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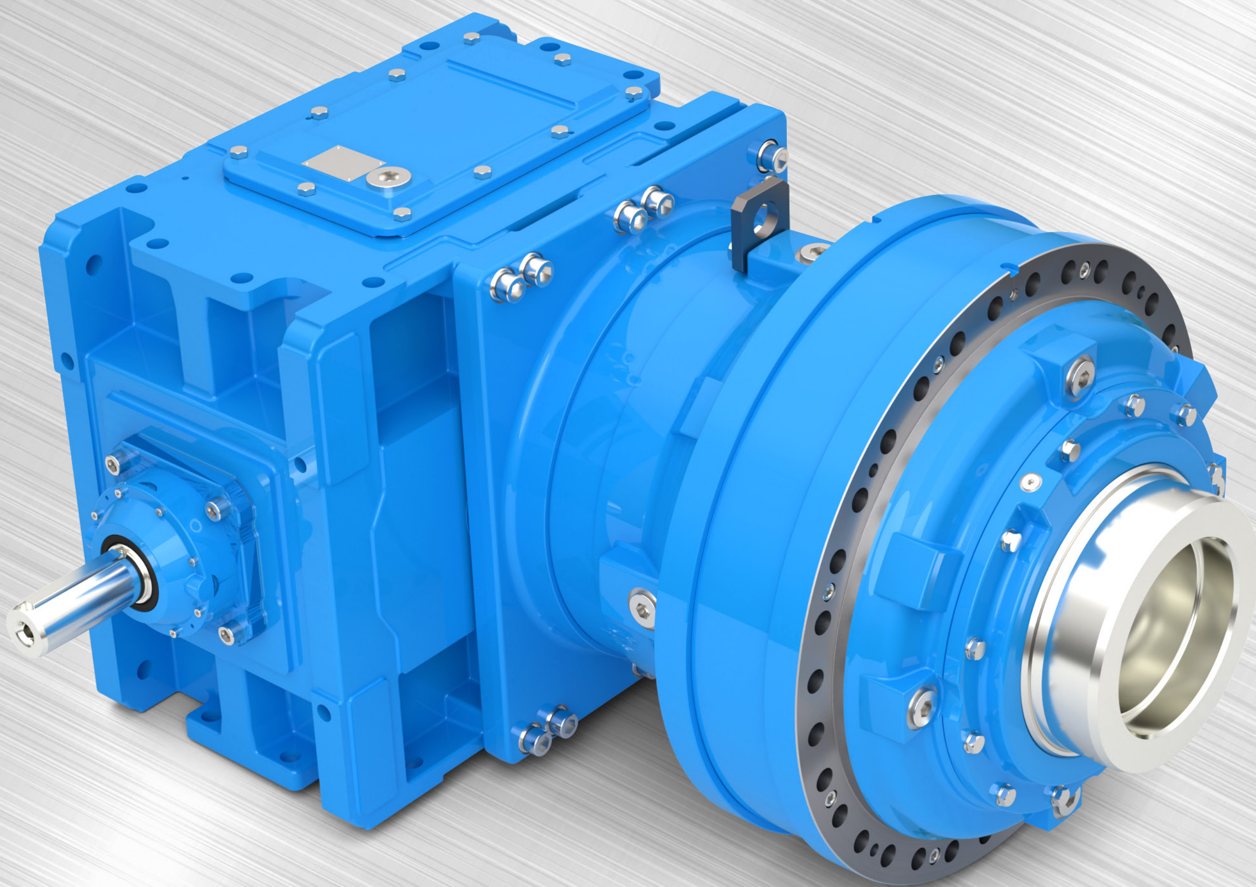
Product Catalog

Helical and Bevel Helical Gearboxes
Brevini High Power Series

Output torque up to 370.000 Nm



Helical and Bevel Helical solutions

The Brevini High Power gearboxes are designed for heavy duty application in mining, material handling and marine application. They ensure high performances in demanding applications based on their modularity and a wide range of combinations.

DANA BREVINI®

Motion Systems

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Dana Brevini High Power series

This powerful combination of planetary gear units and bevel-helical gearboxes is the solution provided by Dana for any high power industrial application, such as:

- materials handling,
- mining,
- marine equipment,
- metal processing,
- pulp and paper,
- recycling industry.

Dana Brevini High Power gear units are designed to offer superior efficiency and performance compared to conventional drives. These powerful gear units match the innovative technology of both Dana Brevini's product lines, planetary output stages with the high quality of helical (on demand) or bevel-helical gearboxes in the input.
The result is a series of gear drives, in right angle configuration, that links the reliable high thermal efficiency and quiet power transmission of helical and bevel-helical gearboxes with the benefits of versatile, high torque output configurations typical of planetary gear units.
The application range of these Dana Brevini gear units includes a variety of ratios – from 1:100 to 1:660 – and a transmission capacity of up to 950 kW of power.
Standard accessory offering include: motor flanges, backstop device, cooling fan and coils, torque arm connections.

Output Shafts Designs
Available types of output shafts:

- Flange and shaft mounting options.
- Keyed male cylindrical shafts.
- Splined shafts: male and female
- Solid shaft, keyed or splined according to DIN5482.
- Hollow shaft, keyed, splined according to DIN5482 or with keyway.
- Hollow shaft with shrink disk.

Input shafts designs:

- Solid shaft
- Double extended solid shaft for helical gear units
- Additional intermediate exterior shaft end for Bevel-Helical gearbox

Casings
The Brevini Industrial series casings basically consist of an input flange, reduction stages, intermediate coupling flanges and output supports. They are dimensioned to suit the loads transmitted through the gearbox, which increase from the input to the output.

Casing materials:

- Input supports: EN-GJL-250 grey cast iron.
- Input supports: on request EN-GJS-500-7
- Rim: high-quality hardened steel.
- Intermediate coupling flange: EN-GJS-400-15 spheroidal-graphite cast iron.
- Output supports: EN-GJS-400-15 spheroidal-graphite cast iron.

Seals
Standard seal systems available for input and output shafts:

- Radial shaft seals in various materials
- Radial shaft seals with additional dust lip
- Second radial shaft seal with intermediate grease-filled chamber
- Greased labyrinth seals also with radial shaft seals
- Maintenance cover with reusable seal

Lubrication

- Gear wheels and roller bearings are oil-bathed as standard
- Standardized injection lubrication systems with shaft or motor driven pump are available as options
- Oil dipstick as standard for horizontal gear units
- Oil sight glass as standard for vertical gear units

Cooling
Additional cooling devices available as standard are:
- Mechanical or Electrical fan cooling
- Cooling coil
- External cooler with oil/air or with oil/water heat exchanger

Torque arms
available on request with 1 or 2 ball-and-socket joint.

Motors and driving engines
- Motors according to DIN, VDE, IEC, NEMA or other standards
- Speed controlled three phase current drives with the necessary accessories,
- Combinations with mechanical continuously variable units of Dana Motion Systems Deutschland GmbH.

Motor supports
Available as standard:
- Motor bell housings
- Motor brackets
- Base plates as support of the motor and the gear unit

Couplings
At the output suitable for standard output shafts and gear torques:
- Elastic couplings
- Gear coupling
- Barrel coupling
- Multiple disc coupling
- other coupling types on request

At the input, suitable for standard drive shafts and gear torques:
- Flexible couplings
- Hydrodynamic couplings
- other couplings on request

Accessories
- Heating element for very cold conditions
- Operational monitoring systems for speed, torque, temperature, oil flow, oil level, and other conditions
- Diagnostic systems also available
- Backstop available as standard, accessible in a closed housing.

General information
- Dimension sheets are available as CAD files for various IT systems and interfaces.
- Computer programs for drive selection.
- Gear, shaft and bearing calculation with proof of calculation.
- The degree of protection corresponds to IP 55.

Information on the weight of the gear unit and the amount of gear oil are guide values. Exact values can be found on the gear unit nameplate or technical description.

Scope of delivery, installation and commissioning
- The delivery takes place without oil filling.
- Transport aids such as eye bolts are not included.
- Oil type and oil quantity according to the nameplate or technical description
- Recommended quality: CLP according to DIN 51517 part 3 or see technical description
- The standard preservation under normal transport and storage conditions is sufficient for a period of 18 months.
- Installation and commissioning according to Brevini Motion Systems operating instructions
- On request, we can supply the legally prescribed contact protection on rotating parts.
- Available, for gearboxes with hollow shaft, protection cover for shrink disk.

Technical descriptions

Reduction ratio i_{eff}
It represents the ratio between gear unit input and output speed. The modularity of the DANA range offers the availability of other ratios in addition to those given: consult DANA for the availability of further ratios.

Output torque T_2 [Nm]
Gear unit output torque referred to 10000-50000 hours of operation, calculated according to I.S.O. (D.P. 6336).

Max. torque T_{2MAX} [Nm]
Max. permissible output torque, as peak or for short periods. For drives involving a high number of starts or reversals, also the max. operational torque must be opportunely limited according to the fatigue resistance of the gears or shafts.

Nominal torque T_N [Nm]
The conventional torque characterizing the size of the gear unit. It corresponds to the limit torque according to I.S.O. (P.D. 6336) of the strongest ratio of each size.

Output power P_2 [kW]
A combination of the torque value relevant to a duration of 10000-50000 h at the relative gear unit input speed. In those cases when the nominal power value in the application considered exceeds the relevant gear unit thermal rating, a special auxiliary oil cooling circuit must be provided.

Thermal rating P_t [kW]
The power that can be transmitted continuously by the gear unit, in given operating conditions, relevant to the max. permissible temperatures for the gear unit. See chapter: Thermal rating.

Rated rating P_N [kW]
Gear unit rating at input (helical bevel).

Input speed n_1 [min^{-1}]
The catalogue gives two input speed values to cover the majority of applications in the industrial sector.

Temperature [°C]
The ideal operating temperature is between 50 °C and 70 °C. For short periods 80 °C can be reached. The best system for keeping the temperature under control is to use an auxiliary cooling system.

For very low ambient temperatures, below –15 °C, or operating temperatures above 80 °C, the use of suitable oils together with special seals and materials (supplied by request) is required. In any case it is advisable to consult the DANA technical commercial service.
See chapter: Lubrication.

Radial and axial loads

Loads on output shafts FS version

The torque arm mounting is normally accompanied by three types of forces:

- A - reaction force given by the anchoring
- B - weight of gearbox and motor
- C - belt-tension force, in case of belt and pulley drive at gear unit input.

Each one of such loading conditions generates a bending moment.

The vector resultant of these moments affects:
- bearing life
- shaft fatigue resistance
- efficiency of the shafts shrink fit.

In case load condition B becomes relevant (for instance gearboxes driven by large electric motors) and/or in presence of load condition C as well when there are axial loads it is recommended to consult DANA technical staff.

Concerning the load due to the reaction force, condition A, the minimum torque arm lengths, L_{1min}, have been tabulated in correspondence to the dimensional sheets Such lengths grant an ISO L_{10} bearings life ($n_2 \cdot h$) > 10^6 as well as shaft resistance under fatigue and efficiency of the shrink fit.

Thermal rating P_t [kW]

The values given refer to a continuous use of the gear unit:

- With splash lubrication
- Horizontally mounted (B3A, B3C)
- At a gear unit input speed of 1500 min^{-1}
- For a max. oil temperature of 80 °C (oil VG150)
- At an ambient temperature of 20 °C

Thermal capacities

SL2PLB .. - B3A, B3C					
v_w [m/s]	n_1 [min^{-1}]	8516	12020 18020	25025	35031
		P_{to} [kW]			
0.5 [1]	–	42	60	94	127
1.2 [2]	–	61	85	134	182
4.0 [3]	–	79	111	174	236
		P_{t1} [kW]			
–	1500	118	166	260	353
–	1000	88	123	193	263
		P_{t3} [kW]			
0.5 [1]	–	168	230	421	566
1.2 [2]	–	187	256	461	620
4.0 [3]	–	205	282	501	675
		P_{t4} [kW]			
–	1500	244	336	588	792
–	1000	214	294	521	702

Thermal capacities of types B3B, B3D, V5, V6: on request

Thermal Factor

Tab. 4	f_W				
ϑ_U [°C]	ED [%]				
	100	**80**	**60**	**40**	**20**
10	1.14	1.21	1.34	1.53	2.03
20	1.00	1.06	1.17	1.34	1.78
30	0.86	0.91	1.00	1.15	1.53
40	0.71	0.76	0.84	0.96	1.27
50	0.57	0.61	0.67	0.77	1.02

Utilization factor

Tab. 5	f_A							
Charge P_e / P_N [%]								
20	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0.7	0.8	0.86	0.9	0.93	0.96	0.98	0.99	1

Utilisation < 20%: question required

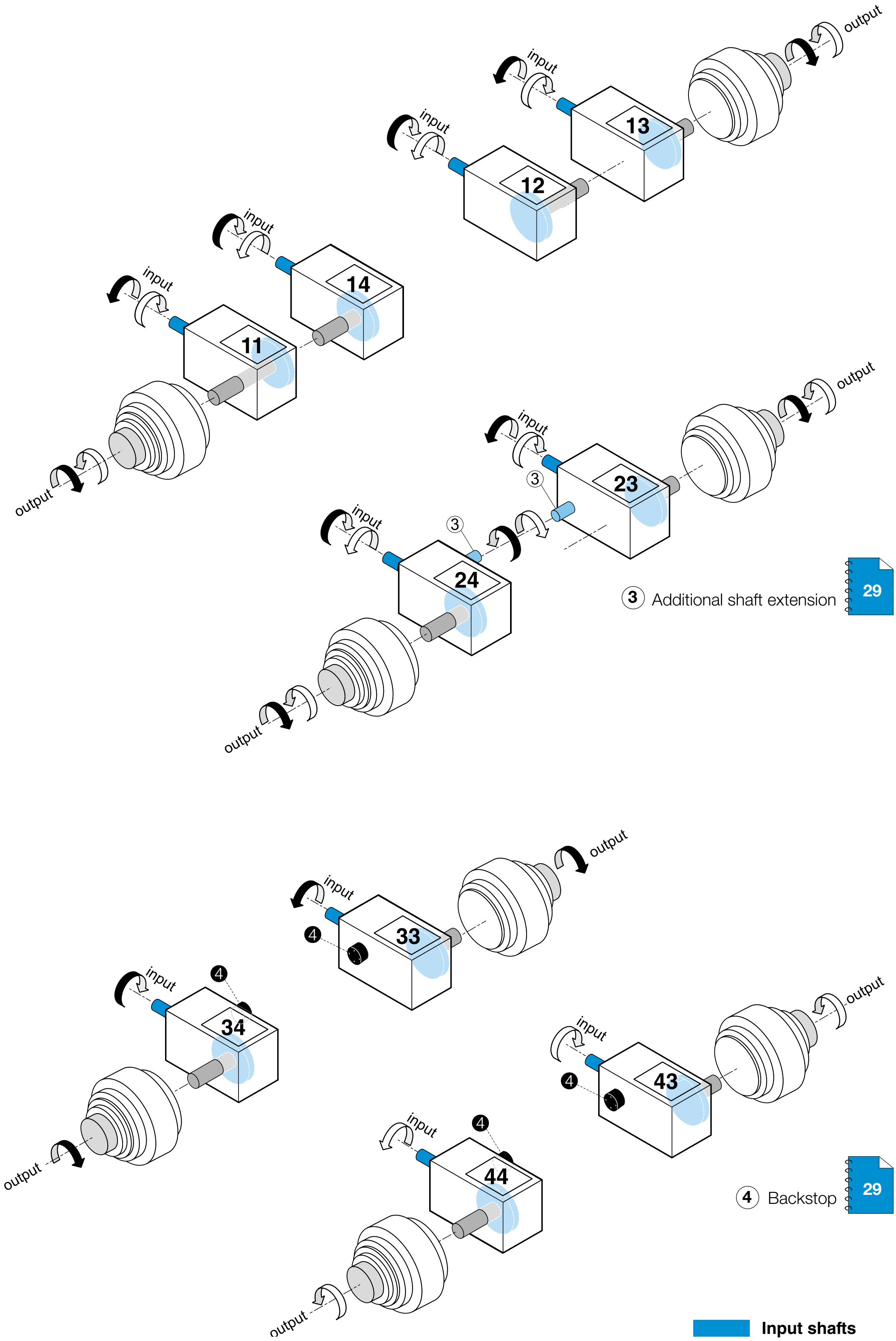
v_w = Average air speed
[1] Small closed room, little air movement
[2] Large hall with free air movement
[3] Constantly strong air movement

P_{to} : Without additional cooling
P_{t1} : With fan
P_{t3} : With cooling coil
P_{t4} : With fan and cooling coil

Description	Measurement unit	Symbol
Nominal reduction ratio	-	i_n
Actual reduction ratio	-	i_{eff}
Output torque	[Nm]	T_2
Max. output torque	[Nm]	T_{2max}
Nominal torque	[Nm]	T_N
Output power	[kW]	P_2
Nominal power	[kW]	P_N
Thermal rating	[kW]	P_t
Input speed	[rpm]	n_1
Output speed	[rpm]	n_2

Description	Measurement unit	Symbol
Tightening torque	[Nm]	
Refer to page	-	

SHAFT ARRANGEMENT AND SENSE OF ROTATION



Input shafts
Output shafts
Double extended input shafts

DESIGNATION FOR ORDER

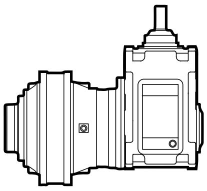
SL2PLB	8516	FAR	180

VERSION	SIZE	OUTPUT CONFIGURATION	NOMINAL RATIO

VERSION

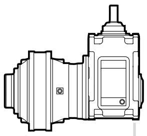
Right-angle

SL2PLB



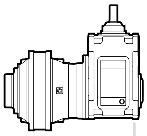
SIZE

8516



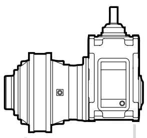
(SL8502 + PLB16)

12020



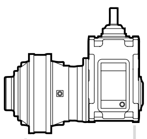
(SL12002 + PLB20)

18020



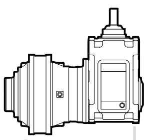
(SL18002 + PLB20)

25025



(SL25002 + PLB25)

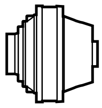
35031



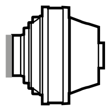
(SL35002 + PLB31)

OUTPUT CONFIGURATION

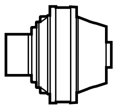
FE



FAR



FS



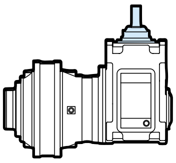
NOMINAL RATIO

100 ↕ 560	**8516**
112 ↕ 560	**12020**
100 ↕ 630	**18020**
112 ↕ 450	**25025**
112 ↕ 450	**35031**

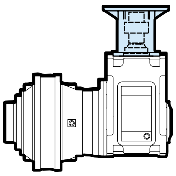
C	14	B3A	-

INPUT CONFIGURATION

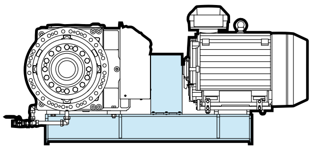
C



K



J1



SHAFT ARRANGEMENT AND SENSE OF ROTATION

11

12

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34

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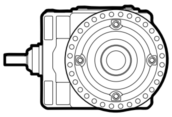
44

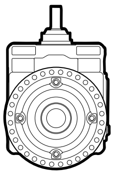
9

MOUNTING POSITION

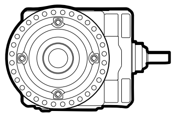
B3C



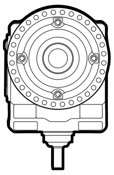
B3D



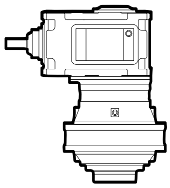
B3A



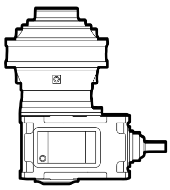
B3B



V5B

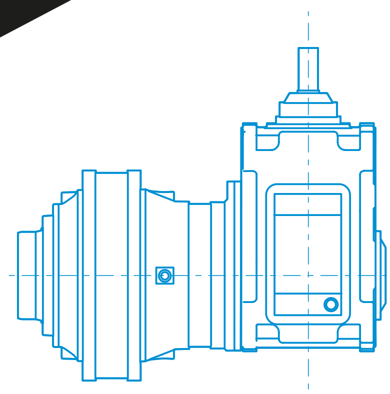


V6B



ACCESSORIES

29



TYPE	T_N	Page
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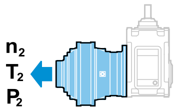
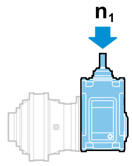
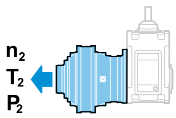
12020	133000	16
18020	190000	18
25025	260000	20
35031	370000	22

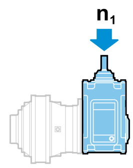




10000 hours life

i_n	i_{eff}	1500 n_2 [rpm]	1500 T_2 [Nm]	1500 P_2 [kW]	1000 n_2 [rpm]	1000 T_2 [Nm]	1000 P_2 [kW]	T_{2MAX} [Nm]	n_{1MAX} [rpm]
SL2PLB 8516									
100	**104.79**	14.3	81216	122	9.5	87122	87	195000	1800 (>1800 on demand)
112	**119.23**	12.6	84423	111	8.4	87953	77		
125	**132.99**	11.3	86052	102	7.5	88659	70		
140	**139.72**	10.7	86368	97	7.2	88980	67		
160	**155.85**	9.6	87067	88	6.4	89881	60		
180	**174.66**	8.6	87800	79	5.7	91567	55		
200	**200.64**	7.5	88697	69	5.0	92577	48.3		
224	**223.79**	6.7	89406	63	4.5	93373	43.7		
250	**250.80**	6.0	91010	57	4.0	94205	39.3		
280	**279.47**	5.4	92037	52	3.6	94997	35.6		
315	**311.72**	4.8	92833	46.8	3.2	95800	32.2		
355	**349.34**	4.3	93664	42.1	2.9	96639	29.0		
400	**401.28**	3.7	94677	37.1	2.5	97665	25.5		
450	**447.58**	3.4	95478	33.5	2.2	98476	23.0		
500	**501.60**	3.0	96317	30.2	2.0	99327	20.7		
560	**551.76**	2.7	97020	27.6	1.8	100042	19.0		

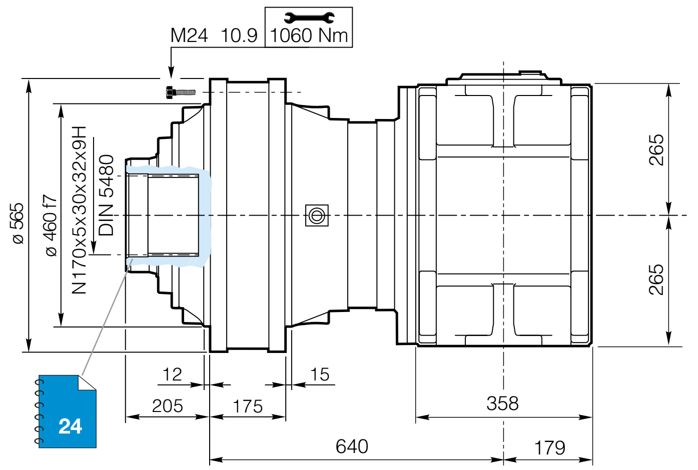


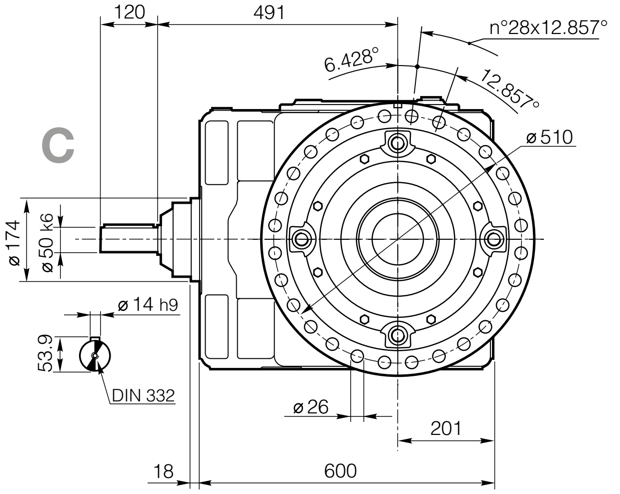


50000 hours life

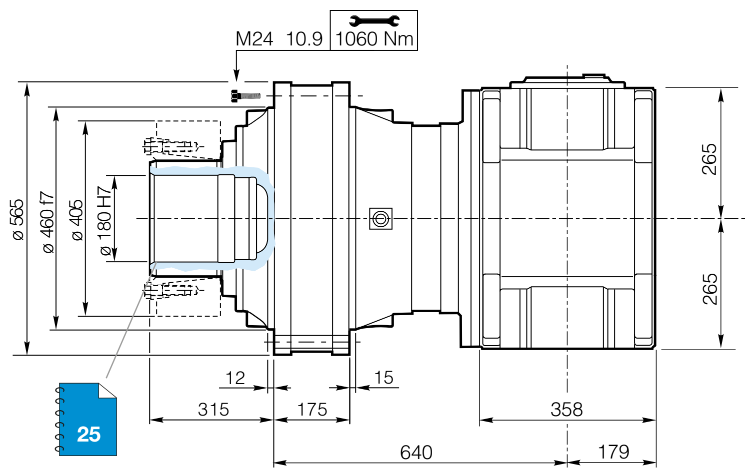
i_n	i_{eff}	1500 n_2 [rpm]	1500 T_2 [Nm]	1500 P_2 [kW]	1000 n_2 [rpm]	1000 T_2 [Nm]	1000 P_2 [kW]	T_{2MAX} [Nm]	n_{1MAX} [rpm]
SL2PLB 8516									
100	**104.79**	14.3	50113	75	9.5	56595	57	195000	1800 (>1800 on demand)
112	**119.23**	12.6	52091	69	8.4	58829	52		
125	**132.99**	11.3	53827	64	7.5	60789	47.9		
140	**139.72**	10.7	54630	61	7.2	61696	46.2		
160	**155.85**	9.6	56450	57	6.4	63751	42.8		
180	**174.66**	8.6	58413	53	5.7	65968	39.6		
200	**200.64**	7.5	60895	47.7	5.0	68771	35.9		
224	**223.79**	6.7	62922	44.2	4.5	71061	33.3		
250	**250.80**	6.0	65111	40.8	4.0	73532	30.7		
280	**279.47**	5.4	67259	37.8	3.6	75959	28.5		
315	**311.72**	4.8	69500	35.0	3.2	78489	26.4		
355	**349.34**	4.3	71916	32.3	2.9	81219	24.3		
400	**401.28**	3.7	74970	29.3	2.5	84667	22.1		
450	**447.58**	3.4	77467	27.2	2.2	86258	20.2		
500	**501.60**	3.0	80161	25.1	2.0	86972	18.2		
560	**551.76**	2.7	82486	23.5	1.8	87572	16.6		

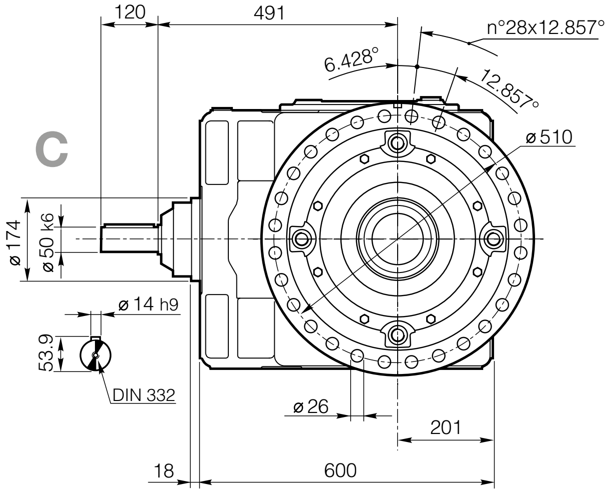
FE - FAR Splined female





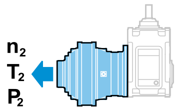
FS Female output for friction couplings

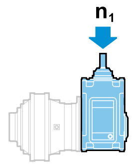




Output male cylindrical and splined shafts available on request.

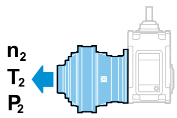
12020

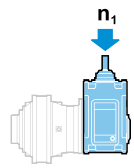




10000 hours life

i_n	i_{eff}	1500 n_2 [rpm]	1500 T_2 [Nm]	1500 P_2 [kW]	1000 n_2 [rpm]	1000 T_2 [Nm]	1000 P_2 [kW]	T_{2MAX} [Nm]	n_{1MAX} [rpm]
SL2PLB 12020									
112	**113.87**	13.2	127143	175	8.8	130943	120	293000	1800 (>1800 on demand)
125	**127.01**	11.8	128162	159	7.9	131976	109		
140	**139.72**	10.7	114100	128	7.2	117999	88		
160	**155.85**	9.6	115155	116	6.4	119045	80		
180	**177.17**	8.5	116388	103	5.6	120273	71		
200	**200.64**	7.5	117581	92	5.0	121465	63		
224	**223.79**	6.7	118627	83	4.5	122513	57		
250	**254.39**	5.9	119854	74	3.9	123745	51		
280	**279.47**	5.4	120755	68	3.6	124652	46.7		
315	**311.72**	4.8	121802	61	3.2	125708	42.2		
355	**354.33**	4.2	123033	55	2.8	126950	37.5		
400	**401.28**	3.7	124230	48.6	2.5	128163	33.4		
450	**447.58**	3.4	125285	44.0	2.2	129231	30.2		
500	**508.77**	2.9	126526	39.1	2.0	130491	26.9		
560	**571.05**	2.6	127649	35.1	1.8	131631	24.1		

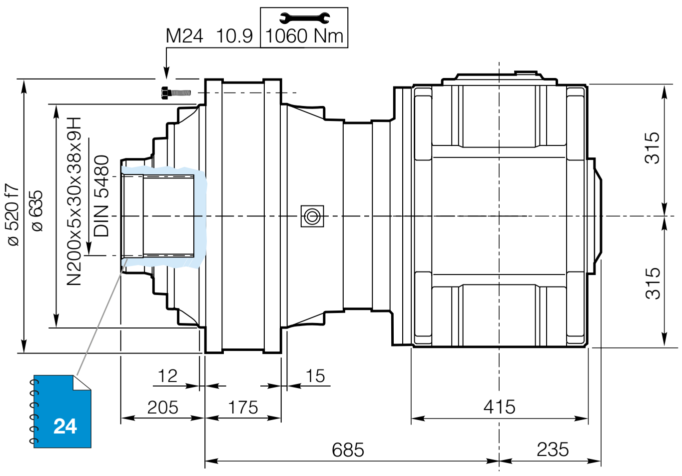


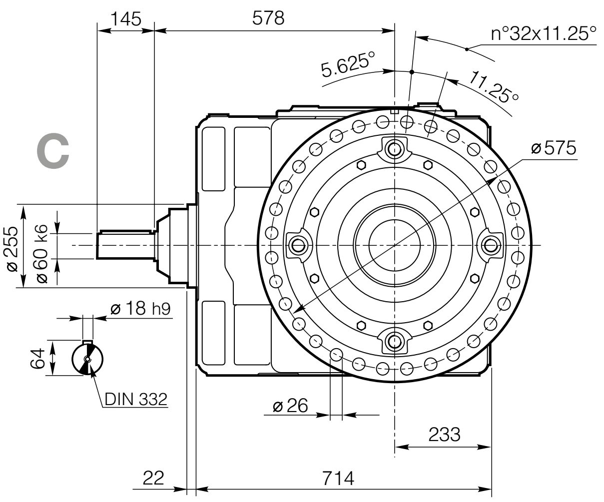


50000 hours life

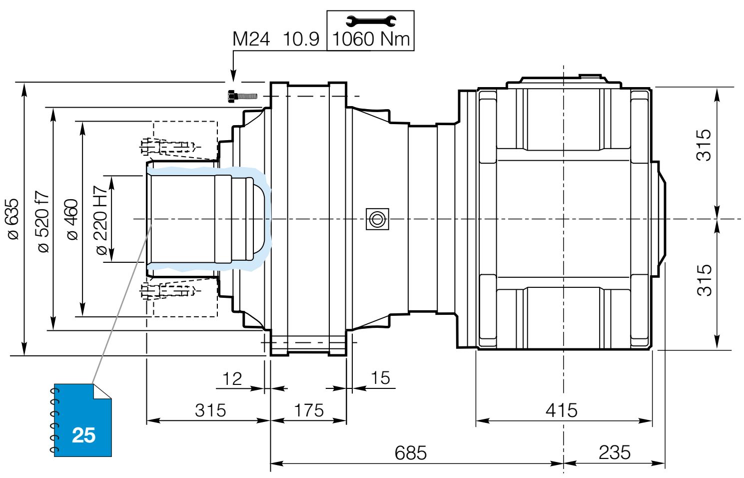
i_n	i_{eff}	1500 n_2 [rpm]	1500 T_2 [Nm]	1500 P_2 [kW]	1000 n_2 [rpm]	1000 T_2 [Nm]	1000 P_2 [kW]	T_{2MAX} [Nm]	n_{1MAX} [rpm]
SL2PLB 12020									
112	**113.87**	13.2	82647	114	8.8	93337	86	293000	1800 (>1800 on demand)
125	**127.01**	11.8	85400	106	7.9	96446	80		
140	**139.72**	10.7	87878	99	7.2	99245	74		
160	**155.85**	9.6	90806	92	6.4	102551	69		
180	**177.17**	8.5	94366	84	5.6	106389	63		
200	**200.64**	7.5	97956	77	5.0	107474	56		
224	**223.79**	6.7	101217	71	4.5	108426	51		
250	**254.39**	5.9	105184	65	3.9	109546	45.1		
280	**279.47**	5.4	106828	60	3.6	110369	41.4		
315	**311.72**	4.8	107780	54	3.2	111328	37.4		
355	**354.33**	4.2	108898	48.3	2.8	112456	33.2		
400	**401.28**	3.7	109986	43.1	2.5	113557	29.6		
450	**447.58**	3.4	110944	38.9	2.2	114526	26.8		
500	**508.77**	2.9	112071	34.6	2.0	115669	23.8		
560	**571.05**	2.6	113090	31.1	1.8	116704	21.4		

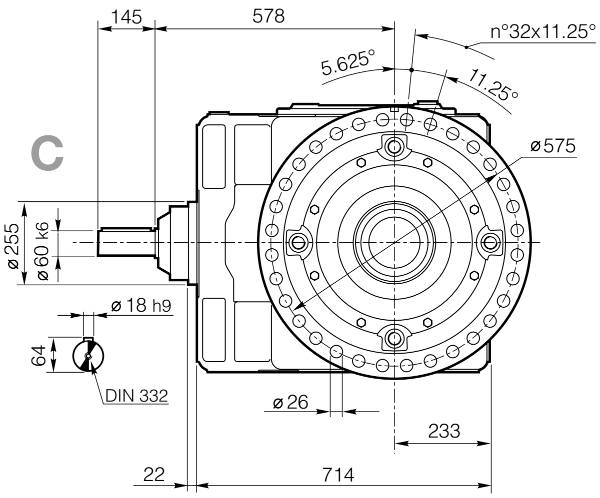
FE - FAR Splined female





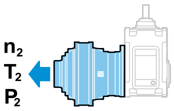
FS Female output for friction couplings

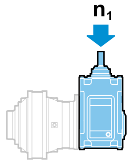




Output male cylindrical and splined shafts available on request.

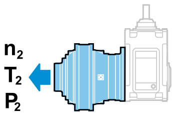
18020

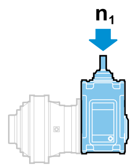




10000 hours life

i_n	i_{eff}	1500 n_2 [rpm]	1500 T_2 [Nm]	1500 P_2 [kW]	1000 n_2 [rpm]	1000 T_2 [Nm]	1000 P_2 [kW]	T_{2MAX} [Nm]	n_{1MAX} [rpm]
SL2PLB 18020									
100	**102.10**	14.7	151811	234	9.8	156355	160	354000	1800 (>1800 on demand)
125	**127.34**	11.8	154280	190	7.9	158855	131		
140	**146.99**	10.2	155893	167	6.8	160491	114		
160	**163.45**	9.2	157090	151	6.1	161707	104		
180	**182.32**	8.2	158326	136	5.5	162964	94		
200	**207.26**	7.2	159784	121	4.8	166212	84		
224	**234.72**	6.4	161206	108	4.3	169809	76		
250	**261.80**	5.7	162461	97	3.8	173021	69		
280	**297.60**	5.0	164964	87	3.4	176857	62		
315	**326.94**	4.6	167659	81	3.1	179717	58		
355	**364.67**	4.1	170837	74	2.7	183091	53		
400	**414.52**	3.6	174630	66	2.4	187118	47.3		
450	**469.44**	3.2	178383	60	2.1	191103	42.6		
500	**523.60**	2.9	181734	55	1.9	194662	38.9		
560	**595.19**	2.5	185736	49.0	1.7	198913	35.0		
630	**668.04**	2.2	189408	44.5	1.5	202814	31.8		

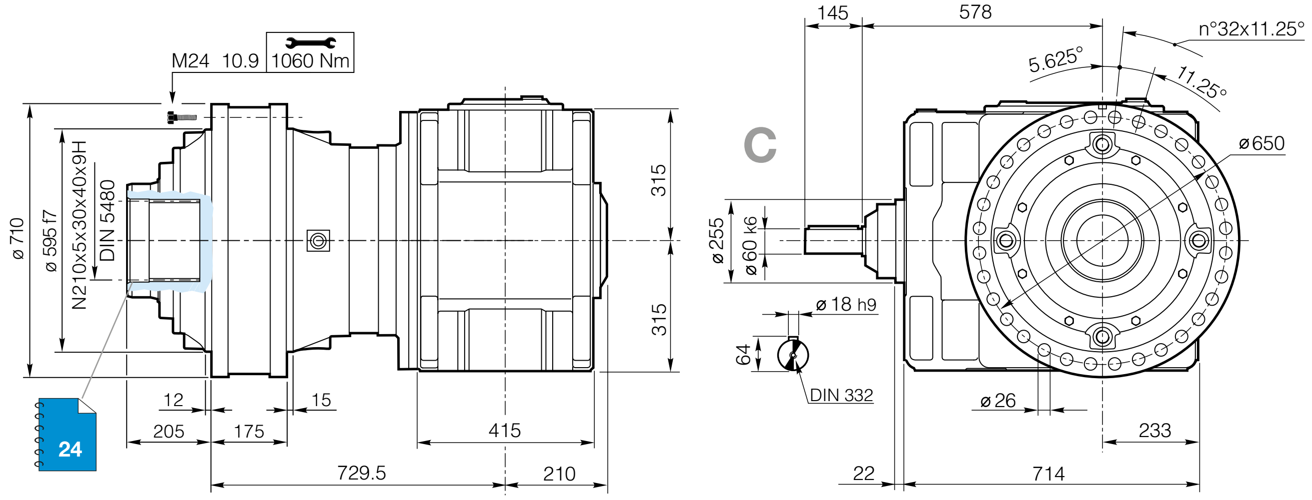




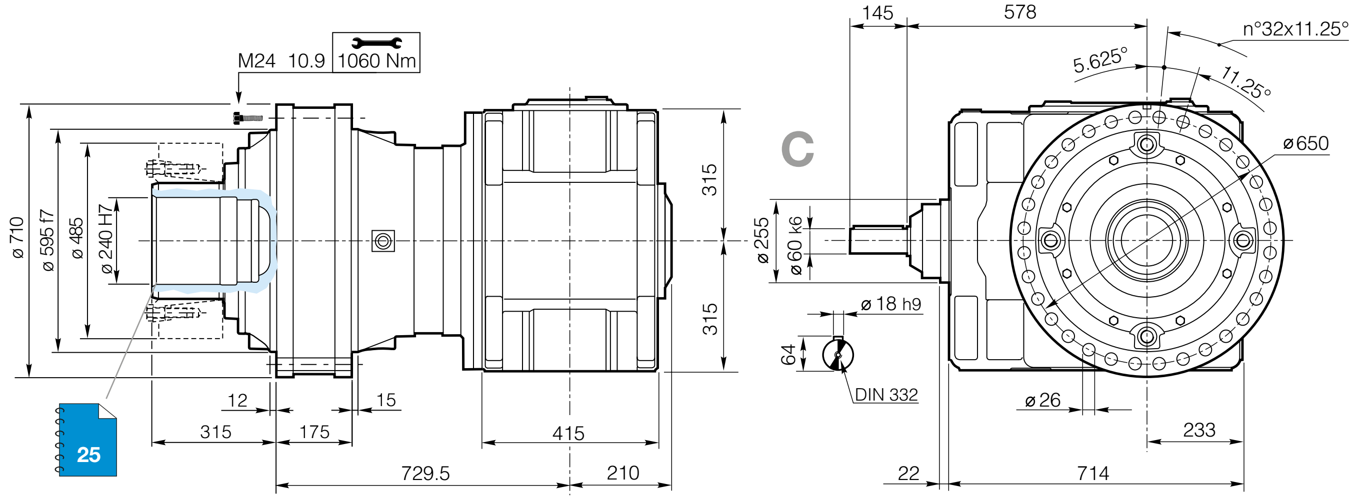
50000 hours life

i_n	i_{eff}	1500 n_2 [rpm]	1500 T_2 [Nm]	1500 P_2 [kW]	1000 n_2 [rpm]	1000 T_2 [Nm]	1000 P_2 [kW]	T_{2MAX} [Nm]	n_{1MAX} [rpm]
SL2PLB 18020									
100	**102.10**	14.7	96171	148	9.8	108611	111	354000	1800 (>1800 on demand)
125	**127.34**	11.8	115885	143	7.9	130875	108		
140	**146.99**	10.2	120985	129	6.8	136634	97		
160	**163.45**	9.2	124900	120	6.1	141055	90		
180	**182.32**	8.2	129060	111	5.5	145557	84		
200	**207.26**	7.2	134121	102	4.8	146902	74		
224	**234.72**	6.4	138102	92	4.3	148216	66		
250	**261.80**	5.7	143858	86	3.8	149375	60		
280	**297.60**	5.0	146443	77	3.4	150743	53		
315	**326.94**	4.6	142966	69	3.1	151753	48.6		
355	**364.67**	4.1	148588	64	2.7	152932	43.9		
400	**414.52**	3.6	149951	57	2.4	154324	39.0		
450	**469.44**	3.2	151283	51	2.1	155685	34.7		
500	**523.60**	2.9	152459	45.7	1.9	156888	31.4		
560	**595.19**	2.5	153848	40.6	1.7	158308	27.9		
630	**668.04**	2.2	155108	36.5	1.5	159597	25.0		

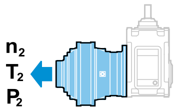
FE - FAR Splined female

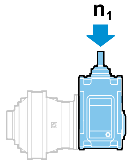


FS Female output for friction couplings



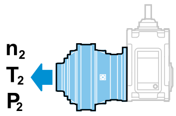
Output male cylindrical and splined shafts available on request.

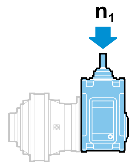




10000 hours life

i_n	i_{eff}	1500 n_2 [rpm]	1500 T_2 [Nm]	1500 P_2 [kW]	1000 n_2 [rpm]	1000 T_2 [Nm]	1000 P_2 [kW]	T_{2MAX} [Nm]	n_{1MAX} [rpm]
SL2PLB 25025									
112	**116.08**	12.9	223717	303	8.6	252654	228	570000	1800 (>1800 on demand)
125	**130.49**	11.5	231710	279	7.7	258590	208		
140	**144.39**	10.4	238854	260	6.9	260425	189		
160	**166.67**	9.0	249360	235	6.0	265344	167		
180	**187.38**	8.0	257801	216	5.3	270647	151		
200	**207.33**	7.2	259632	197	4.8	275302	139		
224	**232.51**	6.5	262103	177	4.3	280659	126		
250	**260.98**	5.7	267280	161	3.8	286149	115		
280	**288.78**	5.2	271886	148	3.5	291036	106		
315	**333.34**	4.5	278534	131	3.0	298090	94		
355	**374.73**	4.0	284061	119	2.7	302222	84		
400	**414.65**	3.6	288917	109	2.4	304525	77		
450	**465.40**	3.2	294546	99	2.1	307162	69		

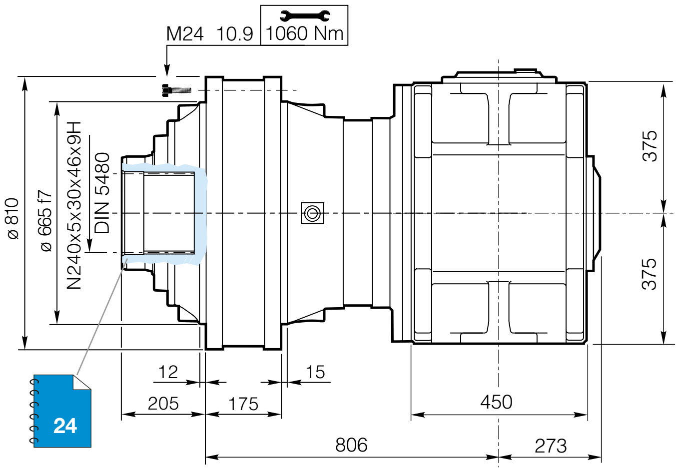


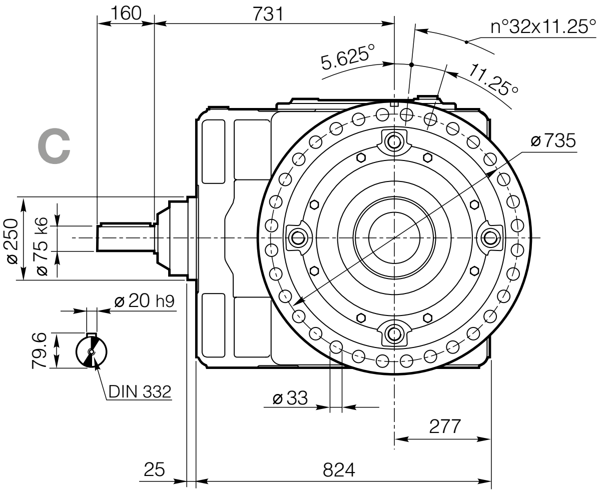


50000 hours life

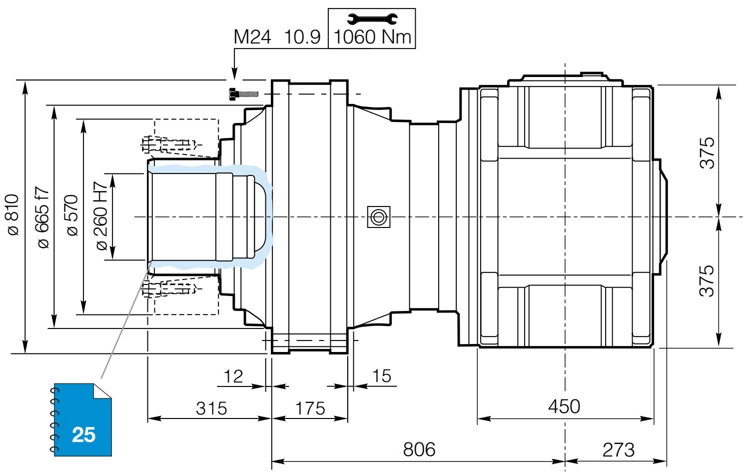
i_n	i_{eff}	1500 n_2 [rpm]	1500 T_2 [Nm]	1500 P_2 [kW]	1000 n_2 [rpm]	1000 T_2 [Nm]	1000 P_2 [kW]	T_{2MAX} [Nm]	n_{1MAX} [rpm]
SL2PLB 25025									
112	**116.08**	12.9	138041	187	8.6	155896	141	570000	1800 (>1800 on demand)
125	**130.49**	11.5	142973	172	7.7	161466	130		
140	**144.39**	10.4	147381	160	6.9	166444	121		
160	**166.67**	9.0	153864	145	6.0	173766	109		
180	**187.38**	8.0	159365	134	5.3	179979	101		
200	**207.33**	7.2	164276	124	4.8	185525	94		
224	**232.51**	6.5	170024	115	4.3	192016	86		
250	**260.98**	5.7	176020	106	3.8	198788	80		
280	**288.78**	5.2	181447	99	3.5	204917	74		
315	**333.34**	4.5	189429	89	3.0	213931	67		
355	**374.73**	4.0	196198	82	2.7	221576	62		
400	**414.65**	3.6	202248	77	2.4	228408	58		
450	**465.40**	3.2	209377	71	2.1	236459	53		

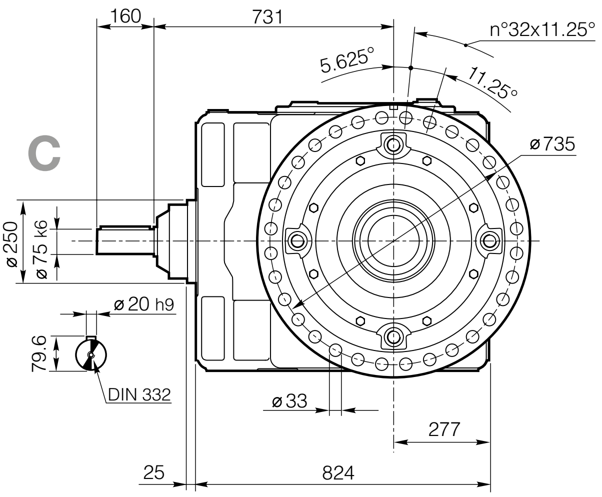
FE - FAR Splined female

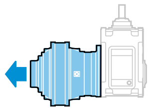


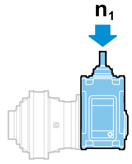


FS Female output for friction couplings



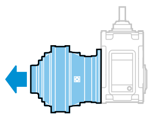


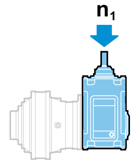




10000 hours life

i_n	i_{eff}	1500 n_2 [rpm]	1500 T_2 [Nm]	1500 P_2 [kW]	1000 n_2 [rpm]	1000 T_2 [Nm]	1000 P_2 [kW]	T_{2MAX} [Nm]	n_{1MAX} [rpm]
SL2PLB 35031									
112	**115.92**	12.9	354882	481	8.6	365137	330	810000	1800 (>1800 on demand)
125	**129.20**	11.6	357616	435	7.7	367903	298		
140	**140.77**	10.7	359782	401	7.1	370096	275		
160	**166.45**	9.0	364027	344	6.0	377600	238		
180	**185.54**	8.1	366790	311	5.4	384529	217		
200	**202.13**	7.4	368978	287	4.9	390074	202		
224	**231.83**	6.5	372932	253	4.3	399090	180		
250	**258.43**	5.8	379789	231	3.9	406360	165		
280	**281.54**	5.3	385274	215	3.6	412179	153		
315	**332.89**	4.5	396198	187	3.0	423769	133		
355	**371.07**	4.0	403422	171	2.7	431436	122		
400	**404.27**	3.7	409204	159	2.5	437573	113		
450	**459.91**	3.3	418043	143	2.2	446957	102		

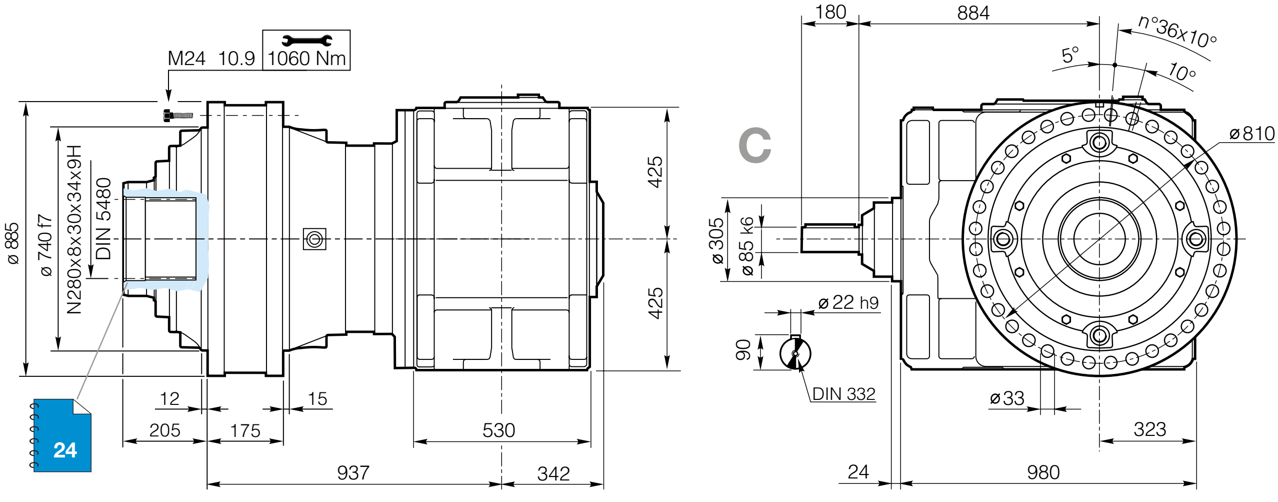




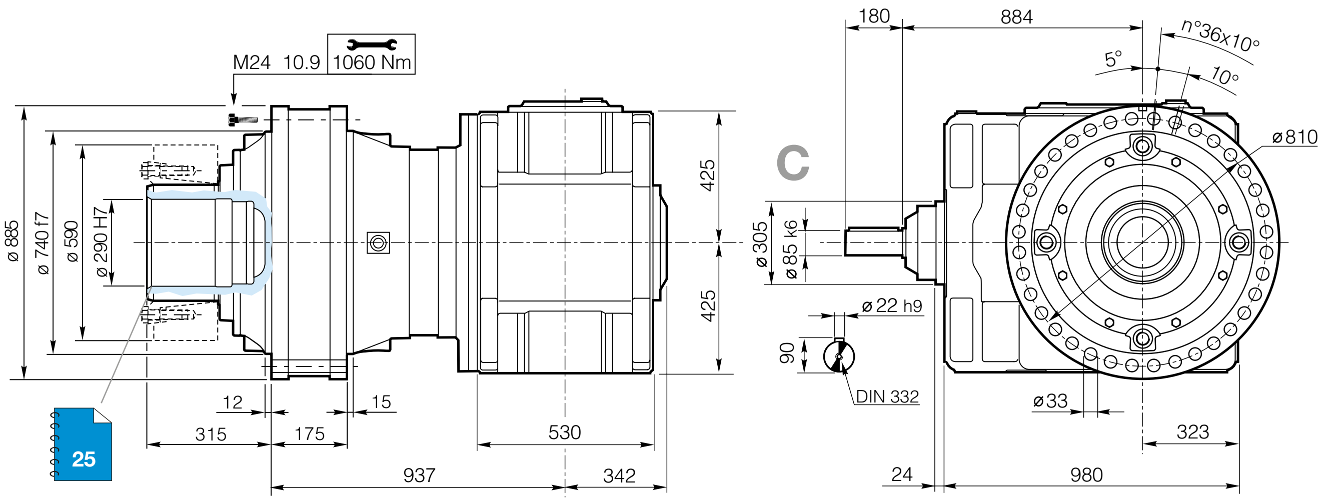
50000 hours life

i_n	i_{eff}	1500 n_2 [rpm]	1500 T_2 [Nm]	1500 P_2 [kW]	1000 n_2 [rpm]	1000 T_2 [Nm]	1000 P_2 [kW]	T_{2MAX} [Nm]	n_{1MAX} [rpm]
SL2PLB 35031									
112	**115.92**	12.9	221954	301	8.6	250663	226	810000	1800 (>1800 on demand)
125	**129.20**	11.6	229299	279	7.7	258958	210		
140	**140.77**	10.7	235275	263	7.1	265707	198		
160	**166.45**	9.0	247401	233	6.0	279402	176		
180	**185.54**	8.1	255593	216	5.4	288653	163		
200	**202.13**	7.4	262248	204	4.9	296169	153		
224	**231.83**	6.5	273258	185	4.3	308603	139		
250	**258.43**	5.8	282306	172	3.9	318822	129		
280	**281.54**	5.3	289657	162	3.6	327123	122		
315	**332.89**	4.5	304586	144	3.0	343984	108		
355	**371.07**	4.0	314672	133	2.7	354757	100		
400	**404.27**	3.7	322865	125	2.5	356843	92		
450	**459.91**	3.3	335599	115	2.2	360000	82		

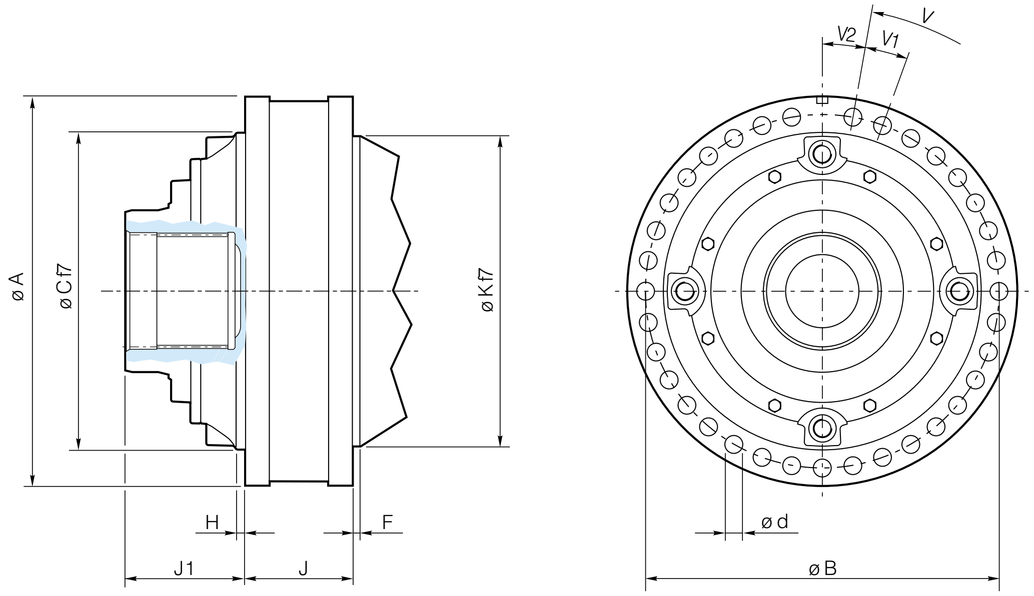
FE - FAR Splined female



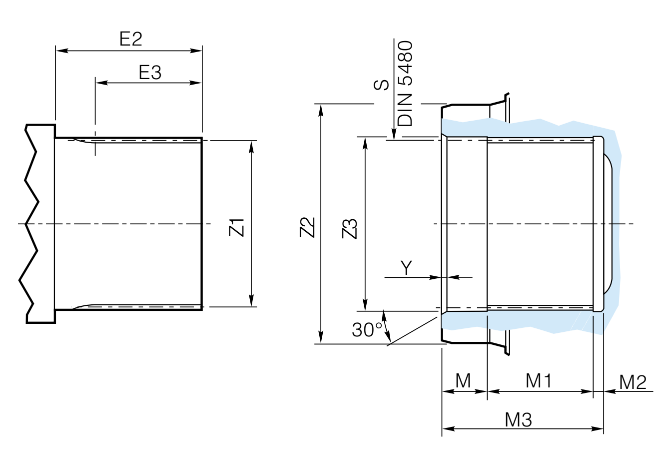
FS Female output for friction couplings



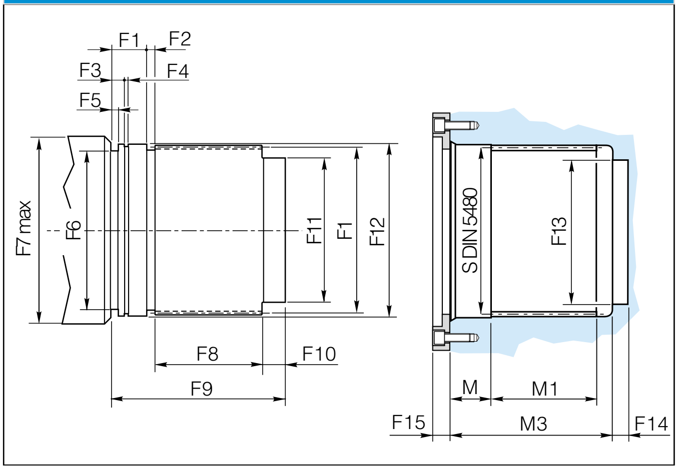
FE - FAR Splined female



FE



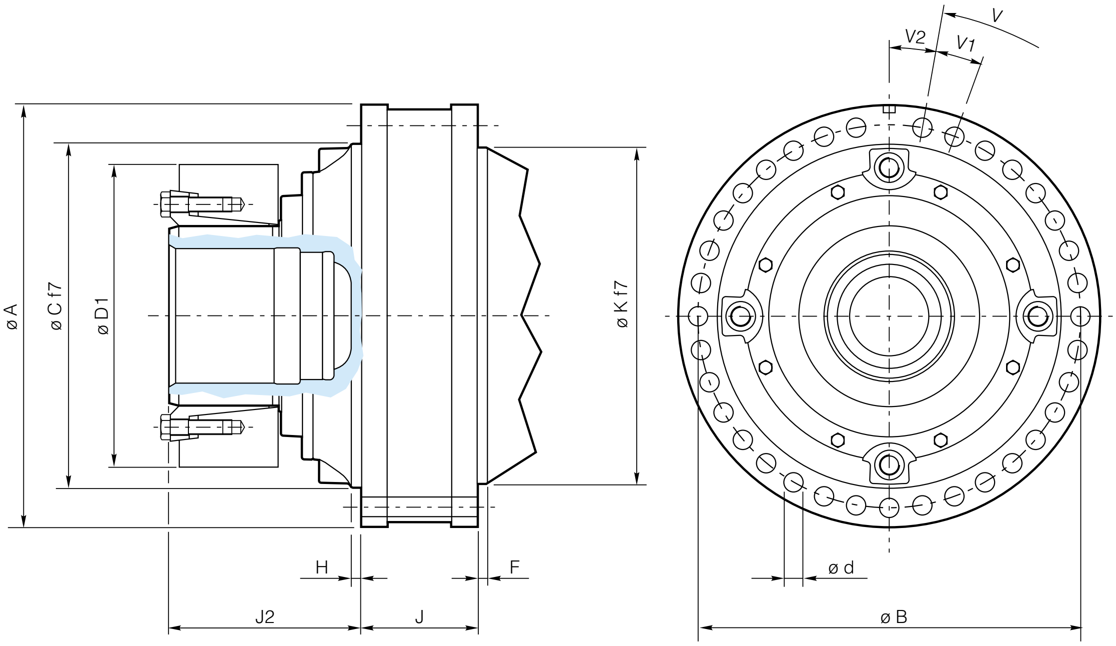
FAR

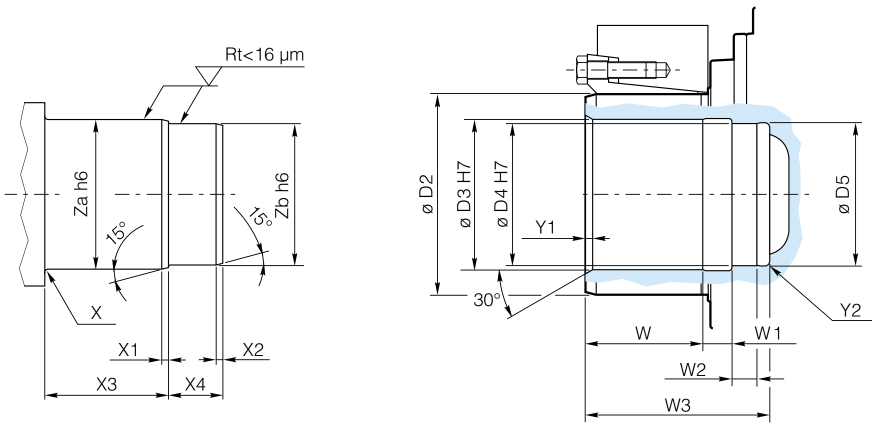


SL2PLB	A	B	C	d	E2	E3	F	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	H	J	J1	K
													d10					g7	g7	H7						
8516	565	510	460	26	150	105	10	42	10	16.4	3.6	9	154	180	110	180	18	145	172	145	13	20	11	156	174	450
12020	635	575	520	26	165	120	15	42	10	16.2	4.8	9	189	220	125	205	28	170	202	170	18	20	12	175	205	520
18020	710	650	595	26	175	130	16	42	10	16.2	4.8	9	199	240	135	215	28	180	212	180	18	20	14	185	213	595
25025	810	735	665	33	190	140	15	49	10	18.2	4.8	11	228	260	141	236	36	220	242	220	22	30	12	195	227	665
35031	885	810	740	33	220	170	14	50	10	19.2	4.8	12	264	300	185	269	34	235	282	235	22	30	14	235	260	740

SL2PLB	M	M1	M2	M3	S	V	V1	V2	Y	Z1	Z2	Z3
8516	45	105	10	160	N170x5x30x32x9H	n°28x12.857°	12.857°	6.428°	5x30°	W170x5x30x32x8g	235	172
12020	45	120	15	180	N200x5x30x38x9H	n°32x11.25	11.25°	5.625°	5x30°	W200x5x30x38x8g	275	202
18020	45	130	15	190	N210x5x30x40x9H	n°32x11.25	11.25°	5.625°	5x30°	W210x5x30x40x8g	297	212
25025	50	140	15	205	N240x5x30x46x9H	n°32x11.25	11.25°	5.625°	5x30°	W240x5x30x46x8g	338	242
35031	50	170	17	237	N280x8x30x34x9H	n°36x10°	10°	5°	5x30°	W280x8x30x34x8g	358	282

FS Female output for friction couplings





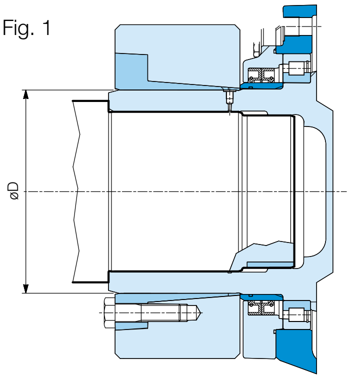
SL2PLB	A	B	C	d	D1	D2	D3	D4	D5	F	H	J	J2	K	V
8516	565	510	460	26	405	240	180	170	172	10	11	156	257	450	n°28x12.857°
12020	635	575	520	26	460	280	220	210	212	15	12	175	315	520	n°32x11.25
18020	710	650	595	26	485	300	240	230	232	16	14	185	322	595	n°32x11.25
25025	810	735	665	33	570	340	260	250	252	15	12	195	358	665	n°32x11.25
35031	885	810	740	33	590	360	290	280	282	14	14	235	368	740	n°36x10°

SL2PLB	V1	V2	W	W1	W2	W3	X	X1	X2	X3	X4	Y1	Y2	Za	Zb
8516	12.857°	6.428°	140	35	30	220	R 4 max	5	5	145	65	5	R 6	180	170
12020	11.25°	5.625°	179	40	32	269	R 4 max	5	5	184	72	8	R 10	220	210
18020	11.25°	5.625°	181	40	32	271	R 4 max	5	5	186	72	8	R 10	240	230
25025	11.25°	5.625°	211	45	37	311	R 4 max	5	5	216	82	8	R 10	260	250
35031	10°	5°	218	45	40	323	R 4 max	5	5	223	85	8	R 12	290	280

To check joint coupling see pages 26 and 27.

The friction couplings are mounted on FS output shaft. Given below are the characteristics and measures to be considered for correct assembly and disassembly of these parts used for the transmission of motion.

Fig. 1



SL2PLB	T_N [Nm]	D [mm]	T_{GN} [Nm]	Coupling Type	DANA code
8516	90000	240	187000	3208-240X405	448J43GU100
12020	133000	280	355000	3208-280X460	448J43GU200
18020	190000	300	397000	3208-300X485	448J43GU300
25025	260000	340	604000	3208-340X570	448J43GU400
35031	370000	360	766000	3208-360X590	448J43GU500

T_N = Gear unit nominal torque
T_{GN} = Joint nominal torque
D = Hub diameter

Assembly

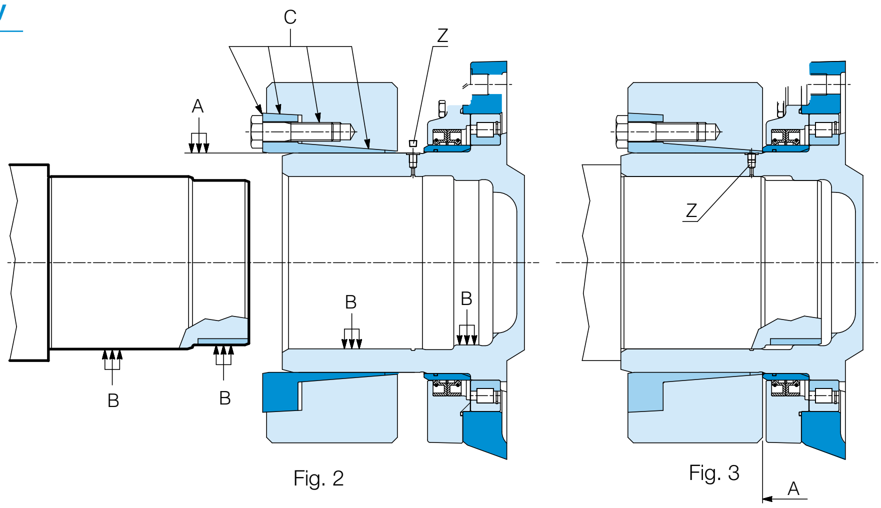


Fig. 2 Fig. 3

1) Carefully clean and remove all grease from the shaft and its seat (Fig.2 points B). To facilitate subsequent disassembly, it is advisable to execute the small shaft centering by means of a suitably worked bushing (Fig.3).

2) Lubricate the joint seat (Fig.2 point A). When new, the joint does not have to be disassembled for greasing. Greasing of areas C is advisable only when reinstalling a used joint.

3) Fit the joint on the gear unit without tightening the screws and leave enough space for removing the cap (Fig.3 point Z) which allows air bleeding when fitting the gear unit on the machine shaft.
If the mounting position is vertical and the relative shaft is facing downwards, make sure the joint cannot slip off and fall. In all cases, never tighten the screws before fitting the shaft in its seat.

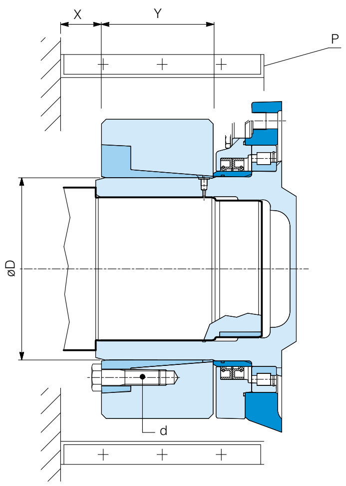
4) Fit the shaft in its seat. Assembly must occur without any interference and this is only possible with exact gear unit/shaft alignment, carried out with the aid of suitable lifting equipment.
CAUTION! Assembly must be carried out without applying axial forces, blows or impacts that could damage the gear unit bearings.

5) Refit the cap (Fig.2 point Z) to protect the coupling from oxidation and move the joint in the final position (Fig.3 point A) before tightening the screws.

6) Tighten the screws gradually in a circular sequence, using a suitable torque wrench, chosen according to design distance “X” and set to the driving torque given in the table. Carry out the last tightening, setting the wrench to a torque of 3-5% higher than that given.
Set the wrench to the torque specified in the table and make sure that no screws can be further tightened, otherwise repeat the procedure from point 5.
Assembly is complete and correct if the front surfaces of the inner and outer ring are on the same level.
The driving torque does not have to be checked after the joint has gone into operation.

7) Protect the joint area with the special sheet casing, (Fig.4 point P) if there is the risk of stones, sand or other material that could damage the joint or the gear unit seals.

Fig. 4



SL2PLB	Coupling type	Y	d	T [Nm]	X [mm] for type of wrench		
8516	3208-240X405	144	M20	490	55	115	58
12020	3208-280X460	172	M24	840	65	120	70
18020	3208-300X485	176	M24	840	65	120	70
25025	3208-340X570	206	M27	1250	–	125	85
35031	3208-360X590	210	M27	1250	–	125	85

Disassembly

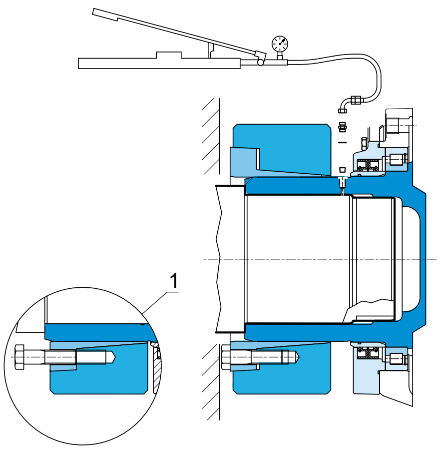


Fig. 5

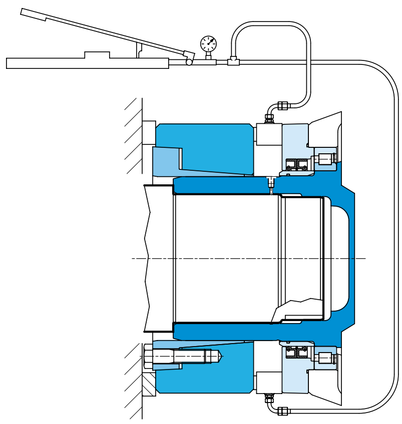


Fig. 6

1) Loosen the screws in repeated sequence until the joint can be moved on the hub.

IMPORTANT: do not undo the screws completely until the rings separate on their own. High axial forces could cause a violent removal, with subsequent danger for operators.

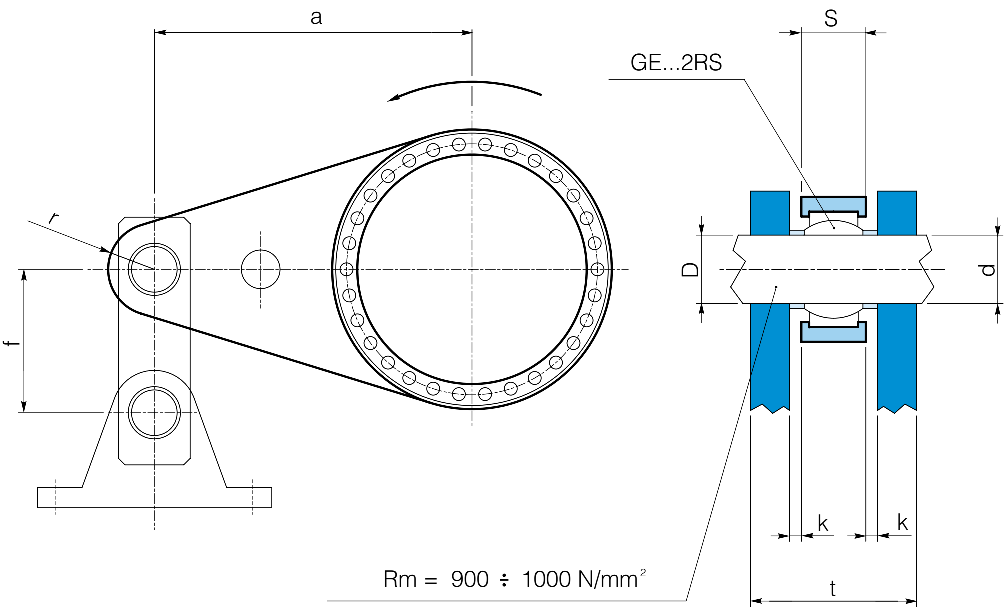
2) If the rings do not separate on their own after loosening the screws, transfer some of them to the extraction holes of the inner ring (Fig.5 detail 1) and, tightening them, separate the inner ring from the outer ring.

3) Slide the joint axially as shown in fig.5 to allow use of the hole G 1/8” for the introduction of pressurized oil (max. 1000 bar) to facilitate removing the gear unit from the machine shaft.
If, on using the method described, the gear unit cannot be freed, because the shaft coupling does not ensure pressure tightness, operate as shown in fig. 6. Available space permitting, using the special hydraulic pushers, operate on two bosses at 180° located on the seal covers, without exceeding the following axial loads:

4) If the gear unit is disassembled some time after start-up, it is necessary to remove the joint from the hub, separate the tapered rings and clean any residuals of dirt or rust from all the surfaces relative to fitting.
Before refitting the clamping unit, carefully clean it and lubricate as shown in fig. 2 (points C).

SL2PLB				
8516	12020	19020	25025	35031
Axial load [N]				
50000	70000	80000	100000	115000

TORQUE ARM COSTRUCTION AND ANCHORING



SL2PLB	a min [mm]	S [mm]	r min [mm]	f min [mm]	GE...2RS	D d [mm]	k [mm]	t min [mm]
8516	1000	35	45	200	45	45	4	81
12020	1000	40	55	230	50	50	5	90
18020	1200	50	60	250	60	60	5	104
25025	1400	55	70	300	70	70	5	115
35031	1600	60	80	350	80	80	5	120

Assembly

1) The torque arm anchorage point must be floating in all directions. Therefore ball joints must be used in all connections.

2) It is advisable to use long life ball joints, protecting rubbing surfaces with PTFE. Alternatively, “steel to steel” type joints can be used, providing for the possibility of periodical greasing.

3) The anchorage connecting rod must be parallel to the torque arm in order to guarantee, unloaded, the side clearance K which ensures free movement of the structure in the event of deformation.

4) The fixed support to which the second end of the connecting rod is connected must ensure adequate anchorage for the load.

5) The torque arm and relevant connecting rod can have different design solutions to those proposed, but the following arrangements must be respected.
   - The torque arm must be perfectly straight
   - If welded parts are provided for, any deformations must be sanded, normalized and machine tool corrected
   - The contact area of the torque arm at the flanging with the reduction unit must be perfectly flat
   - Before connecting the torque arm to the gear unit, carefully remove all traces of grease from the contact surfaces.

   WARNING
   Do not carry out any welding work involving the gear unit, even as an earthing!

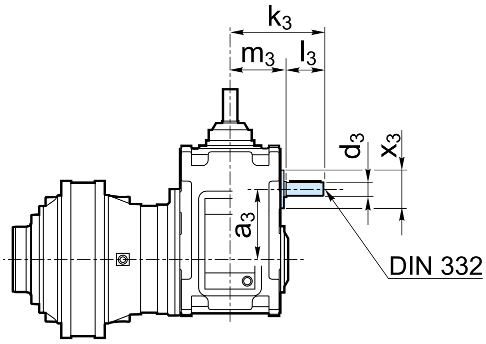
6) Always use a torque wrench for tightening the connection screws.

7) The drawing is only by way of example, since the correct configuration depends on the gear unit rotation direction. In fact, during work it is advisable for the connecting rod to be in traction and not compression. Therefore mounting on the opposite side with respect to that represented may be convenient. If necessary, due to specific encumbrance the connecting rod can be assembled upwards.

8) When carrying out an assembly by means of friction coupling and torque arm, remember that the weights of the gear unit, the torque arm and all the elements connected to them, bring about loads and tipping moments that are supported by the output stage planetary carrier bearings. Therefore the relative position of all the masses involved in transmitting power must be appraised in the design phase, in order to minimize the resultant value on the bearings. Likewise, the weight of the components connected to the gear unit must be limited, carefully appraising the hicknesses of the structures actually necessary for supporting the stresses, and decentralizing all the elements not involved in power transmission. An incorrect design can shorten the life of the bearing and gears due to possible excessive elastic deformation of the stages and determine the possibility of slipping and seizing of the friction coupling.

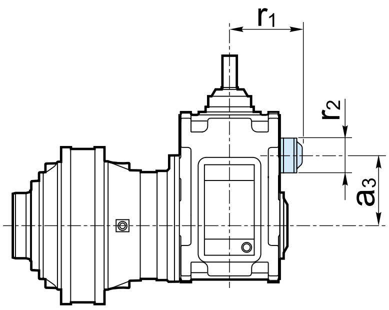
Additional shaft extension

SL2PLB	a_3	Ø d_3	k_3	l_3	m_1	Ø x_3
8516	164	60 m6	337	140	197	195
12020 18020	201	70 m6	369	140	229	205
25025	247	90 m6	446	180	266	255
35031	302	100 m6	537	215	322	328



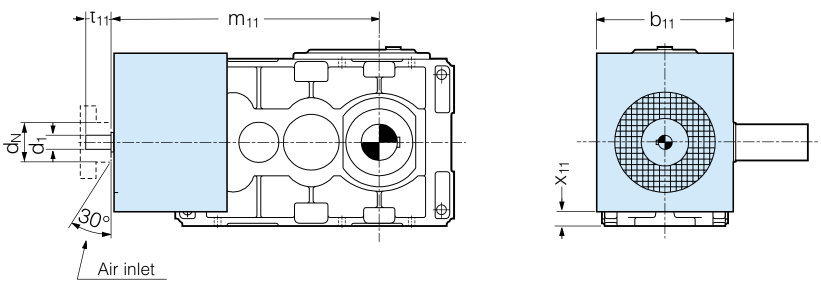
Backstop

SL2PLB	a_3	r_1	r_2
8516	164	275	175
12020 18020	201	322	210
25025	247	372	250
35031	302	456	315



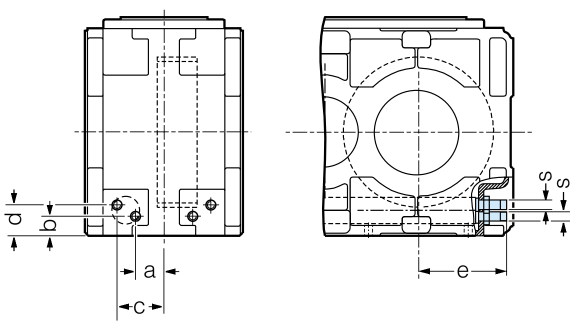
Fan cooling (Z1)

SL2PLB	b_{11}	d_1	dN max	k_1	l_{11}	m_{11}	x_{11}
8516	380	50 k6	140	611	80	531	59
12020 18020	440	60 m6	140	723	105	618	89
25025	468	75 m6	150	891	120	771	94
35031	548	85 m6	180	1064	140	924	94

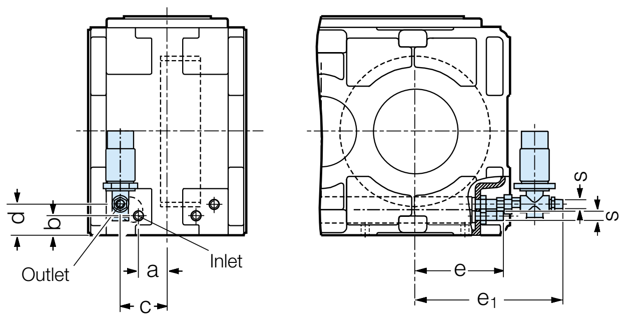


Cooling coils (Z3)

Water connection for cooling coil without cooling water controller



Water connection for cooling coil with cooling water controller

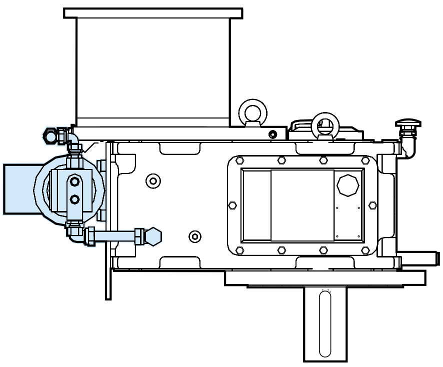


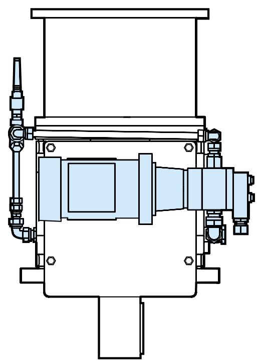
Cooling coil placed adjacent to the final gear wheel. For the gear wheel position see the dimension sheets

	a	b	c	d	e	e_1	s	V Water [l/min]	Δ p Water [bar]
8516	55	48	76	115	193	329	R 1/2 A	12	0.55
12020 18020	58	58	116	98	208	344	R 1/2 A		0.75
25025	54	55	118	118	250	386	R 1/2 A		0.4
35031	68	55	127	123	293	429	R 1/2 A		0.5

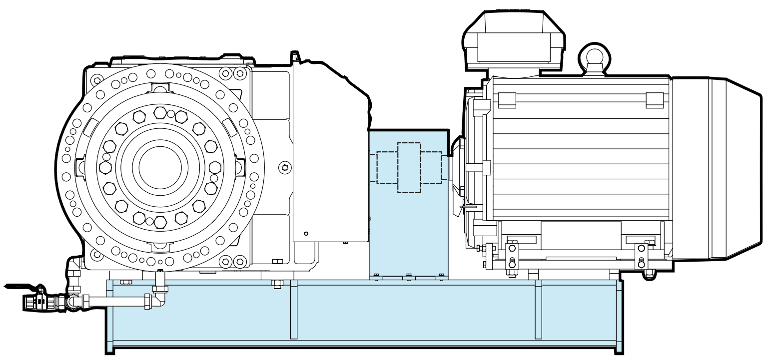
Motor pumps

With pressure lubrification (motor pump)

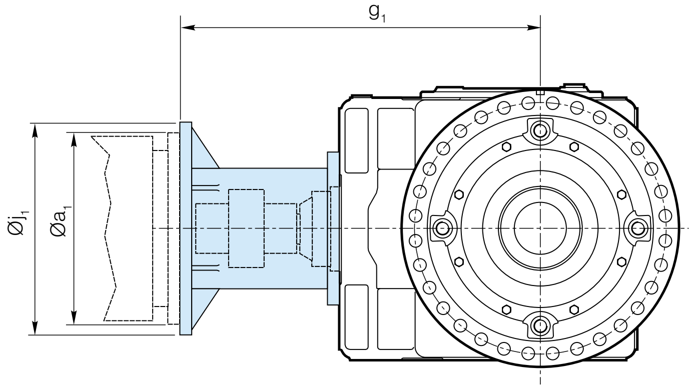




Swing base (J1)



Motor bell housing (K)



	Code	IEC	a_1	g_1	j_1
8516	K250	*	250	778	300
	K300	*	300	778	300
	K350	160	350	723	354
		180	350	723	354
	K400	200	400	723	354
	K450	225	450	838	494
	K550	250	550	838	494
		280	550	838	494
	K660	315	660	868	660
12020	K250	*	250	860	300
	K300	*	300	860	300
	K350	*	350	890	354
	K400	200	400	890	354
	K450	225	450	920	494
	K550	250	550	920	494
	K550	280	550	920	494
	K660	315	660	950	660
18020	K250	*	250	860	300
	K300	*	300	860	300
	K350	*	350	890	354
	K400	200	400	890	354
	K450	225	450	920	494
	K550	250	550	920	494
	K550	280	550	920	494
	K660	315	660	950	660
25025	K350	*	350	967	407
	K400	*	400	967	407
	K450	*	450	1034	494
	K550	280	550	1034	494
	K660	315	660	1064	660
35031	K350	*	350	1177	404
	K400	*	400	1077	404
	K450	*	450	1144	494
	K550	280	550	1144	494
	K660	315	660	1174	660

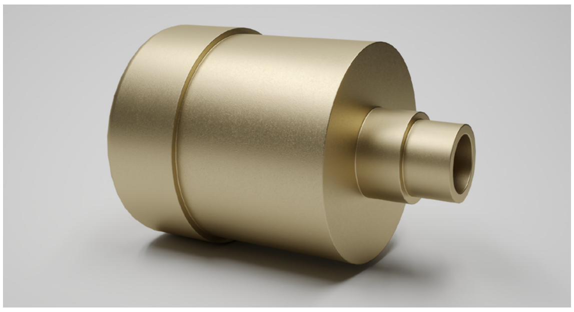
* On request

Breather with filter

A breather with a filter can be used to prevent dust from entering the gearbox while the gear unit is cooling down.

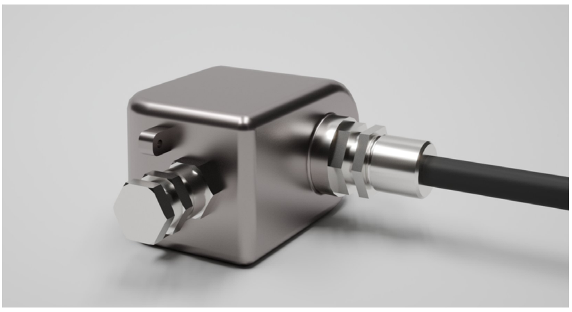
Breather with wet filter

If the humidity is high, we recommend a breather with wet filter to prevent water vapor from penetrating the gear oil.



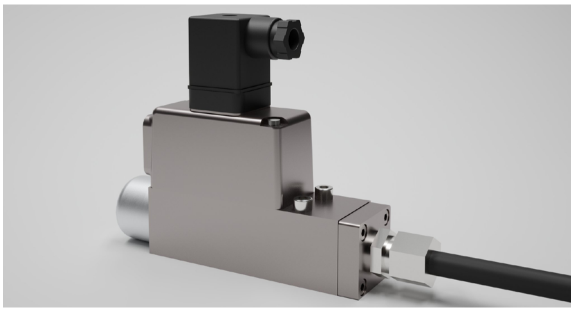
Temperature switch

To control the max. oil temperature there is the possibility to install a Temperature switch into the oil sump and get output signal when the temperature is above certain level.



Pressure switch

In case of a force lubrication or cooling unit there is the possibility to control the oil pressure with a pressure switch. If the oil pressure is below certain pressure a signal will stop the main motor of the gearbox.

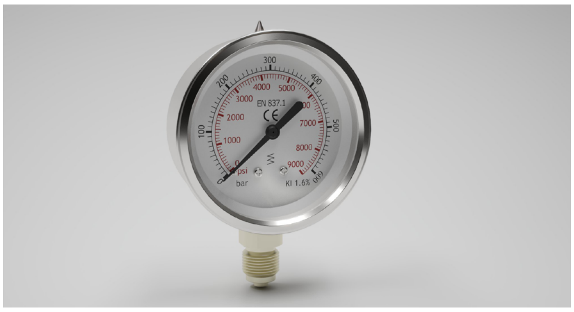


(PT100)

To monitor the oil temperatures on the gearbox, and set up different level of attention at certain temperature, for instance start, alert and stop of the gearbox.

Manometer

In case of a force lubrication or cooling unit there is the possibility to have visual control the oil pressure with a manometer.



Oil level switch

With the oil level switch is it possible to control the min. oil level of the gearbox in case you use a heater.

Oil drain with ball valve

For an easy, safe and clean oil drain from the gearbox, we can deliver an oil drain with a ball valve

Oil filter, single, double

To increase the bearing lifetime is it possible in case of force lubrication/cooling to use an oil filter. We recommend a double switching filter for 24 hours operation.

Regulator for quantity of cooling water

In order to have a constant gear oil temperature with water cooling, we recommend the installation of a water regulator.

Supply conditions

The gear units are painted externally with synthetic primer in blue “RAL 5012”, unless otherwise specified in the contract. The protection is suitable for withstanding normal industrial environments (also external) and can be finished with synthetic paints. If particular aggressive ambient conditions are foreseen, special painting is required.

The worked external parts of the gear unit, such as the ends of the hollow and solid shafts, support tables, centerings, etc., must be protected with antioxidant oil (tectyl). The parts inside the gear unit casings are painted wiyh oil-proof paint and the kinematic mechanisms are protected with antioxidant oil.

Storage conditions

If the product is to be stored for more than 2 months, carry out as follows:

- protect shafts and spigots with a film of grease or corrosion protection products;
- fill the gearbox completely with the lubricant required for the application;
- store in a dry place with a temperature from -5 °C to +30 °C;
- protect the gearbox from dirt, dust and damp;
- always place a wooden support or other material between the gearbox and the ground to prevent direct contact with the ground.

When storing for more than 6 months the rotating seals will loose efficiency.
It is advisable to carry out a periodical check,manually turning the internal gears, turning the input shaft. Possible replacement of the gaskets on starting is advisable.

Installation

The gear units must be carefully installed by suitably trained technical personnel.
Preparation for operation must occur according to all technical information contained in relevant documents.

The structures to which they are fixed must be rigid, with perfectly flat machined unpainted support surfaces,normal with driven shaft, and with centerings to tolerance H8. The contact surfaces must be duly and perfectly greased.
The unit must be carefully aligned with the driven shaft, especially with gear units with female splined output shaft which, it must be remembered, do not take external loads.

For fixing, use screws of class min. 10.9 with tightening at 75% yielding.

During assembly, violent axial impacts must absolutely be avoided since they could damage the internal bearings. The control parts to be fitted on the cylindrical output shaft must be worked according to the specifications given in the chapter:”Output".

We are therefore recommending to use couplings that can recover misalignment when connecting gearbox and motor. In case of use of mechanical components that do not allow misalignment recovering, please pay special care to the alignment between gearbox and motor during assembling operations.

DANA gearboxes are supplied without lubricant; therefore the user must fill them correctly before starting the machine.

Essential oil specifications

The important parameters to consider when choosing the oil type are:

- viscosity under nominal operating conditions
- additives

The same oil must lubricate the bearings and the gears and all these components work inside the same box, in different operating conditions.

Viscosity

Nominal viscosity refers to a temperature of 40 °C, but decreases rapidly as the temperature increases. If the gearbox operating temperature is from 50 °C to 70 °C, a nominal viscosity can be chosen from the following guide table; choose the highest viscosity if a higher operating temperature is expected.

Output speed n_2 [rpm]	**Working temperature**	
	50° C	**70° C**
$n_2 \geq 20$	VG 150	VG 220
$5 < n_2 < 20$	VG 220	VG 320
$n_2 \leq 5$	VG 320	VG 460

Special attention must be paid to highly loaded output stages and those with very low speeds (<1 rpm). In such cases, always use high viscosity oils and with a good amount of Extreme Pressure (EP) additive.

Additives

In addition to the normal anti-foam and antioxidant additives, it is important to use oils with additives offering EP (extreme-pressure) and anti-wear properties, according to ISO 67436 L-CKC or DIN 515173 CLP. The lower the gearbox output speed, the more marked the EP characteristics of the products have to be. It should be remembered that the chemical compounds replacing hydrodynamic lubrication are formed to the detriment of the original EP load.

Therefore in case of very low speeds and high loads, it is important to observe the maintenance intervals so as not to lower the lubricating properties of the oil excessively.

Oil types

Oil types
The oils available generally belong to three large families.

- Mineral oils
- Polyalphaolefin (PAO) synthetic oils
- Polyalkylene glycol (PAG) synthetic oils

The most suitable choice is generally tied to the conditions of use.

Gearboxes that are not particularly loaded and with an intermittent operating cycle but without considerable temperature ranges can be lubricated with mineral oil.
In cases of heavy use, when the gearboxes are highly and continuously loaded resulting in a temperature increase, it is best to use polyalphaolefin synthetic lubricants.
The use of polyalkylene glycol oils is not allowed as they are not compatible with other oils and are often completely mixable with water:;this phenomenon is particularly dangerous because it can go unnoticed, but rapidly diminishes the lubricating properties of the oil. Moreover, these lubricants may chemically attack the oil seals and paint inside the gearbox.

In addition to the above, there are also hydraulic oils and oils for the food industry.
The former are used for negative brakes.
The latter are used specifically in the food industry as they are special products that are not harmful to health.
The tables below contain lubricants offered by the best-known manufacturers, with specifications suitable for lubricating DANA gearboxes.

Contamination

During normal operation, due to run-in of the surfaces, metallic microparticles will inevitably form in the oil.
This contamination can shorten the life of the bearings, resulting in premature gearbox failure.
To limit and control this phenomenon, without resorting to frequent and costly oil changes, a suitable auxiliary oil circulation system with filtering and cooling of the oil must be provided.
This system offers the dual advantage of controlling the level of contamination through the use of special filters and stabilising the operating temperature at a level more suitable for ensuring the required viscosity.

For lubrication problems with gearboxes intended for special uses, it is advisable to contact your local DANA representative regarding the construction type and operating parameters.

Lubricant oils for general use

Manufacturer	Mineral Oil			Polyalphaolefin Synthetic Oils (PAO)		
	ISO VG 150	ISO VG 220	ISO VG 320	ISO VG 150	ISO VG 220	ISO VG 320
ADDINOL	Eco Gear 150 M	Eco Gear 220 M	Eco Gear 320 M	Eco Gear 150 S	Eco Gear 220 S	Eco Gear 320 S
ARAL	Degol BG 50 Plus	Degol BG 220 Plus	Degol BG 320 Plus	Degol PAS 150	Degol PAS 220	Degol PAS 320
BP	Energol GR-XP 150	Energol GR-XP 220	Energol GR-XP 320	Enersyn EPX 150	Enersyn EPX 220	Enersyn EPX 320
CASTROL	Alpha SP 150	Alpha SP 220	Alpha SP 320	Alphasyn EP 150	Alphasyn EP 220	Alphasyn EP 320
CEPSA	Engranajes XMP 150	Engranajes XMP 220	Engranajes XMP 320	-	Aerogear Synt 220	Aerogear Synt 320
CHEVRON	-	-	-	Tegra Synthetic Gear 150	Tegra Synthetic Gear 220	Tegra Synthetic Gear 320
ENI	Blasia 150	Blasia 220	Blasia 320	Blasia SX 150	Blasia SX 220	Blasia SX 320
FUCHS	Renolin CLP Gear Oil 150	Renolin CLP Gear Oil 220	Renolin CLP Gear Oil 320	Renolin Unisyn CLP 150	Renolin Unisyn CLP 220	Renolin Unisyn CLP 320
KLÜBER	Klüberoil GEM 1-150 N	Klüberoil GEM 1-220 N	Klüberoil GEM 1-320 N	Klübersynth GEM 4-150 N	Klübersynth GEM 4-220 N	Klübersynth GEM 4-320 N
LUBRITECH	Gearmaster CLP 150	Gearmaster CLP 220	Gearmaster CLP 320	Gearmaster SYN 150	Gearmaster SYN 220	Gearmaster SYN 320
MOBIL	Mobilgear XMP 150	Mobilgear XMP 220	Mobilgear XMP 320	Mobil SHC Gear 150	Mobil SHC Gear 220	Mobil SHC Gear 320
MOLIKOTE	L-0115	L-0122	L-0132	L-2115	L-2122	L-2132
NILS	Ripress EP 150	Ripress EP 220	Ripress EP 320	Atoil Synth PAO 150	-	Atol Synth PAO 320
Q8	Goya NT 150	Goya NT 220	Goya NT 320	El Greco 150	El Greco 220	El Greco 320
REPSOL	Super Tauro 150	Super Tauro 220	Super Tauro 320	Super Tauro Sintetico 150	Super Tauro Sintetico 220	Super Tauro Sintetico 320
SHELL	Omala S2 G 150	Omala S2 G 220	Omala S2 320	Omala S4 GX 150	Omala S4 GX 220	Omala S4 GX 320
SUNOCO	Sun EP 150	Sun EP 220	Sun EP 320	-	-	-
TEXACO	Meropa 150	Meropa 220	Meropa 320	Pinnacle EP 150	Pinnacle EP 220	Pinnacle EP 320
TOTAL	Carter EP 150	Carter EP 220	Carter EP 320	Carter SH 150	Carter SH 220	Carter SH 320
TRIBOL	1100/150	1100/220	1100/320	-	-	1510/320

Lubricant oils for use in the food industry

(USDA-H1 and NSF-H1 approved)

Manufacturer	Hydraulic Oil			Gear Oil		
	ISO VG 32	ISO VG 46	ISO VG 68	ISO VG 150	ISO VG 220	ISO VG 320
ARAL	Eural Hyd 32	Eural Hyd 46	Eural Hyd 68	Eural Gear 150	Eural Gear 220	-
CASTROL	Optileb HY 32	Optileb HY 46	Optileb HY 68	Optileb GT 150	Optileb GT 220	Optileb GT 320
CHEVRON	Lubricating Oil FM 32	Lubricating Oil FM 46	Lubricating Oil FM 68	-	Lubricating Oil FM 220	-
ENI	Rocol Foodlube Hi-Power 32	Rocol Foodlube Hi-Power 46	Rocol Foodlube Hi-Power 68	Rocol Foodlube Hi-Torque 150	Rocol Foodlube Hi-Torque 220	Rocol Foodlube Hi-Torque 320
FUCHS	Cassida Fluid HF 32	Cassida Fluid HF 46	Cassida Fluid HF 68	Cassida Fluid GL 150	Cassida Fluid GL 220	Cassida Fluid GL 320
KLÜBER	Klüberfood 4 NH1-32	Klüberfood 4 NH1-46	Klüberfood 4 NH1-68	Klüberoil 4 UH1-150N	Klüberoil 4 UH1-220N	Klüberoil 4 UH1-320N
MOBIL	Mobil SHC Cibus 32	Mobil SHC Cibus 46	Mobil SHC CIbus 68	Mobil SHC Cibus 150	Mobil SHC CIbus 220	Mobil SHC Cibus 320
NILS	Mizar 32	Mizar 46	Mizar 68	Ripress Synt Food 150	Ripress Synt Food 220	Ripress Synt Food 320
TEXACO	Cygnus Hydraulic Oil 32	Cygnus Hydraulic Oil 32	Cygnus Hydraulic Oil 32	Cygnus Gear PAO 150	Cygnus Gear PAO 220	-
TRIBOL	Foodproof 1840/32	Foodproof 1840/46	Foodproof 1840/68	-	Foodproof 1810/220	Foodproof 1810/320

Indications for oil control diagrams without auxiliary cooling system

Horizontal mounting. Position of level plug

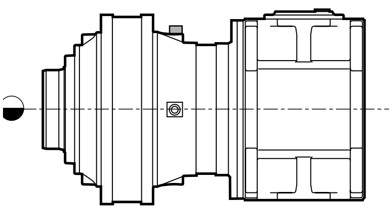


Fig. 1

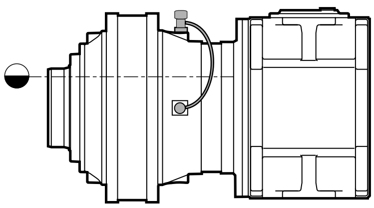


Fig. 2

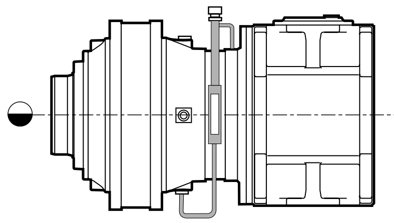


Fig. 3

With horizontal mounting of the gear unit, the normal level for guaranteeing correct lubrication is located at the centre line. Fig. (1).
For applications with very low output rotation speed ($n_2 \leq 5$ rpm) it is advisable to fix the level at a value higher than 50-100 mm. Fig. (2).

The correct level can be easily checked using a transparent tube positioned as shown in the Fig. (2).
If the output speed is extremely low ($n_2 \leq 1$ rpm), or if long gear unit downtimes are foreseen, it is advisable to fill the entire box. In this case a special auxiliary tank must be provided.

To fit an instrument for visually checking the level (or by means of a special electric signal), assembly must be done according to the drawing in Fig.(3).

Locate the breather plug over the instrument by mean of a long tube. Connect the upper (empty) part of the gearbox just under the breather by mean of a bleeding tube to prevent oil leakage.

Technical data of auxiliary cooling system

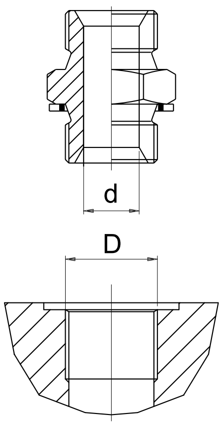
If the power applied is greater than the thermal power that can be dissipated by the gearbox, an auxiliary cooling system (air-oil) must be used to dissipate the excess thermal power and keep the lubricating oil clean by means of constant filtering.

To fulfil this function, DANA offers a range of cooling units: contact your local DANA representative for details. The control units consist of an air-oil heat exchanger, a filter, an electric motor, a hydraulic pump with safety valve and a coaxial fan integral with the pump. If a different type of auxiliary system is to be fitted, make sure not to use systems with an external tank.

If an auxiliary tank is required (e.g. for cooling several gearboxes with a single system), we recommend contacting your local DANA representative. When designing an oil circulation circuit, it is advisable for the suction to be at the lowest point, so that this branch of the circuit can also be used to drain the gearbox.

In any case, the oil suction and delivery points must be far enough apart to ensure that fresh oil passes through the gearbox. The diameter of the oil holes is very important, especially in suction. In fact, the pump tends to cavitate if the holes are too small. Not being able to change the pump delivery, which is a function of the power to be dissipated, the capacity of the holes must be verified.

When sucking oil from the input supports or flanges of fast gearboxes, the use of one hole may be insufficient for the entire flow; therefore 2 or 3 holes must be connected by means of a manifold connected to the suction pipe.
Delivery is usually less problematic since, if the natural flow rate is too low, a small pressure is generated which ensures the flow.



Oil speed table [m/s]				
Hole diameter		Pump flow [l/min]		
D (nom.)	d [mm]	6	12	20
G 1/4"	7	**2.59**	**5.19**	**8.6**
G 3/8"	10	**1.27**	**2.54**	**4.24**
G 1/2"	12	**0.9**	**1.76**	**2.94**
G 3/4"	16	**0.5**	**1**	**1.65**
G 1"	22	**0.26**	**0.52**	**0.87**
G 1 1/4"	30	**0.14**	**0.28**	**0.47**

The velocity can be obtained from the table, or calculated with the formula:

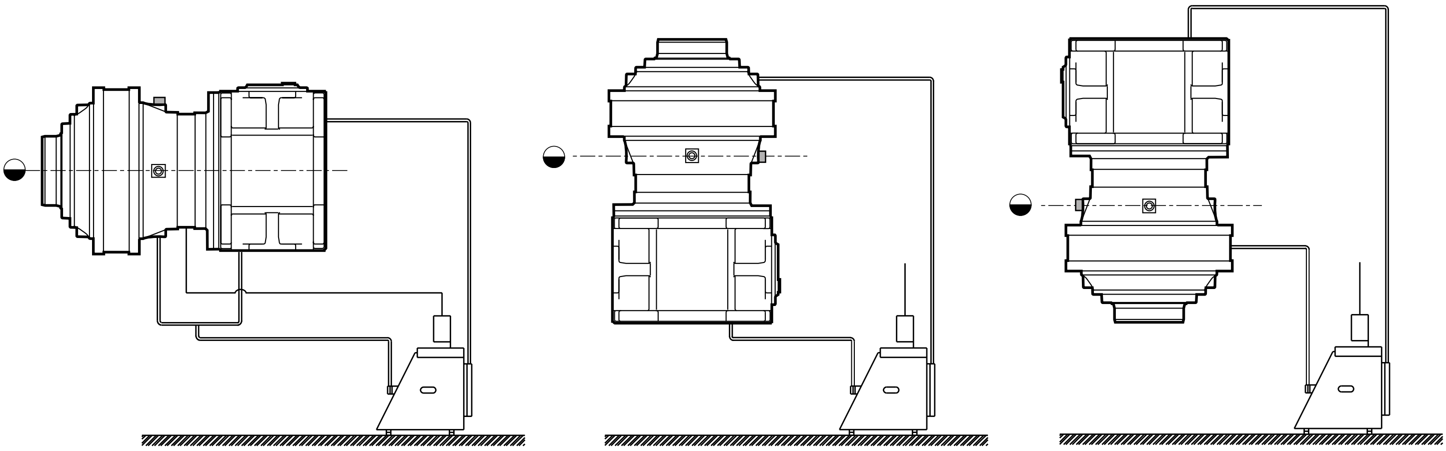
$$V = (Q \times 21.2) / d^2$$

where: V = velocity of oil in m/s
Q = flow in l/min
d = internal diameter of union in mm

In calculating, a kinematic oil viscosity of 60 cSt was considered.

Indications for oil control diagrams with auxiliary cooling system

That described in the previous pages holds good for defining the levels.



IMPORTANT

The auxiliary oil filtering and cooling systems described above represent the minimum condition necessary for obtaining control of the gear unit lubrication.
The end-user can always enhance the system with the addition of auxiliary safety controls on the flow, temperature and level.
The system can also be equipped with cocks for facilitating oil change operations with the auxiliary of the service pump and suction auxiliary filter for protecting the pump from possible debris accidentally coming from inside the gear unit.

Oil change

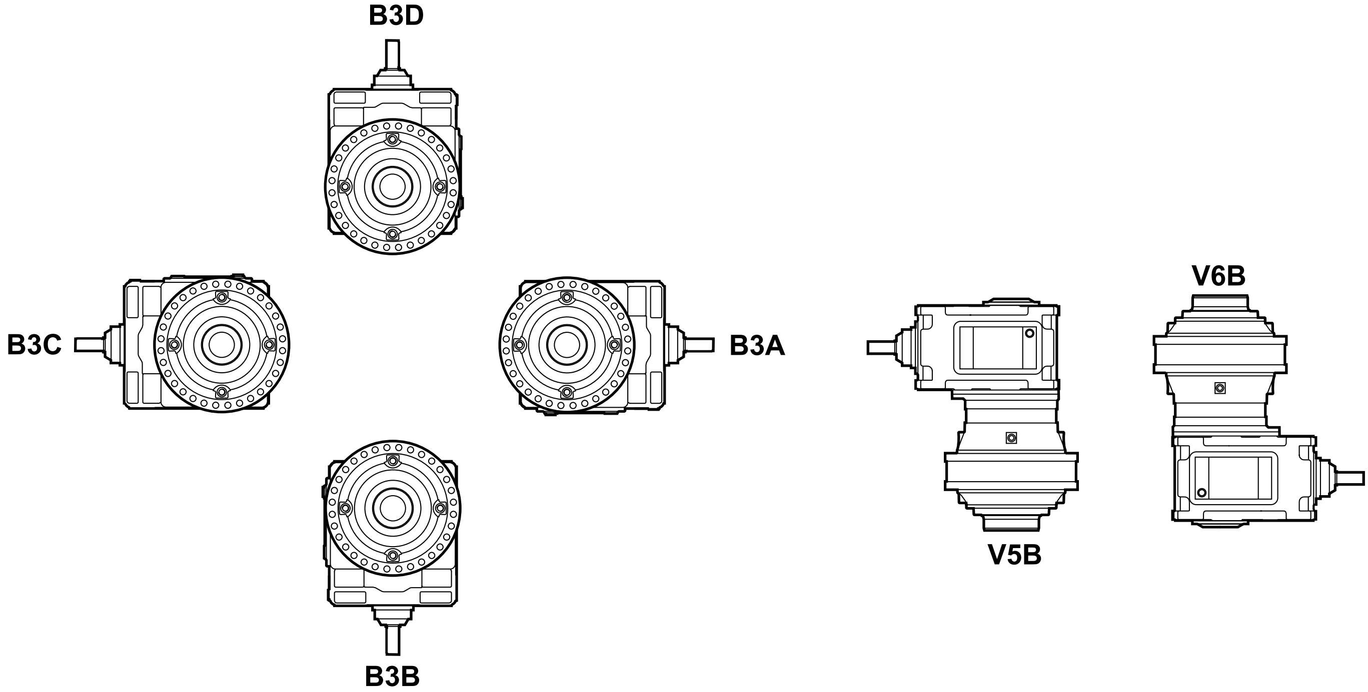
If there is no filtering and cooling circuit, the first oil change must be done after 500–600 hours of operation.
Subsequently, the following oil change frequencies are recommended:

Oil temperature [°C]	**Oil change interval** [h]	
	Synthetic Oil	**Mineral Oil**
≤ 65	10´000	4´000
65 – 80	8´000	3´000

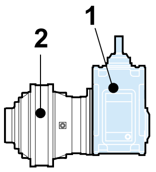
In case of heavy duty applications, the above values must be halved. The values given in the table refer to a work environments free from external contamination.
It is advisable to carry out the oil change with the gearbox hot, (approximately 40°C) to prevent sludge from forming and to help it drain completely.

For the correct procedure, follow the rules given in the installation and maintenance manual supplied with each gearbox.
It is advisable to check the oil level periodically.
Check for leaks if more than 10% the total volume has to be added.

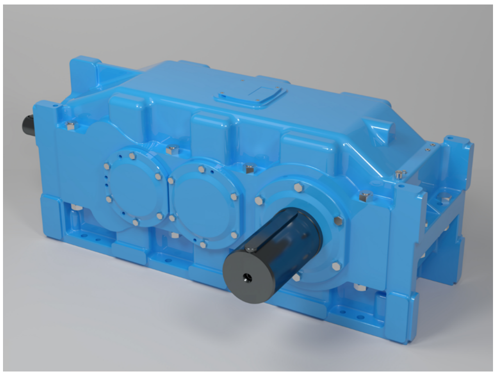
Mounting position



Oil quantity [l]



SL2PLB		B3A	B3B	B3C	B3D	V5B	V6B		Kg
8516	**1**	20	28	20	36	30	40		849
	2	16	16	16	16	32	32		
12020	**1**	40	50	40	64	60	80		1186
	2	20	20	20	20	40	40		
18020	**1**	40	50	40	64	60	80		1354
	2	27	27	27	27	54	54		
25025	**1**	70	74	70	89	105	140		2217
	2	35	35	35	35	70	70		
35031	**1**	120	134	120	156	180	240		3164
	2	45	45	45	45	90	90		



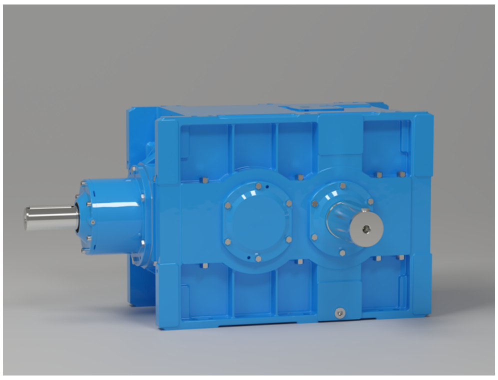
Brevini EvoMax™

The Brevini EvoMax™ gearbox series is a further development of the POSIRED 2 series from PIV Drives GmbH. The development has incorporated over 90 years of application knowledge and customer feedback and the outcome is a series of highly reliable, efficient and economical products.

The development of the Brevini EvoMax™ gearbox series enabled the improvement in torque density, smaller physical envelope, higher efficiency, lower weight, noise and power consumption. Overall, the modular design of the Brevini EvoMax™ series gives sustainable and efficient transmission that minimize operating costs and maximize availability.

Torque range 10 kNm up to 290kNm

Ratios from 4 up to 500

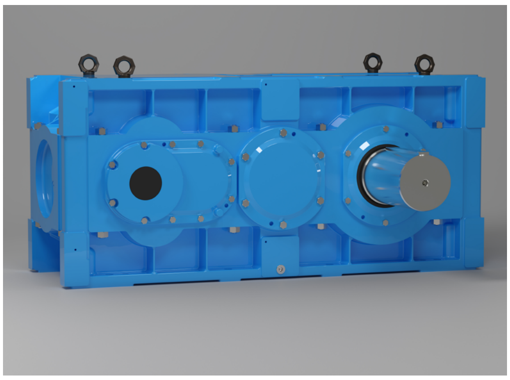


Brevini Posired 2 PB - PLB

The Posired 2 is a bevel-helical gearbox series with 2, 3 and 4 helical bevel helical gear stages. The gearbox based on the modular system of Brevini EvoMax™ .

Torque range from 340 kNm up to 805 kNm.

Ratios up to 560.

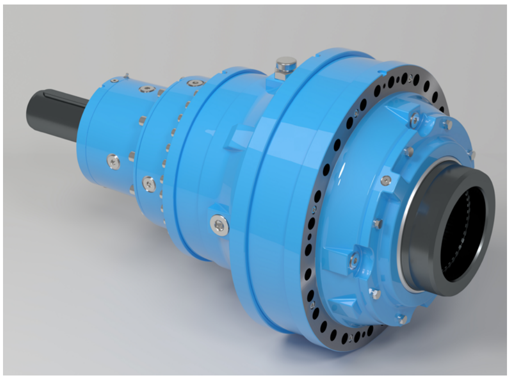


Brevini Posired 2 Big sizes

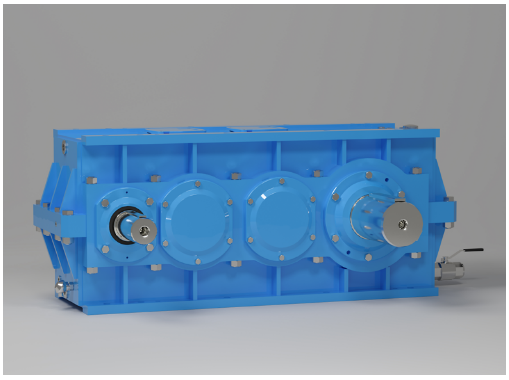
The Posired 2 is a bevel-helical gearbox series with 2, 3 and 4 helical bevel helical gear stages. The gearbox based on the modular system of Brevini EvoMax™ .

Torque range from 340 kNm up to 805 kNm.

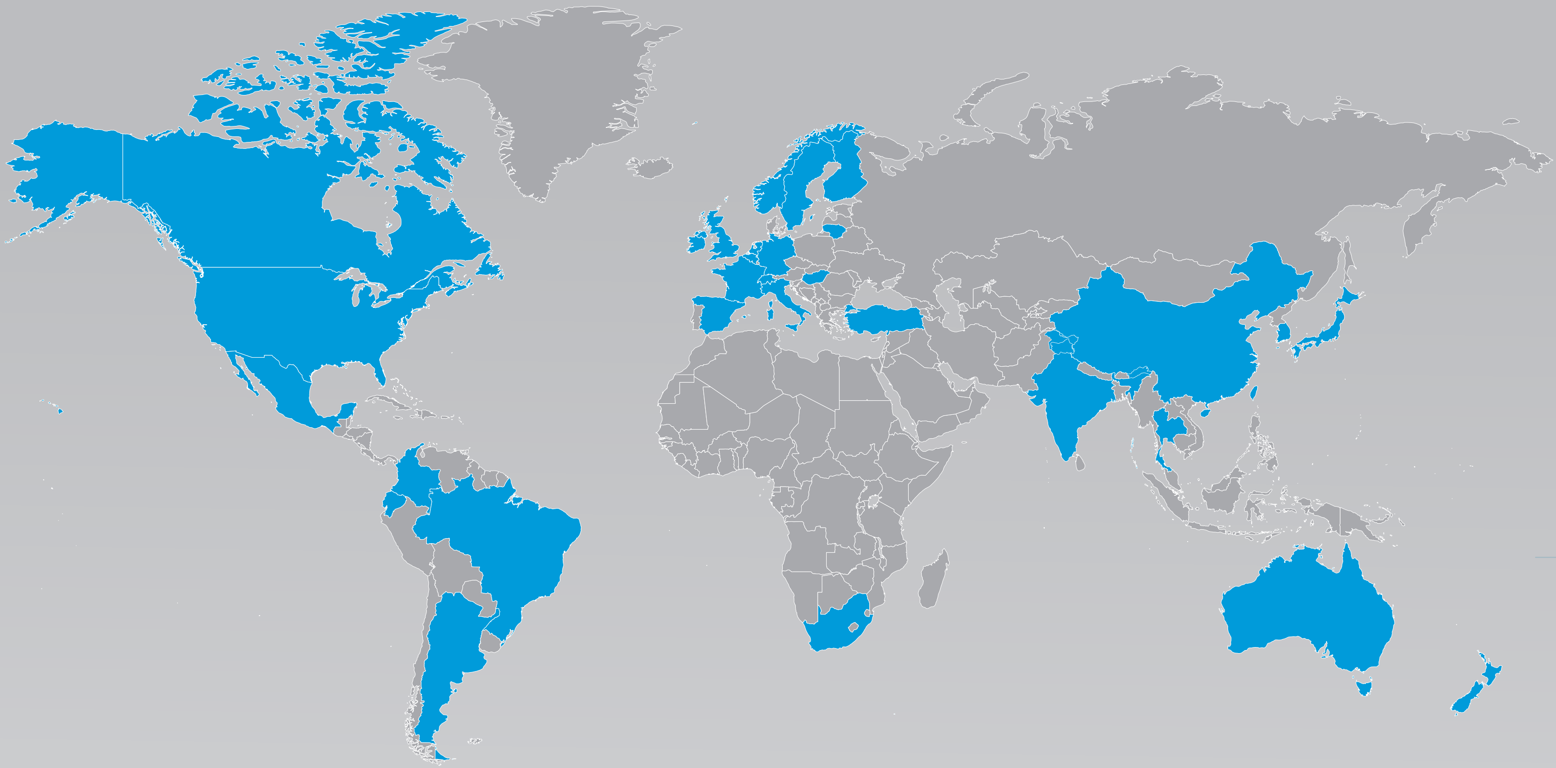
Ratios up to 560.



Brevini® S Series planetary gearboxes
S Series planetary gearboxes are designed to ensure effective performances and quite operation in multiple possible configurations.
Torques from 16.000 Nm to 1.100.000 Nm



POSIRED N
The POSIRED N is a helical gearbox with a extended center distance
Torquerange 8 kNm up to 290 kNm
Ratios from 12,5 up to 500



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BREVINI® Motion Systems

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