DERTEC

Stainless Steel Parallel Shaft Gearboxes

FFA Series Parallel Shaft Helical Gearbox

The FFA series parallel-shaft helical gearboxes are being developed to achieve high torque, low energy use and less surface heat.
The high efficiency of the drive reduces the energy consumption.
The case hardened gears ensure a long lifetime and smooth running.
The footprint and shaft sizes are similar to common used standards in the market.

The design of the gearbox is organic round and the smooth design makes the gearboxes extremely applicable in the food industry.
The FFA parallel shaft helical gearboxes offer ratio's up to 281,71 : 1 with a maximum output torque of 1500 Nm.

The main features are:

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 machineries for the food industry.

All hollow shafts are produced in Duplex Stainless Steel 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.
By this, the gearbox obtains a longer drip free operation compared to standard shaft / seal combinations made of SS304 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.

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.

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.

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

Properties and features :

Standard ratio's 3,77 : 1 up to 281,71 : 1
IEC motor adaption or with integrated motor
Standard hollow shafts 30, 35, 40 and 50mm
Extra hygienic optional shaft covers. (open and closed version)

Easy clean torque arm with built in elastic element to reduce alignment mistakes allows easy assembling of the gearbox on the machine shaft.
There is no need to laser cut and bend your own torque arm.
The Easy clean torque arm has a very open design. This design offers better cleanability during the standard cleaning cycle.

For flange mounted applications we offer several types of secondary output flanges in Electro Polished SS316.

As a problem solver we are happy to investigate the best possible solutions for our customers that fits their budget.

www.dertec.nl info@dertec.nl

FFA 38		FFA 48	
Ratio's	3,77 : 1 up to 128,51 : 1	Ratio's	4,99 : 1 up to 190,76 : 1
Standard shaft	30 mm	Standard shaft	35 mm
Torque	Max. 200 Nm	Torque	Max. 400 Nm
Power	Max. 3.0 kW	Power	Max. 3.0 kW
FFA 68		**FFA 78**	
Ratio's	3,97 : 1 up to 228,99 : 1	Ratio's	4,28 : 1 up to 281,71 : 1
Standard shaft	40 mm	Standard shaft	50 mm
Torque	Max. 820 Nm	Torque	Max. 1500 Nm
Power	Max. 5.5 kW	Power	Max. 7.5 kW

Easy Clean Closed Cover

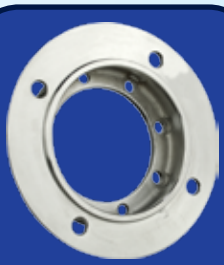
FFA 38	SS095 CC
FFA 48	SS115 CC
FFA 68	SS130 CC
FFA 78	On request

Easy Clean Open Cover

FFA 38	SS095 CO30
FFA 48	SS115 CO35
FFA 68	SS130 CO40
FFA 78	On request

Torque Arms

FFA 38	SS095 MS
FFA 48	SS115 MS
FFA 68	SS130 MS
FFA 78	On request



Output Flanges

FFA 38	SS 095 FL160
	SS 095 FL180
FFA 48	SS 115 FL200
FFA 68	SS 130 FL250
FFA 78	SS 140 FL300

Power P

This parameter can be found in the gearbox selection tables and represents the amount kW that can be safely transmitted into the gearbox

$$P_1 = \frac{P_2}{\eta}[kW]$$

$$P_{1n} \geq P_1 \cdot f_s[kW]$$

P_1 *Input Power (kW)*
P_2 *Output Power (kW)*
P_{1n} *Rated Input Power (kW)*
f_s *Service Factor*
η *Transmission Efficiency %*

Rotation Speed n

n_1 *Gear Units Input Speed*
n_2 *Gear Units Output Speed*

All stated values are based on an input speed of 1500 min^{-1}.
We strongly advise , to obtain the expected lifetime, not to exceed the maximum input speed.
In case of a lower input speed the maximum input torque should be taken in consideration too.

Transmission ratio i

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

Torque M

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

$$M_{2n} \geq M_2 \cdot f_s[Nm]$$

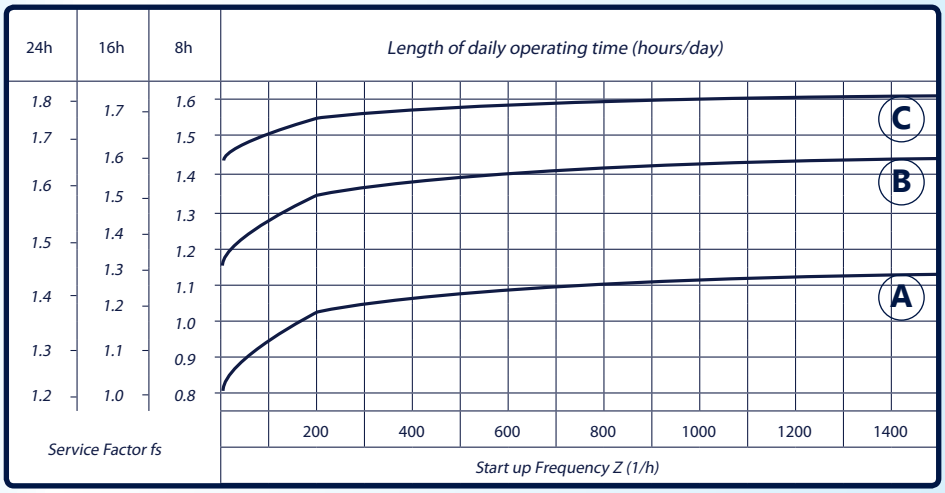
M_2 *= Output Torque (Nm)*
M_{2n} *= Selected Output Torque (Nm)*
P_1 *= Input Power (kW)*
η *= Transmission Efficiency %*
f_s *= Service Factor*

Efficiency of gear units

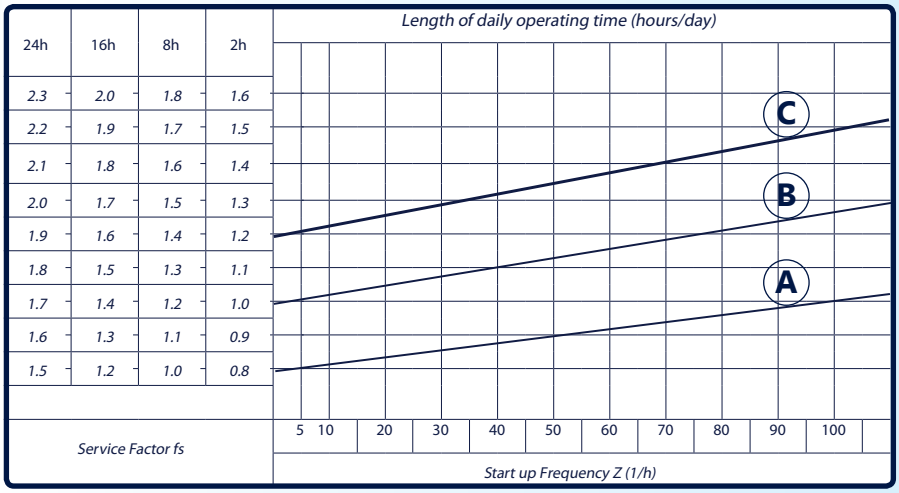
The efficiency of gear units is mainly determined by the gearing and bearing friction. Keep in mind that the starting efficiency of a gear unit is always less than its efficiency at operating speed. This factor is particularly distinctive for worm & helical worm gear boxes.
The gearing in helical worm & worm gearboxes produces a high proportion of sliding friction.
As a result these gearboxes have higher gear efficiency losses than other gearboxes and therefore have a lower total efficiency.
A secondary result is that the surface temperature of these gearboxes will be higher than other gearboxes.
The efficiency of the Dertec Strainless Steel gearboxes can be found in the possible geometrical combinations page's of each gearbox serie.

Service Factor

The effect of the driven machine on the gearbox is taken into account to a sufficient level of accuracy using the Service Factor f_S .
The Service Factor is determined according to the daily operating time and the starting frequency ***Z****.*
Three load classifications are considered depending on the mass acceleration factor.
You can read of the service factor applicable to your application in the figure below.
The service factor selected using this figure must be less than or equal to the service factor as given in the gearbox selection table.



Service Factor for wormgearboxes



Ambient temperature influence on the service factor for wormgearboxes

Service factor fs should be adjusted as following
ambient temperature = 30 ~ 40 : Fs x 1.1 ~1.2
ambient temperature = 40 ~ 50 : Fs x 1.3 ~1.4
ambient temperature = 50 ~ 60 : Fs x 1.5 ~1.6
ambient temperature = > 60, please contact Dertec.

Type of load:

A

Uniform load Permitted mass acceleration factor ***(f_a)≤ 0.3***
Screw feeders for light materials, fans, assembly lines, conveyor belts for light materials, small mixers, lifts, cleaning machines, fillers, control machines.

B

Moderate shock load Permitted mass acceleration factor ***(f_a)≤ 3***
Winding devices, woodworking machine feeders, goods lifts, balancers, threading machines, medium mixers, conveyor belts for heavy materials, winches, sliding doors, fertilizer scrapers, packing machines, concrete mixers, crane mechanism, milling cutters, folding machines, gear pumps.

C

Heavy Shock Load Permitted mass acceleration factor ***(f_a)≤ 10***
Mixers for heavy materials, shears, presses, centrifuges, rotating supports, winches and lifts for heavy materials, grinding lathes, stone mills, bucket elevators, drilling machines, hammer mills, cam presses, folding machines, turntables, tumbling barrels, vibrators, shredders.

To maintain the service life of the gear units,
the Service Factor mentioned in the gearbox selection table must be equal or slightly higher than the calculated service factor.

Mass Acceleration Factor

The Mass acceleration factor is calculated as follows:

$$f_a \frac{Jc}{Jm}$$

f_a = *Mass Acceleration Factor*

Jc = *All External Mass Moments Of Inertia [Kgm²]*

Jm = *Mass Moment Of Inertia on the Motor End [Kgm²]*

If the mass acceleration factor is $f_a > 10$, *please contact us.*

Overhung and axial loads

Determining overhung loads

An important factor for determining the resulting overhung load is the type of transmission element mounted to the shaft end. The following transmission element factors f_z *have to be considered for various transmission elements.*

Transmission Element	Transmission Element 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

The overhung load exerted on the motor or gearshaft is calculated as follows

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

F_r = *Overhung load in N*

M = *Torque in Nm*

d_0 = *Mean Diameter of the mounted transmission element in mm*

f_z = *Transmission element factor*

Permitted overhung load

The basis for determining the permitted overhung loads is the calculation of the rated bearing service life L_{10h} *of the roller bearings (according ISO281)*

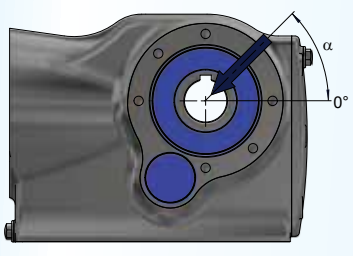
For special operating conditions, the permitted overhung loads can be determined with regard to the modified service life on request.

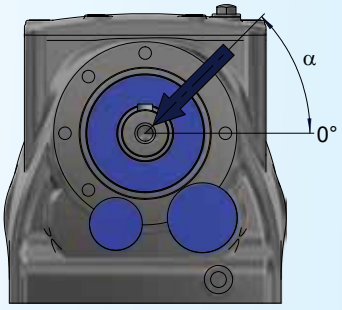
The values refer to force applied to the center of the shaft end (in right angle gear units as viewed onto drive end)

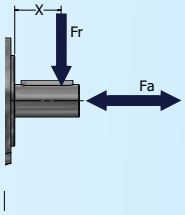
The values for the force application angle α and direction of rotation are based on the most unfavorable conditions.

Definition of force application

The force application is defined according to the following figure.







Fx = Permitted overhung load at point x [N]

Fa = Permitted axial load [N]

Permitted axial forces
If there is no overhung load, than an axial force Fa (Tension or Compression) amounting to 50% of the overhung load given in the selection tables is permitted.

Overhung load conversion for off-center force application
The permitted overhung loads must be calculated according to the selection tables using the following formula in the event that force is not applied at the center of the shaft end. Note that the calculations apply to M2max.

Fxl based on bearing life:

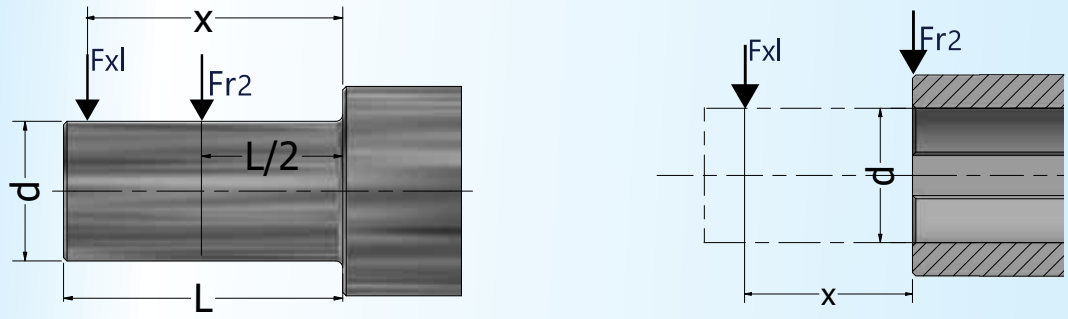
$$Fxl = F_{r2} \cdot \frac{a}{b + x} [N]$$

Fr2 = *Permitted overhung load (x = L/2) for foot mounted gear units according to the selection tables in [N]*

x = *Distance from the shaft shoulder to the force application point in [mm]*

a, b, = *Gear unit constant for overhung load conversions [mm]*

The following figure shows the overhung load Fr with increased distance X to the gear unit.



Values of a & b in mm are given in the following table

FV	a	b	FR	a	b
FV 030	65	50	FR 38	118	93
FV 040	84	64	FR 48	137	107
FV 050	101	76	FR 68	168.5	133.5
FV 063	12	95			
FK	**a**	**b**	**FS(A)**	**a**	**b**
FK 28 B/C	104	78	FS(A) 38	118.5	98.5
FK 38 B/C	118	93	FS(A) 48	130	105
FK 48 B/C	131	101	FS(A) 58	150	120
FK 58 B/C	159	119	FS(A) 68	184	149
FRC	**a**	**b**	**FKA**	**a**	**b**
FRC 01	103	83	FKA 38	123.5	98.5
FRC 02	116.5	91.5	FKA 48	153.5	123.5
FRC 03	130	100	FKA 68	181.3	141.3
FFA	**a**	**b**	FKA 78	215.8	165.8
FFA 38	123.5	98.5	FKA 88	252	192
FFA 48	153.5	123.5			
FFA 68	181.3	141.3			
FFA 78	215.8	165.8			

Efficiency & Irreversibility Characteristics

Efficiency is an important parameter of a wormgear reducer.
Efficiency η depends on the following parameters:

1) Helix angle of gearing
2) Driving speed
3) Running in of gearing
4) The performance of the Lubricant, Oil Seals and Bearings.

The Mesh table shows the dynamic effiency (n_1=1400) and static efficiency values.
Remember that these values are only achieved after the unit has been operating for ca. 24 hours. "Run in period"
Torque values M_{2n} indicated in the gearbox selection tables are calculated by considering the steady state performance of the gearboxes.
The actual values mentioned could have deflection.

Dynamic Irreversibility
Dynamic Irreversibility is achieved when the output shaft stops instantly when power is no longer transmitted through the wormshaft.
This condition requires a dynamic efficiency of η_d<0.4. See mesh table.

η_d	> 0.6	0.5 ~ 0.6	0.4 ~0.5	<0.4
Dynamic irreversibility	Dynamic reversibility	Low Dynamic reversibility	Good Dynamic irreversibility	Dynamic irreversibility

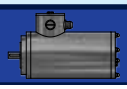
Static Irreversibility
Static Irreversibility is achieved when, at a standstill, the application of a load to the output shaft can't drive the wormshaft of the gear reducer.
This condition requires a static efficiency of η_s <0.5, See mesh table.

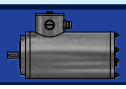
η_s	> 0.55	0.5 ~ 0.55	< 0.5
Static irreversibility	Static reversibility	Low Static reversibility	Static irreversibility

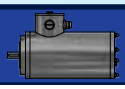
The table shows approximate irreversibility classes. Vibrations and shocks can effect a gear reducers irreversibility.
As it is virtual impossible to provide and guarantee total non reversing, we recommend the use of an external brake with suffficient capability to prevent vibrations in duced starting, where these circumstances are required.
For the irreversibility conditions of a combined geared unit one must consider that the efficiency of the group is given by the product of the efficiencies of each single reducer, i.e.: Ntot = N1 x N2

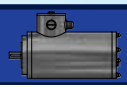
Mesh Data

	i	7,5	10	15	20	25	30	40	50	60	80	100
FV 030	**z1**	4	3	2	2	1	1	1	1	1	1	
	Mn	1.36	1.39	1.42	1.09	1.69	1.43	1.10	0.89	0.74	0.56	
	Y	18°55′	14°25′	9°44′	7°50′	5°33′	4°54′	3°56′	3°17′	2°43′	2°7′	
	η_d	0.84	0.81	0.76	0.72	0.66	0.64	0.59	0.54	0.50	0.44	
	η_s	0.66	0.62	0.54	0.49	0.41	0.38	0.33	0.29	0.26	0.21	
FV 040	**z1**	4	3	2	2	2	1	1	1	1	1	1
	Mn	1.87	1.95	2.00	1.54	1.26	2.04	1.55	1.27	1.06	0.80	0.65
	Y	23°54′	18°23′	12°30′	10°3′	8°45′	6°19′	5°4′	4°24′	3°42′	2°52′	2°29′
	η_d	0.86	0.84	0.80	0.77	0.74	0.69	0.65	0.61	0.57	0.51	0.47
	η_s	0.70	0.66	0.59	0.54	0.51	0.44	0.39	0.36	0.32	0.27	0.24
FV 050	**z1**	4	3	2	2	2	1	1	1	1	1	1
	Mn	2.34	2.43	2.50	1.92	1.56	2.54	1.94	1.58	1.32	1.00	0.80
	Y	23°49′	18°19′	12°27′	10°3′	8°33′	6°18′	5°4′	4°18′	3°38′	2°52′	2°17′
	η_d	0.87	0.85	0.81	0.78	0.75	0.71	0.67	0.63	0.59	0.53	0.48
	η_s	0.70	0.66	0.59	0.54	0.51	0.44	0.39	0.36	0.32	0.27	0.24
FV 063	**z1**	4	3	2	2	2	1	1	1	1	1	1
	Mn	2.96	3.08	3.17	2.44	1.98	3.23	2.47	1.99	1.68	1.27	1.02
	Y	24°31′	18°53′	12°51′	10°29′	8°45′	6°30′	5°17′	4°24′	3°49′	2°59′	2°26′
	η_d	0.88	0.86	0.82	0.80	0.77	0.73	0.69	0.65	0.62	0.56	0.51
	η_s	0.70	0.66	0.59	0.55	0.51	0.44	0.40	0.36	0.33	0.28	0.24

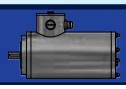
P_{1n} [kW]	N_2 min^{-1}	M_{2n} [Nm]	i	F_{r2} [N]	f_s		
0.12	11	107	128.51	5220	1.85	FFA 38 AM63 FFA 38 B5T1	631-4 B5 631-4 B5T1
	12	98	117.88	5270	2.00		
	14	83	100.36	5340	2.40		
	16	72	86.53	5400	2.80		
	17	67	80.65	5410	3.00		
	7.2	158	190.76	7970	2.50	FFA 48 AM63 FFA 48 B5T1	631-4 B5 631-4 B5T1
	7.9	146	175.38	8020	2.80		
	9.2	125	150.06	8100	3.20		
	11	108	130.07	8150	3.70		
0.18	10	167	128.51	4700	1.20	FFA 38 AM63 FFA 38 B5T1	632-4 B5 632-4 B5T1
	11	154	117.88	4850	1.30		
	13	131	100.36	5050	1.55		
	15	113	86.53	5180	1.75		
	16	105	80.65	5230	1.90		
	19	92	70.50	5300	2.20		
	20	86	66.09	5330	2.30		
	23	76	58.32	5380	2.60		
	8.7	198	100.36	4320	1.00	FFA 38 AM71 FFA 38 B5T1	711-6 B5 711-6 B5T1
	10	171	86.53	4660	1.15		
	11	159	80.65	4790	1.25		
	12	139	70.50	4970	1.45		
	6.9	250	190.76	7470	1.60	FFA 48 AM63 FFA 48 B5T1	632-4 B5 632-4 B5T1
	7.5	230	175.38	7610	1.75		
	8.8	195	150.06	7800	2.10		
	10	169	130.07	7920	2.40		
	11	158	121.57	7970	2.50		
	4.6	375	190.76	6240	1.05	FFA 48 AM71 FFA 48 B5T1	711-6 B5 711-6 B5T1
	5.0	345	175.38	6600	1.15		
	5.8	295	150.06	7090	1.35		
	6.7	255	130.07	7410	1.55		
	7.2	240	121.57	7530	1.65		
	5.8	300	228.99	13000	2.80	FFA 68 AM63 FFA 68 B5T2	632-4 B5 632-4 B5T2
	6.8	255	195.39	13000	3.20		
	7.7	225	170.85	13000	3.70		
	3.8	450	228.99	12600	1.80	FFA 68 AM71 FFA 68 B5T2	711-6 B5 711-6 B5T2
	4.5	385	195.39	12900	2.10		
	5.1	340	170.85	13000	2.40		
	3.1	555	281.71	19600	2.70	FFA 78 AM71 FFA 78 B5T3	711-6 B5 711-6 B5T3
	3.3	520	262.93	19700	2.90		
	3.9	445	225.79	19800	3.40		

P_{1n} [kW]	N_2 min^{-1}	M_{2n} [Nm]	i	F_{r2} [N]	f_s		
0.25	13	184	100.36	4500	1.10	FFA 38 AM71 FFA 38 B5T1	711-4 B5 711-4 B5T1
	15	159	86.53	4790	1.25		
	16	148	80.65	4900	1.35		
	18	130	70.50	5060	1.55		
	20	121	66.09	5120	1.65		
	22	107	58.32	5210	1.85		
	24	100	54.54	5260	2.00		
	25	95	51.70	5280	2.10		
	28	86	47.02	5330	2.30		
	30	81	43.83	5360	2.50		
	34	70	38.31	5400	2.80		
	36	66	35.91	5420	3.00		
	41	58	31.69	5450	3.40		
	6.8	350	190.76	6550	1.15	FFA 48 AM71 FFA 48 B5T1	711-4 B5 711-4 B5T1
	7.4	320	175.38	6850	1.25		
	8.7	275	150.06	7270	1.45		
	10	240	130.07	7540	1.65		
	11	225	121.57	7640	1.80		
	12	193	105.09	7810	2.10		
	15	164	89.29	7950	2.40		
	5.9	405	150.06	5750	1.00	FFA 48 AM71 FFA 48 B5T1	712-6 B5 712-6 B5T1
	6.8	355	130.07	6530	1.15		
	7.2	330	121.57	6770	1.20		
	8.4	285	105.09	7190	1.40		
	5.7	420	228.99	12700	1.95	FFA 68 AM71 FFA 68 B5T2	711-4 B5 711-4 B5T2
	6.7	360	195.39	13000	2.30		
	7.6	315	170.85	13000	2.60		
	8.0	300	162.31	13000	2.80		
	9.1	260	142.40	13000	3.10		
	3.8	620	228.99	11800	1.30	FFA 68 AM71 FFA 68 B5T2	712-6 B5 712-6 B5T2
	4.5	530	195.39	12300	1.55		
	5.2	465	170.85	12600	1.75		
	5.4	440	162.31	12700	1.85		
	6.2	385	142.40	12900	2.10		
	3.1	765	281.71	19100	1.95	FFA 78 AM71 FFA 78 B5T3	712-6 B5 712-6 B5T3
	3.4	715	262.93	19200	2.10		
	3.9	615	225.79	19500	2.50		
	4.4	540	198.31	19600	2.80		
	4.7	510	188.40	19700	2.90		

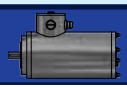
P_{1n} [kW]	N_2 min^{-1}	M_{2n} [Nm]	i	F_{r2} [N]	f_s		
0.37	20	181	70.50	4550	1.10	FFA 38 AM71 FFA 38 B5T1	712-4 B5 712-4 B5T1
	21	169	66.09	4680	1.20		
	24	149	58.32	4890	1.35		
	25	140	54.54	4970	1.45		
	27	132	51.70	5030	1.50		
	29	120	47.02	5120	1.65		
	31	112	43.83	5180	1.80		
	36	98	38.31	5270	2.00		
	38	92	35.91	5300	2.20		
	44	81	31.69	5300	2.50		
	49	72	28.09	5140	2.80		
	58	61	23.88	4930	3.30		
	9.2	385	150.06	6140	1.05	FFA 48 AM71 FFA 48 B5T1	712-4 B5 712-4 B5T1
	11	335	130.07	6740	1.20		
	13	270	105.09	7320	1.50		
	15	230	89.29	7600	1.75		
	17	205	79.72	7750	1.95		
	20	174	68.09	7900	2.30		
	21	167	65.36	7930	2.40		
	6.0	585	228.99	12000	1.40	FFA 68 AM71 FFA 68 B5T2	712-4 B5 712-4 B5T2
	7.1	500	195.39	12400	1.65		
	8.1	435	170.85	12700	1.85		
	8.5	415	162.31	12800	1.95		
	9.7	365	142.40	12900	2.30		
	11	310	120.79	13000	2.70		
	4.6	765	195.39	10800	1.05	FFA 68 AM80 FFA 68 B5T2	801-6 B14a 801-6 B5T2
	5.3	670	170.85	11500	1.20		
	5.5	635	162.31	11700	1.30		
	6.3	560	142.40	12100	1.45		
	7.5	475	120.79	12500	1.75		
	4.9	720	281.71	19200	2.10	FFA 78 AM71 FFA 78 B5T3	712-4 B5 712-4 B5T3
	5.2	675	262.93	19300	2.20		
	6.1	580	225.79	19500	2.60		
	7.0	510	198.31	19700	3.00		
	4.0	890	225.79	18700	1.70	FFA 78 AM80 FFA 78 B5T3	801-6 B14a 801-6 B5T3
	4.5	780	198.31	19100	1.95		
	4.8	740	188.40	19200	2.00		
	5.4	655	166.47	19400	2.30		
	6.3	560	142.27	19600	2.70		

P_{1n} [kW]	N_2 min^{-1}	M_{2n} [Nm]	i	F_{r2} [N]	f_s		
0.55	26	200	51.70	4300	1.00	FFA 38 AM80 FFA 38 B5T1	801-4 B14a 801-4 B5T1
	29	182	47.02	4540	1.10		
	31	169	43.83	4680	1.20		
	36	148	38.31	4900	1.35		
	38	139	35.91	4980	1.45		
	43	122	31.69	4990	1.65		
	48	109	28.09	4870	1.85		
	57	92	23.88	4700	2.20		
	58	91	23.63	4690	2.20		
	66	79	20.57	4540	2.50		
	71	74	19.27	4470	2.70		
	80	66	17.03	4340	3.00		
	95	55	14.33	4150	3.60		
	13	405	105.09	5840	1.00	FFA 48 AM80 FFA 48 B5T1	801-4 B14a 801-4 B5T1
	15	345	89.29	6620	1.15		
	17	310	79.72	6990	1.30		
	20	265	68.09	7370	1.50		
	21	250	65.36	7440	1.60		
	24	220	56.49	7670	1.85		
	28	185	48.00	7850	2.20		
	32	166	42.86	7940	2.40		
	7.0	755	195.39	10900	1.10	FFA 68 AM80 FFA 68 B5T2	801-4 B14a 801-4 B5T2
	8.0	660	170.85	11500	1.25		
	8.4	625	162.31	11700	1.30		
	9.6	550	142.40	12200	1.50		
	11	465	120.79	12600	1.75		
	12	420	109.04	12700	1.95		
	14	370	95.94	12900	2.20		
	15	350	90.59	13000	2.30		
	17	310	79.76	13000	2.70		
	6.0	870	225.79	18800	1.70	FFA 78 AM80 FFA 78 B5T3	801-4 B14a 801-4 B5T3
	6.9	765	198.31	19100	1.95		
	7.2	730	188.40	19200	2.10		
	8.2	645	166.47	19400	2.30		
	9.6	550	142.27	19600	2.70		
	10	505	130.42	19700	3.00		
	12	440	114.45	19800	3.40		
	13	420	108.46	19800	3.60		
	14	365	94.93	19900	4.10		
	4.0	1320	225.79	16800	1.15	FFA 78 AM80 FFA 78 B5T3	802-6 B14a 802-6 B5T3
	4.5	1160	198.31	17600	1.30		
	4.8	1100	188.40	17900	1.35		
	5.4	970	166.47	18400	1.55		
	6.3	830	142.27	18900	1.80		
	6.9	760	130.42	19100	1.95		

P_{1n} [kW]	N_2 min^{-1}	M_{2n} [Nm]	i	F_{r2} [N]	f_s		
0.75	36	199	38.31	4310	1.00	FFA 38 AM80 FFA 38 B5T1	802-4 B14a 802-4 B5T1
	38	186	35.91	4480	1.05		
	44	165	31.69	4620	1.20		
	49	146	28.09	4540	1.35		
	58	123	23.63	4400	1.65		
	67	107	20.57	4290	1.85		
	72	100	19.27	4240	2.00		
	81	88	17.03	4130	2.30		
	96	74	14.33	3970	2.70		
	107	67	12.87	3870	3.00		
	20	355	68.09	6520	1.15	FFA 48 AM80 FFA 48 B5T1	802-4 B14a 802-4 B5T1
	21	340	65.36	6680	1.20		
	24	295	56.49	7120	1.35		
	29	250	48.00	7470	1.60		
	32	220	42.86	7640	1.80		
	38	190	36.61	7820	2.10		
	40	178	34.29	7850	2.30		
	48	150	28.88	7540	2.70		
	9.7	740	142.40	11000	1.10	FFA 68 AM80 FFA 68 B5T2	802-4 B14a 802-4 B5T2
	11	625	120.79	11700	1.30		
	13	565	109.04	12100	1.45		
	14	500	95.94	12400	1.65		
	15	470	90.59	12500	1.75		
	17	415	79.76	12800	2.00		
	20	350	67.65	13000	2.30		
	23	315	61.07	13000	2.60		
	6.1	1170	225.79	17600	1.30	FFA 78 AM80 FFA 78 B5T3	802-4 B14a 802-4 B5T3
	7.0	1030	198.31	18200	1.45		
	7.3	980	188.40	18400	1.55		
	8.3	860	166.47	18800	1.75		
	9.7	740	142.27	19200	2.00		
	11	675	130.42	19300	2.20		
	12	595	114.45	19500	2.50		
	13	565	108.46	19600	2.70		
	4.8	1500	188.40	15700	1.00	FFA 78 AM90 FFA 78 B5T3	90S-6 B14a 90S-6 B5T3
	5.4	1320	166.47	16800	1.15		
	6.3	1130	142.27	17800	1.30		
	6.9	1040	130.42	18200	1.45		

P_{1n} [kW]	N_2 min^{-1}	M_{2n} [Nm]	i	F_{r2} [N]	f_s		
1.1	59	179	23.88	3930	1.10	FFA 38 AM90 FFA 38 B5T1	90S-4 B14a 90S-4 B5T1
	68	154	20.57	3870	1.30		
	73	145	19.27	3840	1.40		
	82	128	17.03	3780	1.55		
	98	108	14.33	3680	1.85		
	109	97	12.87	3610	2.10		
	126	83	11.08	3500	2.30		
	134	78	10.42	3460	2.40		
	156	67	8.97	3350	2.60		
	29	360	48.00	6440	1.10	FFA 48 AM90 FFA 48 B5T1	90S-4 B14a 90S-4 B5T1
	33	320	42.86	6860	1.25		
	38	275	36.61	7280	1.45		
	41	255	34.29	7260	1.55		
	48	215	28.88	7040	1.85		
	45	230	30.86	7130	1.75		
	48	220	29.32	7060	1.80		
	54	193	25.72	6880	2.10		
	64	164	21.82	6640	2.40		
	71	148	19.70	6490	2.70		
	13	820	109.04	10300	1.00	FFA 68 AM90 FFA 68 B5T2	90S-4 B14a 90S-4 B5T2
	15	720	95.94	11100	1.15		
	15	680	90.59	11400	1.20		
	18	600	79.76	11900	1.35		
	21	510	67.65	12400	1.60		
	23	460	61.07	12600	1.80		
	26	405	53.73	12800	2.00		
	28	380	50.74	12900	2.20		
	32	325	43.20	13000	2.50		
	36	295	39.26	13000	2.70		
	41	255	34.01	13000	2.90		
	7.1	1490	198.31	15800	1.00	FFA 78 AM90 FFA 78 B5T3	90S-4 B14a 90S-4 B5T3
	7.4	1410	188.40	16300	1.05		
	8.4	1250	166.47	17200	1.20		
	9.8	1070	142.27	18000	1.40		
	11	980	130.42	18400	1.55		
	12	860	114.45	18800	1.75		
	13	810	108.46	18900	1.85		
	15	710	94.93	19200	2.10		
	16	640	85.52	19400	2.30		
	19	565	75.02	19600	2.70		

P_{1n} [kW]	N_2 min^{-1}	M_{2n} [Nm]	i	F_{r2} [N]	f_s		
1.5	73	196	19.27	3410	1.00	FFA 38 AM90 FFA 38 B5T1	90L-4 B14a 90L-4 B5T1
	83	173	17.03	3400	1.15		
	98	146	14.33	3350	1.35		
	110	131	12.87	3310	1.55		
	127	113	11.08	3250	1.70		
	135	106	10.42	3220	1.75		
	157	91	8.97	3140	1.90		
	176	81	8.01	3080	2.10		
	39	370	36.61	6300	1.10	FFA 48 AM90 FFA 48 B5T1	90L-4 B14a 90L-4 B5T1
	41	350	34.29	6580	1.15		
	49	295	28.88	6500	1.35		
	46	315	30.86	6550	1.30		
	48	300	29.32	6510	1.35		
	55	260	25.72	6390	1.55		
	65	220	21.82	6230	1.80		
	72	200	19.70	6110	2.00		
	81	176	17.33	5970	2.30		
	86	166	16.36	5900	2.40		
	101	142	13.93	5700	2.80		
	18	810	79.76	10400	1.00	FFA 68 AM90 FFA 68 B5T2	90L-4 B14a 90L-4 B5T2
	21	685	67.65	11400	1.20		
	23	620	61.07	11800	1.30		
	26	545	53.73	12200	1.50		
	28	515	50.74	12300	1.60		
	33	440	43.20	12700	1.85		
	36	400	39.26	12800	1.95		
	39	370	36.30	12900	2.20		
	44	325	32.08	13000	2.50		
	51	280	27.41	13000	2.90		
	56	255	25.13	13000	3.20		
	9.9	1450	142.27	16100	1.05	FFA 78 AM90 FFA 78 B5T3	90L-4 B14a 90L-4 B5T3
	11	1320	130.42	16800	1.15		
	12	1160	114.45	17600	1.30		
	13	1100	108.46	17900	1.35		
	15	960	94.93	18400	1.55		
	16	870	85.52	18800	1.75		
	19	760	75.02	19100	1.95		
	19	735	72.50	19200	2.00		
	21	675	66.46	19300	2.20		
	24	595	58.32	19500	2.50		
	26	560	55.27	19600	2.70		
	29	490	48.37	19700	3.10		
	32	445	43.58	19800	3.40		
	37	390	38.23	19900	3.90		
	39	370	36.58	19900	3.00		
	45	320	31.51	20000	4.30		

P_{1n} [kW]	N_2 min^{-1}	M_{2n} [Nm]	i	F_{r2} [N]	f_s		
2.2	110	192	12.87	2810	1.05	FFA 38 AM100 FFA 38 B5T1	100L1-4 B14a 100L1-4 B5T1
	127	165	11.08	2820	1.15		
	135	155	10.42	2810	1.20		
	157	134	8.97	2790	1.30		
	176	119	8.01	2770	1.40		
	209	100	6.74	2630	1.40		
	233	90	6.05	2590	1.50		
	271	78	5.21	2540	1.60		
	288	73	4.90	2520	1.65		
	334	63	4.22	2460	1.75		
	374	56	3.77	2400	1.85		
	55	385	25.72	5560	1.05	FFA 48 AM100 FFA 48 B5T1	100L1-4 B14a 100L1-4 B5T1
	65	325	21.82	5520	1.25		
	72	295	19.70	5480	1.35		
	81	260	17.33	5410	1.55		
	86	245	16.36	5370	1.65		
	101	210	13.93	5250	1.95		
	111	189	12.66	5170	2.10		
	129	163	10.97	5040	2.50		
	157	133	8.96	4740	2.50		
	26	800	53.73	10500	1.00	FFA 68 AM100 FFA 68 B5T2	100L1-4 B14a 100L1-4 B5T2
	28	755	50.74	10800	1.10		
	33	645	43.20	11600	1.25		
	36	585	39.26	12000	1.35		
	41	505	34.01	12400	1.45		
	44	480	32.08	12500	1.70		
	51	410	27.41	12800	2.00		
	56	375	25.13	12900	2.20		
	64	330	22.05	13000	2.50		
	67	310	20.90	13000	2.60		
	77	275	18.29	13000	3.00		
	15	1410	94.93	16300	1.05	FFA 78 AM100 FFA 78 B5T3	100L1-4 B14a 100L1-4 B5T3
	16	1270	85.52	17100	1.20		
	19	1120	75.02	17800	1.35		
	21	990	66.46	18300	1.50		
	24	870	58.32	18800	1.75		
	26	820	55.27	18900	1.80		
	29	720	48.37	19200	2.10		
	32	650	43.58	19400	2.30		
	39	545	36.58	19600	2.00		
	45	470	31.51	19700	2.90		
	49	430	28.75	19800	3.30		
	55	380	25.50	19900	4.00		

P_{1n} [kW]	N_2 min^{-1}	M_{2n} [Nm]	i	F_{r2} [N]	f_s		
3.0	175	164	8.01	2410	1.05	FFA 38 AM100 FFA 38 B5T1	100L2-4 B14a 100L2-4 B5T1
	208	138	6.74	2290	1.00		
	231	124	6.05	2300	1.10		
	269	107	5.21	2290	1.15		
	286	100	4.90	2280	1.20		
	332	86	4.22	2250	1.25		
	372	77	3.77	2220	1.35		
	71	405	19.70	4750	1.00	FFA 48 AM100 FFA 48 B5T1	100L2-4 B14a 100L2-4 B5T1
	81	355	17.33	4760	1.15		
	86	335	16.36	4760	1.20		
	100	285	13.93	4740	1.40		
	111	260	12.66	4700	1.55		
	128	225	10.97	4640	1.80		
	156	183	8.96	4370	1.80		
	41	695	34.01	11300	1.05	FFA 68 AM100 FFA 68 B5T2	100L2-4 B14a 100L2-4 B5T2
	44	655	32.08	11600	1.25		
	51	560	27.41	12100	1.45		
	56	515	25.13	12300	1.60		
	63	450	22.05	12600	1.80		
	67	430	20.90	12700	1.90		
	77	375	18.29	12900	2.20		
	85	335	16.48	13000	2.40		
	97	295	14.46	13000	2.80		
	19	1540	75.02	15500	1.00	FFA 78 AM100 FFA 78 B5T3	100L2-4 B14a 100L2-4 B5T3
	21	1360	66.46	16600	1.10		
	24	1190	58.32	17500	1.25		
	25	1130	55.27	17800	1.35		
	29	990	48.37	18300	1.50		
	32	890	43.58	18700	1.70		
	37	780	38.23	19000	1.90		
	38	750	36.58	19100	1.50		
	44	645	31.51	19400	2.10		
	49	590	28.75	19500	2.40		
	55	520	25.50	19700	2.90		
	65	440	21.43	19800	3.40		

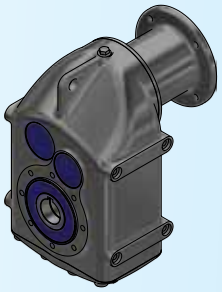
P_{1n} [kW]	$72N_2$ min^{-1}	M_{2n} [Nm]	i	F_{r2} [N]	f_s		
4.0	52	735	27.41	11000	1.10	FFA 68 AM112 FFA 68 B5T2	112M-4 B14a 112M-4 B5T2
	57	675	25.13	11400	1.20		
	64	595	22.05	11900	1.40		
	68	560	20.90	12100	1.45		
	78	490	18.29	12400	1.65		
	86	445	16.48	12700	1.85		
	98	390	14.46	12900	2.10		
	111	345	12.76	13000	2.40		
	126	305	11.31	13000	2.70		
	147	260	9.66	13000	3.20		
	156	245	9.08	13000	2.20		
	165	230	8.60	12800	2.50		
	189	205	7.53	12400	3.00		
	209	183	6.78	12100	3.40		
	239	160	5.95	11700	3.80		
	270	141	5.25	11400	4.20		
	305	125	4.66	11000	4.50		
	357	107	3.97	10600	4.70		
	26	1490	55.27	15800	1.00	FFA 78 AM112 FFA 78 B5T3	112M-4 B14a 112M-4 B5T3
	29	1300	48.37	16900	1.15		
	33	1170	43.58	17600	1.30		
	37	1030	38.23	18200	1.45		
	42	910	33.74	18600	1.65		
	47	800	29.91	19000	1.85		
	56	685	25.54	19300	2.10		
	45	850	31.51	18800	1.65		
	49	775	28.75	19100	1.85		
	56	685	25.50	19300	2.20		
	66	575	21.43	19500	2.60		
	72	530	19.70	19600	2.80		

P_{1n} [kW]	N_2 min^{-1}	M_{2n} [Nm]	i	F_{r2} [N]	f_s		
5.5	65	810	22.05	10400	1.00	FFA 68 AM132 FFA 68 B5T2	132S-4 B14a 132S-4 B5T2
	68	770	20.90	10800	1.05		
	78	670	18.29	11500	1.20		
	87	605	16.48	11900	1.35		
	99	530	14.46	12300	1.55		
	112	470	12.76	12500	1.75		
	126	415	11.31	12800	1.95		
	148	355	9.66	12900	2.30		
	158	335	9.08	12400	1.60		
	166	315	8.60	12300	1.80		
	190	275	7.53	12000	2.20		
	211	250	6.78	11700	2.50		
	240	220	5.95	11400	2.80		
	272	193	5.25	11100	3.10		
	307	171	4.66	10700	3.30		
	360	146	3.97	10300	3.40		
	37	1400	38.23	16300	1.05	FFA 78 AM132 FFA 78 B5T3	132S-4 B14a 132S-4 B5T3
	42	1240	33.74	17300	1.20		
	48	1100	29.91	17900	1.35		
	56	940	25.54	18500	1.55		
	56	940	25.50	18500	1.60		
	67	785	21.43	19000	1.90		
	73	725	19.70	19200	2.10		
	82	645	17.49	19400	2.30		
	91	575	15.64	19600	2.60		
	102	515	14.06	19300	2.90		
	117	450	12.20	18600	3.40		
7.5	48	1500	29.91	15700	1.00	FFA 78 AM132 FFA 78 B5T3	132M-4 B14a 132M-4 B5T3
	56	1280	25.54	17000	1.15		
	56	1280	25.50	17100	1.15		
	67	1070	21.43	18000	1.40		
	73	990	19.70	18400	1.50		
	82	880	17.49	18800	1.70		
	91	785	15.64	19000	1.90		
	102	705	14.06	18600	2.10		
	117	610	12.20	18000	2.50		
	131	545	10.93	17600	2.70		
	154	465	9.30	16500	2.30		
	173	415	8.26	16100	2.60		
	194	370	7.39	15700	2.90		
	215	335	6.64	15300	3.30		
	248	290	5.76	14800	3.70		
	277	260	5.16	14500	4.20		
	334	215	4.28	13800	4.70		

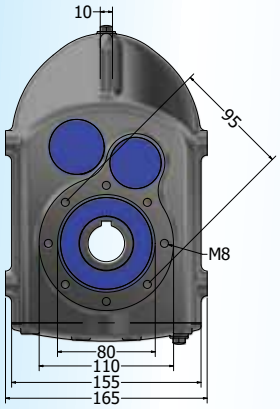
The FFA 38 can be supplied with an integrated motor (B5T1) as well as with an IEC motor adaptor (AM)
The B5T1 version is meant to be assembled with a special motor, made with a non IEC flange and a shouldered shaft.
The AM version can be assembled with a standard motor with flange and shaft according to IEC.

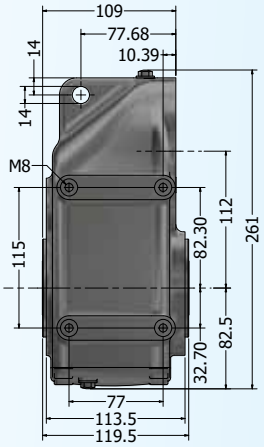
FFA 38 B5T1

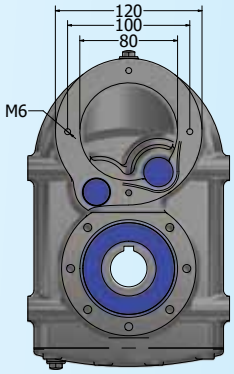
FFA 38 AM..



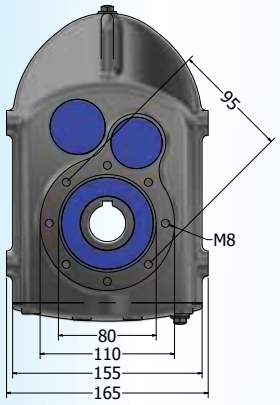
FFA 38 B5T1

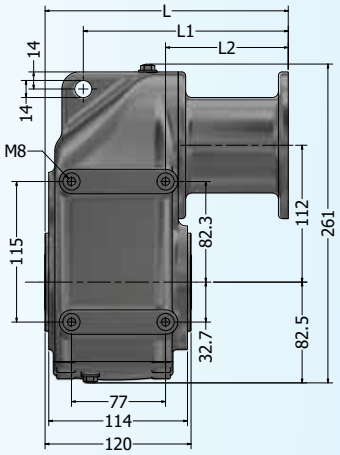


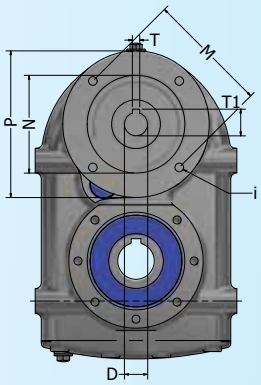




FFA 38 AM

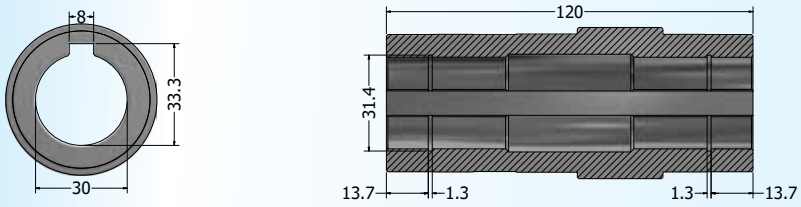






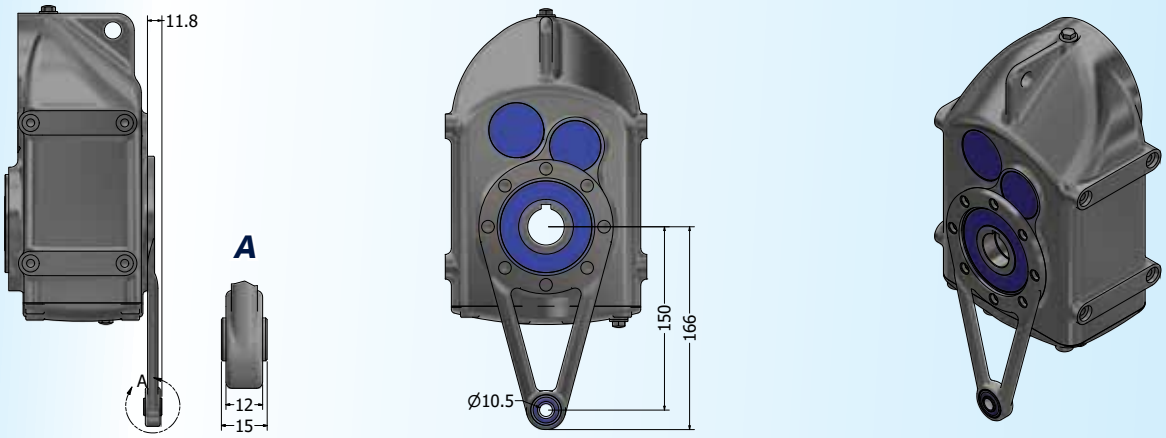
Gearbox	Motor type	D	T	T1	i	M	N	P	L	L1	L2
FFA 38 AM63	IEC63 B5	11	4	12.8	9	115	95	140	199	167.68	100.39
FFA 38 AM71	IEC71 B5	14	5	16.3	9	130	110	160	199	167.68	100.39
FFA 38 AM80	IEC80 B14A	19	6	21.8	7	100	80	120	199	167.68	100.39
FFA 38 AM90	IEC90 B14A	24	8	27.3	9	115	95	140	199	167.68	100.39
FFA 38 AM100	IEC100 B14A	28	8	31.3	9	130	110	160	199	167.68	100.39

Hollow Shaft Dimensions HA30

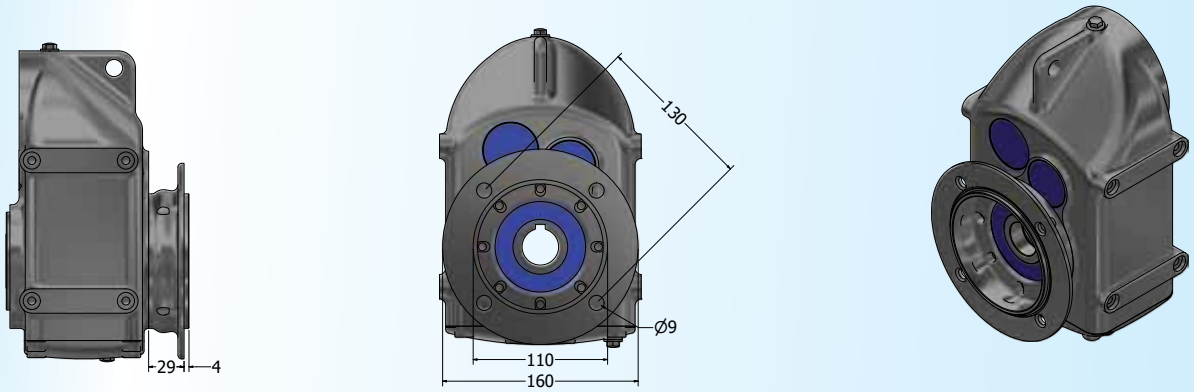


The standard hollow shaft diameter for a FFA38 is 30mm
Different hollow shaft diameters on request

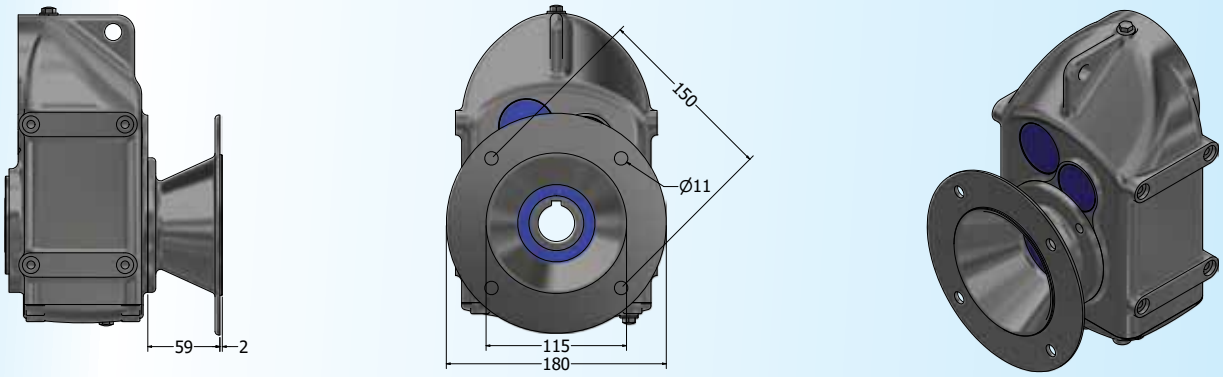
Torque Arm SS095 MS



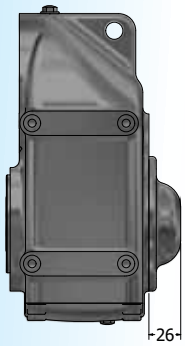
Output Flange SS095 FL160

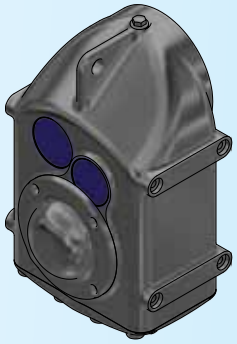


Output Flange SS095 FL180

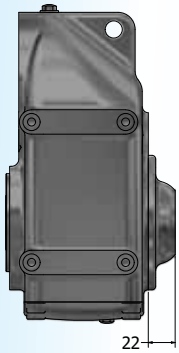


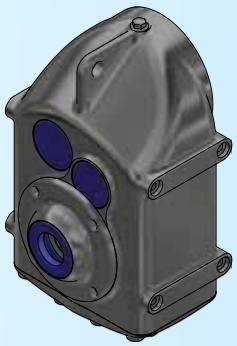
Closed Safety Cap SS095 CC





Open Safety Cap SS095 CO30



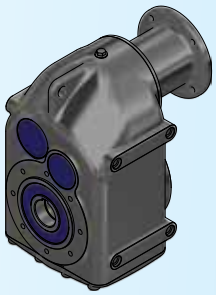


The standard shaft diameter for a SS095 CO is 30mm
Different diameters on request

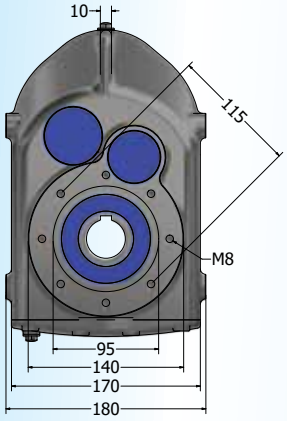
The FFA 48 can be supplied with an integrated motor (B5T1) as well as with an IEC motor adaptor (AM)
The B5T1 version is meant to be assembled with a special motor, made with a non IEC flange and a shouldered shaft.
The AM version can be assembled with a standard motor with flange and shaft according to IEC.

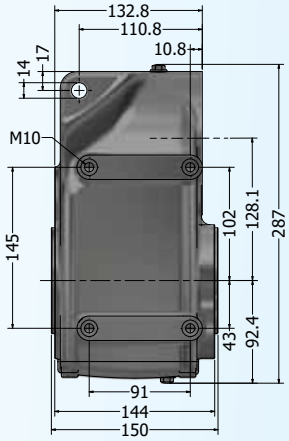
FFA 48 B5T1

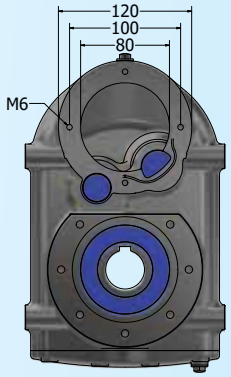
FFA 48 AM..



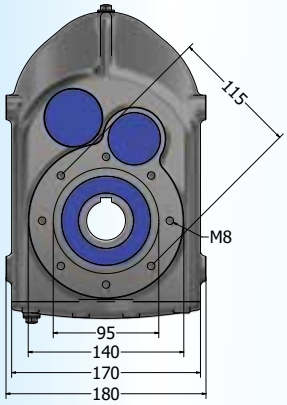
FFA 48 B5T1

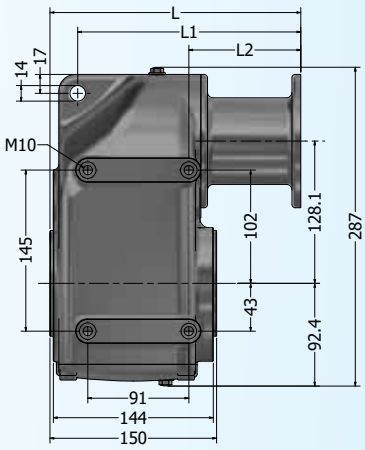


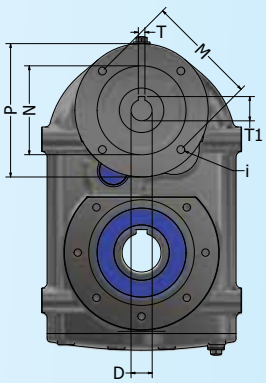




FFA 48 AM

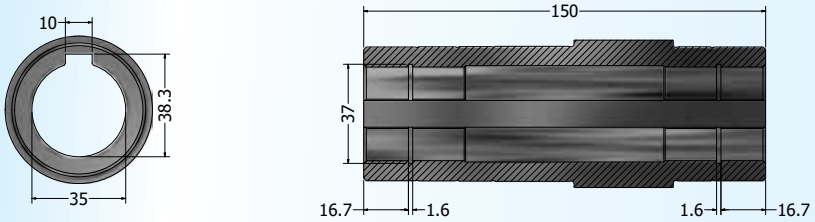






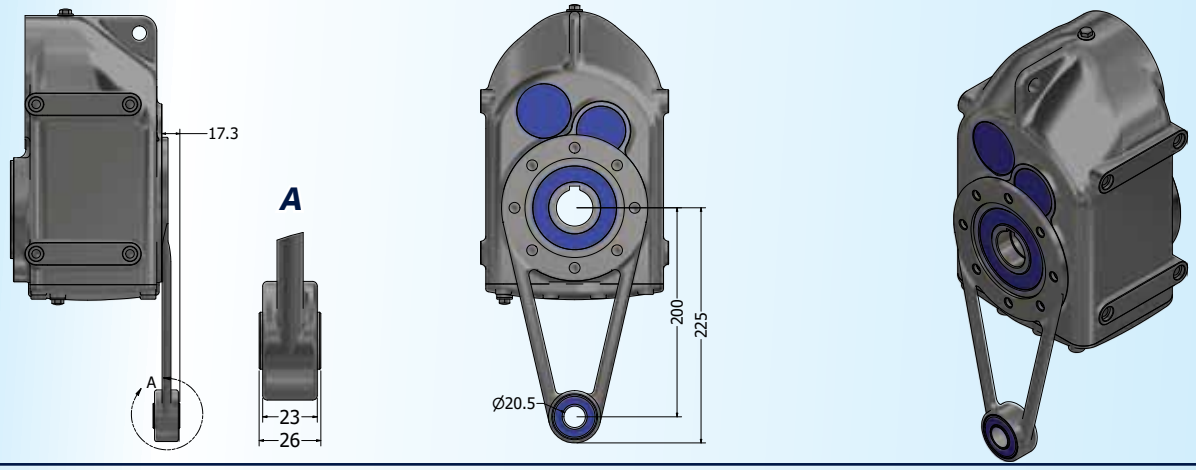
Gearbox	Motor type	D	T	T1	i	M	N	P	L	L1	L2
FFA 48 AM63	IEC63 B5	11	4	12.8	9	115	95	140	222.8	200.8	100.8
FFA 48 AM71	IEC71 B5	14	5	16.3	9	130	110	160	222.8	200.8	100.8
FFA 48 AM80	IEC80 B14A	19	6	21.8	7	100	80	120	222.8	200.8	100.8
FFA 48 AM90	IEC90 B14A	24	8	27.3	9	115	95	140	222.8	200.8	100.8
FFA 48 AM100	IEC100 B14A	28	8	31.3	9	130	110	160	222.8	200.8	100.8

Hollow Shaft Dimensions HA35

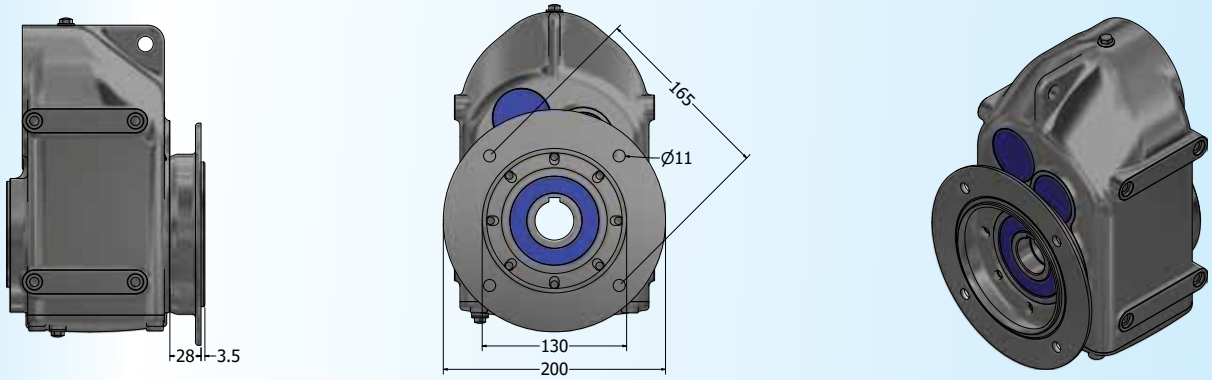


The standard hollow shaft diameter for a FFA48 is 35mm
Different hollow shaft diameters on request

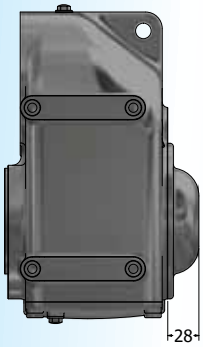
Torque Arm SS115 MS

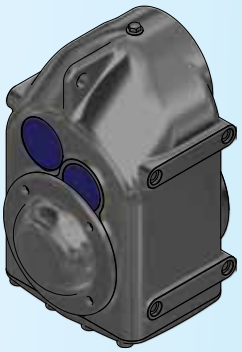


Output Flange SS115 FL200

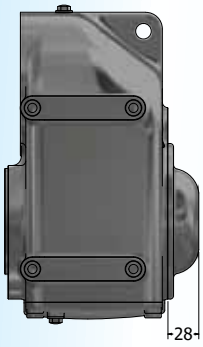


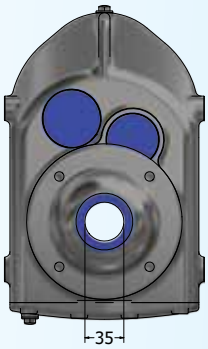
Closed Safety Cap SS115 CC

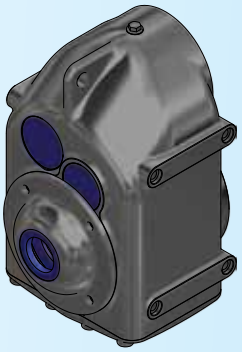




Open Safety Cap SS115 CO35





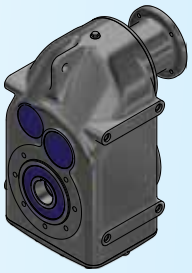


The standard shaft diameter for a SS115 CO is 35mm
Different diameters on request

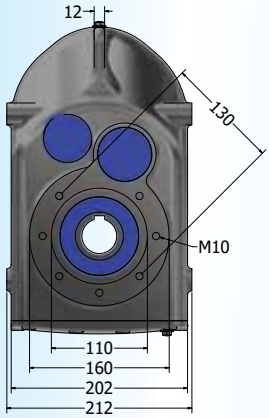
The FFA 68 can be supplied with an integrated motor (B5T2) as well as with an IEC motor adaptor (AM)
The B5T2 version is meant to be assembled with a special motor, made with a non IEC flange and a shouldered shaft.
The AM version can be assembled with a standard motor with flange and shaft according to IEC.

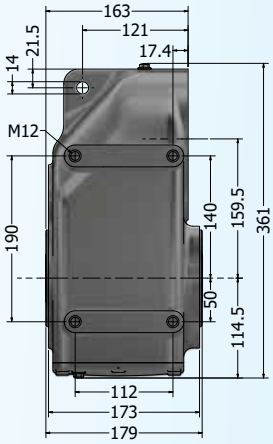
FFA 68 B5T2

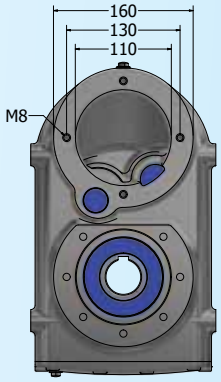
FFA 68 AM..



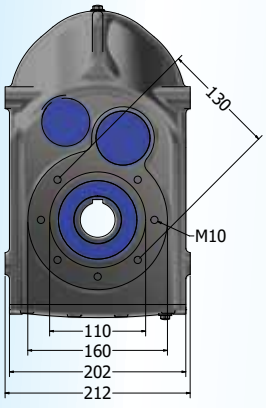
FFA 68 B5T2

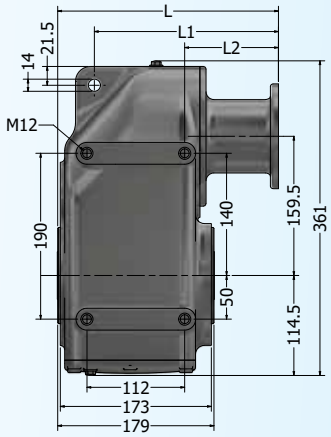


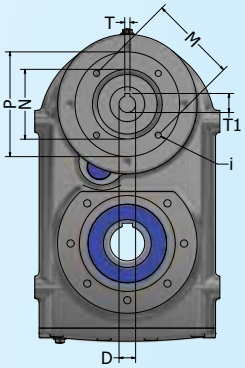




FFA 68 AM

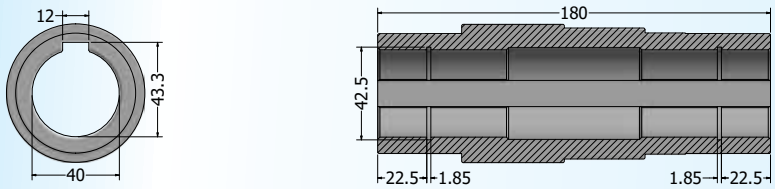






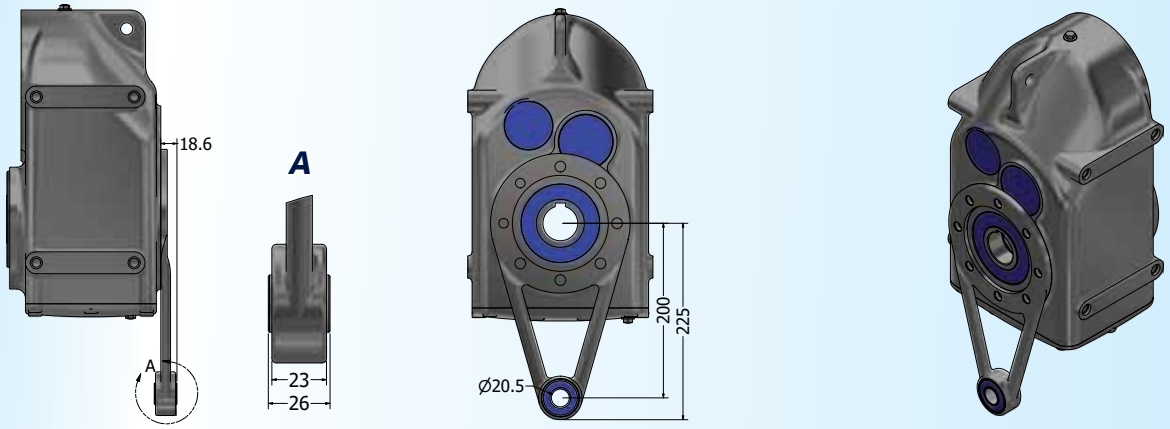
Gearbox	Motor type	D	T	T1	i	M	N	P	L	L1	L2
FFA 68 AM63	IEC63 B5	11	4	12.8	9	115	95	140	253	211	107.4
FFA 68 AM71	IEC71 B5	14	5	16.3	9	130	110	160	253	211	107.4
FFA 68 AM80	IEC80 B14A	19	6	21.8	7	100	80	120	253	211	107.4
FFA 68 AM90	IEC90 B14A	24	8	27.3	9	115	95	140	253	211	107.4
FFA 68 AM100	IEC100 B14A	28	8	31.3	9	130	110	160	253	211	107.4
FFA 68 AM112	IEC112 B14A	28	8	31.3	9	130	110	160	253	211	107.4
FFA 68 AM132	IEC132 B14A	38	10	41.3	11	165	130	200	289	247	143.4

Hollow Shaft Dimensions HA40

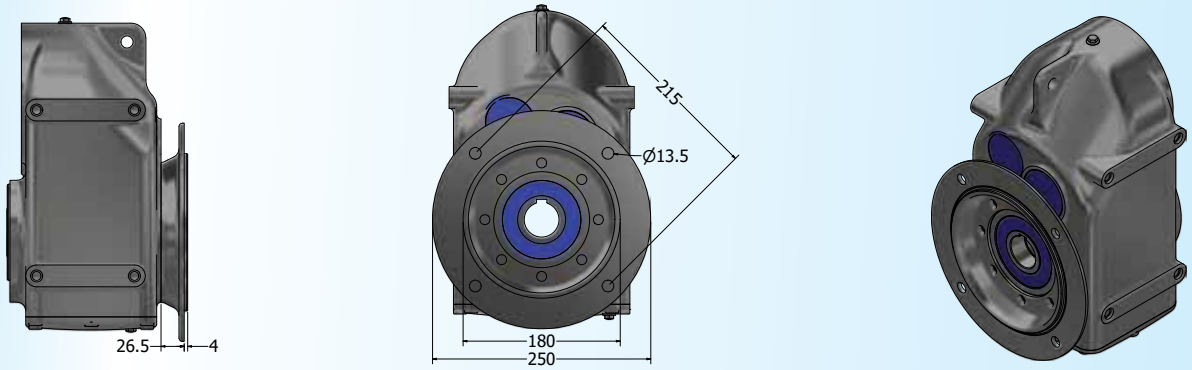


The standard hollow shaft diameter for a FFA68 is 40mm
Different hollow shaft diameters on request

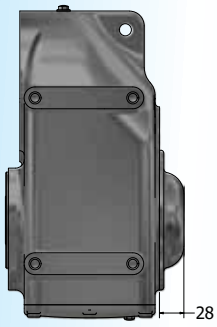
Torque Arm SS130 MS

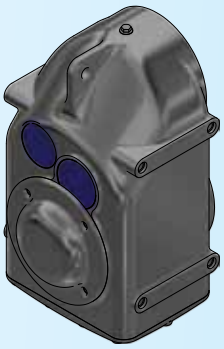


Output Flange SS130 FL250

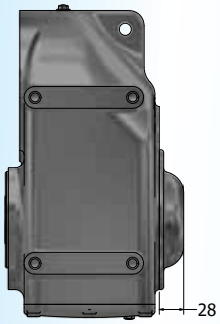


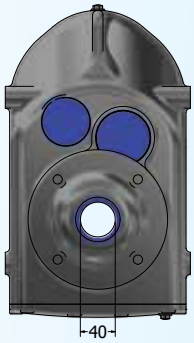
Closed Safety Cap SS130 CC

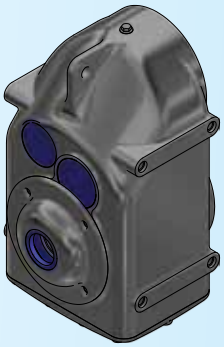




Open Safety Cap SS130 CO40



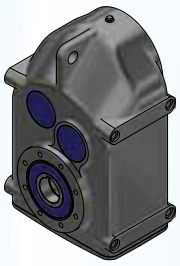




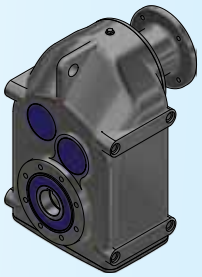
The standard shaft diameter for a SS130 CO is 40mm
Different diameters on request

The FFA 78 can be supplied with an integrated motor (B5T3) as well as with an IEC motor adaptor (AM)
The B5T3 version is meant to be assembled with a special motor, made with a non IEC flange and a shouldered shaft.
The AM version can be assembled with a standard motor with flange and shaft according to IEC.

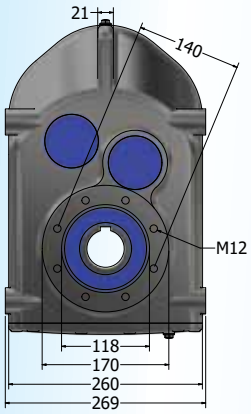
FFA 78 B5T3

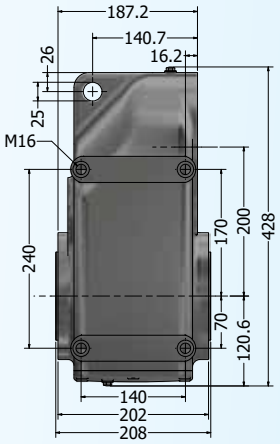


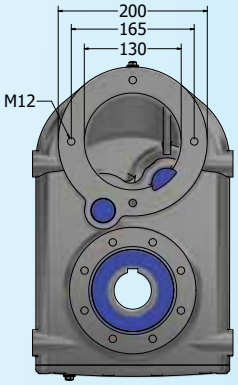
FFA 78 AM..



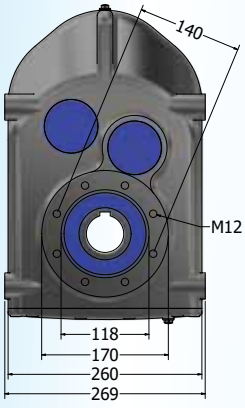
FFA 78 B5T3

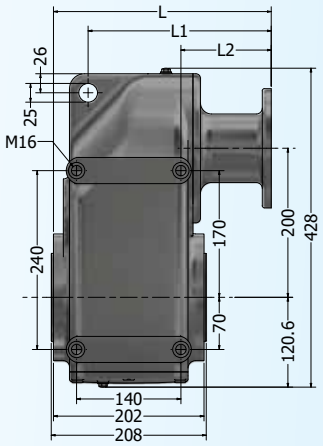


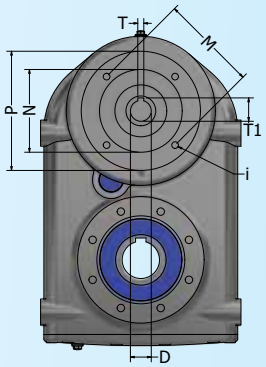




FFA 78 AM

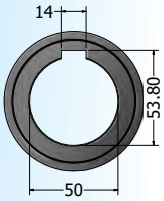


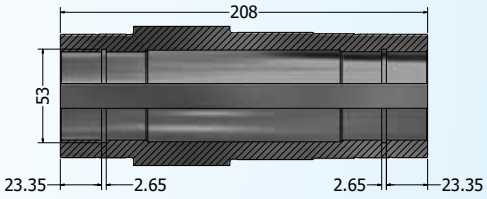




Gearbox	Motor type	D	T	T1	i	M	N	P	L	L1	L2
FFA 78 AM71	IEC71 B5	14	5	16.3	9	130	110	160	292.2	245.7	121.2
FFA 78 AM80	IEC80 B14A	19	6	21.8	9	100	80	120	292.2	245.7	121.2
FFA 78 AM90	IEC90 B14A	24	8	27.3	9	115	95	140	292.2	245.7	121.2
FFA 78 AM100	IEC100 B14A	28	8	31.3	9	130	110	160	292.2	245.7	121.2
FFA 78 AM112	IEC112B14A	28	8	31.3	9	130	110	160	292.2	245.7	121.2
FFA 78 AM132	IEC132 B14A	38	10	41.3	13.5	165	130	200	312.2	265.7	141.2

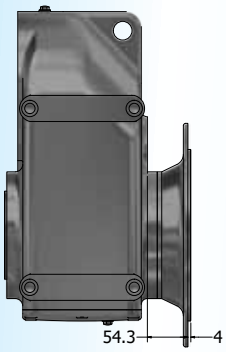
Hollow Shaft Dimensions HA50

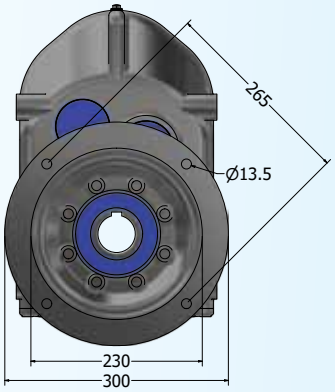


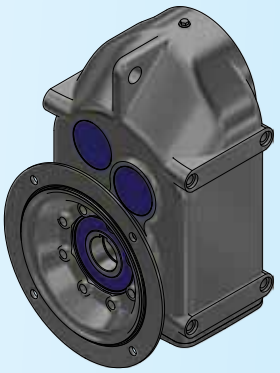


The standard hollow shaft diameter for a FFA78 is 50mm
Different hollow shaft diameters on request

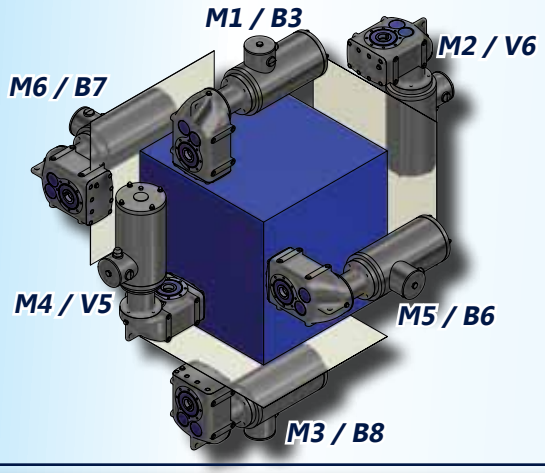
Output Flange SS140 FL300



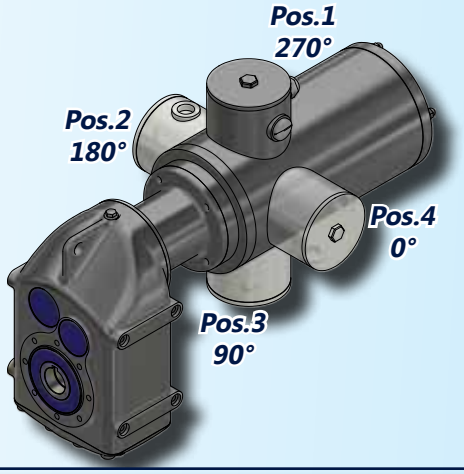




Mounting Positions



Terminal Box Positions



Lubrication Quantity

Oil Quantity in ML.	Mounting Position					
Gearbox	M1 (B3)	M3 (B8)	M6 (B7)	M5 (B6)	M4 (V5)	M2 (V6)
FFA 38 B5T1 / AM..	1150	1350	1250	1250	1250	1250
FFA 48 B5T1 / AM..	2000	2100	2000	2000	1950	2000
FFA 68 B5T2 / AM..	3900	3900	3900	3900	3900	3900
FFA 78 B5T3 / AM..	6500	7200	6500	6500	6500	7200

Lubrication Type

Gearbox	Oil Type	Temp. Range
FFA 38 FFA 48 FFA 68 FFA 78	Matrix Foodmax 460	-20˚C ~ +40˚C
	Castrol Optileb GT 460	-20˚C ~ +40˚C
	Bechem Berusynth 460 H1	-20˚C ~ +40˚C
	Shell Casida Fluid GL460	-20˚C ~ +40˚C
	Mobil SHC Cibus 460	-20˚C ~ +40˚C

Weight

Gearbox	Weight	Gearbox	Weight
FFA 38 B5T1	10.5 Kg.	FFA 38 AM..	14 Kg.
FFA 48 B5T1	15.5 Kg.	FFA 48 AM..	19 Kg.
FFA 68 B5T2	25.5 Kg.	FFA 68 AM..	30 Kg.
FFA 78 B5T3	28.5 Kg.	FFA 78 AM..	36 Kg.

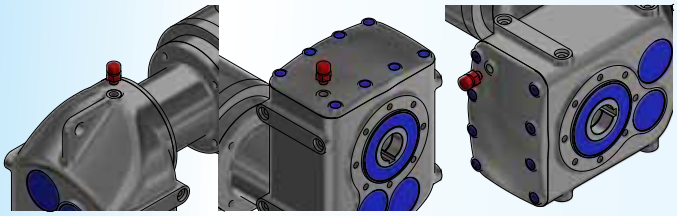
Given values are average values and may vary depending on oil quantity and number of gear stage's

Maintenance

For maintenance instructions
please see our maintenance manual on page .....

Positioning of the debreather

M1 / B3 M3 / B8 M5 / B6



M6 / B7 M4 / V5 M2 / V6