80 B14a motor is preferred.

The choice of motor is based on a 4-pole motor, which means an input speed of 1400 rpm.
However it is possible to choose from a wide range of motors.

Calculate the output speed

i = 30:1
n_1 = 1400 rpm

$$i = \frac{n_1}{n_2} \rightarrow n_2 = \frac{n_1}{i} \rightarrow \frac{1400\ \text{rpm}}{30} = 46{,}67\ \text{rpm}$$

Check of the output torque is known
The output torque is not known yet, so it needs to be calculated with the known values.

$$M = \frac{9550 \cdot P \cdot \eta}{2} = \frac{9550 \cdot 0{,}55 \cdot 0{,}90}{46{,}67\ rpm} \quad 101{,}3\ Nm$$

Check the gear ratio
To check the gear ratio, look in the **"Possible Geometrical Combinations"** tables for the preferred gearbox. As seen below, the gear ratio and output speed match with this gearbox. The preferred motor is also possible with this gearbox type.

FK 28 B

Maximum torque = 130 Nm @ N1= 1400 rpm

n_2 [min⁻¹]	M_{2max} [Nm]	F_{r2} [N]	i		η%	IEC 63 B5	IEC 71 B14a	IEC 80 B14a	IEC 90 B14a
35	130	2610	40	40.09	94	✓	✓	✓	
48	130	2350	30	29.33	94	✓	✓	✓	
59	130	2200	25	24.07	94	✓	✓	✓	✓

Calculate the service output torque
Use the determined service factor and the calculated output torque.

$M_{2fs} = M_2 \cdot fs_{min} \rightarrow 101{,}3\ Nm \cdot 1{,}82 = 184{,}37\ Nm$

Use the Possible Geometrical Combinations tables

FK 28 B
*Maximum torque = **130 Nm** @ N1= 1400 rpm*

n_2 [Min⁻¹]	M_{2max} [Nm]	F_{r2} [N]	i		η%	IEC 63 B5	IEC 71 B14a	IEC 80 B14a	IEC 90 B14a
35	130	2610	40	40.09	94	✔	✔	✔	
48	130	2350	30	29.33	94	✔	✔	✔	
59	130	2200	25	24.07	94	✔	✔	✔	✔

Check the maximum output torque
With the known values and the selected gearbox, we can determine that the following values apply:

n_2 = 48 rpm ≈ 46.67 rpm [calculated]
I = 30 = 30 [known]
M2fs = 101,3 Nm [calculated]

So the determined gearbox has enough output torque for the application 130 Nm, but when we look at the service output torque, it is not recommended to choose this gearbox with this service factor and service output torque.

M_{2fs} = 184,37 Nm [calculated]
$M_{2max} < M_{2fs} \rightarrow$ 130 Nm < 184,37 Nm

It is recommended to choose another gearbox, the easiest way to do this is to look for a bigger gearbox within the same gearbox type.

Selecting a new gearbox
It is recommended to match the calculated results as before, but look for a higher maximum torque. Try to select a maximum torque that still matches the application, it is not recommended to select a gearbox with more maximum torque than the application needs.

FK 38 B
*Maximum torque = **200 Nm** @ N1= 1400 rpm*

n_2 [Min⁻¹]	M_{2max} [Nm]	F_{r2} [N]	i		η%	IEC 63 B5	IEC 71 B14a	IEC 80 B14a	IEC 90 B14a
36	200	2970	40	39.29	94	✔	✔	✔	✔
47	200	2720	30	30.31	94	✔	✔	✔	✔
58	200	25030	25	24.44	94		✔	✔	✔

Verify the results
With the table for the FK38B gearbox, we can determine the following.

n_2 = 47 rpm ≈ 46.67 rpm [calculated]
i = 30 = 30 = [known]
M_2 = 101,3 Nm [calculated]
M_{2fs} = 184,37 Nm [calculated]

Check if the maximum output torque is higher than the service output torque.

$M_{2max} > M_{2fs} \rightarrow$ 200 Nm > 184,37 Nm

So this gearbox can be used for the application, because the service output torque is lower than the maximum output torque.

The recommended gearbox with motor is:
For a gearbox, a **FK38B** with a true gear ratio of **30,31** and for a motor, the **IEC80 B14a** is possible.

⚠ **It is recommended to select a gearbox or geared motor that fits the application. Choosing a gearbox or geared motor that is too light or too heavy can cause damage (to the machine) and shorten the expected service life of the gearbox/geared motor**

Overhung and axial loads

Determing overhung loads

Each transmission element has a transmission element factor **f_z**, this factor is different for each element.

In order to properly use transmission elements, always make sure that they are aligned properly on the shaft of the gearbox and or the shaft of the machine or other application. It is important to check that the transmission element is mounted properly before use, the element might cause problems in dynamic situations if this isn't checked

$$F_r = \frac{M \cdot 2000}{d_0} \cdot fz$$

F_r = overhung load [N]
M = Torque [Nm]
d_0 = Mean diameter of the mounted element [mm]
F_z = Element factor [see table above]

Transmission elements	Transmission elements Factor Fz	Comments
Gears	1.00	≥ 17 Teeth
	1.15	< 17 Teeth
Chain sprockets	1.00	≥ 20 Teeth
	1.25	< 20 Teeth
	1.40	< 13 Teeth
Narrow V-belt Pulleys	1.75	Influence of the tensile force
Flat Belt Pulleys	2.50	Influence of the tensile force
Toothed Belt Pulleys	2.50	Influence of the tensile force

Rated bearing service life

The rated bearing service life **L_{10h}** (in hours, according to **ISO 281**) is used to calculate the estimated bearing life in hours. For special operating conditions the modified service life should be used.

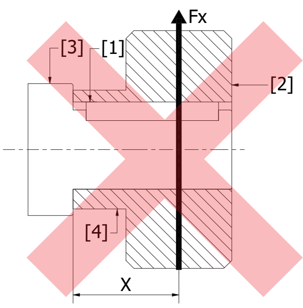
$$L_{10h} = \frac{10^6}{60 \cdot n_2} \cdot \left(\frac{C}{F_r}\right)$$

L_{10h} = Rated service life [hour]
C = Basic dynamic load rating, bearing [kN]
F_r = Equivalent dynamic load, bearing [kN]
ρ = Exponent for the life equation, ρ=3 for ball bearings, ρ=10/3 for roller bearings
n_2 = Gearbox output speed [rpm]

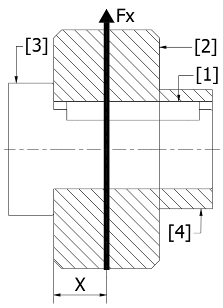
Preferred mounting for overhung loads

The preferred way of mounting the overhung load for sprockets, gears and other transmissions is with the hub **[4]** at the end of the shaft **[3]** and the sprocket/gear **[2]** against the shoulder, see **[B]** in the figure below. This method ensures a better load distribution on the end of the shaft.

[A] NOT Preferred



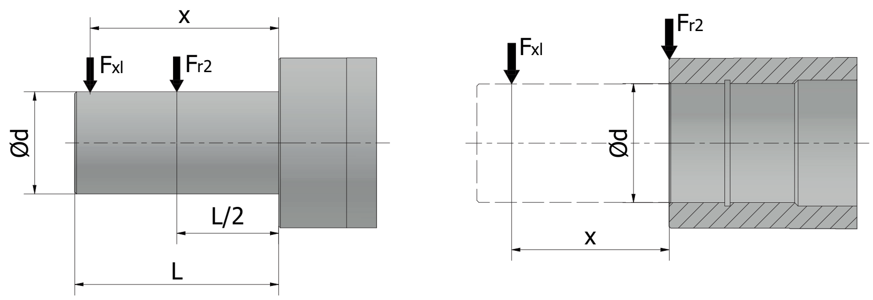
[B] Preferred



nr.	Part Name
[1]	Key
[2]	Sprocket / Gear
[3]	Solid shaft
[4]	Hub
[Fx]	Radial Force on the Sprocket / Gear
[X]	Distance to center of mass and force

Overhung load conversion for off-centre force applications

The rated bearing life is the basis for determining the permissible overhung load. The permissible overhung loads for foot mounted gearboxes with solid shafts can be calculated with the following calculation.



$$F_{xL}=F_{r2}\cdot\frac{a}{b+x}$$

F_{xL} = Permitted overhung load based on bearing service life[N]
F_{r2} = Permitted overhung load (x=L/2) for foot mounted gearboxes according to the selection tables [N]
F_{r2max} = Maximum permitted overhung load (x=L/2) for foot mounted gearboxes according to the selection tables [N]
x = Distance from the shaft shoulder to the applied force [mm]
a,b ød, L = Gear unit constant for overhung load conversions [mm]

The values in table are for the foot mounted gearboxes with solid shaft only, the measurements are for the standard shafts.

FV	a [mm]	b [mm]	Ød [mm]	L [mm]	Fr2 max [N]
FV 030	65	50	14	30	1830
FV 040	84	64	18	40	3490
FV 050	101	76	25	50	4840
FV 063	120	95	25	50	6270
FV 075	131	101	28	60	7380
FV 090	162	122	35	80	8180

FKA	a [mm]	b [mm]	Ød [mm]	L [mm]
FKA 38	123,5	98,5	25	50
FKA 48	153,5	123,5	30	60
FKA 68	181,3	141,3	40	80
FKA 78	215,8	165,8	50	100
FKA 88	252	192	60	120

FFA	a [mm]	b [mm]	Ød [mm]	L [mm]
FFA 38	123,5	98,5	25	50
FFA 48	153,5	123,5	30	60
FFA 68	181,3	141,3	40	80
FFA 78	215,8	165,8	50	100

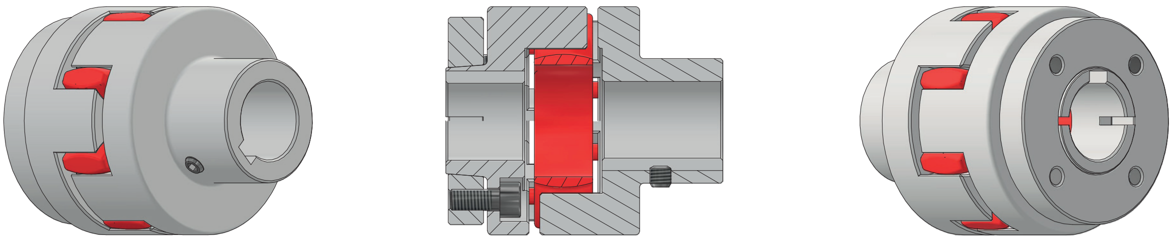
FRC	a [mm]	b [mm]	Ød [mm]	L [mm]
FRC 01	103	83	20	40
FRC 02	116,5	91,5	25	50

FK	a [mm]	b [mm]	Ød [mm]	L [mm]
FK 28 B/C	104	78	25	50
FK 38 B/C	118	93	25	50
FK 48 B/C	131	101	28	60
FK 58 B/C	159	119	35	80

FS(A)	a [mm]	b [mm]	Ød [mm]	L [mm]
FS(A) 38	118,5	98,5	20	40
FS(A) 48	130	105	25	50
FS(A) 58	150	120	30	60
FS(A) 68	184	149	35	70

FR	a [mm]	b [mm]	Ød [mm]	L [mm]
FR 38	118	93	25	50
FR 48	137	107	30	60
FR 68	168,5	133,5	35	70

The use of couplings



Example of a flexible coupling

Couplings are usually needed when a gearbox is rigidly mounted to a machine or other application. A coupling offers some room for misalignment that may be present or develop during use of the gearbox.

Not all misalignments can be statically determined, some may develop during dynamic processes are only present during use of the gearbox

Couplings give room for these misalignments and ensure the service life of the bearings inside of the gearbox, by offering a bit more room for error when there are misalignments.

There are different types of couplings that can be used in such applications, one example is a flexible coupling ***,see: example of a flexible coupling***.
Flexible couplings often have three parts, one for the shaft of the machine or application,
one for the shaft of the gearbox and a part that gives flexibility. The flexible part is often made of rubber or another kind of polymer.

Note: A coupling slightly increases the temperature of the shafts, due to friction and slightly decreases the efficiency of the gearbox.

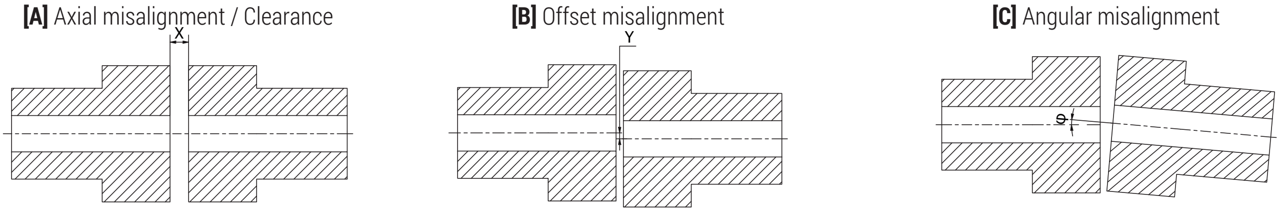
Mounting of couplings

To properly mount the couplings and prevent excessive wear on the gearbox, it is necessary to mount the couplings correctly.
To mount a coupling properly please pay attention to the following types of misalignment.

Note: The amount of allowable misalignment is often specified in the coupling datasheet, from the coupling manufacturer

Never mount couplings onto the shaft by hitting them with a hammer, this can cause damage to the gearbox bearings and can reduce the gearbox service life

[A] Axial misalignment / Clearance | **[B]** Offset misalignment | **[C]** Angular misalignment



[A] Horizontal misalignment/Clearance:
Make sure that the horizontal misalignment/clearance [X] does not exceed the minimum and maximum clearance. This value is dependant on the type of coupling, material of the coupling and bore/shaft diameter and length. Xmin ≤ X ≤ Xmax , where Xmin > 0.

Note: For the allowable clearance see the coupling manufacturers data sheet.

[B] Axial misalignment:
Make sure that the axial misalignment [Y] is as close to 0 as possible, in general axial misalignment will cause wear when the misalignment is too big.

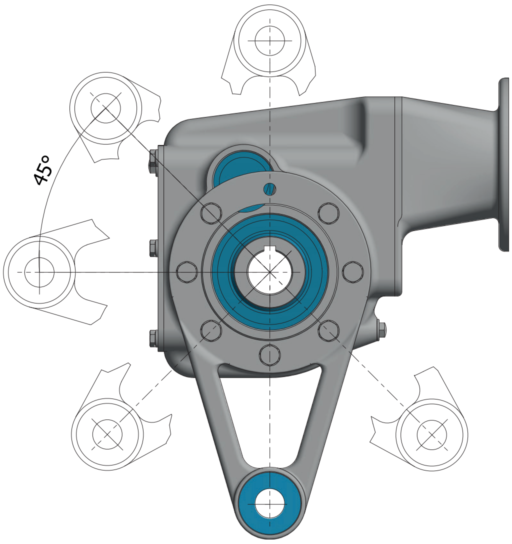
[C] Angular misalignment:
Make sure the angular misalignment [φ] is as close to 0 (degrees) as possible, excessive angular misalignment will cause damage.

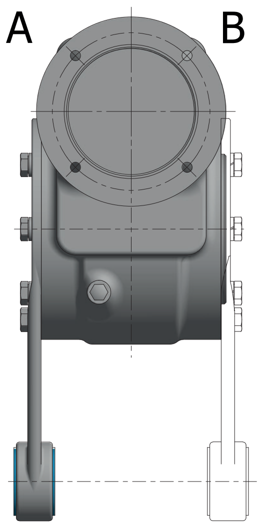
Couplings allow small misalignments, but excessive misalignment and couplings that aren't mounted properly can still cause damage to the gearbox and or machine or other applications.

Torque arm

A torque arm is an attachment for a gearbox that prevents the gearbox from spinning with the driven shaft. When a gearbox is mounted directly on the output shaft without any external support it is always necessary to use a torque arm.

Depending on the gearbox type and size, torque arms can be mounted in a multitude of different positions on the output sides of the gearbox, see the figure below for an example of the different positions.

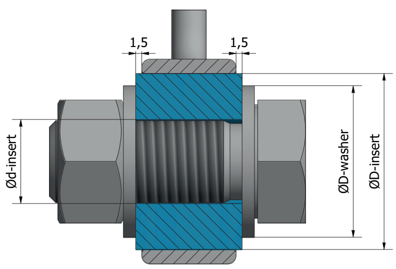


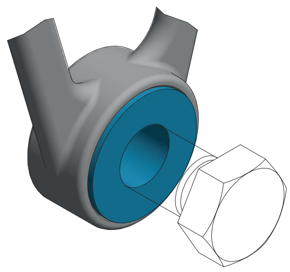


When mounting the torque arm pay attention to the following:

- A torque arm is used to prevent the gearbox from turning with the driven shaft, the torque arm does not prevent movement.
- It is important that the gearbox is allowed some movement when using a torque arm, to ensure that the gearbox bearings don't wear excessively.
- Make sure that the gearbox has enough clearance around it, so it is not in direct contact with the surroundings.
- It is always recommended to mount the torque arm on the gearbox side closest to the machine, this lowers the probability and the effect of misalignment.
- Avoid mounting the torque arm to a separate frame, this could cause misalignment. Mounting to the machine/application is always preferred.
- Always make sure the torque arm is properly mounted to the gearbox, and all available mounting holes are used.
- When using a torque arm, pay attention when mounting the torque arm to a "fixed" position. The torque arm should have enough room to move freely and should not be mounted too tight.
- When attaching the torque arm to a "fixed" position with a bolt, make sure that the bolt is hand tightened and that the rubber insert is not tightened too firm.
- Make sure when using a bolt to hold the torque arm in place, that the washer is smaller than the rubber insert (see figure below).
- If the rubber insert moves out of place, the alignment is not done properly. This does not mean that the torque arm is not tightened properly.

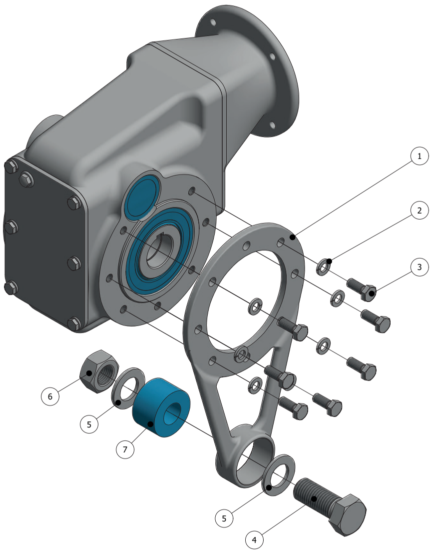
	ø D-ring [mm]	ø D-insert [mm]	ø d-insert
MSB 2510	<25	25	10
MSB 4320	<43	43	20





Mounting the torque arm

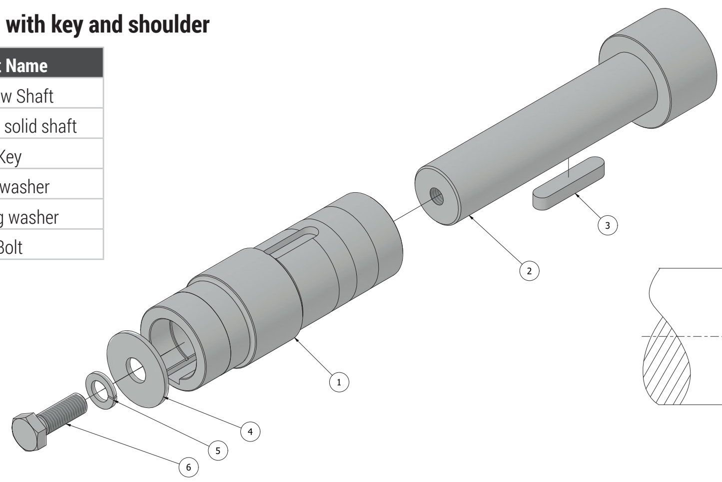
To mount the torque arm, mount the **[1]**torque arm to the gearbox and bolt it down with **[2]** spring washer and **[3]** bolts of the right size. Attach the holding **[4]**bolt with a **[5]** washer, through the hole of the **[7]**rubber insert. Add another **[5]**washer on the opposite side of the **[7]**rubber insert and attach the **[6]** nut hand tight to the holding **[4]**bolt.



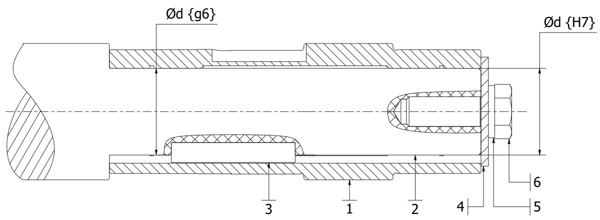
nr.	Part Name
1	Torque arm
2	Spring washer
3	Bolt
4	Bolt
5	Washer
6	Nut
7	Rubber insert

Hollow shaft with key and shoulder

nr.	Part Name
1	Hollow Shaft
2	Machine solid shaft
3	Key
4	Flat washer
5	Spring washer
6	Bolt

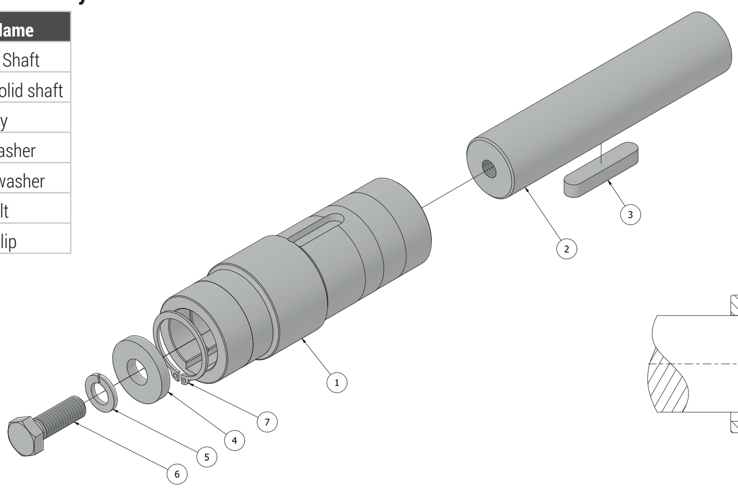


A machine shaft with a key and shoulder is usually held in place with a bolt, a lock washer and a flat washer on the outside of the hollow shaft.

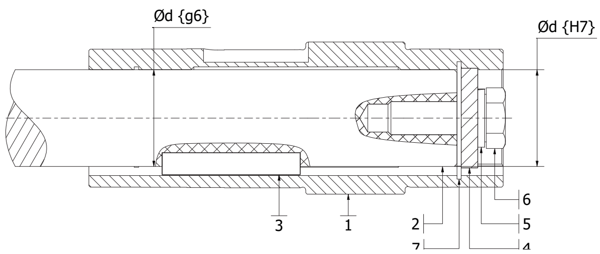


Hollow shaft with key without shoulder

nr.	Part Name
1	Hollow Shaft
2	Machine solid shaft
3	Key
4	Flat washer
5	Spring washer
6	Bolt
7	Circlip



A machine shaft with a key and without shoulder is usually held in place with a bolt, lock washer, a thick flat washer and a circlip on the inside of the hollow shaft.

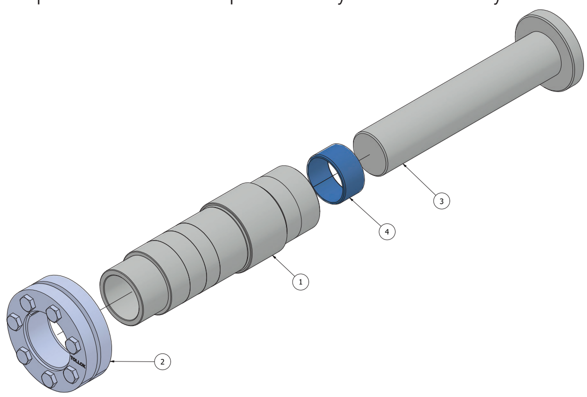


Hollow shaft with a shrink disk

For some applications a shrink disk is preferred, this is a disk that is installed on a longer hollow shaft, which clamps down onto is shaft. This friction holds the machine shaft inside the hollow shaft in place. Because of the friction fit, the machine shaft does not need to have a key in it.

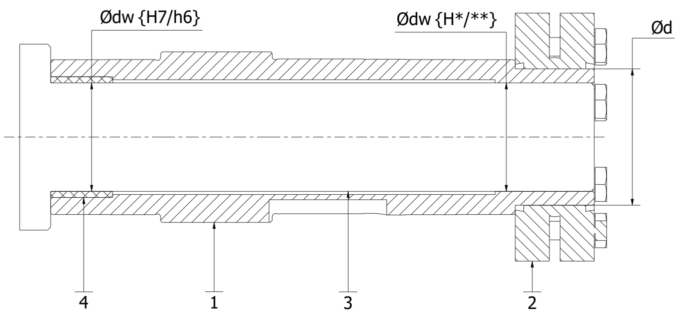
The benefit of a shrink disk is that it provides a way for easy removal of the shaft. Because it is a friction fit, no contact corrosion forms between the shafts, Also it provides an extra fail safe when the machine locks up. The gearbox will not be damaged because the shrink disk will slip when to much torque is applied. A shrink disk provides fast and simple assembly and disassembly. The downside to a shrink disk is that it takes up more space.

nr.	Part Name
1	Hollow Shaft SD
2	Shrinkdisk
3	Machine solid shaft
4	Spacer tube



Shrink disk specifications and installation

The measurements for the machine shaft diameter and the tolerances are shown in the table below. Here the amount of screws and screw type with the tightening torque are also shown.

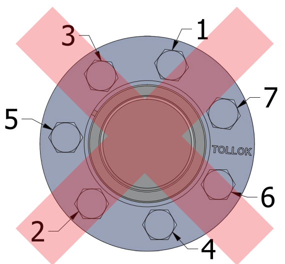


Ød [mm]	Ødw size [mm]	Ødw {H*/**} tolerance	Tightening screws [N° X Type]	Tightening torque [Nm]
14	11-12	H6/j6	4 x M5	4
16	13-14		5 x M5	
24	19-21		6 x M5	
30	24-26		7 x M5	
>30	24-26	H6/h6		
36	28-31		5 x M6	12
44	32-36		7 x M6	
50	38-42		8 x M6	
>50	38-42	H6/g6		
55	42-48			
62	48-52		10 x M6	
68	50-55			
75	55-65		7 x M8	30
80	60-75			
>80	60-75	H7/g9		

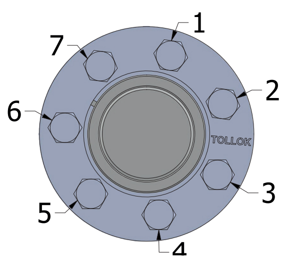
In order to ensure the shrinkdisk is used correctly the following has to be taken into account:

- When the shrink disk is untightened, make sure the screws don't get loosened all the way, this could cause them to fall out.
- When tightening the shrink disk do this in the correct order according to **[B]** with the right amount of torque as shown in the table. If tightening is not done properly situation **[E]** unequally tightening can occur.

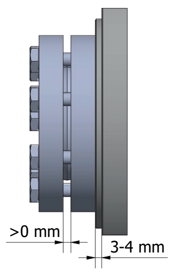
[A] Incorrect tightening order



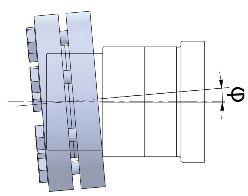
[B] Correct tightening order



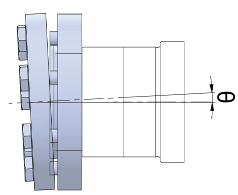
[C] Minumum and maximum clearance



[D] Angular misalignment



[E] Unequally tightened



Possible Geometrical Combinations

FKA 38

Maximum Torque = 200 Nm @ N1 = 1400 r/min

n2 [Min-1]	M2max [Nm]	Fr2 [N]	i	η%	IEC63 (AM / B5T1)	IEC71 (AM / B5T1)	IEC80 (AM / B5T1)	IEC90 (AM / B5T1)	IEC100 (AM / B5T1)
13	200	5640	106,38	94%	V	V	V		
14	200	5640	97,81	94%	V	V	V		
17	200	5640	83,69	94%	V	V	V		
19	200	5520	72,54	94%	V	V	V	V	
21	200	5360	67,8	94%	V	V	V	V	
24	200	5020	58,6	94%	V	V	V	V	V
28	200	4660	49,79	94%	V	V	V	V	V
31	200	4420	44,46	94%	V	V	V	V	V
37	200	4100	37,97	94%	V	V	V	V	V
39	200	3970	35,57	94%	V	V	V	V	V
47	200	3650	29,96	94%	V	V	V	V	V
49	200	3580	28,83	94%	V	V	V		
56	200	3330	24,99	94%	V	V	V	V	
60	195	3260	23,36	94%	V	V	V	V	
69	185	3110	20,19	94%	V	V	V	V	V
82	180	2900	17,15	94%	V	V	V	V	V
91	175	2780	15,31	94%	V	V	V	V	V
107	165	2650	13,08	94%	V	V	V	V	V
115	160	2600	12,14	94%	V	V	V	V	
133	160	2410	10,49	94%	V	V	V	V	V
157	160	2200	8,91	94%	V	V	V	V	V
176	155	2110	7,96	94%	V	V	V	V	V
206	150	1980	6,8	94%	V	V	V	V	V
220	145	1950	6,37	94%	V	V	V	V	V
261	140	1810	5,36	94%	V	V		V	V
352	125	1660	3,98	94%				V	V

FKA 48

Maximum Torque = 400 Nm @ N1 = 1400 r/min

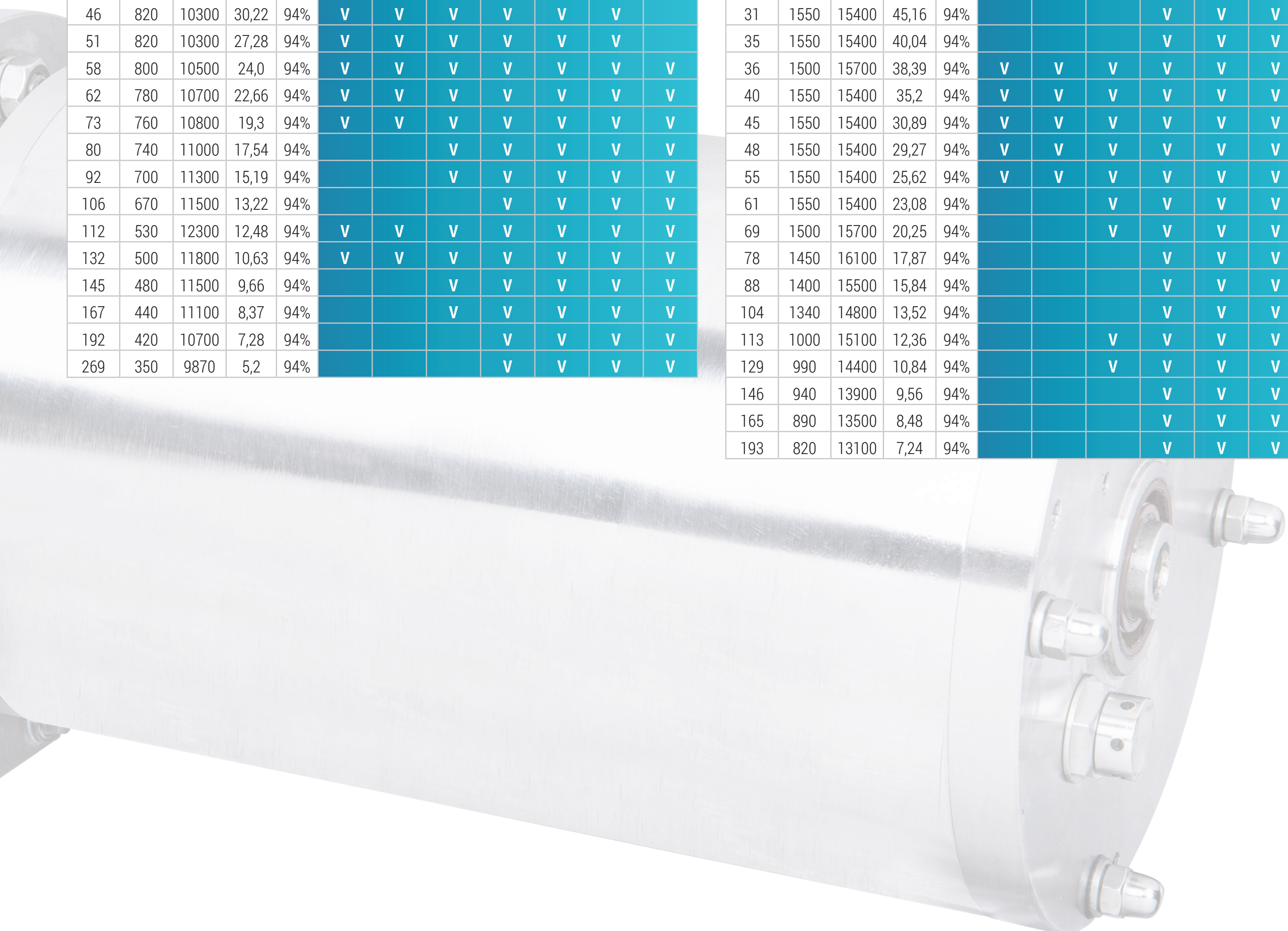
n2 [Min-1]	M2max [Nm]	Fr2 [N]	i	η%	IEC63 (AM / B5T1)	IEC71 (AM / B5T1)	IEC80 (AM / B5T1)	IEC90 (AM / B5T1)	IEC100 (AM / B5T1)
11	400	5920	131,87	94%	V	V			
12	400	5920	121,48	94%	V	V			
13	400	5920	104,37	94%	V	V	V		
15	400	5920	90,86	94%	V	V	V	V	
16	400	5920	85,12	94%	V	V	V	V	
19	400	5920	75,2	94%	V	V	V	V	V
20	400	5920	69,84	94%	V	V	V	V	
22	400	5920	63,3	94%	V	V	V	V	V
25	400	5920	56,83	94%	V	V	V	V	V
29	400	5920	48,95	94%	V	V	V	V	V
30	400	5920	46,03	94%	V	V	V	V	V
35	400	5920	39,61	94%	V	V	V	V	V
40	400	5920	35,39	94%			V	V	V
45	400	5700	31,3	94%	V	V	V	V	
48	400	5520	29,32	94%	V	V	V	V	
54	400	5170	25,91	94%	V	V	V	V	V
58	400	4970	24,06	94%	V	V	V	V	
64	400	4710	21,81	94%	V	V	V	V	V
72	400	4440	19,58	94%	V	V	V	V	V
83	380	4230	16,86	94%	V	V	V	V	V
88	380	4080	15,86	94%	V	V	V	V	V
103	360	3890	13,65	94%	V	V	V	V	V
115	350	3720	12,19	94%			V	V	V
119	280	4060	11,77	94%	V	V	V	V	V
133	280	3830	10,56	94%	V	V	V	V	V
154	280	3540	9,1	94%	V	V	V	V	V
164	270	3500	8,56		V	V	V	V	

FKA 68
Maximum Torque = 820 Nm @ N1 = 1400 r/min

n2 [Min-1]	M2max [Nm]	Fr2 [N]	i	η%	AM / B5T1 IEC63	AM / B5T1 IEC71	AM / B5T1 IEC80	AM / B5T1 IEC90	AM / B5T1 IEC100	AM / B5T1 IEC112	AM / B5T1 IEC132
9,7	820	10300	144,79	94%	V	V					
11	820	10300	123,54	94%	V	V	V				
13	820	10300	108,03	94%	V	V	V	V			
14	820	10300	102,62	94%	V	V	V	V			
16	820	10300	90,04	94%	V	V	V	V	V		
18	820	10300	76,37	94%	V	V	V	V	V	V	
20	820	10300	68,95	94%	V	V	V	V	V	V	
23	820	10300	60,66	94%	V	V	V	V	V	V	V
24	820	10300	57,28	94%	V	V	V	V	V	V	V
29	820	10300	48,77	94%	V	V	V	V	V	V	V
32	820	10300	44,32	94%			V	V	V	V	V
36	800	10500	38,39	94%			V	V	V	V	V
39	820	10300	35,62	94%	V	V	V	V	V		
46	820	10300	30,22	94%	V	V	V	V	V	V	
51	820	10300	27,28	94%	V	V	V	V	V	V	
58	800	10500	24,0	94%	V	V	V	V	V	V	V
62	780	10700	22,66	94%	V	V	V	V	V	V	V
73	760	10800	19,3	94%	V	V	V	V	V	V	V
80	740	11000	17,54	94%			V	V	V	V	V
92	700	11300	15,19	94%			V	V	V	V	V
106	670	11500	13,22	94%				V	V	V	V
112	530	12300	12,48	94%	V	V	V	V	V	V	V
132	500	11800	10,63	94%	V	V	V	V	V	V	V
145	480	11500	9,66	94%			V	V	V	V	V
167	440	11100	8,37	94%			V	V	V	V	V
192	420	10700	7,28	94%				V	V	V	V
269	350	9870	5,2	94%				V	V	V	V

FKA 78
Maximum Torque = 1550 Nm @ N1 = 1400 r/min

n2 [Min-1]	M2max [Nm]	Fr2 [N]	i	η%	AM / B5T1 IEC63	AM / B5T1 IEC71	AM / B5T1 IEC80	AM / B5T1 IEC90	AM / B5T1 IEC100	AM / B5T1 IEC112	AM / B5T1 IEC132
7,3	1450	16100	192,18	94%	V	V					
7,8	1450	16100	179,37	94%	V	V					
9,1	1550	15400	154,02	94%	V	V	V				
10	1550	15400	135,28	94%	V	V	V	V			
11	1550	15400	128,52	94%	V	V	V	V			
12	1550	15400	113,56	94%	V	V	V	V	V		
14	1550	15400	97,05	94%	V	V	V	V	V	V	
16	1550	15400	88,97	94%	V	V	V	V	V	V	
18	1550	15400	78,07	94%	V	V	V	V	V	V	V
19	1550	15400	73,99	94%	V	V	V	V	V	V	V
22	1550	15400	64,75	94%	V	V	V	V	V	V	V
24	1550	15400	58,34	94%			V	V	V	V	V
27	1550	15400	51,18	94%			V	V	V	V	V
31	1550	15400	45,16	94%				V	V	V	V
35	1550	15400	40,04	94%				V	V	V	V
36	1500	15700	38,39	94%	V	V	V	V	V	V	
40	1550	15400	35,2	94%	V	V	V	V	V	V	
45	1550	15400	30,89	94%	V	V	V	V	V	V	V
48	1550	15400	29,27	94%	V	V	V	V	V	V	V
55	1550	15400	25,62	94%	V	V	V	V	V	V	V
61	1550	15400	23,08	94%			V	V	V	V	V
69	1500	15700	20,25	94%			V	V	V	V	V
78	1450	16100	17,87	94%				V	V	V	V
88	1400	15500	15,84	94%				V	V	V	V
104	1340	14800	13,52	94%				V	V	V	V
113	1000	15100	12,36	94%			V	V	V	V	V
129	990	14400	10,84	94%			V	V	V	V	V
146	940	13900	9,56	94%				V	V	V	V
165	890	13500	8,48	94%				V	V	V	V
193	820	13100	7,24	94%				V	V	V	V

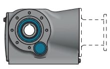
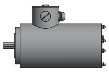


FKA 88
Maximum Torque = 2700 Nm @ N1 = 1400 r/min

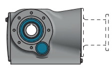
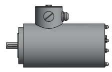
n2 [Min-1]	M2max [Nm]	Fr2 [N]	i	η%	AM B5T1 IEC80	AM B5T1 IEC90	AM B5T1 IEC100	AM B5T1 IEC112	AM B5T1 IEC132
7,1	2700	27300	197,37	94%	V				
8	2700	27300	174,19	94%	V	V			
8,5	2700	27300	164,34	94%	V	V			
9,5	2700	27300	147,32	94%	V	V	V		
11	2700	27300	126,91	94%	V	V	V	V	
12	2700	27300	115,82	94%	V	V	V	V	
14	2700	27300	102,71	94%	V	V	V	V	V
16	2700	27300	86,34	94%	V	V	V	V	V
18	2700	27300	79,34	94%	V	V	V	V	V
20	2700	27300	70,46	94%	V	V	V	V	V
22	2700	26200	63,0	94%		V	V	V	V
25	2700	25000	56,64	94%		V	V	V	V
28	2700	23500	49,16	94%		V	V	V	V
32	2600	22800	44,02	94%			V	V	V
38	2500	21400	36,52	94%			V	V	V
45	2700	19200	31,39	94%	V	V	V	V	V
50	2600	18500	27,88	94%	V	V	V	V	V
56	2500	18000	24,92	94%		V	V	V	V
62	2300	17900	22,41	94%		V	V	V	V
72	2300	16800	19,45	94%		V	V	V	V
80	2200	16300	17,42	94%			V	V	V
88	1800	16000	16,0	94%	V	V	V	V	V
97	2100	15300	14,45	94%			V	V	V
111	2000	14800	12,56	94%					V
125	1500	14900	11,17	94%		V	V	V	V
140	1500	14200	10,0	94%			V	V	V
169	1400	13500	8,29	94%			V	V	V
194	1300	13200	7,21	94%					V

Gearbox Selection Tables

0,12 - 0,18 kW

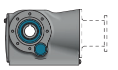
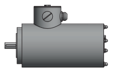
P1 [kW]	n2 [Min-1]	M2 [Nm]	i	Fr2 [N]	fs (gear-box)		
0,12	13	88	106,38	6500	2,3	FKA 38 AM63 FKA 38 B5T1	631-4 B5 631-4 B5T1
	14	81	97,81	6530	2,5		
	16	70	83,69	6570	2,9		
	19	60	72,54	6600	3,3		
	20	56	67,8	6610	3,6		
	24	49	58,6	6430	4,1		
	28	41	49,79	6130	4,8		
	31	37	44,46	5930	5,4		
	36	32	37,97	5660	6,4		
	39	30	35,57	5550	6,8		
	46	25	29,96	5270	8		
	48	24	28,83	5210	8,4		
	55	21	24,99	4980	9,6		
	59	19	23,36	4880	10		
	68	17	20,19	4660	11		
	80	14	17,15	4430	13		
	90	13	15,31	4280	14		
	105	11	13,08	4070	15		
	114	10	12,14	3970	16		
	10	110	131,87	8140	3,7	FKA 48 AM63 FKA 48 B5T2	631-4 B5 631-4 B5T2
	11	101	121,48	8170	4		
0,18	12	139	106,38	6210	1,45	FKA 38 AM63 FKA 38 B5T1	632-4 B5 632-4 B5T1
	14	127	97,81	6280	1,55		
	16	109	83,69	6400	1,85		
	18	95	72,54	6470	2,1		
	19	88	67,8	6500	2,3		
	23	76	58,6	6280	2,6		
	27	65	49,79	6010	3,1		
	30	58	44,46	5830	3,5		
	35	49	37,97	5580	4,1		
	37	46	35,57	5480	4,3		
	44	39	29,96	5220	5,1		
	46	38	28,83	5160	5,3		
	53	33	24,99	4950	6,2		
	57	30	23,36	4850	6,4		
	65	26	20,19	4650	7		
	77	22	17,15	4430	8,1		
	86	20	15,31	4280	8,8		
	101	17	13,08	4080	9,7		
	109	16	12,14	3980	10		
	126	14	10,49	3810	12		
	148	12	8,91	3620	14		
	166	10	7,96	3490	15		
	8,9	193	97,81	5710	1,05	FKA 38 AM71 FKA 38 B5T1	711-6 B5 711-6 B5T1
	10	165	83,69	5990	1,2		
	12	143	72,54	6170	1,4		

0,18 - 0,25 kW

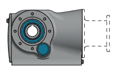
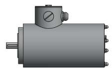
P1 [kW]	n2 [Min-1]	M2 [Nm]	i	Fr2 [N]	fs (gear-box)		
0,18	10	172	131,87	7910	2,3	FKA 48 AM63 FKA 48 B5T2	632-4 B5 632-4 B5T2
	11	158	121,48	7970	2,5		
	13	136	104,37	8060	2,9		
	15	118	90,86	8120	3,4		
	16	111	85,12	8140	3,6		
	6,6	260	131,87	7380	1,55	FKA 48 AM71 FKA 48 B5T2	711-6 B5 711-6 B5T2
	7,2	240	121,48	7530	1,65		
	8,3	205	104,37	7740	1,95		
	9,6	180	90,86	7880	2,2		
	10	168	85,12	7930	2,4		
	9,1	189	144,79	13000	4,4	FKA 68 AM63 FKA 68 B5T2	632-4 B5 632-4 B5T2
	11	161	123,54	13000	5,1		
	12	141	108,03	13000	5,8		
	6	285	144,79	13000	2,9	FKA 68 AM71 FKA 68 B5T2	711-6 B5 711-6 B5T2
	7	245	123,54	13000	3,4		
	8	215	108,03	13000	3,8		
	8,5	205	102,62	13000	4		
0,25	12	195	106,38	5690	1	FKA 38 AM71 FKA 38 B5T1	711-4 B5 711-4 B5T1
	13	180	97,81	5860	1,1		
	16	154	83,69	6090	1,3		
	18	133	72,54	6250	1,5		
	19	125	67,8	6230	1,6		
	22	108	58,6	6030	1,85		
	26	91	49,79	5810	2,2		
	29	82	44,46	5650	2,5		
	34	70	37,97	5430	2,9		
	37	65	35,57	5340	3,1		
	43	55	29,96	5100	3,6		
	45	53	28,83	5050	3,8		
	52	46	24,99	4860	4,4		
	56	43	23,36	4770	4,6		
	64	37	20,19	4580	5		
	76	32	17,15	4370	5,7		
	85	28	15,31	4230	6,2		
	99	24	13,08	4030	6,9		
	107	22	12,14	3940	7,2		
	124	19	10,49	3780	8,3		
	146	16	8,91	3590	9,8		
	163	15	7,96	3470	11		
	191	13	6,8	3310	12		
	204	12	6,37	3240	12		
	12	197	72,54	5680	1	FKA 38 AM71 FKA 38 B5T1	712-6 B5 712-6 B5T1
	13	184	67,8	5810	1,1		
	15	159	58,6	6050	1,25		
	18	135	49,79	6230	1,5		

P_{1n} = Rated Motor Power [kW]
n_2 = Output Speed [Min^{-1}]
M_{2n} = Rated Output torque [Nm]
M_{2max} = Maximum permissible output torque [Nm]
F_{r2} = Permitted Overhung Load Output Side [N]
i = Gear unit Ratio
η% = Transmission Efficiency %
fs = Service Factor

0,25kW - 0,37 kW

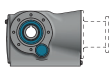
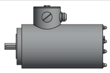
P1 [kW]	n2 [Min-1]	M2 [Nm]	i	Fr2 [N]	fs (gear-box)		
0,25	9,9	240	131,87	7510	1,65	FKA 48 AM71 FKA 48 B5T2	711-4 B5 711-4 B5T2
	11	225	121,48	7640	1,8		
	12	192	104,37	7820	2,1		
	14	167	90,86	7930	2,4		
	15	156	85,12	7980	2,6		
	6,7	360	131,87	6470	1,1	FKA 48 AM71 FKA 48 B5T2	712-6 B5 712-6 B5T2
	7,2	330	121,48	6780	1,2		
	8,4	285	104,37	7210	1,4		
	9,7	245	90,86	7480	1,6		
	10	230	85,12	7590	1,75		
	9	265	144,79	13000	3,1	FKA 68 AM71 FKA 68 B5T2	711-4 B5 711-4 B5T2
	11	225	123,54	13000	3,6		
	12	198	108,03	13000	4,1		
	13	189	102,62	13000	4,4		
	6,1	395	144,79	12800	2,1	FKA 68 AM71 FKA 68 B5T2	712-6 B5 712-6 B5T2
	7,1	335	123,54	13000	2,5		
	8,2	295	108,03	13000	2,8		
	8,6	280	102,62	13000	3		
	5,5	435	123,54	12700	1,9	FKA 68 AM80 FKA 68 B5T2	802-8 B14a 802-8 B5T2
	6,3	380	108,03	12900	2,2		
	6,6	360	102,62	12900	2,3		
	7,5	315	90,04	13000	2,6		
	4,6	520	192,18	19700	2,8	FKA 78 AM71 FKA 78 B5T3	712-6 B5 712-6 B5T3
	4,9	485	179,37	19700	3		
	5,7	420	154,02	19800	3,7		
	6,5	365	135,28	19900	4,2		
	4,4	540	154,02	19600	2,9	FKA 78 AM80 FKA 78 B5T3	802-8 B14a 802-8 B5T3
	5	475	135,52	19700	3,3		
	5,3	450	128,52	19800	3,4		
	6	400	113,56	19900	3,9		
0,37	19	186	72,54	5690	1,1	FKA 38 AM71 FKA 38 B5T1	712-4 B5 712-4 B5T1
	20	174	67,8	5630	1,15		
	24	150	58,6	5510	1,35		
	28	128	49,79	5350	1,55		
	31	114	44,46	5230	1,75		
	36	97	37,97	5060	2,1		
	39	91	35,57	4990	2,2		
	46	77	29,96	4800	2,6		
	48	74	28,83	4750	2,7		
	55	64	24,99	4590	3,1		
	59	60	23,36	4510	3,3		
	68	52	20,19	4350	3,6		
	80	44	17,15	4160	4,1		
	90	39	15,31	4040	4,5		
	105	34	13,08	3860	4,9		
	114	31	12,14	3780	5,1		
	132	27	10,49	3630	6		

0,37 kW

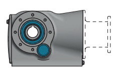
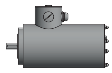
P1 [kW]	n2 [Min-1]	M2 [Nm]	i	Fr2 [N]	fs (gear-box)		
0,37	155	23	8,91	3460	7	FKA 38 AM71 FKA 38 B5T1	712-4 B5 712-4 B5T1
	173	20	7,96	3350	7,6		
	203	17	6,8	3190	8,6		
	217	16	6,37	3130	8,9		
	257	14	5,36	2970	10		
	10	340	131,87	6690	1,2	FKA 48 AM71 FKA 48 B5T2	712-4 B5 712-4 B5T2
	11	310	121,48	6960	1,3		
	13	265	104,37	7330	1,5		
	15	235	90,86	7580	1,7		
	16	220	85,12	7670	1,85		
	18	193	75,2	7810	2,1		
	20	179	69,84	7880	2,2		
	22	162	63,3	7960	2,5		
	8,6	410	104,37	5490	1	FKA 48 AM80 FKA 48 B5T2	801-6 B14a 801-6 B5T2
	9,9	355	90,86	6480	1,1		
	11	335	85,12	6730	1,2		
	12	295	75,2	7100	1,35		
	9,5	370	144,79	12900	2,2	FKA 68 AM71 FKA 68 B5T2	712-4 B5 712-4 B5T2
	11	315	123,54	13000	2,6		
	13	275	108,03	13000	3		
	15	230	90,04	13000	3,6		
	18	196	76,37	13000	4,2		
	7,3	485	123,54	12500	1,7	FKA 68 AM80 FKA 68 B5T2	801-6 B14a 801-6 B5T2
	8,3	425	108,03	12700	1,95		
	8,8	405	102,62	12800	2		
	10	355	90,04	13000	2,3		
	7,2	490	192,18	19700	3	FKA 78 AM71 FKA 78 B5T3	712-4 B5 712-4 B5T3
	7,7	460	179,37	19800	3,2		
	9	395	154,02	19900	3,9		
	5,8	605	154,02	19500	2,6	FKA 78 AM80 FKA 78 B5T3	801-6 B14a 801-6 B5T3
	6,7	530	135,28	19600	2,9		
	7	505	128,52	19700	3,1		
	7,9	445	113,56	19800	3,5		
	4,6	775	197,37	28900	3,5	FKA 88 AM80 FKA 88 B5T4	801-6 B14a 801-6 B5T4
	5,2	685	174,19	28900	4		

P_{1n}	= Rated Motor Power [kW]	M_{2max}	= Maximum permissible output torque [Nm]	η%	= Transmission Efficiency %
n_2	= Output Speed [Min^{-1}]	F_{r2}	= Permitted Overhung Load Output Side [N]	fs	= Service Factor
M_{2n}	= Rated Output torque [Nm]	i	= Gear unit Ratio		

0,55 kW

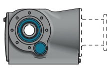
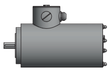
P1 [kW]	n2 [Min-1]	M2 [Nm]	i	Fr2 [N]	fs (gear-box)		
0,55	27	192	49,79	4790	1,05	FKA 38 AM80 FKA 38 B5T1	801-4 B14a 801-4 B5T1
	31	172	44,46	4740	1,15		
	36	147	37,97	4640	1,35		
	38	137	35,57	4600	1,45		
	45	116	29,96	4470	1,75		
	47	111	28,83	4440	1,8		
	54	97	24,99	4320	2,1		
	58	90	23,36	4260	2,2		
	67	78	20,19	4130	2,4		
	79	66	17,15	3980	2,7		
	89	59	15,31	3880	3		
	104	51	13,08	3730	3,3		
	112	47	12,14	3660	3,4		
	130	41	10,49	3520	4		
	153	34	8,91	3370	4,7		
	171	31	7,96	3270	5,1		
	200	26	6,8	3130	5,7		
	214	25	6,37	3070	5,9		
	254	21	5,36	2920	6,8		
	342	15	3,98	2680	8,1		
	13	405	104,37	5880	1	FKA 48 AM80 FKA 48 B5T2	801-4 B14a 801-4 B5T2
	15	350	90,86	6550	1,15		
	16	330	85,12	6790	1,2		
	18	290	75,2	7150	1,4		
	19	270	69,84	7310	1,5		
	21	245	63,3	7500	1,65		
	24	220	56,83	7660	1,8		
	28	189	48,95	7830	2,1		
	30	178	46,03	7880	2,3		
	11	475	123,54	12500	1,7	FKA 68 AM80 FKA 68 B5T2	801-4 B14a 801-4 B5T2
	13	415	108,03	12800	1,95		
	15	350	90,04	13000	2,4		
	18	295	76,37	13000	2,8		
	7,3	720	123,54	11100	1,15	FKA 68 AM80 FKA 68 B5T2	802-6 B14a 802-6 B5T2
	8,3	630	108,03	11700	1,3		
	8,8	600	102,62	11900	1,35		
	10	525	90,04	12300	1,55		
	12	445	76,37	12600	1,85		
	8,8	595	154,02	19500	2,6	FKA 78 AM80 FKA 78 B5T3	801-4 B14a 801-4 B5T3
	10	520	135,28	19700	3		
	11	495	128,52	19700	3,1		
	12	440	113,56	19800	3,5		
	14	375	97,05	19900	4,1		
	5,8	900	154,02	18700	1,7	FKA 78 AM80 FKA 78 B5T3	802-6 B14a 802-6 B5T3
	6,7	790	135,28	19000	1,95		
	7	750	128,52	19100	2,1		
	7,9	665	113,56	19400	2,3		

0,55 - 0,75 kW

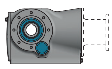
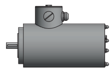
P1 [kW]	n2 [Min-1]	M2 [Nm]	i	Fr2 [N]	fs (gear-box)		
0,55	4,6	1150	197,37	28700	2,3	FKA 88 AM80 FKA 88 B5T4	802-6 B14a 802-6 B5T4
	5,2	1020	174,19	28800	2,7		
	5,5	960	164,34	28800	2,8		
	6,1	860	147,32	28900	3,1		
0,75	36	197	37,97	4150	1	FKA 38 AM80 FKA 38 B5T1	802-4 B14a 802-4 B5T1
	39	185	35,57	4140	1,1		
	46	156	29,96	4080	1,3		
	48	150	28,83	4060	1,35		
	55	130	24,99	3990	1,55		
	59	121	23,36	3950	1,6		
	68	105	20,19	3860	1,75		
	80	89	17,15	3750	2		
	90	80	15,31	3670	2,2		
	105	68	13,08	3550	2,4		
	114	63	12,14	3500	2,5		
	132	54	10,49	3380	2,9		
	155	46	8,91	3250	3,5		
	173	41	7,96	3160	3,8		
	203	35	6,8	3030	4,3		
	217	33	6,37	2980	4,4		
	257	28	5,36	2840	5		
	347	21	3,98	2620	6		
	18	390	75,2	6060	1	FKA 48 AM80 FKA 48 B5T2	802-4 B14a 802-4 B5T2
	20	365	69,84	6410	1,1		
	22	330	63,3	6790	1,2		
	24	295	56,83	7110	1,35		
	28	255	48,95	7430	1,55		
	30	240	46,03	7540	1,65		
	35	205	39,61	7740	1,95		
	39	184	35,39	7760	2,2		
	44	162	31,3	7550	2,5		
	11	640	123,54	11700	1,3	FKA 68 AM80 FKA 68 B5T2	802-4 B14a 802-4 B5T2
	13	560	108,03	12100	1,45		
	15	465	90,04	12600	1,75		
	18	395	76,37	12800	2,1		
	20	360	68,95	13000	2,3		
	23	315	60,66	13000	2,6		
	24	295	57,28	13000	2,8		
	9	800	154,02	19000	1,95	FKA 78 AM80 FKA 78 B5T3	802-4 B14a 802-4 B5T3
	10	700	135,28	19300	2,2		
	11	665	128,52	19300	2,3		
	12	590	113,56	19500	2,6		
	14	505	97,05	19700	3,1		

P_{1n} = Rated Motor Power [kW]
n_2 = Output Speed [Min^{-1}]
M_{2n} = Rated Output torque [Nm]
M_{2max} = Maximum permissible output torque [Nm]
F_{r2} = Permitted Overhung Load Output Side [N]
i = Gear unit Ratio
η% = Transmission Efficiency %
fs = Service Factor

0,75 - 1,1 kW

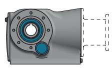
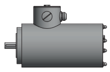
P1 [kW]	n2 [Min-1]	M2 [Nm]	i	Fr2 [N]	fs (gear-box)		
0,75	6,7	1080	135,28	18000	1,45	802-4 B5T3 FKA 78 B5T3	90S-6 B14a 90S-6 B5T3
	7	1020	128,52	18200	1,5		
	7,9	900	113,56	18700	1,7		
	9,3	770	97,05	19100	2		
	10	710	88,97	19200	2,2		
	7	1020	197,37	28800	2,6	FKA 88 AM80 FKA 88 AM80	802-4 B14a 802-4 B5T4
	7,9	900	174,19	28800	3		
	8,4	850	164,34	28900	3,2		
	9,4	765	147,32	28900	3,5		
	5,2	1390	174,19	28600	1,95	FKA 88 AM90 FKA 88 B5T4	90S-6 B14a 90S-6 B5T4
	5,5	1310	164,34	28600	2,1		
	6,1	1170	147,32	28700	2,3		
	7,1	1010	126,91	28800	2,7		
1,1	56	188	24,99	3440	1,05	FKA 38 AM90 FKA 38 B5T1	90S-4 B14a 90S-4 B5T1
	60	175	23,36	3440	1,1		
	69	152	20,19	3420	1,2		
	82	129	17,15	3370	1,4		
	91	115	15,31	3330	1,5		
	107	98	13,08	3260	1,7		
	115	91	12,14	3220	1,75		
	133	79	10,49	3140	2		
	157	67	8,91	3040	2,4		
	176	60	7,96	2970	2,6		
	206	51	6,8	2870	2,9		
	220	48	6,37	2830	3		
	261	40	5,36	2720	3,5		
	352	30	3,98	2520	4,2		
	29	365	48,95	6360	1,1	FKA 48 AM90 FKA 48 B5T2	90S-4 B14a 90S-4 B5T2
	30	345	46,03	6610	1,15		
	35	295	39,61	7090	1,35		
	40	265	35,39	7090	1,5		
	45	235	31,3	6960	1,7		
	48	220	29,32	6890	1,8		
	54	194	25,91	6730	2,1		
	64	164	21,81	6510	2,4		
	72	147	19,58	6360	2,7		
	13	810	108,03	10400	1	FKA 68 AM90 FKA 68 B5T2	90S-4 B14a 90S-4 B5T2
	14	770	102,62	10700	1,05		
	16	675	90,04	11400	1,2		
	18	575	76,37	12000	1,45		
	20	515	68,95	12300	1,6		
	23	455	60,66	12600	1,8		
	24	430	57,28	12700	1,9		
	29	365	48,77	12900	2,2		
	32	335	44,32	13000	2,5		
	36	290	38,39	13000	2,8		

1,1 - 1,5 kW

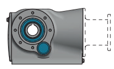
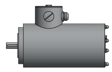
P1 [kW]	n2 [Min-1]	M2 [Nm]	i	Fr2 [N]	fs (gear-box)		
1,1	10	1020	135,28	18300	1,55	FKA 78 AM90 FKA 78 B5T3	90S-4 B14a 90S-4 B5T3
	11	960	128,52	18400	1,6		
	12	850	113,56	18800	1,8		
	14	730	97,05	19200	2,1		
	16	670	88,97	19300	2,3		
	18	585	78,07	19500	2,7		
	19	555	73,99	19600	2,8		
	6,8	1540	135,28	15400	1	FKA 78 AM90 FKA 78 B5T3	90L-6 B14a 90L-6 B5T3
	7,2	1470	128,52	15900	1,05		
	8,1	1300	113,56	17000	1,2		
	9,5	1110	97,05	17900	1,4		
	8	1310	174,19	28600	2,1	FKA 88 AM90 FKA 88 B5T4	90S-4 B14a 90S-4 B5T4
	8,5	1230	164,34	28700	2,2		
	9,5	1110	147,32	28700	2,4		
	11	950	126,91	28800	2,8		
	12	870	115,82	28800	3,1		
	5,3	1990	174,19	28100	1,35	FKA 88 AM90 FKA 88 B5T4	90L-6 B14a 90L-6 B5T4
	5,6	1880	164,34	28200	1,45		
	6,2	1680	147,32	28300	1,6		
	7,2	1450	126,91	28500	1,85		
1,5	82	174	17,15	2940	1,05	FKA 38 AM90 FKA 38 AM90	90L-4 B14a 90L-4 B5T1
	92	156	15,31	2950	1,1		
	108	133	13,08	2930	1,25		
	116	123	12,14	2920	1,3		
	134	107	10,49	2880	1,5		
	158	91	8,91	2820	1,75		
	177	81	7,96	2770	1,9		
	207	69	6,8	2700	2,2		
	221	65	6,37	2670	2,2		
	263	55	5,36	2580	2,6		
	354	40	3,98	2420	3,1		
	36	400	39,61	5890	1	FKA 48 AM90 FKA 48 B5T2	90L-4 B14a 90L-4 B5T2
	40	360	35,39	6360	1,1		
	45	320	31,3	6310	1,25		
	48	300	29,32	6270	1,35		
	54	265	25,91	6190	1,5		
	65	220	21,81	6050	1,8		
	72	199	19,58	5950	2		
	84	171	16,86	5800	2,2		
	89	161	15,86	5730	2,4		
	103	139	13,65	5560	2,6		
	116	124	12,19	5430	2,8		
	120	120	11,77	5340	2,3		

P_{1n} = Rated Motor Power [kW]
n_2 = Output Speed [Min^{-1}]
M_{2n} = Rated Output torque [Nm]
M_{2max} = Maximum permissible output torque [Nm]
F_{r2} = Permitted Overhung Load Output Side [N]
i = Gear unit Ratio
η% = Transmission Efficiency %
fs = Service Factor

1,5 - 2,2 kW

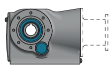
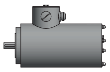
P1 [kW]	n2 [Min-1]	M2 [Nm]	i	Fr2 [N]	fs (gear-box)		
1,5	18	775	76,37	10700	1,05	FKA 68 AM90 FKA 68 B5T2	90L-4 B14a 90L-4 B5T2
	20	700	68,95	11300	1,15		
	23	615	60,66	11800	1,35		
	25	580	57,28	12000	1,4		
	29	495	48,77	12400	1,65		
	32	450	44,32	12600	1,8		
	37	390	38,39	12800	2,1		
	40	360	35,62	12900	2,3		
	47	305	30,22	13000	2,7		
	52	275	27,28	13000	3		
	59	245	24	13000	3,3		
	10	1370	135,28	16500	1,15	FKA 78 AM90 FKA 78 B5T3	FKA 78 B5T3 FKA 78 B5T3
	11	1310	128,52	16900	1,2		
	12	1150	113,56	17700	1,35		
	15	990	97,05	18400	1,55		
	16	900	88,97	18700	1,7		
	18	795	78,07	19000	1,95		
	19	750	73,99	19100	2,1		
	22	660	64,75	19400	2,4		
	24	595	58,34	19500	2,6		
	28	520	51,18	19700	3		
	31	460	45,16	19800	3,4		
	35	405	40,04	19800	3,8		
	9,5	1510	97,05	15700	1,05	FKA 78 AM100 FKA 78 B5T3	100L1-6 B14a 100L1-6 B5T3
	10	1390	88,97	16400	1,1		
	12	1220	78,07	17400	1,3		
	8,1	1770	174,19	28300	1,55	FKA 88 AM90 FKA 88 AM90	90L-4 B14a 90L-4 B5T4
	8,6	1670	164,34	28300	1,6		
	9,6	1500	147,32	28500	1,8		
	11	1290	126,91	28600	2,1		
	12	1180	115,82	28700	2,3		
	14	1040	102,71	28800	2,6		
	16	880	86,34	28800	3,1		
	6,2	2290	147,32	27800	1,2	FKA 88 AM100 FKA 88 AM100	100L1-6 B14a 100L1-6 B5T4
	7,2	1980	126,91	28100	1,35		
	7,9	1800	115,82	28200	1,5		
	9	1600	102,71	28400	1,7		
2,2	134	156	10,49	2430	1	FKA 38 AM100 FKA 38 AM100	100L1-4 B14a 100L1-4 B5T1

2,2 kW

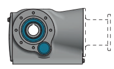
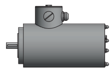
P1 [kW]	n2 [Min-1]	M2 [Nm]	i	Fr2 [N]	fs (gear-box)		
2,2	54	385	25,91	5260	1,05	FKA 48 AM100 FKA 48 B5T2	100L1-4 B14a 100L1-4 B5T2
	65	325	21,81	5260	1,25		
	72	290	19,58	5240	1,35		
	84	250	16,86	5190	1,5		
	89	235	15,86	5160	1,6		
	103	205	13,65	5070	1,75		
	116	182	12,19	4990	1,95		
	120	175	11,77	4890	1,6		
	133	157	10,56	4810	1,8		
	155	136	9,1	4690	2,1		
	29	725	48,77	11100	1,15	FKA 68 AM100 FKA 68 B5T2	FKA 68 B5T2 100L1-4 B5T2
	32	660	44,32	11500	1,25		
	37	570	38,39	12100	1,4		
	40	530	35,62	12300	1,55		
	47	450	30,22	12600	1,8		
	52	405	27,28	12800	2		
	59	360	24	13000	2,2		
	62	340	22,66	13000	2,3		
	73	285	19,3	13000	2,6		
	80	260	17,54	13000	2,8		
	93	225	15,19	13000	3,1		
	107	197	13,22	13000	3,4		
	113	186	12,48	13000	2,9		
	133	158	10,63	13000	3,2		
	146	144	9,66	13000	3,3		
	169	125	8,37	13000	3,5		
	194	109	7,28	12700	3,9		
	271	78	5,2	11700	4,5		
	15	1450	97,05	16100	1,05	FKA 78 AM100 FKA 78 B5T3	100L1-4 B14a 100L1-4 B5T3
	16	1330	88,97	16800	1,15		
	18	1160	78,07	17600	1,35		
	19	1100	73,99	17900	1,4		
	22	960	64,75	18400	1,6		
	24	870	58,34	18800	1,8		
	28	765	51,18	19100	2		
	31	675	45,16	19300	2,3		
	35	595	40,04	19500	2,6		
	40	525	35,2	19700	3		
	46	460	30,89	19800	3,4		
	48	435	29,27	19800	3,6		
	55	380	25,62	19900	4,1		

P_{1n} = Rated Motor Power [kW]
n_2 = Output Speed [Min^{-1}]
M_{2n} = Rated Output torque [Nm]
M_{2max} = Maximum permissible output torque [Nm]
F_{r2} = Permitted Overhung Load Output Side [N]
i = Gear unit Ratio
η% = Transmission Efficiency %
fs = Service Factor

2,2 - 3 kW

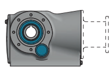
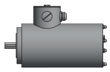
P1 [kW]	n2 [Min-1]	M2 [Nm]	i	Fr2 [N]	fs (gear-box)		
2,2	9,6	2200	147,32	27900	1,25	FKA 88 AM100 FKA 88 B5T4	100L1-4 B14a 100L1-4 B5T4
	11	1890	126,91	28200	1,45		
	12	1730	115,82	28300	1,55		
	14	1530	102,71	28500	1,75		
	16	1290	86,34	28600	2,1		
	18	1180	79,34	28700	2,3		
	20	1050	70,46	28800	2,6		
	22	940	63	28800	2,9		
3	206	139	6,8	2080	1,1	FKA 38 AM100 FKA 38 B5T1	100L2-4 B14a 100L2-4 B5T1
	220	130	6,37	2080	1,1		
	261	110	5,36	2090	1,3		
	352	81	3,98	2050	1,55		
	72	400	19,58	4430	1	FKA 48 AM100 FKA 48 B5T2	100L2-4 B14a 100L2-4 B5T2
	83	345	16,86	4490	1,1		
	88	325	15,86	4500	1,15		
	103	280	13,65	4510	1,3		
	115	250	12,19	4490	1,4		
	119	240	11,77	4370	1,15		
	133	215	10,56	4350	1,3		
	154	186	9,1	4290	1,5		
	164	175	8,56	4270	1,55		
	190	151	7,36	4190	1,65		
	213	135	6,58	4120	1,8		
	241	119	5,81	4030	1,95		
	302	95	4,64	3860	2,2		
	36	785	38,39	10600	1	FKA 68 AM100 FKA 68 B5T2	100L2-4 B14a 100L2-4 B5T2
	39	730	35,62	11100	1,15		
	46	620	30,22	11800	1,35		
	51	560	27,28	12100	1,45		
	58	490	24	12500	1,65		
	62	465	22,66	12600	1,7		
	73	395	19,3	12800	1,95		
	80	360	17,54	13000	2,1		
	92	310	15,19	13000	2,3		
	106	270	13,22	13000	2,5		
	112	255	12,48	13000	2,1		
	132	220	10,63	13000	2,3		
	145	198	9,66	13000	2,4		
	19	1510	73,99	15600	1	FKA 78 AM100 FKA 78 B5T3	100L2-4 B14a 100L2-4 B14a
	22	1330	64,75	16800	1,15		
	24	1190	58,34	17500	1,3		
	27	1050	51,18	18100	1,5		
	31	920	45,16	18600	1,7		
	35	820	40,04	18900	1,9		
	40	720	35,2	19200	2,2		
	45	630	30,89	19400	2,5		

3 - 4 kW

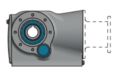
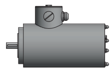
P1 [kW]	n2 [Min-1]	M2 [Nm]	i	Fr2 [N]	fs (gear-box)		
3	11	2600	126,91	27400	1,05	FKA 88 AM100 FKA 88 B5T4	100L2-4 B14a 100L2-4 B5T4
	12	2370	115,82	27700	1,15		
	14	2100	102,71	28000	1,3		
	16	1770	86,34	28300	1,55		
	18	1620	79,34	28400	1,65		
	20	1440	70,46	28500	1,85		
	22	1290	63	28600	2,1		
	25	1160	56,64	28700	2,3		
	28	1010	49,16	28800	2,7		
	32	900	44,02	28800	2,9		
	38	745	36,52	28400	3,4		
4	47	810	30,22	10400	1	FKA 68 AM112 FKA 68 B5T2	112M-4 B14a 112M-4 B5T2
	52	735	27,28	11000	1,1		
	59	645	24	11600	1,25		
	63	610	22,66	11800	1,3		
	74	520	19,3	13000	1,45		
	81	470	17,54	12500	1,55		
	94	410	15,19	12800	1,7		
	107	355	13,22	13000	1,9		
	114	335	12,48	13000	1,6		
	134	285	10,63	13000	1,75		
	147	260	9,66	12900	1,85		
	170	225	8,37	12500	1,95		
	195	196	7,28	12100	2,1		
	273	140	5,2	11200	2,5		
	24	1570	58,34	15200	1	FKA 78 AM112 FKA 78 B5T3	112M-4 B14a 112M-4 B5T3
	28	1380	51,18	16500	1,15		
	31	1210	45,16	17400	1,3		
	35	1080	40,04	18000	1,45		
	37	1030	38,39	18200	1,45		
	40	950	35,2	18500	1,65		
	46	830	30,89	18900	1,85		
	49	785	29,27	19000	1,95		
	55	690	25,62	19300	2,3		
	62	620	23,08	19500	2,5		
	70	545	20,25	19600	2,8		
	14	2760	102,71	27200	1	FKA 88 AM112 FKA 88 B5T4	112M-4 B14a 112M-4 B14a
	16	2320	86,34	27700	1,15		
	18	2130	79,34	27900	1,25		
	20	1900	70,46	28200	1,4		
	23	1690	63	28300	1,6		
	25	1520	56,64	28500	1,75		
	29	1320	49,16	28600	2		
	32	1180	44,02	28300	2,2		
	39	980	36,52	27300	2,5		

P_{1n} = Rated Motor Power [kW]
n_2 = Output Speed [Min^{-1}]
M_{2n} = Rated Output torque [Nm]
M_{2max} = Maximum permissible output torque [Nm]
F_{r2} = Permitted Overhung Load Output Side [N]
i = Gear unit Ratio
η% = Transmission Efficiency %
fs = Service Factor

5,5 - 7,5 kW

P1 [kW]	n2 [Min-1]	M2 [Nm]	i	Fr2 [N]	fs (gear-box)		
5,5	74	710	19,3	11200	1,05	FKA 68 AM132 FKA 68 B5T2	132S-4 B14a 132S-4 B5T2
	82	645	17,54	11600	1,15		
	94	560	15,19	12100	1,25		
	108	485	13,22	12500	1,4		
	115	460	12,48	12600	1,15		
	135	390	10,63	12400	1,3		
	148	355	9,66	12200	1,35		
	171	305	8,37	11900	1,45		
	196	265	7,28	11600	1,55		
	275	191	5,2	10800	1,85		
	36	1470	40,04	15900	1,05	FKA 78 AM132 FKA 78 B5T3	132S-4 B14a 132S-4 B5T3
	46	1130	30,89	17800	1,35		
	49	1070	29,27	18000	1,45		
	56	940	25,62	18500	1,65		
	62	850	23,08	18800	1,85		
	71	745	20,25	19100	2		
	80	655	17,87	19400	2,2		
	90	580	15,84	19200	2,4		
	106	495	13,52	18600	2,7		
	116	455	12,36	17900	2,2		
	132	400	10,84	17400	2,5		
	20	2590	70,46	27400	1,05	FKA 88 AM132 FKA 88 B5T4	132S-4 B14a 132S-4 B5T4
	23	2310	63	27500	1,15		
	25	2080	56,64	27300	1,3		
	29	1810	49,16	26900	1,5		
	32	1620	44,02	26500	1,6		
	39	1340	36,52	25800	1,85		
	46	1150	31,39	25200	2,3		
	51	1020	27,88	24700	2,5		
7,5	46	1550	30,89	15400	1	FKA 78 AM132 FKA 78 B5T3	132M-4 B14a 132M-4 B5T3
	49	1470	29,27	16000	1,05		
	56	1280	25,62	17000	1,2		
	62	1160	23,08	17700	1,35		
	71	1010	20,25	18300	1,5		
	80	890	17,87	18600	1,6		
	90	795	15,84	18200	1,75		
	106	675	13,52	17800	2		
	116	620	12,36	17000	1,6		
	132	545	10,84	16700	1,8		
	150	480	9,56	16300	1,95		
	169	425	8,48	15900	2,1		
	198	365	7,24	15400	2,3		

7,5 kW

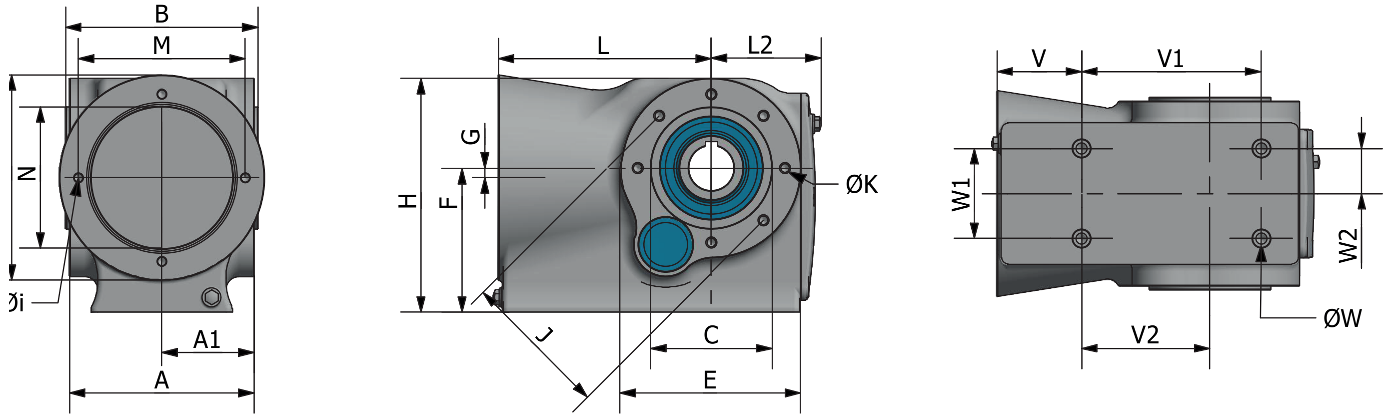
P1 [kW]	n2 [Min-1]	M2 [Nm]	i	Fr2 [N]	fs (gear-box)		
7,5	29	2460	49,16	24200	1,1	FKA 88 AM132 FKA 88 B5T4	132M-4 B14a 132M-4 B5T4
	32	2200	44,02	24200	1,2		
	39	1830	36,52	23900	1,35		
	46	1570	31,39	23500	1,7		
	51	1400	27,88	23200	1,85		
	57	1250	24,92	22800	2		
	64	1120	22,41	22500	2,1		
	74	970	19,45	21900	2,4		
	82	870	17,42	21500	2,5		
	89	800	16	20600	2,3		
	99	725	14,45	20700	2,9		

P_{1n} = Rated Motor Power [kW]
n_2 = Output Speed [Min^{-1}]
M_{2n} = Rated Output torque [Nm]
M_{2max} = Maximum permissible output torque [Nm]
F_{r2} = Permitted Overhung Load Output Side [N]
i = Gear unit Ratio
η% = Transmission Efficiency %
fs = Service Factor

P_{1n}	= Rated Motor Power [kW]	M_{2max}	= Maximum permissible output torque [Nm]	η%	= Transmission Efficiency %
n_2	= Output Speed [Min^{-1}]	F_{r2}	= Permitted Overhung Load Output Side [N]	fs	= Service Factor
M_{2n}	= Rated Output torque [Nm]	i	= Gear unit Ratio		

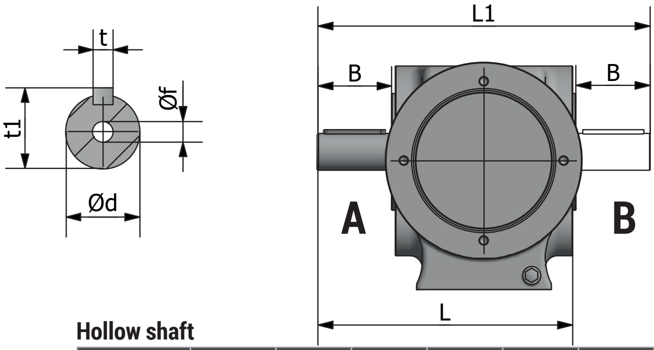
General Dimensions

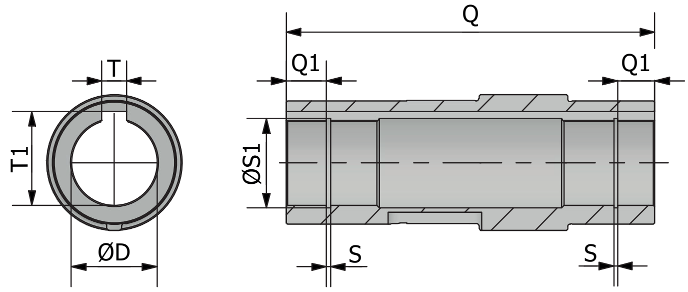
General dimensions



Gearbox	A	A1	B	C	E	F	G	H	Øi	J	ØK	L	L2	M	N	P	V	V1	V2	ØW	W1	W2
FKA 38 B5T1	115	57,5	121	80	110	100	8,5	161,5	M6	95	M8	139	76	100	80	120	57	117	82	M10	60	30
FKA 48 B5T2	144	72	150	95	140	112	7,2	185	M8	115	M8	166	86	130	110	160	66	140	100	M10	70	35
FKA 68 B5T2	173	86,5	179	110	160	140	20	226	M8	130	M10	179	110,5	130	110	160	69	152	110	M12	88	44
FKA 78 B5T3	202	101	208	118	170	180	31,4	280,5	M12	140	M12	202	111,5	165	130	200	80	170	122	M16	102	51
FKA 88 B5T4	232	116	240	150	215	212	26,1	342	M12	178	M16	257	136,5	215	180	250	97	225	160	M16	118	59

Hollow shaft & Solid shaft





Hollow shaft

Gearbox	ØD [H7/h6]	T	T1	Q	Q1	S	S1
FKA 38	30	8	33,3	120	13,7	1,3	31,4
FKA 48	35	10	38,3	150	16,7	1,6	37
FKA 68	40	12	43,3	179	22,5	1,85	43
FKA 78	50	14	53,8	208	26	2,65	53
FKA 88	60 [H8/h6]	18	64,4	240	27,7	2,3	63,2

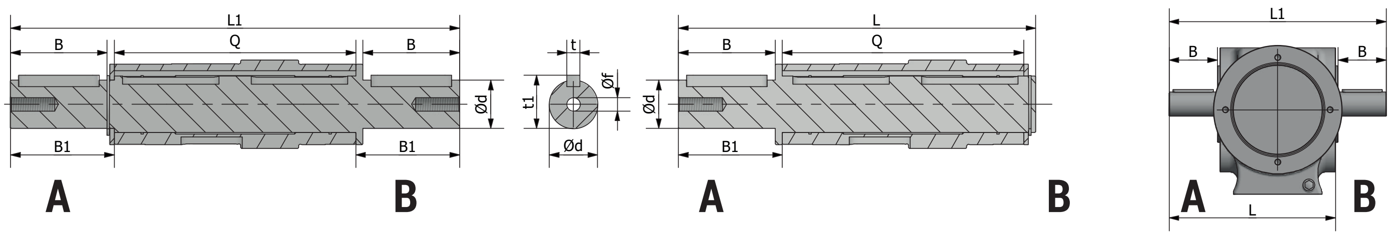
Solid shaft

Gearbox	Ød [g6]	Øf	t	t1	L	L1	B
FKA 38	25	M10	8	28	170	220	50
FKA 48	30	M10	8	33	210	270	60
FKA 68	40	M16	12	43	159	339	80
FKA 78	50	M16	14	53,5	308	408	100
FKA 88	60	M20	18	64	460	480	120

Different solid shaft dimensions possible on request

Different solid shaft dimensions possible on request

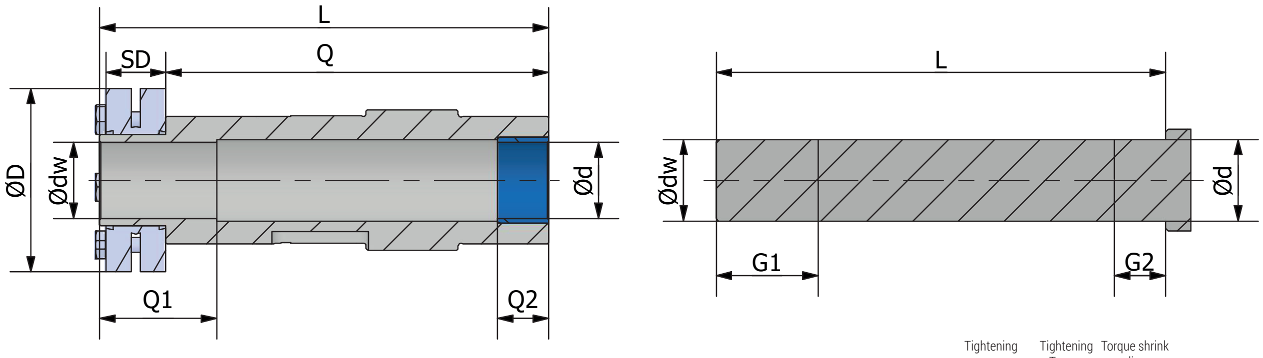
Solid input shaft



Gearbox	Ød[h6]	B	B1	Q	L	L1	Øf	t	t1
FKA 38	25	50	53,5	120	182	227	M10	8	28
FKA 48	30	60	64,5	150	222	279	M10	8	33
FKA 68	40	80	84,5	179	274	384	M16	12	43

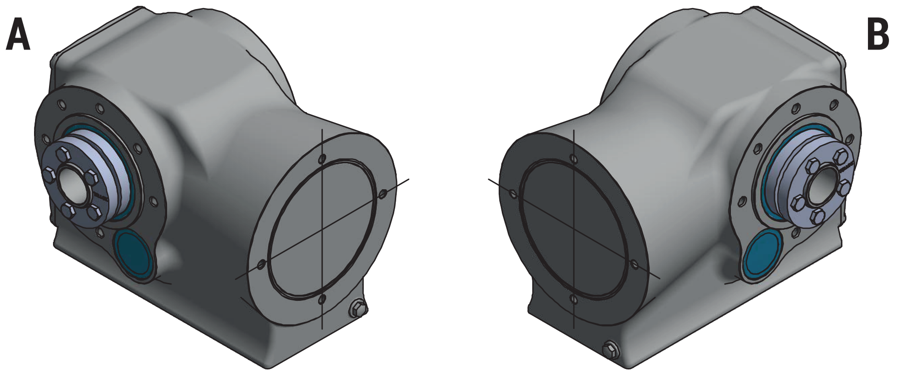
Different solid input shaft dimensions possible on request

Shrink disk



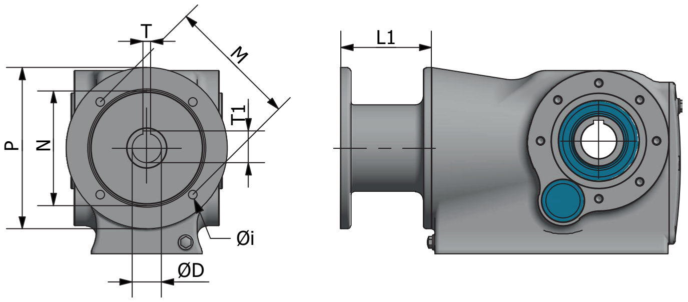
											Tightening screws	Tightening Torque	Torque shrink disc
Gearbox	Ød[H7/h6]	Ødw[H6/*]	ØD	L	SD	Q	Q1	Q2	G1	G2	N° x Type	Ms [Nm]	Mt [Nm]
FKA 38	30	30 [*h6]	72	143,5	23,5	120	31	20	36	25	5 x M6	12	570
FKA 48	35	35 [*h6]	80	175,5	25,5	150	32	20	37	25	7 x M6	12	780
FKA 68	40	40 [*h6]	90	206,5	27,5	179	38	20	43	25	8 x M6	12	1160
FKA 78	50	50 [*g6]	110	238,5	30,5	208	36	30	41	35	10 x M6	12	2200
FKA 88	60	60 [*g6]	115	270,5	30,5	240	41	40	46	45	10 x M6	12	3150

Different shrinkdisk dimensions possible on request
From 18 mm to 30 mm H6/j6
From 30 mm to 50 mm H6/h6
* depends on the shaft diameter



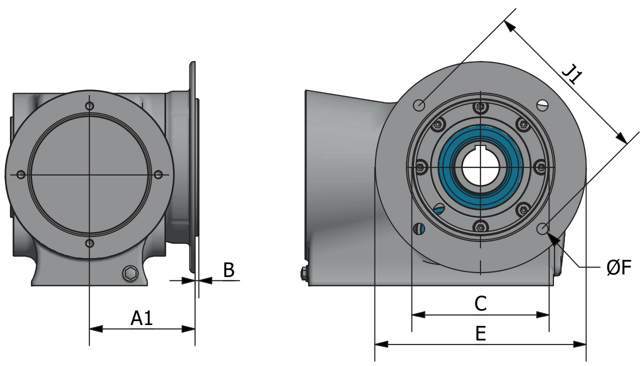
General Dimensions

AM Flange dimensions



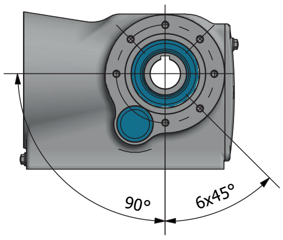
Gearbox	AM flange	ØD [H7/h6]	Øi	L1	M	N	P	T	T1
FKA38 B5T1	AM63	11	9	90	115	95	140	4	12,8
	AM71	14			130	110	160	5	16,3
	AM80	19	7		100	80	120	6	21,8
	AM90	24	9		115	95	140	8	27,3
	AM100	28			130	110	160		31,3
FKA48 B5T2	AM63	11	9	90	115	95	140	4	12,8
	AM71	14			130	110	160	5	16,3
	AM80	19	7		100	80	120	6	21,8
	AM90	24	9		115	95	140	8	27,3
	AM100	28			130	110	160		31,3
FKA68 B5T2	AM63	11	9	90	115	95	140	4	12,8
	AM71	14			130	110	160	5	16,3
	AM80	19	7		100	80	120	6	21,8
	AM90	24	9		115	95	140	8	27,3
	AM100	28			130	110	160		31,3
	AM112								
	AM132	38	11	126	165	130	200	10	41,3
FKA78 B5T3	AM71	14	9	105	130	110	160	5	16,3
	AM80	19			100	80	120	6	21,8
	AM90	24			115	95	140	8	27,3
	AM100	28			130	110	160		31,3
	AM112								
	AM132	38	11	125	165	130	200	10	41,3
FKA88 B5T4	AM80	19	9	105	100	80	120	6	21,8
	AM90	24			115	95	140	8	27,3
	AM100	28			130	110	160		31,3
	AM112								
	AM132	38	11	125	165	130	200	10	41,3

Output flanges

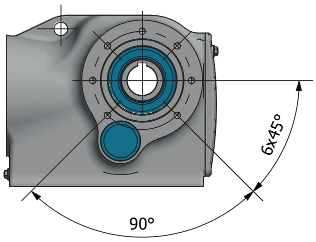


Gearbox	Flange type	A1	B	C	E	J	ØF
FKA 38	SS 095 FL160	86,5	4	110	160	130	9
FKA 48	SS 115 FL200	100	3,5	130	200	165	11
FKA 68	SS 130 FL250	113	4	180	250	215	13,5
FKA 78	SS 140 FL250	142	4	180	250	215	13,5
	SS 140 FL300	142	4	230	300	265	13,5
FKA 88	SS 178 FL350	156	5	250	350	300	17,5

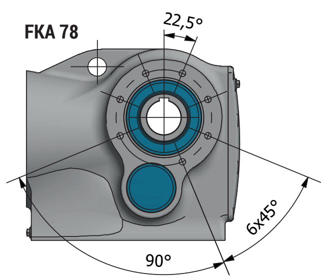
FKA 38 & 48



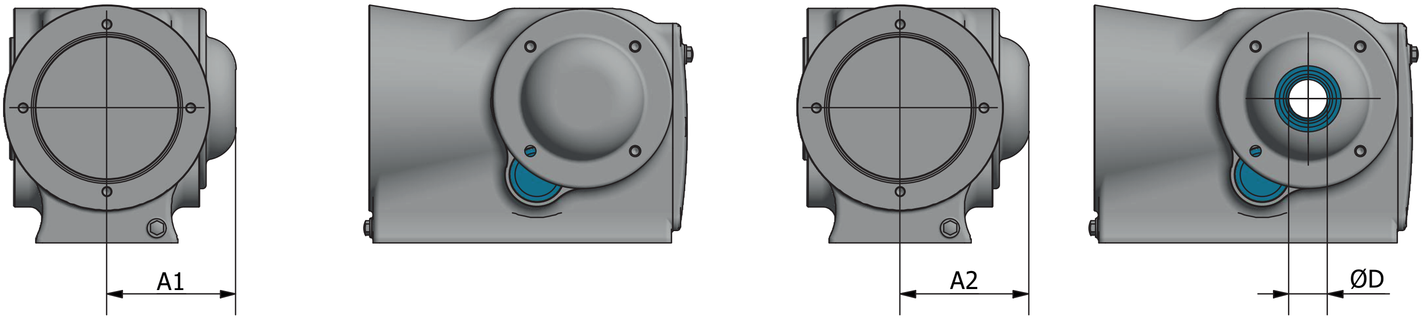
FKA 68 & 88



FKA 78



Open & Closed covers



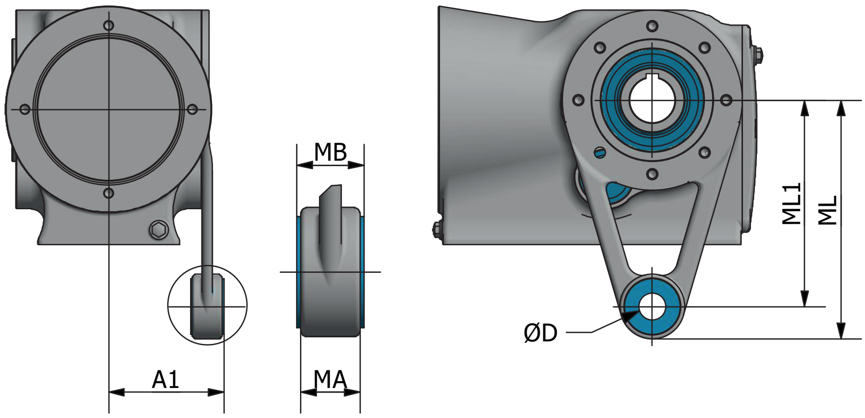
Closed cover

Gearbox	Closed cover	A1
FKA 38	SS 095 CC	83,5
FKA 48	SS 115 CC	100
FKA 68	SS 130 CC	114,5
FKA 78	SS 140 CC	130
FKA 88	SS 178 CC	151

Open cover

Gearbox	Open cover	A2	ØD
FKA 38	SS 095 CO30	79,5	30
FKA 48	SS 115 CO35	100	35
FKA 68	SS 130 CO40	114,5	40
FKA 78	SS140 CO50	130	50
FKA 88	SS178 CO60	151	60

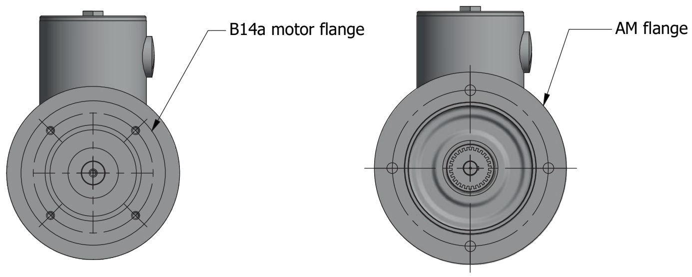
Torque arm

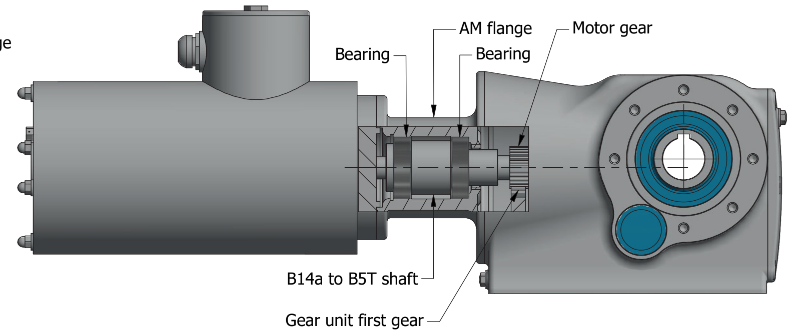


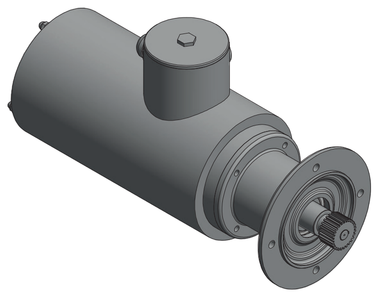
Gearbox	Torque arm	A1	MA	MB	ØD	ML	ML1
FKA 38	SS 095 MS L130S	69,3	12	15	10,5	146	130
	SS 095 MS L150	69,3	12	15	10,5	166	150
FKA 48	SS 115 MS L160S	89,3	23	26	20,5	185	160
	SS 115 MS L200	89,3	23	26	20,5	225	200
FKA 68	SS 130 MS L200	105	23	26	20,5	225	200
FKA 78	SS 140 MS L250	124	23	26	20,5	285	250
FKA 88	SS 178 MS L300	139	23	26	20,5	335	300

Difference between B5T and B14a

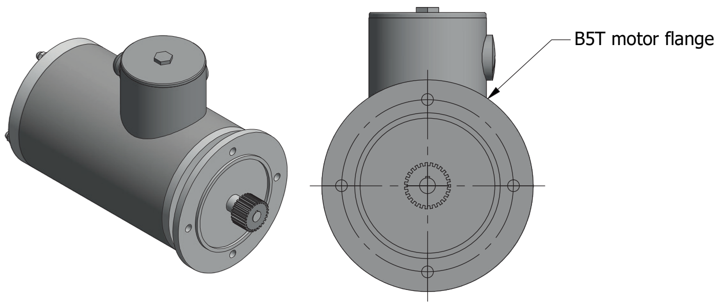
B14a motor with AM - flange

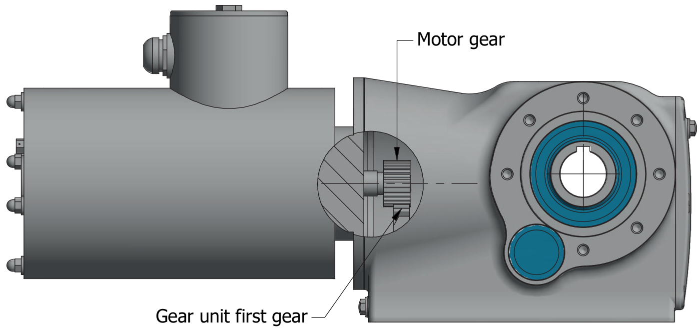






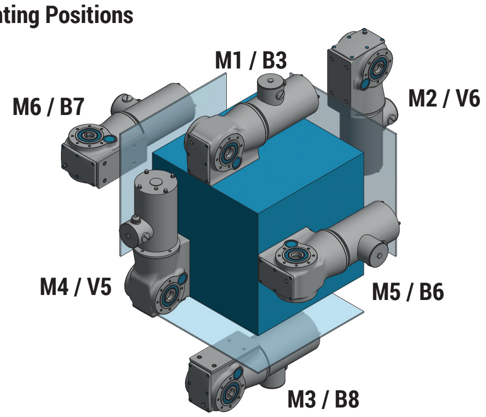
B5 motor



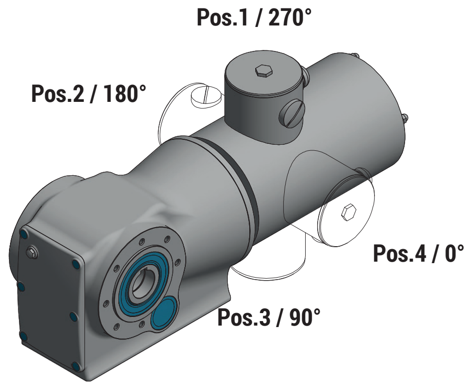


Extra information

Mounting Positions



Terminal Box Positions



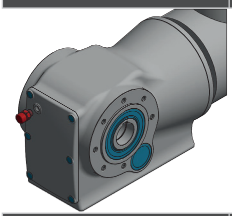
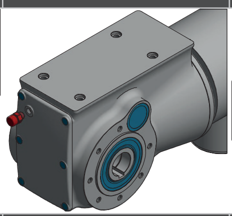
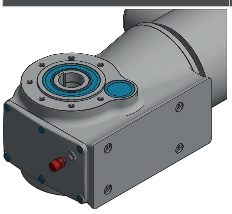
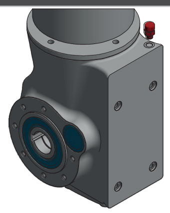
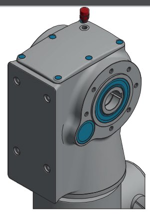
Lubrication Quantity

Oil Quantity in ML.	Mounting Position					
Gearbox	M1 (B3)	M3 (B8)	M6 (B7)	M5 (B6)	M4 (V5)	M2 (V6)
FKA 38	900	900	1000	1000	1400	1000
FKA 48	2000	2000	2000	2000	2700	2300
FKA 68	2900	3750	3200	3200	4100	3100
FKA 78	4000	5000	3750	3750	6000	3750
FKA 88	5000	9000	8000	7500	11200	9000

Lubrication Type

Lubrication Brand	Lubrication Type	
Matrix	Foodmax 460	Standard
Castrol	Optileb GT 460	Alternative
Bechem	Berusynth 460H1	Alternative
Shell	Casida Fluid GL460	Alternative
Mobil	SHC Cibus 460	Alternative

Debreather Positions

M1 / B3	M3 / B8	M5 / B6
		
M6 / B7	**M4 / V5**	**M2 / V6**
		

Weight

Gearbox B5T versions	Weight
FKA 38 B5T1	11.5 Kg
FKA 48 B5T2	16.0 Kg
FKA 68 B5T2	25.5 Kg
FKA 78 B5T3	43.0 Kg
FKA 88 B5T4	*

Gearbox AM versions	Weight
FKA 38 AM..	15.0 Kg
FKA 48 AM..	20.0 Kg
FKA 68 AM..	30 Kg
FKA 78 AM..	50 KG
FKA 88 AM..	*

* in development

Given values are an average and may vary depending on oil quantity.

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FKA Documentation - 1.0

3/3/2022

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Note: Unless otherwise stated all sizes are in millimeters