RUBIX

evox PLATFORM INCLUDED | Ex INCLUDED

300M SERIES

IE2-IE3

Modular planetary gearboxes

Bonfiglioli

Revisions

Refer to page 632 for the catalogue revision index. Visit www.bonfiglioli.com to search for catalogues with up-to-date revisions.

1 SYMBOLS AND UNITS OF MEASURE

Symbols	Units of Measure	Description
$A_{c\ 1,\ 2}$	[N]	Calculated thrust load
$A_{n\ 1,\ 2}$	[N]	Rated thrust load
A_{r2}	[N]	Thrust load at gearbox output shaft
F_h	–	Lifetime factor for gearbox calculation
$F_{h\ 1,\ 2}$	–	Lifetime factor for bearing calculation
$f_{n\ 1,\ 2}$	–	Speed factor referred to input and output shaft loading
f_L	–	Lifetime factor
f_m	–	Increase factor
$f_{h\ 1,\ 2}$	–	Load corrective factor on shafts
f_S	–	Service factor
f_S'	–	Service factor required by the application
f_t	–	Thermal factor
f_v	–	Speed factor
h	[h]	Lifetime in hours
i	–	Reduction ratio
K_a	–	Axial load duty factor
K_r	–	Radial load factor
I	–	Intermittence factor
M_2	[Nm]	Torque delivered to output shaft
M_{c2}	[Nm]	Calculated torque at gearbox output
M_{2REF}	[Nm]	Reference torque
M_{n2}	[Nm]	Gearbox rated output torque
M_{2max}	[Nm]	Gearbox max. output torque
Mb	[Nm]	Rated brake torque
$M_{r\ 1,\ 2}$	[Nm]	Required torque at gearbox
$n_{\ 1,\ 2}$	[min^{-1}]	Angular speed

Symbols	Units of Measure	Description
p	[bar]	Hydraulic oil pressure
P_1	[kW]	Max transmissible power at gearbox input
P_1'	[kW]	Transmitted power at gearbox input
P_2	[kW]	Transmitted power at gearbox output
P_n	[kW]	Motor rated power
P_{r1}	[kW]	Required input power
P_{r2}	[kW]	Output power at n_2 max
P_{r2}'	[kW]	Output power at n_2 min
P_S	[kW]	Excess power
P_T	[kW]	Gearbox thermal capacity
Q	[l/min]	Hydraulic flow rate
$R_{c\ 1,\ 2}$	[N]	Calculated radial load
$R_{n1\ 1,\ 2}$	[N]	Rated radial load at shaft mid-point
$R_{x\ 1,\ 2}$	[N]	Rated radial load at gearbox re-calculated with respect to different load application points
t_a	[°C]	Ambient temperature
t_s	[°C]	Surface temperature
t_o	[°C]	Oil temperature
V	[cm^3]	Hydraulic motor displacement
V_c	[cm^3]	(Theoretical) Hydraulic motor displacement
X	[mm]	Load application distance from shaft shoulder
η_d	–	Dynamic efficiency
Z	–	Frequency of starts

$_1$ value applies to input shaft

$_2$ value applies to output shaft

Symbol referring to weight of gearboxes.

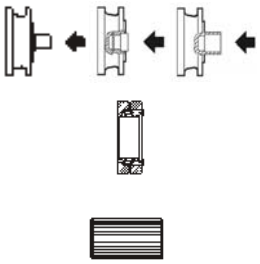
Columns marked with this symbol indicate the reference page showing dimensions.

This symbol identifies reference page number.

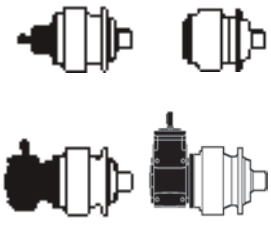
DANGER - WARNING
This symbol indicates situations of danger, which if ignored, may result in serious injury to the operator.

IMPORTANT
This symbol indicates important technical information.

Apply to equipment complying with “ATEX” Directive



These symbols identify the mounting positions of accessories.



These symbols identify the position of gearbox input (black-filled areas).

The number associated with the wrench symbol indicates the tightening torque for friction coupling screws.

Negative multidisc brake.

Hydraulic motor connection.

Cover for standard input flanging.

Inline units.

Right angle units.

Worm-planetary combined design.

Bevel helical-planetary combined design.

2 INTRODUCTION

This catalogue presents BONFIGLIOLI RIDUTTORI's range of Series 300M modular planetary gearboxes. The range has been expanded and integrated with new sizes, technical improvements and enhanced modularity right through to the larger sizes. This feature signifies greater flexibility in internal production to ensure quick availability of products in the sizes and types requested either directly from the company or from the many affiliates belonging to the BONFIGLIOLI sales network in various countries around the world.

The gearboxes are tested in conformity with the following standards:

ISO 6336 : 2006 - method B for gears
ISO 281 for bearings
DIN 743 : 2012 for shafts

3 ALLOWED TEMPERATURE LIMITS

Symbols	Description / Condition	Value (*)	
		Synthetic Oil	Mineral Oil
t_a	Ambient temperature		
$t_{au\ min}$	Minimum operating ambient temperature	**-30°C**	**-10°C**
$t_{au\ Max}$	Maximum operating ambient temperature	**+50°C**	**+40°C**
$t_{as\ min}$	Minimum storage ambient temperature	**-40°C**	**-10°C**
$t_{as\ Max}$	Maximum storage ambient temperature	**+50°C**	**+50°C**
t_s	Surface temperature		
$t_{s\ min}$	Minimum gearbox surface temperature starting with partial load (#)	**-25°C**	**-10°C**
$t_{sc\ min}$	Minimum gearbox surface temperature starting with full load	**-10°C**	**-5°C**
$t_{s\ Max}$	Maximum casing surface temperature during continuous operation (measured next to the gearbox input)	**+100°C**	**+100°C** (@)
t_o	Oil temperature		
$t_{o\ Max}$	Maximum oil temperature during continuous operation	**+95°C**	**+95°C** (@)

(*) = Refer to the table "Selection of the optimal oil viscosity" for further information about minimum and maximum values of different oil viscosity and for using hydraulic circuits. For values of t_a < -20°C and t_s, t_o > 80 °C, choose (as permitted in the product configuration stage) the sealing type of the most suitable material to the type of application. If needed contact Bonfiglioli Technical Service.

(@) = Continuous operation it is not advised if t_s and t_o range is 80°C to 95 °C.

(#) = For full load start-up it is recommended to ramp-up and provide for greater absorption of the motor. If needed, contact Bonfiglioli Technical Service.

4 SPECIFICATIONS

The 300M series consist of a range of multi-purpose planetary gearboxes that can be operated by either hydraulic or electric motors. Basic features are:

- 20 frame sizes of modular design
- output torque up to 1.286.700 Nm
- transmissible power up to 1050 kW
- ratios from 3,4:1 to 5234:1
- versions:
  - in-line with 1 to 4 reductions
  - right angle (spiral bevel gear set into first stage) with 2 to 4 reductions
- combinations with:
  - worm gear units
  - bevel-helical gear units
- flange, foot and shaft mounting arrangements
- slow output shafts: keyed, splined male, splined hollow, shrink disk mounted
- input adaptors for:
  - IEC-normalised electric motors
  - integral motor for in-line units up to size 307 and for units combined with bevel helical and worm gears
  - hydraulic motors by major manufacturers and according to SAE J744C
- parallel input shafts
- gearmotors with:
  - electric motors IEC
  - hydraulic orbital motors by BONFIGLIOLI TRASMITAL MG
- negative hydraulic parking brakes for operation by hydraulic motors
- output shaft accessories:
  - flanges
  - pinions
  - splined bars
  - shrink discs

More design features:

- high ratio of transmissible torque to overall dimensions
- high overhung and axial load capacity due to heavy duty tapered roller bearings featured on H and P versions
- high efficiency
- inner parts are coupled through splined connections rather than keys
- planetary gears mounted onto self-centering carriers to ensure the most even load distribution among planetary gears
- housing made of spheroidal cast iron.

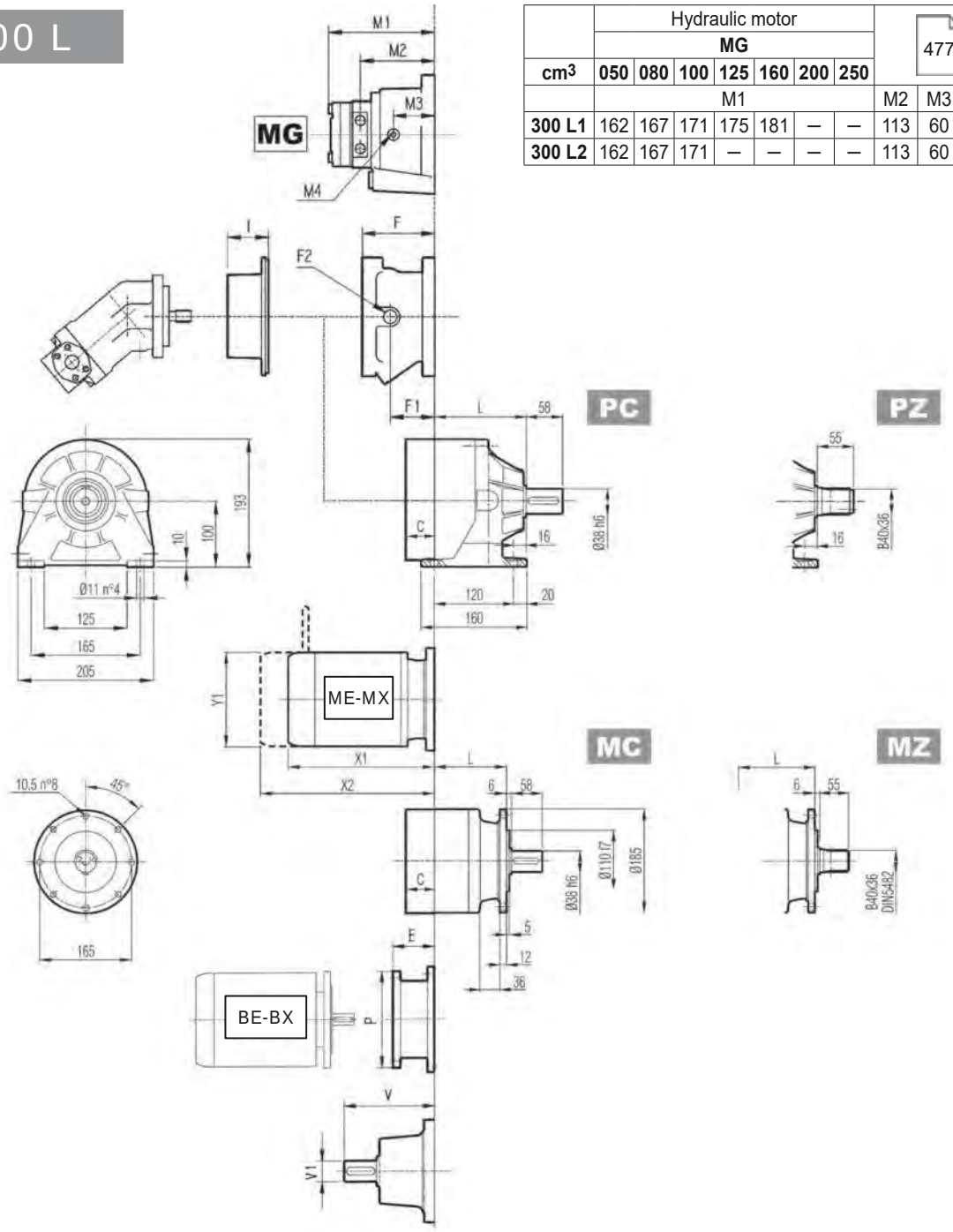
Configurations

(A 1)

Configuration	Power	Torque	Ratios	Efficiency	Noise level
	$0.25 \le P_n$ [kW] ≤ 55	$M_{2REF} \le 1286700$ Nm	$3.4 \le i \le 2916$	High	Medium
	$0.25 \le P_n$ [kW] ≤ 55	$M_{2REF} \le 656000$ Nm	$7 \le i \le 953$	High	Medium
	$0.12 \le P_n$ [kW] ≤ 22	$M_{2REF} \le 656000$ Nm	$370 \le i \le 5234$	Medium	Low
	$0.12 \le P_n$ [kW] ≤ 22	$M_{2REF} \le 15680$ Nm	$18.7 \le i \le 731$	High	Low

26 DIMENSIONS

300 L

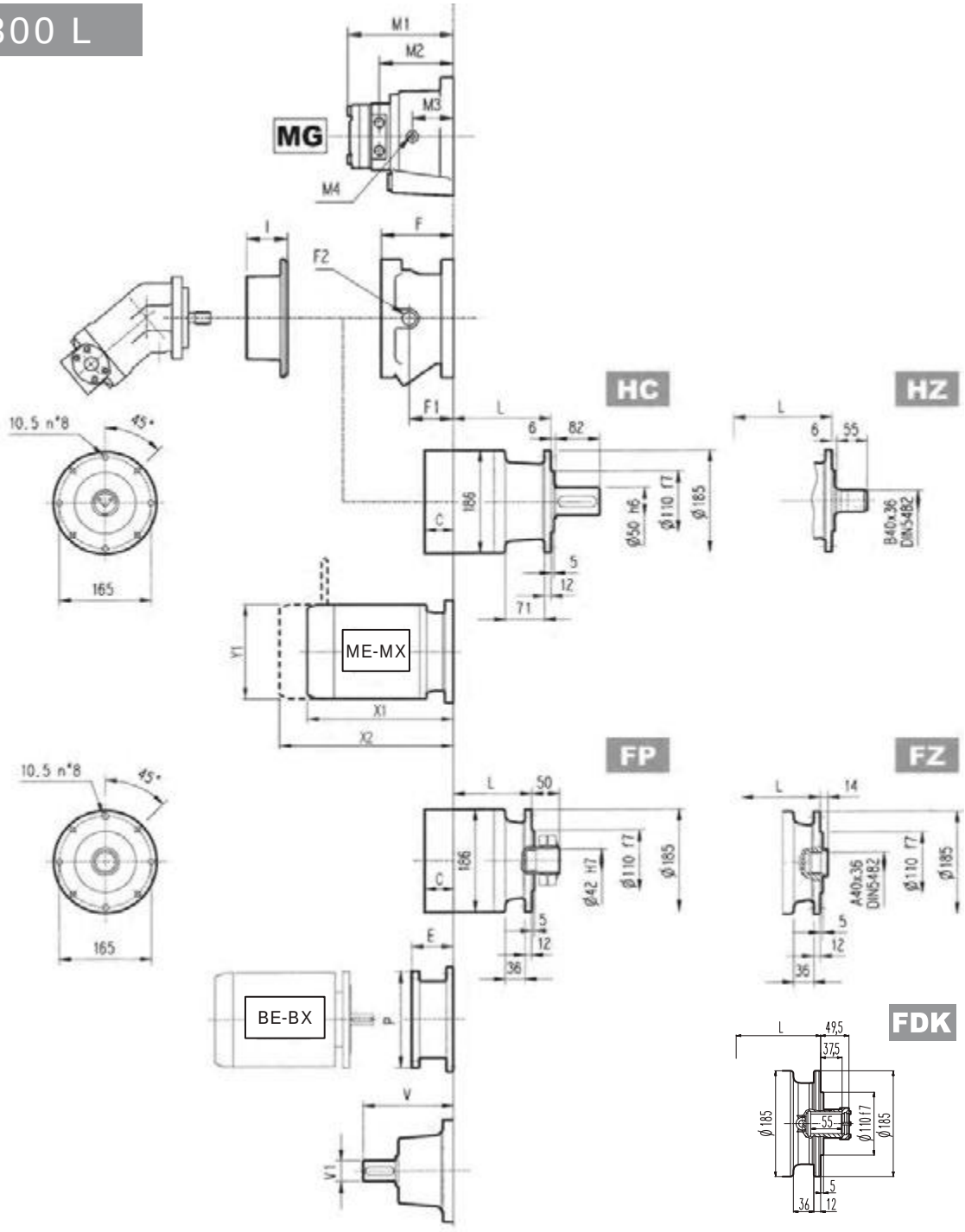


	Hydraulic motor MG							477			
cm³	**050**	**080**	**100**	**125**	**160**	**200**	**250**				
	M1							M2	M3	M4	
300 L1	162	167	171	175	181	–	–	113	60	1/4G	14
300 L2	162	167	171	–	–	–	–	113	60	1/4G	14

	L							
	MC - MZ	**PC - PZ**	**HC - HZ**	**FP - FZ - FDK**	**MC - MZ**	**PC - PZ**	**HC - HZ**	**FP - FZ - FDK**
300 L1	80	86	115	80	18	23	20	16
300 L2	133	139	168	133	22	27	24	20
300 L3	186	192	221	186	26	31	28	24
300 L4	239	245	274	239	30	35	32	28

	V	**V1**		**V**	**V1**		**C**	**Input**	**I**	**F**	**F1**	**F2**	**Type**	**Input**	
300 L1	137.5	24	6	158	38	7	37	A	467	105	65	1/4 G	4	A	10
300 L2	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10
300 L3	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10
300 L4	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10

300 L



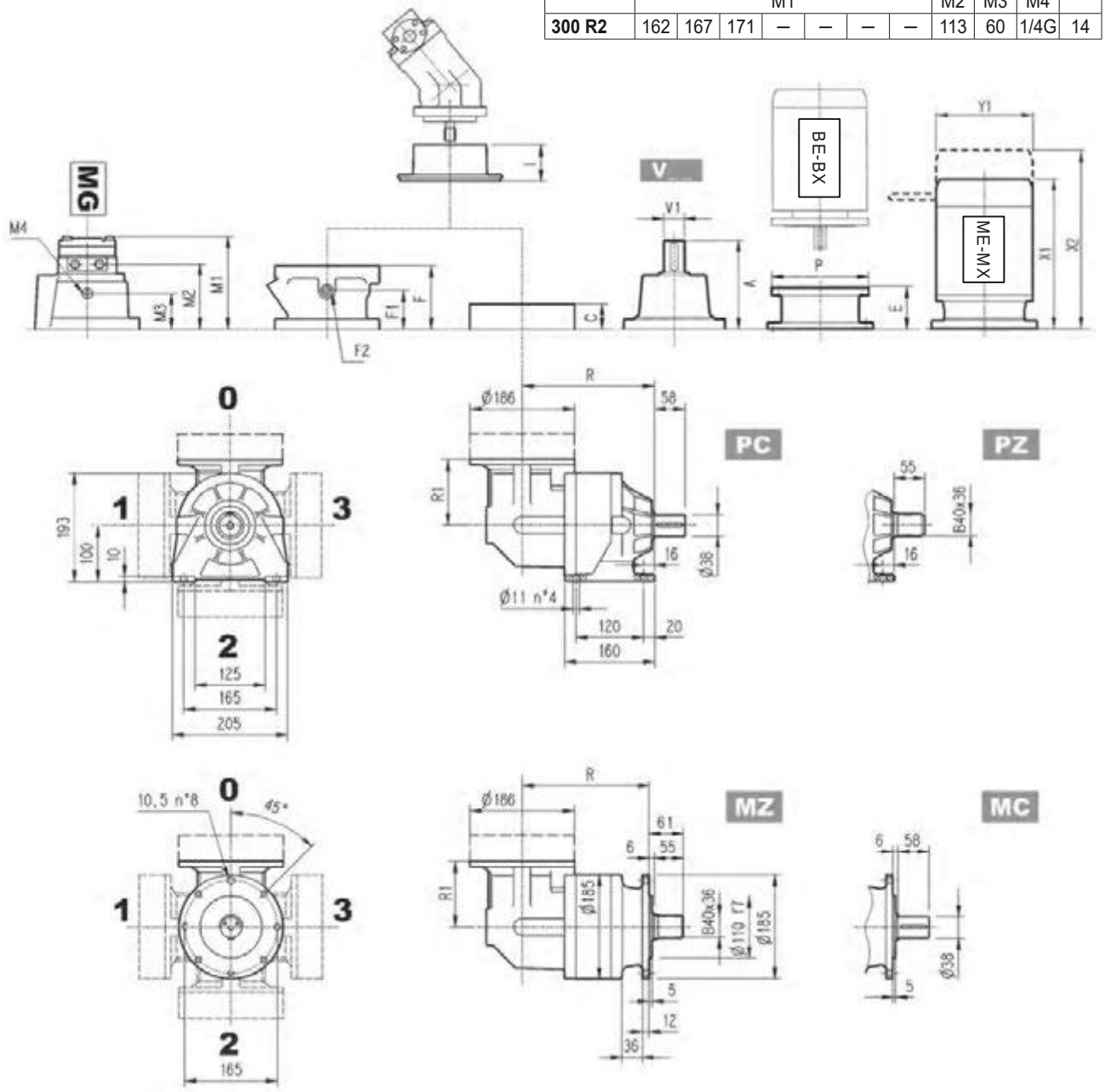
FP M_{2max} = 1300 Nm

	P71		P80		P90		P100		P112		P132	
	E	P	E	P	E	P	E	P	E	P	E	P
300 L1	65	160	84	200	84	200	94	250	94	250	114	300
300 L2	65	160	84	200	84	200	94	250	94	250	114	300
300 L3	65	160	84	200	84	200	94	250	94	250	114	300
300 L4	65	160	84	200	84	200	94	250	94	250	114	300

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
300 L1	253	314	138	324	399	156	357	447	195	401	493	195	460	559	258
300 L2	253	314	138	324	399	156	357	447	195	401	493	195	460	559	258
300 L3	253	314	138	324	399	156	357	447	195	401	493	195	460	559	258
300 L4	253	314	138	324	399	156	357	447	195	401	493	195	460	559	258

300 R

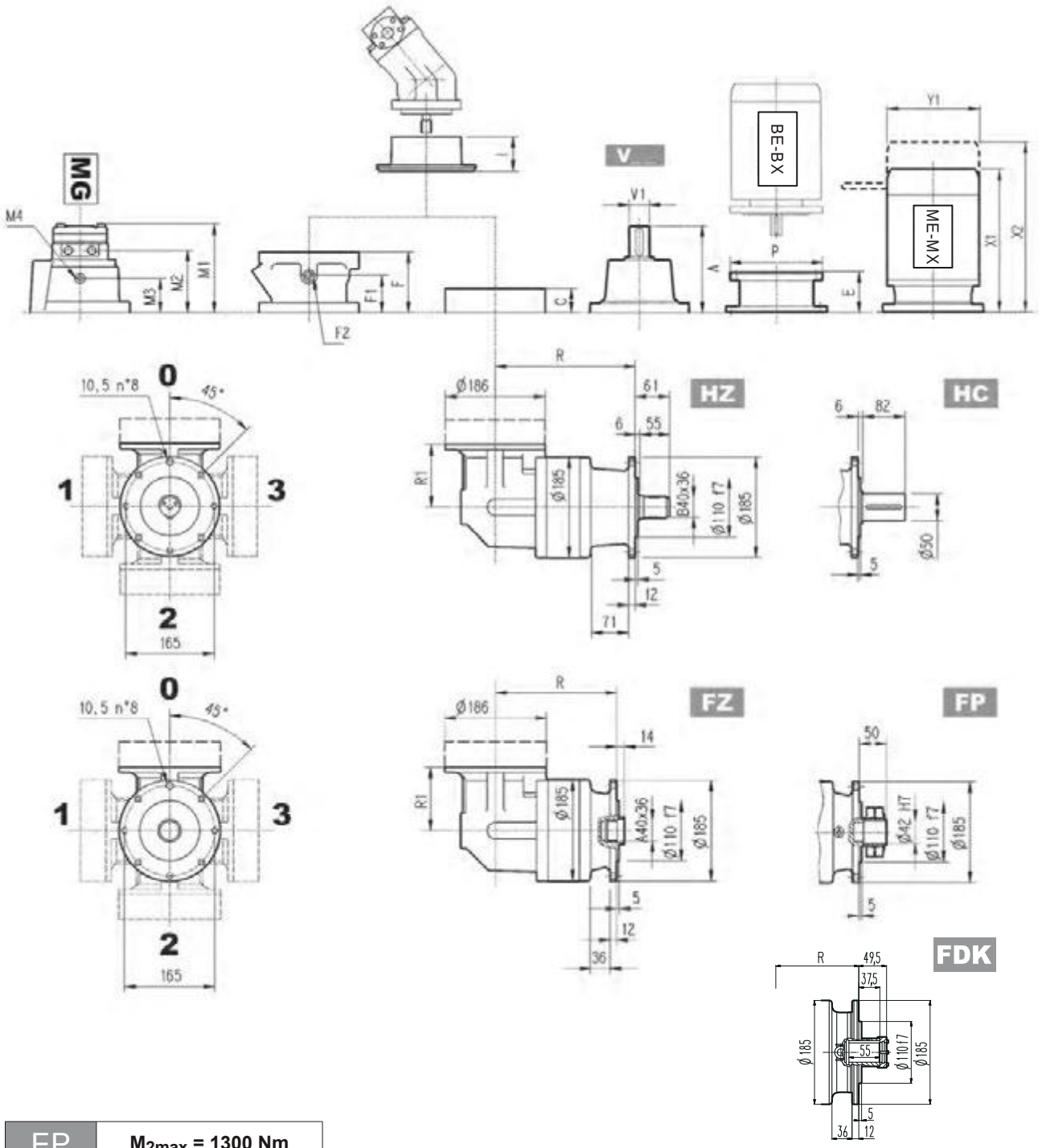
	Hydraulic motor							477			
	MG										
cm³	050	080	100	125	160	200	250				
	M1							M2	M3	M4	
300 R2	162	167	171	–	–	–	–	113	60	1/4G	14



	R				R1				
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK		MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
300 R2	172	178	207	172	122	32	37	34	30
300 R3	225	231	260	225	122	36	41	38	34
300 R4	278	284	313	278	122	40	45	42	38

	V	V1		V	V1		C	Input	I	F	F1	F2	Type	Input	
300 R2	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10
300 R3	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10
300 R4	137.5	24	6	158	38	7	37	A	467	105	65	1/4 G	4	A	10

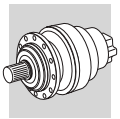
300 R



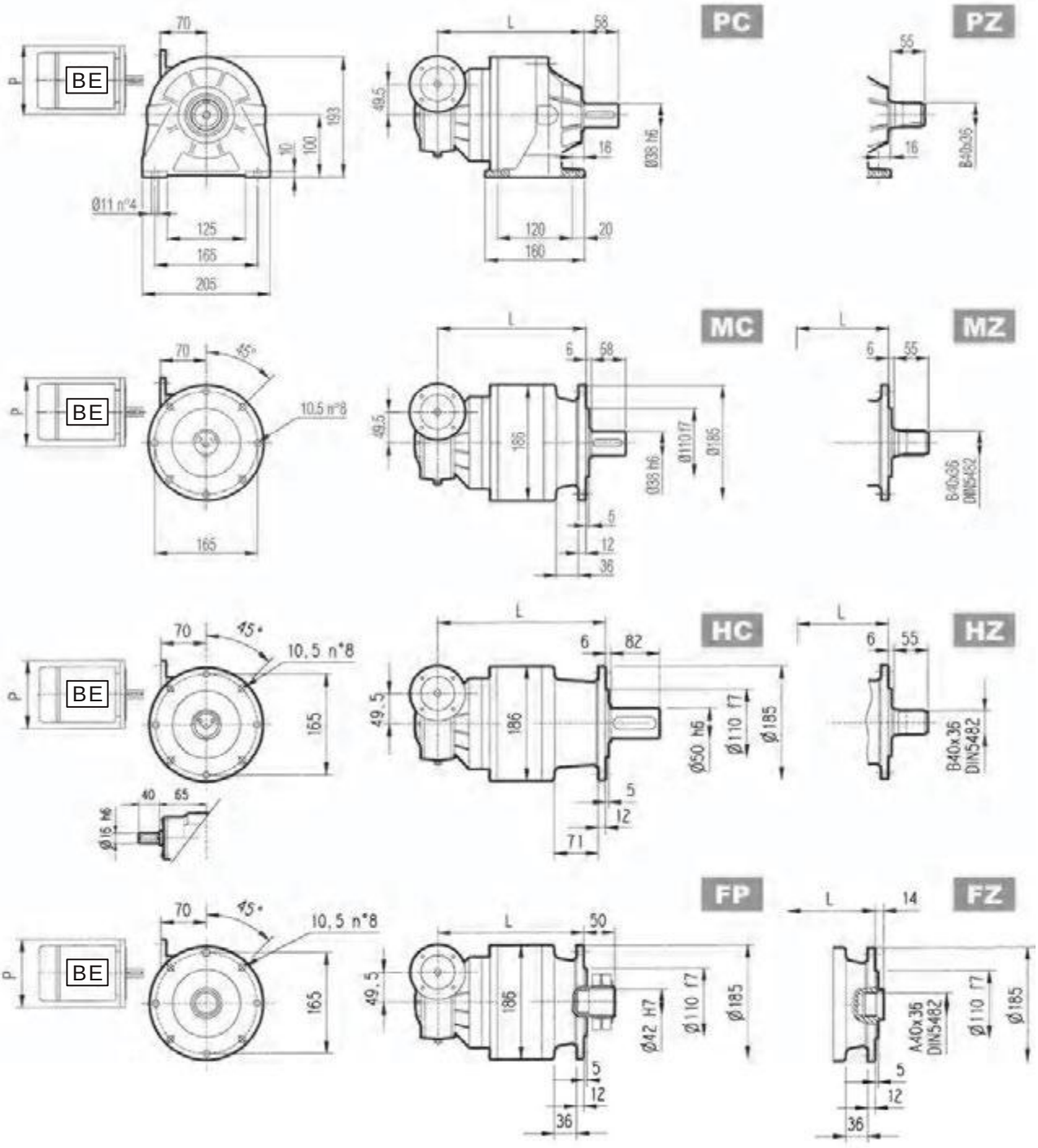
FP M_{2max} = 1300 Nm

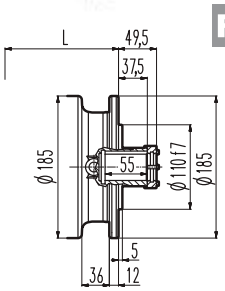
	P71		P80		P90		P100		P112		P132	
	E	P	E	P	E	P	E	P	E	P	E	P
300 R2	65	160	84	200	84	200	94	250	94	250	114	300
300 R3	65	160	84	200	84	200	94	250	94	250	114	300
300 R4	65	160	84	200	84	200	94	250	94	250	114	300

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
300 R2	253	314	138	372	444	156	405	495	195	437	529	195	508	607	258
300 R3	253	314	138	372	444	156	405	495	195	437	529	195	–	–	–
300 R4	253	314	138	372	444	156	405	495	195	–	–	–	–	–	–



3/V 00 L3

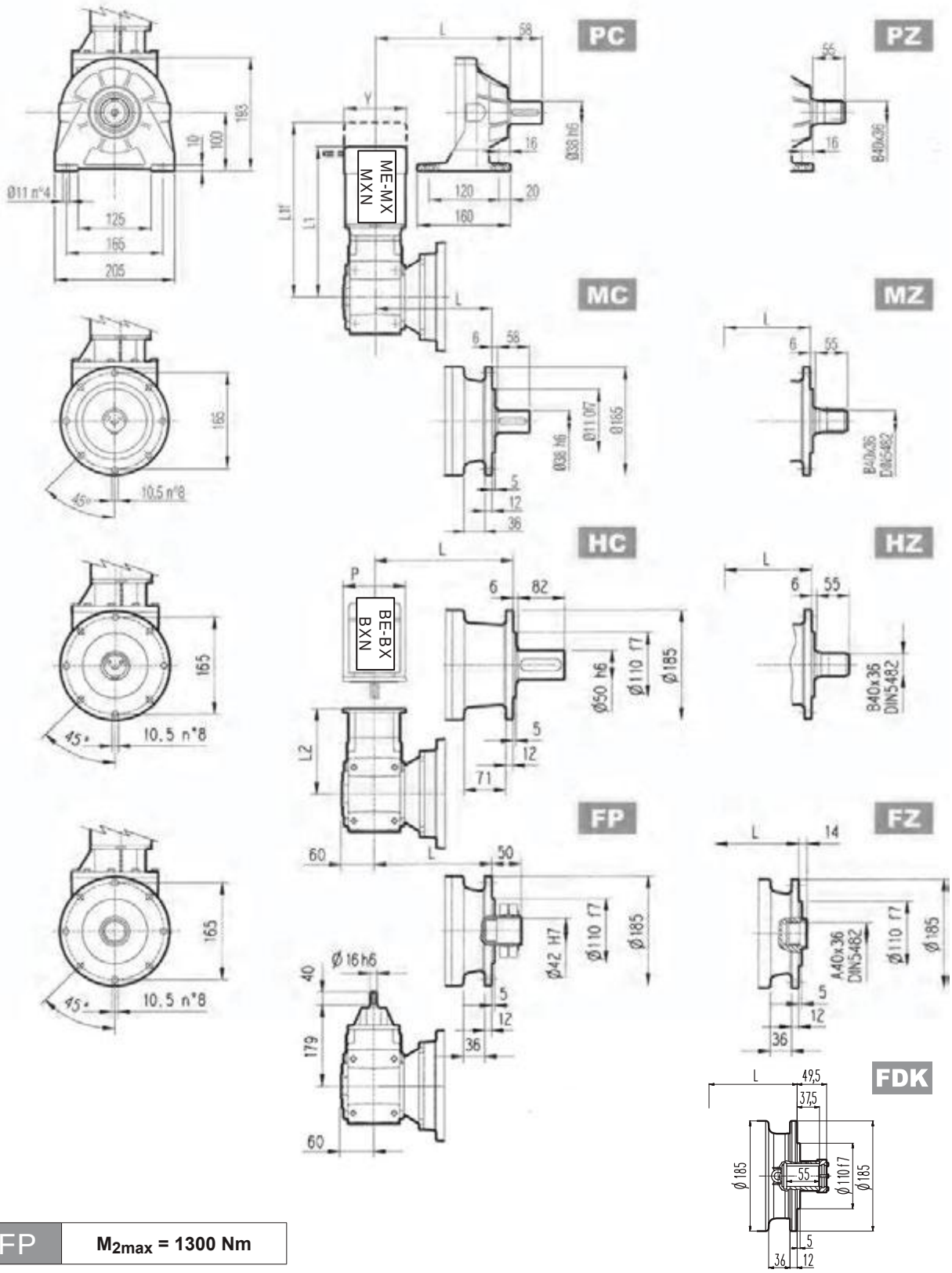




FP | **M_{2max} = 1300 Nm**

	L				kg				P63	P71	P80
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	P	P	P
3/V 00 L3	255	261	290	255	25	30	27	23	140	160	200

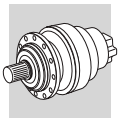
3/A 00 L2



FP | M_{2max} = 1300 Nm

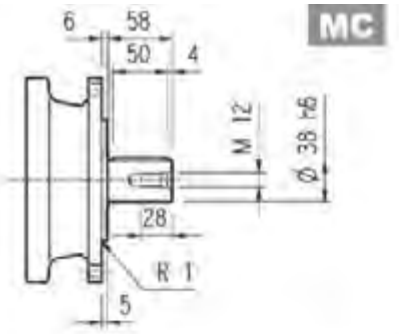
	L							
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
3/A 00 L2	193	199	228	193	38	43	40	36

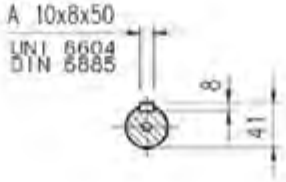
	P63		P71		P80		P90		P100		S1/S10+ME1/MXN10			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L		
	L2	P	L2	P	L2	P	L2	P	L2	P	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y
3/A 00 L2	212.5	140	212.5	160	232	200	232	200	242	250	396.5	455.5	138	440.5	498	156	471.5	561.5	195	515.5	607.5	195



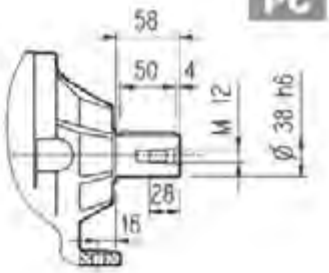
300 L | 300 R | 3/V 00 L3 | 3/A 00 L2

MC

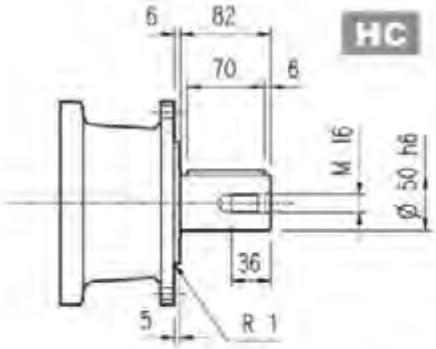


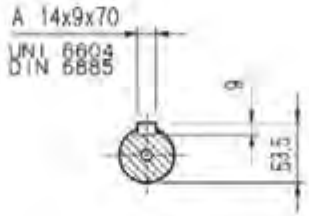


PC

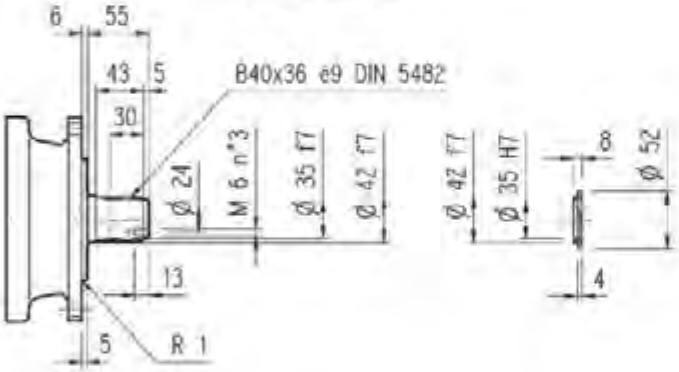


HC

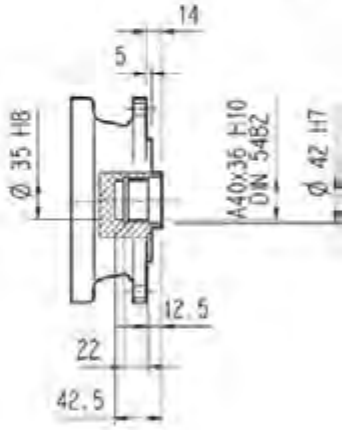




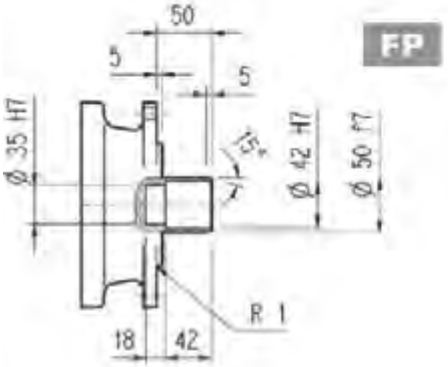
MZ HZ

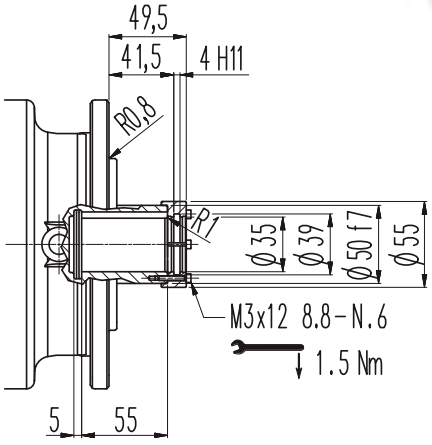


FZ

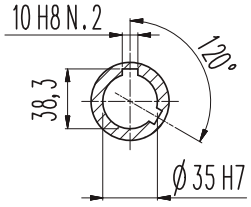


FP

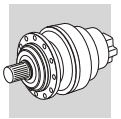




FDK



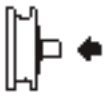
FP	M_{2max} = 1300 Nm

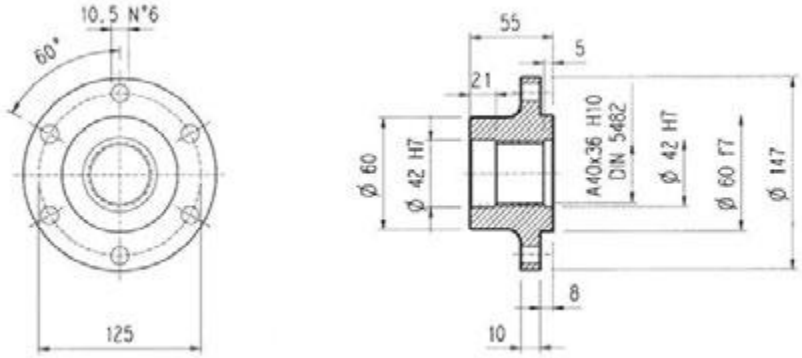


300 L | 300 R | 3/V 00 L3 | 3/A 00 L2

Flange

W0A

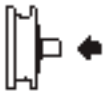


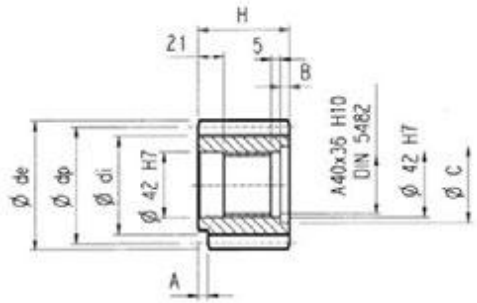


Material: Steel C40

Pinions

P...



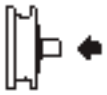


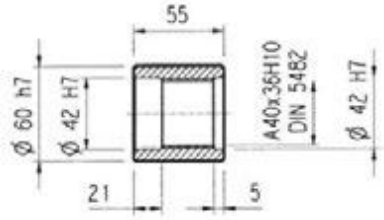
α = 20°

	m	z	x	dp	di	de	H	A	B	C	Material
PBE	4.5	14	0.507	63	56	75.5	55	—	—	—	Steel 39NiCrMo3 hardened and tempered
PCE	5	14	0.500	70	62.5	84.8	65	—	10	53	
PDC	6	12	0.250	72	61	84.8	59	14	4	54	
PDE	6	14	0.500	84	73	99.6	65	—	10	54	

Sleeve coupling

M0A

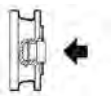


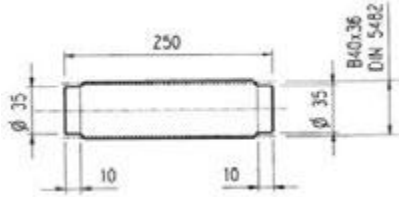


Material: Steel 16CrNi4

Splined bars

B0A

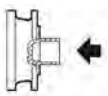


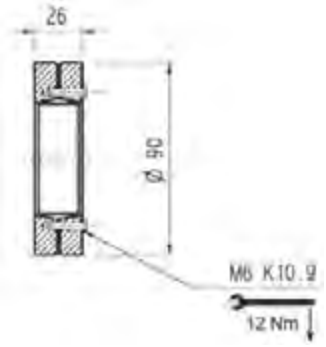


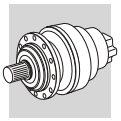
Material: Case hardening steel 18NiCrMo5 UNI 5331
must be case hardened 50-55 HRC

Shrink disc

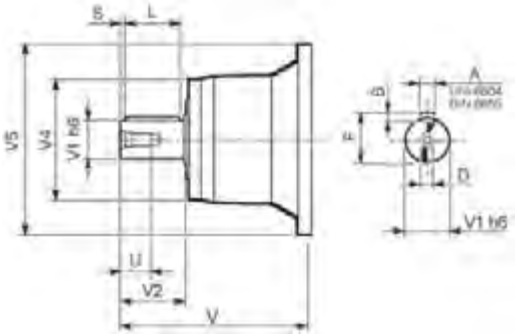
G0A





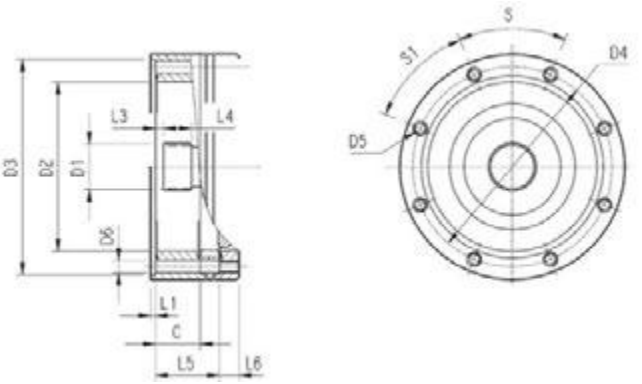


300 L 300 R



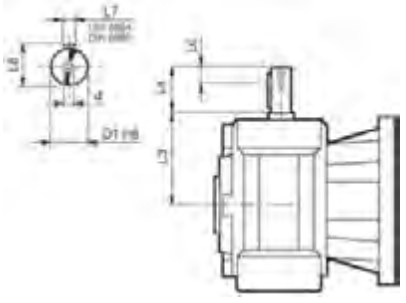
		V	V1	V2	V4	V5	A	B	F	L	S	D	U
300 L1	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
300 L2	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
300 L3	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
300 L4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
300 R2-R3-R4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28

300 L 300 R



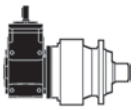
		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
300 L1	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	53	18	45°	45°	A
300 L2	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	106	18	45°	45°	A
300 L3	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	159	18	45°	45°	A
300 L4	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	212	18	45°	45°	A
300 R2-R3-R4	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	37	18	45°	45°	A

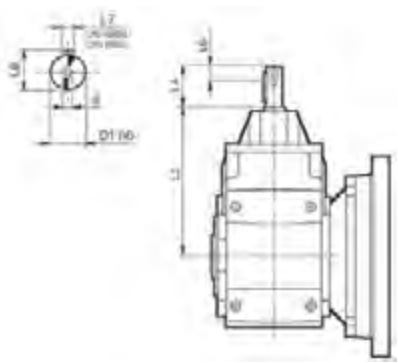
3/V 00 L3



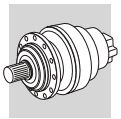
	D1 h6	L3	L4	L6	L7	L8	d
3/V 00 L3_HS	16	65	40	16	5	18	M6

3/A 00 L2



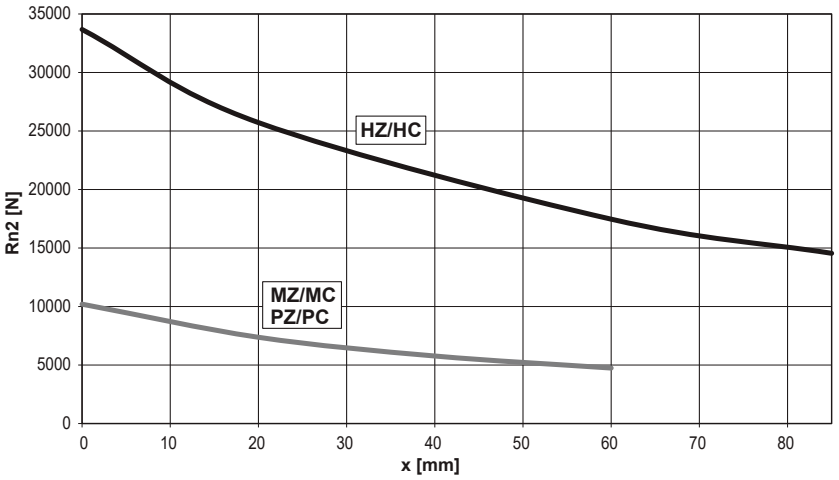


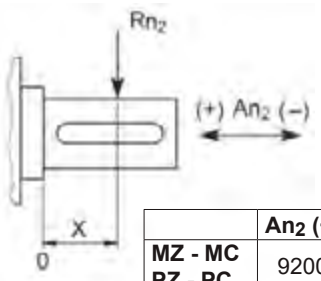
	D1 h6	L3	L4	L6	L7	L8	d
3/A 00 L2_HS	16	179	40	16	5	18	M6



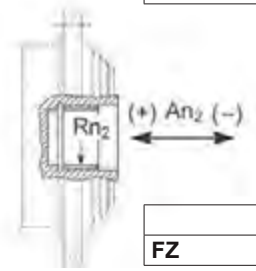
300 L | 300 R | 3/V 00 L3 | 3/A 00 L2

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$





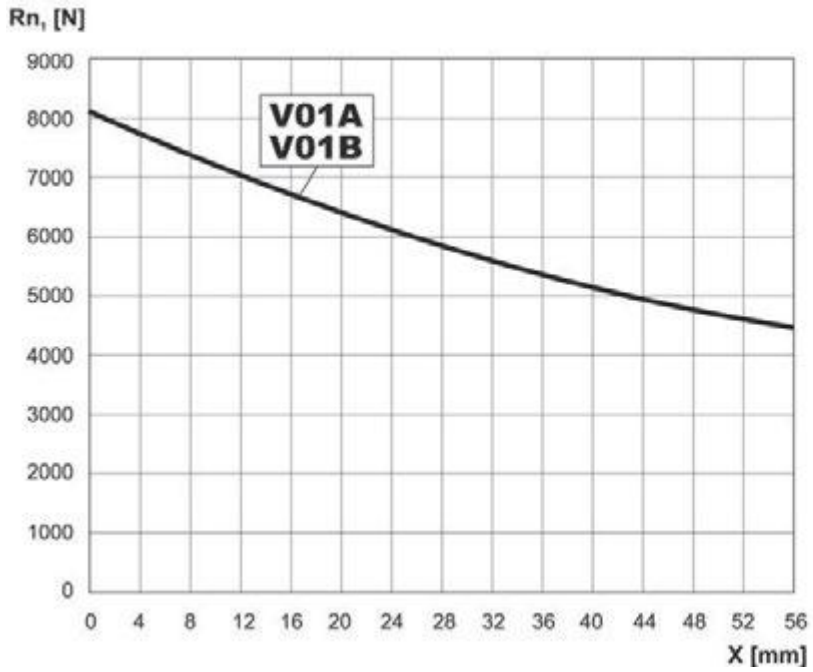
	An_2 (+)	An_2 (-)
MZ - MC PZ - PC	9200	6900
HZ - HC	20000	20000

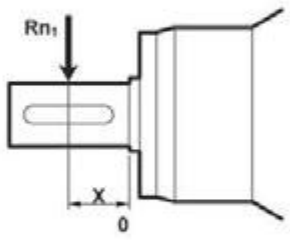


	Rn_2	An_2 (+/-)
FZ	3713	3713

Load corrective factor fh_2 on shafts	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
	fh_2	FZ	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		MZ - MC - PZ - PC	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HZ - HC	**1.27**	**1.27**	**1.26**	**1.00**	**0.62**	**0.50**

Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$

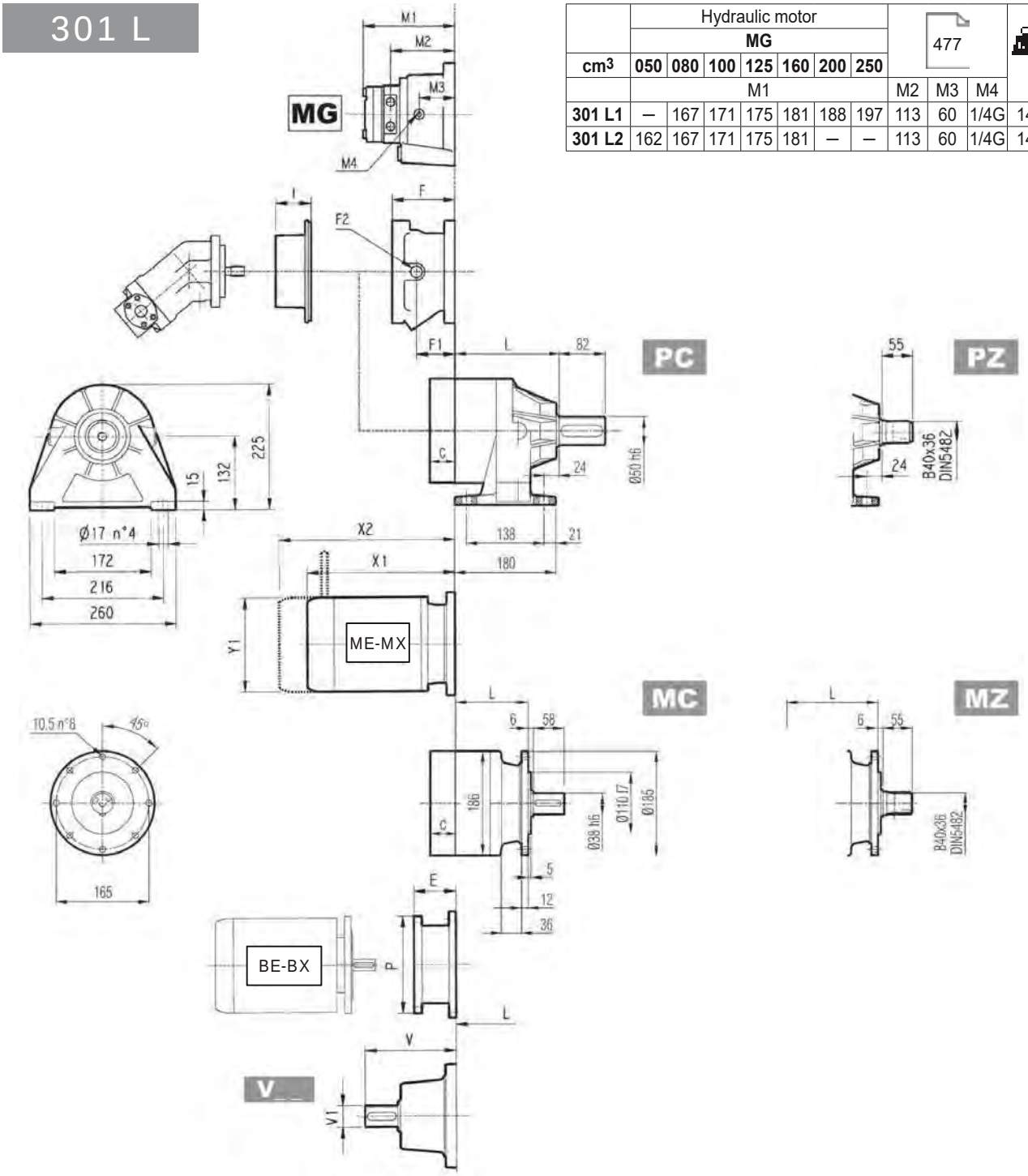




Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

301 L

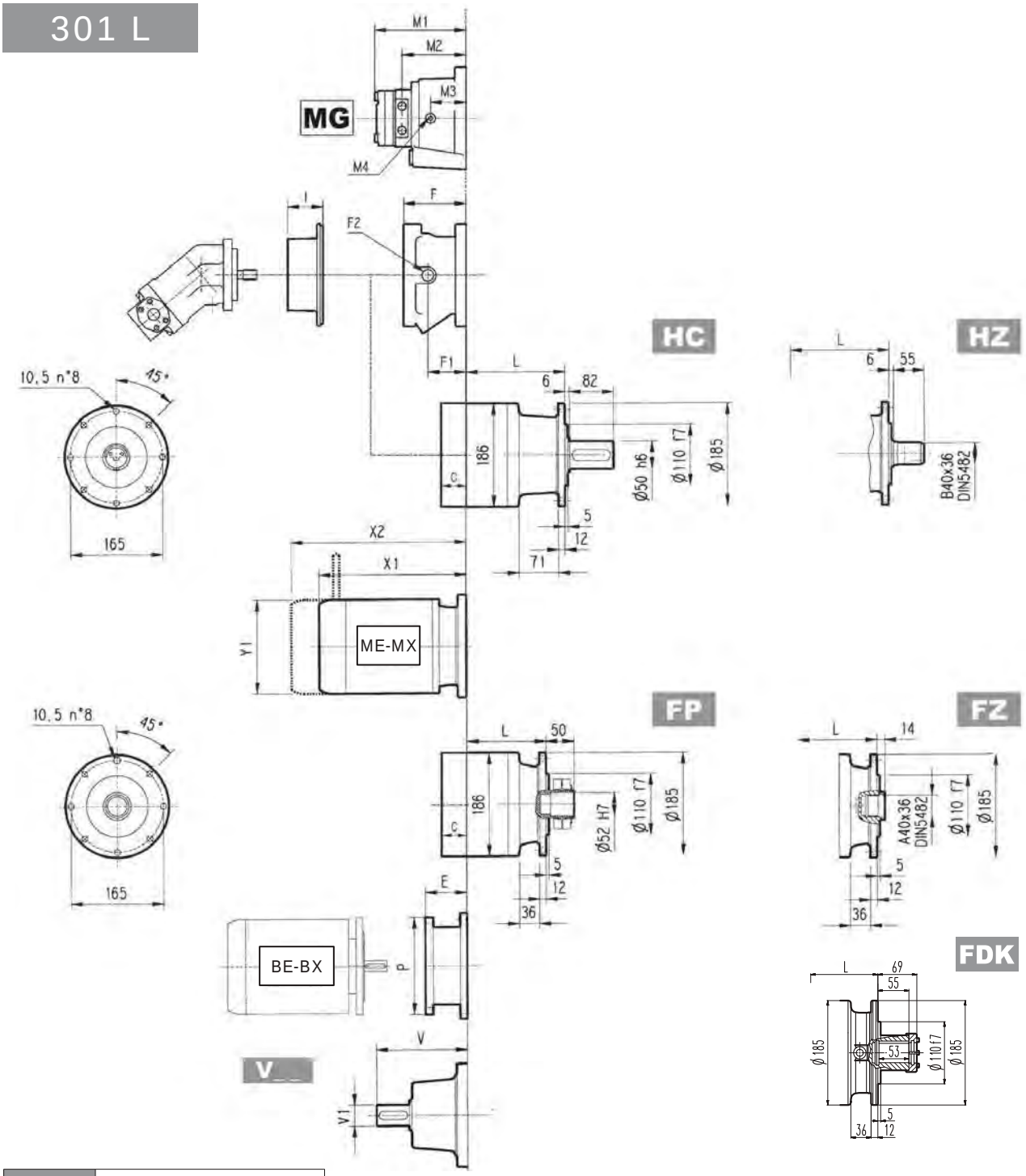
	Hydraulic motor							477			
	MG										
cm³	050	080	100	125	160	200	250				
	M1							M2	M3	M4	
301 L1	–	167	171	175	181	188	197	113	60	1/4G	14
301 L2	162	167	171	175	181	–	–	113	60	1/4G	14



	L				Kg			
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
301 L1	92	132	126	92	21	26	23	19
301 L2	145	185	176	145	25	30	27	23
301 L3	198	238	232	198	29	34	31	27
301 L4	251	291	285	251	33	38	35	31

	V	V1	Kg	V	V1	Kg	C	Input	I	F	F1	F2	Type	Input	
301 L1	137.5	24	6	158	38	7	37	A	467	105	65	1/4 G	4	A	10
301 L2	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10
301 L3	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10
301 L4	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10

301 L



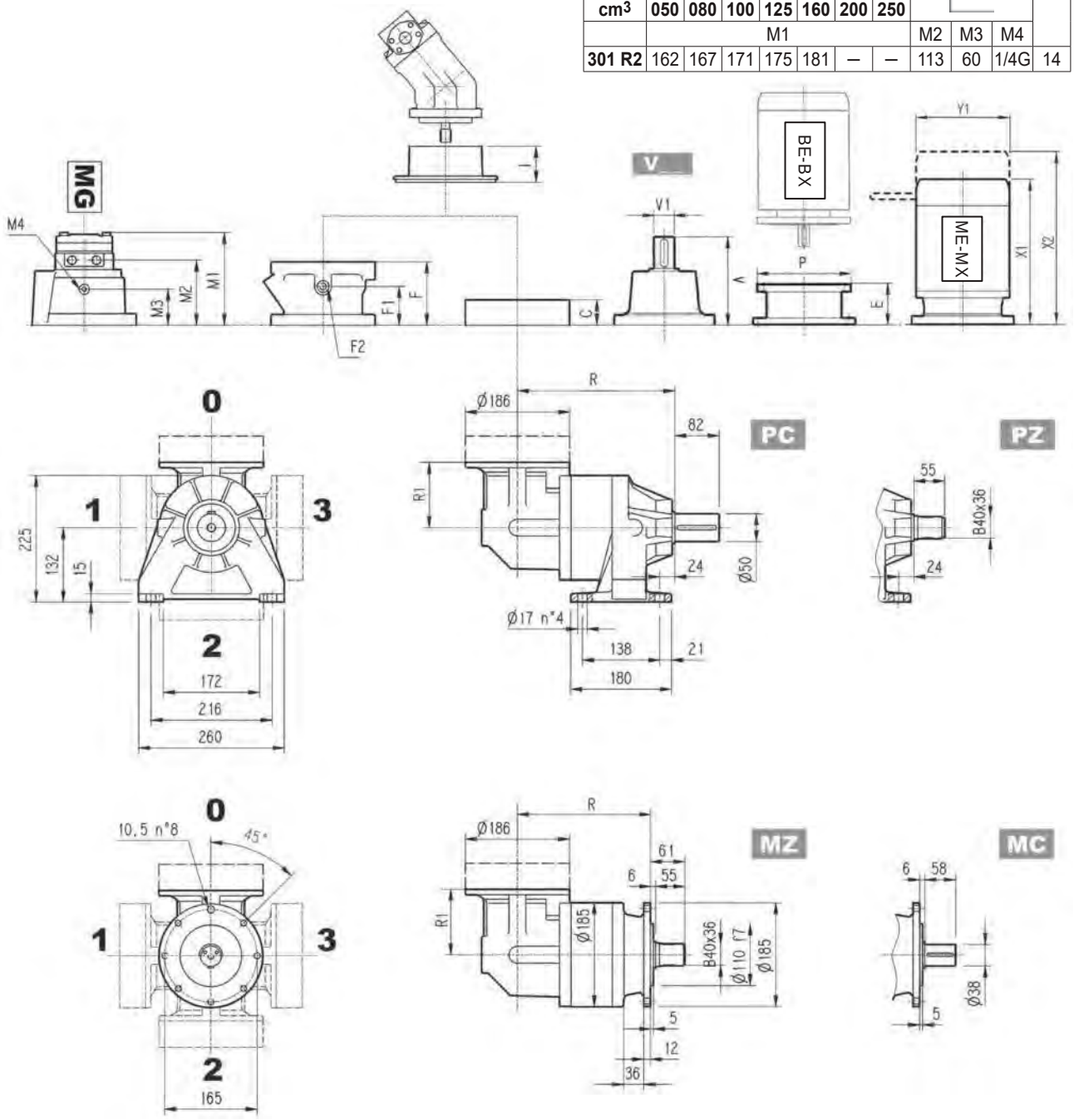
FP — M_{2max} = 2400 Nm

	P71		P80		P90		P100		P112		P132	
	E	P	E	P	E	P	E	P	E	P	E	P
301 L1	65	160	84	200	84	200	94	250	94	250	114	300
301 L2	65	160	84	200	84	200	94	250	94	250	114	300
301 L3	65	160	84	200	84	200	94	250	94	250	114	300
301 L4	65	160	84	200	84	200	94	250	94	250	114	300

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
301 L1	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258
301 L2	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258
301 L3	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258
301 L4	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258

301 R

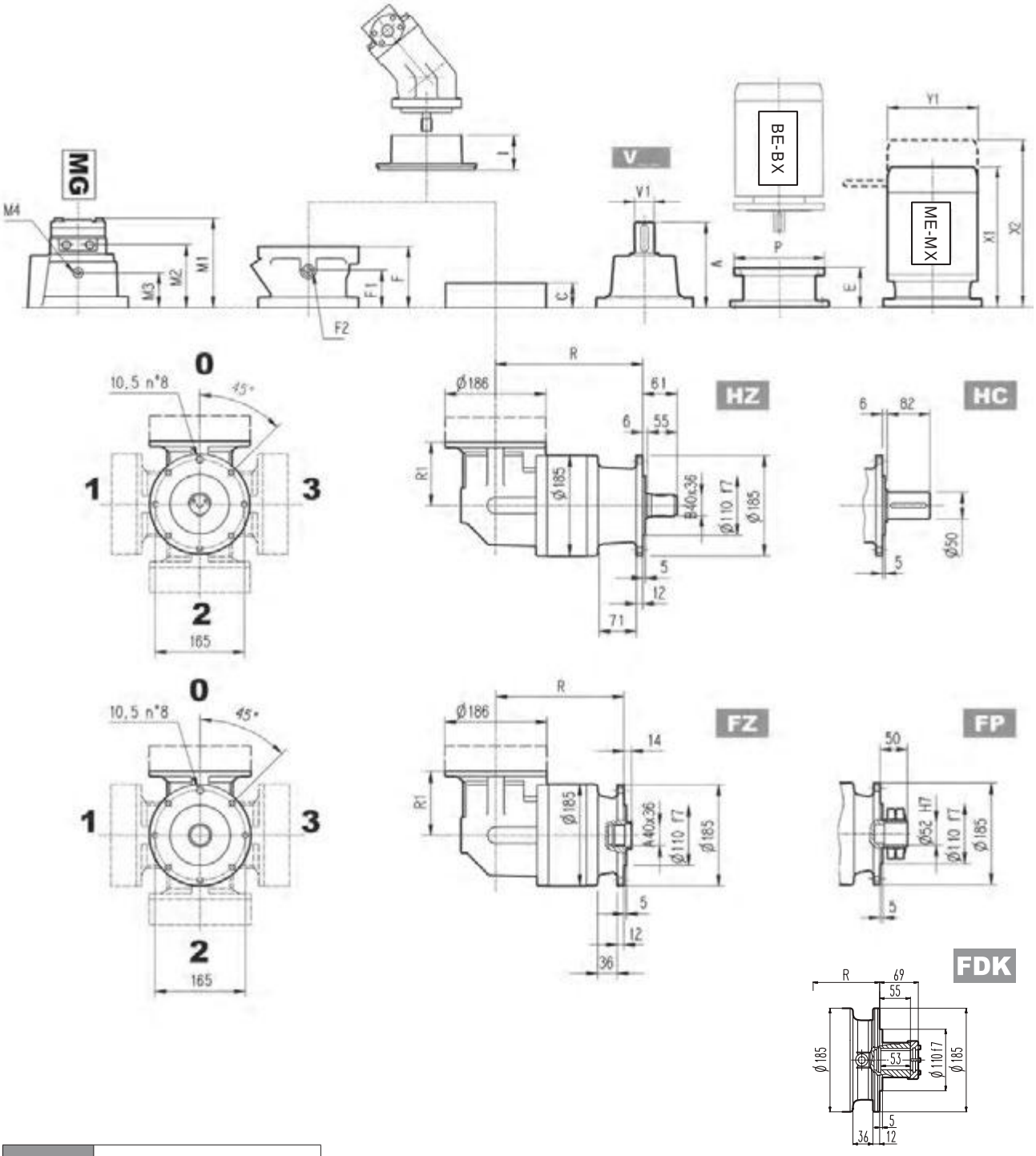
	Hydraulic motor							477			
	MG										
cm³	050	080	100	125	160	200	250				
	M1							M2	M3	M4	
301 R2	162	167	171	175	181	–	–	113	60	1/4G	14



	R				R1				
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK		MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
301 R2	184	225	219	184	122	35	42	37	33
301 R3	237	278	272	237	122	39	46	41	37
301 R4	290	331	325	290	122	43	50	45	41

	V	V1		V	V1		C	Input	I	F	F1	F2	Type	Input	
301 R2	137.5	24	6	158	38	7	37	A	467	105	65	1/4 G	4	A	10
301 R3	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10
301 R4	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10

301 R

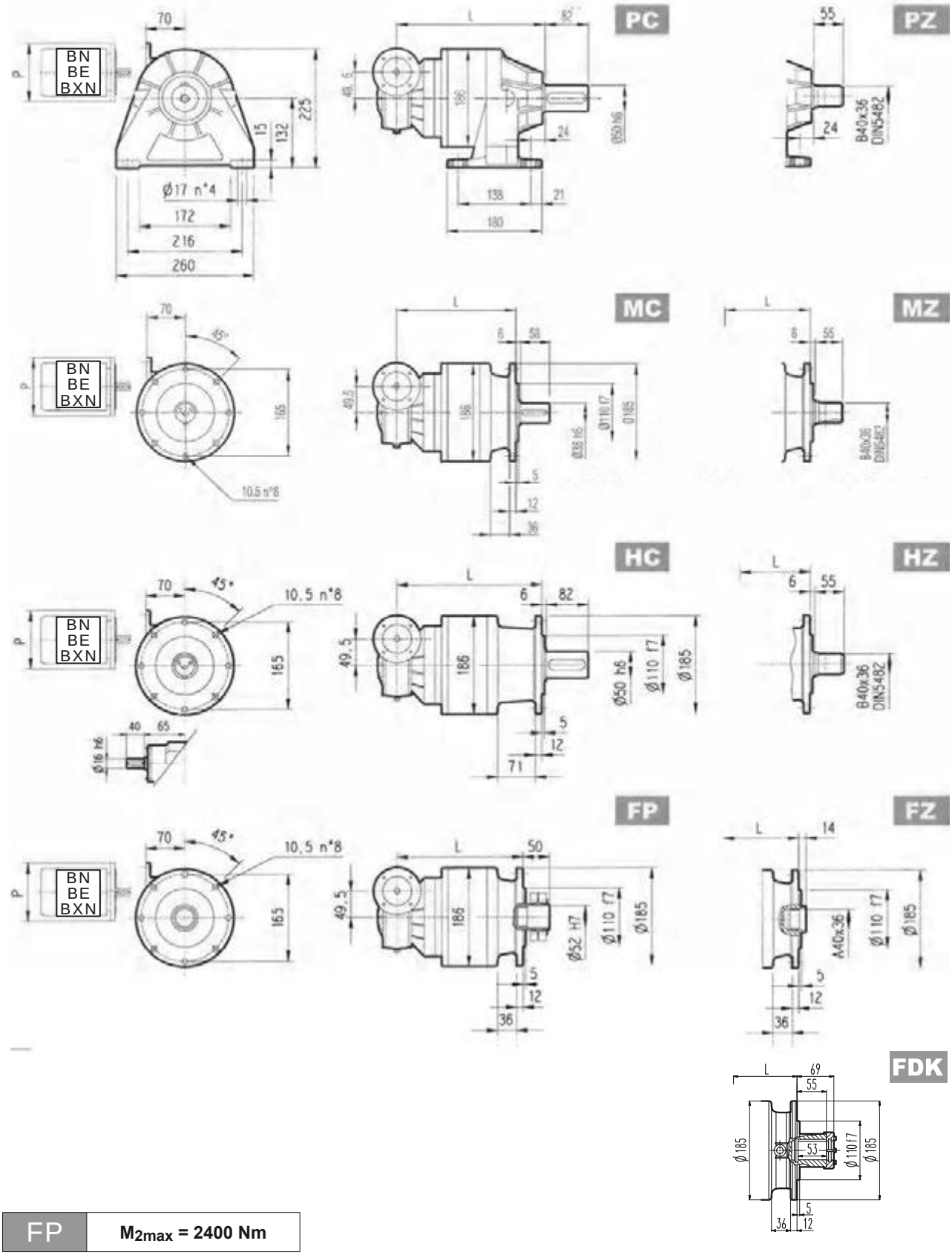


FP — M_{2max} = 2400 Nm

	P71		P80		P90		P100		P112		P132	
	E	P	E	P	E	P	E	P	E	P	E	P
301 R2	65	160	84	200	84	200	94	250	94	250	114	300
301 R3	65	160	84	200	84	200	94	250	94	250	114	300
301 R4	65	160	84	200	84	200	94	250	94	250	114	300

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
301 R2	253	314	138	372	444	156	405	495	195	449	541	195	508	607	258
301 R3	253	314	138	372	444	156	405	495	195	449	541	195	—	—	—
301 R4	253	314	138	372	444	156	405	495	195	—	—	—	—	—	—

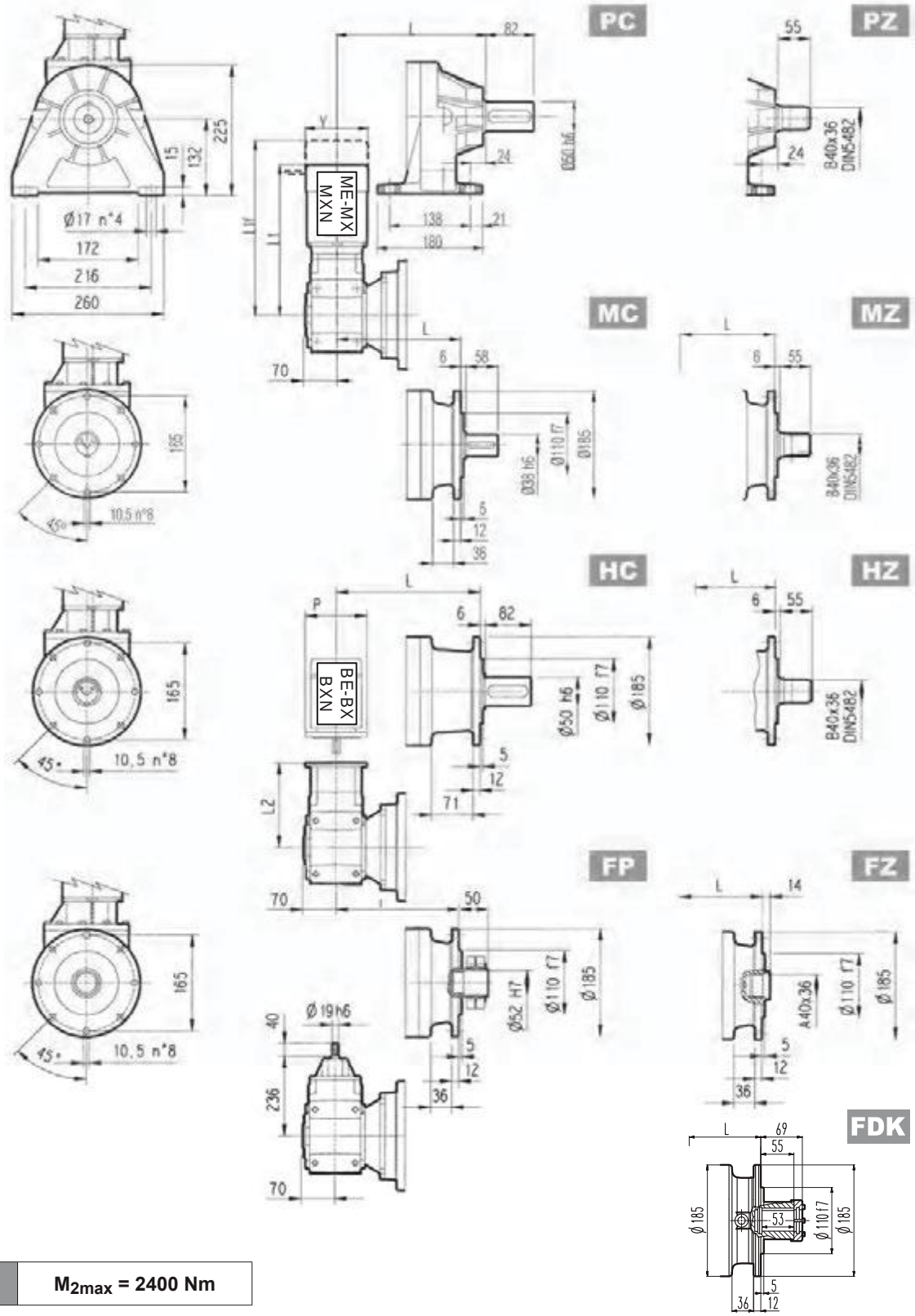
3/V 01 L3



FP	M_{2max} = 2400 Nm

	L				kg				P63	P71	P80
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	P	P	P
3/V 01 L3	267	308	302	267	28	35	30	26	140	160	200

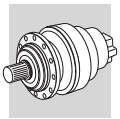
3/A 01 L2



FP | **M_{2max} = 2400 Nm**

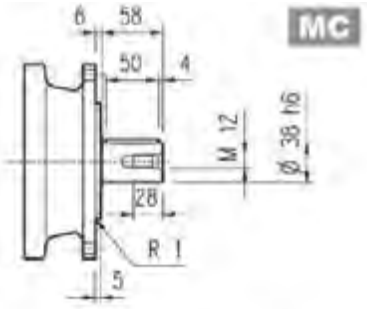
	L				Kg			
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
3/A 01 L2	202	208	237	202	40	46	43	40

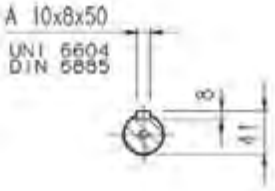
	P63		P71		P80		P90		P100		S1/S10+ME1/MXN10			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L		
	L2	P	L2	P	L2	P	L2	P	L2	P	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y
3/A 01 L2	226	140	226	160	245.5	200	245.5	200	255.5	250	410	469	138	454	526	156	485	575	195	429	621	195



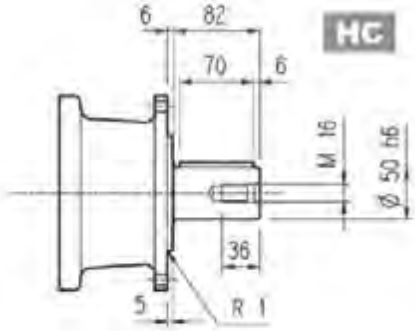
301 L	301 R	3/V 01 L3	3/A 01 L2

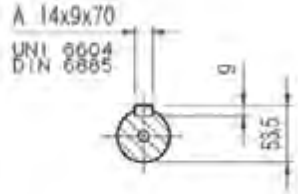
MC



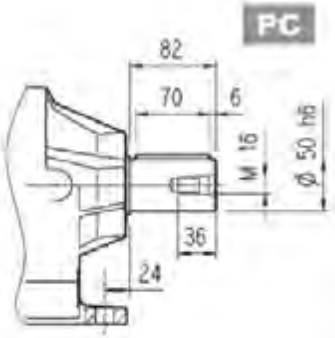


HC

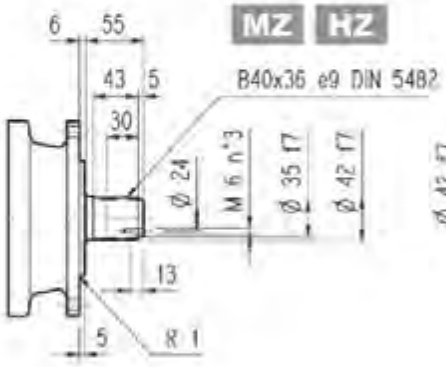


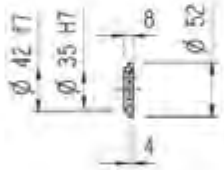


FC

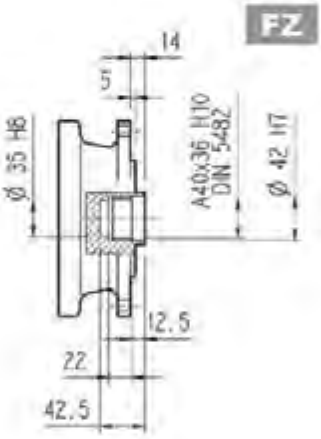


MZ **HZ**

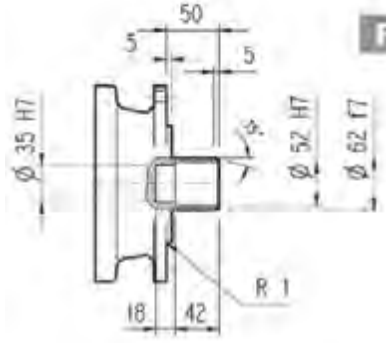


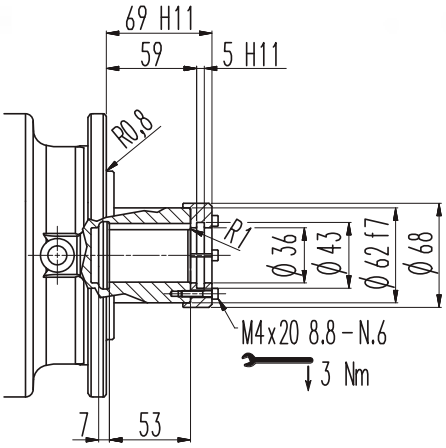


FZ

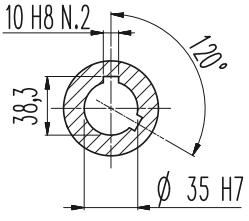


FP

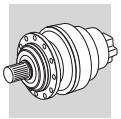




FDK



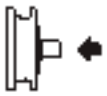
FP	M_{2max} = 2400 Nm

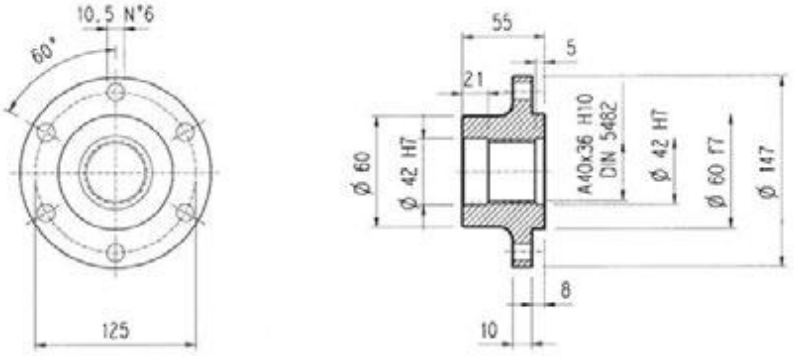


301 L | 301 R | 3/V 01 L3 | 3/A 01 L2

Flange

W0A

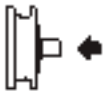


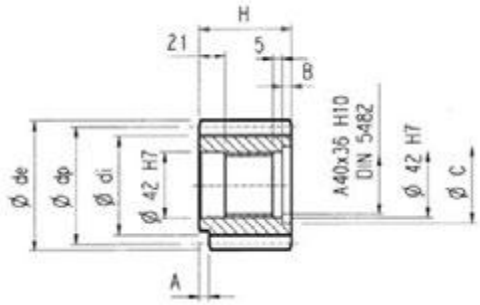


Material: Steel C40

Pinions

P...



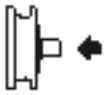


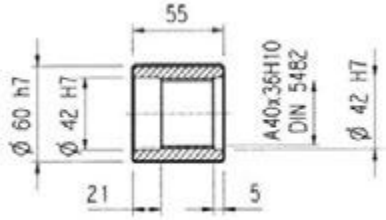
$\alpha = 20°$

	m	z	x	dp	di	de	H	A	B	C	Material
PBE	4.5	14	0.507	63	56	75.5	55	—	—	—	Steel 39NiCrMo3 hardened and tempered
PCE	5	14	0.500	70	62.5	84.8	65	—	10	53	
PDC	6	12	0.250	72	61	84.8	59	14	4	54	
PDE	6	14	0.500	84	73	99.6	65	—	10	54	

Sleeve coupling

M0A

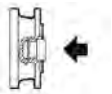


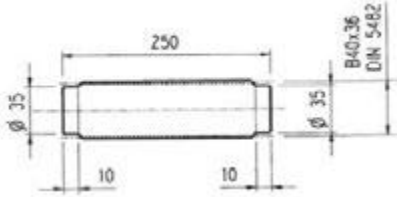


Material: Steel 16CrNi4

Splined bars

B0A

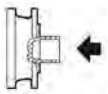


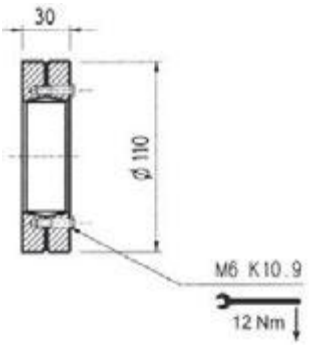


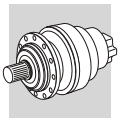
Material: Case hardening steel 18NiCrMo5 UNI 5331
must be case hardened 50-55 HRC

Shrink disc

G0A

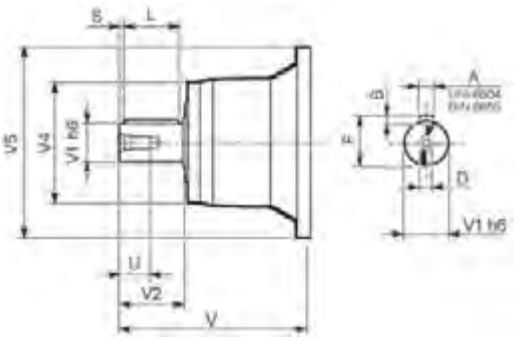






301 L

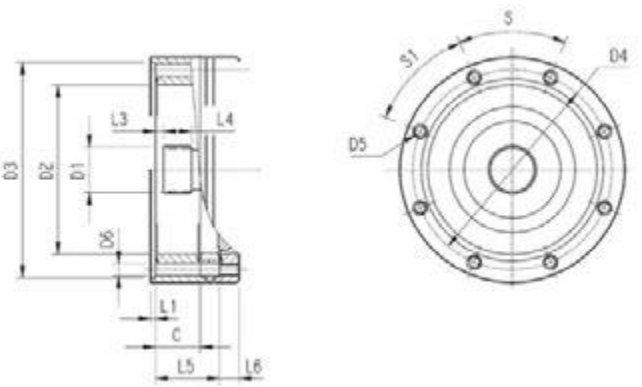
301 R



		V	V1	V2	V4	V5	A	B	F	L	S	D	U
301 L1	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
301 L2	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
301 L3	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
301 L4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
301 R2-R3-R4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28

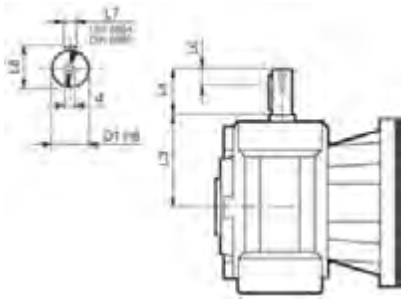
301 L

301 R



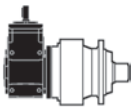
		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
301 L1	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	65	18	45°	45°	A
301 L2	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	118	18	45°	45°	A
301 L3	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	171	18	45°	45°	A
301 L4	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	224	18	45°	45°	A
301 R2-R3-R4	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	37	18	45°	45°	A

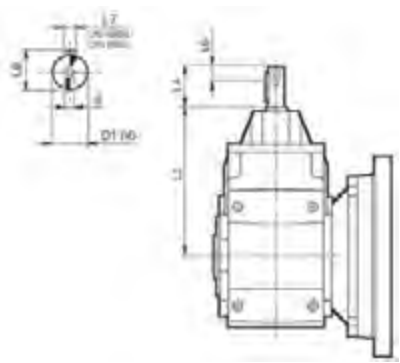
3/V 01 L3



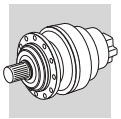
	D1 h6	L3	L4	L6	L7	L8	d
3/V 01 L3_HS	16	65	40	16	5	18	M6

3/A 01 L2



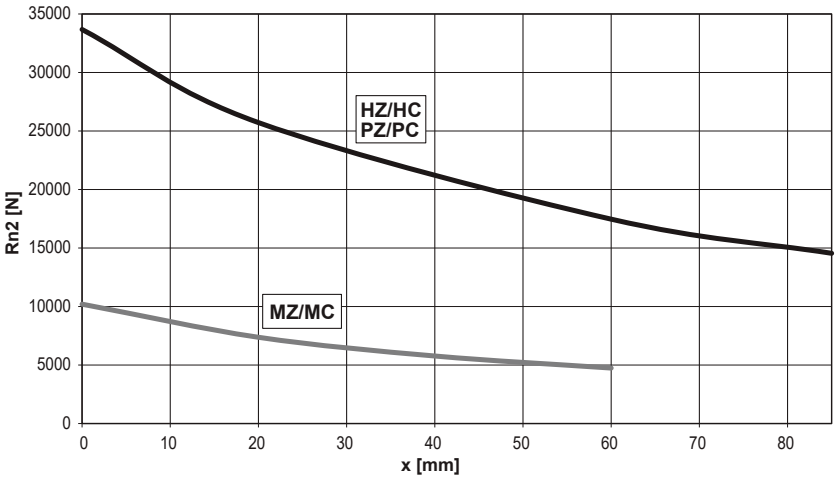


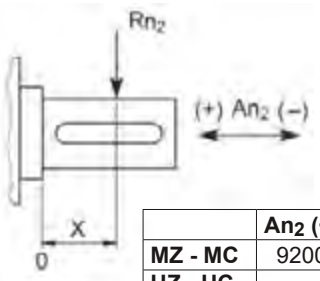
	D1 h6	L3	L4	L6	L7	L8	d
3/A 01 L2_HS	19	235.5	40	16	6	21.5	M6



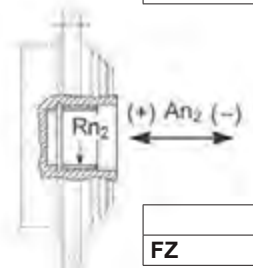
301 L | 301 R | 3/V 01 L3 | 3/A 01 L2

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$





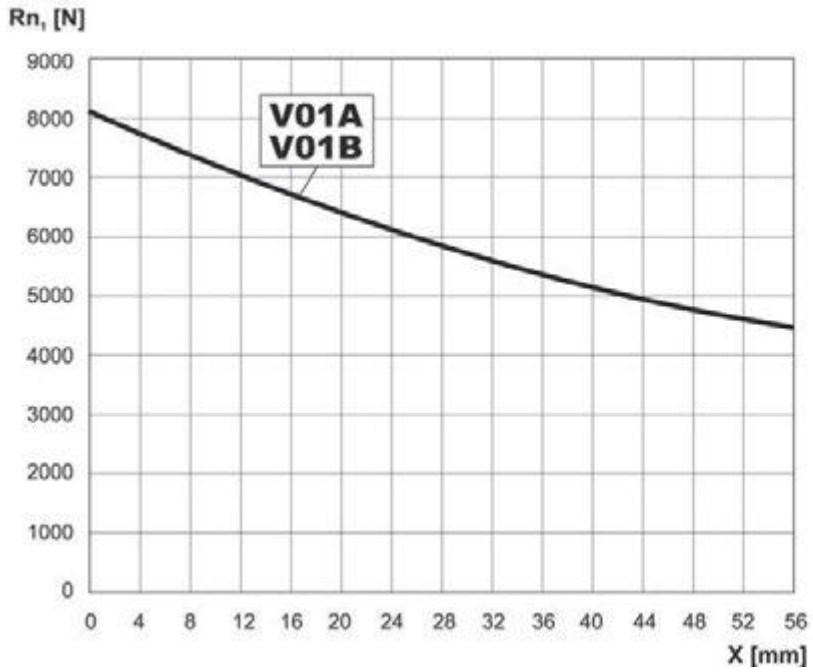
	An_2 (+)	An_2 (-)
MZ - MC	9200	6900
HZ - HC PZ - PC	20000	20000

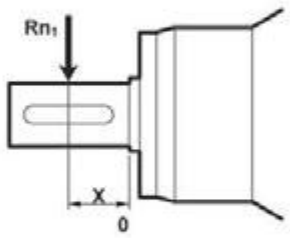


	Rn_2	An_2 (+/-)
FZ	3713	3713

Load corrective factor fh_2 on shafts	**$Fh_2 = n_2 \cdot h$**		10000	25000	50000	100000	500000	1000000
	fh_2	**FZ**	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		MZ - MC	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HZ - HC - PZ - PC	**1.27**	**1.27**	**1.26**	**1.00**	**0.62**	**0.50**

Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$

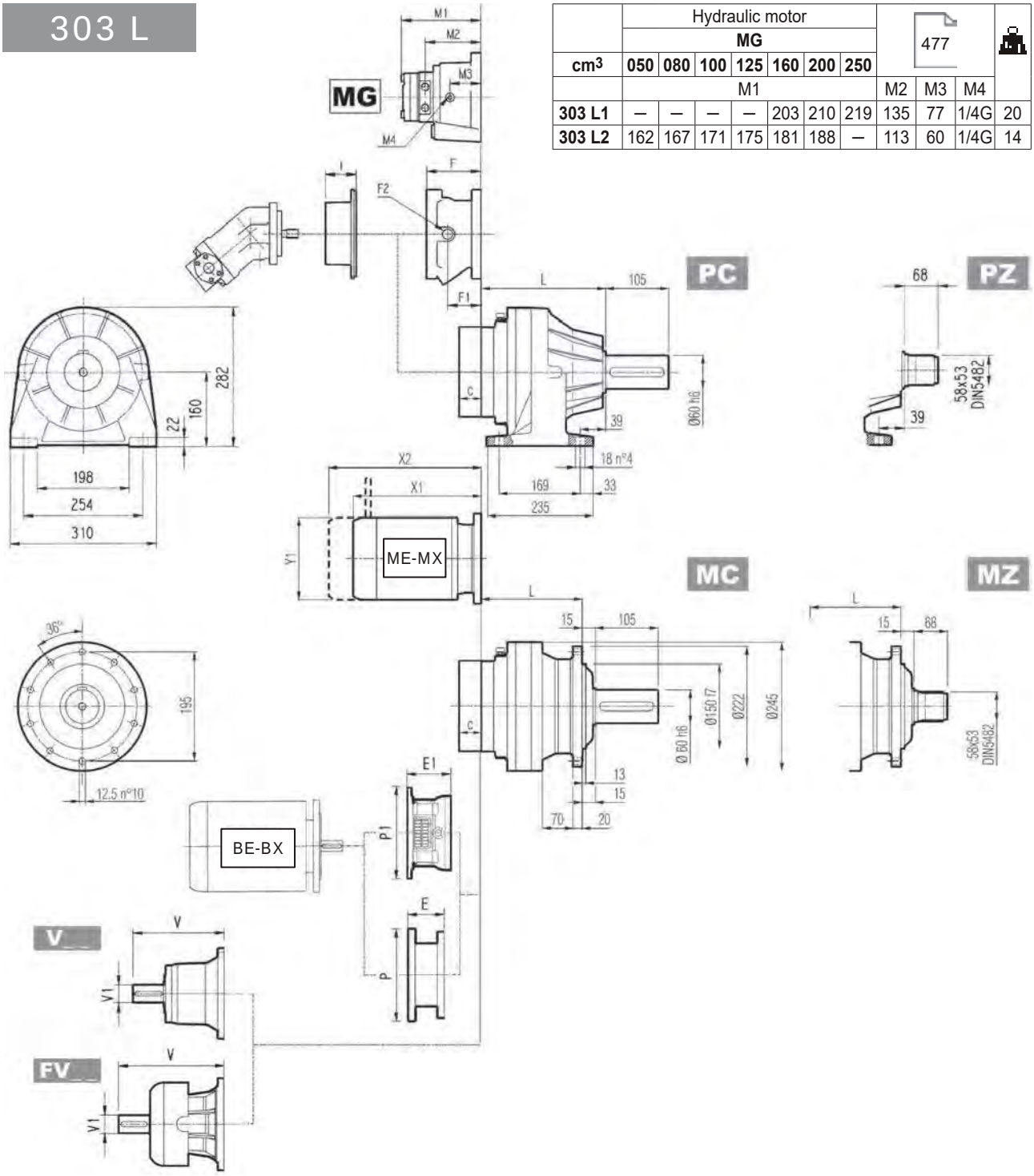




Load corrective factor fh_1 on shafts	**$Fh_1 = n_1 \cdot h$**	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

303 L

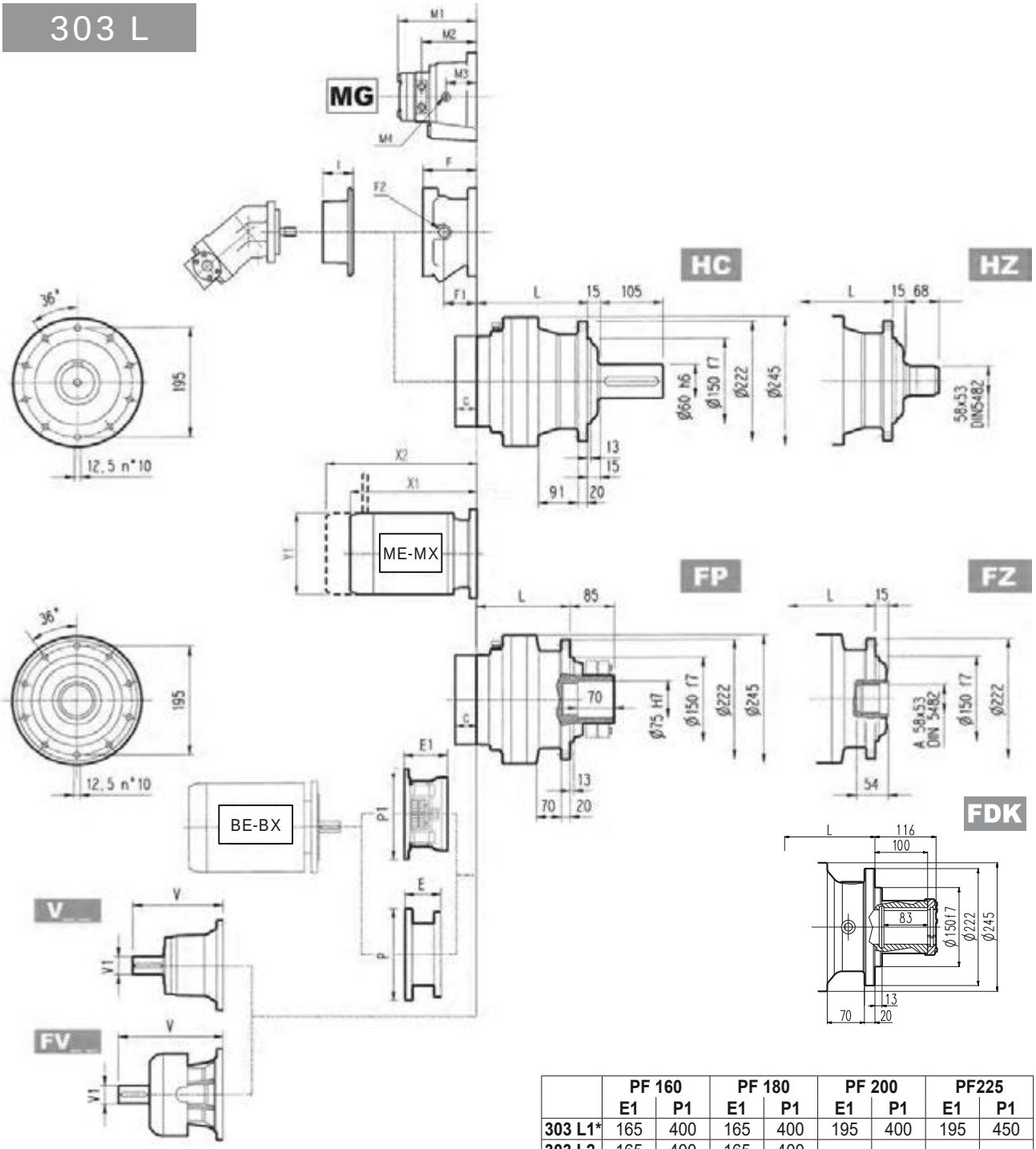
	Hydraulic motor							477			
	MG										
cm³	050	080	100	125	160	200	250				
	M1							M2	M3	M4	
303 L1	—	—	—	—	203	210	219	135	77	1/4G	20
303 L2	162	167	171	175	181	188	—	113	60	1/4G	14



	L							
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
303 L1	125	165	150	125	31	40	35	31
303 L2	178	218	203	178	35	44	39	35
303 L3	231	271	256	231	39	48	43	39
303 L4	284	324	309	284	43	52	47	43

	V	V1		V	V1		V	V1		V	V1		C	Input	I	F	F1	F2	Type	Input	
303 L1	239	48	15	—	—	—	276	48	17	—	—	—	37	A	467	145	95	1/4 G	5	A	16
303 L2	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		105	65	1/4 G	4	A	10
303 L3	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		105	65	1/4 G	4	A	10
303 L4	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		105	65	1/4 G	4	A	10

303 L



	PF 160		PF 180		PF 200		PF225	
	E1	P1	E1	P1	E1	P1	E1	P1
303 L1*	165	400	165	400	195	400	195	450
303 L2	165	400	165	400	—	—	—	—
303 L3	165	400	165	400	—	—	—	—

(*): contact Bonfiglioli technical service
NOTE: For R design contact Bonfiglioli Technical service

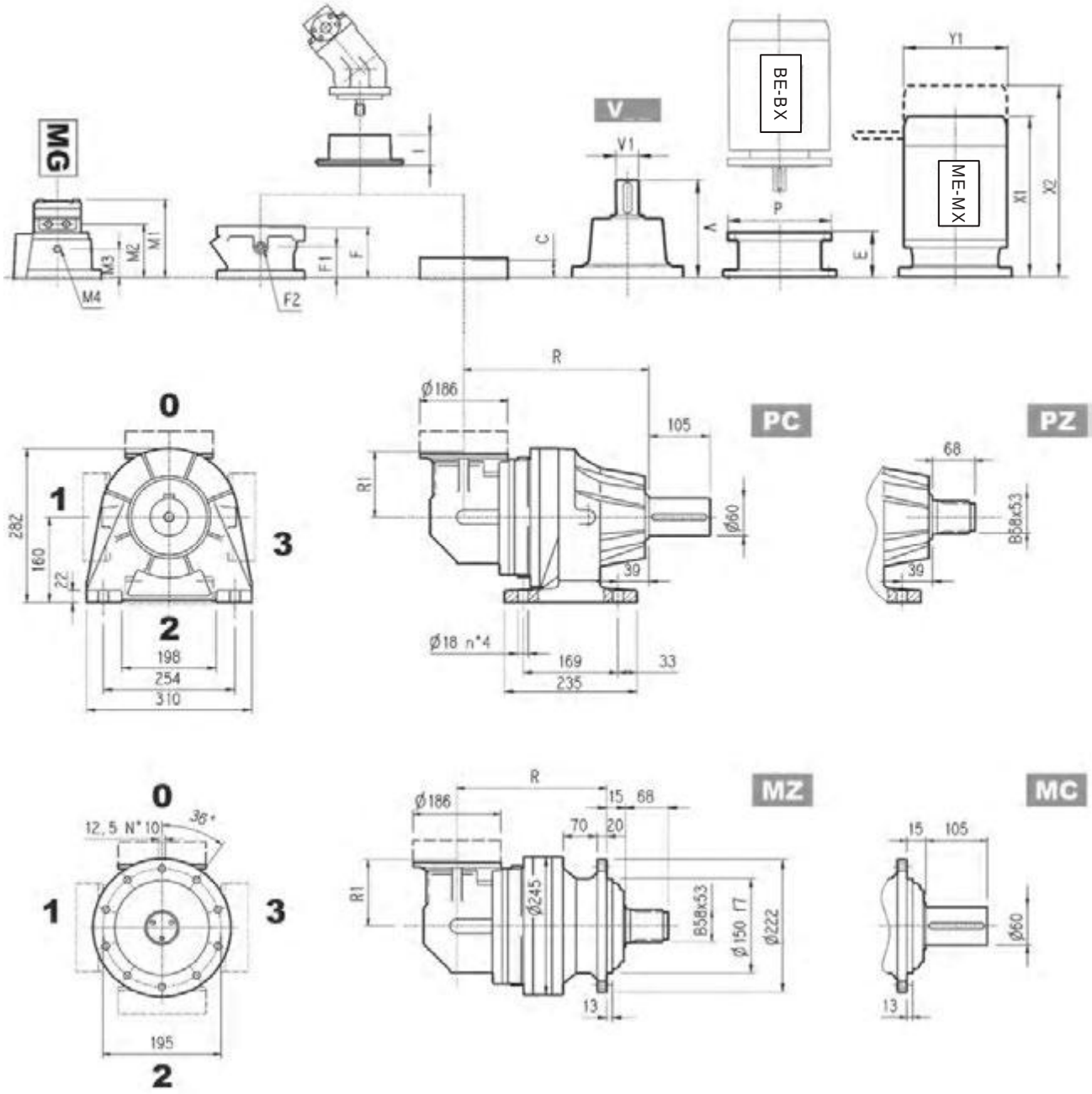
FP — M_{2max} = 5200 Nm

	P71		P80		P90		P100		P112		P132		P160		P180		P200	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
303 L1	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400
303 L2	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—
303 L3	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—
303 L4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4			S5+ME5S/MX5S			S5+ ME5L/MX5L		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
303 L1	—	—	—	—	—	—	—	—	—	—	—	—	460	559	258	552	692.5	310	596	736.5	310
303 L2	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—
303 L3	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—
303 L4	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—

303 R

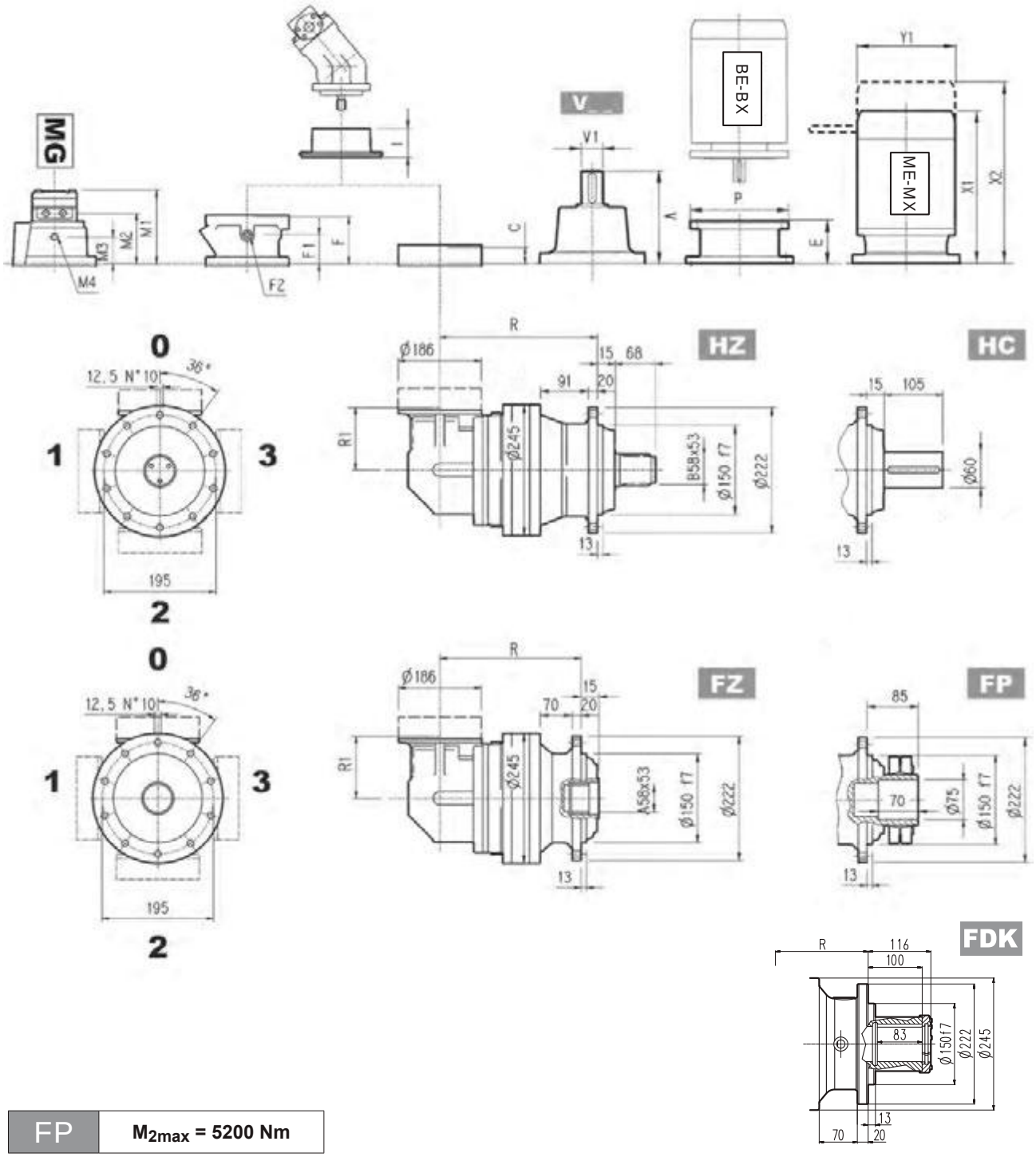
	Hydraulic motor							477			
	MG										
cm³	**050**	**080**	**100**	**125**	**160**	**200**	**250**				
	M1							M2	M3	M4	
303 R2	162	167	171	175	181	188	—	113	60	1/4G	14



	R				R1				
	MC - MZ	**PC - PZ**	**HC - HZ**	**FP - FZ - FDK**		**MC - MZ**	**PC - PZ**	**HC - HZ**	**FP - FZ - FDK**
303 R2	217	257	242	217	140	51	60	55	51
303 R3	270	310	295	270	122	49	58	53	49
303 R4	323	363	348	323	122	53	62	57	53

	V	**V1**		**V**	**V1**		**C**	**Input**	**I**	**F**	**F1**	**F2**	**Type**	**Input**	
303 R2	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10
303 R3	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10
303 R4	137.5	24	6	158	38	7	37	A	467	105	65	1/4 G	4	A	10

303 R

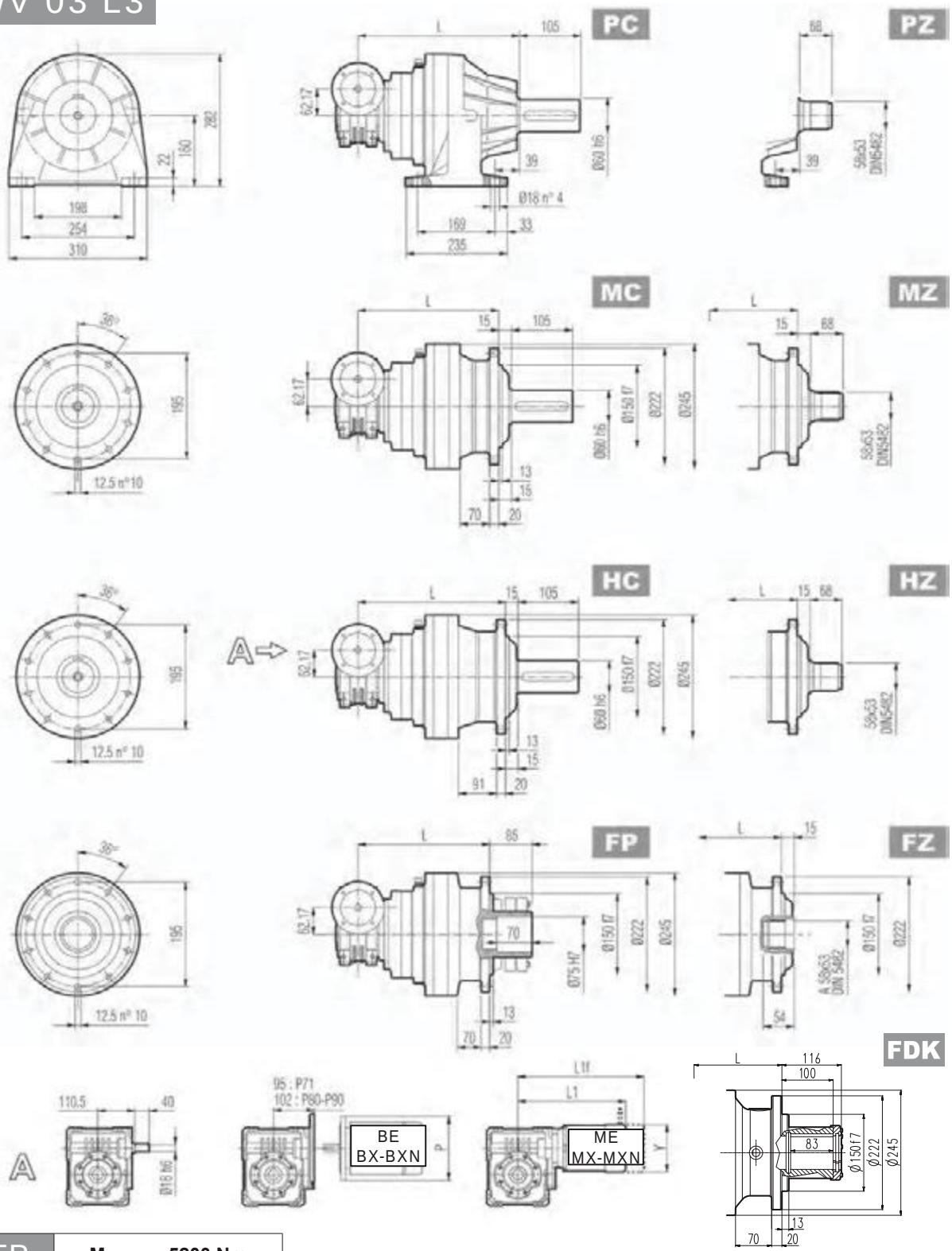


FP M_{2max} = 5200 Nm

	P71		P80		P90		P100		P112		P132	
	E	P	E	P	E	P	E	P	E	P	E	P
303 R2	65	160	84	200	84	200	94	250	94	250	114	300
303 R3	65	160	84	200	84	200	94	250	94	250	114	300
303 R4	65	160	84	200	84	200	94	250	94	250	114	300

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
303 R2	—	—	—	372	444	156	405	495	195	449	541	195	508	607	258
303 R3	253	314	138	372	444	156	405	495	195	449	541	195	—	—	—
303 R4	253	314	138	372	444	156	405	495	195	449	541	195	—	—	—

3/V 03 L3

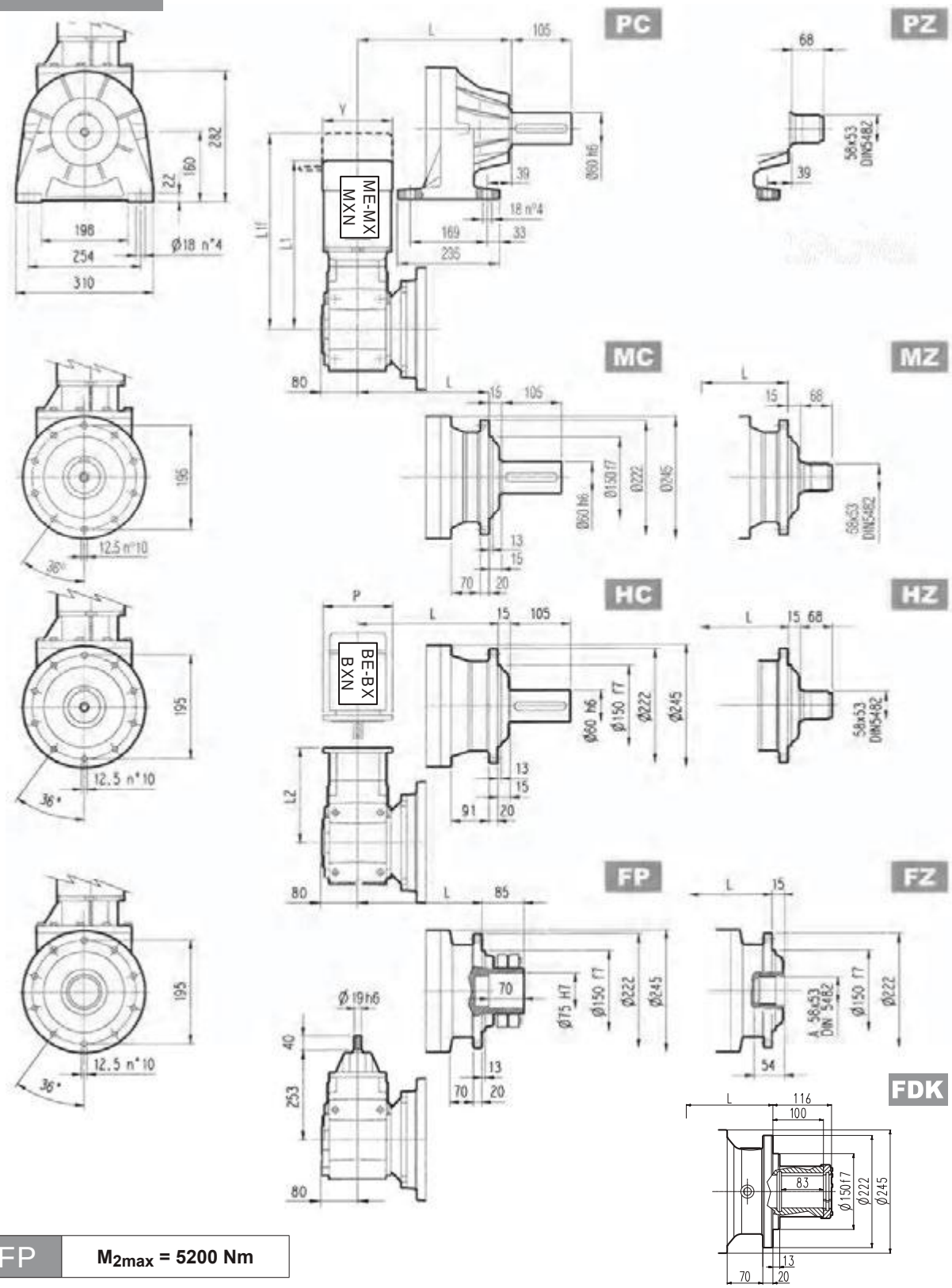


FP M_{2max} = 5200 Nm

	L				Kg			
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
3/V 03 L3	270	330	315	270	43	51	45	41

	P71	P80	P90	S1+M1			S2+ME2S/MX2S		
	P	P	P	L1	L1f	Y	L1	L1f	Y
3/V 03 L3	160	200	200	289	350	138	351	—	156

3/A 03 L2

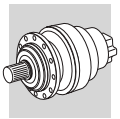


FP

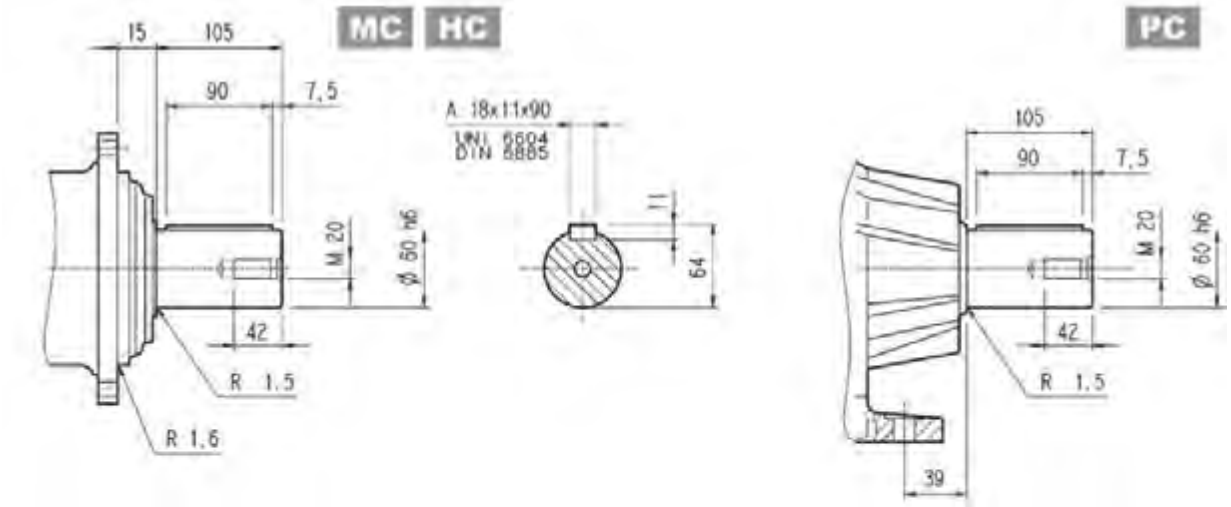
M_{2max} = 5200 Nm

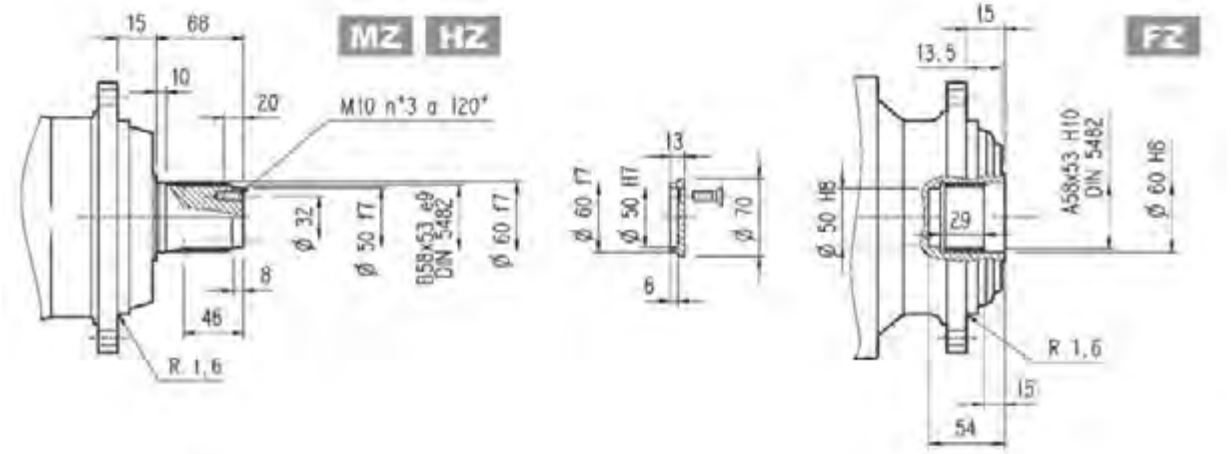
	L				Kg			
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
3/A 03 L2	225	285	270	225	63	71	65	60

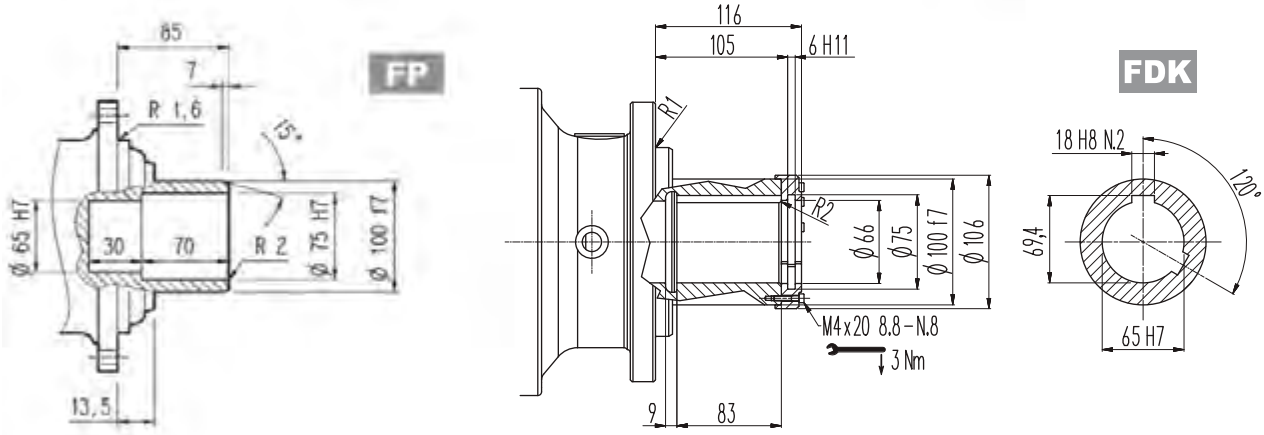
	P63		P71		P80		P90		P100		P112		S1/S10+ME1/MXN10			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L		
	L2	P	L2	P	L2	P	L2	P	L2	P	L2	P	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y
3/A 03 L2	243	140	243	160	262	200	262	200	272	250	272	250	427	486	138	471	543	156	502	592	195	546	638	195



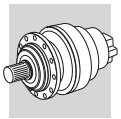
303 L | 303 R | 3/V 03 L3 | 3/A 03 L2







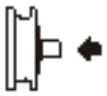
FP	M_{2max} = 5200 Nm

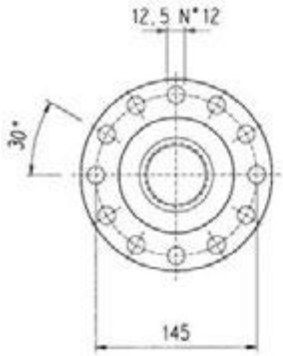


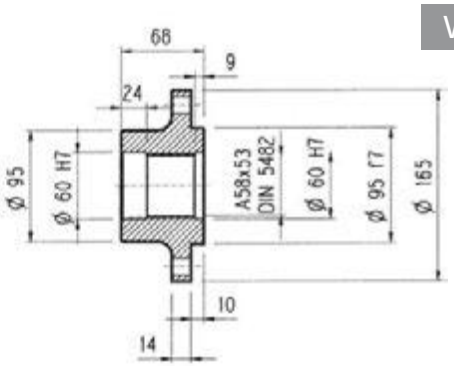
303 L | 303 R | 3/V 03 L3 | 3/A 03 L2

Flange

W0A



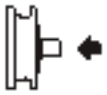


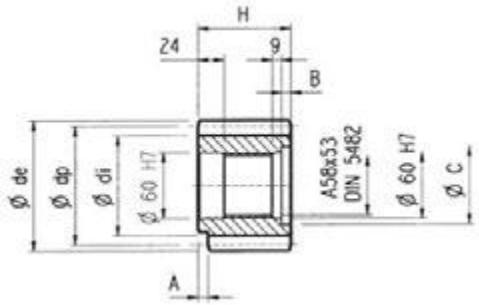


Material: Steel C40

Pinions

P...



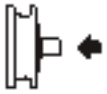


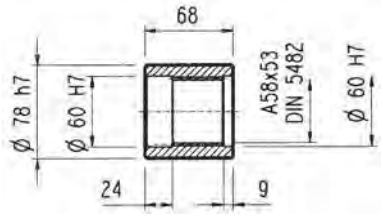
α = 20°

	m	z	x	dp	di	de	H	A	B	C	Material
PCL1	5	19	—	95	82	104	77	12	9	72	Steel 39NiCrMo3 hardened and tempered
PCL2	5	19	—	95	82	104	68	—	—	—	
PCM	5	20	—	100	87.5	110	68	18	—	—	Steel 18NiCrMo5 case hardened
PCP	5	22	—	110	97.5	120	68	18	—	—	
PDE	6	14	0.500	84	75	99.6	68	—	—	—	Steel 39NiCrMo3 hardened and tempered
PDI	6	18	0.500	108	99	123.6	68	—	—	—	
PDM	6	20	0.833	120	115	140	68	—	—	—	
PFD	8	13	0.675	104	95	127.6	68	—	—	—	Steel 18NiCrMo5 case hardened
PFE1	8	14	—	112	92	126	68	—	—	—	
PFE2	8	14	—	112	92	126	80	—	12	72	
PFF	8	15	—	120	100	136	68	—	—	—	Steel 39NiCrMo3 hardened and tempered
PFP	8	22	—	176	156	190	77	12	10	71	
PHG	10	16	0.500	160	145	188	75	—	7	72	

Sleeve coupling

M0A

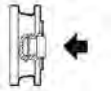


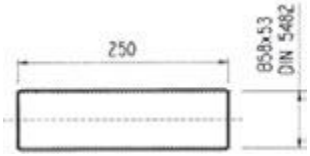


Material: Steel 16CrNi4

Splined bars

B0A

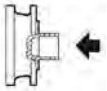


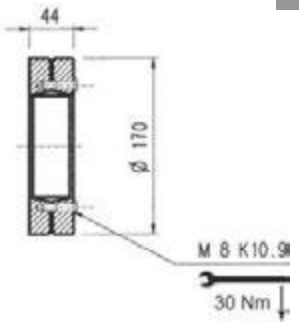


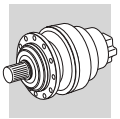
Material: Case hardening steel 18NiCrMo5 UNI 5331
must be case hardened 50-55 HRC

Shrink disc

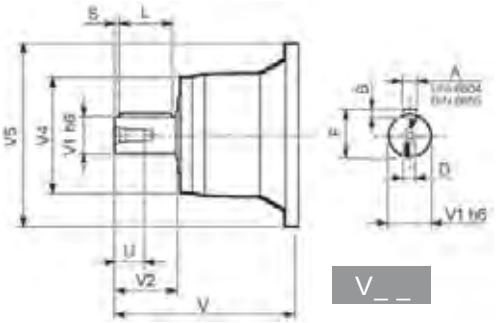
G0A

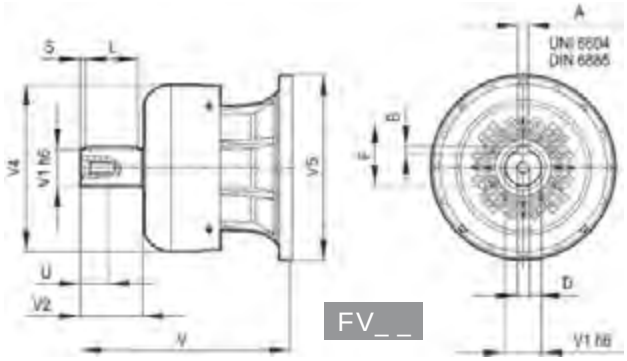






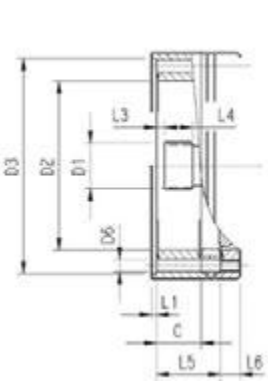
303 L 303 R

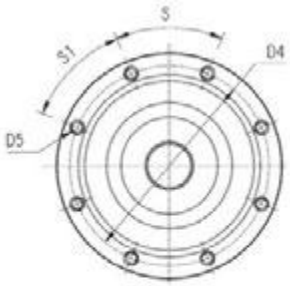




		V	V1	V2	V4	V5	A	B	F	L	S	D	U
303 L1	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36
303 L2	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
303 L3	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
303 L4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
303 R2-R3-R4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28

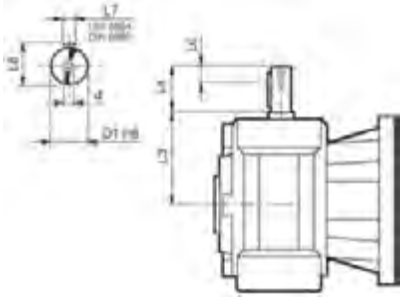
303 L 303 R





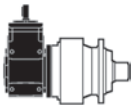
		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
303 L1	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	—	18	45°	45°	A
303 L2	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	53	18	45°	45°	A
303 L3	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	106	18	45°	45°	A
303 L4	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	159	18	45°	45°	A
303 R2-R3-R4	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	37	18	45°	45°	A

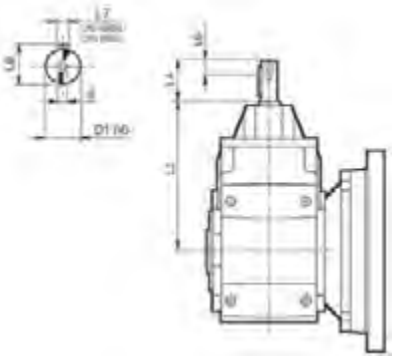
3/V 03 L3



	D1 h6	L3	L4	L6	L7	L8	d
3/V 03 L3_HS	18	110.5	40	16	6	20.5	M6

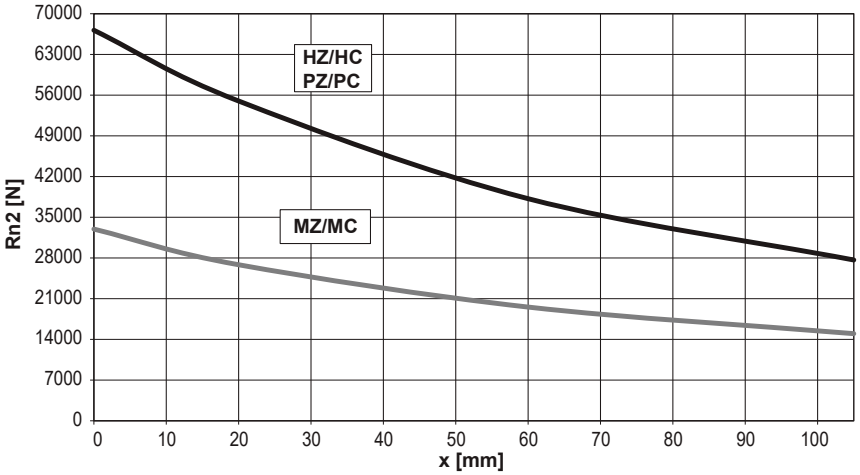
3/A 03 L2

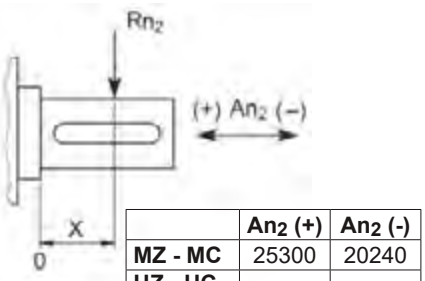




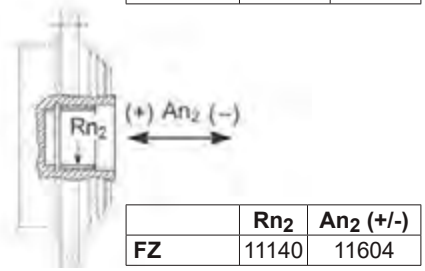
	D1 h6	L3	L4	L6	L7	L8	d
3/A 03 L2_HS	19	252.5	40	16	6	21.5	M6

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$





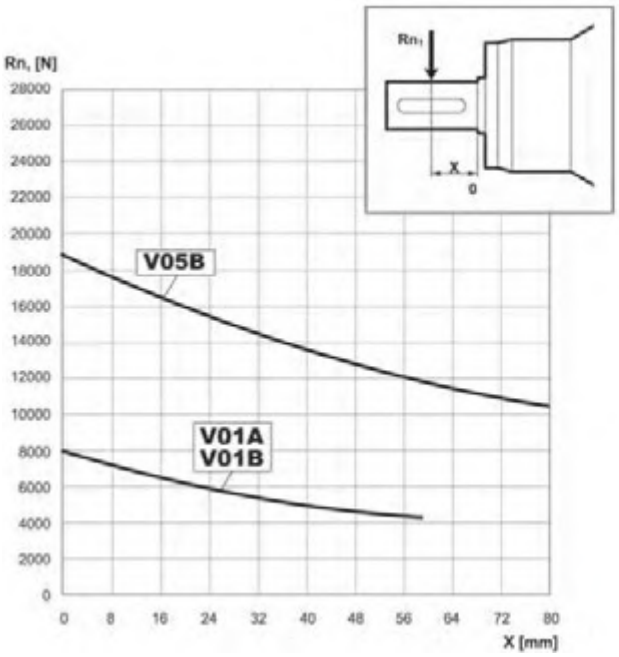
	An2 (+)	An2 (-)
MZ - MC	25300	20240
HZ - HC PZ - PC	27500	22000

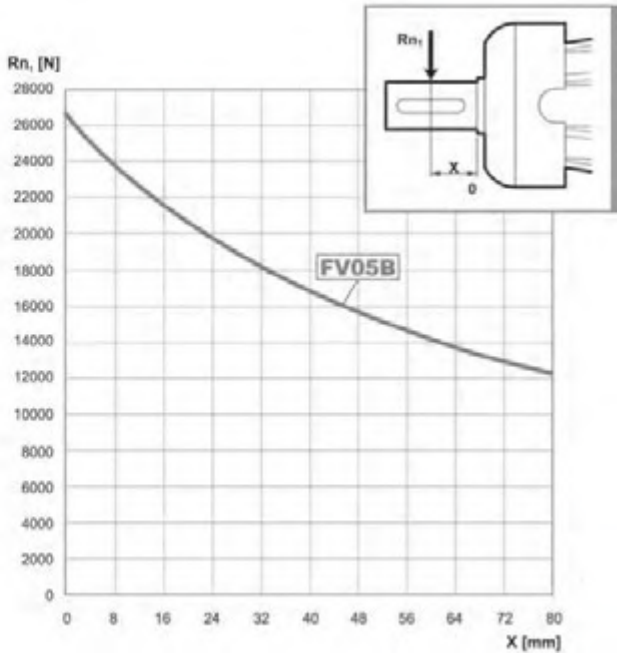


	Rn2	An2 (+/-)
FZ	11140	11604

Load corrective factor fh_2 on shafts	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
	fh_2	FZ	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		MZ - MC	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HZ - HC - PZ - PC	**1.48**	**1.48**	**1.23**	**1.00**	**0.62**	**0.50**

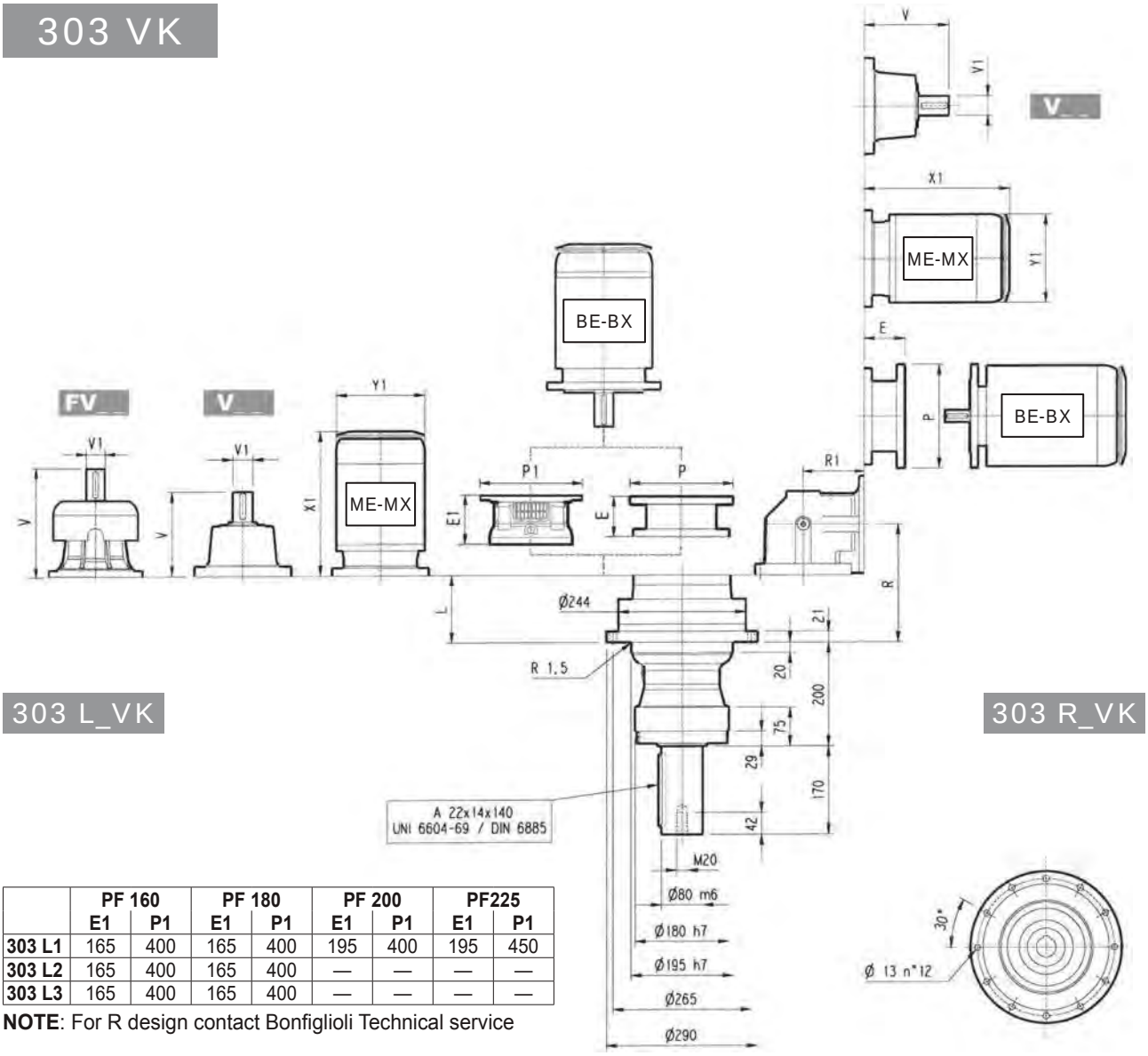
Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$





Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

303 VK



303 L_VK

303 R_VK

	PF 160		PF 180		PF 200		PF225	
	E1	P1	E1	P1	E1	P1	E1	P1
303 L1	165	400	165	400	195	400	195	450
303 L2	165	400	165	400	—	—	—	—
303 L3	165	400	165	400	—	—	—	—

NOTE: For R design contact Bonfiglioli Technical service

	L													P71		P80		P90		P100		P112		P132		P160		P180		P200	
			V	V1		V	V1		V	V1		V	V1		E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
303 L1	51	65	239	48	15	—	—	—	276	48	17	—	—	—	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400
303 L2	104	70	137.5	24	6	158	38	7	—	—	—	—	—	—	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—
303 L3	157	73	137.5	24	6	158	38	7	—	—	—	—	—	—	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—
303 L4	210	77	137.5	24	6	158	38	7	—	—	—	—	—	—	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—

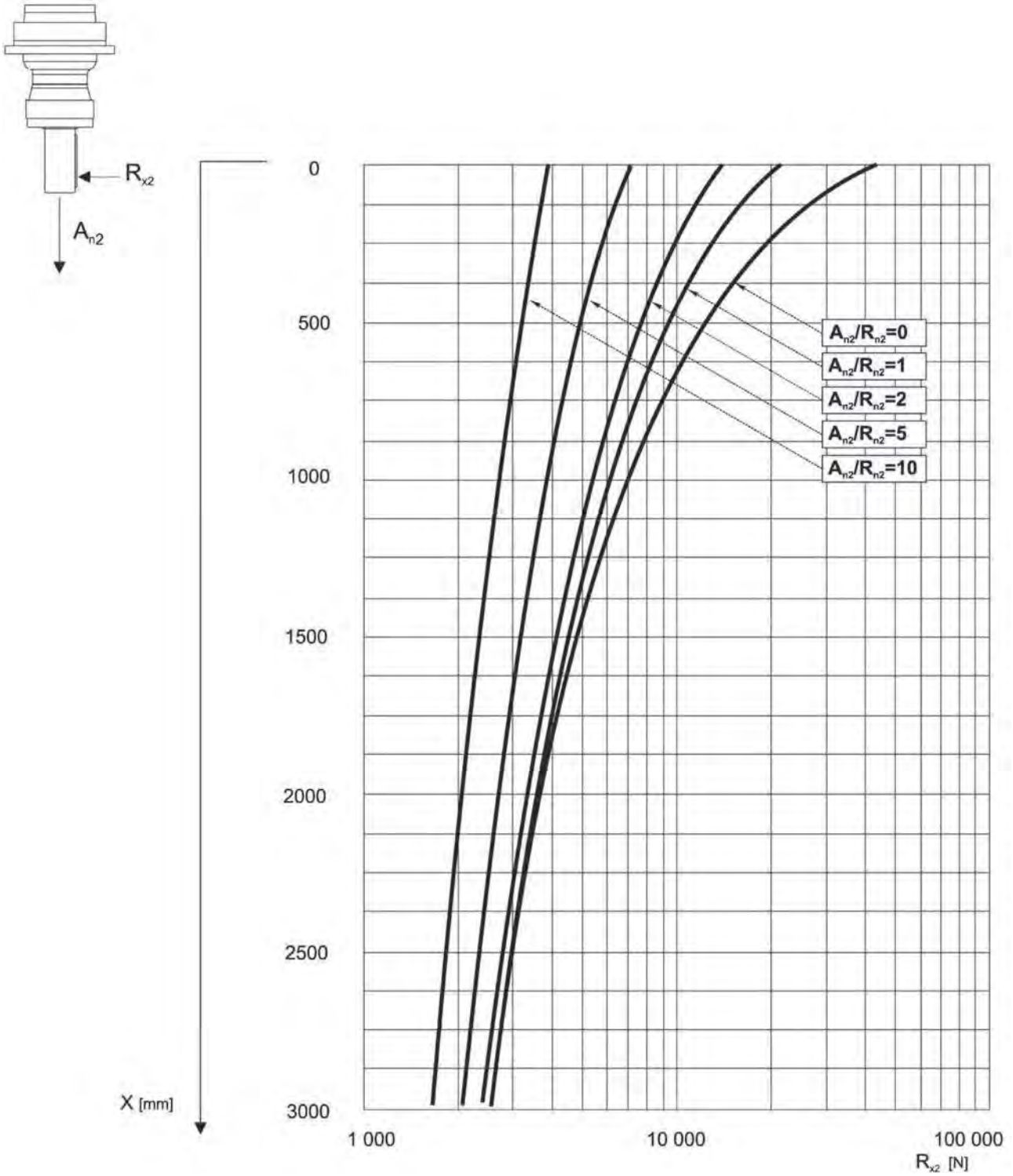
	S1+M1			S2+ME2S			S3+ME3S			S3+ME3L			S4+ME4/MX4			S5+ME5S/MX5S			S5+ME5L/MX5L		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
303 L1	—	—	—	—	—	—	—	—	—	—	—	—	460	559	258	552	692.5	310	596	736.5	310
303 L2	253	314	138	280	350	156	325	421	195	357	448	195	460	559	258	—	—	—	—	—	—
303 L3	253	314	138	280	350	156	325	421	195	357	448	195	460	559	258	—	—	—	—	—	—
303 L4	253	314	138	280	350	156	325	421	195	357	448	195	460	559	258	—	—	—	—	—	—

	R	R1								P71		P80		P90		P100		P112		P132	
				V	V1		V	V1		E	P	E	P	E	P	E	P	E	P	E	P
303 R2	143	140	85	137.5	24	6	158	38	7	65	160	84	200	84	200	94	250	94	250	114	300
303 R3	196	122	83	137.5	24	6	158	38	7	65	160	84	200	84	200	94	250	94	250	114	300
303 R4	249	122	87	137.5	24	6	158	38	7	65	160	84	200	84	200	94	250	94	250	114	300

	S1+ M1			S2+ ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
303 R2	—	—	—	372	444	156	405	495	195	449	541	195	508	607	258
303 R3	253	314	138	372	444	156	405	495	195	449	541	195	—	—	—
303 R4	253	314	138	372	444	156	405	495	195	449	541	195	—	—	—

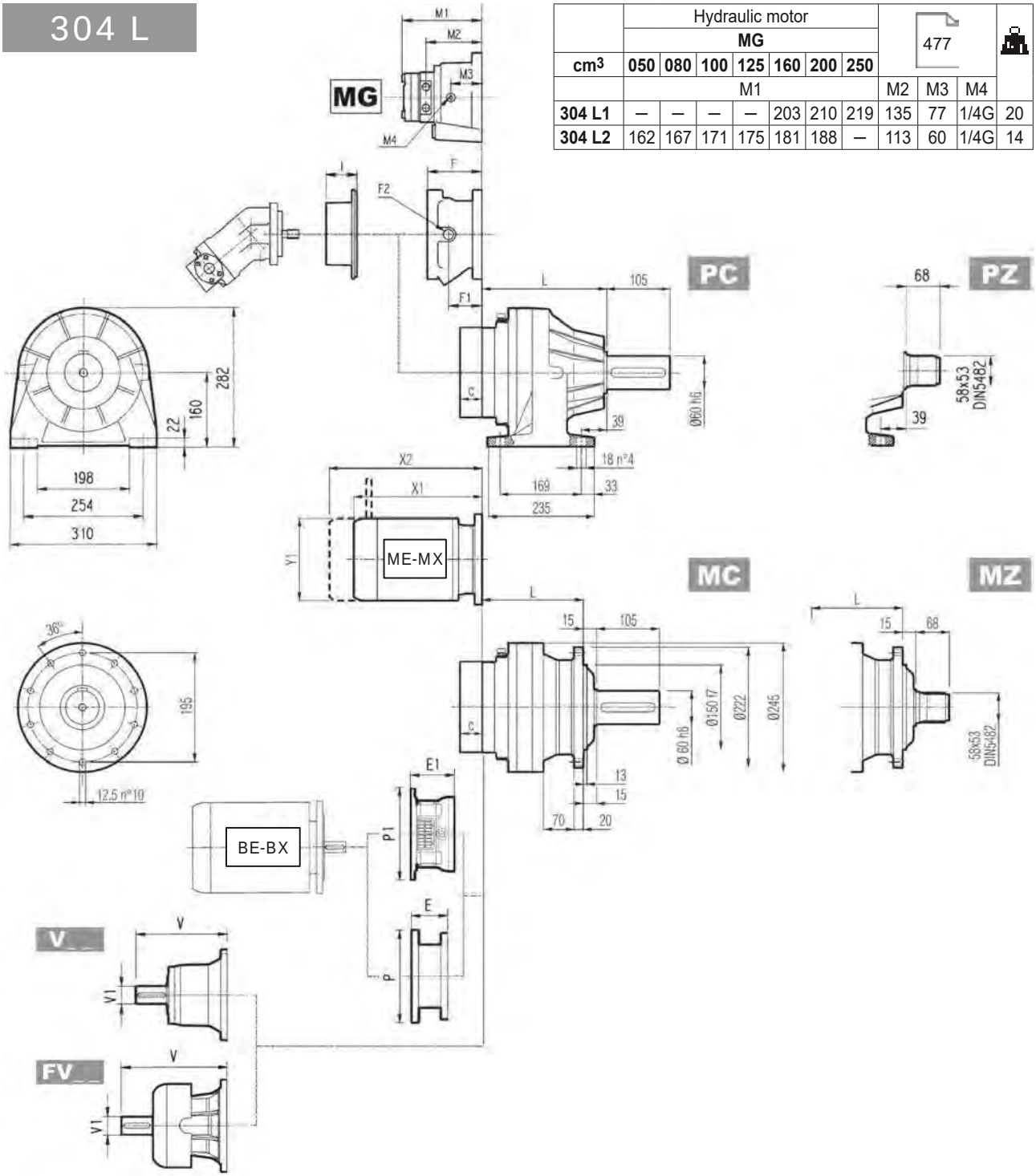
303 VK

The diagram below allows the calculation of permitted overhung load R_{x2} on the output shaft of gearbox, with radial force applying at a distance x from shaft shoulder.
The curves are relevant to value resulting from the relationship of trust load A_{n2} to radial load R_{n2}, based on n_2 = 10 min^{-1} and 10000 hrs theoretical lifetime.



304 L

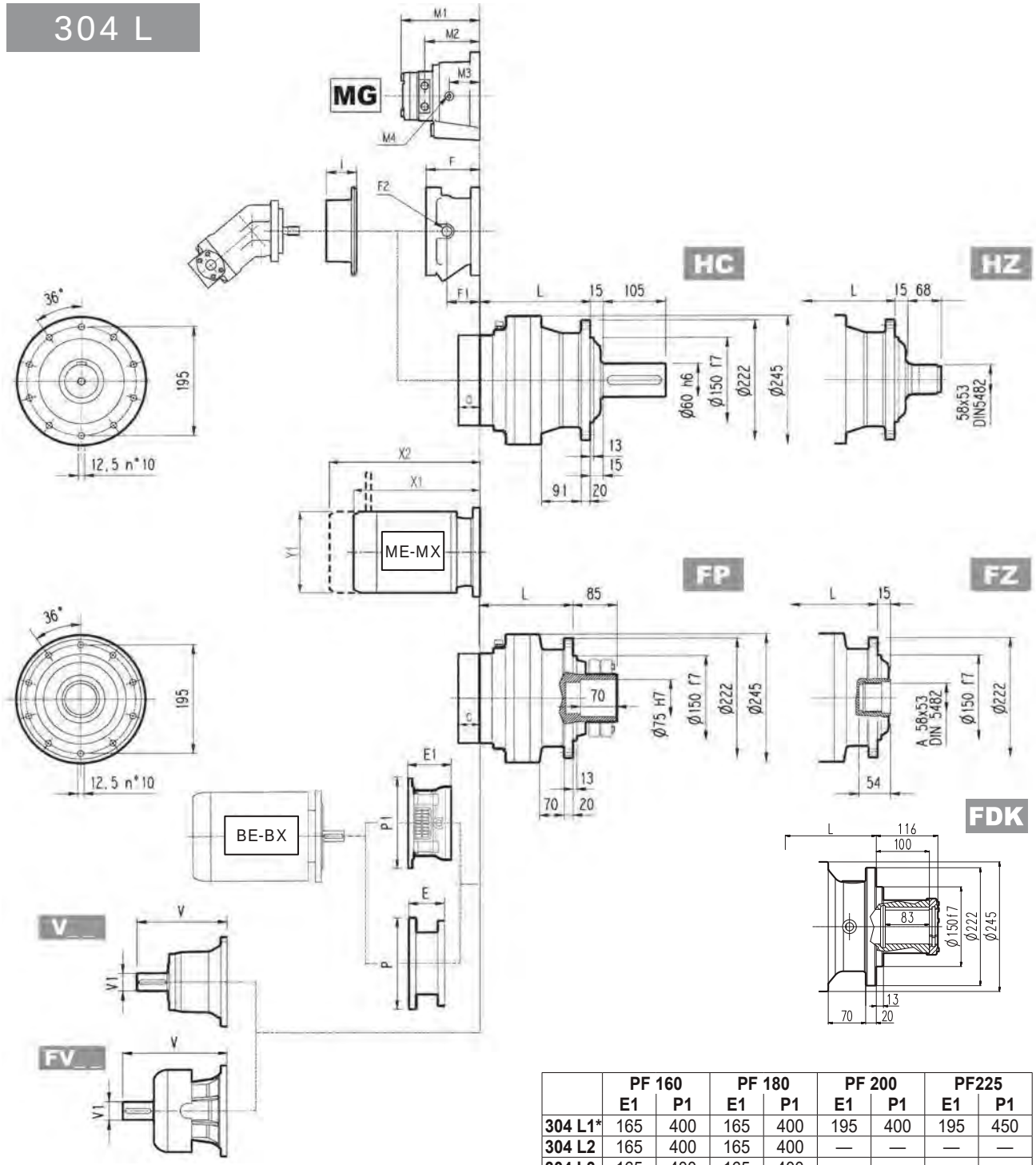
	Hydraulic motor							477			
	MG										
cm³	050	080	100	125	160	200	250				
	M1							M2	M3	M4	
304 L1	—	—	—	—	203	210	219	135	77	1/4G	20
304 L2	162	167	171	175	181	188	—	113	60	1/4G	14



	L							
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
304 L1	125	165	150	125	31	40	35	31
304 L2	190	230	215	190	38	47	42	38
304 L3	243	283	268	243	42	51	46	42
304 L4	296	336	321	296	46	55	50	46

	V	V1		V	V1		V	V1		V	V1		C	Input	I	F	F1	F2	Type	Input	
304 L1	239	48	15	—	—	—	276	48	17	—	—	—	37	A	467	145	95	1/4 G	5	A	16
304 L2	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		105	65	1/4 G	4	A	10
304 L3	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		105	65	1/4 G	4	A	10
304 L4	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		105	65	1/4 G	4	A	10

304 L



	PF 160		PF 180		PF 200		PF225	
	E1	P1	E1	P1	E1	P1	E1	P1
304 L1*	165	400	165	400	195	400	195	450
304 L2	165	400	165	400	—	—	—	—
304 L3	165	400	165	400	—	—	—	—

(*): contact Bonfiglioli technical service
NOTE: For R design contact Bonfiglioli Technical service

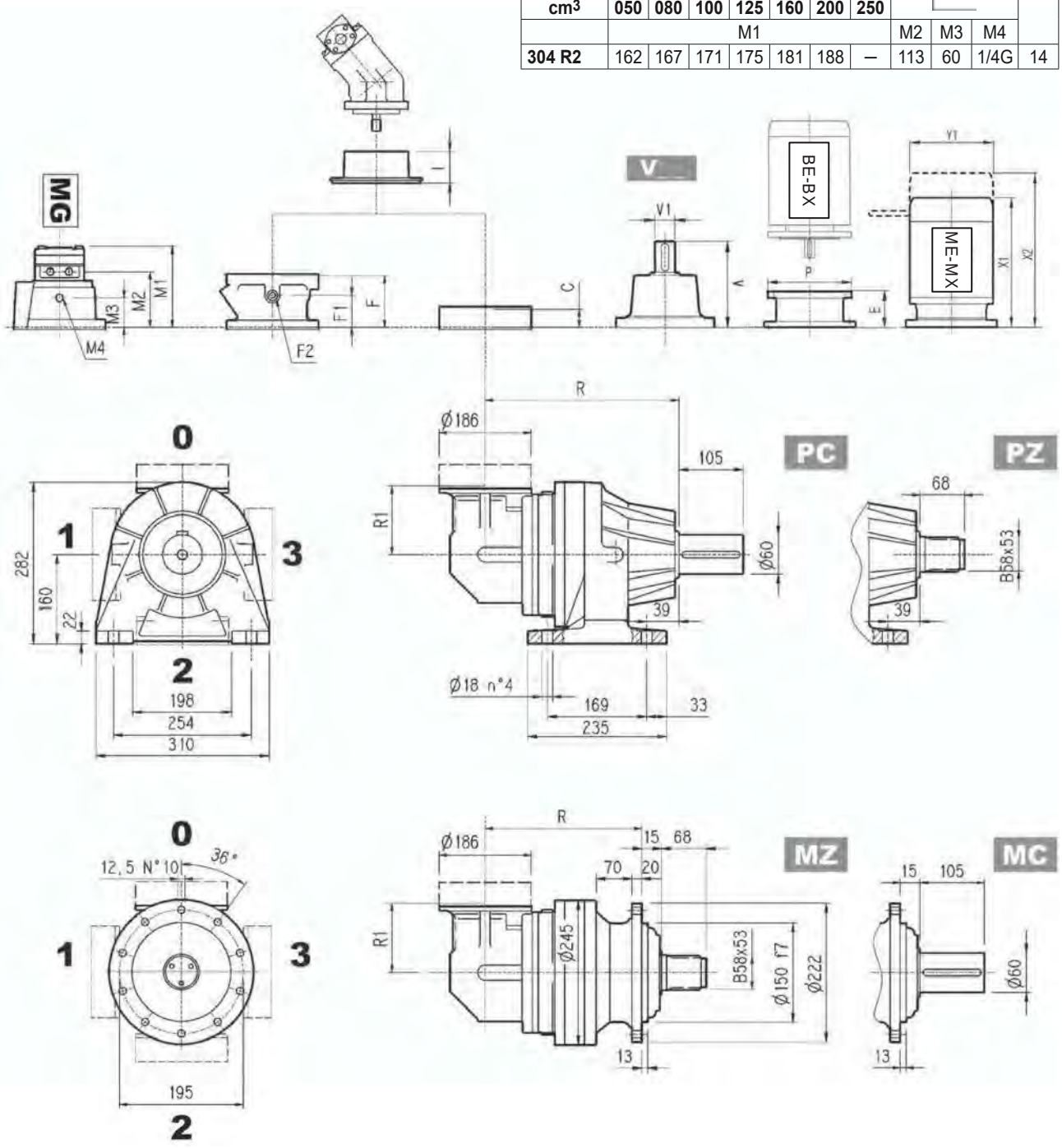
FP M_{2max} = 7300 Nm

	P71		P80		P90		P100		P112		P132		P160		P180		P200	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
304 L1	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400
304 L2	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—
304 L3	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—
304 L4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4			S5+ME5S/MX5S			S5+ME5L/MX5L		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
304 L1	—	—	—	—	—	—	—	—	—	—	—	—	460	559	258	552	692.5	310	596	736.5	310
304 L2	253	314	138	324	396	156	357	447	195	461	553	195	460	559	258	—	—	—	—	—	—
304 L3	253	314	138	324	396	156	357	447	195	461	553	195	460	559	258	—	—	—	—	—	—
304 L4	253	314	138	324	396	156	357	447	195	461	553	195	460	559	258	—	—	—	—	—	—

304 R

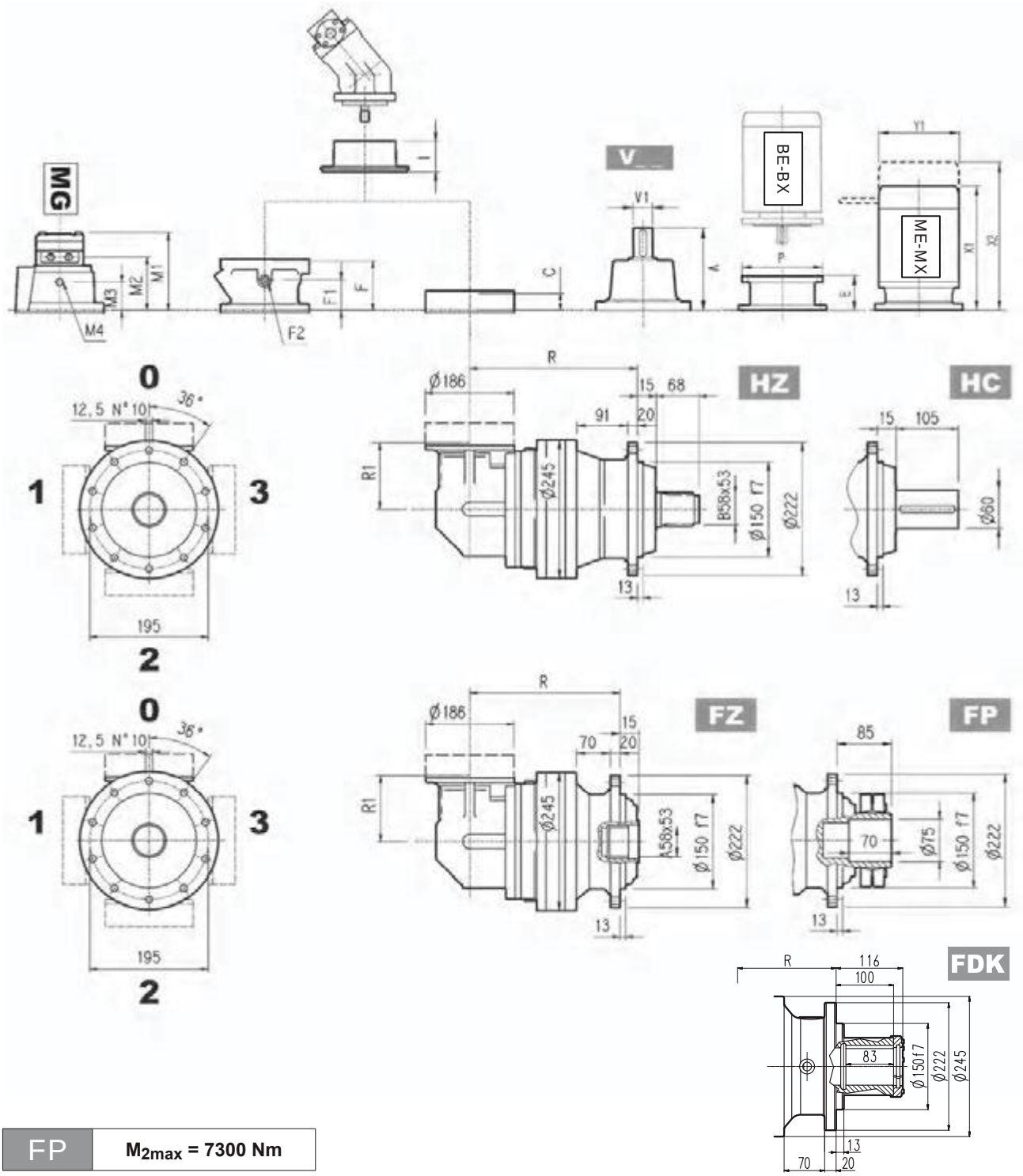
	Hydraulic motor							477			
	MG										
cm³	050	080	100	125	160	200	250				
	M1							M2	M3	M4	
304 R2	162	167	171	175	181	188	—	113	60	1/4G	14



	R				R1				
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK		MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
304 R2	217	257	242	217	140	51	60	55	51
304 R3	282	322	307	282	122	52	61	56	52
304 R4	335	375	360	335	122	56	65	60	56

	V	V1		V	V1		C	Input	I	F	F1	F2	Type	Input	
304 R2	137.5	24	6	158	38	7	37	A	467	105	65	1/4 G	4	A	10
304 R3	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10
304 R4	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10

304 R

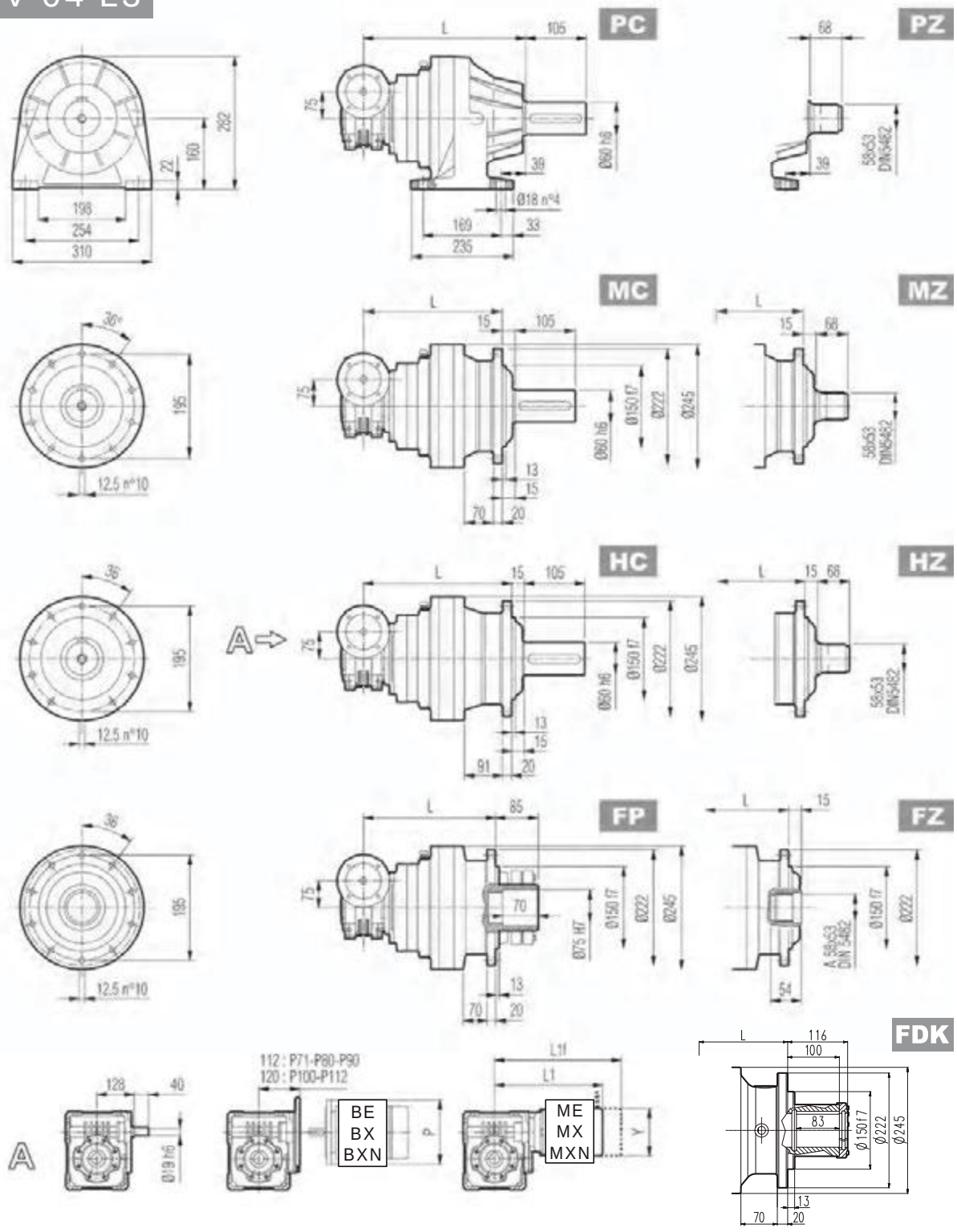


FP M_{2max} = 7300 Nm

	P71		P80		P90		P100		P112		P132	
	E	P	E	P	E	P	E	P	E	P	E	P
304 R2	65	160	84	200	84	200	94	250	94	250	114	300
304 R3	65	160	84	200	84	200	94	250	94	250	114	300
304 R4	65	160	84	200	84	200	94	250	94	250	114	300

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
304 R2	-	-	-	372	444	156	373	463	195	405	497	195	508	607	258
304 R3	253	314	138	372	444	156	373	463	195	405	497	195	—	—	—
304 R4	253	314	138	372	444	156	373	463	195	405	497	195	—	—	—

3/V 04 L3

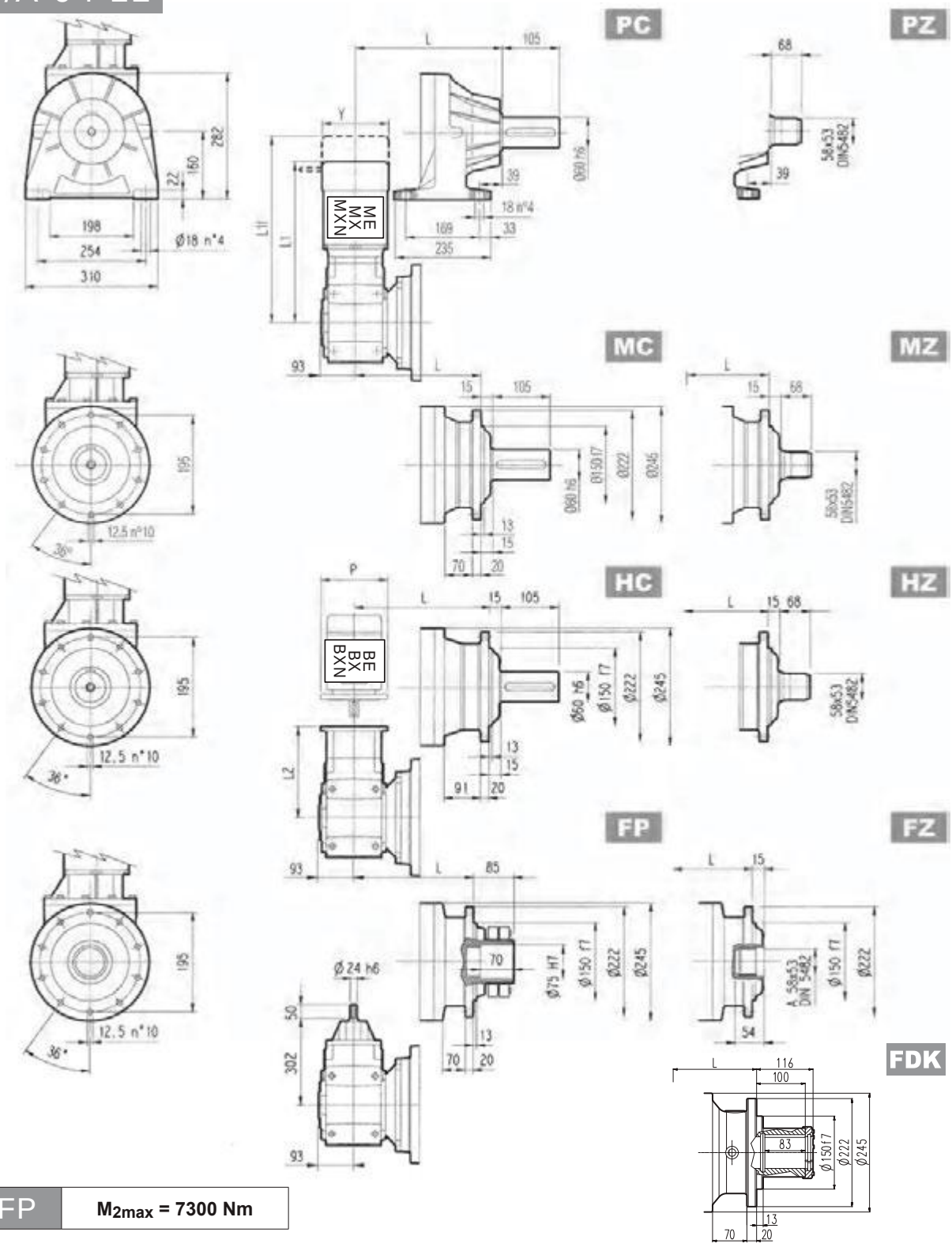


FP — M_{2max} = 7300 Nm

	L				Kg				P71	P80	P90	P100	P112
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	P	P	P	P	P
3/V 04 L3	305	345	330	305	47	56	51	47	160	200	200	250	250

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L		
	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y
3/V 04 L3	308	369	138	377	449	156	408	498	193	452	544	193

3/A 04 L2

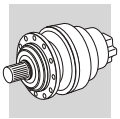


FP	M_{2max} = 7300 Nm

	L							
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
3/A 04 L2	258	298	283	258	80	95	90	80

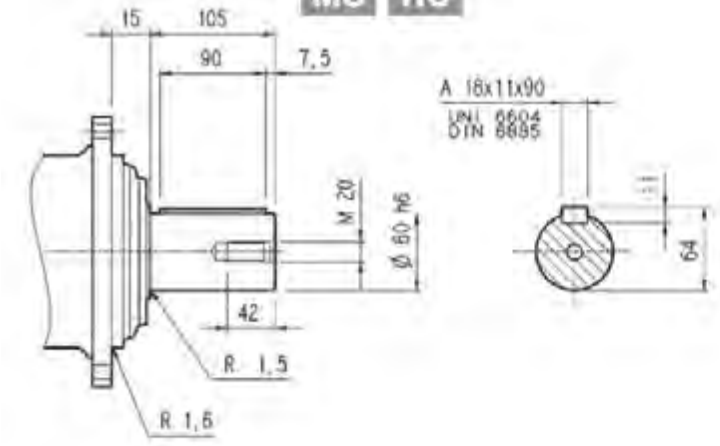
	P63		P71		P80		P90		P100		P112		P132	
	L2	P	L2	P	L2	P	L2	P	L2	P	L2	P	L2	P
3/A 04 L2	263	140	263	160	282.5	200	282.5	200	292.5	250	292.5	250	329	457

	S1+ME1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4		
	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y
3/A 04 L2	306	327	138	491	563	156	522	580	195	566	658	195	665	764	258

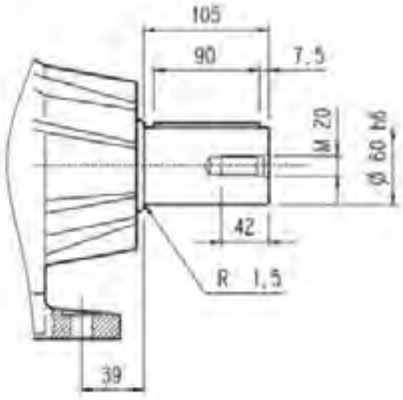


304 L | 304 R | 3/V 04 L3 | 3/A 04 L2

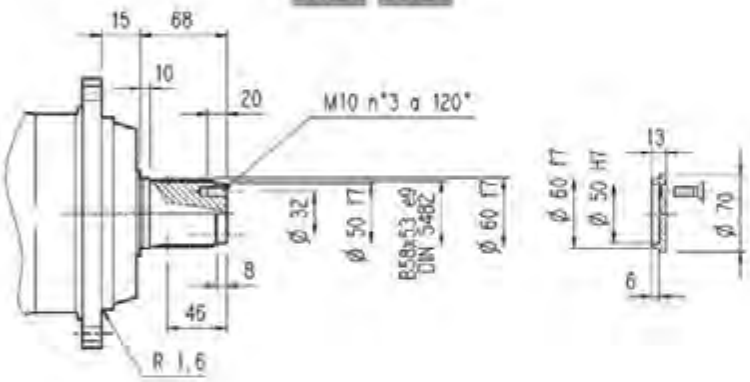
MC HC



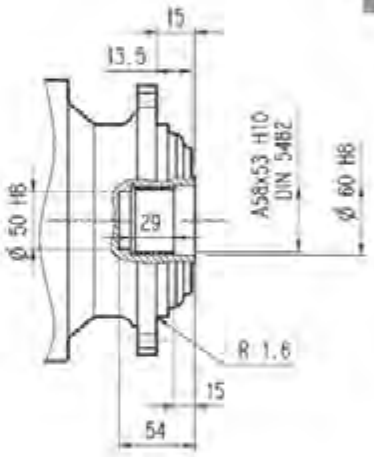
PC



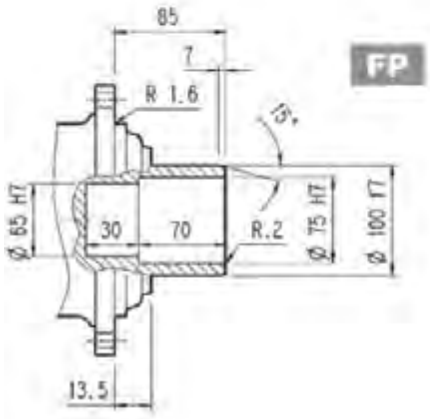
MZ HZ

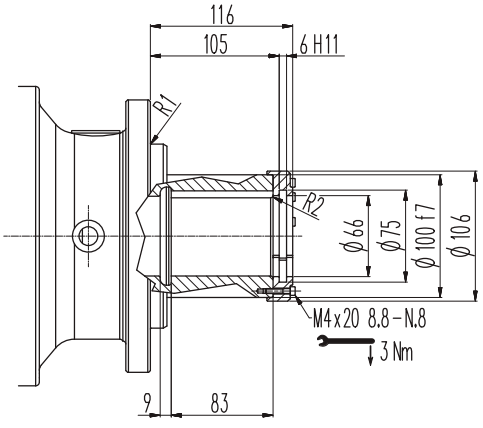


FZ

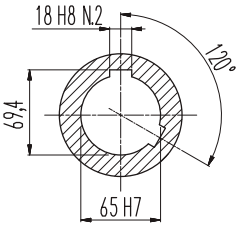


FP

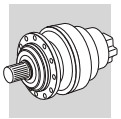




FDK



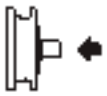
FP	M_{2max} = 7300 Nm

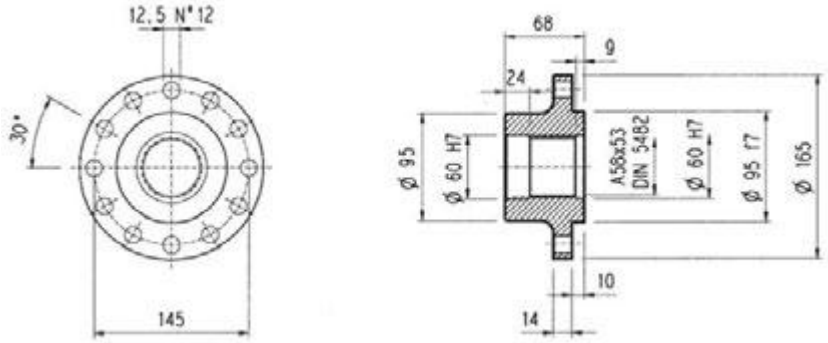


304 L | 304 R | 3/V 04 L3 | 3/A 04 L2

Flange

W0A

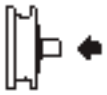


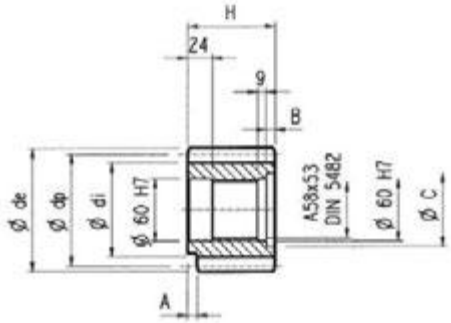


Material: Steel C40

Pinions

P...



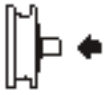


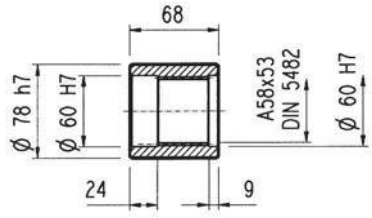
$\alpha = 20°$

	m	z	x	dp	di	de	H	A	B	C	Material
PCL1	5	19	—	95	82	104	77	12	9	72	Steel 39NiCrMo3 hardened and tempered
PCL2	5	19	—	95	82	104	68	—	—	—	
PCM	5	20	—	100	87.5	110	68	18	—	—	Steel 18NiCrMo5 case hardened
PCP	5	22	—	110	97.5	120	68	18	—	—	
PDE	6	14	0.500	84	75	99.6	68	—	—	—	Steel 39NiCrMo3 hardened and tempered
PDI	6	18	0.500	108	99	123.6	68	—	—	—	
PDM	6	20	0.833	120	115	140	68	—	—	—	
PFD	8	13	0.675	104	95	127.6	68	—	—	—	Steel 18NiCrMo5 case hardened
PFE1	8	14	—	112	92	126	68	—	—	—	
PFE2	8	14	—	112	92	126	80	—	12	72	
PFF	8	15	—	120	100	136	68	—	—	—	Steel 39NiCrMo3 hardened and tempered
PFP	8	22	—	176	156	190	77	12	10	71	
PHG	10	16	0.500	160	145	188	75	—	7	72	

Sleeve coupling

M0A

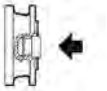


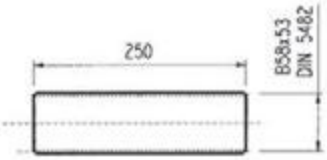


Material: Steel 16CrNi4

Splined bars

B0A

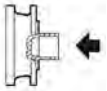


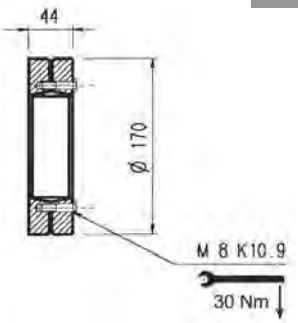


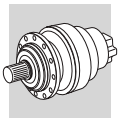
Material: Case hardening steel 18NiCrMo5 UNI 5331
must be case hardened 50-55 HRC

Shrink disc

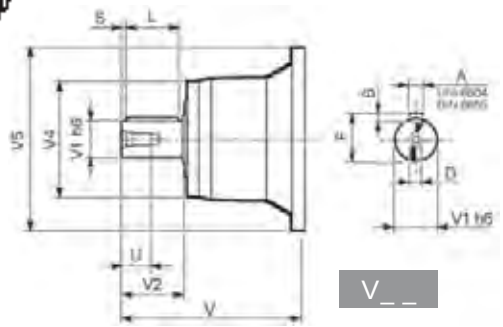
G0A

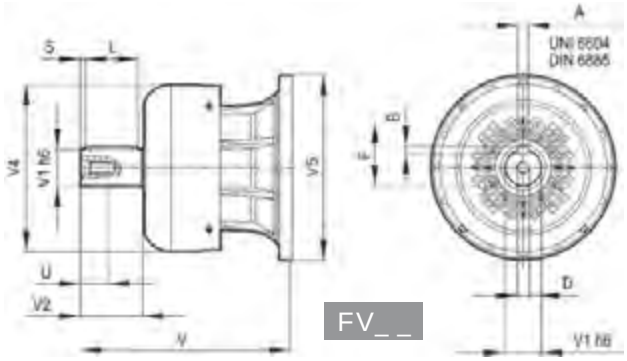






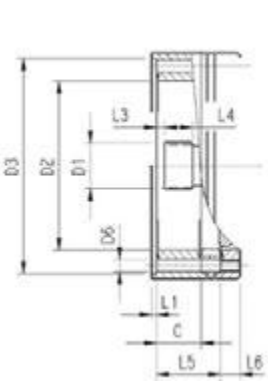
304 L 304 R

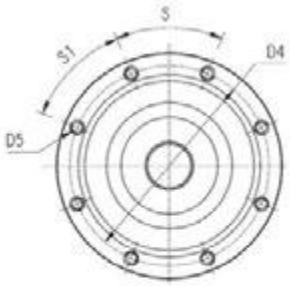




		V	V1	V2	V4	V5	A	B	F	L	S	D	U
304 L1	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36
304 L2	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
304 L3	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
304 L4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
304 R2-R3-R4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28

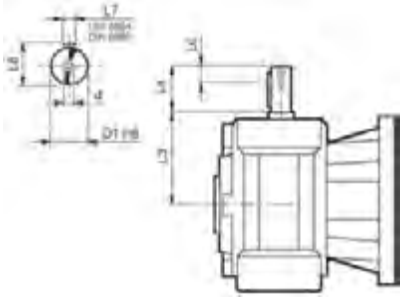
304 L 304 R





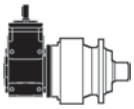
		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
304 L1	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	—	18	45°	45°	A
304 L2	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	65	18	45°	45°	A
304 L3	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	118	18	45°	45°	A
304 L4	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	171	18	45°	45°	A
304 R2-R3-R4	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	37	18	45°	45°	A

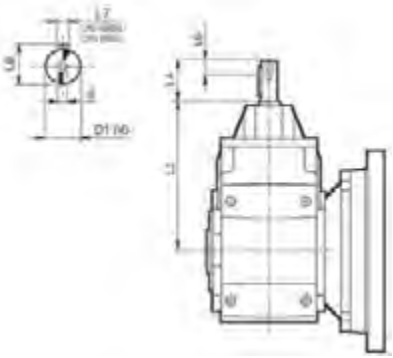
3/V 04 L3



	D1 h6	L3	L4	L6	L7	L8	d
3/V 04 L3_HS	19	128	40	16	6	21.5	M6

3/A 04 L2

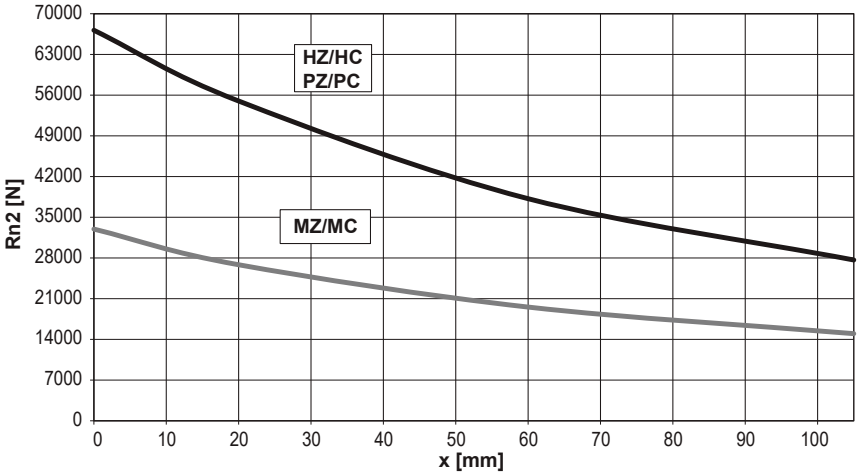


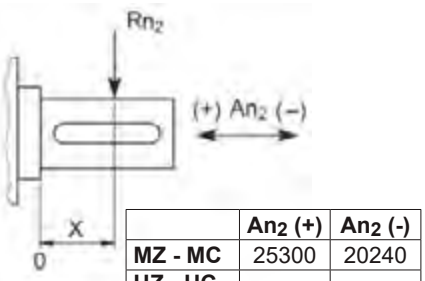


	D1 h6	L3	L4	L6	L7	L8	d
3/A 04 L2_HS	24	302	50	19	8	27	M8

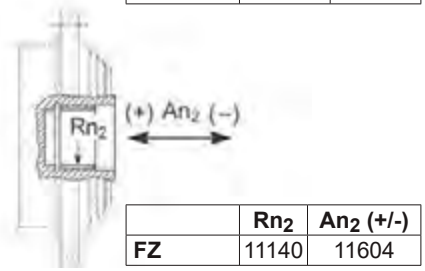
304 L | 304 R | 3/V 04 L3 | 3/A 04 L2

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$





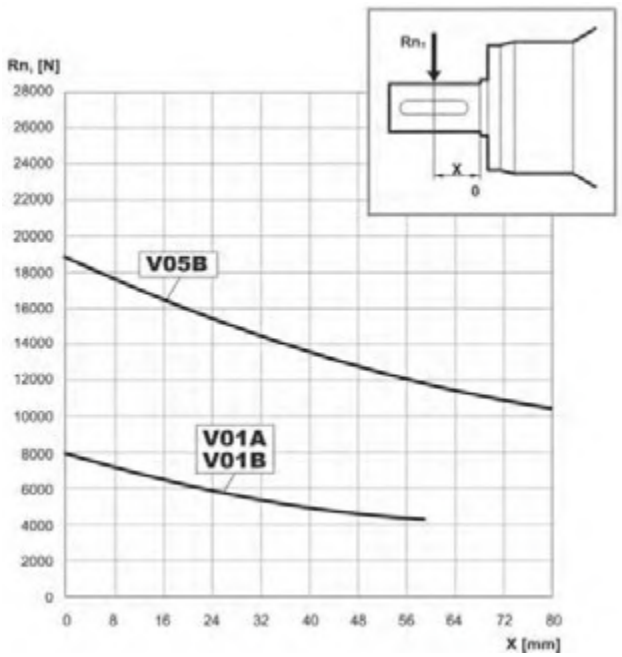
	An2 (+)	An2 (-)
MZ - MC	25300	20240
HZ - HC PZ - PC	27500	22000

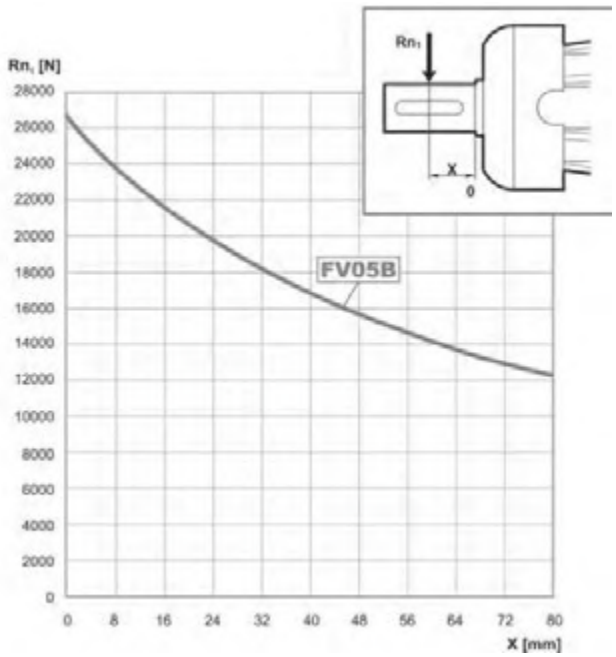


	Rn2	An2 (+/-)
FZ	11140	11604

	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
Load corrective factor fh_2 on shafts	fh_2	FZ	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		MZ - MC	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HZ - HC - PZ - PC	**1.48**	**1.48**	**1.23**	**1.00**	**0.62**	**0.50**

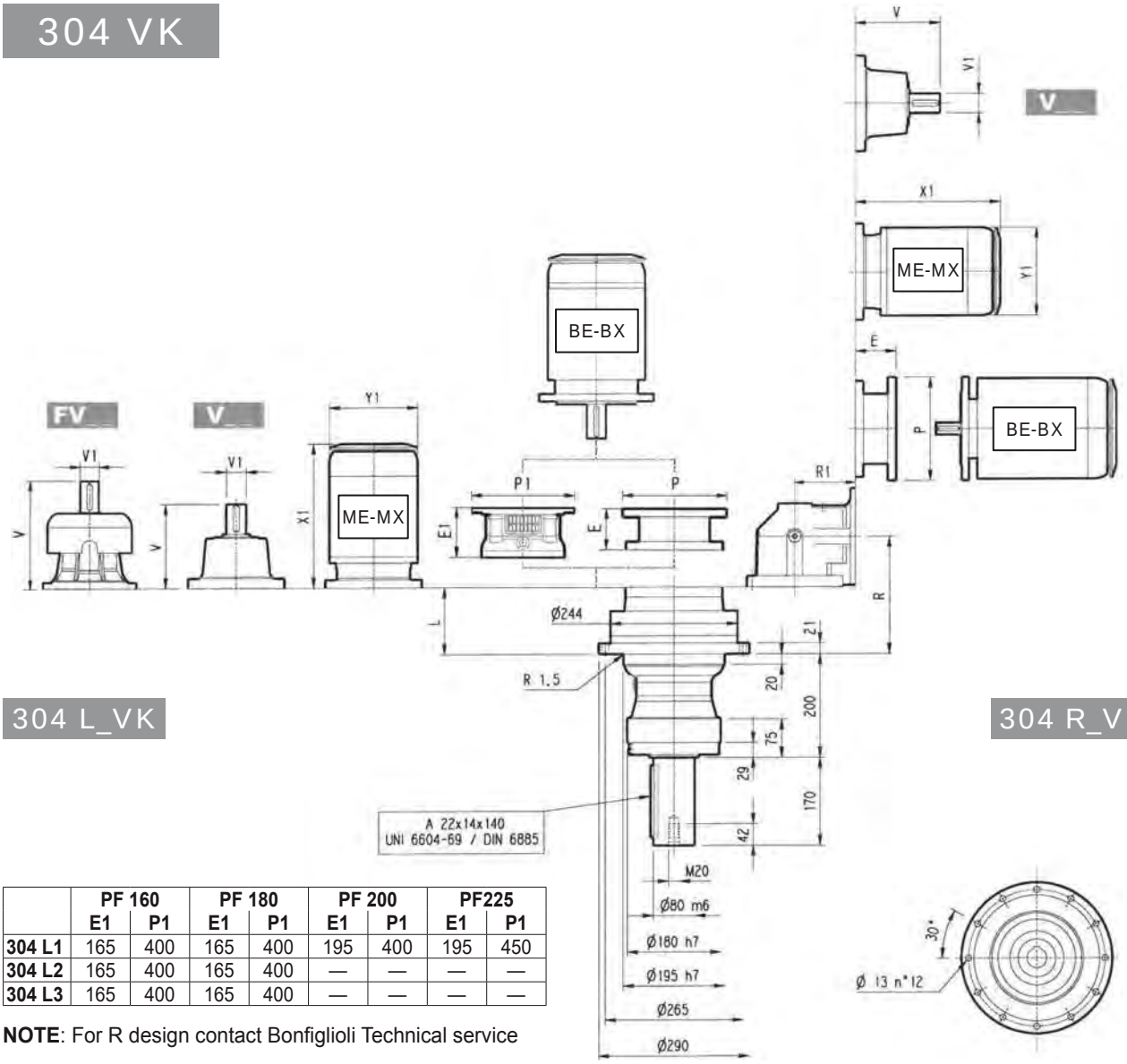
Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$





Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

304 VK



304 L_VK

304 R_VK

	PF 160		PF 180		PF 200		PF225	
	E1	P1	E1	P1	E1	P1	E1	P1
304 L1	165	400	165	400	195	400	195	450
304 L2	165	400	165	400	—	—	—	—
304 L3	165	400	165	400	—	—	—	—

NOTE: For R design contact Bonfiglioli Technical service

	L		V	V1		V	V1		V	V1		V	V1		P71		P80		P90		P100		P112		P132		P160		P180		P200	
															E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
304 L1	51	65	239	48	15	—	—	—	276	48	17	—	—	—	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400
304 L2	116	73	137.5	24	6	158	38	7	—	—	—	—	—	—	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—
304 L3	169	76	137.5	24	6	158	38	7	—	—	—	—	—	—	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—
304 L4	222	80	137.5	24	6	158	38	7	—	—	—	—	—	—	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—

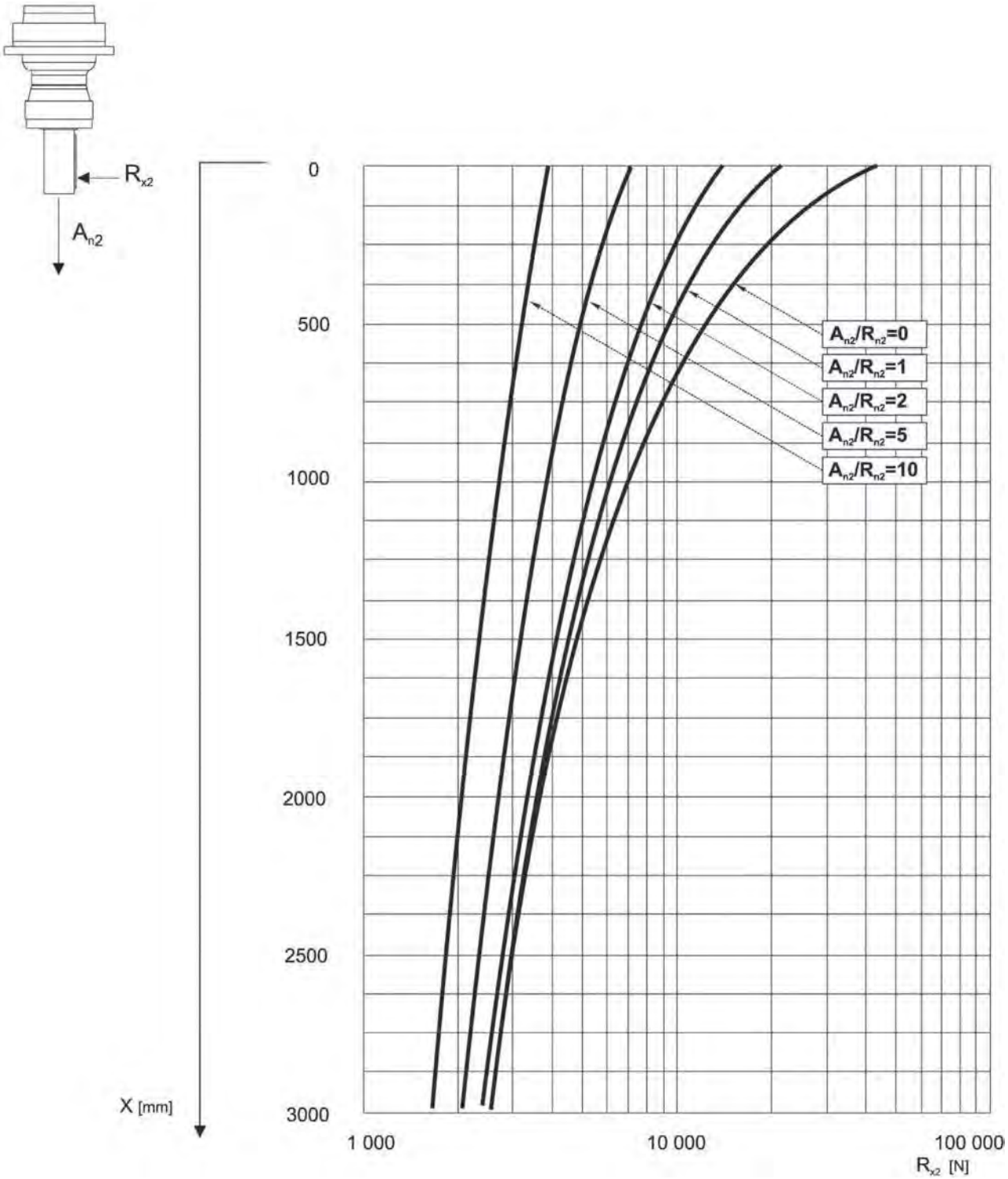
	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4			S5+ME5S/MX5S			S5+ME5L/MX5L		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
304 L1	—	—	—	—	—	—	—	—	—	—	—	—	460	559	258	552	692.5	310	596	736.5	310
304 L2	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—
304 L3	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—
304 L4	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—

	R	R1		V	V1		V	V1		P71		P80		P90		P100		P112		P132	
										E	P	E	P	E	P	E	P	E	P	E	P
304 R2	143	140	85	137.5	24	6	158	38	7	65	160	84	200	84	200	94	250	94	250	114	300
304 R3	208	122	86	137.5	24	6	158	38	7	65	160	84	200	84	200	94	250	94	250	114	300
304 R4	261	122	90	137.5	24	6	158	38	7	65	160	84	200	84	200	94	250	94	250	114	300

	S1+ME1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
304 R2	—	—	—	372	444	156	405	495	195	449	541	195	508	607	258
304 R3	253	314	138	372	444	156	405	495	195	449	541	195	—	—	—
304 R4	253	314	138	372	444	156	405	495	195	449	541	195	—	—	—

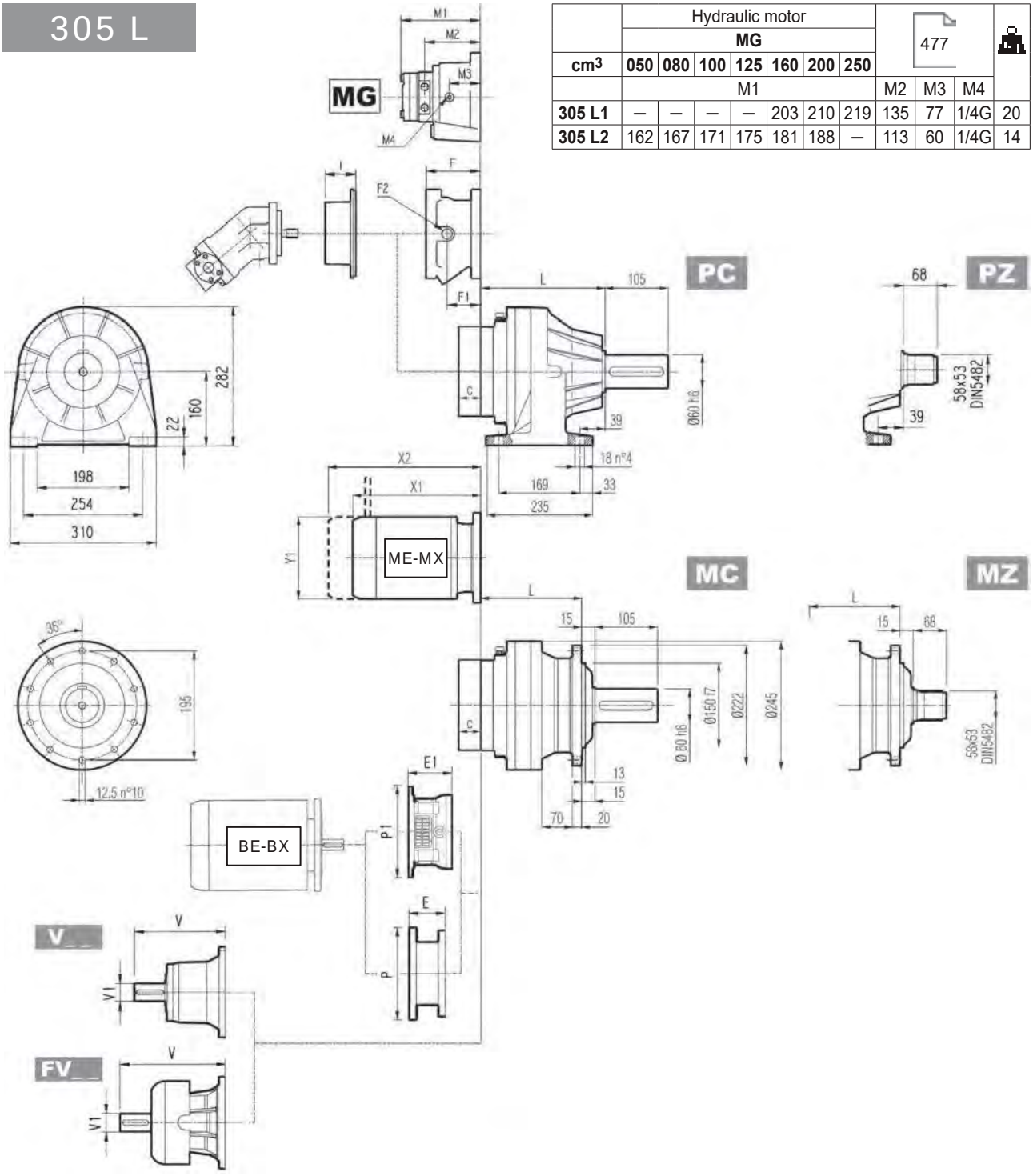
304 VK

The diagram below allows the calculation of permitted overhung load R_{x2} on the output shaft of gearbox, with radial force applying at a distance x from shaft shoulder.
The curves are relevant to value resulting from the relationship of trust load A_{n2} to radial load R_{n2}, based on n_2 = 10 min^{-1} and 10000 hrs theoretical lifetime.



305 L

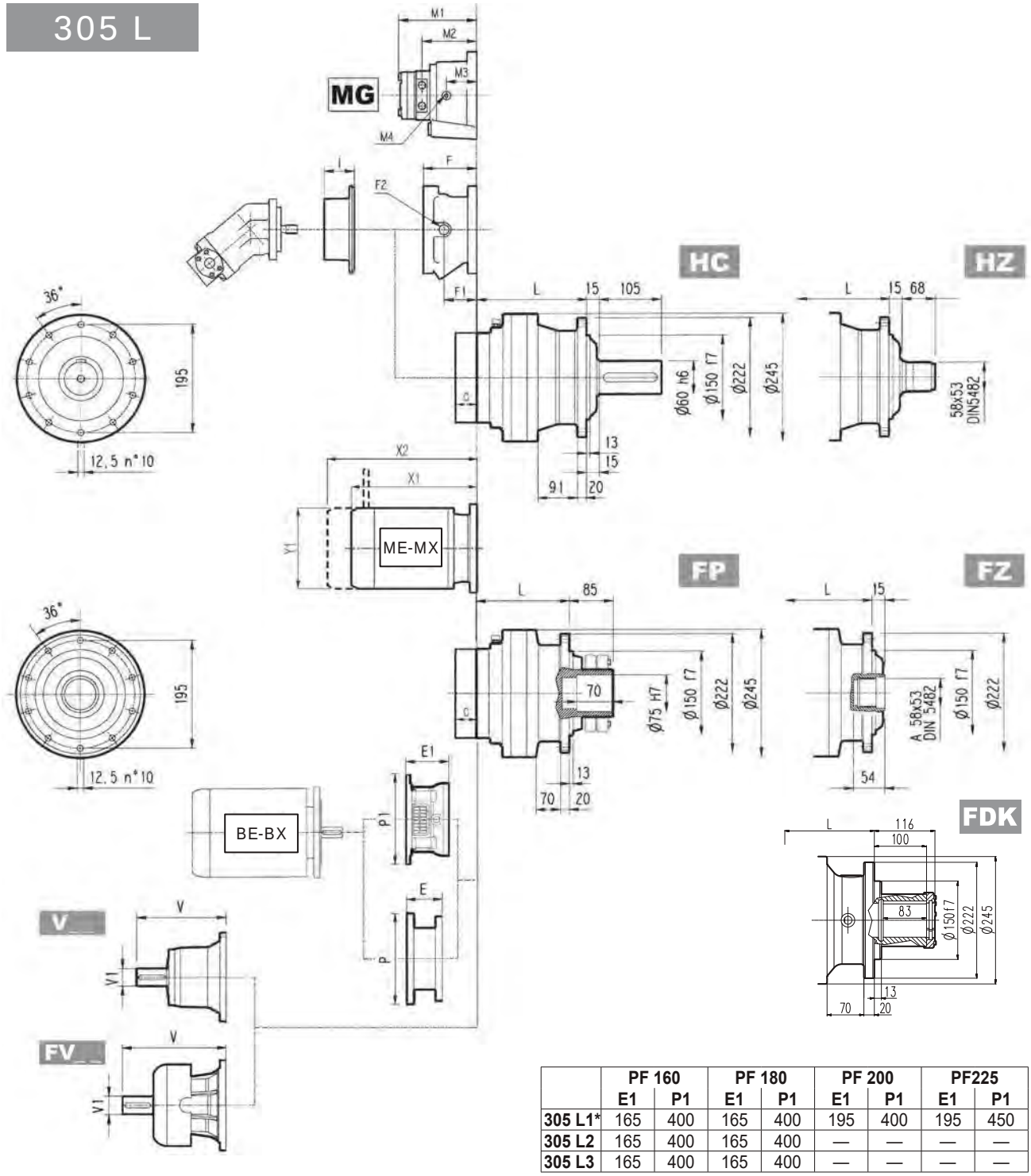
	Hydraulic motor							477			
	MG										
cm³	050	080	100	125	160	200	250				
	M1							M2	M3	M4	
305 L1	—	—	—	—	203	210	219	135	77	1/4G	20
305 L2	162	167	171	175	181	188	—	113	60	1/4G	14



	L							
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
305 L1	143	183	168	143	36	45	40	36
305 L2	208	248	233	208	43	52	47	43
305 L3	261	301	286	261	47	56	51	47
305 L4	314	354	339	314	51	60	55	51

	V	V1	kg	V	V1	kg	V	V1	kg	V	V1	kg	C	Input	I	F	F1	F2	Type	Input	kg
305 L1	239	48	15	—	—	—	276	48	17	—	—	—	37	A	467	145	95	1/4 G	5	A	16
305 L2	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		105	65	1/4 G	4	A	10
305 L3	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		105	65	1/4 G	4	A	10
305 L4	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		105	65	1/4 G	4	A	10

305 L



	PF 160		PF 180		PF 200		PF225	
	E1	P1	E1	P1	E1	P1	E1	P1
305 L1*	165	400	165	400	195	400	195	450
305 L2	165	400	165	400	—	—	—	—
305 L3	165	400	165	400	—	—	—	—

(*): contact Bonfiglioli technical service
NOTE: For R design contact Bonfiglioli Technical service

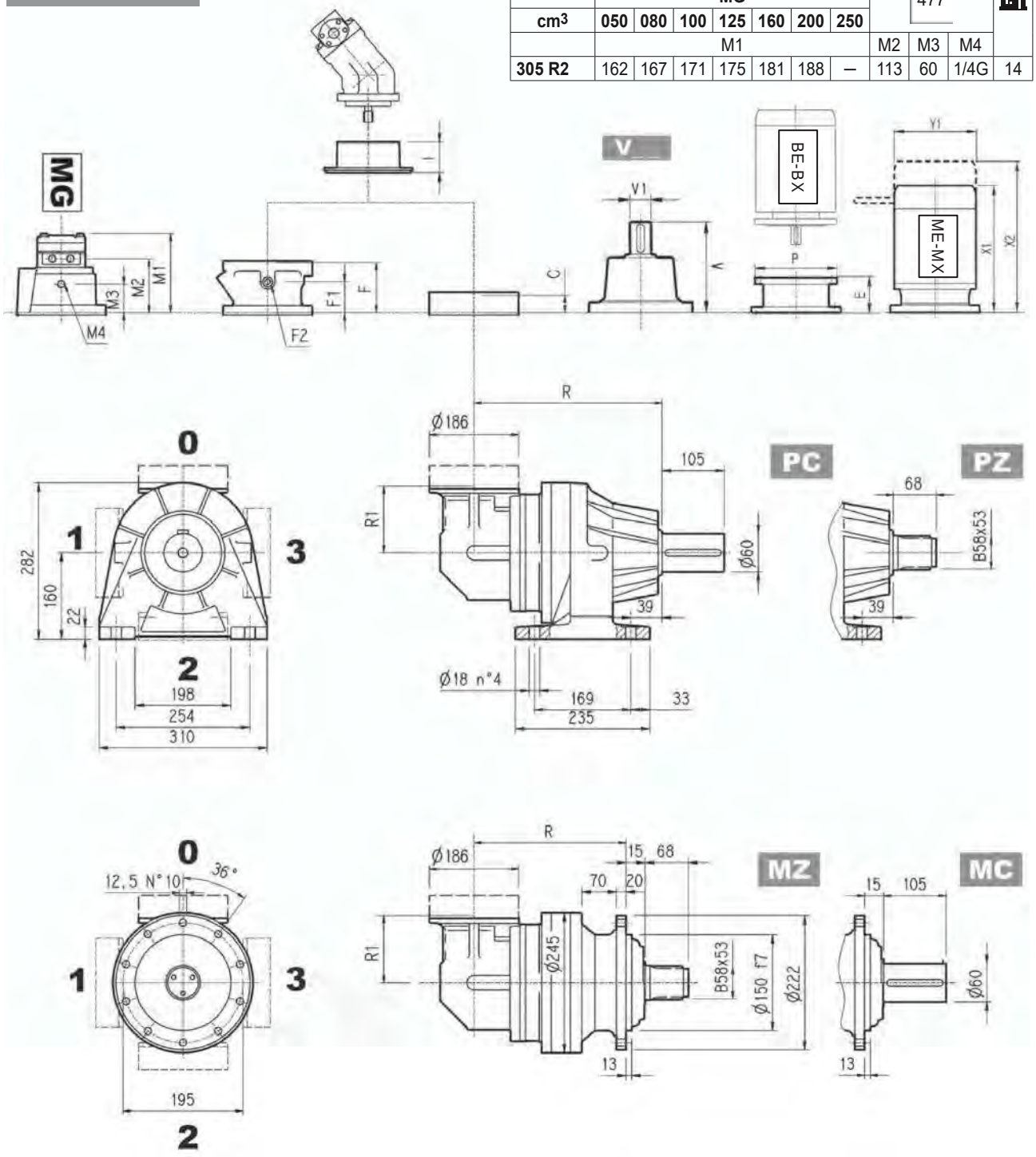
FP — M_{2max} = 7500 Nm

	P71		P80		P90		P100		P112		P132		P160		P180		P200	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
305 L1	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400
305 L2	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—
305 L3	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—
305 L4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4			S5+ME5S/MX5S			S5+ME5L/MX5L		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
305 L1	—	—	—	—	—	—	—	—	—	—	—	—	460	559	258	574	714.5	310	552	692.5	310
305 L2	—	—	—	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—
305 L3	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—
305 L4	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—

305 R

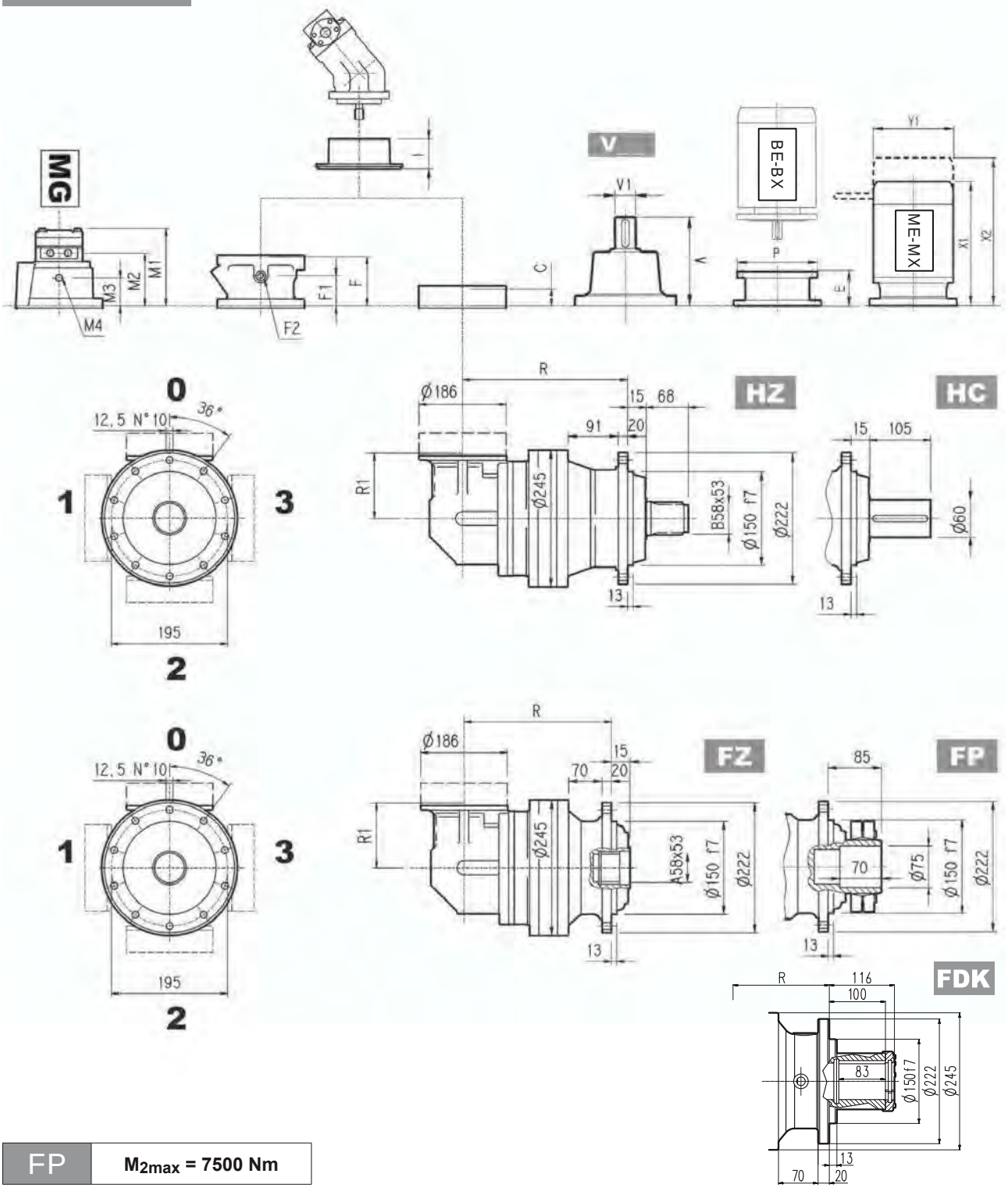
	Hydraulic motor							477			
	MG										
cm³	050	080	100	125	160	200	250				
	M1							M2	M3	M4	
305 R2	162	167	171	175	181	188	—	113	60	1/4G	14



	R				R1				
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK		MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
305 R2	235	375	260	235	140	56	65	60	56
305 R3	300	340	325	300	122	57	66	61	57
305 R4	353	393	378	353	122	61	70	65	61

	V	V1		V	V1		C	Input	I	F	F1	F2	Type	Input	
305 R2	137.5	24	6	158	38	7	37	A	467	105	65	1/4 G	4	A	10
305 R3	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10
305 R4	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10

305 R

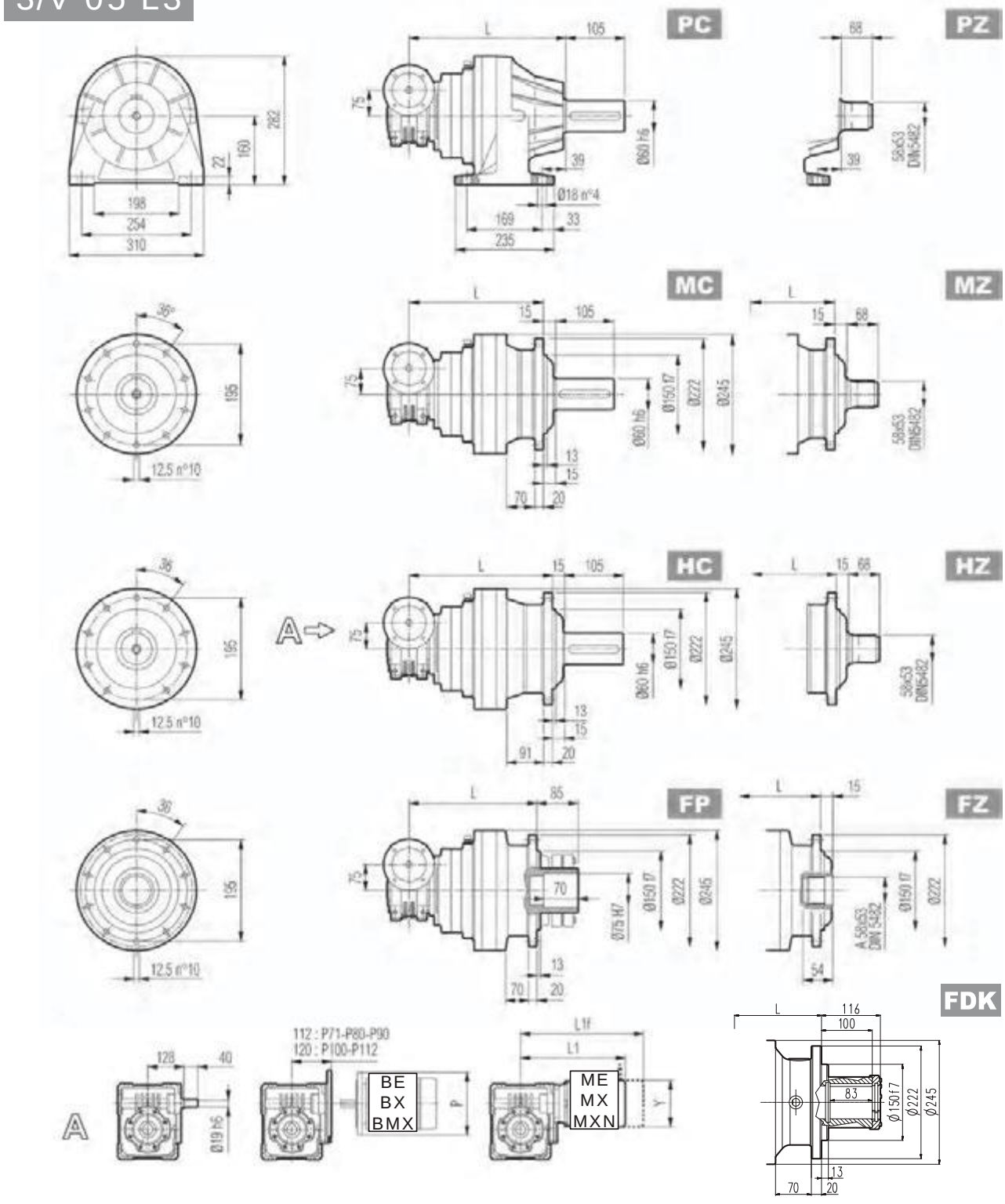


FP — M_{2max} = 7500 Nm

	P71		P80		P90		P100		P112		P132	
	E	P	E	P	E	P	E	P	E	P	E	P
305 R2	65	160	84	200	84	200	94	250	94	250	114	300
305 R3	65	160	84	200	84	200	94	250	94	250	114	300
305 R4	65	160	84	200	84	200	94	250	94	250	114	300

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
305 R2	—	—	—	372	444	156	405	495	195	449	541	195	508	607	258
305 R3	253	314	138	372	444	156	405	495	195	449	541	195	508	607	258
305 R4	253	314	138	372	444	156	405	495	195	449	541	195	508	607	258

3/V 05 L3

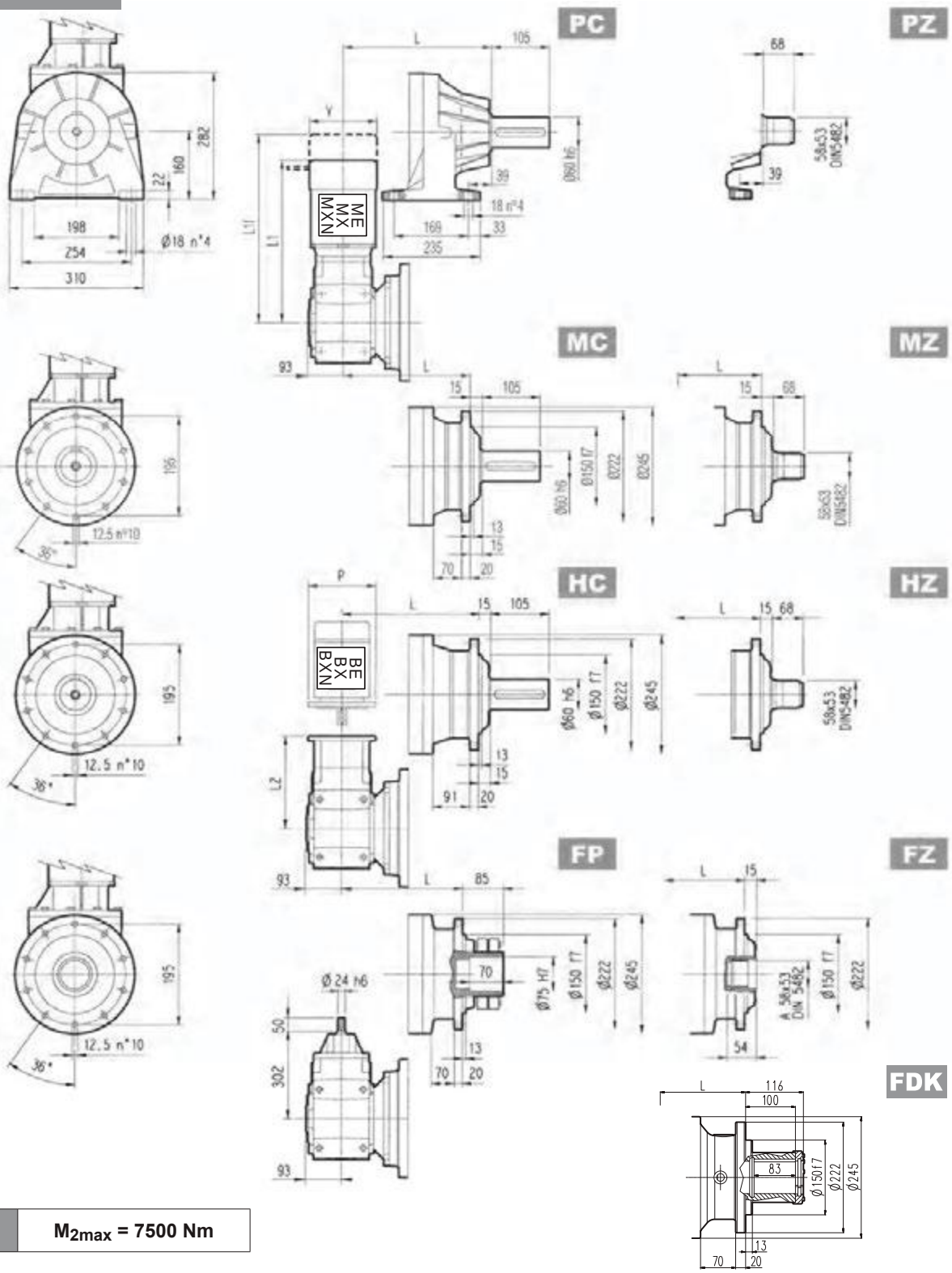


FP — M_{2max} = 7500 Nm

	L				Kg				P71	P80	P90	P100	P112
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	P	P	P	P	P
3/V 05 L3	323	363	348	323	51	60	55	51	160	200	200	250	250

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L		
	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y
3/V 05 L3	308	369	138	376	448	156	408	498	193	452	544	193

3/A 05 L2

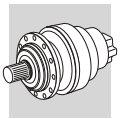


FP	M_{2max} = 7500 Nm

	L				Kg			
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
3/A 05 L2	276	316	301	276	90	105	100	90

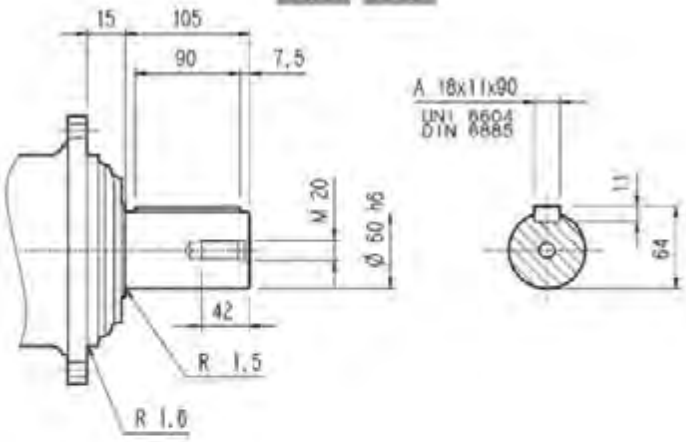
	P63		P71		P80		P90		P100		P112		P132	
	L2	P	L2	P	L2	P	L2	P	L2	P	L2	P	L2	P
3/A 05 L2	263	140	263	160	282.5	200	282.5	200	292.5	250	292.5	250	329	457

	S1+ME1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4		
	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y
3/A 05 L2	418	479	138	491	563	156	522	580	195	566	658	195	665	764	258

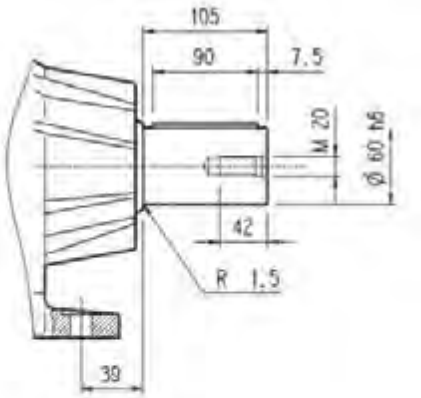


305 L	305 R	3/V 05 L3	3/A 05 L2

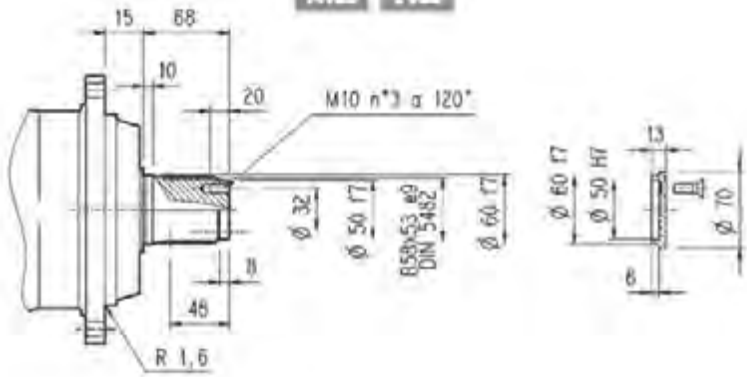
MC HC



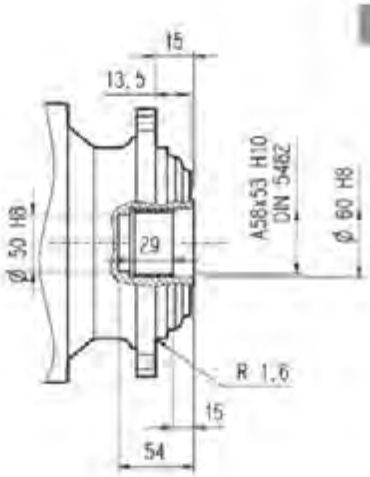
PC



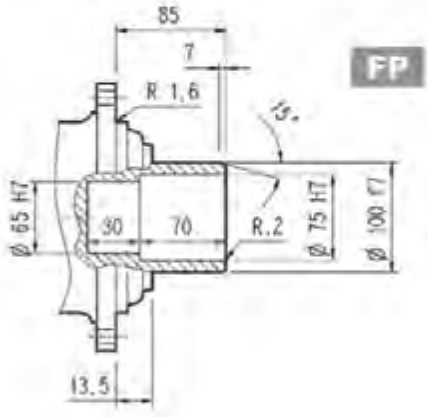
MZ HZ

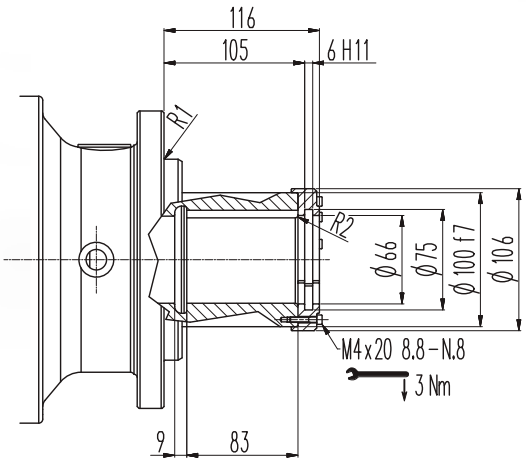


FZ

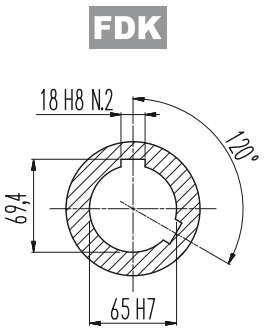


FP

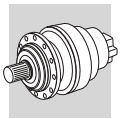




FDK



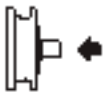
FP	M_{2max} = 7500 Nm

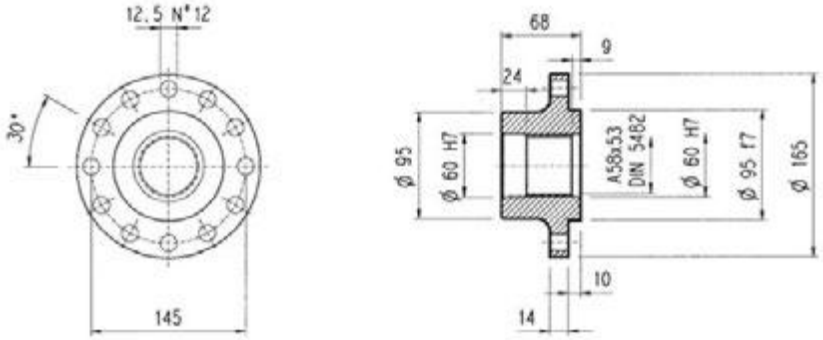


305 L | 305 R | 3/V 05 L3 | 3/A 05 L2

Flange

W0A

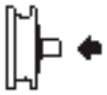


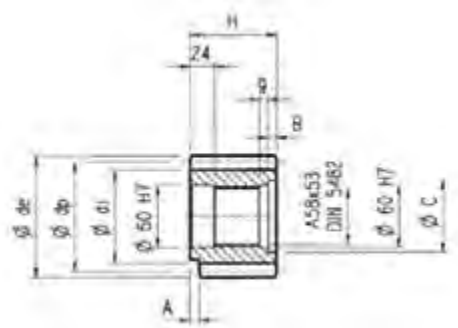


Material: Steel C40

Pinions

P...



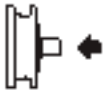


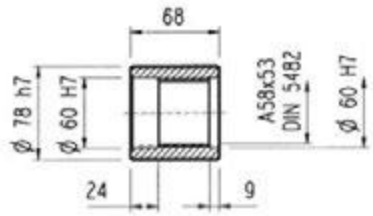
$\alpha = 20°$

	m	z	x	dp	di	de	H	A	B	C	Material
PCL1	5	19	—	95	82	104	77	12	9	72	Steel 39NiCrMo3 hardened and tempered
PCL2	5	19	—	95	82	104	68	—	—	—	
PCM	5	20	—	100	87.5	110	68	18	—	—	Steel 18NiCrMo5 case hardened
PCP	5	22	—	110	97.5	120	68	18	—	—	
PDE	6	14	0.500	84	75	99.6	68	—	—	—	Steel 39NiCrMo3 hardened and tempered
PDI	6	18	0.500	108	99	123.6	68	—	—	—	
PDM	6	20	0.833	120	115	140	68	—	—	—	
PFD	8	13	0.675	104	95	127.6	68	—	—	—	Steel 18NiCrMo5 case hardened
PFE1	8	14	—	112	92	126	68	—	—	—	
PFE2	8	14	—	112	92	126	80	—	12	72	
PFF	8	15	—	120	100	136	68	—	—	—	Steel 39NiCrMo3 hardened and tempered
PFP	8	22	—	176	156	190	77	12	10	71	
PHG	10	16	0.500	160	145	188	75	—	7	72	

Sleeve coupling

M0A

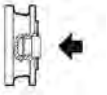


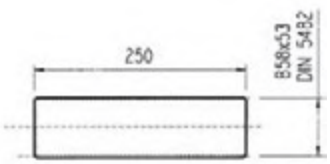


Material: Steel 16CrNi4

Splined bars

B0A

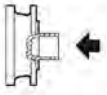


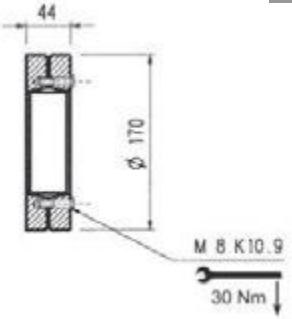


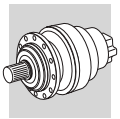
Material: Case hardening steel 18NiCrMo5 UNI 5331
must be case hardened 50-55 HRC

Shrink disc

G0A

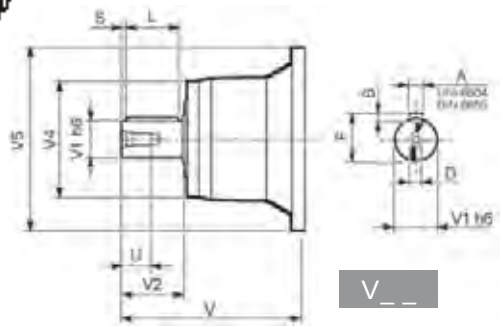




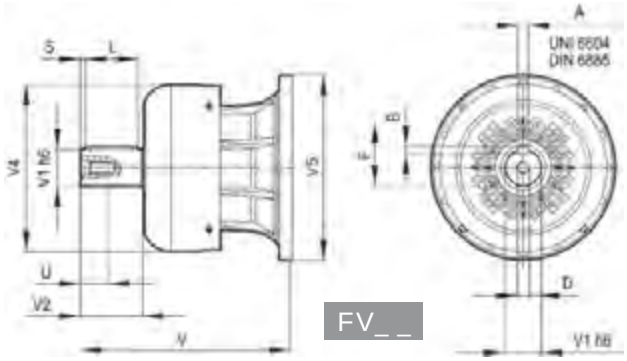


305 L

305 R



V_ _

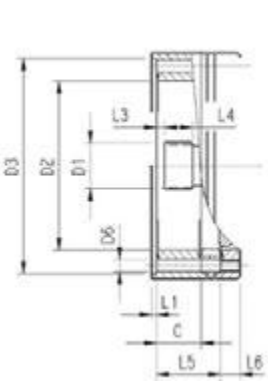


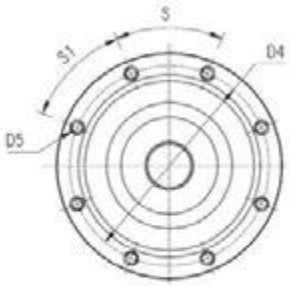
FV_ _

		V	V1	V2	V4	V5	A	B	F	L	S	D	U
305 L1	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36
305 L2	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
305 L3	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
305 L4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
305 R2-R3-R4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28

305 L

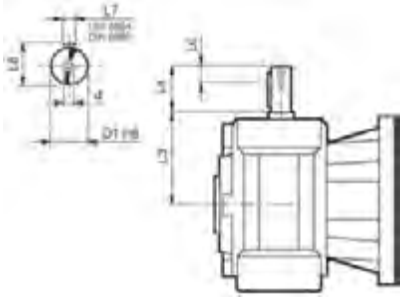
305 R





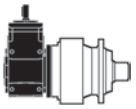
		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
305 L1	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	—	18	45°	45°	A
305 L2	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	65	18	45°	45°	A
305 L3	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	118	18	45°	45°	A
305 L4	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	171	18	45°	45°	A
305 R2-R3-R4	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	37	18	45°	45°	A

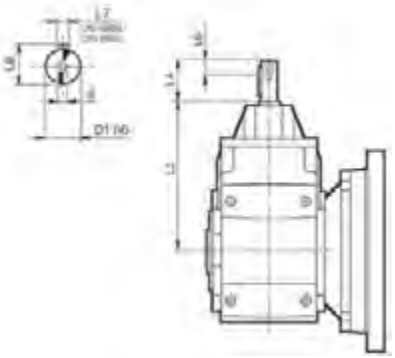
3/V 05 L3



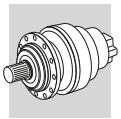
	D1 h6	L3	L4	L6	L7	L8	d
3/V 05 L3_HS	19	128	40	16	6	21.5	M6

3/A 05 L2



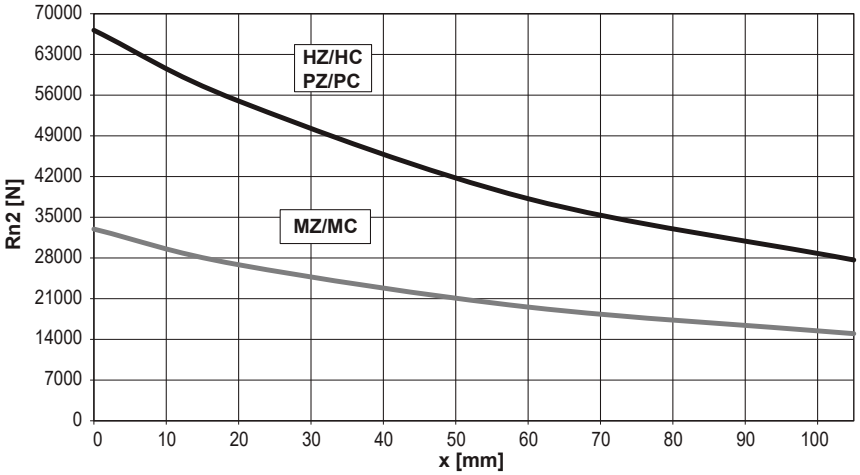


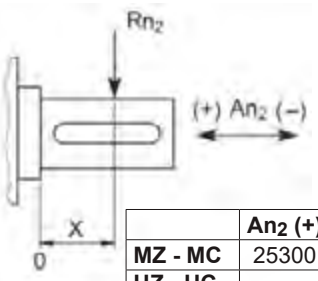
	D1 h6	L3	L4	L6	L7	L8	d
3/A 05 L2_HS	24	302	50	19	8	27	M8



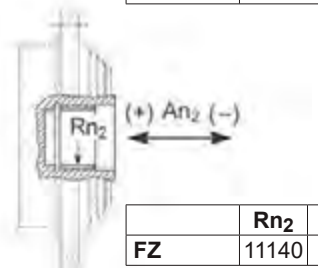
305 L | 305 R | 3/V 05 L3 | 3/A 05 L2

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$





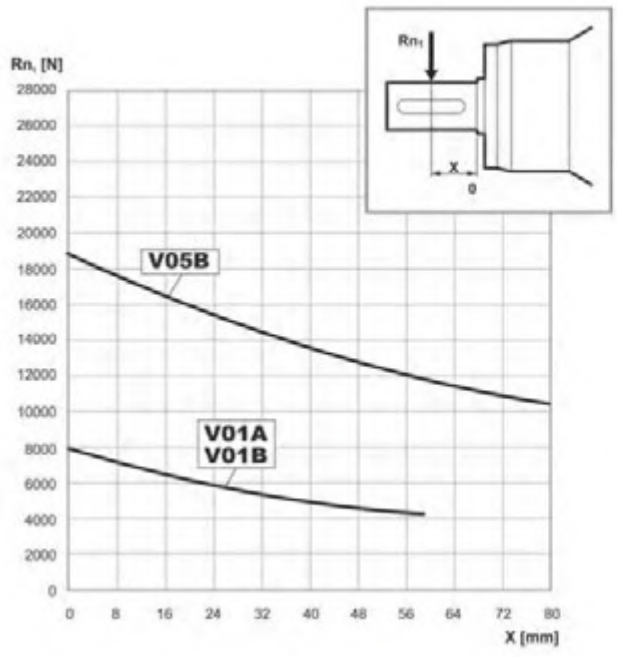
	An2 (+)	An2 (-)
MZ - MC	25300	20240
HZ - HC PZ - PC	27500	22000

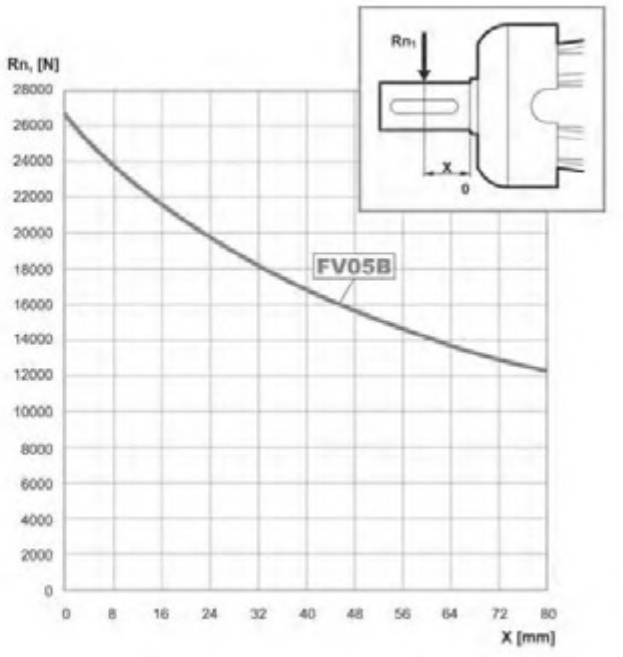


	Rn2	An2 (+/-)
FZ	11140	11604

	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
Load corrective factor fh_2 on shafts	fh_2	FZ	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		MZ - MC	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HZ - HC - PZ - PC	**1.48**	**1.48**	**1.23**	**1.00**	**0.62**	**0.50**

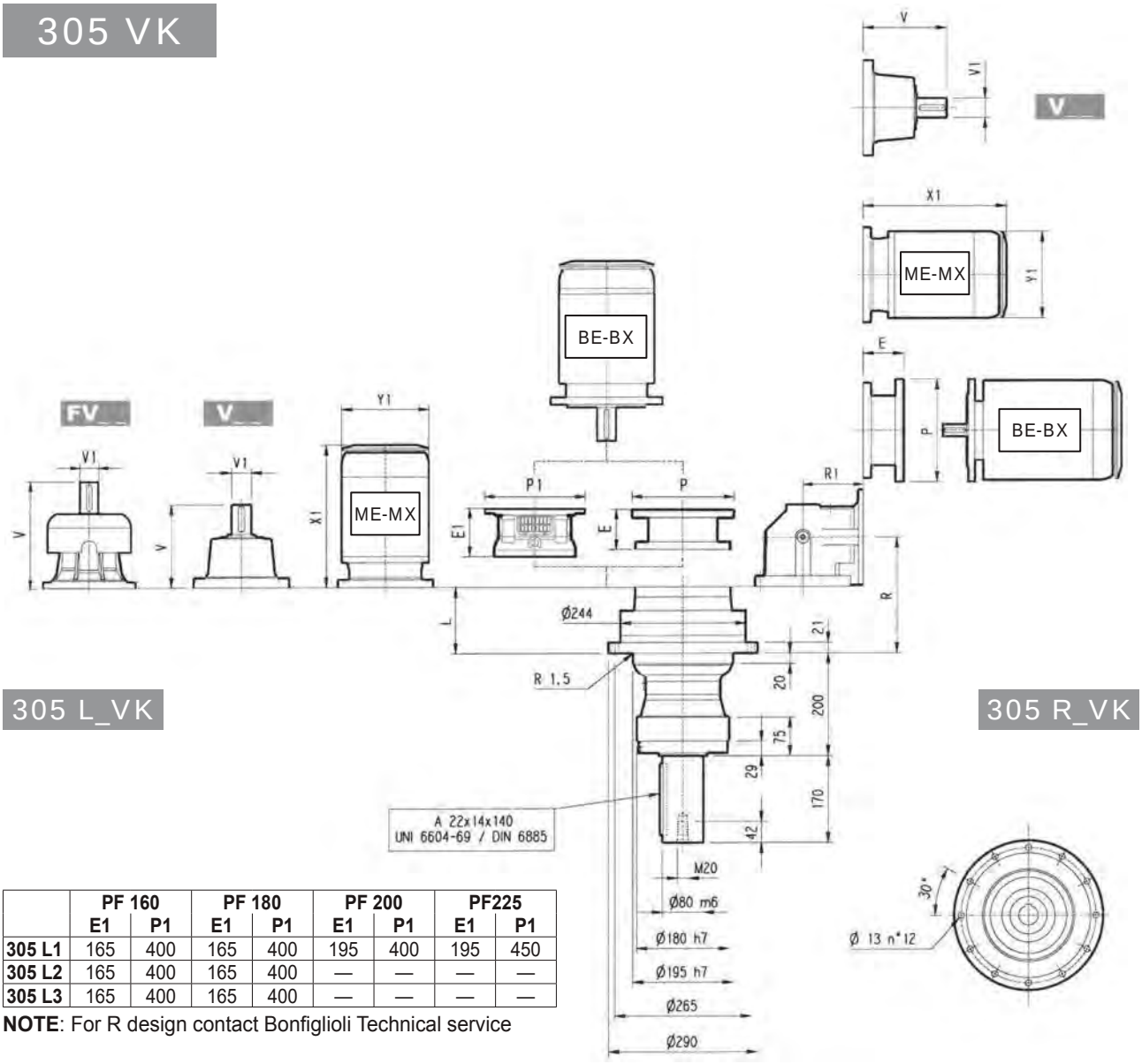
Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$





Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

305 VK



305 L_VK

305 R_VK

	PF 160		PF 180		PF 200		PF225	
	E1	P1	E1	P1	E1	P1	E1	P1
305 L1	165	400	165	400	195	400	195	450
305 L2	165	400	165	400	—	—	—	—
305 L3	165	400	165	400	—	—	—	—

NOTE: For R design contact Bonfiglioli Technical service

	L		V	V1		V	V1		V	V1		V	V1		P71		P80		P90		P100		P112		P132		P160		P180		P200	
															E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
305 L1	69	70	239	48	15	—	—	—	276	48	17	—	—	—	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400
305 L2	134	77	137.5	24	6	158	38	7	—	—	—	—	—	—	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—
305 L3	187	81	137.5	24	6	158	38	7	—	—	—	—	—	—	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—
305 L4	240	85	137.5	24	6	158	38	7	—	—	—	—	—	—	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—

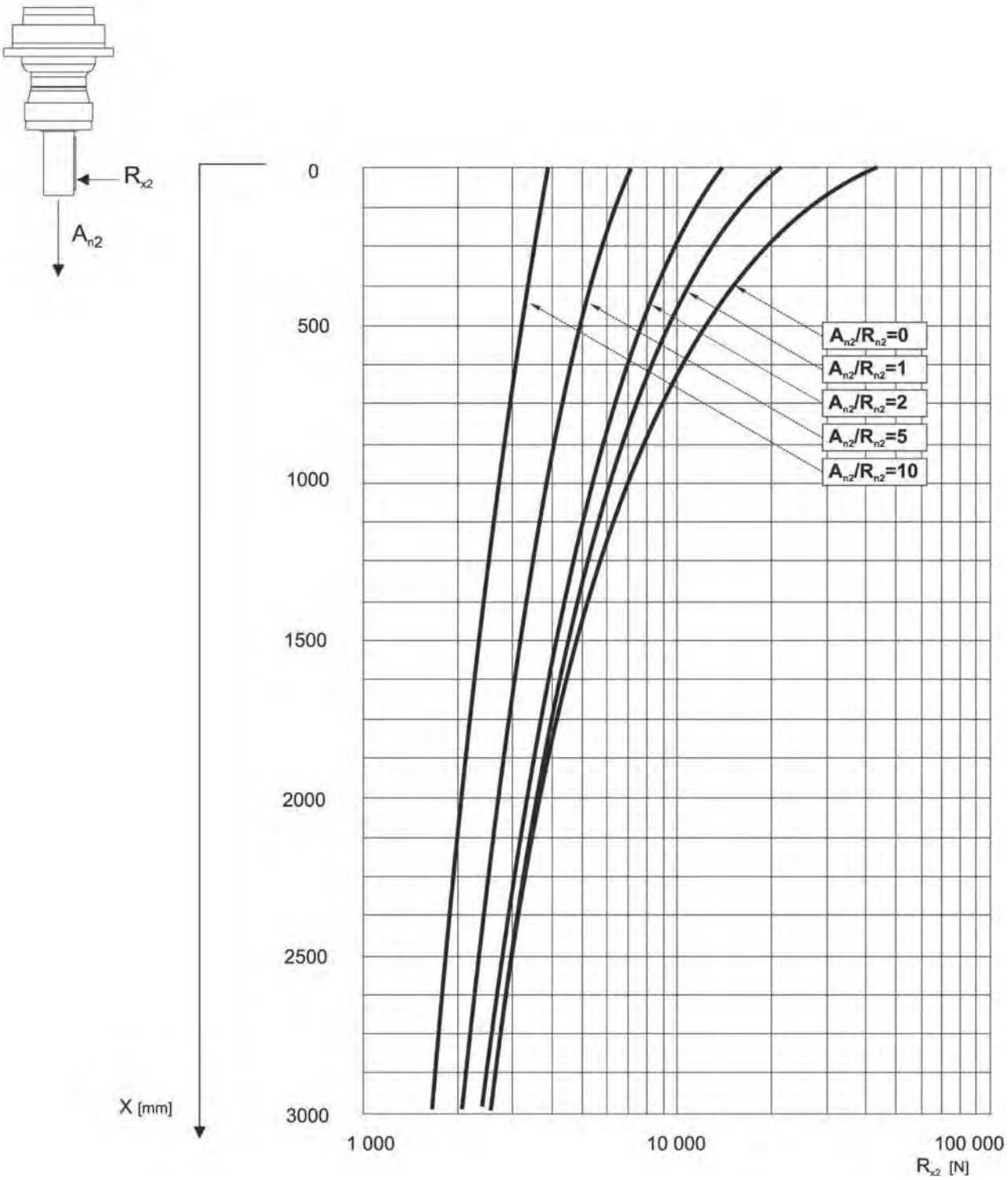
	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4			S5+ME5S/MX5S			S5+ME5L/MX5L		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
305 L1	—	—	—	—	—	—	—	—	—	—	—	—	460	559	258	552	692.5	310	596	736.5	310
305 L2	—	—	—	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—
305 L3	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—
305 L4	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—

	R	R1		V	V1		V	V1		P71		P80		P90		P100		P112		P132	
										E	P	E	P	E	P	E	P	E	P	E	P
305 R2	161	140	90	137.5	24	6	158	38	7	65	160	84	200	84	200	94	250	94	250	114	300
305 R3	226	122	92	137.5	24	6	158	38	7	65	160	84	200	84	200	94	250	94	250	114	300
305 R4	279	122	95	137.5	24	6	158	38	7	65	160	84	200	84	200	94	250	94	250	114	300

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
305 R2	—	—	—	372	444	156	405	495	195	449	541	195	508	607	258
305 R3	253	314	138	372	444	156	405	495	195	449	541	195	508	607	258
305 R4	253	314	138	372	444	156	405	495	195	449	541	195	508	607	258

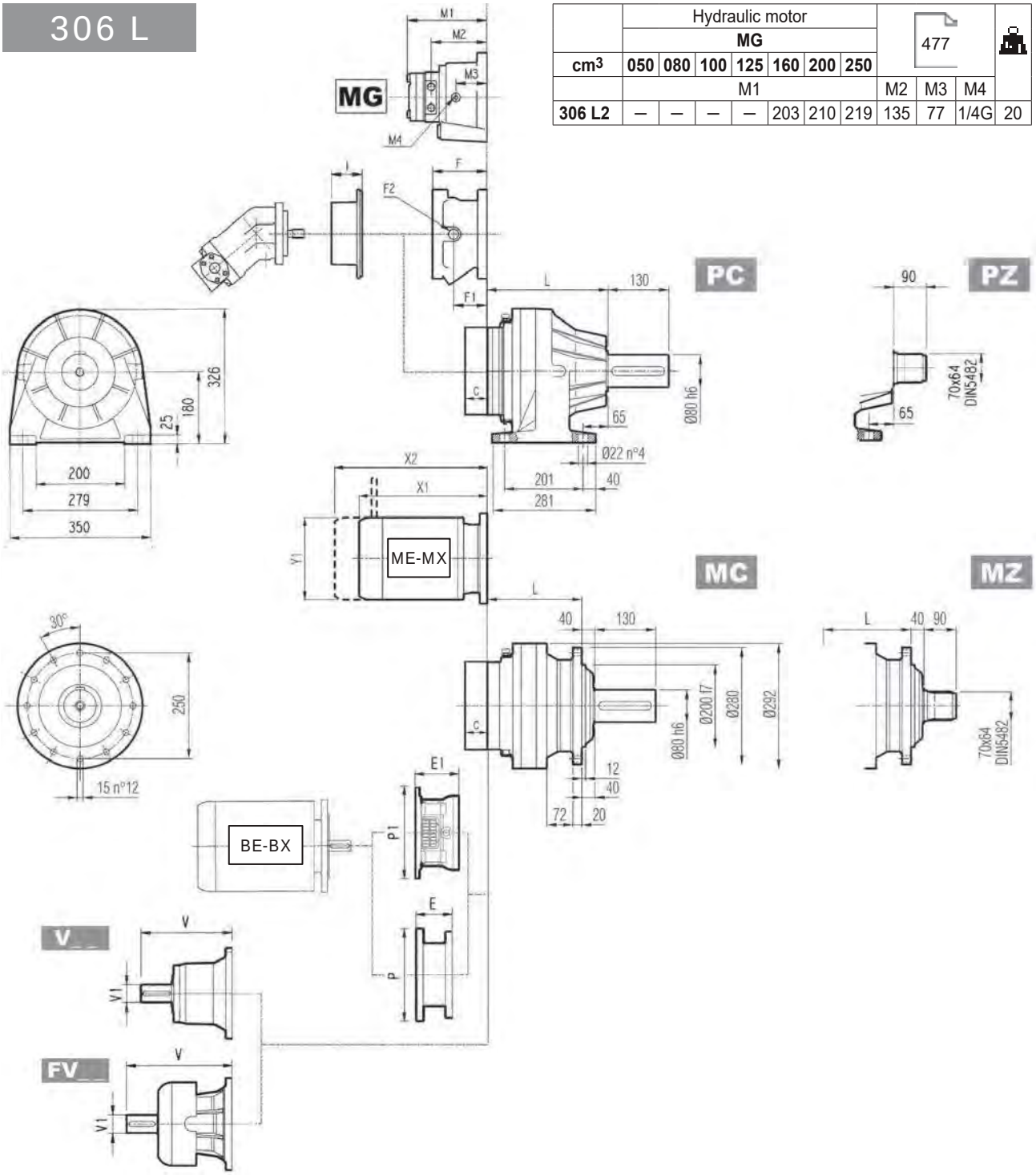
305 VK

The diagram below allows the calculation of permitted overhung load R_{x2} on the output shaft of gearbox, with radial force applying at a distance x from shaft shoulder.
The curves are relevant to value resulting from the relationship of trust load A_{n2} to radial load R_{n2}, based on n_2 = 10 min^{-1} and 10000 hrs theoretical lifetime.



306 L

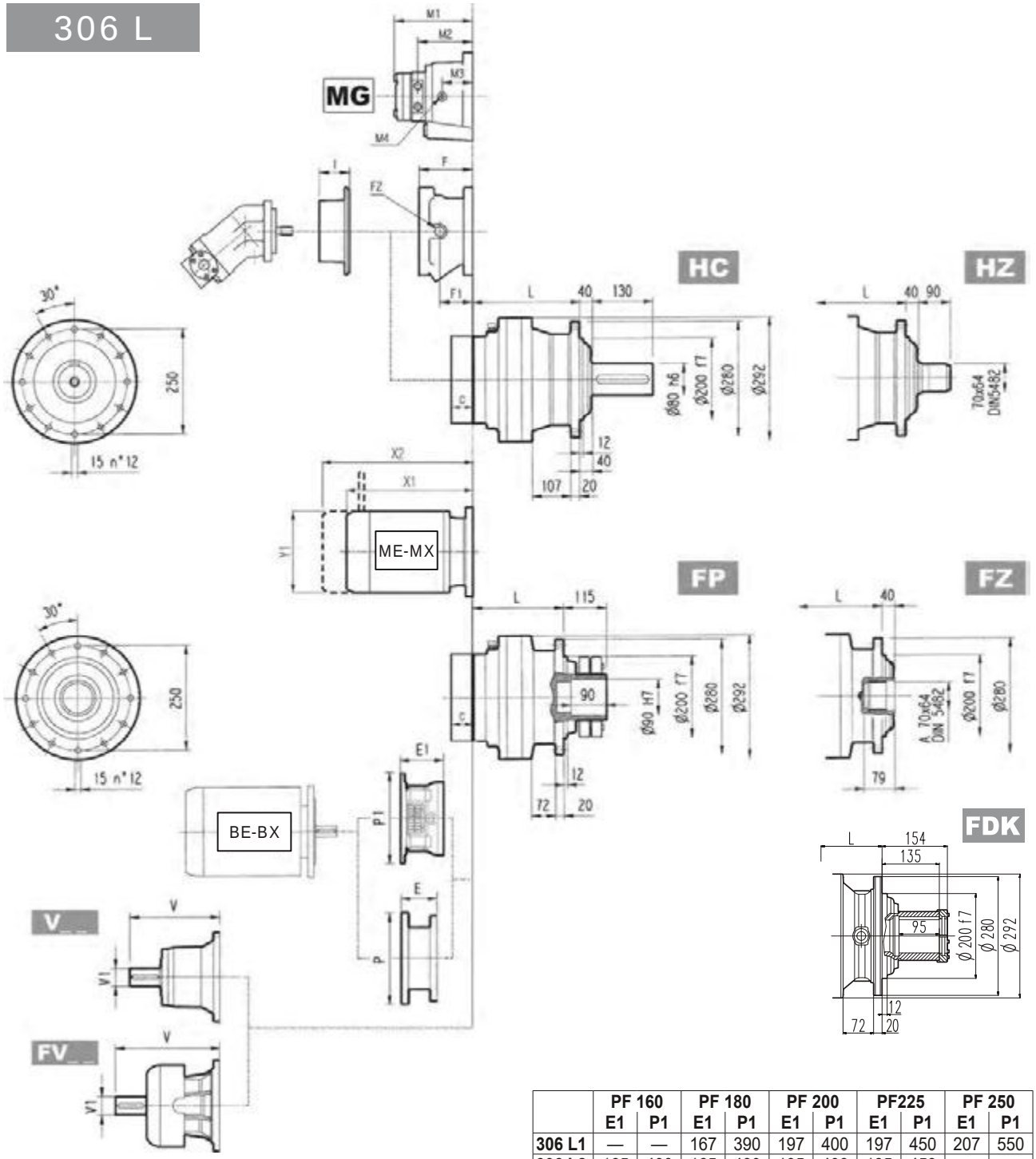
	Hydraulic motor							477			
	MG										
cm³	050	080	100	125	160	200	250				
	M1							M2	M3	M4	
306 L2	–	–	–	–	203	210	219	135	77	1/4G	20



	L							
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
306 L1	160	235	195	160	65	85	70	65
306 L2	225	300	260	225	74	95	79	74
306 L3	278	353	313	278	78	98	83	78
306 L4	331	406	366	331	82	103	87	82

	V	V1	kg	V	V1	kg	V	V1	kg	V	V1	kg	C	Input	I	F	F1	F2	Type	Input	kg
306 L1	307	60	23	—	—	—	357	60	28	—	—	—	45	B	467	195	147	1/4 G	6	B	28
306 L2	239	48	15	—	—	—	276	48	17	—	—	—	37	A		145	95	1/4 G	5	A	16
306 L3	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		105	65	1/4 G	4	A	10
306 L4	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		105	65	1/4 G	4	A	10

306 L



	PF 160		PF 180		PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1	E1	P1	E1	P1
306 L1	—	—	167	390	197	400	197	450	207	550
306 L2	165	400	165	400	195	400	195	450	—	—
306 L3	165	400	165	400	—	—	—	—	—	—

NOTE: For R design contact Bonfiglioli Technical service

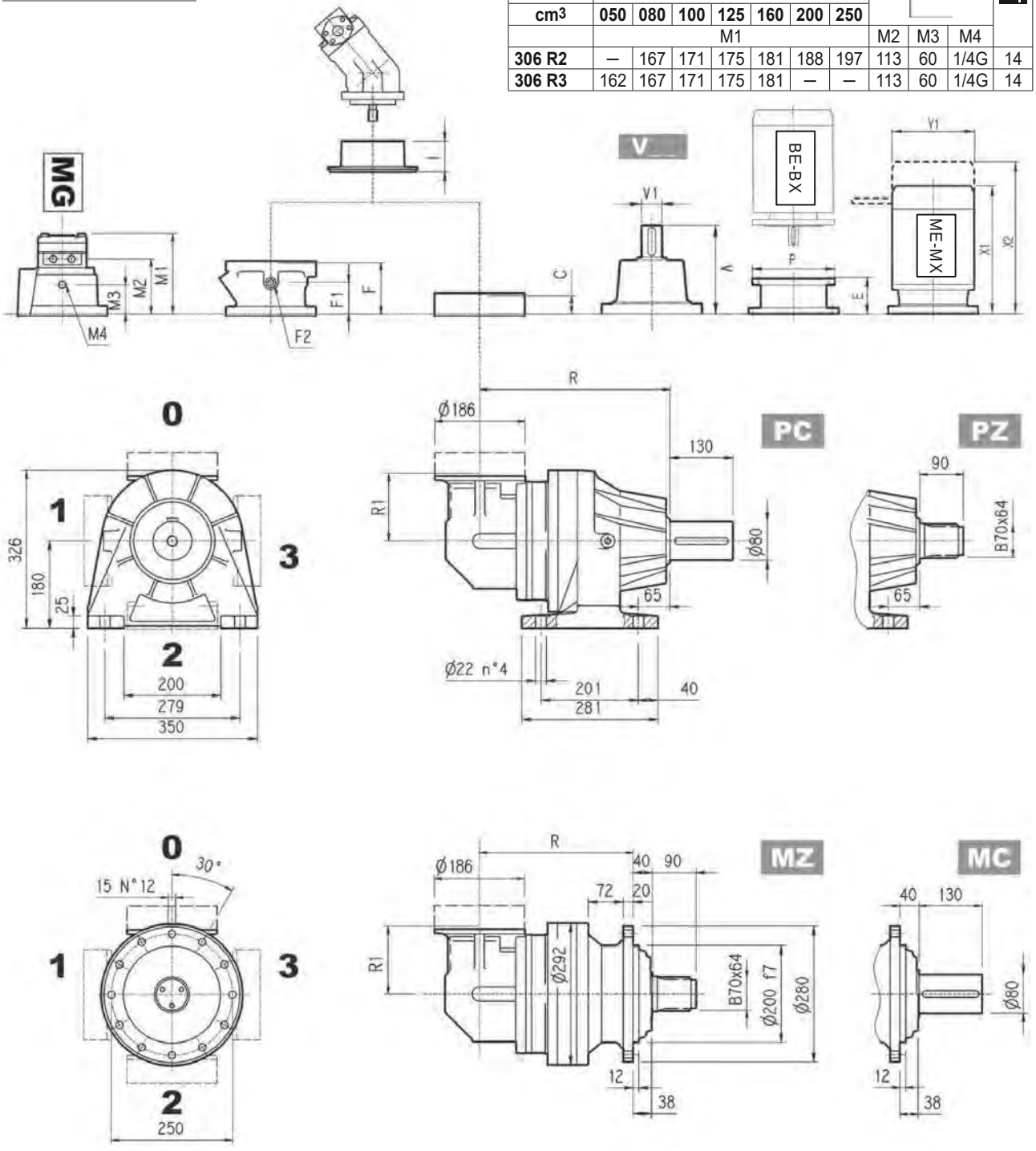
FP M_{2max} = 12000 Nm

	P71		P80		P90		P100		P112		P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
306 L1	—	—	—	—	—	—	—	—	—	—	—	—	144	350	153	350	183	400	212	450	193	550
306 L2	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400	—	—	—	—
306 L3	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—
306 L4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—

	S1+M1			S2+ME2S/MX5S			S3+ME3S/MX5S			S3+ME3L/MX5S			S4+ME4/MX4			S5+ME5S/MX5S			S5+ME5L/MX5L		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
306 L1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
306 L2	—	—	—	—	—	—	—	—	—	—	—	—	460	559	258	552	692.5	310	596	736.5	310
306 L3	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—
306 L4	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—

306 R

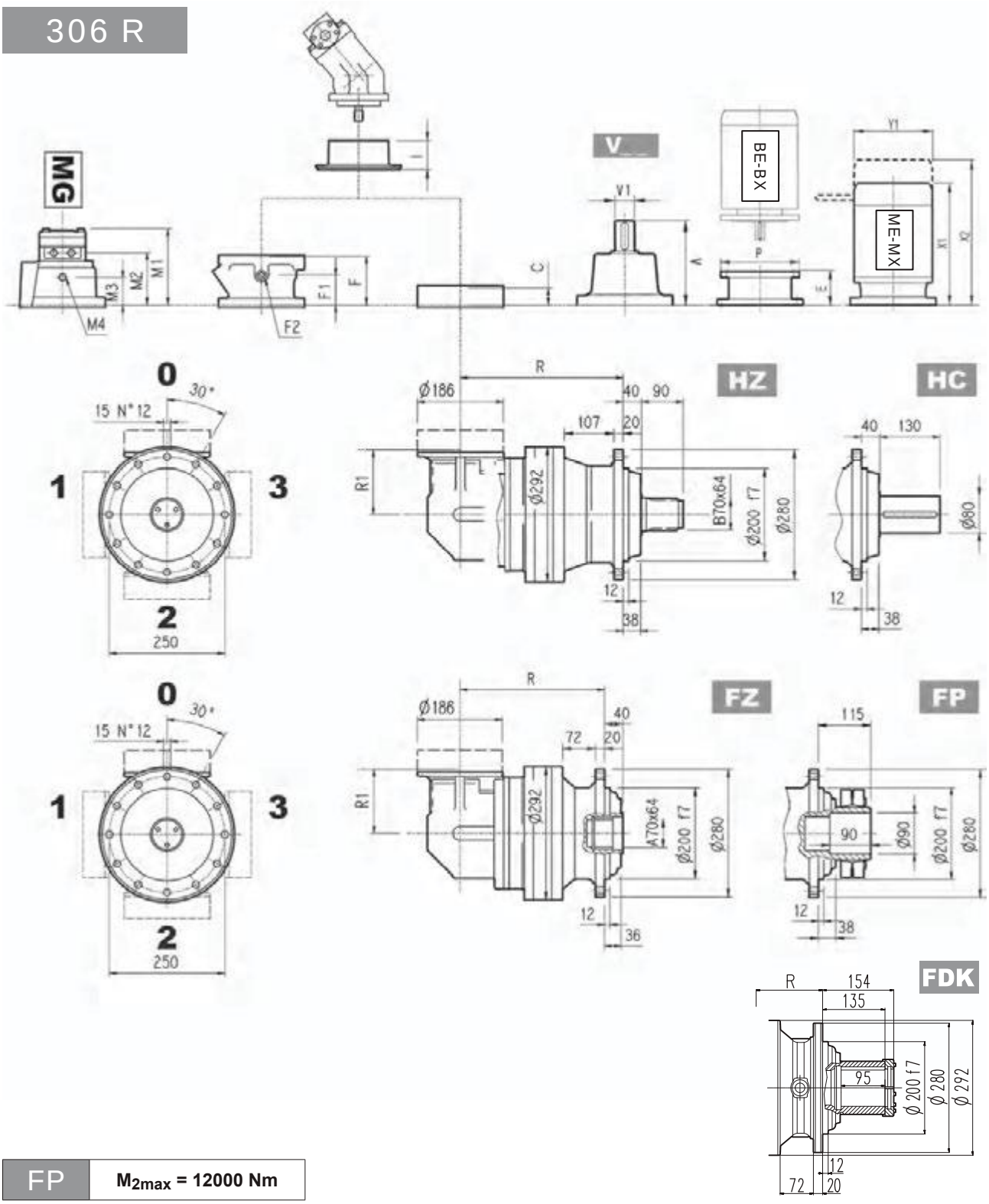
	Hydraulic motor							477			
	MG										
cm³	050	080	100	125	160	200	250				
	M1							M2	M3	M4	
306 R2	–	167	171	175	181	188	197	113	60	1/4G	14
306 R3	162	167	171	175	181	–	–	113	60	1/4G	14



	R				R1				
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK		MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
306 R2	297	372	332	297	140	89	105	94	89
306 R3	317	392	352	317	140	85	100	90	85
306 R4	370	445	405	370	122	79	95	84	79

	V	V1		V	V1		C	Input	I	F	F1	F2	Type	Input	
306 R2	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10
306 R3	137.5	24	6	158	38	7	37	A		105	65	1/4 G	4	A	10
306 R4	137.5	24	6	158	38	7	37	A	467	105	65	1/4 G	4	A	10

306 R

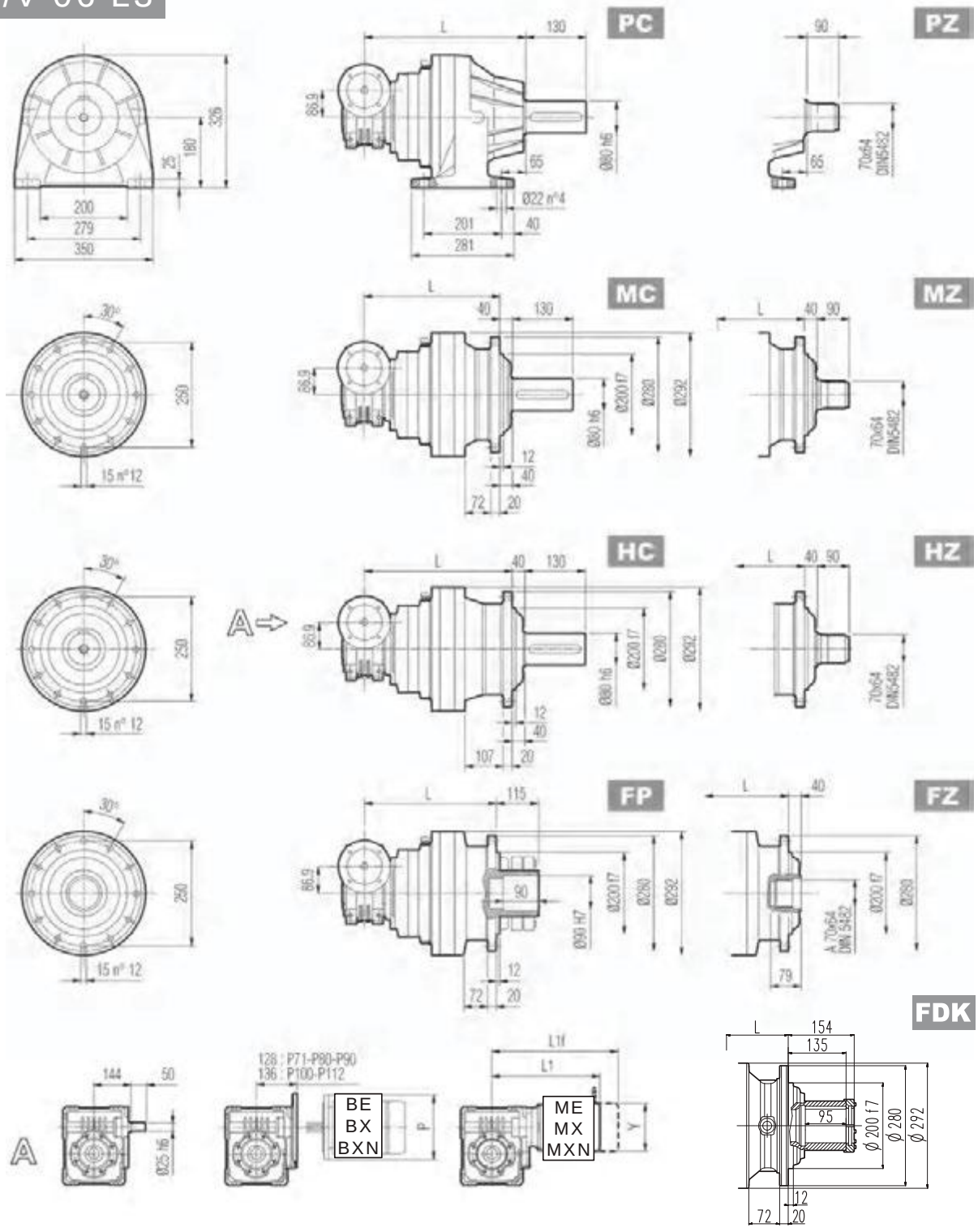


FP | M_{2max} = 12000 Nm

	P71		P80		P90		P100		P112		P132		P160	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P
306 R2	65	160	84	200	84	200	94	250	94	250	114	300	144	350
306 R3	65	160	84	200	84	200	94	250	94	250	114	300	144	350
306 R4	65	160	84	200	84	200	94	250	94	250	114	300	144	350

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
306 R2	—	—	—	372	444	156	405	495	195	449	541	195	508	607	258
306 R3	253	314	138	372	444	156	405	495	195	449	541	195	508	607	258
306 R4	253	314	138	372	444	156	405	495	195	449	541	195	508	607	258

3/V 06 L3

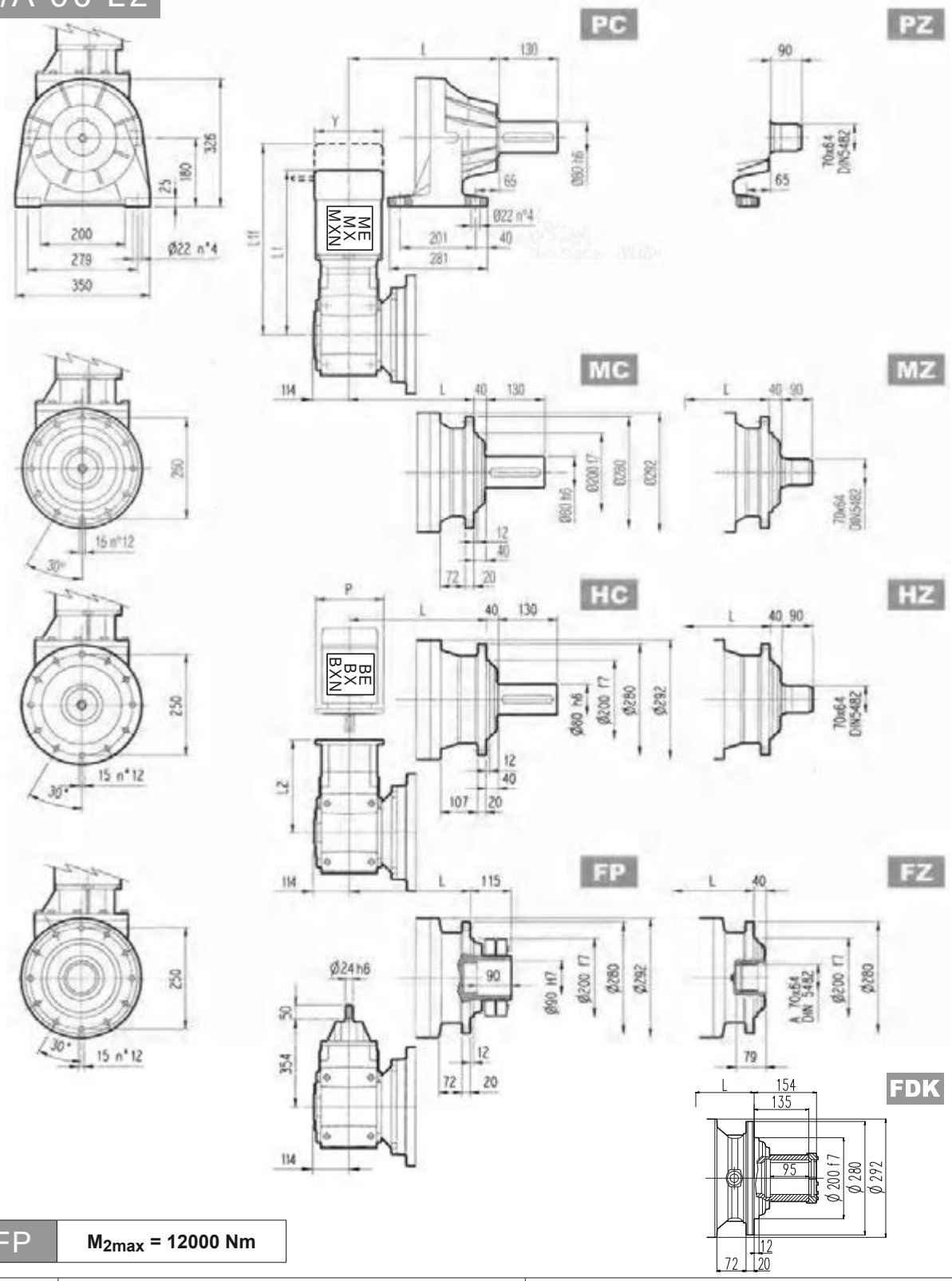


FP | **M_{2max} = 12000 Nm**

	L								P71	P80	P90	P100	P112
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	P	P	P	P	P
3/V 06 L3	370	445	405	370	80	111	95	80	160	200	200	250	250

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L		
	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y
3/V 06 L3	324	385	138	393	465	156	424	514	193	468	560	193

3/A 06 L2

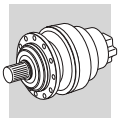


FP M_{2max} = 12000 Nm

	L				Kg			
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
3/A 06 L2	340	415	375	340	140	170	150	140

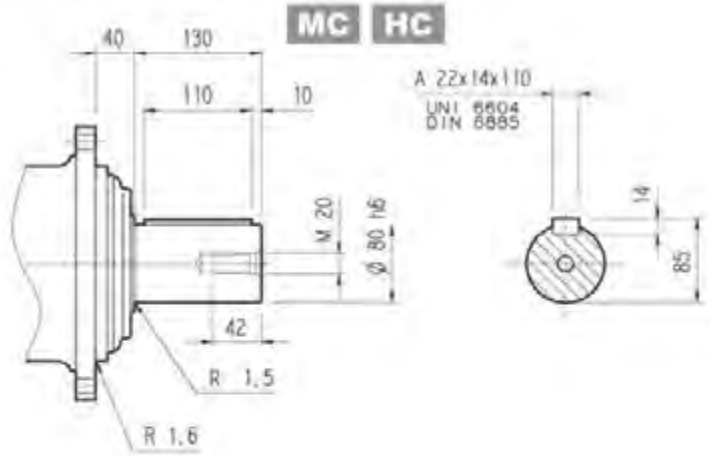
	P63		P71		P80		P90		P100		P112		P132		P160		P180	
	L2	P	L2	P	L2	P	L2	P	L2	P	L2	P	L2	P	L2	P	L2	P
3/A 06 L2	314.5	140	314.5	160	334	200	334	200	344	250	344	250	380.5	300	431	350	431	350

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4		
	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y
3/A 06 L2	469.5	530.5	138	542.5	614.5	156	573.5	663.5	195	617.5	709.5	195	716.5	815.5	258

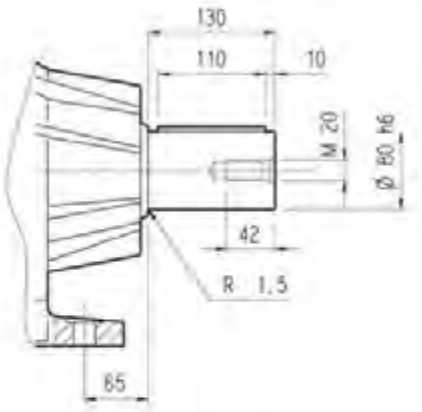


306 L | 306 R | 3/V 06 L3 | 3/A 06 L2

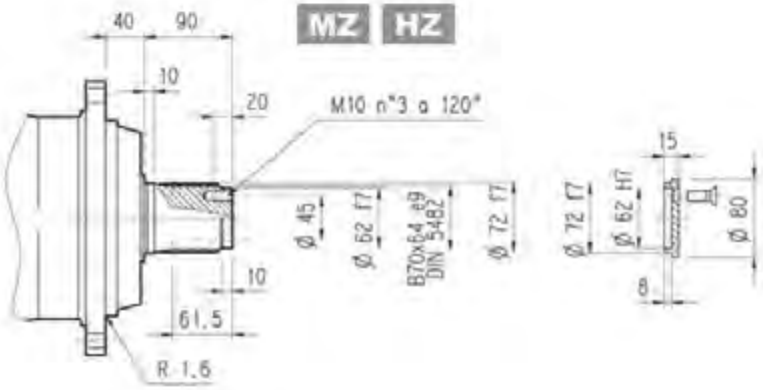
MC HC



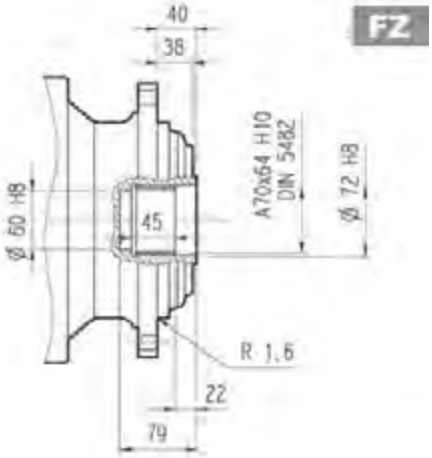
PC



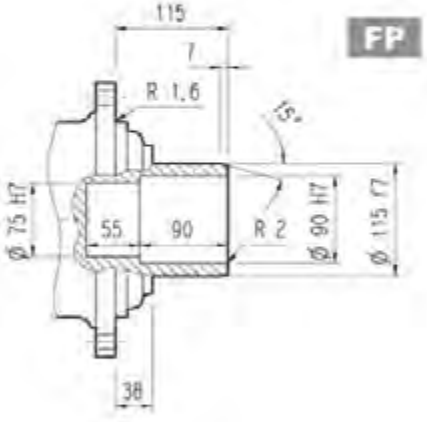
MZ HZ

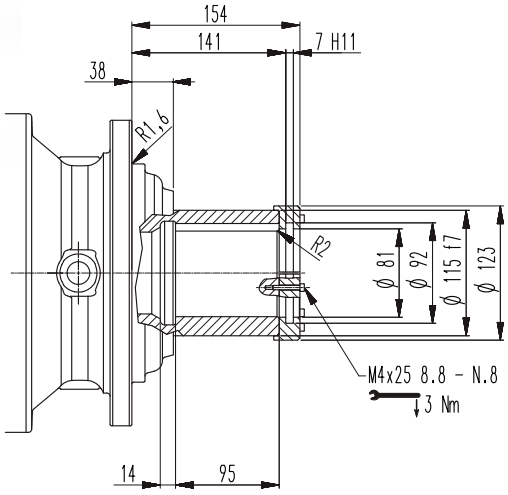


FZ

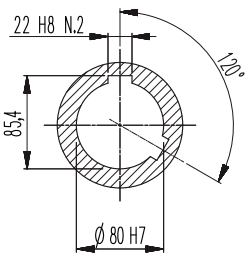


FP

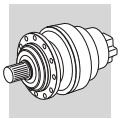




FDK



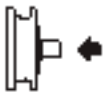
FP	M_{2max} = 12000 Nm

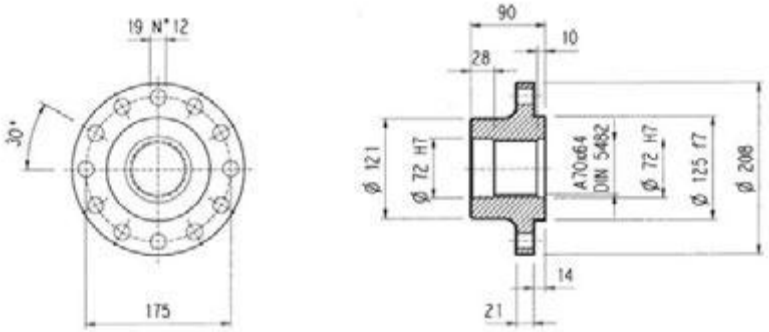


306 L | 306 R | 3/V 06 L3 | 3/A 06 L2

Flange

W0A

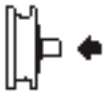


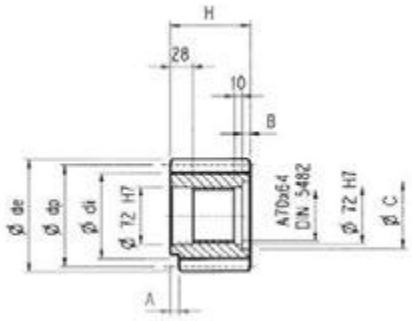


Material: Steel C40

Pinions

P...



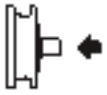


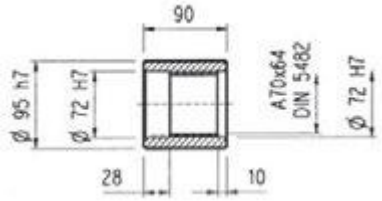
α = 20°

	m	z	x	dp	di	de	H	A	B	C	Material
PFF1	8	15	—	120	100	134	90	—	—	—	Steel 39NiCrMo3 hardened and tempered
PFF2	8	15	0.500	120	108	141	90	—	—	—	
PHB	10	11	0.500	110	95	136	90	10	—	—	
PHC1	10	12	0.450	120	104	145	90	—	—	—	
PHC2	10	12	0.320	120	100	144.2	90	—	—	—	
PHC3	10	12	0.350	120	101	144	90	—	—	—	
PHD1	10	13	0.950	130	124	165	90	—	—	—	
PHD2	10	13	0.500	130	115	159	90	—	—	—	
PHE1	10	14	—	140	115	160	90	—	—	—	
PHE2	10	14	0.500	140	125	166	90	—	—	—	Steel 18NiCrMo5 case hardened
PHF	10	15	—	150	127	167	90	24	—	—	Steel 39NiCrMo3 hardened and tempered
PHH	10	17	0.480	170	154	197.5	90	10	—	—	
PHM	10	20	—	200	175	220	90	10	—	—	Steel 18NiCrMo5 case hardened

Sleeve coupling

M0A

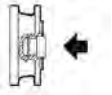


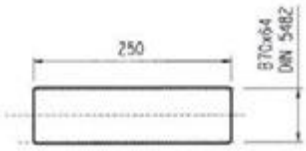


Material: Steel 16CrNi4

Splined bars

B0A

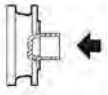


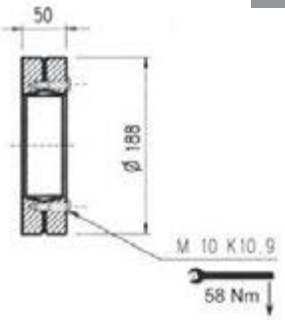


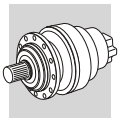
Material: Case hardening steel 18NiCrMo5 UNI 5331
must be case hardened 50-55 HRC

Shrink disc

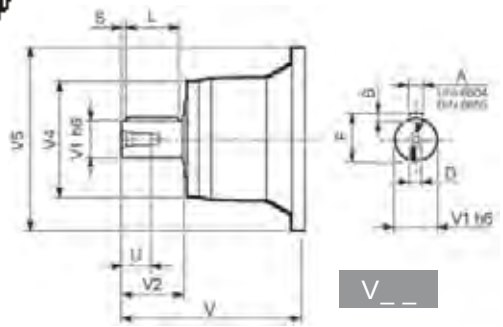
G0A



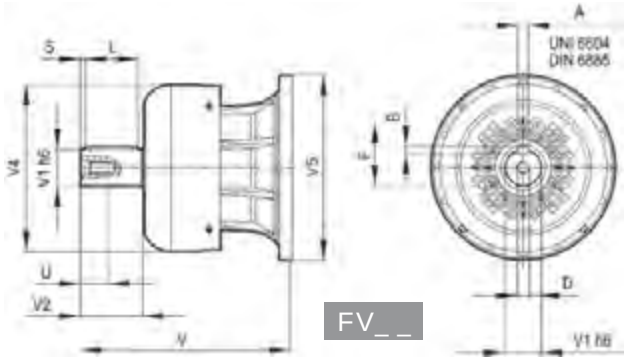




306 L 306 R



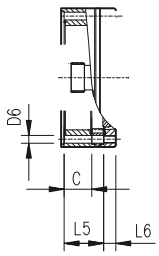
V__

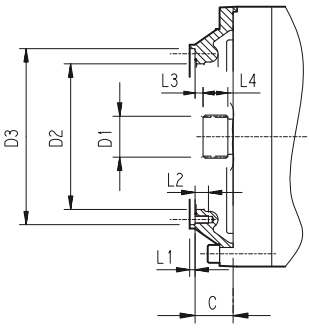


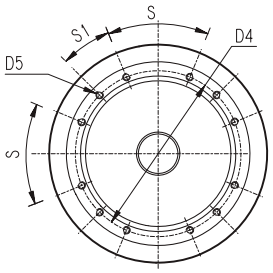
FV__

		V	V1	V2	V4	V5	A	B	F	L	S	D	U
306 L1	**V06B**	307	60	105	155	292	18	11	64	90	7.5	M16	36
	FV06B	357	60	105	309	292	18	11	64	90	7.5	M16	36
306 L2	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36
306 L3	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
306 L4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
306 R2-R3-R4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28

306 L 306 R

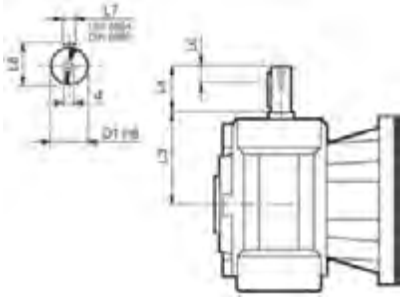






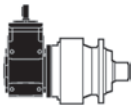
		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
306 L1	**V9AB**	45	58x53 DIN5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B
306 L2	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	—	4	18	9	18	—	—	45°	45°	A
306 L3	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	53	18	45°	45°	A
306 L4	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	106	18	45°	45°	A
306 R2-R3-R4	**V9AA**	37	40x36 DIN5482	140	178 H7	165	M10 n°8	11	4	—	9	18	37	18	45°	45°	A

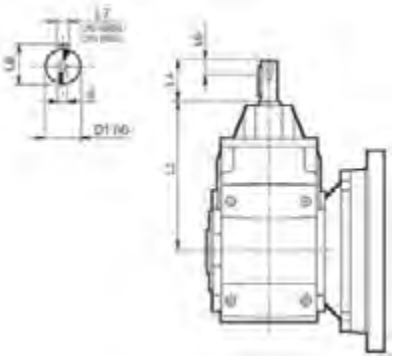
3/V 06 L3



	D1 h6	L3	L4	L6	L7	L8	d
3/V 06 L3_HS	25	144	50	19	8	28	M8

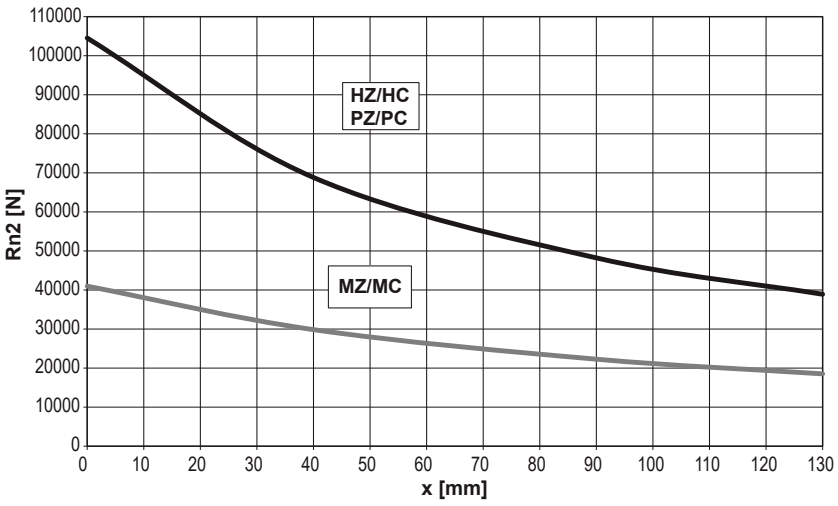
3/A 06 L2

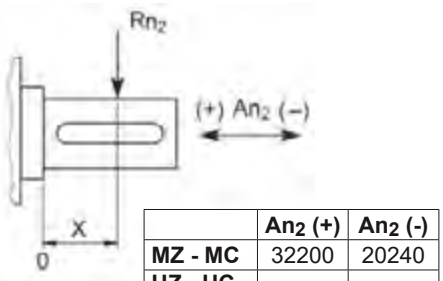




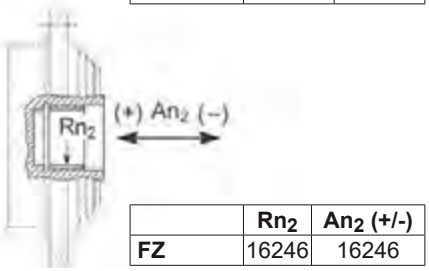
	D1 h6	L3	L4	L6	L7	L8	d
3/A 06 L2_HS	24	354	50	19	8	27	M8

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$





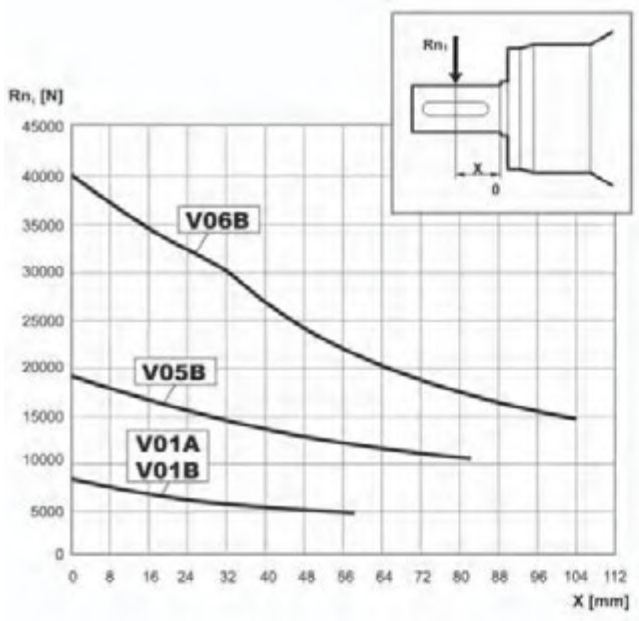
	An2 (+)	An2 (-)
MZ - MC	32200	20240
HZ - HC PZ - PC	60000	30000

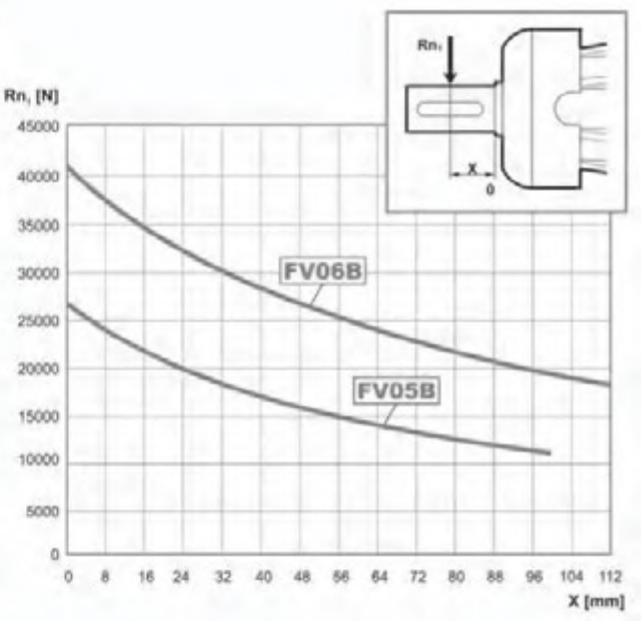


	Rn2	An2 (+/-)
FZ	16246	16246

Load corrective factor fh_2 on shafts	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
	fh_2	FZ	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		MZ - MC	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HZ - HC - PZ - PC	**1.34**	**1.34**	**1.23**	**1.00**	**0.62**	**0.50**

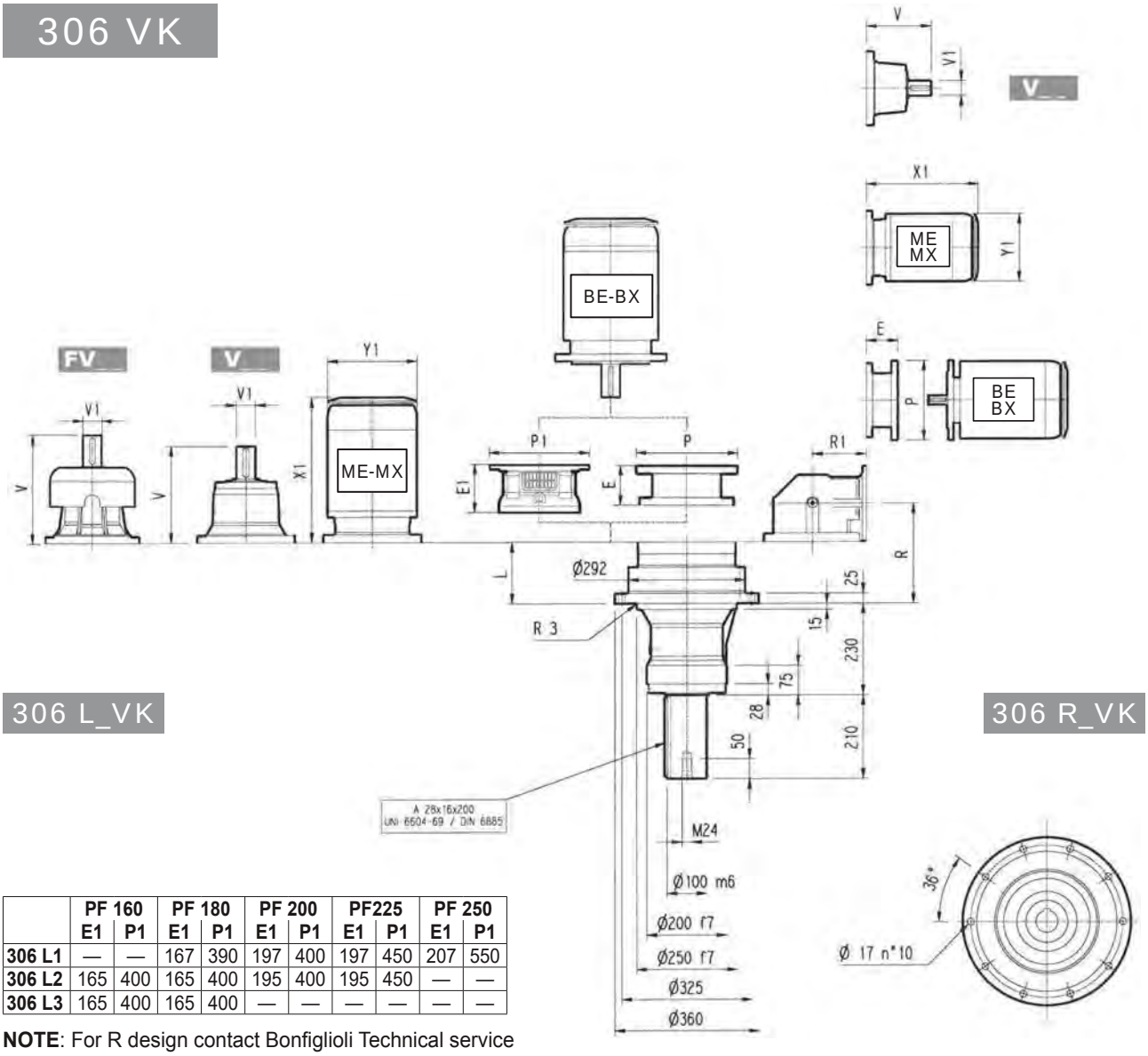
Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$





Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

306 VK



306 L_VK

306 R_VK

	PF 160		PF 180		PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1	E1	P1	E1	P1
306 L1	—	—	167	390	197	400	197	450	207	550
306 L2	165	400	165	400	195	400	195	450	—	—
306 L3	165	400	165	400	—	—	—	—	—	—

NOTE: For R design contact Bonfiglioli Technical service

	L		V	V1		V	V1		V	V1		V	V1		P71		P80		P90		P100		P112		P132		P160		P180		P200		P225		P250	
															E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
306 L1	75	110	307	60	23	—	—	—	357	60	28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	144	350	153	350	183	400	212	450	193	550
306 L2	140	120	239	48	15	—	—	—	276	48	17	—	—	—	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400	—	—	—	—
306 L3	193	125	137.5	24	6	158	38	7	—	—	—	—	—	—	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—
306 L4	246	130	137.5	24	6	158	38	7	—	—	—	—	—	—	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—

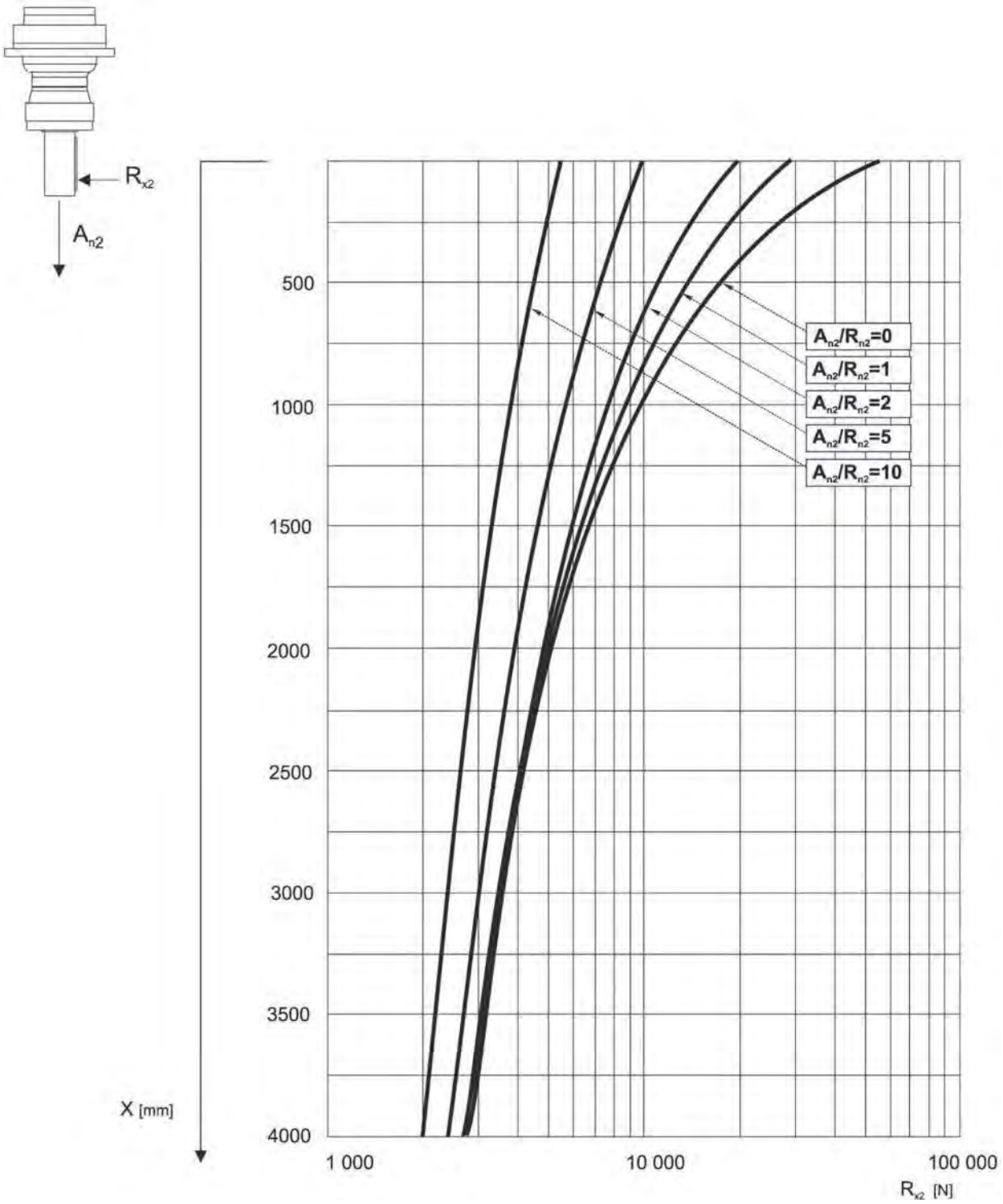
	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4			S5+ME5S/MX5S			S5+ME5L/MX5L		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
306 L1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
306 L2	—	—	—	—	—	—	—	—	—	—	—	—	460	559	258	552	692.5	310	596	736.5	310
306 L3	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—
306 L4	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—

	R	R1		V	V1		V	V1		P71		P80		P90		P100		P112		P132		P160	
										E	P	E	P	E	P	E	P	E	P	E	P	E	P
306 R2	212	140	90	137.5	24	6	158	38	7	65	160	84	200	84	200	94	250	94	250	114	300	144	350
306 R3	232	140	92	137.5	24	6	158	38	7	65	160	84	200	84	200	94	250	94	250	114	300	144	350
306 R4	285	122	95	137.5	24	6	158	38	7	65	160	84	200	84	200	94	250	94	250	114	300	144	350

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
306 R2	—	—	—	372	444	156	405	495	195	449	541	195	508	607	258
306 R3	253	314	138	372	444	156	405	495	195	449	541	195	508	607	258
306 R4	253	314	138	372	444	156	405	495	195	449	541	195	508	607	258

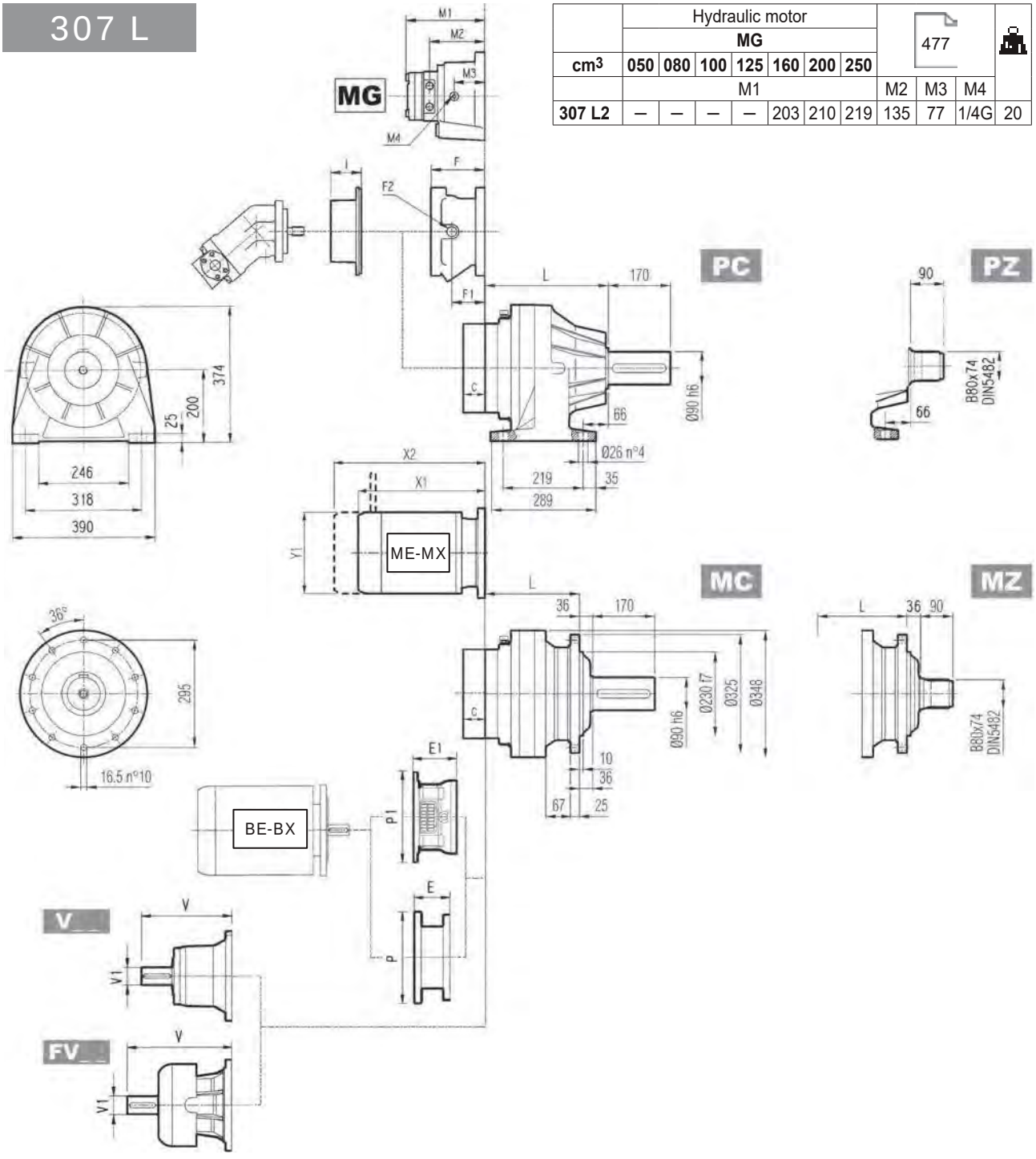
306 VK

The diagram below allows the calculation of permitted overhung load R_{x2} on the output shaft of gearbox, with radial force applying at a distance x from shaft shoulder.
The curves are relevant to value resulting from the relationship of trust load A_{n2} to radial load R_{n2}, based on n_2 = 10 min^{-1} and 10000 hrs theoretical lifetime.



307 L

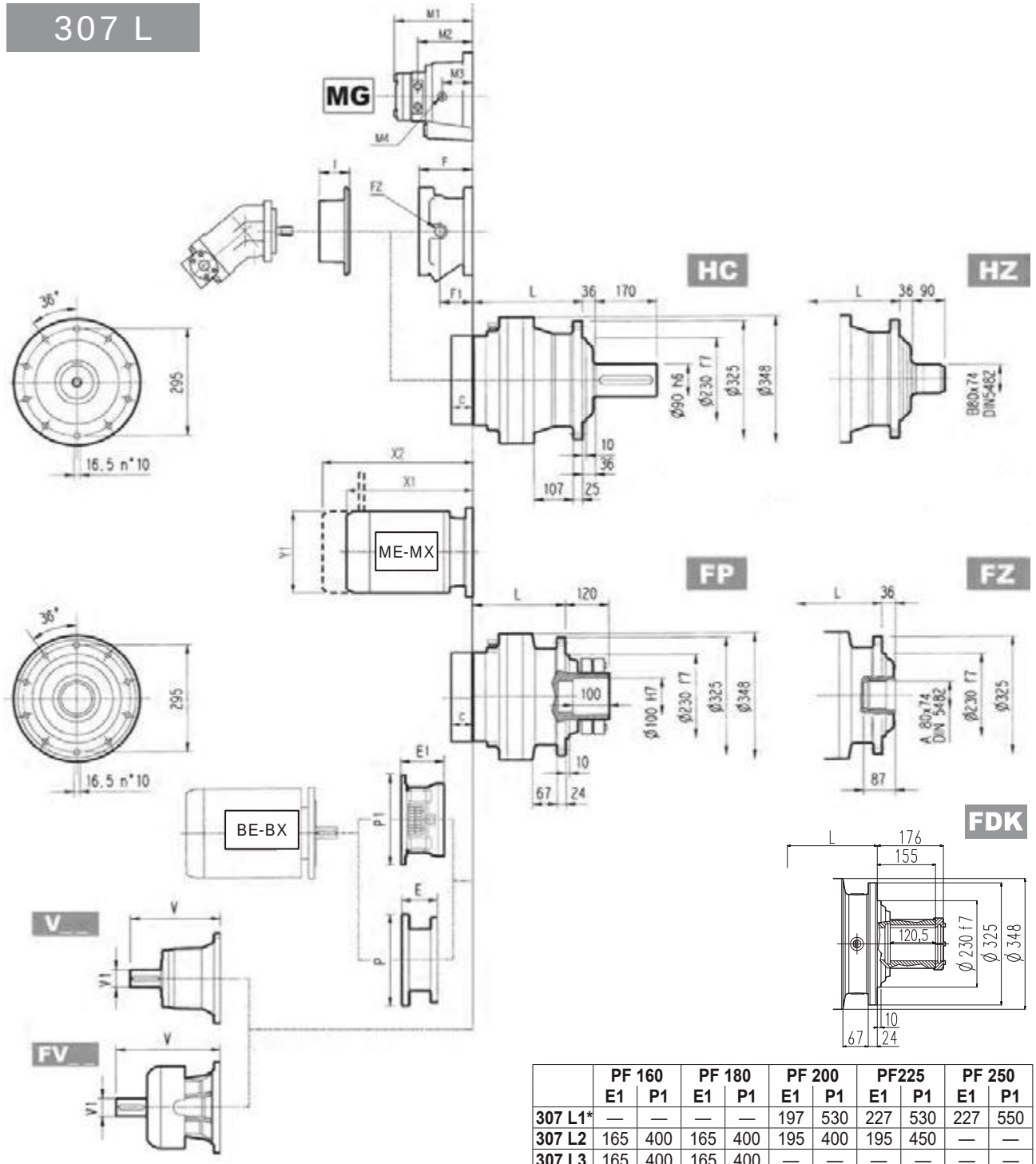
	Hydraulic motor							477			
	MG										
cm³	050	080	100	125	160	200	250				
	M1							M2	M3	M4	
307 L2	–	–	–	–	203	210	219	135	77	1/4G	20



	L							
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
307 L1	165	246	210	165	85	120	105	85
307 L2	254	335	299	254	97	132	117	97
307 L3	319	400	364	319	104	139	124	104
307 L4	372	453	417	372	108	143	128	108

	V	V1		V	V1		V	V1		V	V1		C	Input	I	F	F1	F2	Type	Input	
307 L1	315	80	35	313	60	28	375	80	48	363	60	34	51	B		201	153	1/4 G	6	B	28
307 L2	239	48	15	—	—	—	276	48	17	—	—	—	37	A		145	95	1/4 G	5	A	16
307 L3	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A	467	105	65	1/4 G	4	A	10
307 L4	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		105	65	1/4 G	4	A	10

307 L



	PF 160		PF 180		PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1	E1	P1	E1	P1
307 L1*	—	—	—	—	197	530	227	530	227	550
307 L2	165	400	165	400	195	400	195	450	—	—
307 L3	165	400	165	400	—	—	—	—	—	—
307 L4	165	400	165	400	—	—	—	—	—	—

(*): contact Bonfiglioli technical service
NOTE: For R design contact Bonfiglioli Technical service

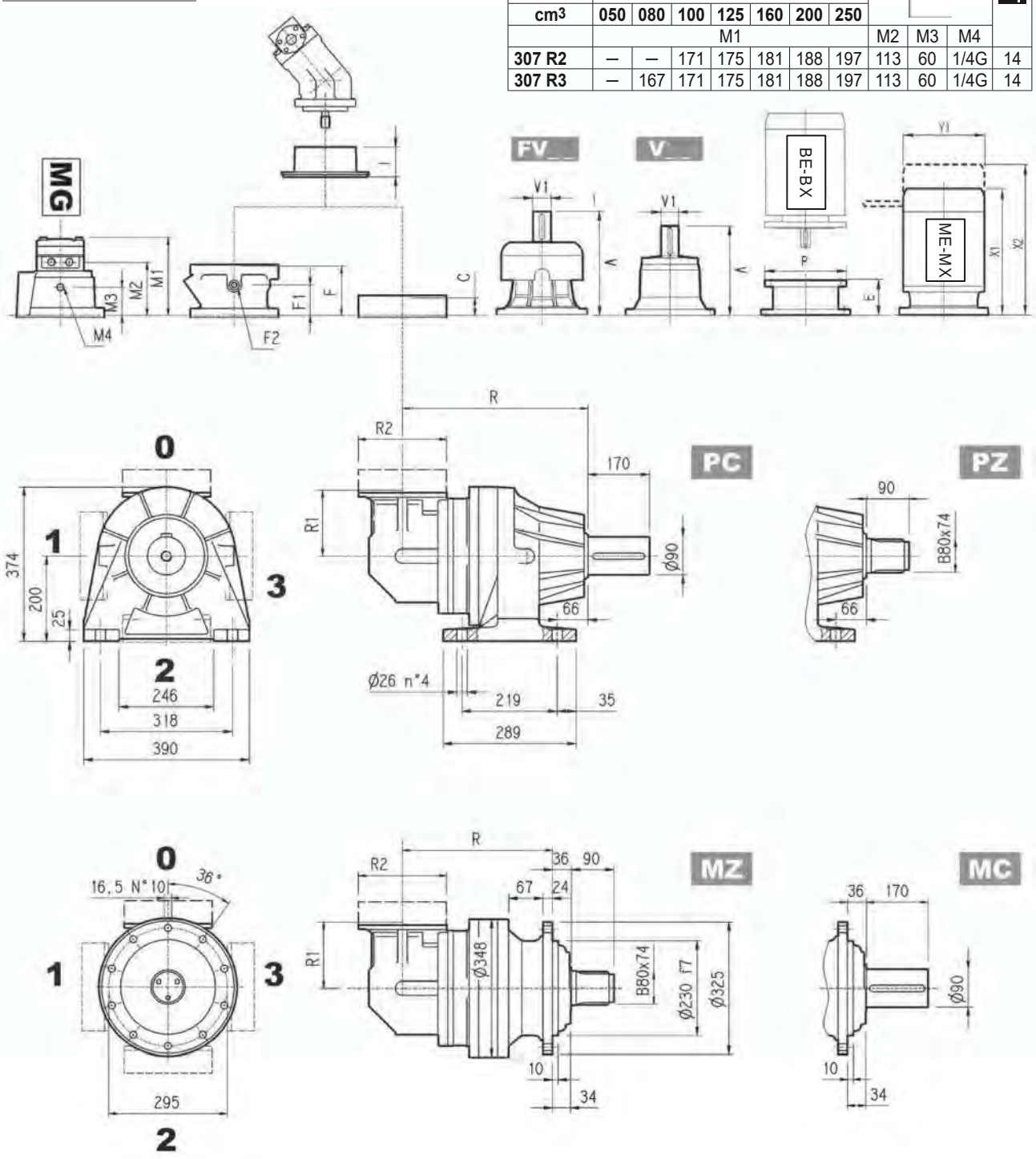
FP — M_{2max} = 18200 Nm

	P71		P80		P90		P100		P112		P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
307 L1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	195	350	186	400	216	450	215	550
307 L2	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400	—	—	—	—
307 L3	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—
307 L4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4			S5+ME5S/MX5S			S5+ME5L/MX5L		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
307 L1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
307 L2	—	—	—	—	—	—	—	—	—	—	—	—	460	559	258	552	692.5	310	596	736.5	310
307 L3	—	—	—	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—
307 L4	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—

307 R

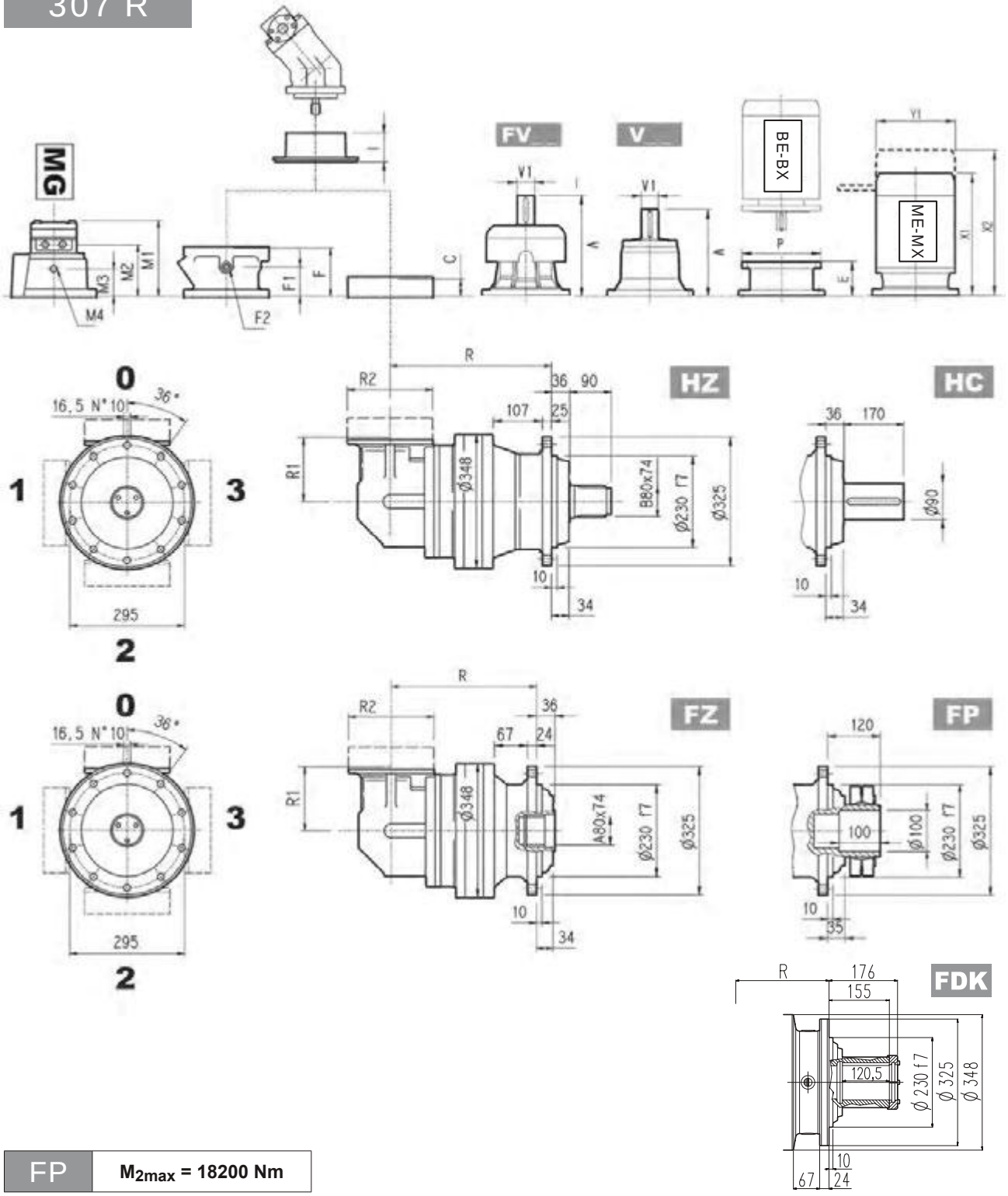
	Hydraulic motor										
	MG							477			
cm³	050	080	100	125	160	200	250				
	M1							M2	M3	M4	
307 R2	–	–	171	175	181	188	197	113	60	1/4G	14
307 R3	–	167	171	175	181	188	197	113	60	1/4G	14



	R				R1	R2	kg			
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK			MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
307 R2	284	365	329	284	225	245	135	170	155	135
307 R3	346	427	391	346	140	186	117	152	137	117
307 R4	411	492	456	411	122	186	118	153	138	118

	V	V1	kg	V	V1	kg	V	V1	kg	V	V1	kg	C	Input	I	F	F1	F2	Type	Input	kg
307 R2	239	48	15	—	—	—	276	48	17	—	—	—	37	A		145	95	1/4 G	5	A	16
307 R3	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		105	65	1/4 G	4	A	10
307 R4	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A	467	105	65	1/4 G	4	A	10

307 R



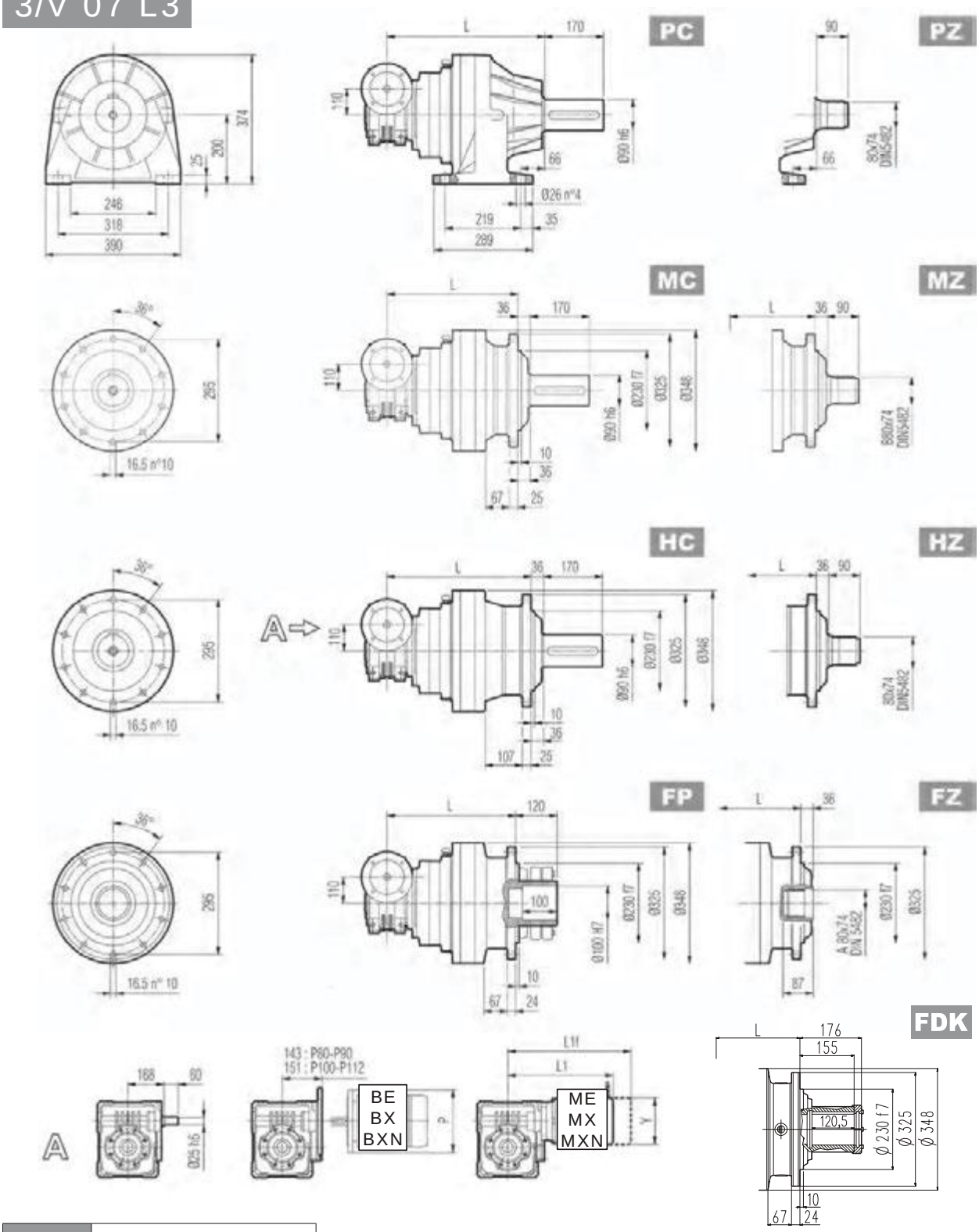
FP

M_{2max} = 18200 Nm

	P71		P80		P90		P100		P112		P132		P160		P180		P200	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
307 R2	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400
307 R3	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—
307 R4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—

	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4			S5+ME5S/MX5S			S5+ME5L/MX5L		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
307 R2	—	—	—	—	—	—	—	—	—	—	—	—	508	607	258	552	692.5	310	596	736.5	310
307 R3	253	314	138	372	444	156	405	495	195	449	541	195	508	607	258	—	—	—	—	—	—
307 R4	253	314	138	372	444	156	405	495	195	449	541	195	508	607	258	—	—	—	—	—	—

3/V 07 L3

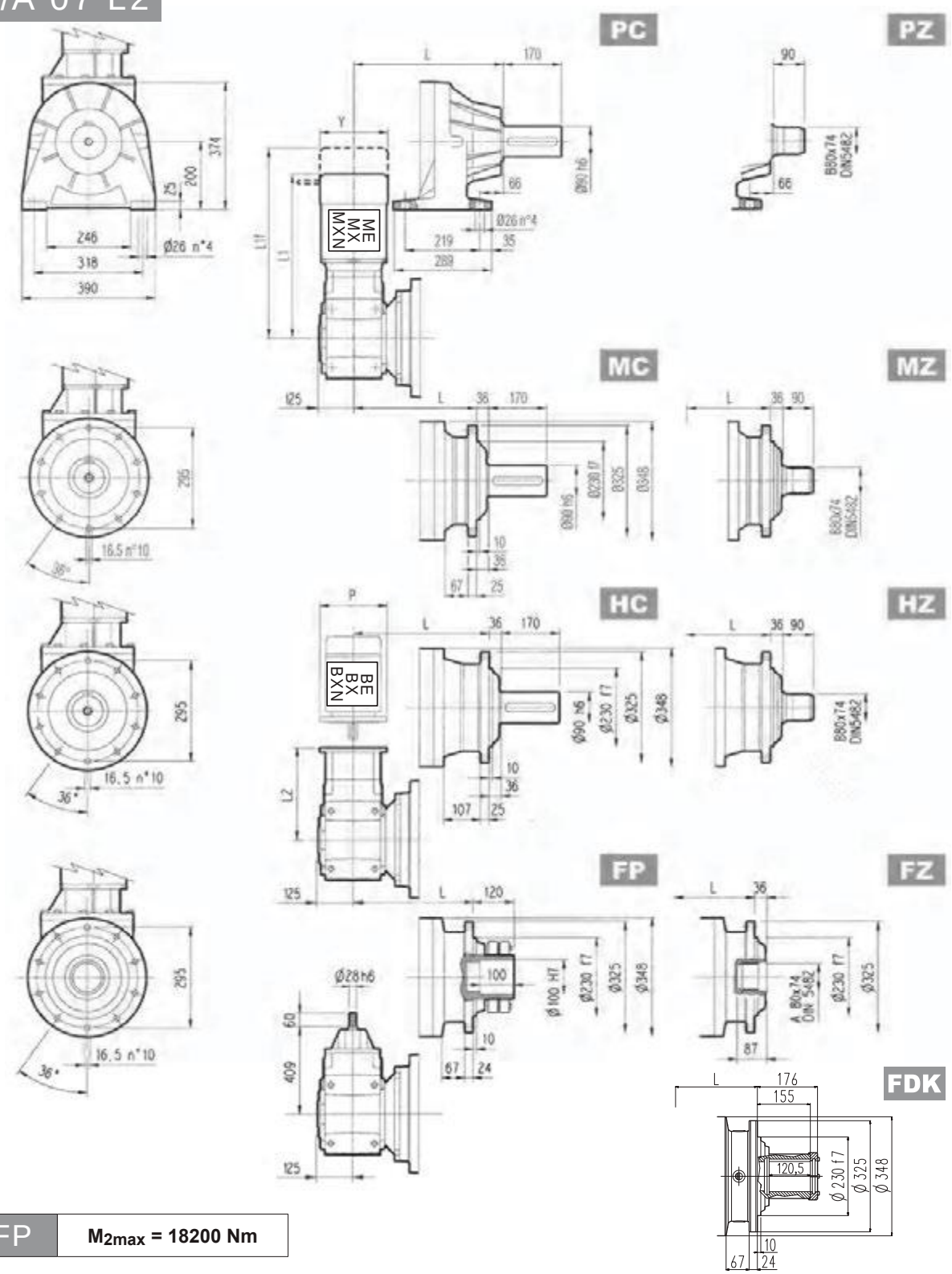


FP — M_{2max} = 18200 Nm

	L				kg				P80	P90	P100	P112
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	P	P	P	P
3/V 07 L3	414	495	459	414	130	165	150	130	200	200	250	250

	S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L		
	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y
3/V 07 L3	408	480	156	439	529	195	483	575	195

3/A 07 L2

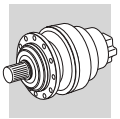


FP | **M_{2max} = 18200 Nm**

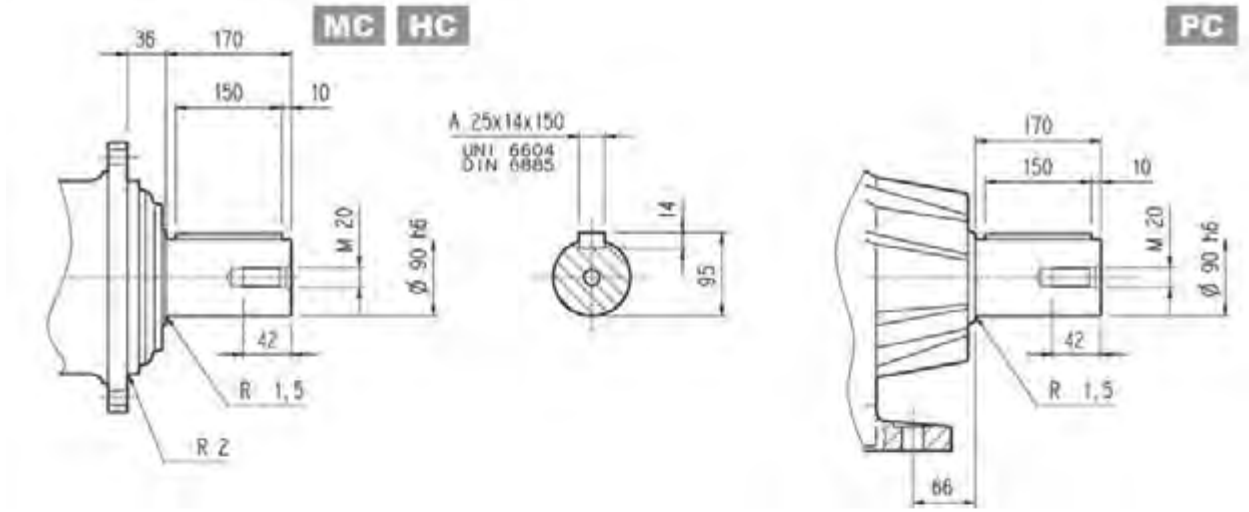
	L				Kg			
	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK	MC - MZ	PC - PZ	HC - HZ	FP - FZ - FDK
3/A 07 L2	336	417	381	336	200	230	210	200

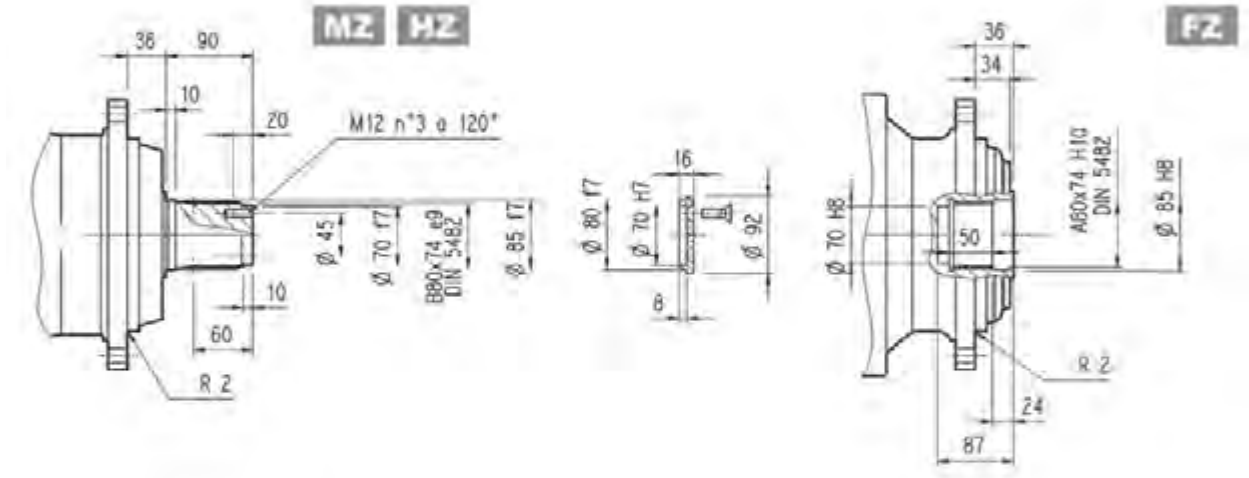
	P80		P90		P100		P112		P132		P160		P180	
	L2	P	L2	P	L2	P	L2	P	L2	P	L2	P	L2	P
3/A 07 L2	371	200	371	200	381	250	381	250	416.5	300	468	350	468	350

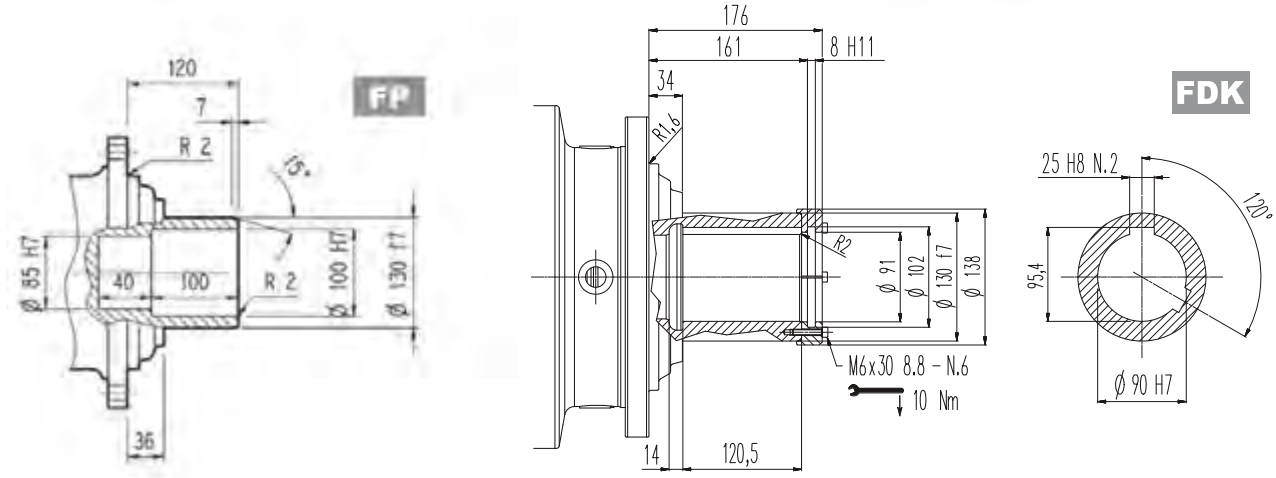
	S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4			S5+ME5S/MX5S			S5+ME5L/MX5L		
	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y
3/A 07 L2	579.5	651.5	156	610.5	700.5	195	654.5	746.5	195	753.5	852.5	258	970	1110.5	310	1014	1154.5	310



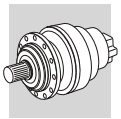
307 L | 307 R | 3/V 07 L3 | 3/A 07 L2







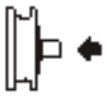
FP	M_{2max} = 18200 Nm

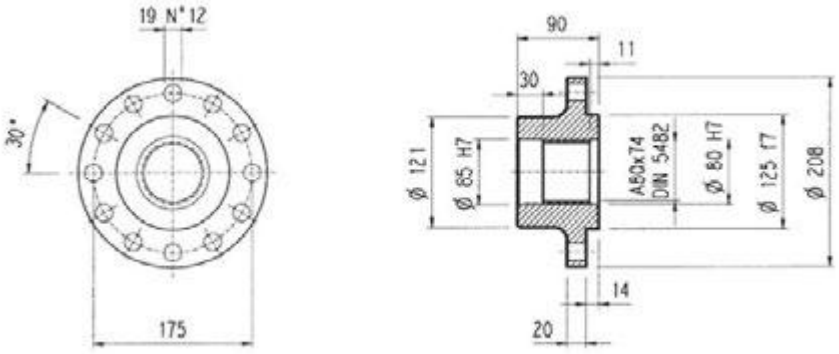


307 L | 307 R | 3/V 07 L3 | 3/A 07 L2

Flange

W0A

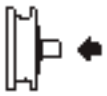


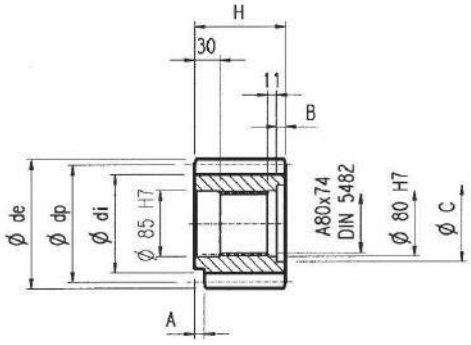


Material: Steel C40

Pinions

P...



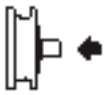


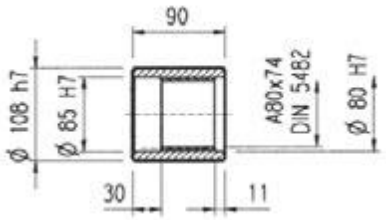
α = 20°

	m	z	x	dp	di	de	H	A	B	C	Material
PFG	8	16	0.500	128	117	149.5	90	—	—	—	Steel 39NiCrMo3 hardened and tempered
PHC	10	12	0.450	120	104	145	90	—	—	—	
PHE	10	14	0.320	140	121	165	116	13	26	95	
PHF	10	15	0.150	150	130	171.5	107	20	17	100	
PHG	10	16	0.500	160	145	186	90	—	—	—	Steel 18NiCrMo5 case hardened
PHH1	10	17	—	170	145	189	90	—	—	—	
PHH2	10	17	0.500	170	154	198	90	—	—	—	
PLD	12	13	0.500	156	138	192	102	—	12	95	Steel 39NiCrMo3 hardened and tempered
PLE	12	14	0.500	168	150	199.2	90	—	—	—	
PLI	12	18	0.500	216	198	249.6	107	7	17	95	
PLT	12	26	—	312	282	336	90	10	—	—	Steel 18NiCrMo5 case hardened

Sleeve coupling

M0A

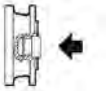


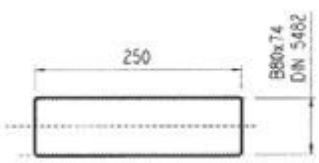


Material: Steel 16CrNi4

Splined bars

B0A

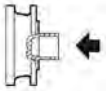


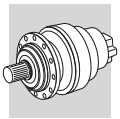


Material: Case hardening steel 18NiCrMo5 UNI 5331
must be case hardened 50-55 HRC

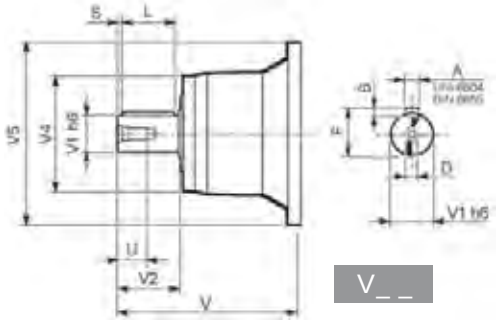
Shrink disc

G0A

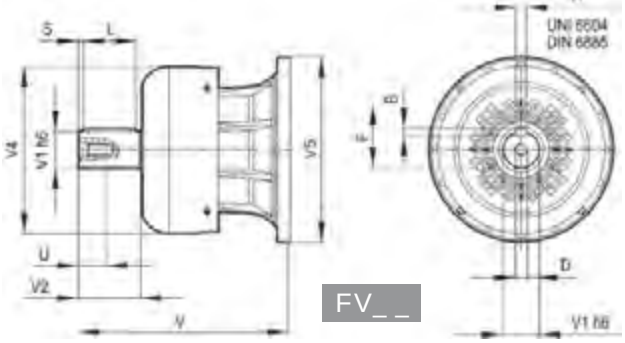




307 L 307 R



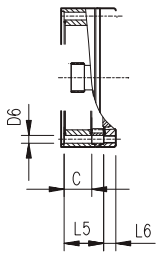
V_ _

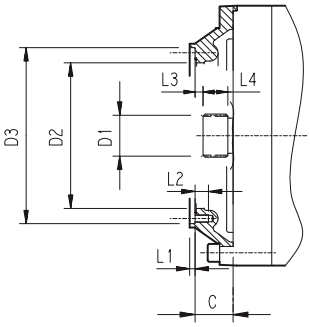


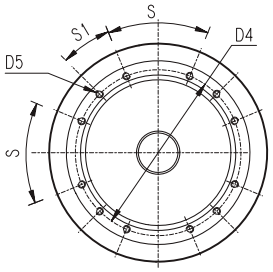
FV_ _

		V	V1	V2	V4	V5	A	B	F	L	S	D	U
307 L1	**V07B**	315	80	130	200	345	22	14	85	110	10	M16	36
	FV07B	375	80	130	347.5	348	22	14	85	110	10	M16	36
	V07A	313	60	105	155	345	18	11	64	90	7.5	M16	36
	FV07A	363	60	105	309	348	18	11	64	90	7.5	M16	36
307 L2	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36
307 L3	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
307 L4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
307 R2	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36
307 R3-R4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28

307 L 307 R

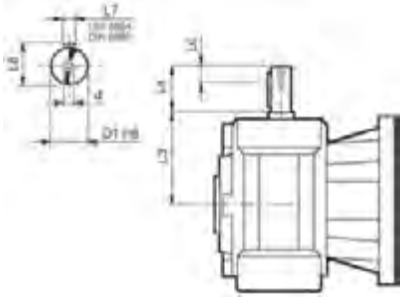






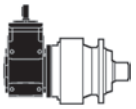
		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
307 L1	**V9AB**	51	58x53 DIN 5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B
307 L2	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	—	4	18	9	18	—	—	45°	45°	A
307 L3	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	11	4	—	9	18	65	18	45°	45°	A
307 L4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	11	4	—	9	18	118	18	45°	45°	A
307 R2	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	11	4	18	9	18	—	—	45°	45°	A
307 R3-R4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	11	4	—	9	18	37	18	45°	45°	A

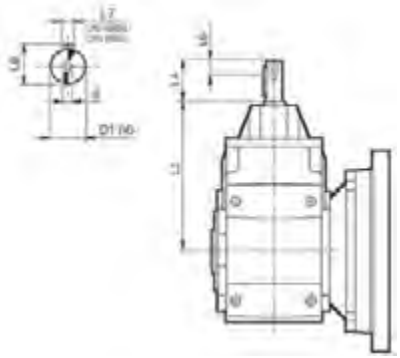
3/V 07 L3



	D1 h6	L3	L4	L6	L7	L8	d
3/V 07 L3_HS	25	168	60	19	8	28	M8

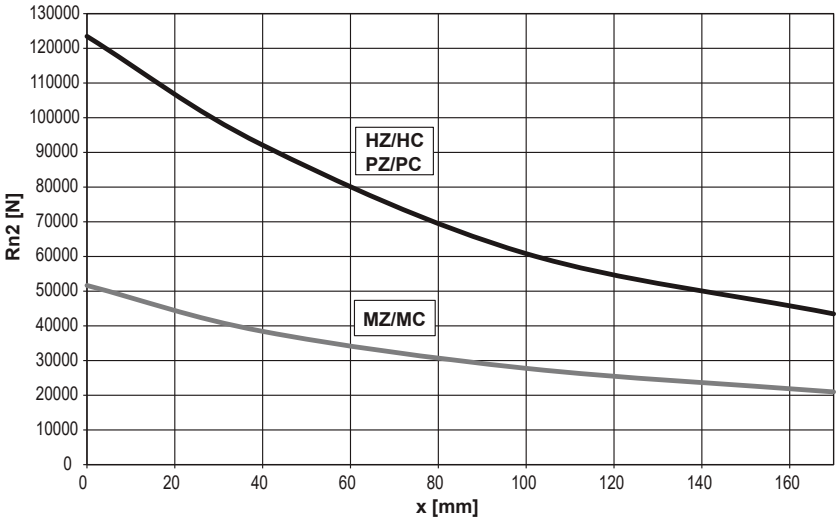
3/A 07 L2

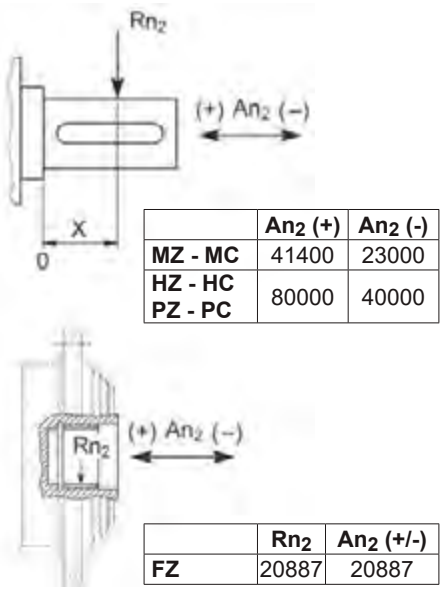




	D1 h6	L3	L4	L6	L7	L8	d
3/A 07 L2_HS	28	409	60	22	8	31	M10

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$



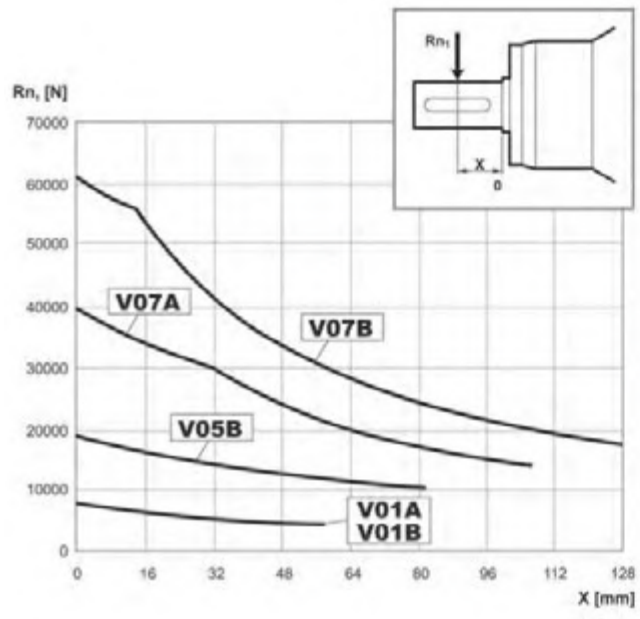


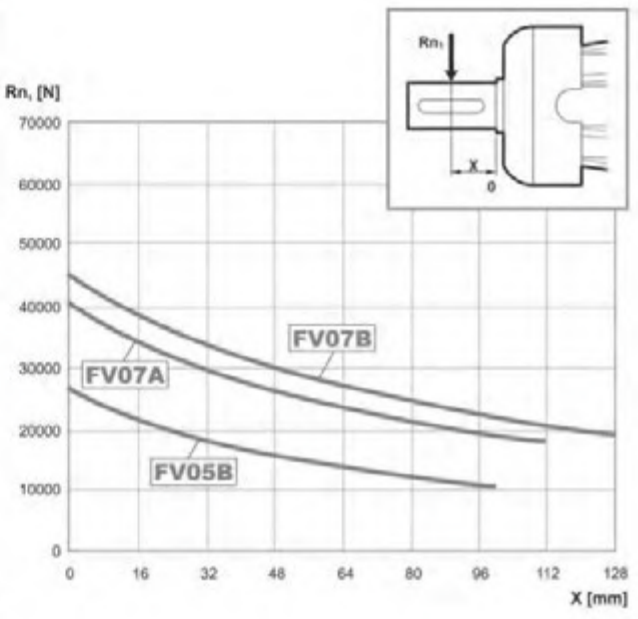
	An2 (+)	An2 (-)
MZ - MC	41400	23000
HZ - HC PZ - PC	80000	40000

	Rn2	An2 (+/-)
FZ	20887	20887

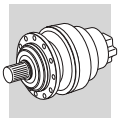
	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
Load corrective factor fh_2 on shafts	fh_2	FZ	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		MZ - MC	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HZ - HC - PZ - PC	**1.49**	**1.49**	**1.23**	**1.00**	**0.62**	**0.50**

Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$

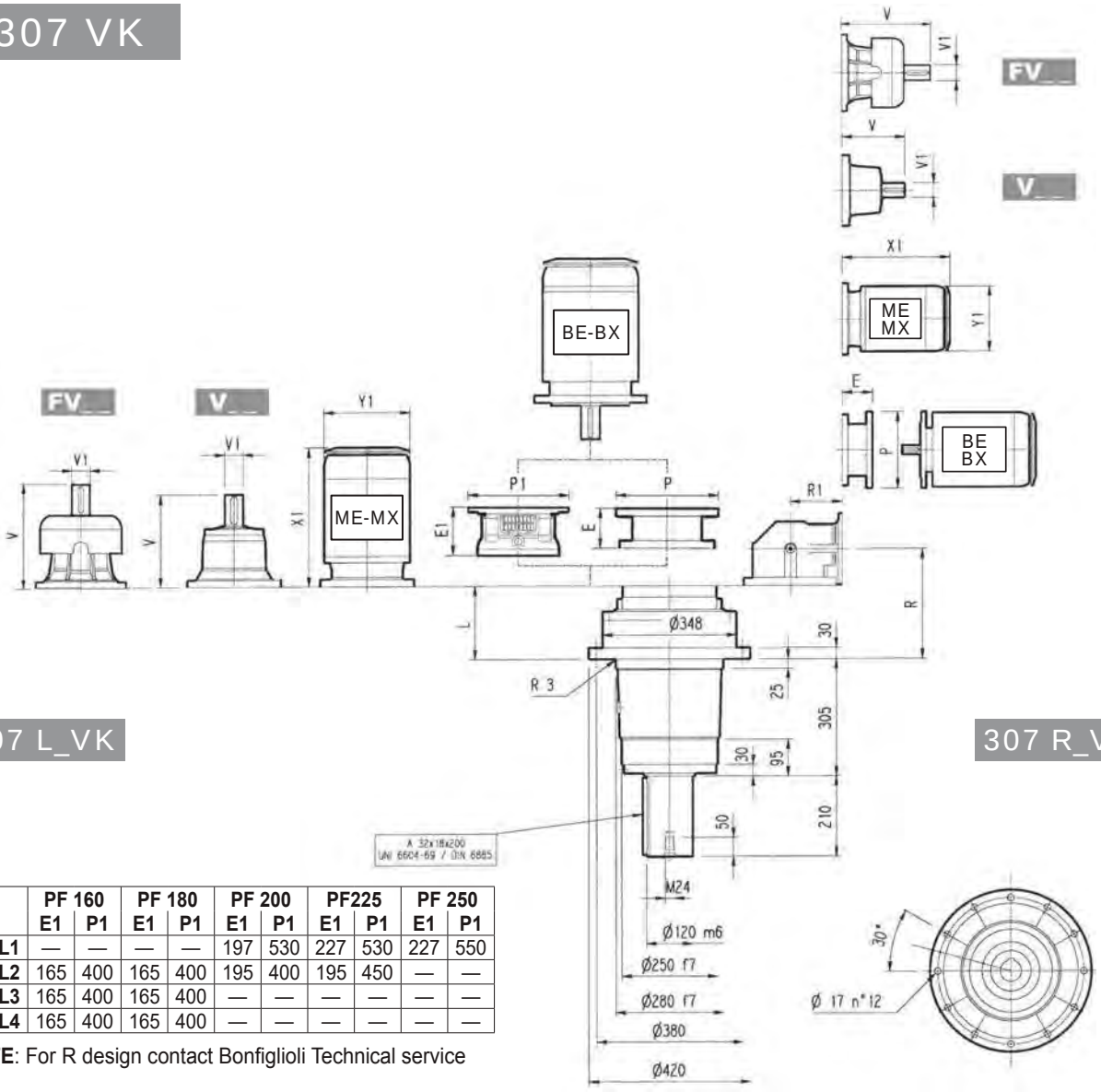




Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**



307 VK



307 L_VK

	PF 160		PF 180		PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1	E1	P1	E1	P1
307 L1	—	—	—	—	197	530	227	530	227	550
307 L2	165	400	165	400	195	400	195	450	—	—
307 L3	165	400	165	400	—	—	—	—	—	—
307 L4	165	400	165	400	—	—	—	—	—	—

NOTE: For R design contact Bonfiglioli Technical service

307 R_VK

	L														P71		P80		P90		P100		P112		P132		P160		P180		P200		P225		P250	
			V	V1		V	V1		V	V1		V	V1		E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
307 L1	80	145	315	80	35	313	60	28	375	80	48	363	60	34	—	—	—	—	—	—	—	—	—	—	—	—	—	—	195	350	186	400	216	450	215	550
307 L2	169	160	239	48	15	—	—	—	276	48	17	—	—	—	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400	—	—	—	—
307 L3	234	170	137.5	24	6	158	38	7	—	—	—	—	—	—	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—
307 L4	287	175	137.5	24	6	158	38	7	—	—	—	—	—	—	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—

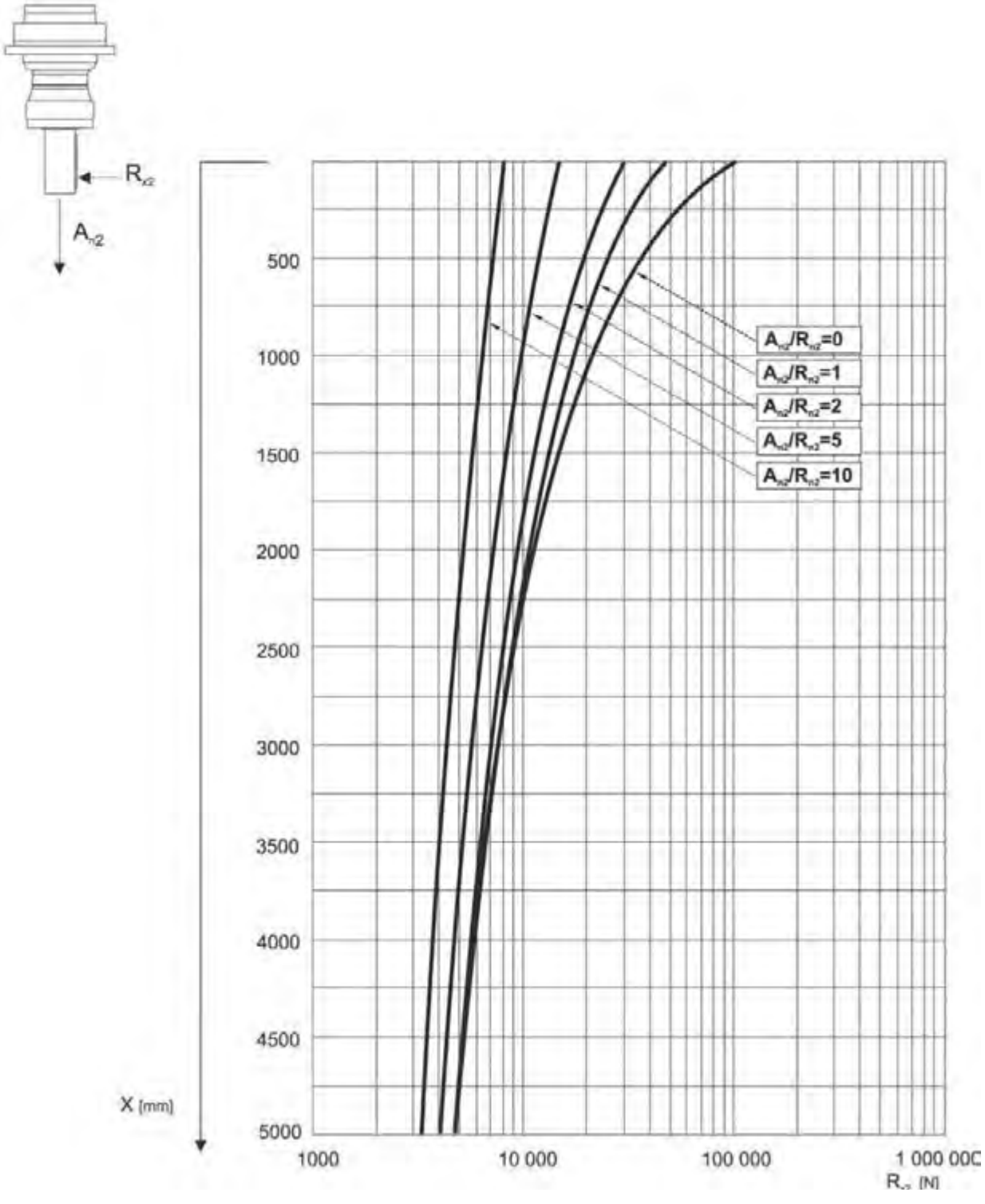
	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4			S5+ME5S/MX5S			S5+ME5L/MX5L		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
307 L1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
307 L2	—	—	—	—	—	—	—	—	—	—	—	—	460	559	258	552	692.5	310	596	736.5	310
307 L3	—	—	—	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—
307 L4	253	314	138	324	396	156	357	447	195	401	493	195	460	559	258	—	—	—	—	—	—

	R	R1														P71		P80		P90		P100		P112		P132		P160		P180		P200	
				V	V1		V	V1		V	V1		V	V1		E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
307 R2	199	225	180	239	48	15	—	—	—	276	48	17	—	—	—	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400
307 R3	261	140	170	137.5	24	6	158	38	7	—	—	—	—	—	—	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—
307 R4	326	122	175	137.5	24	6	158	38	7	—	—	—	—	—	—	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—

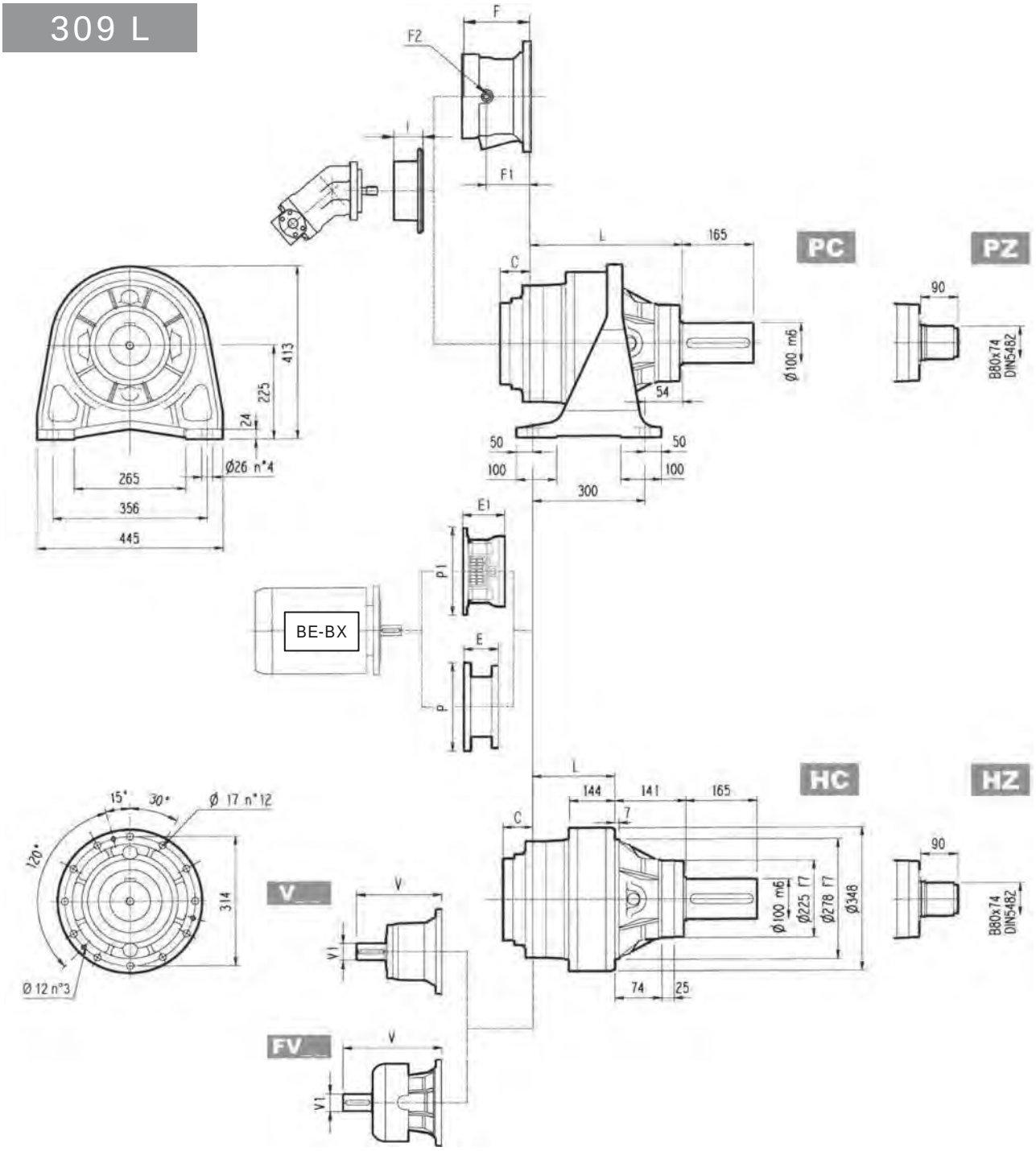
	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L			S4+ME4/MX4			S5+ME5S/MX5S			S5+ME5L/MX5L		
	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1	X1	X2	Y1
307 R2	—	—	—	—	—	—	—	—	—	—	—	—	508	607	258	552	692.5	310	596	736.5	310
307 R3	253	314	138	372	444	156	405	495	195	449	541	195	508	607	258	—	—	—	—	—	—
307 R4	253	314	138	372	444	156	405	495	195	449	541	195	508	607	258	—	—	—	—	—	—

307 VK

The diagram below allows the calculation of permitted overhung load R_{x2} on the output shaft of gearbox, with radial force applying at a distance x from shaft shoulder.
The curves are relevant to value resulting from the relationship of trust load A_{n2} to radial load R_{n2}, based on n_2 = 10 min^{-1} and 10000 hrs theoretical lifetime.



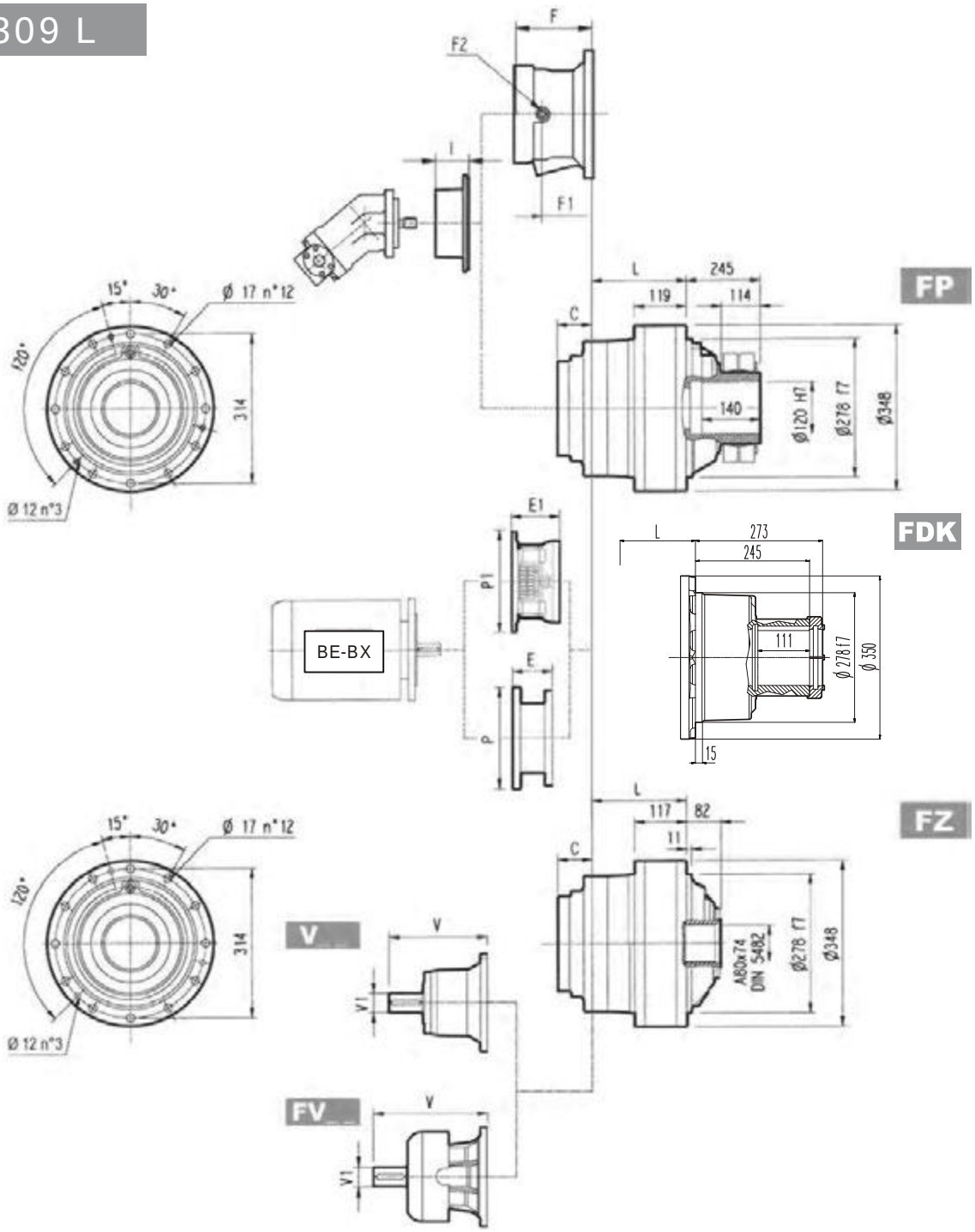
309 L



	L				Kg			
	PC - PZ	HC - HZ	FZ	FP - FDK	PC - PZ	HC - HZ	FZ	FP - FDK
309 L1	267	126	99	101	130	115	95	100
309 L2	356	215	188	190	142	127	107	112
309 L3	421	280	253	255	149	134	114	119
309 L4	474	333	306	308	153	138	118	123

	V	V1	Kg	V	V1	Kg	V	V1	Kg	V	V1	Kg	C	Input	I	F	F1	F2	Type	Input	Kg
309 L1	315	80	35	313	60	28	375	80	48	363	60	34	51	B	467	201	153	1/4 G	6	B	28
309 L2	239	48	15	—	—	—	276	48	17	—	—	—	37	A		145	95	1/4 G	5	A	16
309 L3	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		105	65	1/4 G	4	A	10
309 L4	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		105	65	1/4 G	4	A	10

309 L



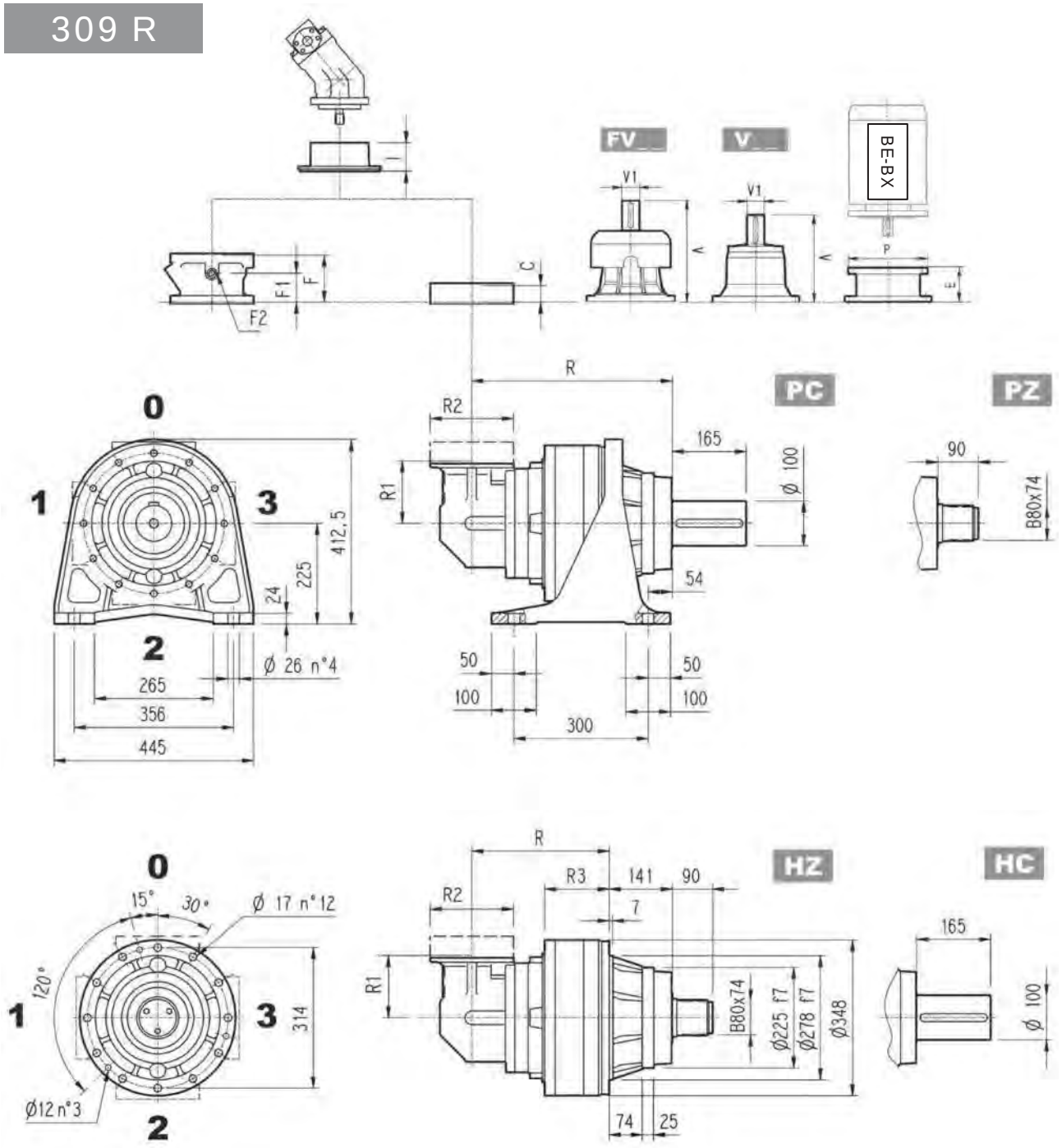
	PF 160		PF 180		PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1	E1	P1	E1	P1
309 L1*	—	—	—	—	197	530	227	530	227	550
309 L2	165	400	165	400	195	400	195	450	—	—
309 L3	165	400	165	400	—	—	—	—	—	—
309 L4	165	400	165	400	—	—	—	—	—	—

(*): contact Bonfiglioli technical service
NOTE: For R design contact Bonfiglioli Technical service

FP M_{2max} **= 29000 Nm**

	P71		P80		P90		P100		P112		P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
309 L1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	195	350	186	400	216	450	216	550
309 L2	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400	—	—	—	—
309 L3	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—
309 L4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—

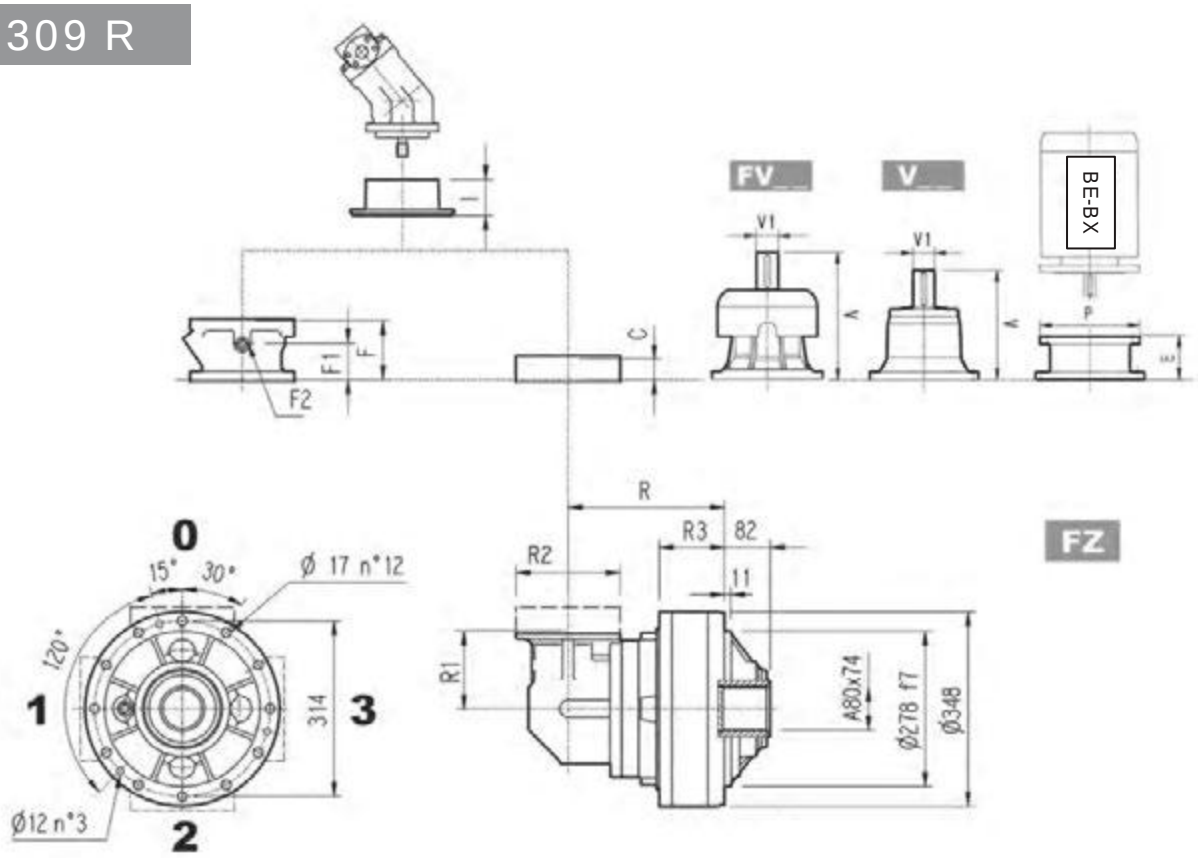
309 R

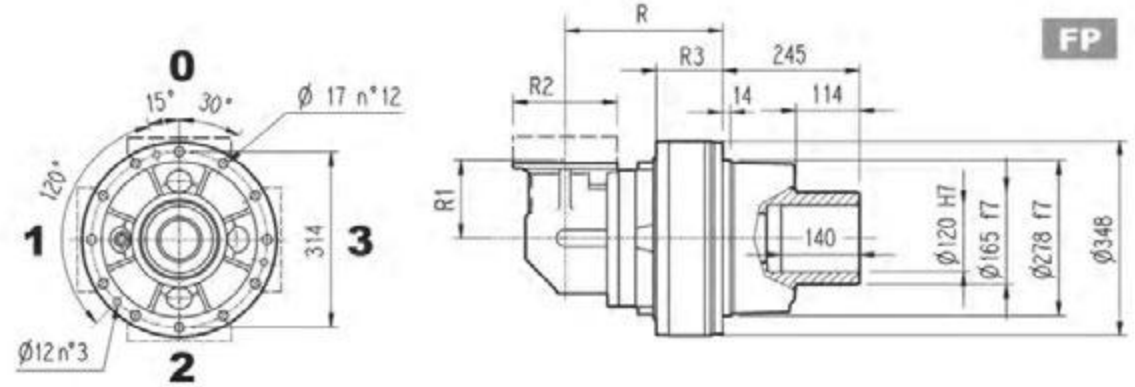


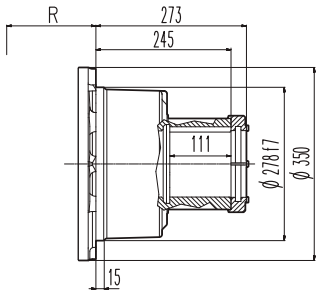
	R				R1	R2	R3						
	PC-PZ	HC-HZ	FZ	FP - FDK			HC-HZ	FZ	FP	PC-PZ	HC-HZ	FZ	FP - FDK
309 R2	386	245	218	220	225	245	168	141	143	180	165	145	150
309 R3	448	307	280	282	140	186	144	117	119	162	147	127	132
309 R4	513	372	345	347	122	186	144	117	119	163	148	128	133

	V	V1	kg	V	V1	kg	V	V1	kg	V	V1	kg	C	Input	I	F	F1	F2	Type	Input	kg
309 R2	239	48	15	—	—	—	276	48	17	—	—	—	37	A		145	95	1/4 G	5	A	16
309 R3	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		105	65	1/4 G	4	A	10
309 R4	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A	467	105	65	1/4 G	4	A	10

309 R



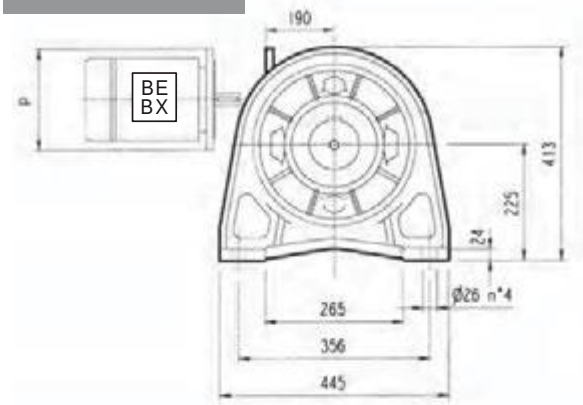




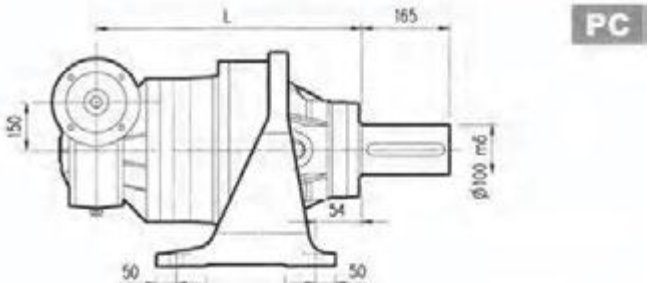
FP M_{2max} = 29000 Nm

	P71		P80		P90		P100		P112		P132		P160		P180		P200	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
309 R2	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400
309 R3	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—
309 R4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—

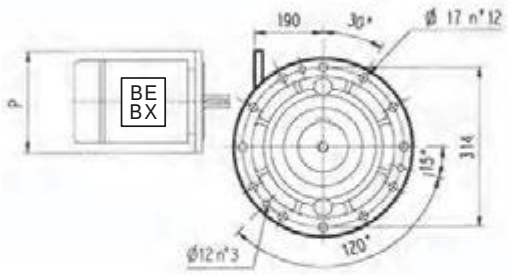
3/V 09 L3



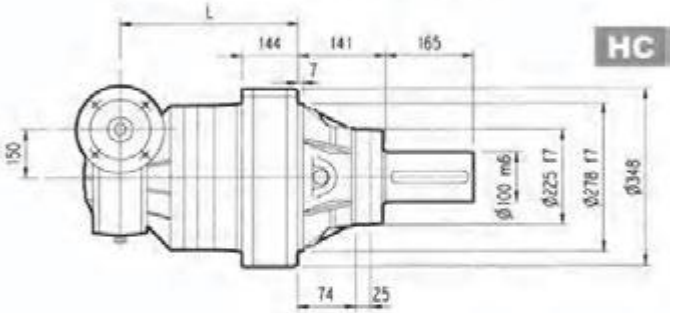
PC

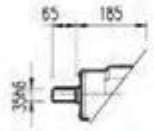


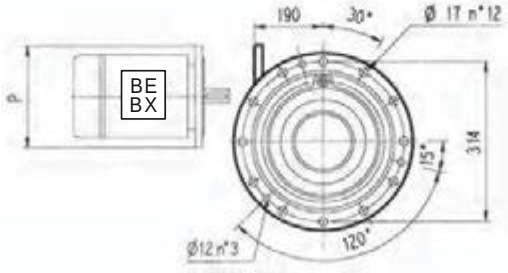
HZ PZ



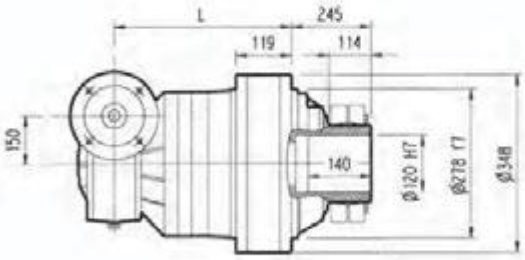
HC

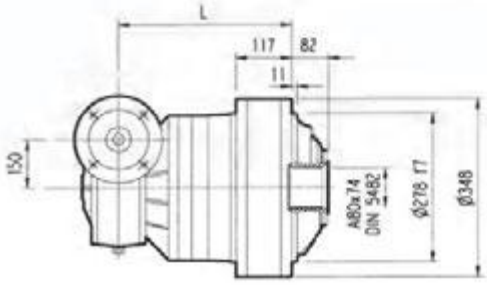






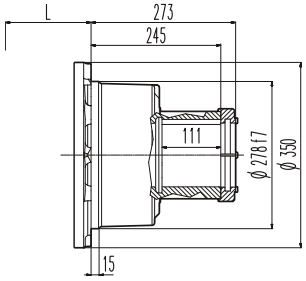
FP





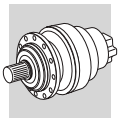
FZ

FDK



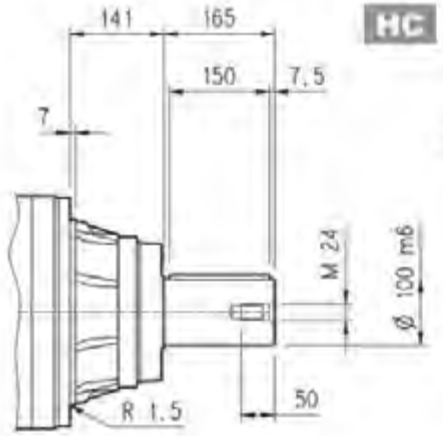
FP | **M_{2max} = 29000 Nm**

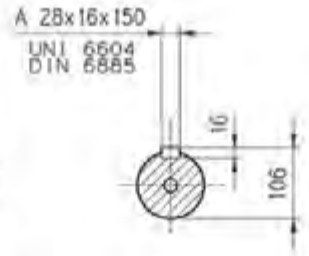
	L				kg				P100	P112	P132	P160
	PC - PZ	HC - HZ	FZ	FP - FDK	PC - PZ	HC - HZ	FZ	FP - FDK	P	P	P	P
3/V 09 L3	530	389	362	364	202	187	167	172	250	250	300	350



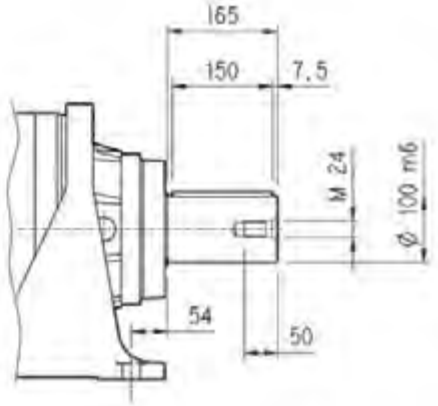
309 L | 309 R | 3/V 09 L3

HC

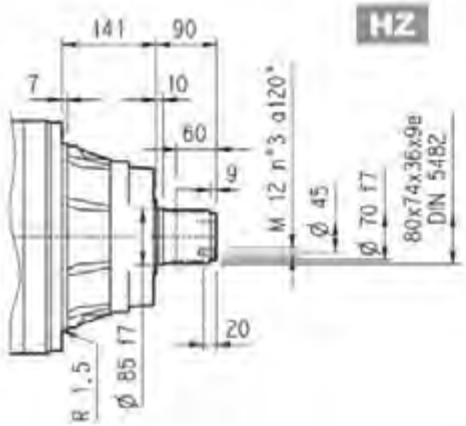


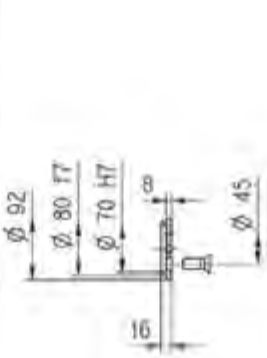


PC



HZ





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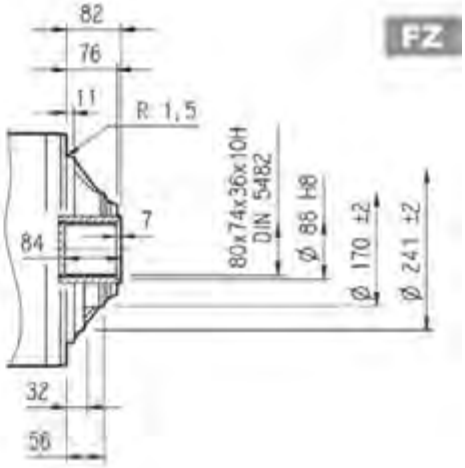
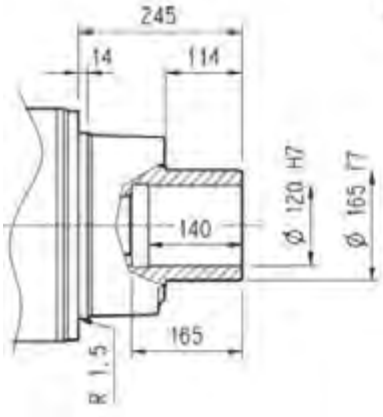
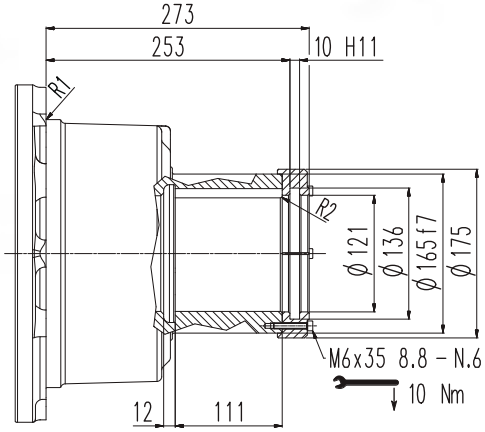
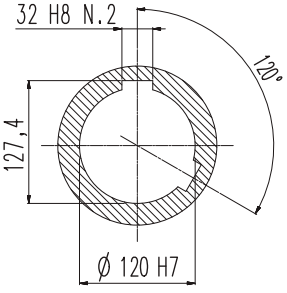


FP

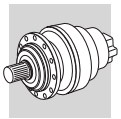


FDK





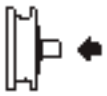
FP	M_{2max} = 29000 Nm

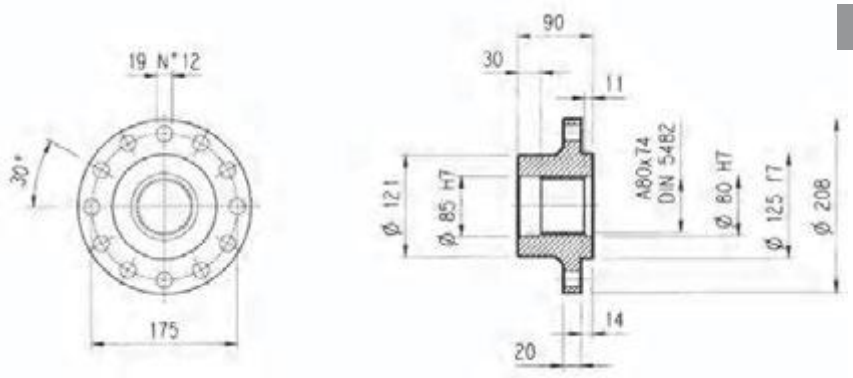


309 L | 309 R | 3/V 09 L3

Flange

W0A

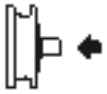


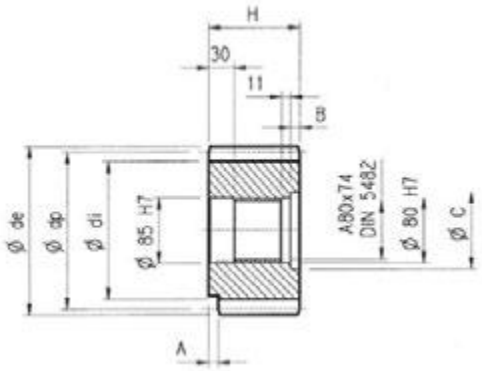


Material: Steel C40

Pinions

P...



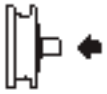


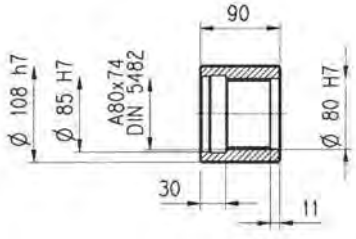
α = 20°

	m	z	x	dp	di	de	H	A	B	C	Material
PFG	8	16	0.500	128	117	149.5	90	—	—	—	Steel 39NiCrMo3 hardened and tempered
PHC	10	12	0.450	120	104	145	90	—	—	—	
PHE	10	14	0.320	140	121	165	116	13	26	95	
PHF	10	15	0.150	150	130	171.5	107	20	17	100	
PHG	10	16	0.500	160	145	186	90	—	—	—	Steel 18NiCrMo5 case hardened
PHH1	10	17	—	170	145	189	90	—	—	—	
PHH2	10	17	0.500	170	154	198	90	—	—	—	
PLD	12	13	0.500	156	138	192	102	—	12	95	Steel 39NiCrMo3 hardened and tempered
PLE	12	14	0.500	168	150	199.2	90	—	—	—	
PLI	12	18	0.500	216	198	249.6	107	7	17	95	
PLT	12	26	—	312	282	336	90	10	—	—	Steel 18NiCrMo5 case hardened

Sleeve coupling

M0A

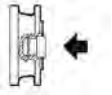


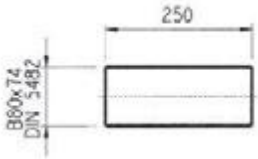


Material: Steel 16CrNi4

Splined bars

B0A

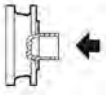




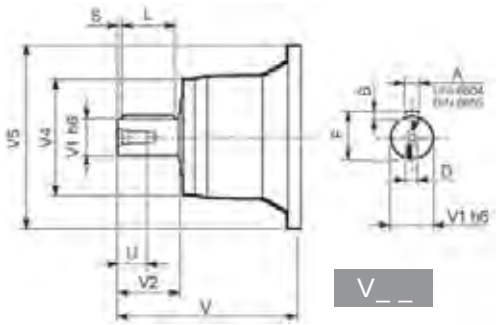
Material: Case hardening steel 18NiCrMo5 UNI 5331
must be case hardened 50-55 HRC

Shrink disc

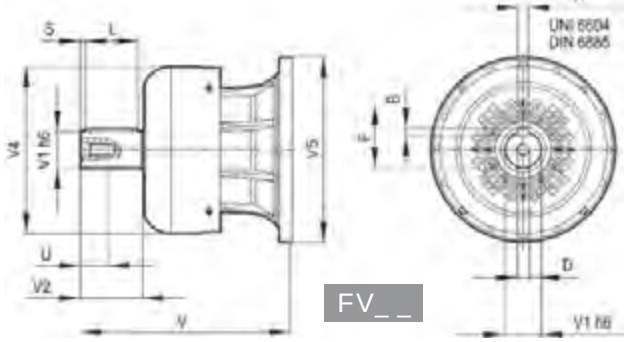
G0A



309 L 309 R



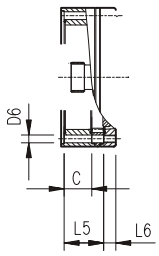
V_ _

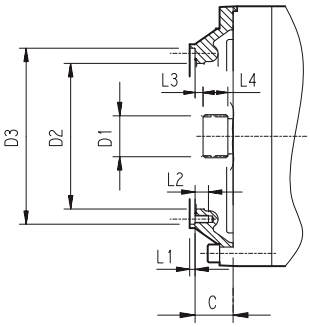


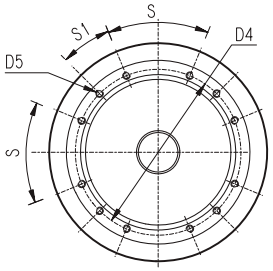
FV_ _

		V	V1	V2	V4	V5	A	B	F	L	S	D	U
309 L1	**V07B**	315	80	130	200	345	22	14	85	110	10	M16	36
	FV07B	375	80	130	347.5	348	22	14	85	110	10	M16	36
	V07A	313	60	105	155	345	18	11	64	90	7.5	M16	36
	FV07A	363	60	105	309	348	18	11	64	90	7.5	M16	36
309 L2	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36
309 L3	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
309 L4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
309 R2	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36
309 R3-R4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28

309 L 309 R

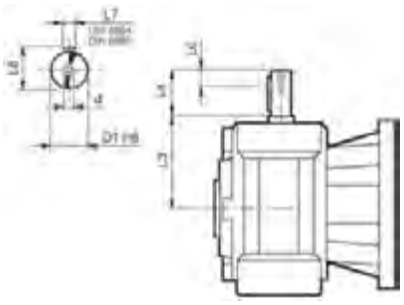






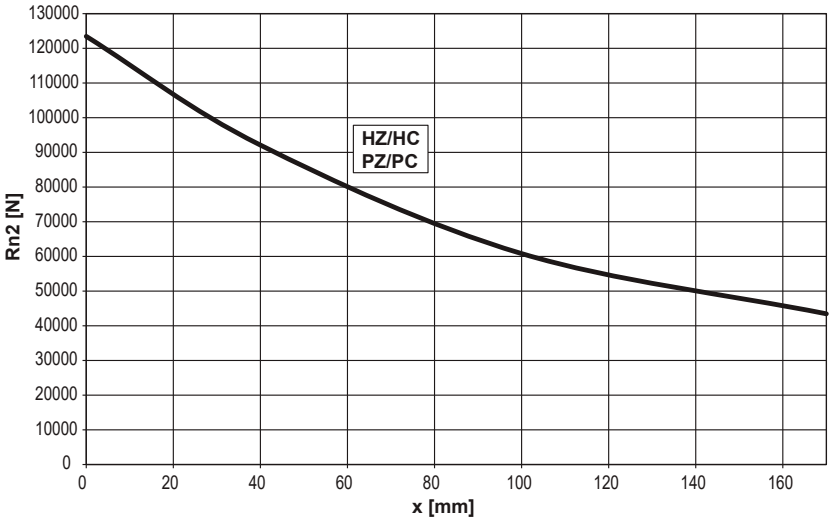
		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
309 L1	**V9AB**	51	58x53 DIN 5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B
309 L2	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	—	4	18	9	18	—	—	45°	45°	A
309 L3	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	11	4	—	9	18	65	18	45°	45°	A
309 L4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	11	4	—	9	18	118	18	45°	45°	A
309 R2	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	11	4	18	9	18	—	—	45°	45°	A
309 R3-R4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	11	4	—	9	18	37	18	45°	45°	A

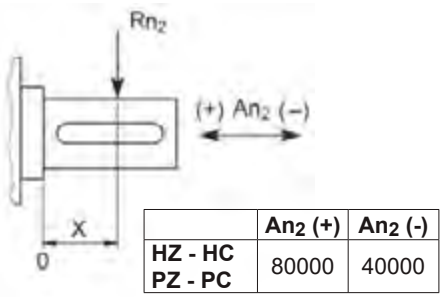
3/V 09 L3



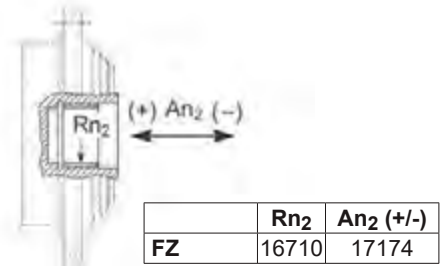
	D1 h6	L3	L4	L6	L7	L8	d
3/V 09 L3_HS	35	185	65	20	10	38	M8

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$





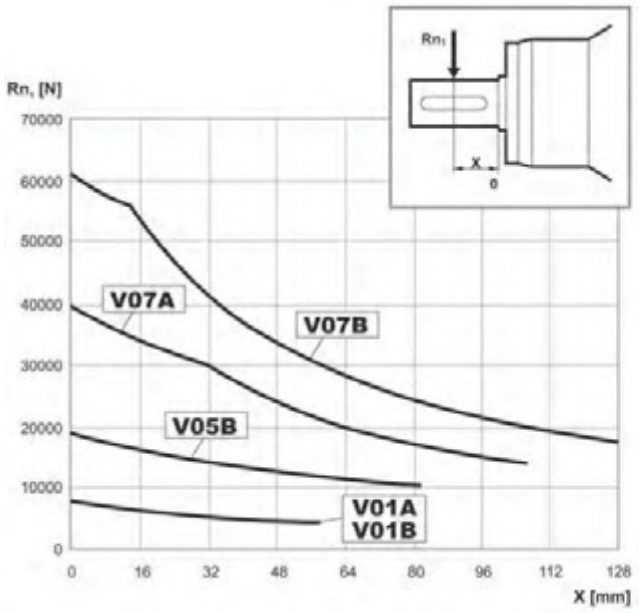
	An2 (+)	An2 (-)
HZ - HC PZ - PC	80000	40000

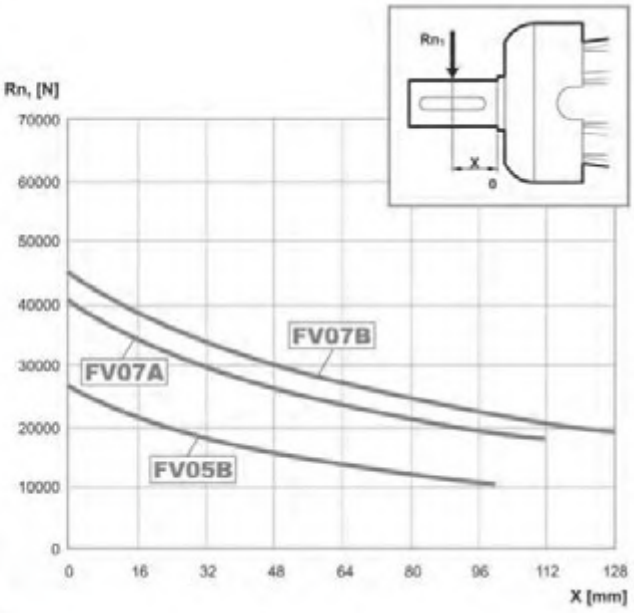


	Rn2	An2 (+/-)
FZ	16710	17174

Load corrective factor fh_2 on shafts	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
	fh_2	FZ	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HZ - HC - PZ - PC	**1.49**	**1.49**	**1.23**	**1.00**	**0.62**	**0.50**

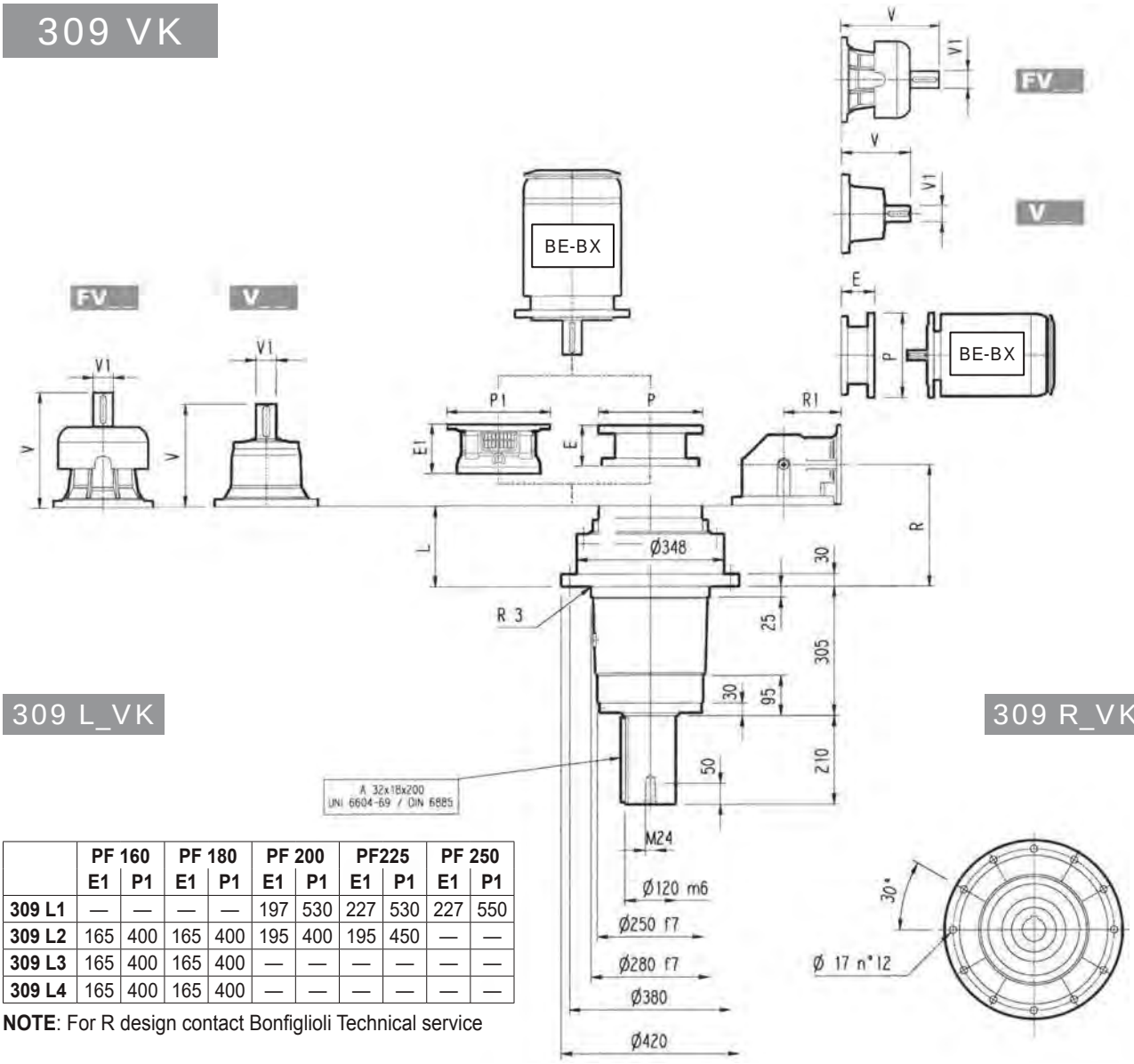
Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$





Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

309 VK



309 L_VK

309 R_VK

	PF 160		PF 180		PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1	E1	P1	E1	P1
309 L1	—	—	—	—	197	530	227	530	227	550
309 L2	165	400	165	400	195	400	195	450	—	—
309 L3	165	400	165	400	—	—	—	—	—	—
309 L4	165	400	165	400	—	—	—	—	—	—

NOTE: For R design contact Bonfiglioli Technical service

	L		V	V1		V	V1		V	V1		V	V1	
309 L1	102	165	315	80	35	313	60	28	375	80	48	363	60	34
309 L2	191	180	239	48	15	—	—	—	276	48	17	—	—	—
309 L3	256	190	137.5	24	6	158	38	7	—	—	—	—	—	—
309 L4	309	195	137.5	24	6	158	38	7	—	—	—	—	—	—

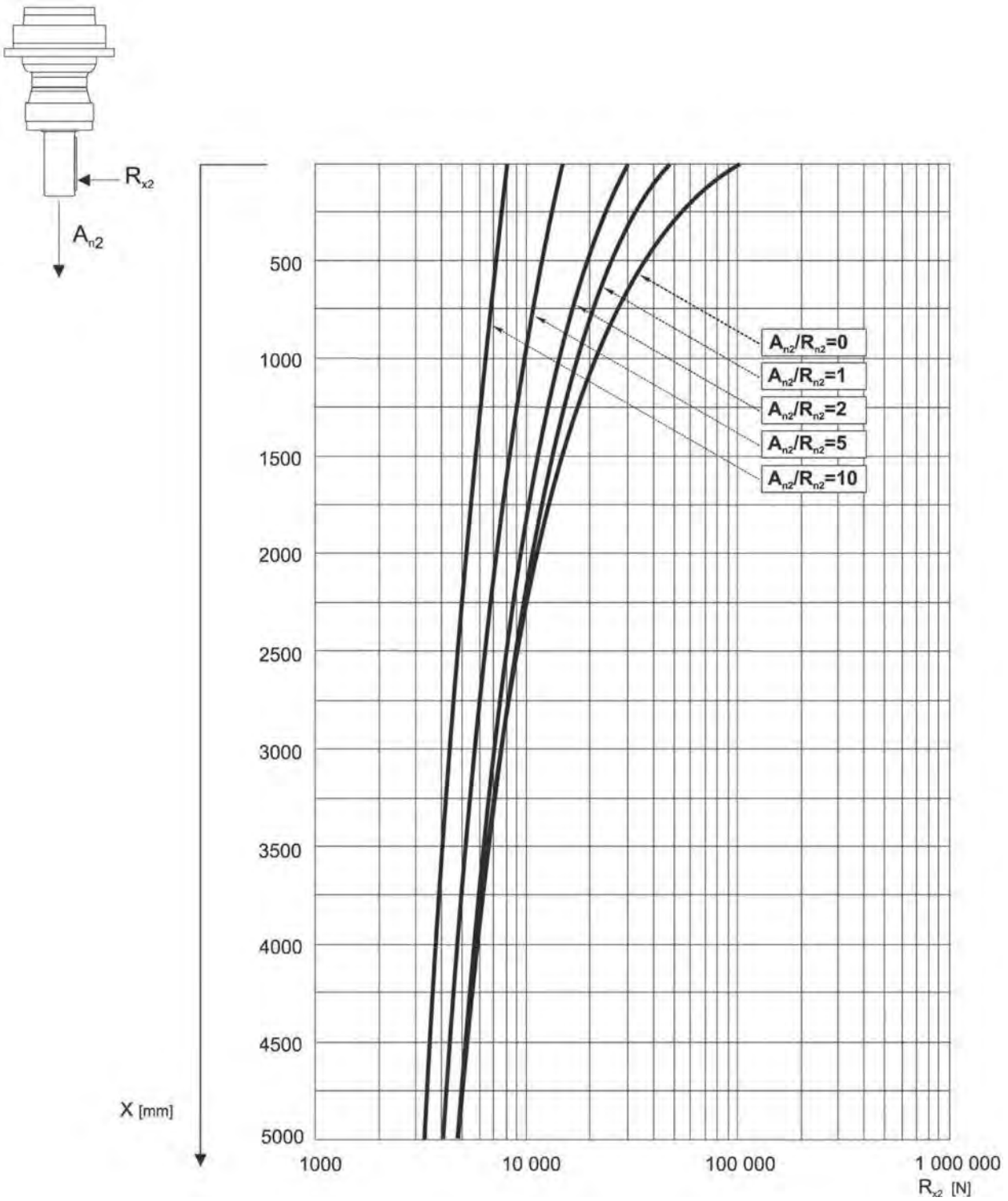
	P71		P80		P90		P100		P112		P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
309 L1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	195	350	186	400	216	450	216	450
309 L2	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400	—	—	—	—
309 L3	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—
309 L4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—

	R	R1		V	V1		V	V1		V	V1		V	V1	
309 R2	221	225	200	239	48	15	—	—	—	276	48	17	—	—	—
309 R3	283	140	190	137.5	24	6	158	38	7	—	—	—	—	—	—
309 R4	348	122	195	137.5	24	6	158	38	7	—	—	—	—	—	—

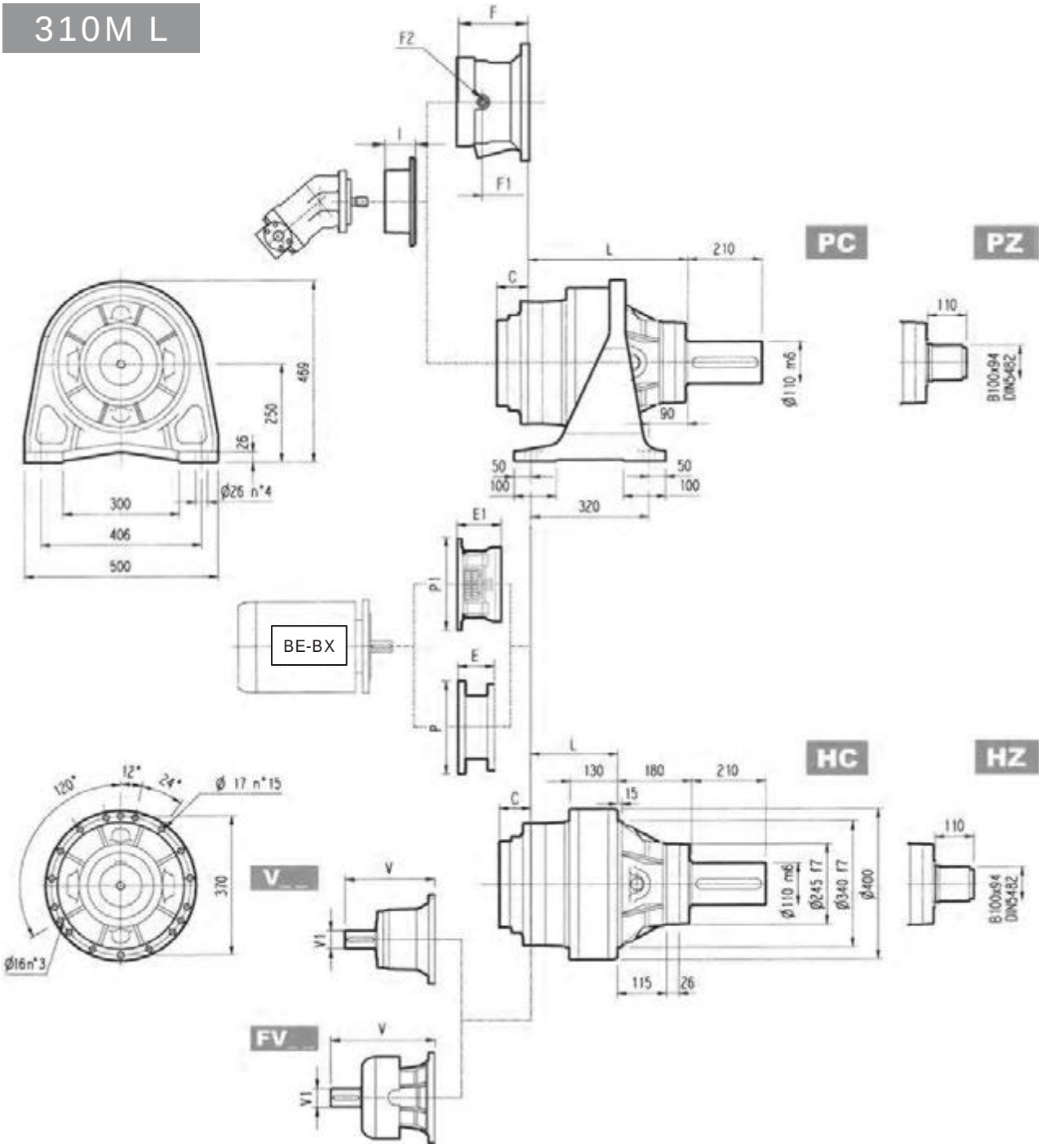
	P71		P80		P90		P100		P112		P132		P160		P180		P200	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
309 R2	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400
309 R3	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—
309 R4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—

309 VK

The diagram below allows the calculation of permitted overhung load R_{x2} on the output shaft of gearbox, with radial force applying at a distance x from shaft shoulder.
The curves are relevant to value resulting from the relationship of trust load A_{n2} to radial load R_{n2}, based on n_2 = 10 min^{-1} and 10000 hrs theoretical lifetime.



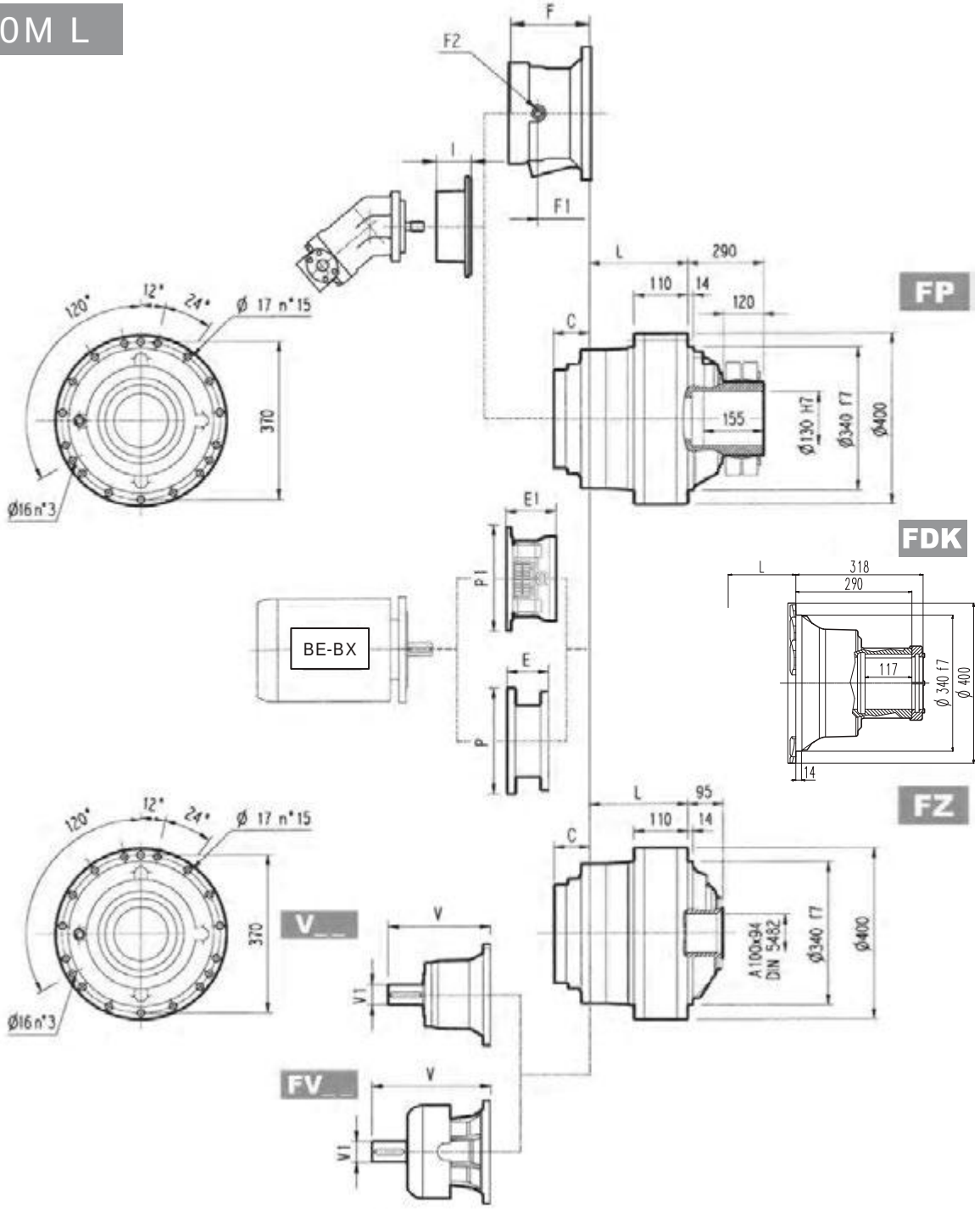
310M L



	L							
	PC - PZ	HC - HZ	FZ	FP - FDK	PC - PZ	HC - HZ	FZ	FP - FDK
310M L1	288	108	88	88	155	135	110	115
310M L2	424	244	224	224	185	165	140	145
310M L3	489	309	289	289	194	174	149	154
310M L4	542	362	342	342	198	178	153	158

	V	V1	kg	V	V1	kg	V	V1	kg	V	V1	kg	C	Input	I	F	F1	F2	Type	Input	kg
310M L1	377	80	50	—	—	—	457	80	63	—	—	—	88	C		—	—	—	—	—	—
310M L2	307	60	23	—	—	—	357	60	28	—	—	—	45	B		195	147	1/4 G	6	B	28
310M L3	239	48	15	—	—	—	276	48	17	—	—	—	37	A		145	95	1/4 G	5	A	16
310M L4	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A	467	105	65	1/4 G	4	A	10

310M L



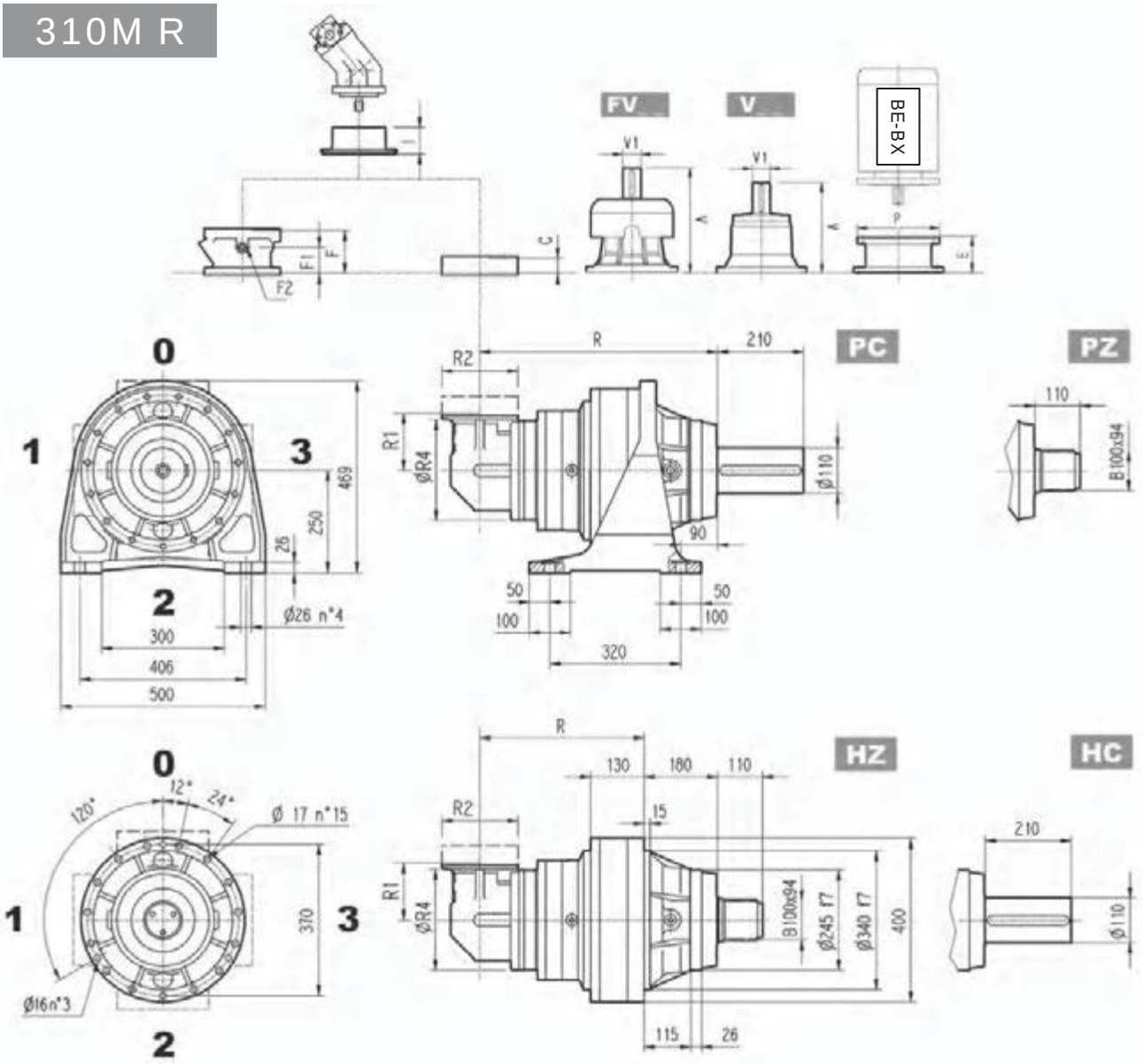
	PF 160		PF 180		PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1	E1	P1	E1	P1
310M L1	—	—	—	—	—	—	254	550	254	550
310M L2	—	—	167	390	197	400	197	450	207	550
310M L3	165	400	165	400	195	400	195	450	—	—
310M L4	165	400	165	400	—	—	—	—	—	—

NOTE: For R design contact Bonfiglioli Technical service

FP M_{2max} **= 44000 Nm**

	P71		P80		P90		P100		P112		P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
310M L1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	271	400	301	450	281	550
310M L2	—	—	—	—	—	—	—	—	—	—	—	—	152	350	153	350	183	400	212	450	193	550
310M L3	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400	—	—	—	—
310M L4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—

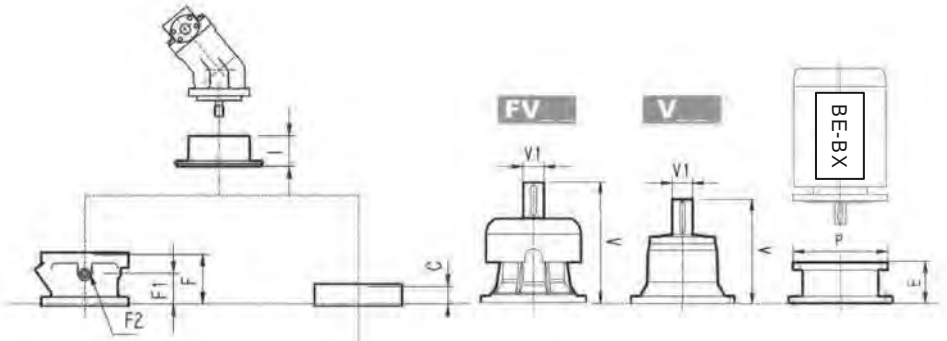
310M R

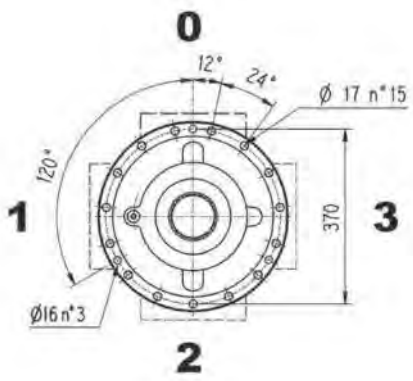


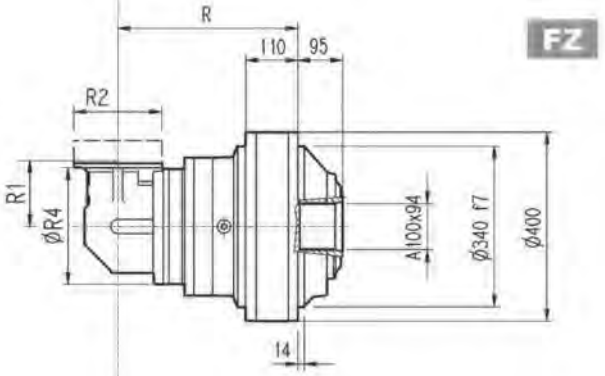
	R				R1	R2	R4	Kg			
	PC-PZ	HC-HZ	FZ	FP - FDK				PC-PZ	HC-HZ	FZ	FP - FDK
310M R2 (B)	495	315	295	295	345	292	400	280	260	240	250
310M R2 (C)	513	333	313	313	390	292	480	300	280	260	270
310M R3	561	381	361	361	140	186	244	209	189	164	169
310M R4	581	401	381	381	140	186	244	214	194	169	174

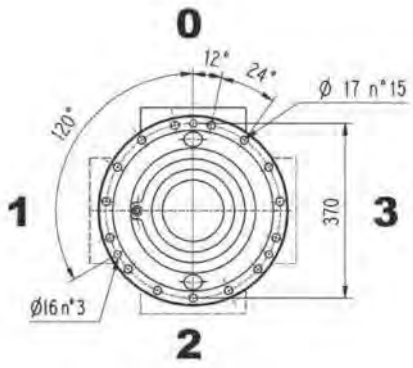
	V	V1	Kg	V	V1	Kg	V	V1	Kg	V	V1	Kg	C	Input	I	F	F1	F2	Type	Input	Kg
310M R2 (B)	307	60	23	—	—	—	357	60	28	—	—	—	45	B		195	147	1/4 G	6	B	28
310M R2 (C)	307	60	23	—	—	—	357	60	28	—	—	—	45	B		195	147	1/4 G	6	B	28
310M R3	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A		145	95	1/4 G	5	A	16
310M R4	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A	467	105	65	1/4 G	4	A	10

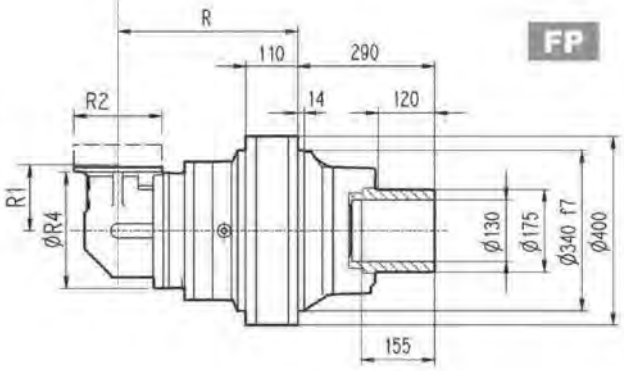
310M R

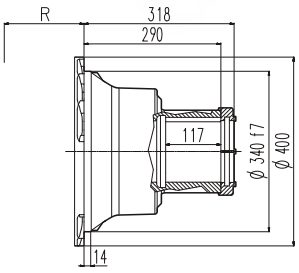






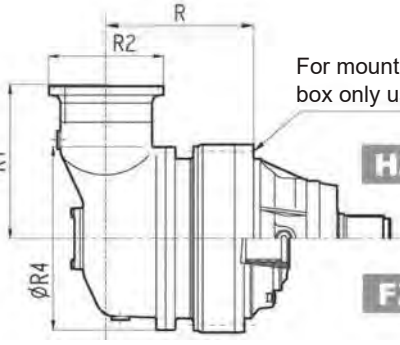






Only for configuration:

R2



For mounting the gear-box only use stud bolts

HZ HC

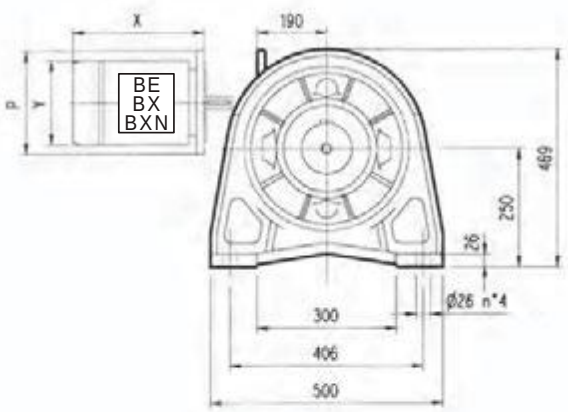
FZ FP

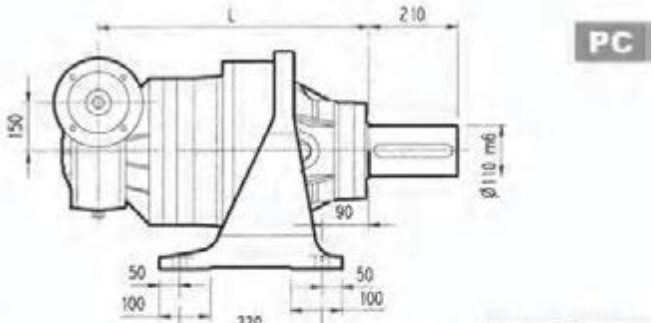
FP

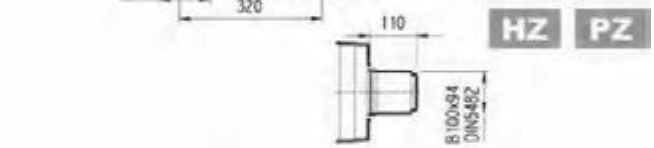
M_{2max} = 44000 Nm

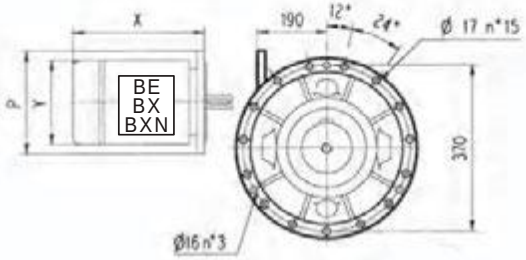
	P71		P80		P90		P100		P112		P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
310M R2 (B)	—	—	—	—	—	—	—	—	—	—	—	—	152	350	152	350	182	400	212	450	—	—
310M R2 (C)	—	—	—	—	—	—	—	—	—	—	—	—	152	350	152	350	182	400	212	450	193	550
310M R3	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—
310M R4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—

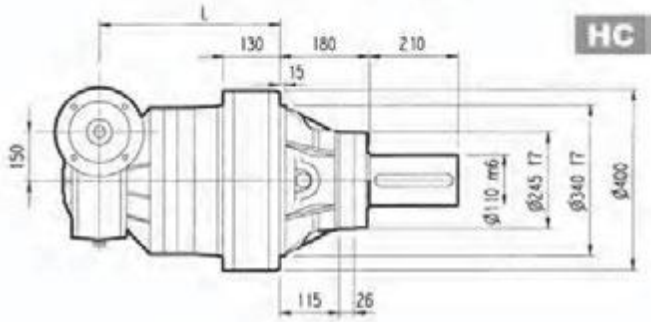
3/V 10M L3

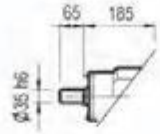


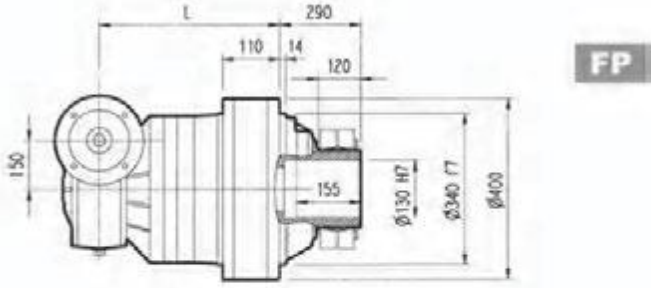


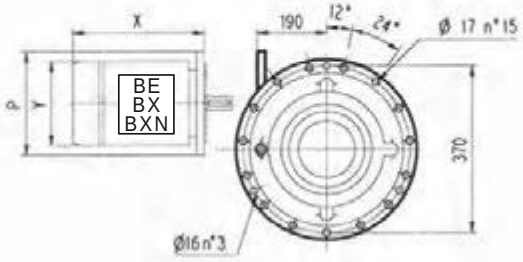


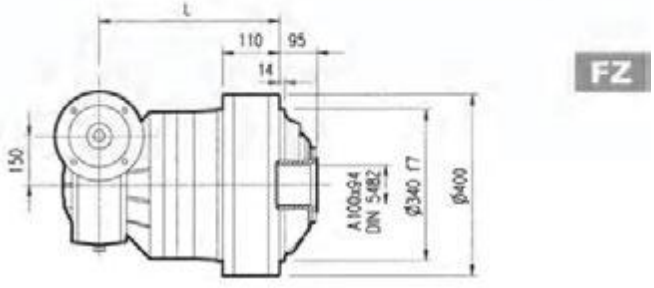


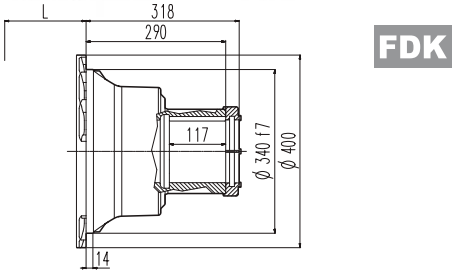










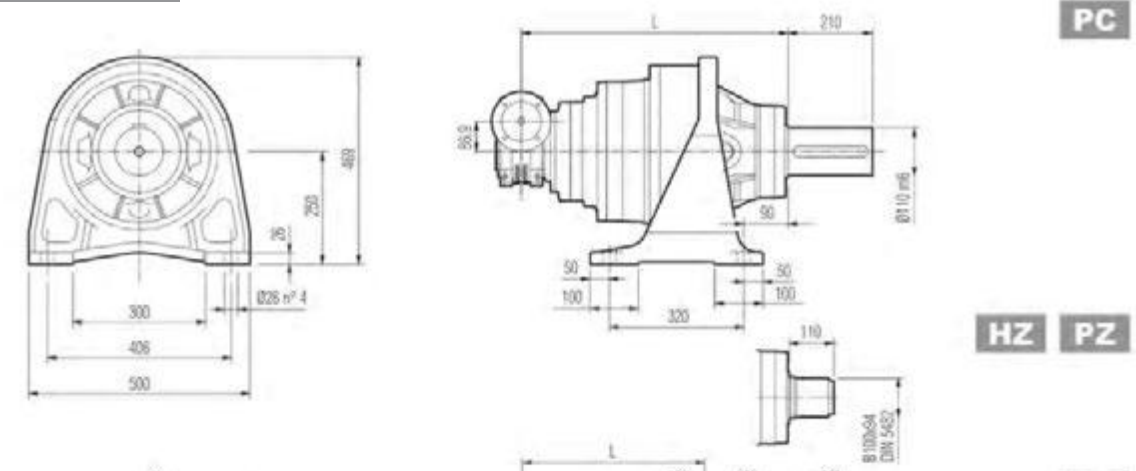


FP | **M_{2max} = 44000 Nm**

	L				Kg				P71	P80	P90	P100	P112	P132	P160
	PC - PZ	HC - HZ	FZ	FP - FDK	PC - PZ	HC - HZ	FZ	FP - FDK	P	P	P	P	P	P	P
3/V 10M L3	608	428	408	408	245	225	200	205	—	—	—	250	250	300	300

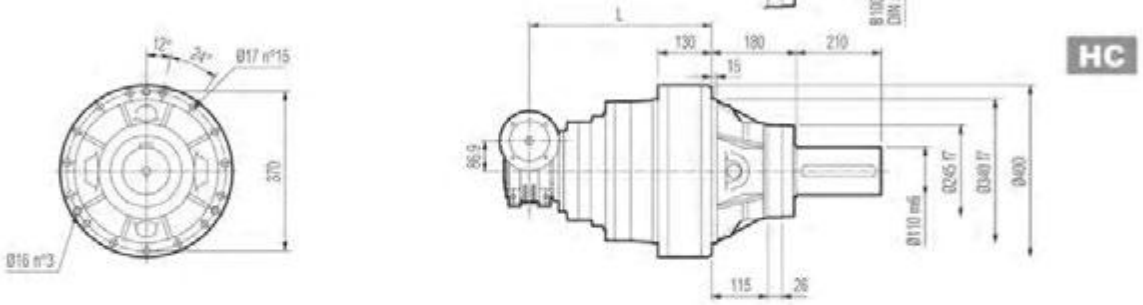
3/V 10M L4

PC

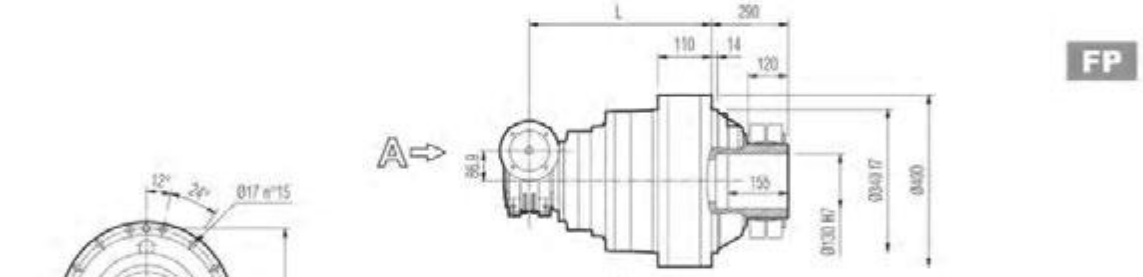


HZ PZ

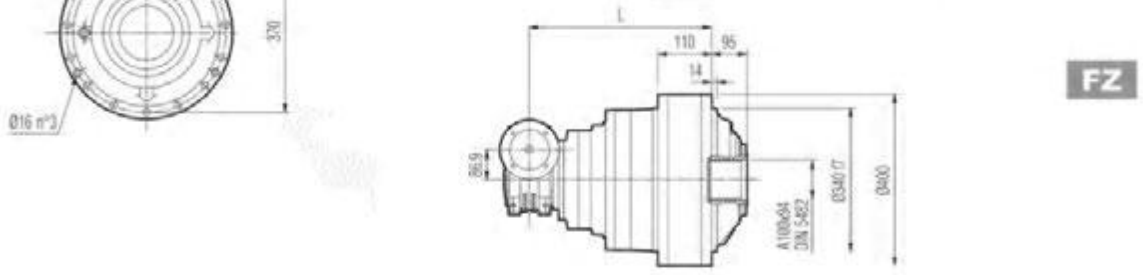
HC



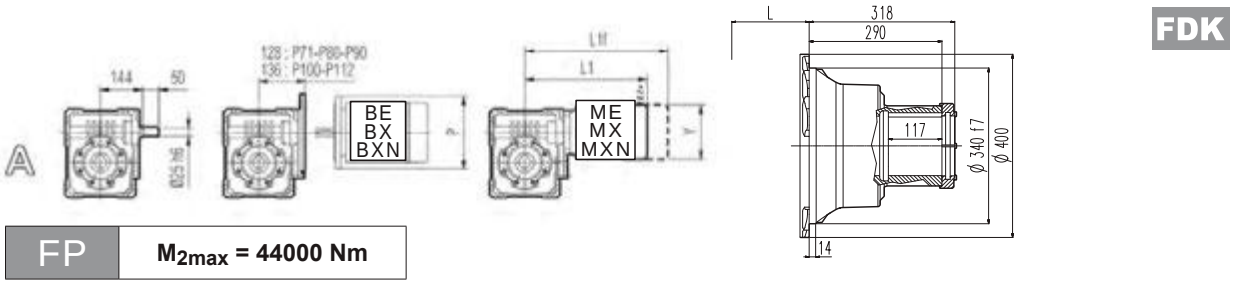
FP



FZ



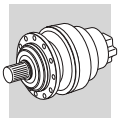
FDK



FP | **M_{2max} = 44000 Nm**

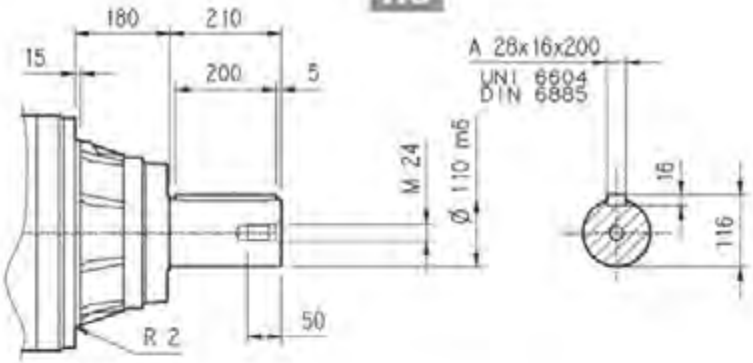
	L							
	PC - PZ	HC - HZ	FZ	FP	PC - PZ	HC - HZ	FZ	FP - FDK
3/V 10M L4	634	454	434	434	210	190	165	170

	P71	P80	P90	P100	P112	S1+M1			S2+ME2S/MX2S			S3+ME3S/MX3S			S3+ME3L/MX3L		
	P	P	P	P	P	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y	L1	L1f	Y
3/V 10M L4	160	200	200	250	250	324	385	138	393	465	156	424	514	193	468	560	193

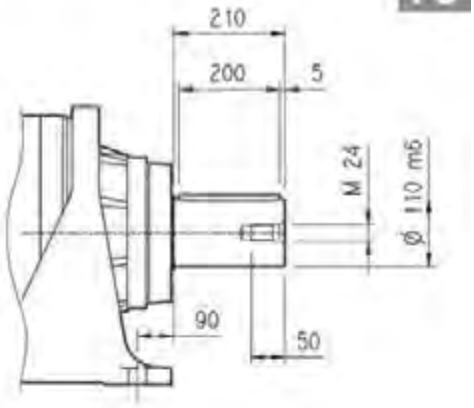


310M L | 310M R | 3/V 10M L

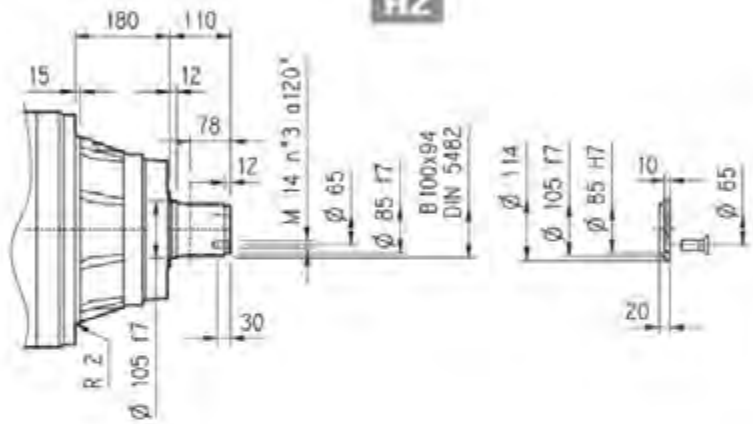
HC



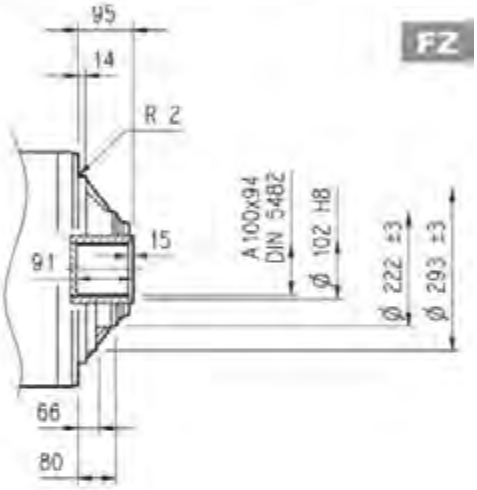
PC



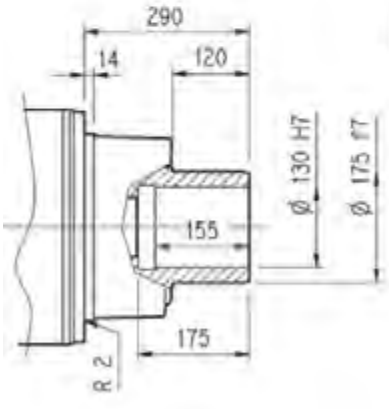
HZ

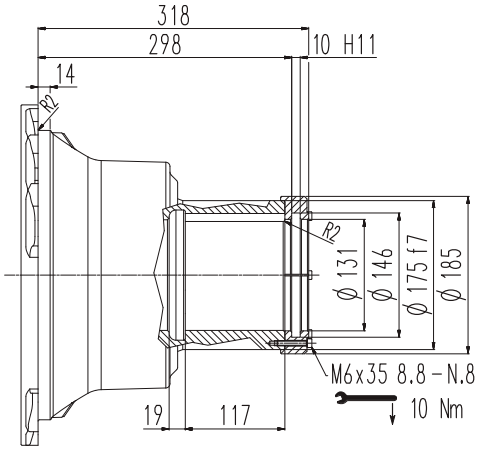


FZ

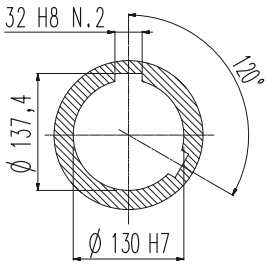


FP

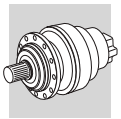




FDK



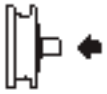
FP	M_{2max} = 44000 Nm

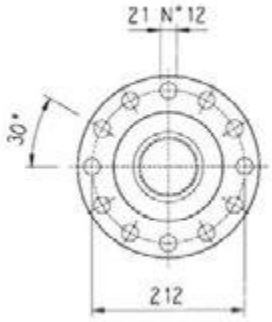


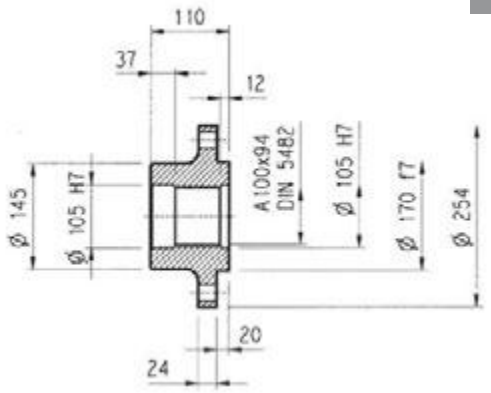
310M L | 310M R | 3/V 10M L

Flange

W0A



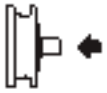


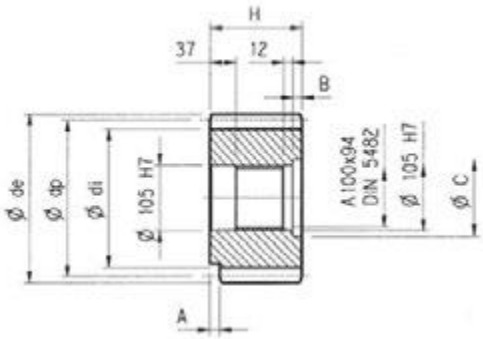


Material: Steel C40

Pinions

P...



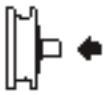


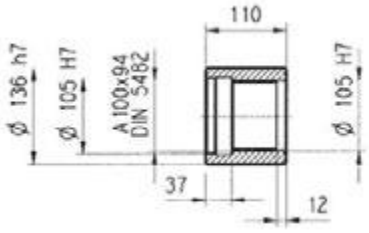
α = 20°

	m	z	x	dp	di	de	H	A	B	C	Material
PLQ	12	23	—	276	246	300	110	—	—	—	Steel 18NiCrMo5 case hardened
PPD	16	13	0.500	208	184	252.5	145	—	35	116	Steel 39NiCrMo3 hardened and tempered
PPF	16	15	0.450	240	215	280	125	—	15	120	

Sleeve coupling

M0A

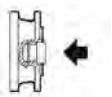


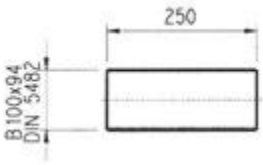


Material: Steel 16CrNi4

Splined bars

B0A

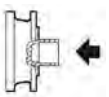


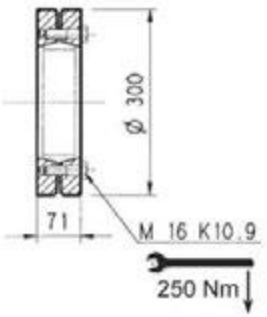


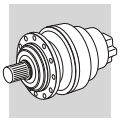
Material: Case hardening steel 18NiCrMo5 UNI 5331
must be case hardened 50-55 HRC

Shrink disc

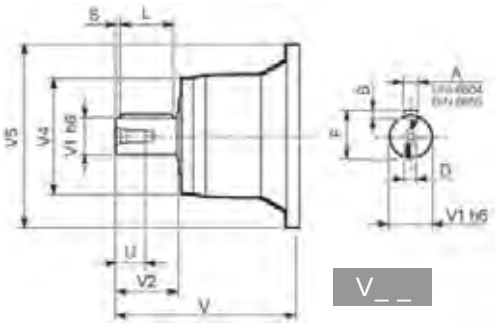
G0A

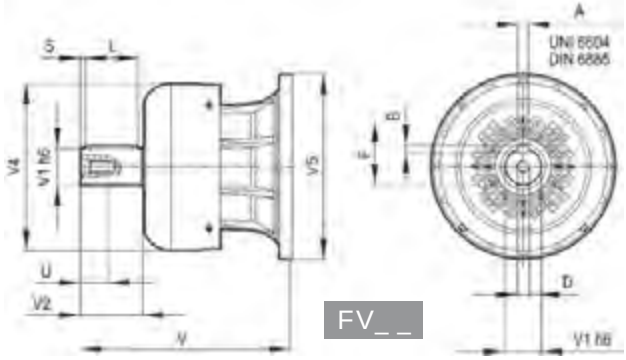






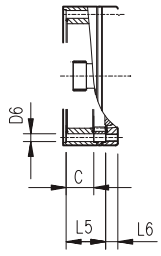
310M L 310M R

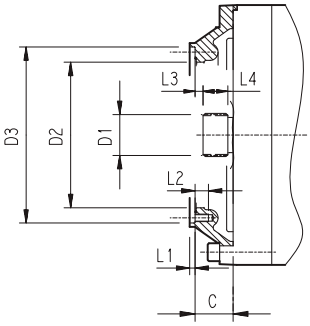


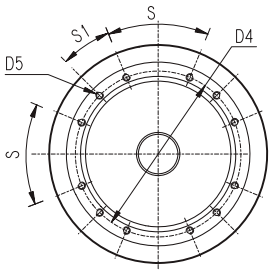


		V	V1	V2	V4	V5	A	B	F	L	S	D	U
310M L1	**V10B**	377	80	130	200	400	22	14	85	110	10	M16	36
	FV10B	457	80	130	347.5	400	22	14	85	110	10	M16	36
310M L2	**V06B**	307	60	105	155	292	18	11	64	90	7.5	M16	36
	FV06B	357	60	105	309	292	18	11	64	90	7.5	M16	36
310M L3	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36
310M L4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
310M R2 (B) (C)	**V06B**	307	60	105	155	292	18	11	64	90	7.5	M16	36
	FV06B	357	60	105	309	292	18	11	64	90	7.5	M16	36
310M R3-R4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28

310M L 310M R

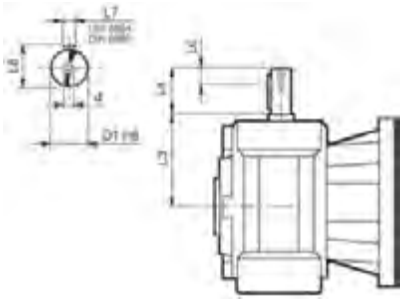






		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
310M L1	**V9AC**	88	70x64 DIN 5482	200	282 H7	266	M12 n°12	—	4	22	11	32	—	—	45°	45°	C
310M L2	**V9AB**	45	58x53 DIN 5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B
310M L3	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	—	4	18	9	18	—	—	45°	45°	A
310M L4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	11	4	—	9	18	53	18	45°	45°	A
310M R2 (B) (C)	**V9AA**	45	58x53 DIN 5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B
310M R3-R4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	11	4	—	9	18	37	18	45°	45°	A

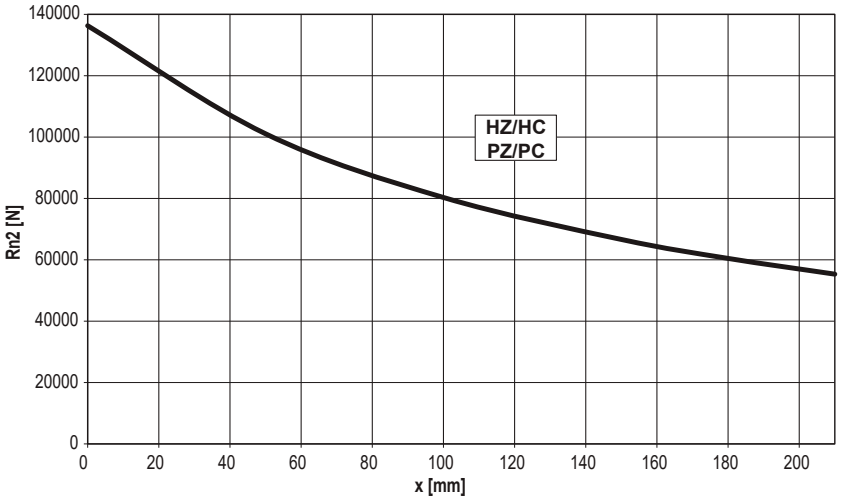
3/V 10M L

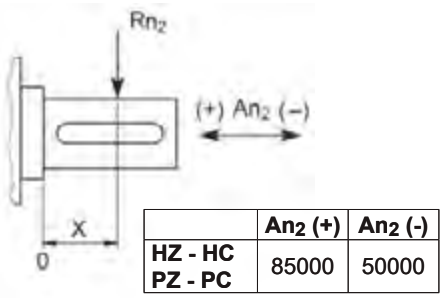


	D1 h6	L3	L4	L6	L7	L8	d
3/V 10M L3_HS	35	185	65	20	10	38	M8
3/V 10M L4_HS	25	144	50	19	8	28	M8

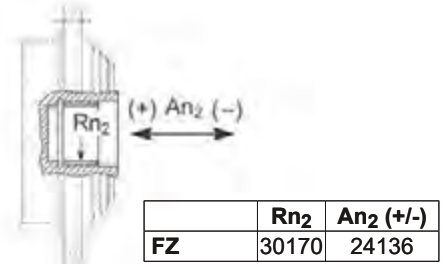
310M L | 310M R | 3/V 10M L

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$





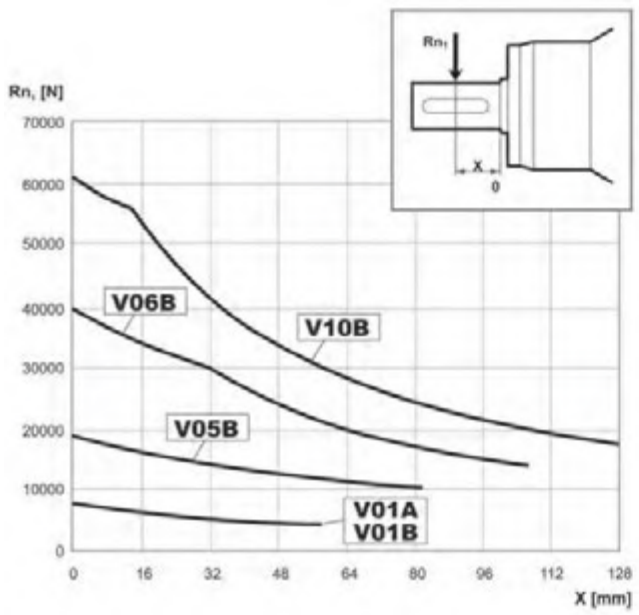
	An2 (+)	An2 (-)
HZ - HC PZ - PC	85000	50000

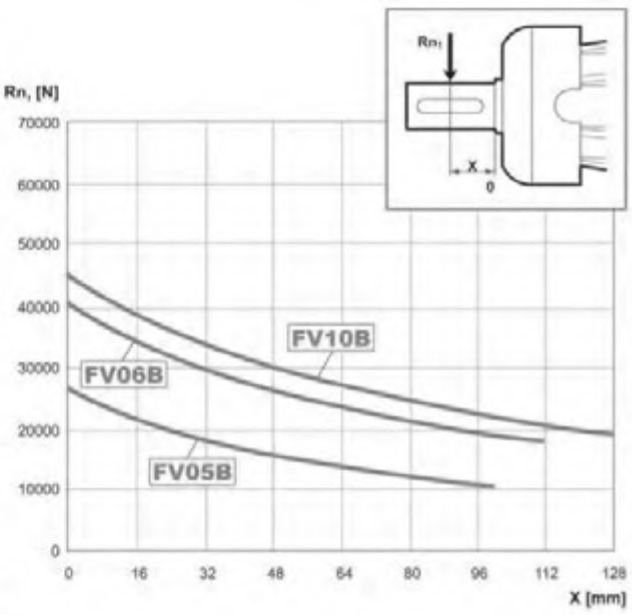


	Rn2	An2 (+/-)
FZ	30170	24136

Load corrective factor fh_2 on shafts	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
	fh_2	FZ	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HZ - HC - PZ - PC	**1.27**	**1.27**	**1.23**	**1.00**	**0.62**	**0.50**

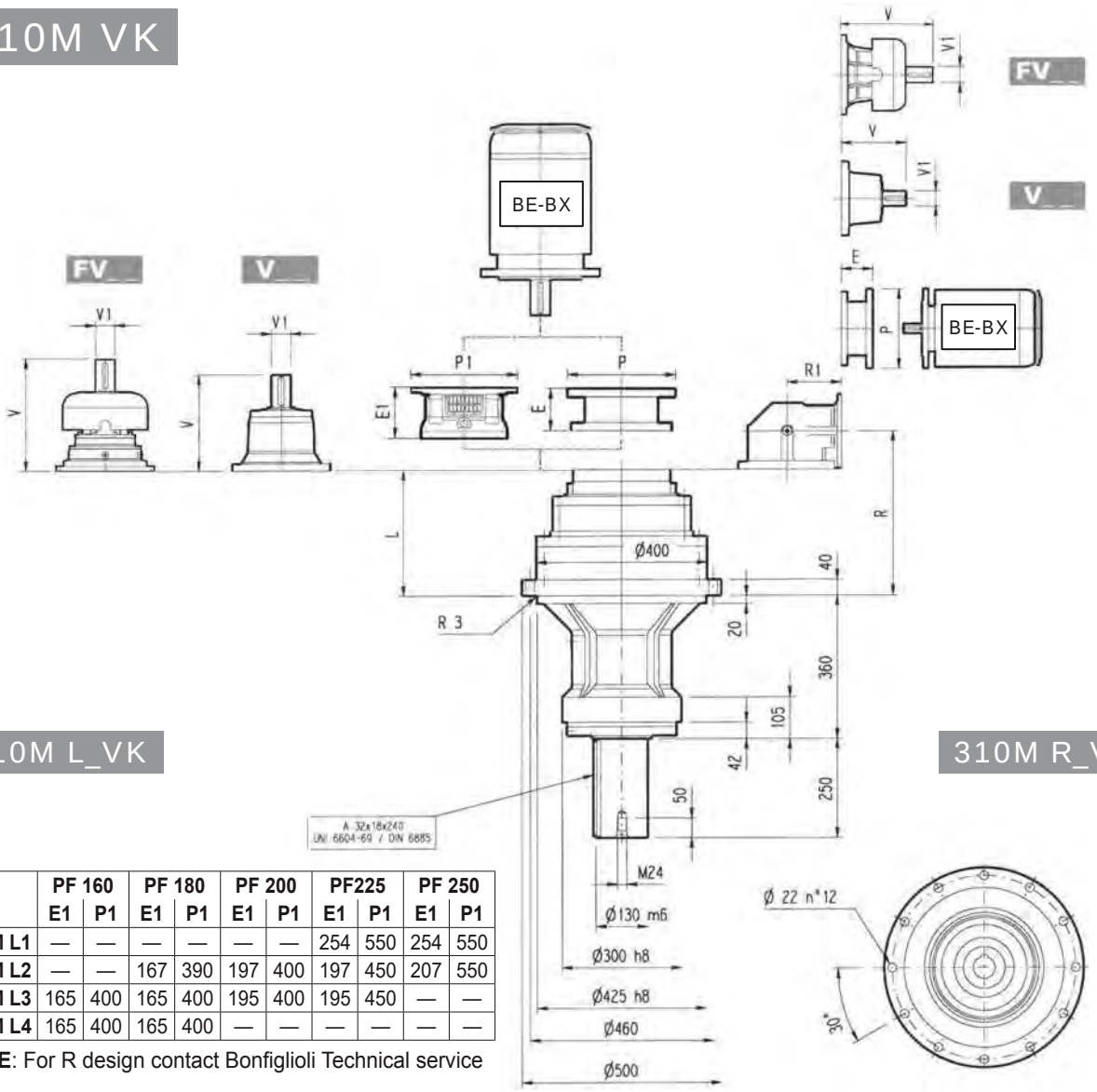
Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$





Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

310M VK



310M L_VK

	PF 160		PF 180		PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1	E1	P1	E1	P1
310M L1	—	—	—	—	—	—	254	550	254	550
310M L2	—	—	167	390	197	400	197	450	207	550
310M L3	165	400	165	400	195	400	195	450	—	—
310M L4	165	400	165	400	—	—	—	—	—	—

NOTE: For R design contact Bonfiglioli Technical service

310M R_VK

	L		V	V1		V	V1		V	V1		V	V1	
310M L1	107	200	377	80	50	—	—	—	457	80	63	—	—	—
310M L2	243	230	307	60	23	—	—	—	357	60	28	—	—	—
310M L3	308	240	239	48	15	—	—	—	276	48	17	—	—	—
310M L4	361	245	137.5	24	6	158	38	7	—	—	—	—	—	—

	P71		P80		P90		P100		P112		P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
310M L1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	271	400	301	450	281	550
310M L2	—	—	—	—	—	—	—	—	—	—	—	—	152	350	153	350	183	400	212	450	193	550
310M L3	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400	—	—	—	—
310M L4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—

	R	R1		V	V1		V	V1		V	V1		V	V1	
310M R2 (B)	315	345	320	307	60	23	—	—	—	357	60	28	—	—	—
310M R2 (C)	333	390	340	307	60	23	—	—	—	357	60	28	—	—	—
310M R3	380	140	250	137.5	24	6	158	38	7	—	—	—	—	—	—
310M R4	400	140	260	137.5	24	6	158	38	7	—	—	—	—	—	—

	P71		P80		P90		P100		P112		P132		P160		P180		P200		P225	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
310M R2 (B)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	152	350	182	400	212	450
310M R2 (C)	—	—	—	—	—	—	—	—	—	—	114	300	152	350	152	350	182	400	212	450
310M R3	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—
310M R4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—

H1 SYMBOLS AND UNITS OF MEASURE

Symbols	Units of Measure	Description
V	[cm^3]	Rot. displacement
p	[bar]	Pressure
pA. pB	[bar]	Pressure in A and B connections
Q	[l/min]	Flow rate
ηt		Efficiency
ηmh		Hydraulic-mechanical efficiency

Symbols	Units of Measure	Description
ηv		Volumetric efficiency
n	[min^{-1}]	Angular speed
M	[Nm]	Actual torque onto the motor shaft
cont		General value, for continuous duty
int		General value, intermittent duty

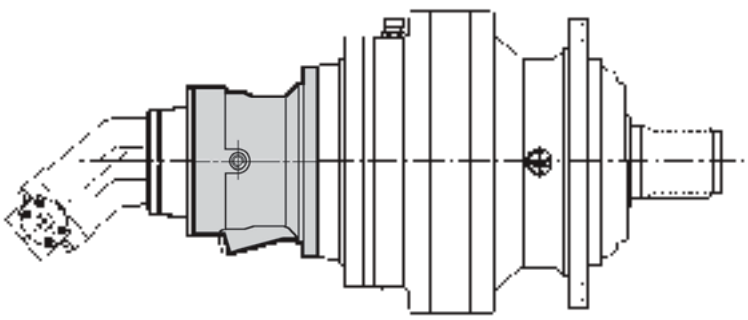
H2 NEGATIVE MULTIDISC BRAKE

DESCRIPTION

TRASMITAL's fail-safe parking brake is an oil immersed multidisc unit on the input side of the gearbox. The brake is operated when there is no hydraulic pressure and is released when the minimum release pressure is applied.
Use of parking brake is necessary whenever the driven system must be kept at standstill even under external forces and/or torques.

Applications:

- winches
- slewing drives
- parking brake on mobile equipment
- general industrial applications



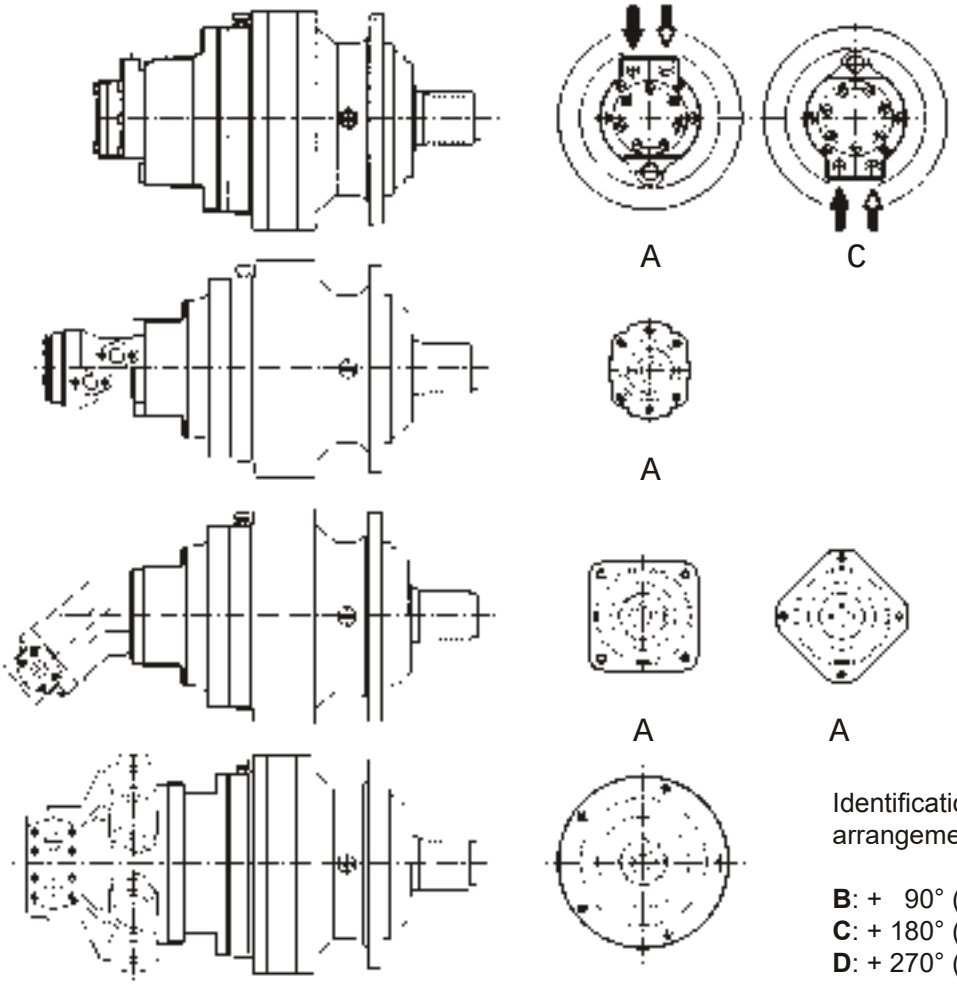
H2.1 Brake technical data

(A 31)

		Type																	
		4.							5.					6.					
		A	B	D	F	H	K	L	B	C	E	G	K	B	C	E	G	K	L
Static braking torque Mb	Nm ±10%	50	100	160	260	330	400	440	400	500	630	800	1000	900	1200	1600	2200	2750	3300
Min. opening pressure	bar	10	20	30	20	25	30	34	20	27	20	26	32	16	21	28	21	27	32
Max. operating pressure	bar	320																	
Oil volume for brake release	cm^3	6.65	6.65	6.65	6.65	6.65	6.65	6.65	13.96	13.96	13.96	13.96	13.96	37.2	37.2	37.2	37.2	37.2	37.2

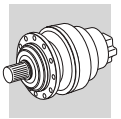
H3 INPUTS FOR HYDRAULIC MOTORS

The available motor adaptors and motor sizes are shown in the following pages.
The standard orientations (A) of the motor flanges are shown in the following scheme, taking into consideration the input side of the gearbox.

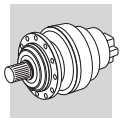


Identification codes of other arrangements:

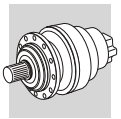
B: + 90° (clockwise)
C: + 180° (clockwise)
D: + 270° (clockwise)



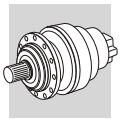
		SAE Standard J744c											
		SAE A 16/32 z9	SAE A ø15,875	SAE B 16/32 z13	SAE B ø22,2	SAE BB 16/32 z15	SAE BB ø25,4	SAE C 12/24 z14	SAE C ø31,7	SAE CC 12/24 z17	SAE C ø38,1	SAE D 8/16 z13	SAE E 8/16 z13
		S5AM	S5AN	S5BA	S5BB	S5BM	S5BN	S5CA	S5CB	S5CP	S5CQ	S5DA	S5EA
	CODE	I											
300	L1-L2-L3-L4	42	42	52	52	52	52	64	64	80	80	81	
	R2-R3-R4	42	42	52	52	52	52	64	64	80	80	81	
301	L1-L2-L3-L4	42	42	52	52	52	52	64	64	80	80	81	
	R2-R3-R4	42	42	52	52	52	52	64	64	80	80	81	
303	L1	42	42	52	52	52	52	64	64	80	80	81	
	L2-L3-L4	42	42	52	52	52	52	64	64	80	80	81	
	R2-R3-R4	42	42	52	52	52	52	64	64	80	80	81	
304	L1	42	42	52	52	52	52	64	64	80	80	81	
	L2-L3-L4	42	42	52	52	52	52	64	64	80	80	81	
	R2-R3-R4	42	42	52	52	52	52	64	64	80	80	81	
305	L1	42	42	52	52	52	52	64	64	80	80	81	
	L2-L3-L4	42	42	52	52	52	52	64	64	80	80	81	
	R2-R3-R4	42	42	52	52	52	52	64	64	80	80	81	
306	L1											101	113
	L2	42	42	52	52	52	52	64	64	80	80	81	
	L3-L4	42	42	52	52	52	52	64	64	80	80	81	
	R2-R3-R4	42	42	52	52	52	52	64	64	80	80	81	
307	L1											101	113
	L2	42	42	52	52	52	52	64	64	80	80	81	
	L3-L4	42	42	52	52	52	52	64	64	80	80	81	
	R2	42	42	52	52	52	52	64	64	80	80	81	
	R3-R4	42	42	52	52	52	52	64	64	80	80	81	
309	L1											101	113
	L2	42	42	52	52	52	52	64	64	80	80	81	
	L3-L4	42	42	52	52	52	52	64	64	80	80	81	
	R2	42	42	52	52	52	52	64	64	80	80	81	
	R3-R4	42	42	52	52	52	52	64	64	80	80	81	
310M	L1											146	158
	L2											101	113
	L3	42	42	52	52	52	52	64	64	80	80	81	
	L4	42	42	52	52	52	52	64	64	80	80	81	
	R2(B)-R2(C)											101	113
	R3-R4	42	42	52	52	52	52	64	64	80	80	81	
311M	L1												
	L2											101	113
	L3	42	42	52	52	52	52	64	64	80	80	81	
	L4	42	42	52	52	52	52	64	64	80	80	81	
	R2(B)-R2(C)											101	113
	R3-R4	42	42	52	52	52	52	64	64	80	80	81	
313M	L1												
	L2											101	113
	L3	42	42	52	52	52	52	64	64	80	80	81	
	L4	42	42	52	52	52	52	64	64	80	80	81	
	R2(B)-R2(C)											101	113
	R3-R4	42	42	52	52	52	52	64	64	80	80	81	
314M	L1												
	L2											146	113
	L3	42	42	52	52	52	52	64	64	80	80	81	
	L4	42	42	52	52	52	52	64	64	80	80	81	
	R3(B)-R3(C)											101	113
	R4	42	42	52	52	52	52	64	64	80	80	81	
315M	L1												
	L2												
	L3											101	113
	L4	42	42	52	52	52	52	64	64	80	80	81	
	R3(B)-R3(C)											101	113
	R4	42	42	52	52	52	52	64	64	80	80	81	
316M	L1												
	L2												
	L3											101	113
	L4	42	42	52	52	52	52	64	64	80	80	81	
	R3(B)-R3(C)											101	113
	R4	42	42	52	52	52	52	64	64	80	80	81	
317M	L1												
	L2												
	L3											101	113
	L4	42	42	52	52	52	52	64	64	80	80	81	
	R3(B)-R3(C)											101	113
	R4	42	42	52	52	52	52	64	64	80	80	81	
318M	L1												
	L2												
	L3												
	L4											101	113
	R4(B)-R4(C)											101	113
319	L1												
	L2												
	L3												
	L4											101	113
	R4(B)-R4(C)											101	113
321	L1												
	L2												
	L3												
	L4											101	113
	R4(B)-R4(C)											101	113



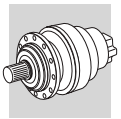
		CALZONI								CHAR-LYNN (EATON)								
		CALZONI MR190 N z8	CALZONI MR300 N z8	CALZONI MRP300 N z8	CALZONI MR450 N z8	CALZONI MR700 N z8	CALZONI MR1100 N z8	CALZONI MR1800 N z10	CALZONI MR2800 N z10	SERIE 2000 SAE A 1" 6B	SERIE 2000 SAE A ø25,4	SERIE 2000 SAE A ø32	SERIE 2000 SAE A 12/24 z14	SERIE 2000 BEARINGLESS 1.2/24 z12	SERIE 4000 SAE B ø31,75	SERIE 4000 SAE C 12/24 z17	SERIE 6000 SAE C ø38,1	SERIE 6000 SAE C 12/24 z17
	CODE	C0AA	C0AD	C0BL	C0AG	C0AL	C0AP	C0AS	C0AV	S5AQ	S5AS	D0AG	D0AH	E2AA	S5BP	S5CP	S5CQ	S5CP
										I								
300	L1-L2-L3-L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2-R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
301	L1-L2-L3-L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2-R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
303	L1	64	78	78						42	42	64	64	52	68	80	80	80
	L2-L3-L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2-R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
304	L1	64	78	78						42	42	64	64	52	68	80	80	80
	L2-L3-L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2-R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
305	L1	64	78	78						42	42	64	64	52	68	80	80	80
	L2-L3-L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2-R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
306	L1				98	102	133											
	L2	64	78	78						42	42	64	64	52	68	80	80	80
	L3-L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2-R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
307	L1				98	102	133											
	L2	64	78	78						42	42	64	64	52	68	80	80	80
	L3-L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2	64	78	78						42	42	64	64	52	68	80	80	80
	R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
309	L1				98	102	133											
	L2	64	78	78						42	42	64	64	52	68	80	80	80
	L3-L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2	64	78	78						42	42	64	64	52	68	80	80	80
	R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
310M	L1				143	147	178											
	L2				98	102	133											
	L3	64	78	78						42	42	64	64	52	68	80	80	80
	L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2(B)-R2(C)				98	102	133											
	R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
311M	L1					130	130	165	200									
	L2				98	102	133											
	L3	64	78	78						42	42	64	64	52	68	80	80	80
	L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2(B)-R2(C)				98	102	133											
	R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
313M	L1					130	130	165	200									
	L2				98	102	133											
	L3	64	78	78						42	42	64	64	52	68	80	80	80
	L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2(B)-R2(C)				98	102	133											
	R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
314M	L1																	
	L2				98	102	133											
	L3	64	78	78						42	42	64	64	52	68	80	80	80
	L4	64	78	78						42	42	64	64	52	68	80	80	80
	R3(B)-R3(C)				98	102	133											
	R4	64	78	78						42	42	64	64	52	68	80	80	80
315M	L1																	
	L2					130	130	165	200									
	L3				98	102	133											
	L4	64	78	78						42	42	64	64	52	68	80	80	80
	R3(B)-R3(C)				98	102	133											
	R4	64	78	78						42	42	64	64	52	68	80	80	80
316M	L1																	
	L2					130	130	165	200									
	L3				98	102	133											
	L4	64	78	78						42	42	64	64	52	68	80	80	80
	R3(B)-R3(C)				98	102	133											
	R4	64	78	78						42	42	64	64	52	68	80	80	80
317M	L1																	
	L2					130	130	165	200									
	L3				98	102	133											
	L4	64	78	78						42	42	64	64	52	68	80	80	80
	R3(B)-R3(C)				98	102	133											
	R4	64	78	78						42	42	64	64	52	68	80	80	80
318M	L1																	
	L2																	
	L3					130	130	165	200									
	L4				98	102	133											
	R4(B)-R4(C)				98	102	133											
319	L1																	
	L2																	
	L3					130	130	165	200									
	L4				98	102	133											
	R4(B)-R4(C)				98	102	133											
321	L1																	
	L2																	
	L3					130	130	165	200									
	L4				98	102	133											
	R4(B)-R4(C)				98	102	133											



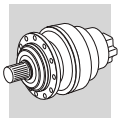
		SAUER DANFOSS (orbit)									DENISON Hydraulics							
		OMP-OMR 50/315 ø25	OMP-OMR 50/315 SAE 1" 6B	OMS 80/315 ø32	OMS 80/315 12/24 z14	OMSS 80/315 12/24 z12	OMT 160/400 ø40	OMT 160/400 12/24 z17	OMTS 160/400 12/24 z16	OMVS 315/800 10/20 z16	M6-M7-M8 *3** 12/24 z14	M11-M14 *3** 8/16 z13	M3 B 16/32 z9	M4C-M4SC 16/32 z13	M4D-M4SD 12/24 z14	M4DC-M4S DC 12/24 z14	M4E-M4SE 12/24 z14	M5BS 16/32 z13
	CODE	S5AP	S5AQ	D0AG	D0AH	D0AL	D0AM	D0AN	D0AQ	D0AU	S5CA	S5EA	S5AM	S5BA	S5CA	S5CA	S5CA	S5BA
										I								
300	L1-L2-L3-L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2-R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
301	L1-L2-L3-L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2-R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
303	L1	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L2-L3-L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2-R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
304	L1	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L2-L3-L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2-R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
305	L1	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L2-L3-L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2-R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
306	L1									70		113						
	L2	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L3-L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2-R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
307	L1									70		113						
	L2	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L3-L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
309	L1									70		113						
	L2	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L3-L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
310M	L1									115		158						
	L2									70		113						
	L3	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2(B)-R2(C)									70		113						
	R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
311M	L1																	
	L2									70		113						
	L3	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2(B)-R2(C)									70		113						
	R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
313M	L1																	
	L2									70		113						
	L3	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2(B)-R2(C)									70		113						
	R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
314M	L1																	
	L2									70		113						
	L3	42	42	64	64	37		112	57		64		42	52	64	64	64	52
	L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R3(B)-R3(C)									70		113						
	R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
315M	L1																	
	L2																	
	L3									70		113						
	L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R3(B)-R3(C)									70		113						
	R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
316M	L1																	
	L2																	
	L3									70		113						
	L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R3(B)-R3(C)									70		113						
	R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
317M	L1																	
	L2																	
	L3									70		113						
	L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R3(B)-R3(C)									70		113						
	R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
318M	L1																	
	L2																	
	L3																	
	L4									70		113						
	R4(B)-R4(C)									70		113						
319	L1																	
	L2																	
	L3																	
	L4									70		113						
	R4(B)-R4(C)									70		113						
321	L1																	
	L2																	
	L3																	
	L4									70		113						
	R4(B)-R4(C)									70		113						



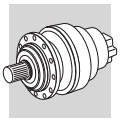
		LINDE							
		MMF 43 16/32 z15	MMF 63 12/24 z14	HMF 28-35-02 16/32 z15	HMF 50-02 16/32 z21	HMF-HMV 75-02 16/32 z21	HMF-HMV 105-02 16/32 z23	HMF-HMV 135-02 16/32 z27	BMF-BMV 186 50x2 Z24
		S5BM	S5CA	S5BM	S5CE	S5CE	S5CD	S5DC	I5AF
	CODE	I							
300	L1-L2-L3-L4	52	64	52	64	64	64	81	
	R2-R3-R4	52	64	52	64	64	64	81	
301	L1-L2-L3-L4	52	64	52	64	64	64	81	
	R2-R3-R4	52	64	52	64	64	64	81	
303	L1	52	64	52	64	64	64	81	
	L2-L3-L4	52	64	52	64	64	64	81	
	R2-R3-R4	52	64	52	64	64	64	81	
304	L1	52	64	52	64	64	64	81	
	L2-L3-L4	52	64	52	64	64	64	81	
	R2-R3-R4	52	64	52	64	64	64	81	
305	L1	52	64	52	64	64	64	81	
	L2-L3-L4	52	64	52	64	64	64	81	
	R2-R3-R4	52	64	52	64	64	64	81	
306	L1							101	121
	L2	52	64	52	64	64	64	81	
	L3-L4	52	64	52	64	64	64	81	
	R2-R3-R4	52	64	52	64	64	64	81	
307	L1							101	121
	L2	52	64	52	64	64	64	81	
	L3-L4	52	64	52	64	64	64	81	
	R2	52	64	52	64	64	64	81	
	R3-R4	52	64	52	64	64	64	81	
309	L1							101	121
	L2	52	64	52	64	64	64	81	
	L3-L4	52	64	52	64	64	64	81	
	R2	52	64	52	64	64	64	81	
	R3-R4	52	64	52	64	64	64	81	
310M	L1							146	166
	L2							101	121
	L3	52	64	52	64	64	64	81	
	L4	52	64	52	64	64	64	81	
	R2(B)-R2(C)							101	121
	R3-R4	52	64	52	64	64	64	81	
311M	L1								
	L2							101	121
	L3	52	64	52	64	64	64	81	
	L4	52	64	52	64	64	64	81	
	R2(B)-R2(C)							101	121
	R3-R4	52	64	52	64	64	64	81	
313M	L1								
	L2							101	121
	L3	52	64	52	64	64	64	81	
	L4	52	64	52	64	64	64	81	
	R2(B)-R2(C)							101	121
	R3-R4	52	64	52	64	64	64	81	
314M	L1								
	L2							101	121
	L3	52	64	52	64	64	64	81	
	L4	52	64	52	64	64	64	81	
	R3(B)-R3(C)							101	121
	R4	52	64	52	64	64	64	81	
315M	L1								
	L2								
	L3							101	121
	L4	52	64	52	64	64	64	81	
	R3(B)-R3(C)							101	121
	R4	52	64	52	64	64	64	81	
316M	L1								
	L2								
	L3							101	121
	L4	52	64	52	64	64	64	81	
	R3(B)-R3(C)							101	121
	R4	52	64	52	64	64	64	81	
317M	L1								
	L2								
	L3							101	121
	L4	52	64	52	64	64	64	81	
	R3(B)-R3(C)							101	121
	R4	52	64	52	64	64	64	81	
318M	L1								
	L2								
	L3								
	L4							101	121
	R4(B)-R4(C)							101	121
319	L1								
	L2								
	L3								
	L4							101	121
	R4(B)-R4(C)							101	121
321	L1								
	L2								
	L3								
	L4							101	121
	R4(B)-R4(C)							101	121



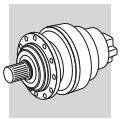
		BRUENINGHAUS HYDROMATIK (BOSCH REXROTH)															
		A2FM10-12-16 25x1.25 z18	A2FM23-28-32 A6VM 28 30x2 z14	A2FM23-28 ø25	A2FM45 32x2 z14	A2FM45-56 30x2 z14	A2FM56-63 A6VM55 35x2 z16	A2FM80-90 A6VM80 40x2 z18	A2FM80 35x2 z16	A2FM107-125 A6VM107 45x2 z21	A2FM107 A6VM107 40x2 z18	A2FM160-180 A6VM160 50x2 z24	A2FM160 A6VM160 45x2 z21	A2FM200 A6VM200 50x2 z24	A6VM250 50x2 z24	A2FM250 50x2 z24	A10FM45.30W A10VM63 16/32 z15
	CODE	H0AA	H0AE	H0AH	H0AI	H0BA	H0BC	H0BG	H0BI	H0CA	H0CC	H0CE	H0CG	H0CI	H0DA	H0DE	S5BM
		I															
300	L1-L2-L3-L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2-R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
301	L1-L2-L3-L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2-R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
303	L1	42	52	52	64	64	64	75	75	101	101		101				52
	L2-L3-L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2-R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
304	L1	42	52	52	64	64	64	75	75	101	101		101				52
	L2-L3-L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2-R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
305	L1	42	52	52	64	64	64	75	75	101	101		101				52
	L2-L3-L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2-R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
306	L1											101	101	101	113	113	
	L2	42	52	52	64	64	64	75	75	101	101		101				52
	L3-L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2-R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
307	L1											101	101	101	113	113	
	L2	42	52	52	64	64	64	75	75	101	101		101				52
	L3-L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2	42	52	52	64	64	64	75	75	101	101		101				52
	R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
309	L1											101	101	101	113	113	
	L2	42	52	52	64	64	64	75	75	101	101		101				52
	L3-L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2	42	52	52	64	64	64	75	75	101	101		101				52
	R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
310M	L1											146	146	146	158	158	
	L2											101	101	101	113	113	
	L3	42	52	52	64	64	64	75	75	101	101		101				52
	L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2(B)-R2(C)											101	101	101	113	113	
	R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
311M	L1																
	L2											101	101	101	113	113	
	L3	42	52	52	64	64	64	75	75	101	101		101				52
	L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2(B)-R2(C)											101	101	101	113	113	
	R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
313M	L1																
	L2											101	101	101	113	113	
	L3	42	52	52	64	64	64	75	75	101	101		101				52
	L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2(B)-R2(C)											101	101	101	113	113	
	R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
314M	L1																
	L2											101	101	101	113	113	
	L3	42	52	52	64	64	64	75	75	101	101		101		113		52
	L4	42	52	52	64	64	64	75	75	101	101		101				52
	R3(B)-R3(C)											101	101	101	113	113	
	R4	42	52	52	64	64	64	75	75	101	101		101				52
315M	L1																
	L2																
	L3											101	101	101	113	113	
	L4	42	52	52	64	64	64	75	75	101	101		101				52
	R3(B)-R3(C)											101	101	101	113	113	
	R4	42	52	52	64	64	64	75	75	101	101		101				52
316M	L1																
	L2																
	L3											101	101	101	113	113	
	L4	42	52	52	64	64	64	75	75	101	101		101				52
	R3(B)-R3(C)											101	101	101	113	113	
	R4	42	52	52	64	64	64	75	75	101	101		101				52
317M	L1																
	L2																
	L3											101	101	101	113	113	
	L4	42	52	52	64	64	64	75	75	101	101		101				52
	R3(B)-R3(C)											101	101	101	113	113	
	R4	42	52	52	64	64	64	75	75	101	101		101				52
318M	L1																
	L2																
	L3																
	L4											101	101	101	113	113	
	R4(B)-R4(C)											101	101	101	113	113	
319	L1																
	L2																
	L3																
	L4											101	101	101	113	113	
	R4(B)-R4(C)											101	101	101	113	113	
321	L1																
	L2																
	L3																
	L4											101	101	101	113	113	
	R4(B)-R4(C)											101	101	101	113	113	



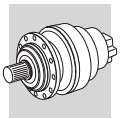
		SAI							KAWASAKI STAFFA		
		GM05 UNI 8953	GM1 UNI 8953	GM1/P1/S1 35x2 z16	GM2 UNI 8953	GM3 UNI 8953	GM4/GM5 UNI 8953	SAI L7 (9) N80x3 z25	B030 z17	B045 z17	HM (HD)B150 HM (HD)B200 5/10 z16
		S2BA	S2AB	S2CE	S2AF	S2DN	S2BF	S2BH	S1AB	S1AC	S1AL
	CODE	I									
300	L1-L2-L3-L4	73	37	57							
	R2-R3-R4	73	37	57							
301	L1-L2-L3-L4	73	37	57							
	R2-R3-R4	73	37	57							
303	L1	73	37	57							
	L2-L3-L4	73	37	57							
	R2-R3-R4	73	37	57							
304	L1	73	37	57							
	L2-L3-L4	73	37	57							
	R2-R3-R4	73	37	57							
305	L1	73	37	57							
	L2-L3-L4	73	37	57							
	R2-R3-R4	73	37	57							
306	L1		74		98	98	105		135	140	
	L2	73	37	57							
	L3-L4	73	37	57							
	R2-R3-R4	73	37	57							
307	L1		74		98	98	105		135	140	
	L2	73	37	57							
	L3-L4	73	37	57							
	R2	73	37	57							
	R3-R4	73	37	57							
309	L1		74		98	98	105		135	140	
	L2	73	37	57							
	L3-L4	73	37	57							
	R2	73	37	57							
	R3-R4	73	37	57							
310M	L1		119		143	143	150		180	185	
	L2		74		98	98	105		135	140	
	L3	73	37	57							
	L4	73	37	57							
	R2(B)-R2(C)		74		98	98	105		135	140	
	R3-R4	73	37	57							
311M	L1				135		150	90			187
	L2		74		98	98	105		135	140	
	L3	73	37	57							
	L4	73	37	57							
	R2(B)-R2(C)		74		98	98	105		135	140	
	R3-R4	73	37	57							
313M	L1				135		150	90			187
	L2		74		98	98	105		135	140	
	L3	73	37	57							
	L4	73	37	57							
	R2(B)-R2(C)		74		98	98	105		135	140	
	R3-R4	73	37	57							
314M	L1										
	L2		74		98	98	105		135	140	
	L3	73	37	57							
	L4	73	37	57							
	R3(B)-R3(C)		74		98	98	105		135	140	
	R4	73	37	57							
315M	L1										
	L2				135		150	90			187
	L3		74		98	98	105		135	140	
	L4	73	37	57							
	R3(B)-R3(C)		74		98	98	105		135	140	
	R4	73	37	57							
316M	L1										
	L2				135		150	90			187
	L3		74		98	98	105		135	140	
	L4	73	37	57							
	R3(B)-R3(C)		74		98	98	105		135	140	
	R4	73	37	57							
317M	L1										
	L2				135		150	90			187
	L3		74		98	98	105		135	140	
	L4	73	37	57							
	R3(B)-R3(C)		74		98	98	105		135	140	
	R4	73	37	57							
318M	L1										
	L2										
	L3				135		150	90			187
	L4		74		98	98	105		135	140	
	R4(B)-R4(C)		74		98	98	105		135	140	
319	L1										
	L2										
	L3				135		150	90			187
	L4		74		98	98	105		135	140	
	R4(B)-R4(C)		74		98	98	105		135	140	
321	L1										
	L2										
	L3				135		150	90			187
	L4		74		98	98	105		135	140	
	R4(B)-R4(C)		74		98	98	105		135	140	



		SAUER DANFOSS (piston)														
		OMF-SMF-OMV -SMV 1-038 16/32 z13	SMF 2/033-052-070 16/32 z21	SMF 2/089 16/32 z23	SMF 2/119 16/32 z27	SMF 2/166-227 16/32 z27	SMF 4/023 90M042 16/32 z13	SMF 4/046 90M042 16/32 z15	90 M055 16/32 z21	90 M075-M100 16/32 z23	90 M130 16/32 z27	51 V 060 12/24 z14	51 V 080 12/24 z14	51 V 110 8/16 z13	51 V 160 8/16 z13	51 V 250 8/16 z15
	CODE	S5BA	S5CE	S5CD	S5DC	S5EC	S5BA	S5BM	S5CE	S5CD	S5DC	S5CA	S5CA	S5DA	S5DA	S5ED
									I							
300	L1-L2-L3-L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2-R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
301	L1-L2-L3-L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2-R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
303	L1	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L2-L3-L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2-R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
304	L1	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L2-L3-L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2-R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
305	L1	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L2-L3-L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2-R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
306	L1				101	113					101			101	101	113
	L2	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L3-L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2-R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
307	L1				101	113					101			101	101	113
	L2	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L3-L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
309	L1				101	113					101			101	101	113
	L2	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L3-L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
310M	L1				146	158					146			146	146	158
	L2				101	113					101			101	101	113
	L3	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2(B)-R2(C)				101	113					101			101	101	113
	R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
311M	L1															
	L2				101	113					101			101	101	113
	L3	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2(B)-R2(C)				101	113					101			101	101	113
	R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
313M	L1															
	L2				101	113					101			101	101	113
	L3	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2(B)-R2(C)				101	113					101			101	101	113
	R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
314M	L1															
	L2				101	113					101			101	101	113
	L3	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R3(B)-R3(C)				101	113					101			101	101	113
	R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
315M	L1															
	L2															
	L3				101	113					101			101	101	113
	L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R3(B)-R3(C)				101	113					101			101	101	113
	R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
316M	L1															
	L2															
	L3				101	113					101			101	101	113
	L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R3(B)-R3(C)				101	113					101			101	101	113
	R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
317M	L1															
	L2															
	L3				101	113					101			101	101	113
	L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R3(B)-R3(C)				101	113					101			101	101	113
	R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
318M	L1															
	L2															
	L3															
	L4				101	113					101			101	101	113
	R4(B)-R4(C)				101	113					101			101	101	113
319	L1															
	L2															
	L3															
	L4				101	113					101			101	101	113
	R4(B)-R4(C)				101	113					101			101	101	113
321	L1															
	L2															
	L3															
	L4				101	113					101			101	101	113
	R4(B)-R4(C)				101	113					101			101	101	113



		TRW-TORQMOTOR (PARKER)					VICKERS (EATON)				WHITE				
		MAG 04-32 SAE 1" 6B	MAF 06-40 SAE 1" 6B	MAB 06-32 SAE 1" 6B	MAB 06-32 SAE A ø25	MAE 10-68 SAE 1" 6B	MFE 19 16/32 z15	25M**A11 16/32 z13	35-45 M**A11 12/24 z14	50 M**A11 8/16 z13	HS 02-15 SAE A ø25	HS 02-15 SAE A 1" 6B	RS 08-24 SAE A ø25	RS 08-24 SAE A 1" 6B	REO 06-45 SAE A 1" 6B
		S5AQ	S5AQ	S5AQ	S5AP	S5AQ	S5BM	S5BA	S5CA	S5DA	S5AP	S5AQ	S5AP	S5AQ	S5AP
	CODE	I													
300	L1-L2-L3-L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2-R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
301	L1-L2-L3-L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2-R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
303	L1	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	L2-L3-L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2-R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
304	L1	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	L2-L3-L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2-R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
305	L1	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	L2-L3-L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2-R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
306	L1									101					
	L2	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	L3-L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2-R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
307	L1									101					
	L2	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	L3-L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
309	L1									101					
	L2	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	L3-L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
310M	L1									146					
	L2									101					
	L3	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2(B)-R2(C)									101					
	R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
311M	L1														
	L2									101					
	L3	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2(B)-R2(C)									101					
	R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
313M	L1														
	L2									101					
	L3	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2(B)-R2(C)									101					
	R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
314M	L1														
	L2									101					
	L3	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R3(B)-R3(C)									101					
	R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
315M	L1														
	L2														
	L3									101					
	L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R3(B)-R3(C)									101					
	R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
316M	L1														
	L2														
	L3									101					
	L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R3(B)-R3(C)									101					
	R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
317M	L1														
	L2														
	L3									101					
	L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R3(B)-R3(C)									101					
	R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
318M	L1														
	L2														
	L3														
	L4									101					
	R4(B)-R4(C)									101					
319	L1														
	L2														
	L3														
	L4									101					
	R4(B)-R4(C)									101					
321	L1														
	L2														
	L3														
	L4									101					
	R4(B)-R4(C)									101					

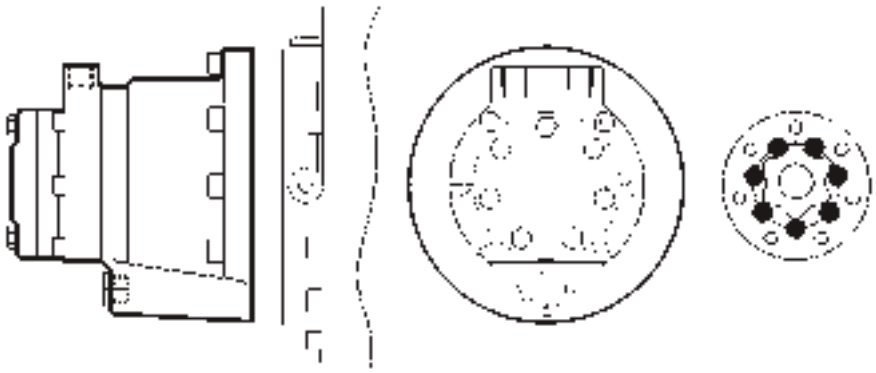


		VOAC (PARKER)																		
		F11-5 CK ø18	F11-10 CK ø20	F11-19 CK ø25	F11-19 CD 25x1.25 z18	F12-30 MF*I*D 30x2 z14	F12-40 MF*I*D 32x2 z14	F12-60 MF*I*D 35x2 z16	F12-80 MF*I*D 40x2 z18	F12-110 MF*I*D 45x2 z21	F11-150/250 S+S	8/16 z13 V12 060 I*D	35x2 z16 V12 060 S*S	12/24 z14 V12 080 N*D	40x2 z18 V12 080 S*S	12/24 z14 V12 110 I*D	45x2 z21	V12 110 S*S 8/16 z13	V12 160 S*S 8/16 z13	V12 160 N*C 45x2 z21
		V0AA	V0AC	V0AE	V0AG	H0AE	H0AI	H0BC	H0BG	H0CA	S5DA	H0BC	S5CA	H0BG	S5CA	H0CA		S5DA	S5DA	H0CG
	CODE										I									
300	L1-L2-L3-L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2-R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
301	L1-L2-L3-L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2-R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
303	L1	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L2-L3-L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2-R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
304	L1	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L2-L3-L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2-R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
305	L1	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L2-L3-L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2-R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
306	L1										101							101	101	
	L2	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L3-L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2-R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
307	L1										101							101	101	
	L2	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L3-L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
309	L1										101							101	101	
	L2	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L3-L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
310M	L1										146							146	146	
	L2										101							101	101	
	L3	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2(B)-R2(C)										101							101	101	
	R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
311M	L1																			
	L2										101							101	101	
	L3	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2(B)-R2(C)										101							101	101	
	R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
313M	L1																			
	L2										101							101	101	
	L3	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2(B)-R2(C)										101							101	101	
	R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
314M	L1																			
	L2										101							101	101	
	L3	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R3(B)-R3(C)										101							101	101	
	R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
315M	L1																			
	L2																			
	L3										101							101	101	
	L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R3(B)-R3(C)										101							101	101	
	R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
316M	L1																			
	L2																			
	L3										101							101	101	
	L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R3(B)-R3(C)										101							101	101	
	R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
317M	L1																			
	L2																			
	L3										101							101	101	
	L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R3(B)-R3(C)										101							101	101	
	R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
318M	L1																			
	L2																			
	L3																			
	L4										101							101	101	
	R4(B)-R4(C)										101							101	101	
319	L1																			
	L2																			
	L3																			
	L4										101							101	101	
	R4(B)-R4(C)										101							101	101	
321	L1																			
	L2																			
	L3																			
	L4										101							101	101	
	R4(B)-R4(C)										101							101	101	

H4 HYDRAULIC MOTORS

GENERAL FEATURES

Gearboxes belonging to the series 300M can be supplied complete with MG hydraulic motors manufactured by BONFIGLIOLI TRASMITAL. These motors were designed to provide compact and energy efficient gearmotors.
Before ordering, you should consult with the Technical Service Bonfiglioli.



H4.1 MG hydraulic motors

Design characteristics:

- Orbit system with GEROLER® rollers between rotor and stator
- Distributor on output shaft
- Displacements from 50 to 250 cm^3
- Max. pressure 175 bar
- Max. flow rate 48 lt/min
- High efficiency
- Hydraulic brake can be included in the motor overall dimensions
- Inner brake directly controlled by the motor with no valves or outer circuits required.

H5 TECHNICAL FEATURES

H5.1 Displacement V [cm^3]

Geometrical volume produced as a result of each motor rotation corresponding to the theoretical volume of hydraulic oil necessary for a rotation of the driving shaft

H5.2 Pressure p [bar]

Hydraulic pressure applied to the motor when running.

H5.3 Flow rate Q [l / min]

Hydraulic oil flow through the motor when running.

H5.4 Efficiency η_t

Total efficiency of the hydraulic motor given by:

$$\eta_t = \eta mh \times \eta v \quad (38)$$

H5.5 Mechanical-hydraulic efficiency ηmh

This is the ratio of actual torque to theoretical torque at the driving shaft. Value depending on inner losses due to mechanical friction as well as hydraulic fluid pressure losses, calculated as follows:

$$\eta mh = \frac{2\pi \times 10 \times M}{(pA - pB) \times V} \quad (39)$$

H5.6 Hydraulic efficiency ηv

This is the ratio of motor actual speed to motor theoretical speed. Value depending on the motor inner blow-by between high and low pressure volumes. This value is given by the following formula:

$$\eta v = \frac{n \times V}{Q \times 1000} \quad (40)$$

H5.7 Angular speed n [min-1]

Hydraulic motor rotation speed. Value resulting from the following formula:

$$n = \frac{Q \times 1000}{V} \times \eta v \quad (41)$$

H5.8 Torque M [Nm]

Actual torque transmitted by the hydraulic motor. Value given by the following formula:

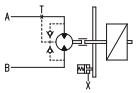
$$M = \frac{(p\,A - p\,B) \times V}{2\pi \times 10} \times \eta mh \quad (42)$$

H6 DESIGNATION

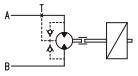
MG 050 _R P010

PORTS

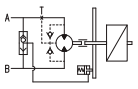
P010 = oil ports on motor housing direct — with brake



without brake



B02P = oil ports with valve brake pilot — with brake



CONSTRUCTIVE SERIES

DISPLACEMENT

050	51.60	cm³	**160**	159.60	cm³
080	80.30	cm³	**200**	199.80	cm³
100	99.80	cm³	**250**	249.30	cm³
125	125.70	cm³			

ORBIT MOTOR TYPE MG

H7 DISPLACEMENT SELECTION

Displacement V of the hydraulic motor should be selected together with the gearbox.

Once the output torque and speed n_2 for the gearbox M_{r2} is known, proceed as follows:

Define the control pressure value pA-pB ≤ 175 bar for the motor.

Calculate the gearbox displacement value called Veq with the following formula:

$$Veq = \frac{2\pi \times 10 \times M_{r2}}{(pA - pB) \times \eta mh \times \eta d} \ [cm^3] \quad (43)$$

where ηmh, for example, is equal to 0.85;
η_d: gearbox dynamic efficiency, consider 0.94.

Calculate the value for flow rate Q, necessary for feeding the hydraulic motor, with the following formula:

$$Q = \frac{n_2 \times Veq}{1000 \times \eta v} \ [l/min] \quad (44)$$

where ηv, for example, is equal to 0.90.

− Select the gearbox size with M_{r2} and n_2.

− Look up the diagram (A23) for the gearmotor with equivalent displacement value Veq and select:
- a motor that fulfils the p int. and Q requirements and at the same time.
- the indicative value of reduction ratio i. Please consider that ratio should be obtained with as few reduction stages as possible, to save on gearmotor costs and contain dimensions.

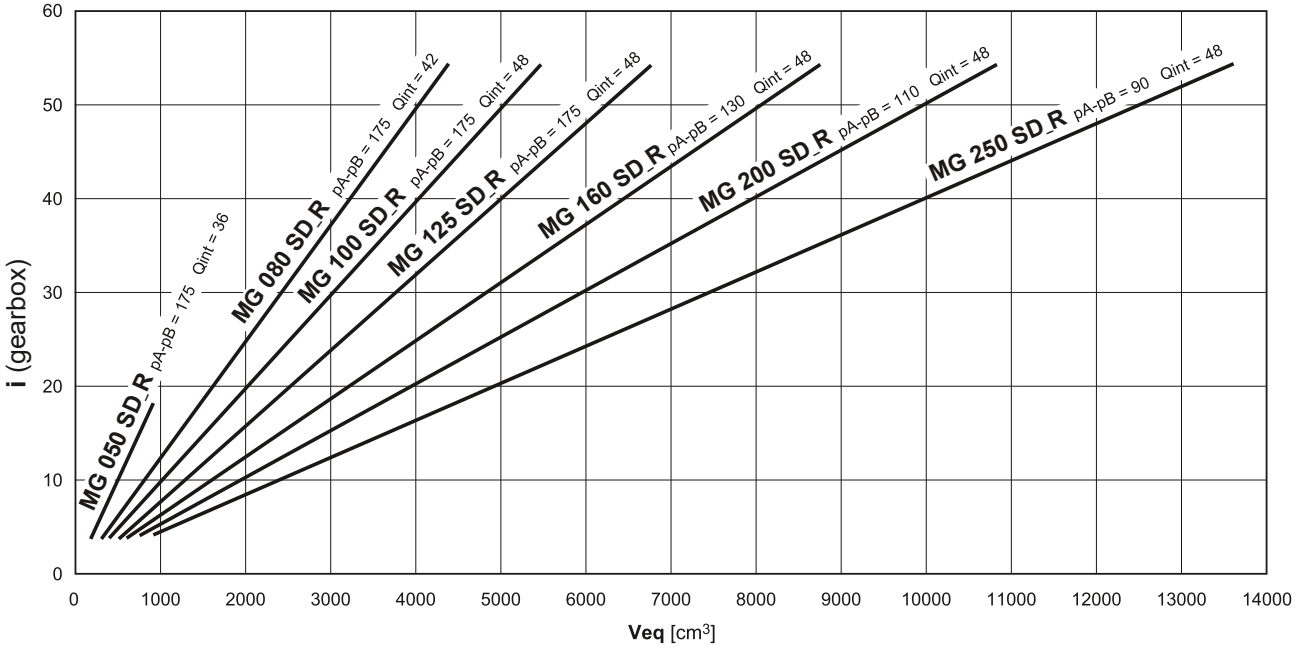
Once you have determined the value of M_2 and the indicative value of i, select the gearbox and check your selection as indicated in chapt. 14.5.

H8 CHECKING

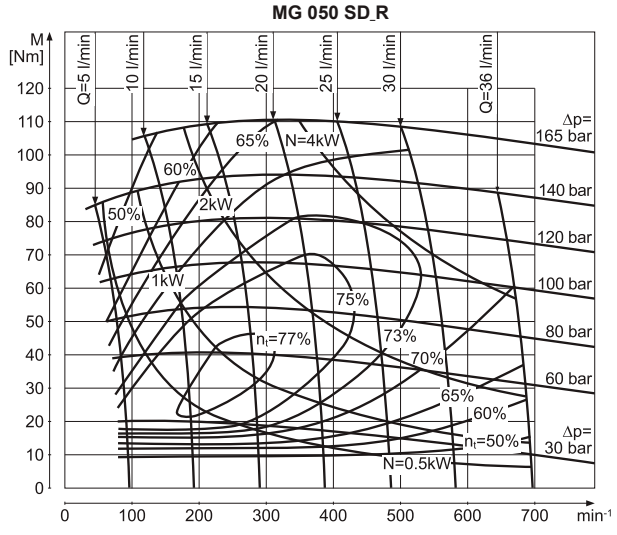
Check that pressure, efficiency and flow rate values correspond with values indicated in Table (A33 and A34) on motor technical features.

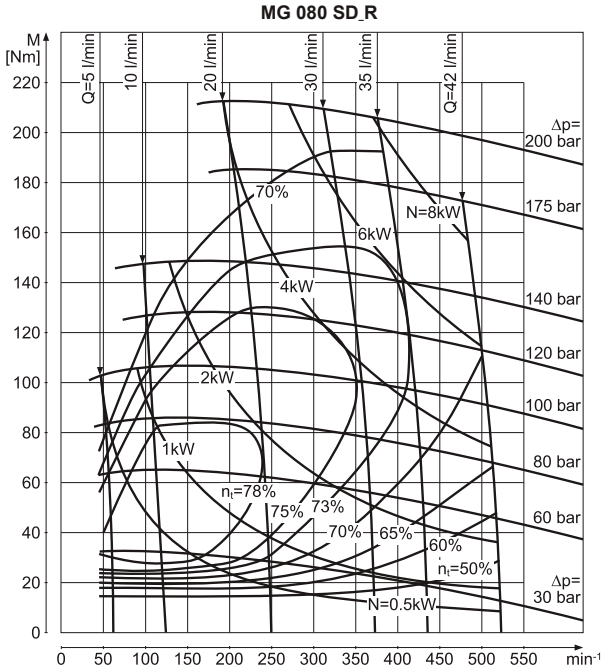
H9 TECHNICAL DATA MG MOTORS

(A 32)



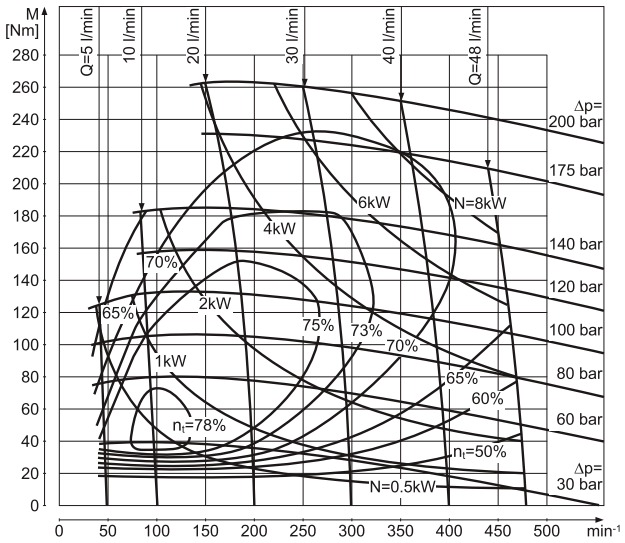
(A 33)



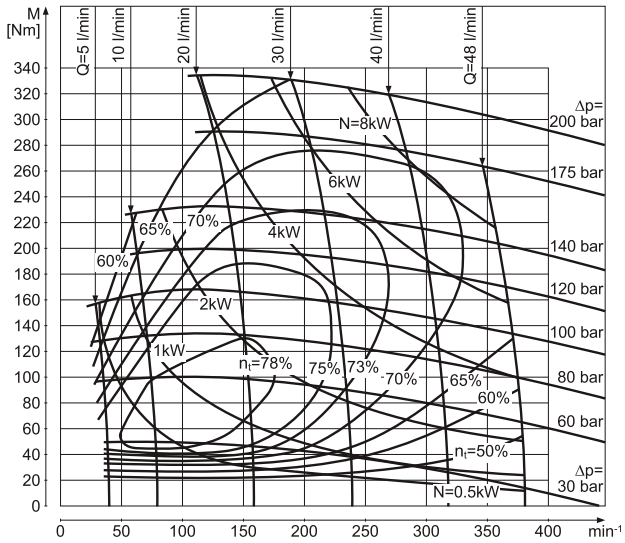


(A 34)

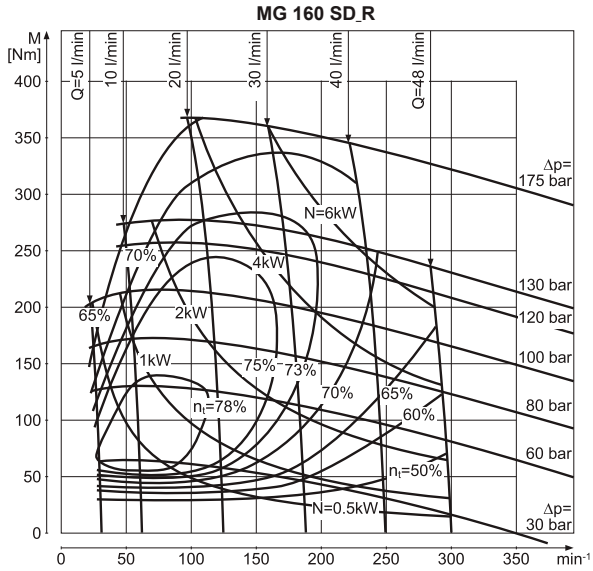
MG 100 SD_R



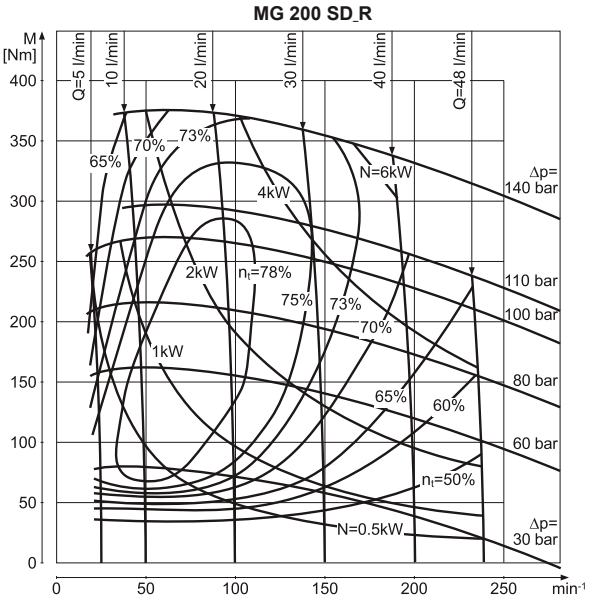
MG 125 SD_R



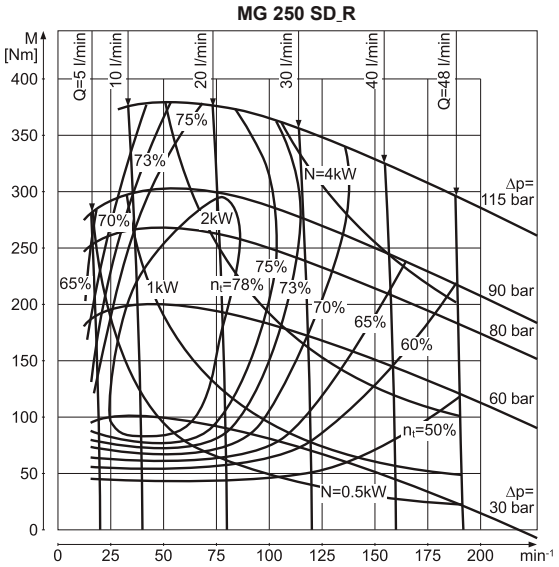
MG 160 SD_R



MG 200 SD_R

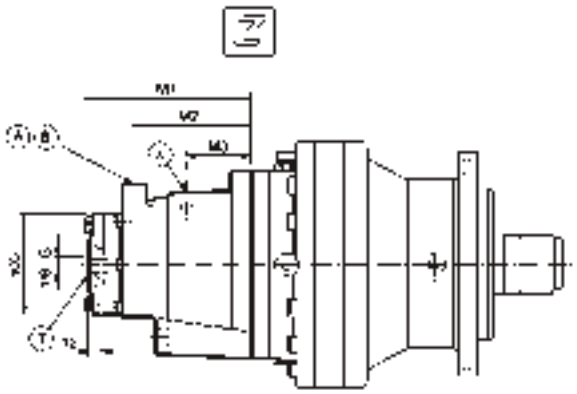


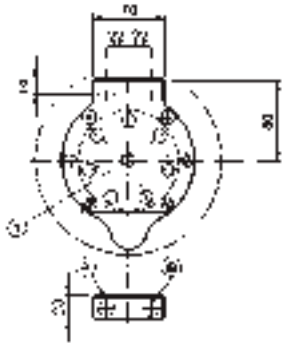
MG 250 SD_R

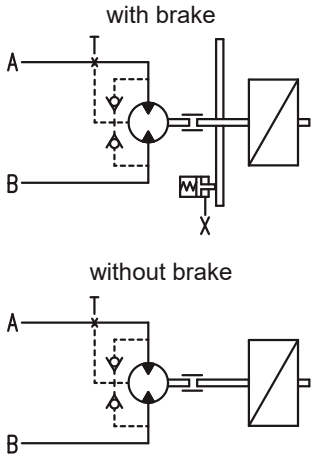


H10 DIMENSIONS MG MOTORS

MG- P010



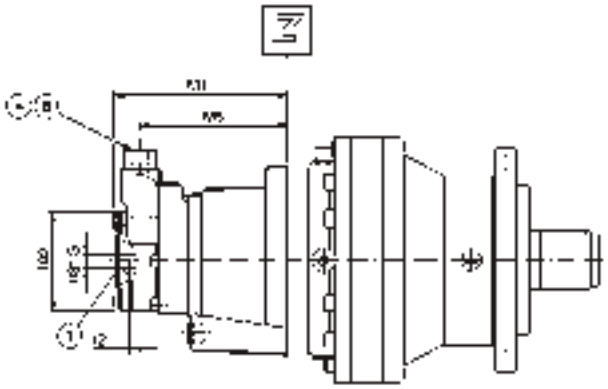


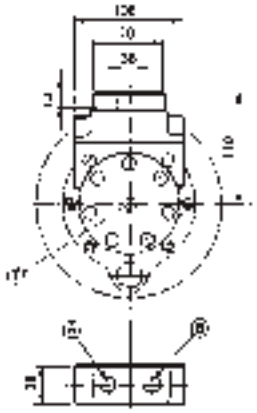


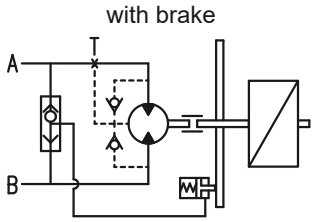
PORTS

A - B = 3/8" G 19TPI
T = 1/8" G 28TPI
X = 1/4 G 19TPI

MG- B02P







(A 35)

Suitable gearbox	Motor							Execution		
	MG 050	**MG 080**	**MG 100**	**MG 125**	**MG 160**	**MG 200**	**MG 250**	**P010**		**B02P**
	M1							M2	M3	M5
300 L1 - L2 - R2	162	167	171	175	181			113	60	143
301 L1 - L2 - R2	162	167	171	175	181	188	197	113	60	143
303 L1					203	210	219	135	77	165
303 L2 - R2	162	167	171	175	181	188	197	113	60	143
304 L1				197	203	210	219	135	77	165
304 L2 - R2	162	167	171	175	181	188	197	113	60	143
305 L1					203	210	219	135	77	165
305 L2 - R2	162	167	171	175	181	188	197	113	60	143
306 L2					203	210	219	135	77	165
306 R2 - R3	162	167	171	175	181	188	197	113	60	143
307 L2					203	210	219	135	77	165
307 R2 - R3	162	167	171	175	181	188	197	113	60	143

H11 TECHNICAL DATABRAKES FOR MG MOTORS

(A 36)

		Brake TYPE 3				Brake TYPE 4			
		3E	**3I**	**3L**	**3N**	**4K**	**4N**	**4R**	**4U**
Brake torque Mf	Nm]	120	200	280	350	260	320	430	620
Min. opening pressure	[bar]	16	28	28	35	25	30	24	34
Max. operating pressure	[bar]	200							
Oil volume for brake release	[cc]	6.43	6.43	6.43	6.43	6.65	6.65	6.65	6.65

(A 37)

Suitable gearbox	Motor													
	MG 050		**MG 080**		**MG 100**		**MG 125**		**MG 160**		**MG 200**		**MG 250**	
	Mf [Nm]		Mf [Nm]		Mf [Nm]		Mf [Nm]		Mf [Nm]		Mf [Nm]		Mf [Nm]	
300 L1 - L2	120	**3E**	200	**3I**	280	**3L**	350	**3N**	350	**3N**				
300 R2	120	**3E**	200	**3I**	280	**3L**								
301 L1 - L2			200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**	350	**3N**
301 R2	120	**3E**	200	**3I**	280	**3L**	350	**3N**	350	**3N**				
303 L1									430	**4R**	430	**4R**	430	**4R**
303 L2	120	**3E**	200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**		
303 R2	120	**3E**	200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**		
304 L1							350	**3N**	430	**4R**	430	**4R**	430	**4R**
304 L2	120	**3E**	200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**		
304 R2	120	**3E**	200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**		
305 L1									430	**4R**	430	**4R**	430	**4R**
305 L2	120	**3E**	200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**		
305 R2	120	**3E**	200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**		
306 L2			260	**4K**	260	**4K**	430	**4R**	430	**4R**	430	**4R**	430	**4R**
306 R2 - R3			200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**		
307 L2					260	**4K**	430	**4R**	430	**4R**	430	**4R**	430	**4R**
307 R2 - R3			200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**	350	**3N**

H12 INSTALLATION

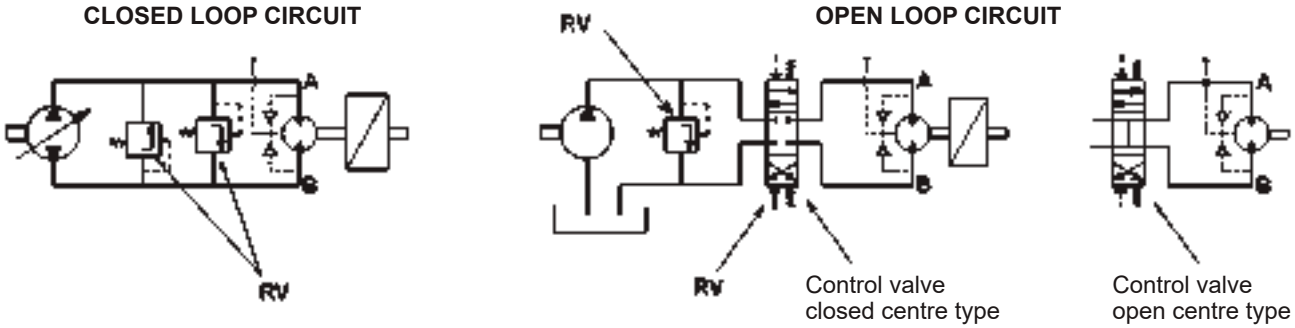
Further to standards on gearbox installation, refer to chapter 15, comply with the following hydraulic motor installation instructions.

a) Connection to the hydraulic circuit

Motors can be connected either to closed or open circuits.
In case of an open circuit, solenoid valve or control distributor can be of the closed or open center type.

The hydraulic motor delivery side should always have a max. pressure valve set to a value not exceeding the p_{int} value allowed for the hydraulic motor. See hydraulic diagrams (A29).

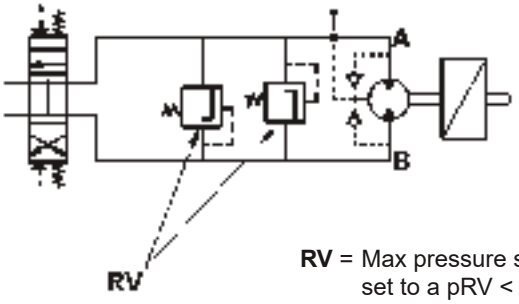
(A 38)



RV = Max pressure valve set to a pRV < pmax

If not possible, because the circuits control other devices needing a higher pressure and/or a closed center control valve is fitted and the motor controls parts with a high moment of inertia, max. pressure secondary valves should be as close as possible to the motor. See diagram (A39).

(A 39)

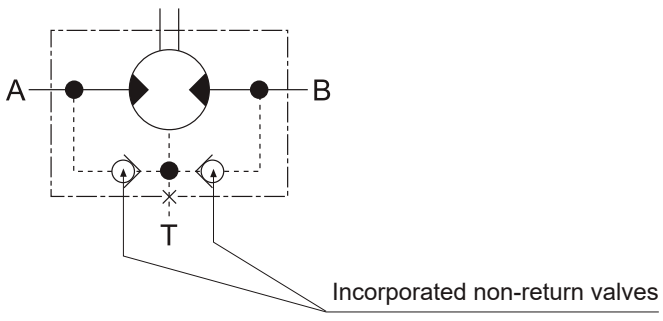


RV = Max pressure secondary valve
set to a pRV < pmax

b) Connecting drain port T

These motors have a 1/8" G drain hole in the centre of the cover. The motor is supplied with the port closed by a metal plug (see figure below).
Two non-return valves are incorporated in the motor casing to maintain internal pressure at the same level as the low pressure line A or B if the drain port is not connected to the tank.

(A 40)

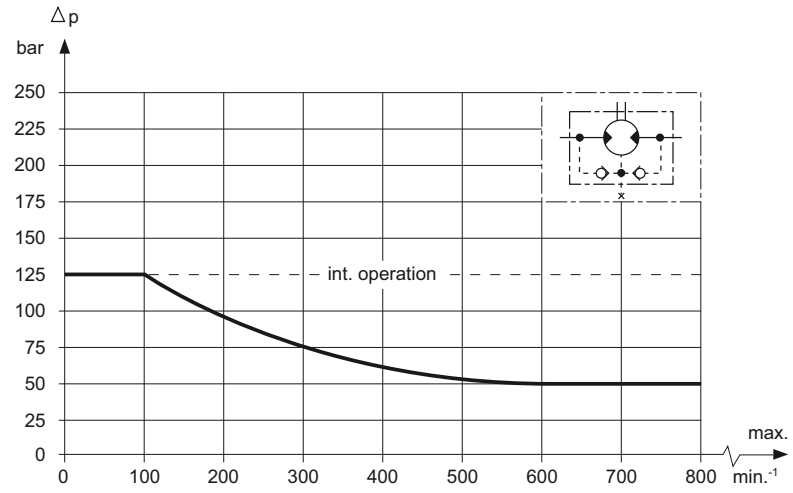


1) If the drain port is connected up, pressure at the shaft seal is always equal to the pressure in the drain line.

2) If the drain port is closed off, pressure at the shaft seal never exceeds pressure in the return line.

The maximum values for pressure in the drain line (case 1) or return line (case 2) are given in the following figure (for continuous and intermittent operating conditions).

(A 41)



The drain port must always be connected up when more motors are operated in series.

c) Brake control

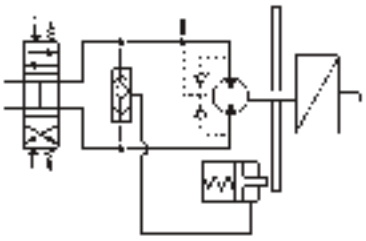
For gearmotors equipped with brakes, there are two motor versions available, i.e. the B02P or P010 executions.
In the B02P version, the motor has an in-built, direct brake control system. In the P010 version, an auxiliary branching is required to control the brake. See the following diagram.

(A 42)

OPEN LOOP CIRCUIT

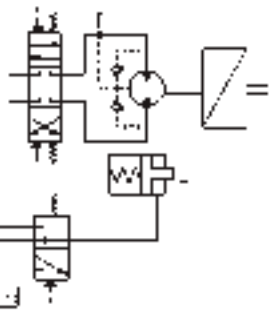
Control valve open centre type

Motor execution **B02P**



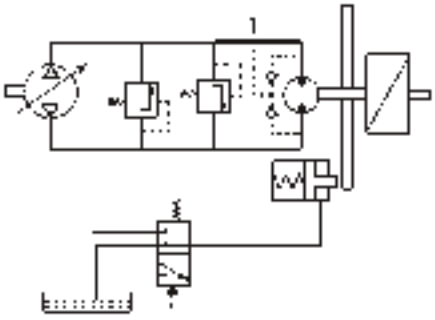
Control valve closed centre type

Motor execution **P010**



CLOSED LOOP CIRCUIT

Motor execution **P010**



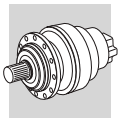
d) Hydraulic oil

Use hydraulic mineral oil with viscosity ISO VG 46 (46 Cst at t = 40°C).
It is recommended the oil temperature should be between +30°C and +70°C.

e) Oil filtering

For reliable motor operation and long life, it is important that the hydraulic circuit has a filter for a proper oil filtering according to the following degree:

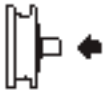
degree 9 NAS 1638
degree 6 SAE
degree 18/15 SO DIS 4406

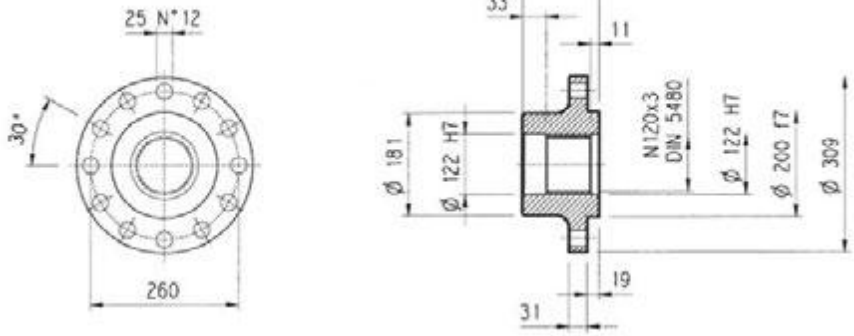


313M L | 313M R | 3/V 13M L

Flange

W0A

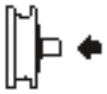


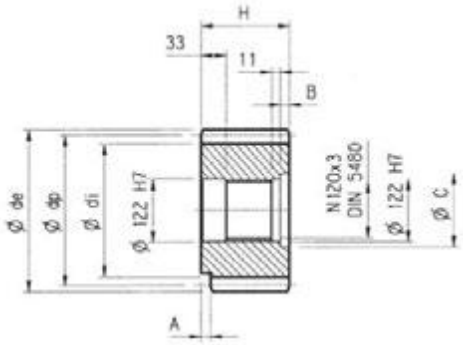


Material: Steel C40

Pinions

P...



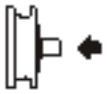


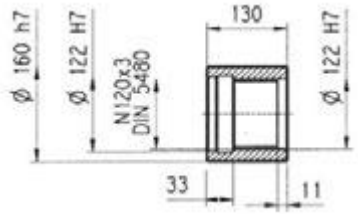
α = 20°

	m	z	x	dp	di	de	H	A	B	C	Material
PPH	16	17	0.500	272	247	315	135	—	5	136	Steel 39NiCrMo3 hardened and tempered
PRI	18	18	0.333	324	294	365	140	—	10	140	

Sleeve coupling

M0A

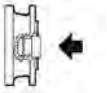


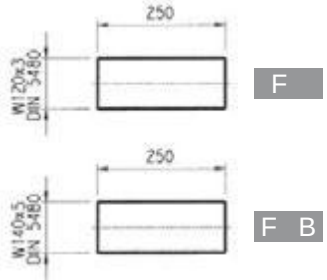


Material: Steel 16CrNi4

Splined bars

B0A

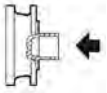


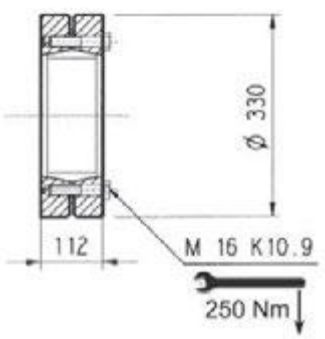


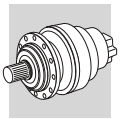
Material: Case hardening steel 18NiCrMo5 UNI 5331
must be case hardened 50-55 HRC

Shrink disc

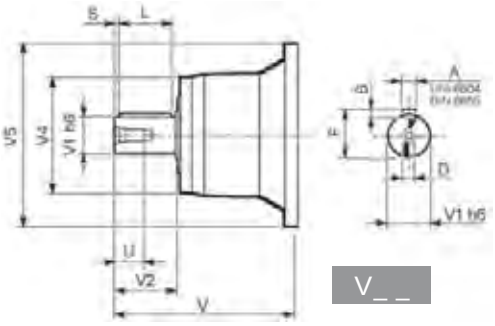
G0A



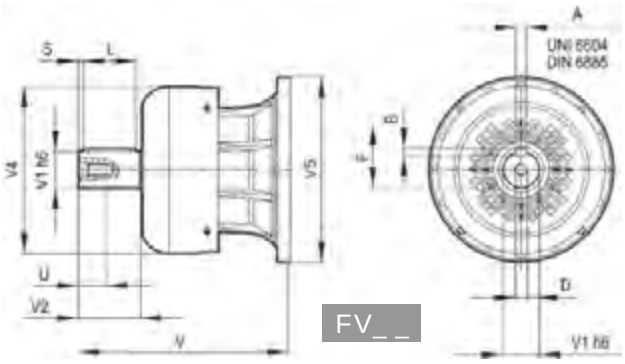




313M L 313M R



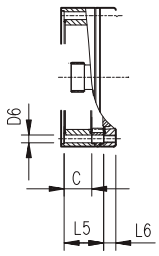
V_ _

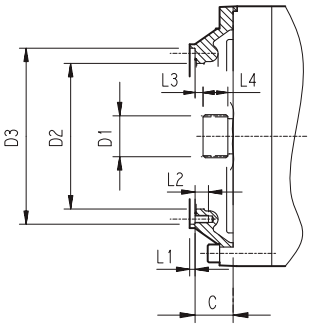


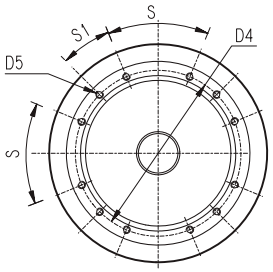
FV_ _

		V	V1	V2	V4	V5	A	B	F	L	S	D	U
313M L1	**V11B**	343	80	130	200	445	22	14	85	110	10	M16	36
	FV11B	451	80	130	347.5	445	22	14	85	110	10	M16	36
313M L2	**V07B**	315	80	130	200	345	22	14	85	110	10	M16	36
	FV07B	375	80	130	347.5	348	22	14	85	110	10	M16	36
	V07A	313	60	105	155	345	18	11	64	90	7.5	M16	36
	FV07A	363	60	105	309	348	18	11	64	90	7.5	M16	36
313M L3	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36
313M L4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28
313M R2 (B) (C)	**V06B**	307	60	105	155	292	18	11	64	90	7.5	M16	36
	FV06B	357	60	105	309	292	18	11	64	90	7.5	M16	36
313M R3	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36
313M R4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28

313M L 313M R

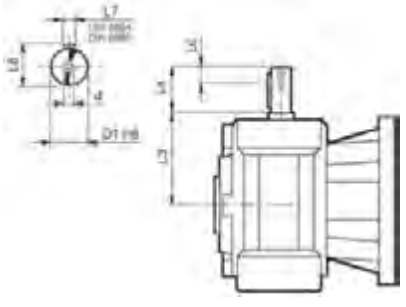






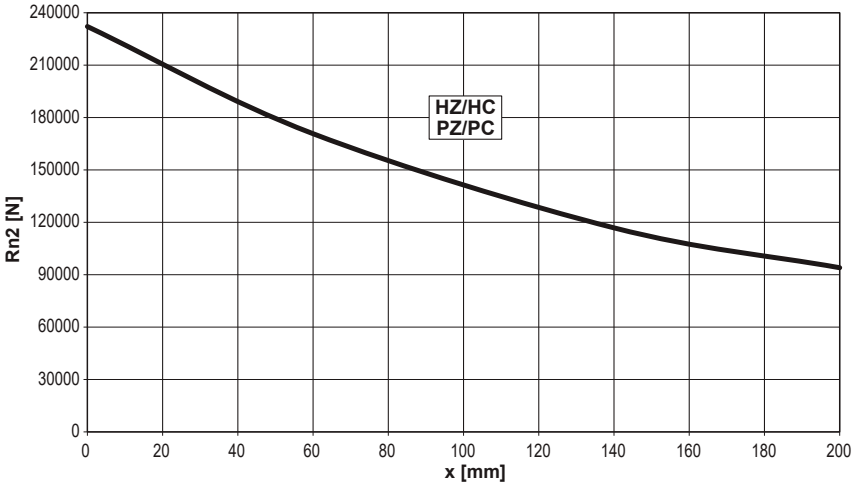
		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
313M L1	**V9AD**	75	80x74 DIN 5482	270	335 H7	314	M16 n°8	—	5	30	8.5	40	—	—	60°	30°	D
313M L2	**V9AB**	51	58x53 DIN 5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B
313M L3	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	—	4	18	9	18	—	—	45°	45°	A
313M L4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	11	4	—	9	18	65	18	45°	45°	A
313M R3	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	11	4	18	9	18	—	—	45°	45°	A
313M R2 (B) (C)	**V9AB**	45	58x53 DIN 5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B
313M R4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	11	4	—	9	18	37	18	45°	45°	A

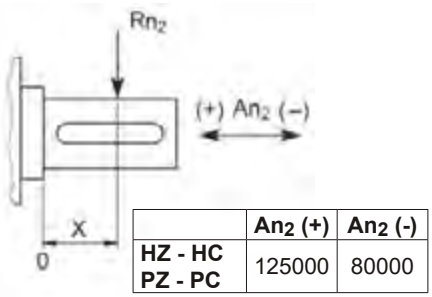
3/V 13M L



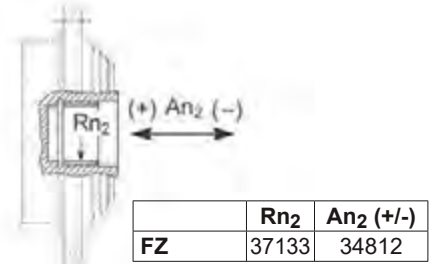
	D1 h6	L3	L4	L6	L7	L8	d
3/V 13M L3_HS	40	214.5	70	20	12	43	M8
3/V 13M L4_HS	25	168	60	19	8	28	M8

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$





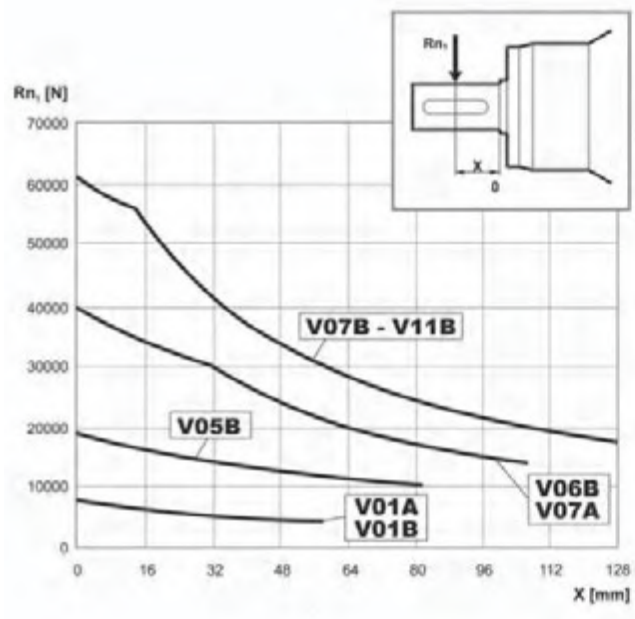
	An_2 (+)	An_2 (-)
HZ - HC PZ - PC	125000	80000

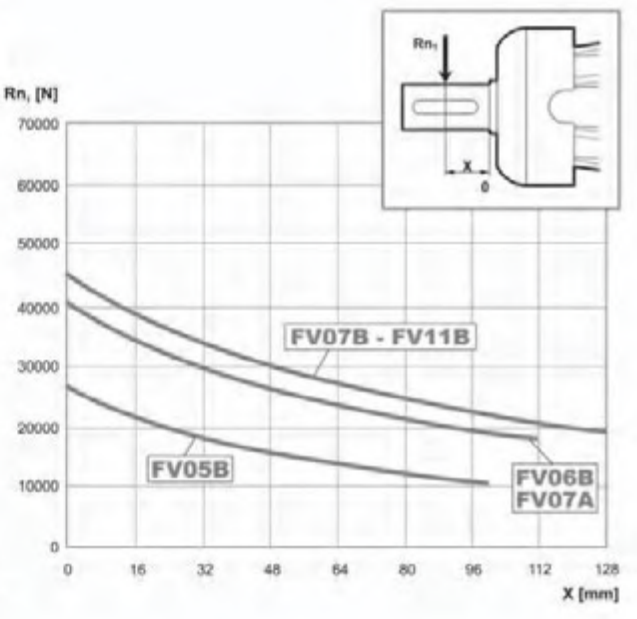


	Rn_2	An_2 (+/-)
FZ	37133	34812

Load corrective factor fh_2 on shafts	**$Fh_2 = n_2 \cdot h$**		10000	25000	50000	100000	500000	1000000
	fh_2	**FZ**	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HZ - HC - PZ - PC	**1.32**	**1.20**	**1.20**	**1.00**	**0.62**	**0.50**

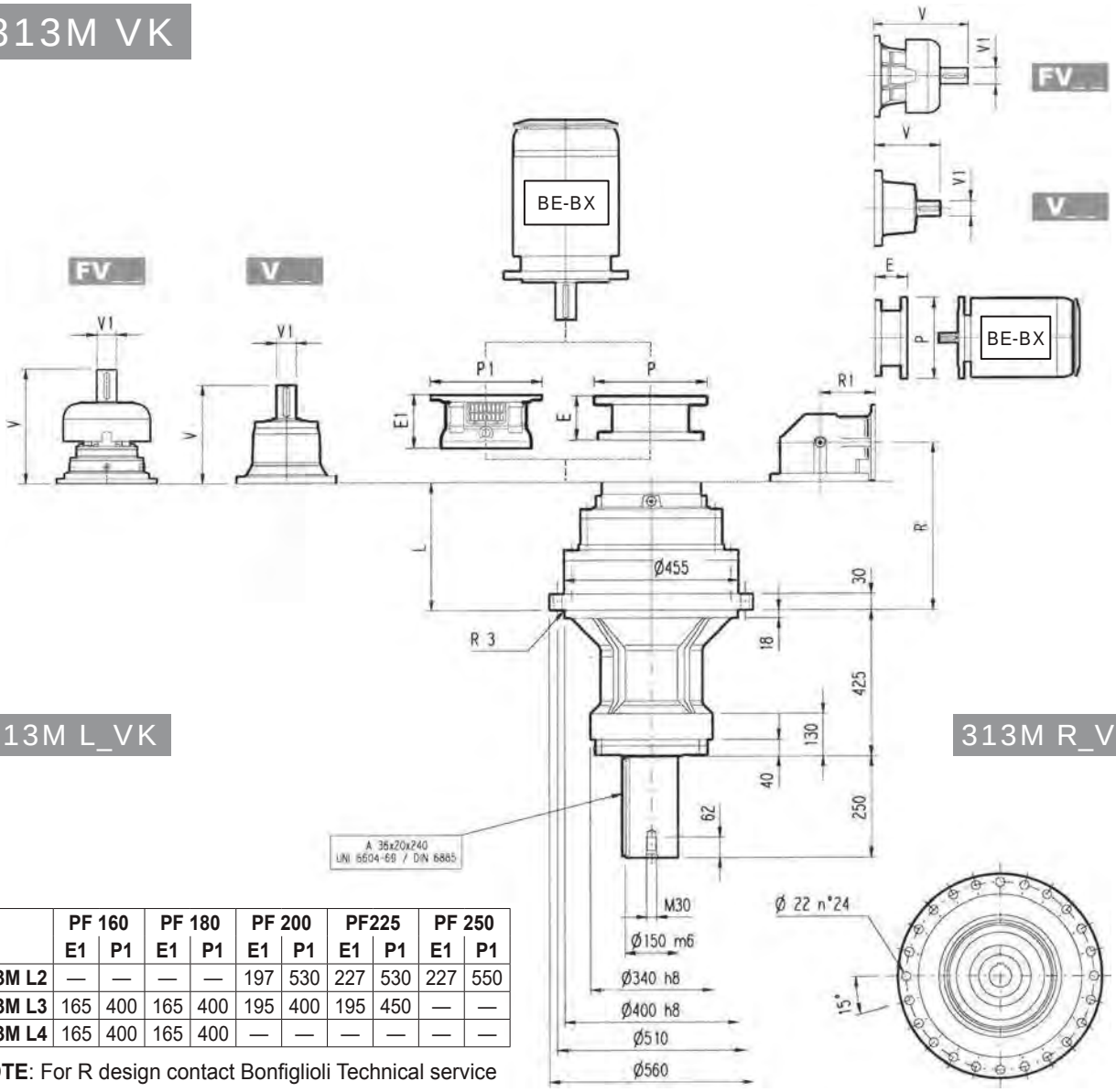
Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$





Load corrective factor fh_1 on shafts	**$Fh_1 = n_1 \cdot h$**	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

313M VK



313M L_VK

313M R_VK

	PF 160		PF 180		PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1	E1	P1	E1	P1
313M L2	—	—	—	—	197	530	227	530	227	550
313M L3	165	400	165	400	195	400	195	450	—	—
313M L4	165	400	165	400	—	—	—	—	—	—

NOTE: For R design contact Bonfiglioli Technical service

	L		V	V1		V	V1		V	V1		V	V1	
313M L1	158	380	343	80	55	—	—	—	451	80	71	—	—	—
313M L2	308	440	315	80	35	313	60	28	375	80	48	363	60	34
313M L3	397	450	239	48	15	—	—	—	276	48	17	—	—	—
313M L4	462	460	137.5	24	6	158	38	7	—	—	—	—	—	—

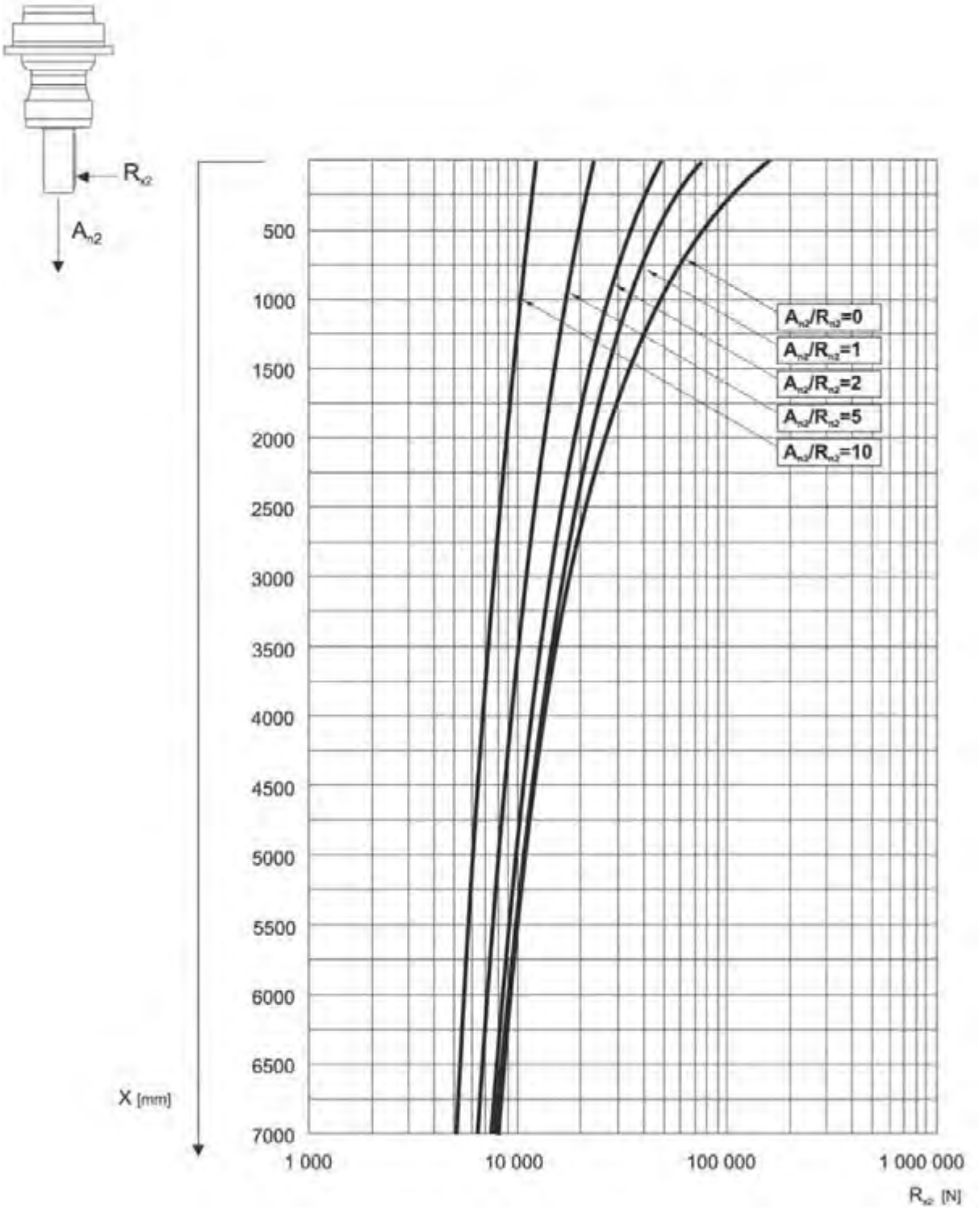
	P71		P80		P90		P100		P112		P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
313M L2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	195	350	186	400	216	450	216	550
313M L3	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400	—	—	—	—
313M L4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—

	R	R1		V	V1		V	V1		V	V1		V	V1	
313M R2 (B)	388	345	510	307	60	23	—	—	—	357	60	28	—	—	—
313M R2 (C)	388	390	520	307	60	23	—	—	—	357	60	28	—	—	—
313M R3	427	225	490	239	48	15	—	—	—	—	—	—	—	—	—
313M R4	489	140	470	137.5	24	6	158	38	7	—	—	—	—	—	—

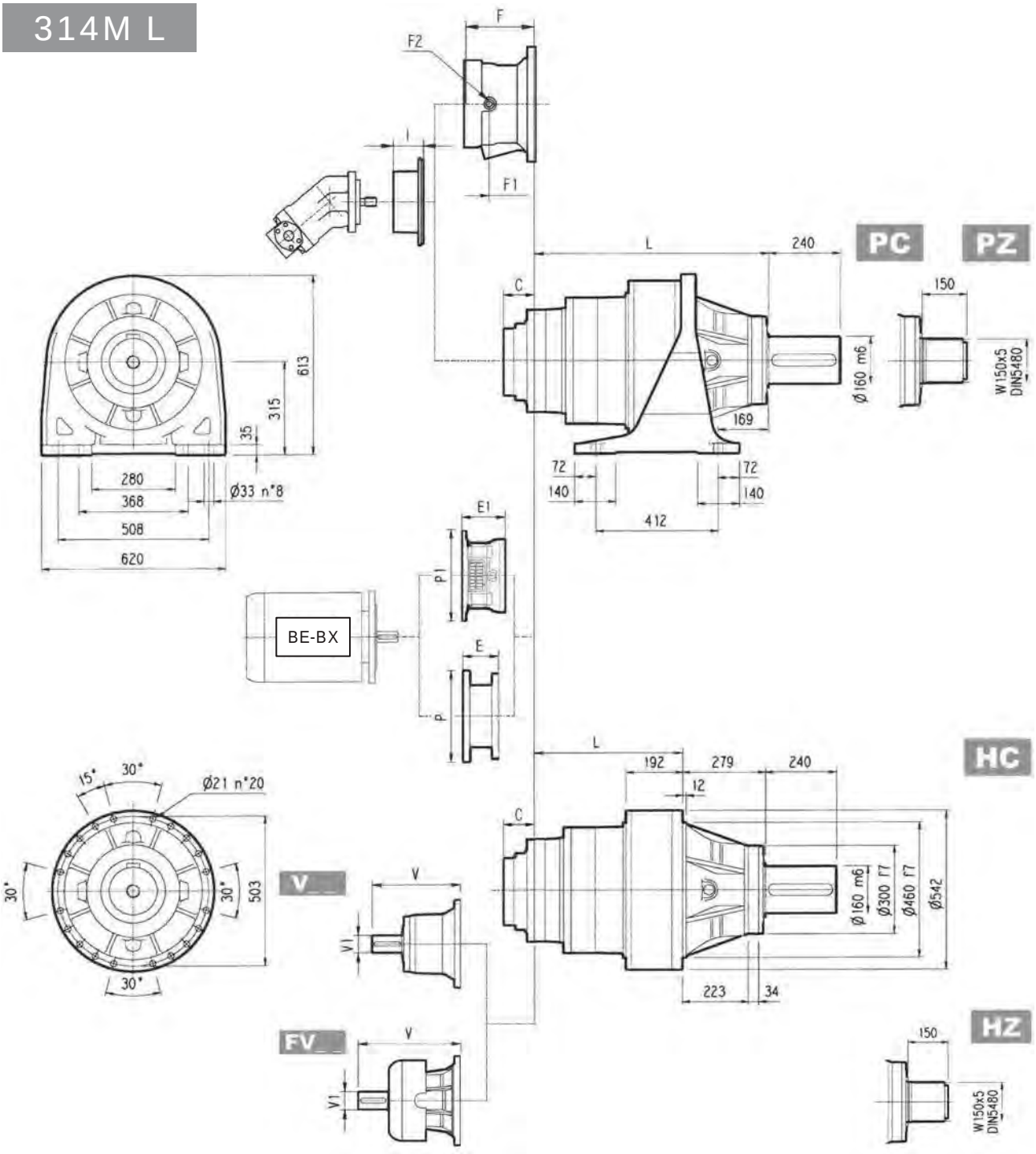
	P71		P80		P90		P100		P112		P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
313M R2 (B)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	152	350	182	400	212	450	193	550
313M R2 (C)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	152	350	182	400	212	450	193	550
313M R3	—	—	—	—	—	—	—	—	—	—	114	300	144	350	144	350	174	400	—	—	—	—
313M R4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—

313M VK

The diagram below allows the calculation of permitted overhung load R_{x2} on the output shaft of gearbox, with radial force applying at a distance x from shaft shoulder.
The curves are relevant to value resulting from the relationship of trust load A_{n2} to radial load R_{n2}, based on n_2 = 10 min^{-1} and 10000 hrs theoretical lifetime.



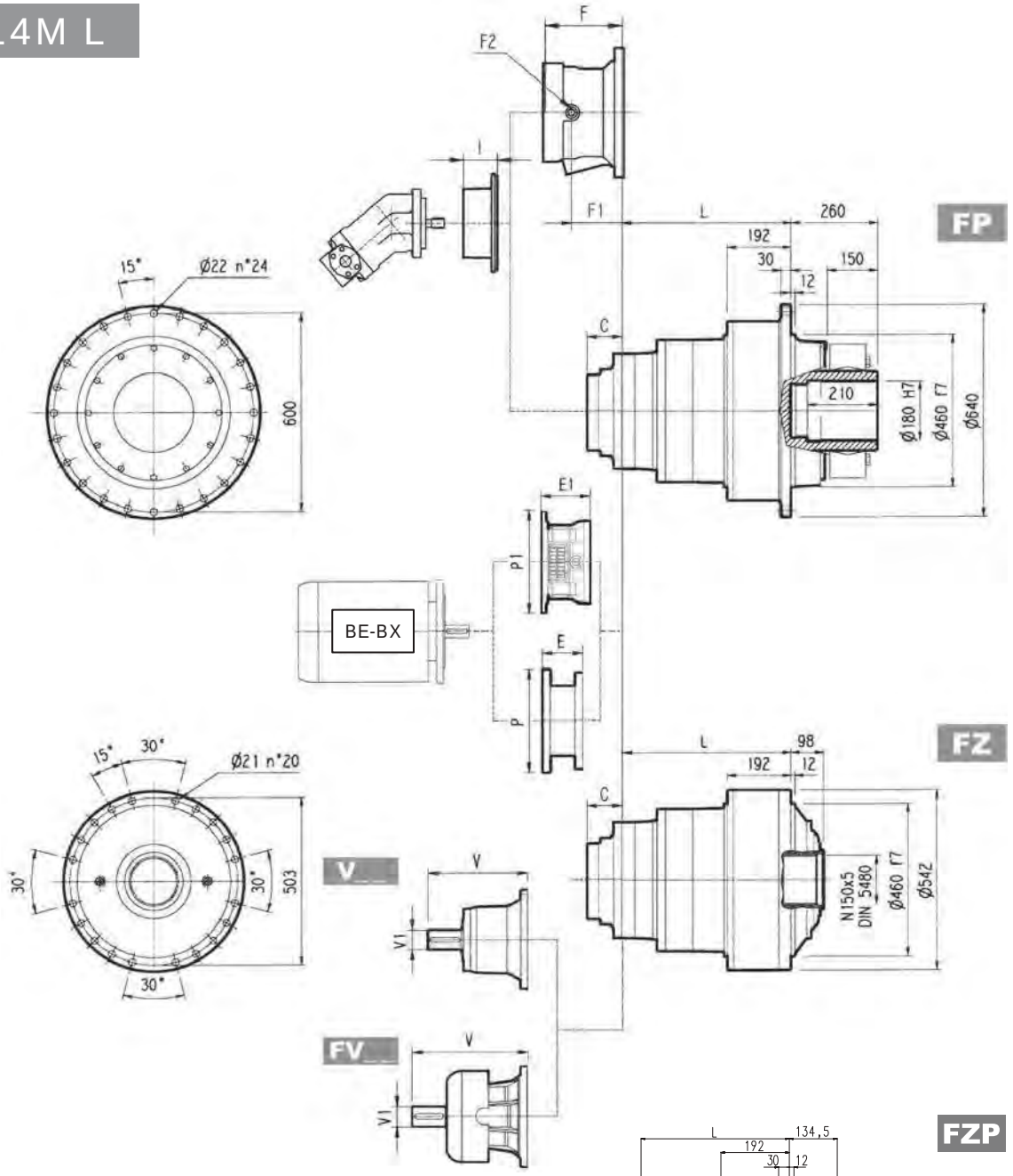
314M L



	L							
	PC - PZ	HC - HZ	FZ - FZP	FP	PC - PZ	HC - HZ	FZ - FZP	FP
314M L1	453	174	174	174	500	370	280	330
314M L2	641	362	362	362	545	415	325	375
314M L3	777	498	498	498	590	460	370	420
314M L4	842	563	563	563	600	470	380	430

	V	V1	Kg	V	V1	Kg	V	V1	Kg	V	V1	Kg	C	Input	I	F	F1	F2	Type	Input	Kg
314M L1	—	—	—	—	—	—	—	—	—	—	—	—	120	L		—	—	—	—	—	—
314M L2	377	80	50	—	—	—	457	80	63	—	—	—	88	C		195	147	1/4 G	6	B	28
314M L3	307	60	23	—	—	—	357	60	28	—	—	—	45	B	467	145	95	1/4 G	5	B	16
314M L4	239	48	15	—	—	—	276	48	17	—	—	—	37	A		105	65	1/4 G	5	A	10

314M L



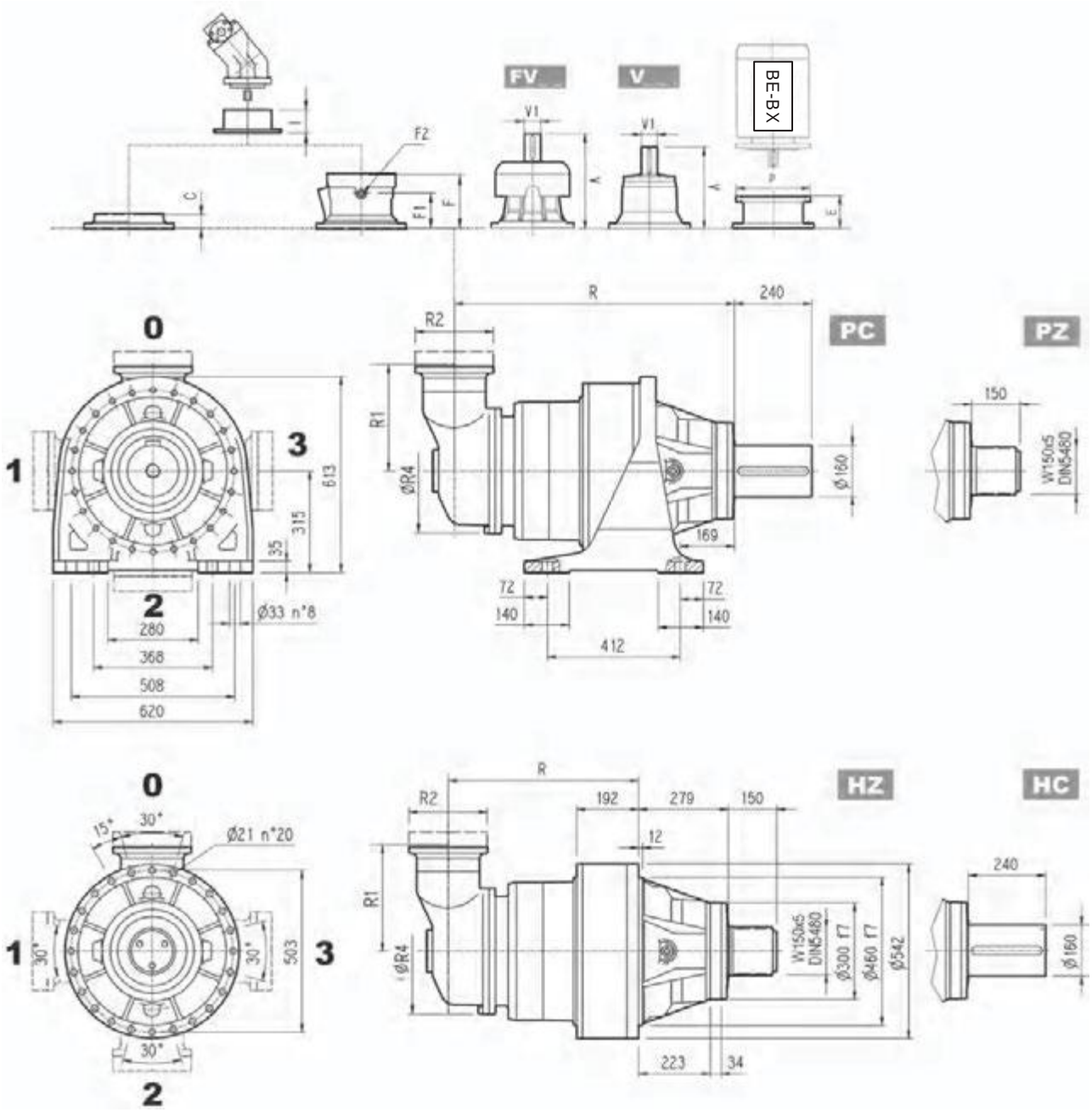
	PF 160		PF 180		PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1	E1	P1	E1	P1
314M L2	—	—	—	—	—	—	254	550	254	550
314M L3	—	—	167	390	197	400	197	450	207	550
314M L4	165	400	165	400	195	400	197	450	—	—

NOTE: For R design contact Bonfiglioli Technical service

FP	M_{2max} = 115000 Nm

	P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P
314M L2	—	—	—	—	—	—	271	400	301	450	281	550
314M L3	—	—	153	350	153	350	183	400	213	450	193	550
314M L4	114	300	144	350	144	350	174	400	—	—	—	—

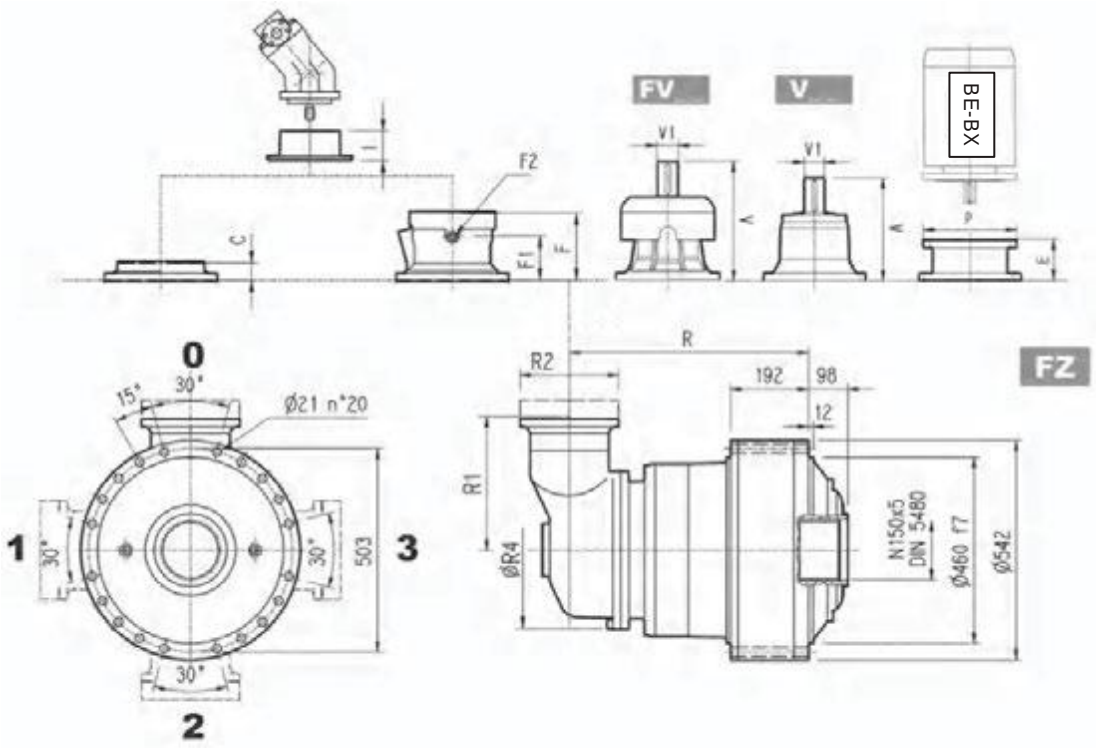
314M R

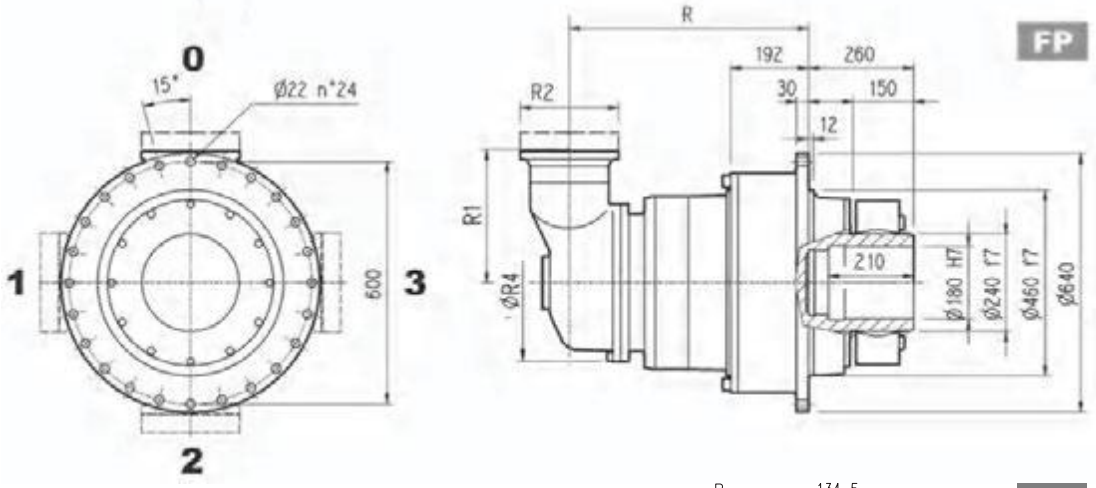


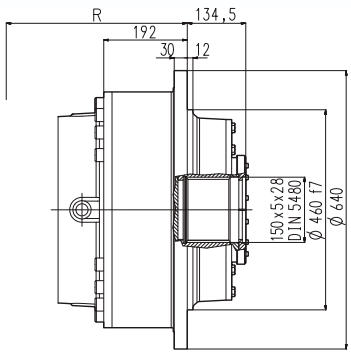
	R				R1	R2	R4	Kg			
	PC-PZ	HC-HZ	FZ - FZP	FP				PC-PZ	HC-HZ	FZ - FZP	FP
314M R3 (B)	848	569	569	569	345	292	400	720	590	500	550
314M R3 (C)	856	587	587	587	390	292	480	730	600	510	560
314M R4	914	635	635	635	140	186	244	680	550	460	510

	V	V1	Kg	V	V1	Kg	V	V1	Kg	V	V1	Kg	C	Input	I	F	F1	F2	Type	Input	Kg
314M R3 (B)	307	60	23	—	—	—	357	60	28	—	—	—	45	B		195	147	1/4 G	6	B	28
314M R3 (C)	307	60	23	—	—	—	357	60	28	—	—	—	45	B		195	147	1/4 G	6	B	28
314M R4	137.5	24	6	158	38	7	—	—	—	—	—	—	37	A	467	105	65	1/4 G	4	A	10

314M R





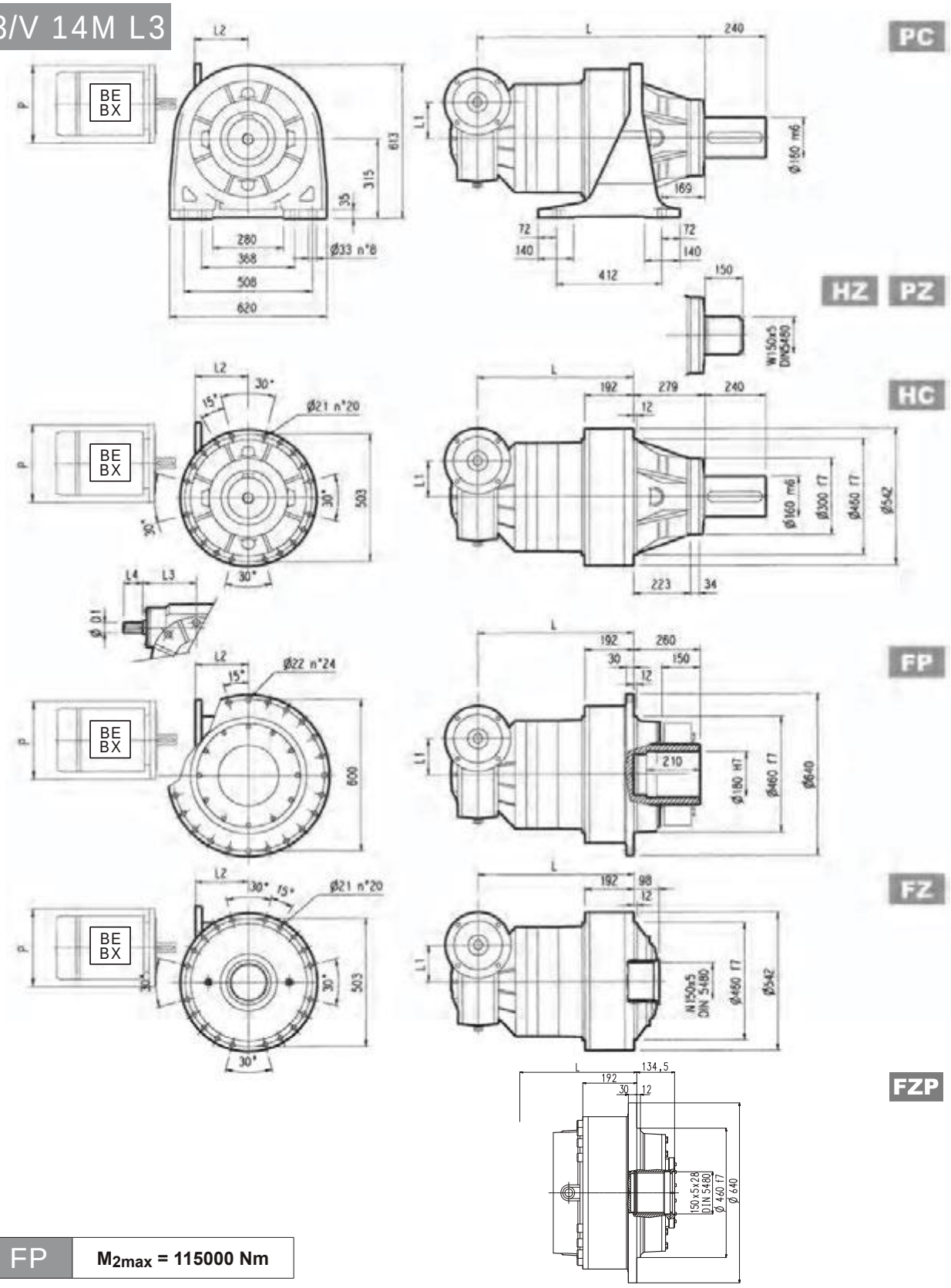


FP

M_{2max} = 115000 Nm

	P71		P80		P90		P100		P112		P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
314M R3 (B)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	152	350	182	400	212	450	193	550
314M R3 (C)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	152	350	182	400	212	450	193	550
314M R4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—

3/V 14M L3

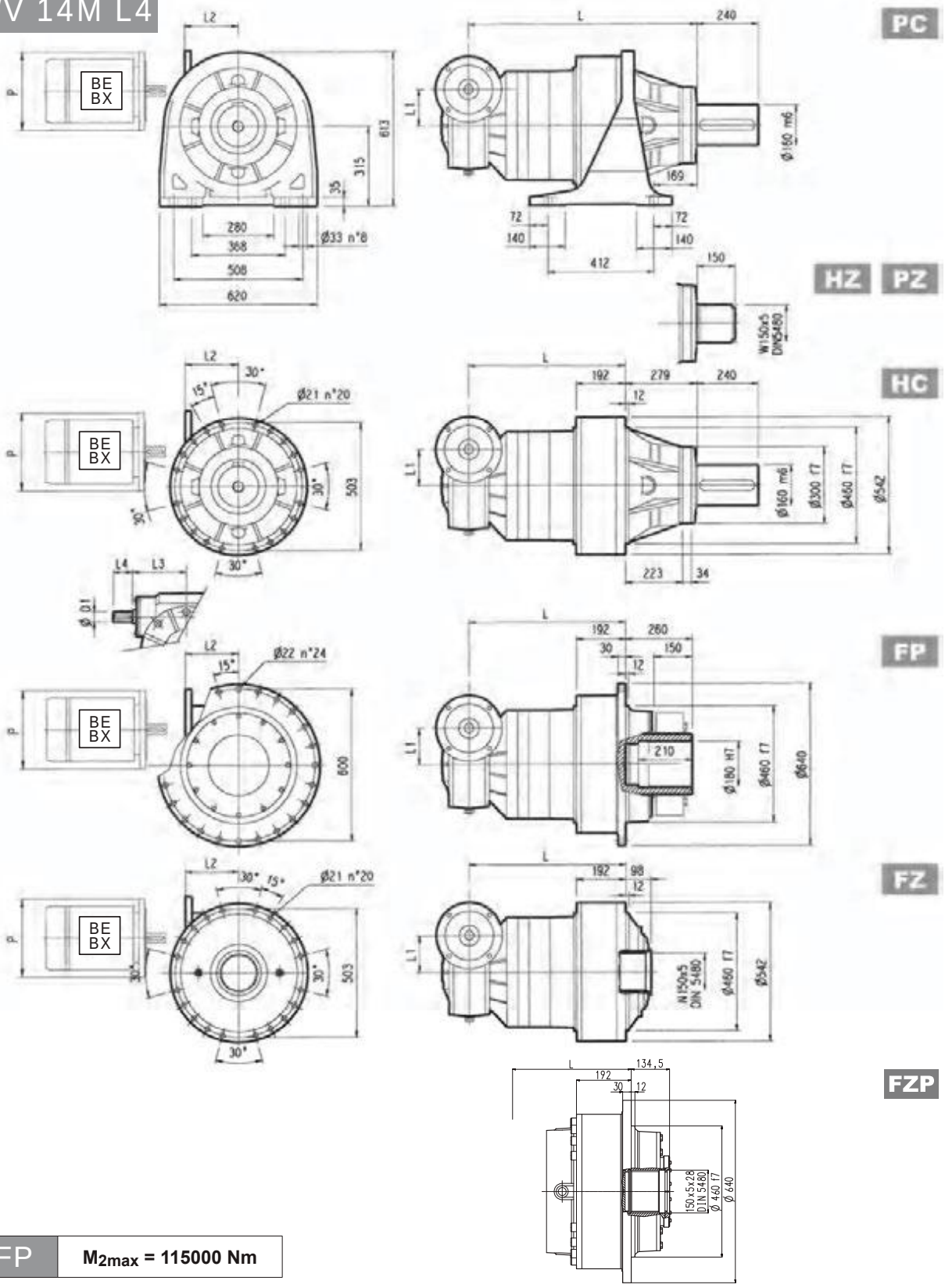


FP M_{2max} = 115000 Nm

	L				L1	L2	D1	L3	L4	Kg			
	PC - PZ	HC - HZ	FZ - FZP	FP						PC - PZ	HC - HZ	FZ - FZP	FP
3/V 14M L3	920	641	641	641	185	217	40	214.5	70	665	535	445	495

	P100	P112	P132		P160		P180	
	P	P	L2	P	L2	P	L2	P
3/V 14M L3	250	250	—	300	—	350	—	350

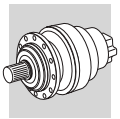
3/V 14M L4



FP | M_{2max} = 115000 Nm

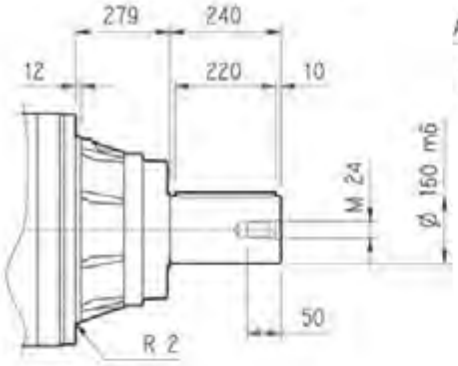
	L				L1	L2	D1	L3	L4	Kg			
	PC - PZ	HC - HZ	FZ - FZP	FP						PC - PZ	HC - HZ	FZ - FZP	FP
3/V 14M L4	961	682	682	682	150	190	35	185	65	690	560	470	520

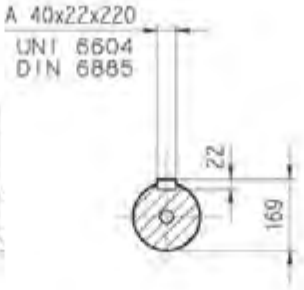
	P100	P112	P132		P160		P180	
	P	P	L2	P	L2	P	L2	P
3/V 14M L4	250	250	—	300	—	350	—	—



314M L | 314M R | 3/V 14M L

HC





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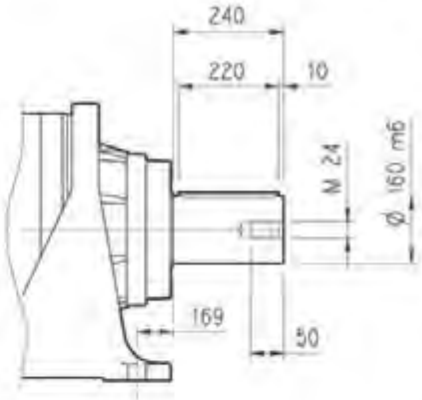
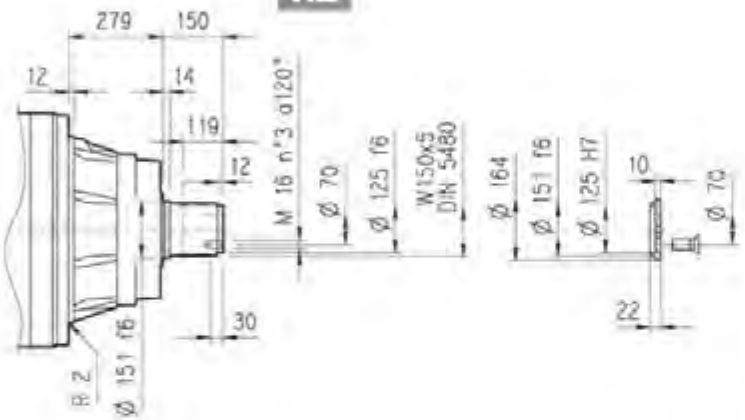
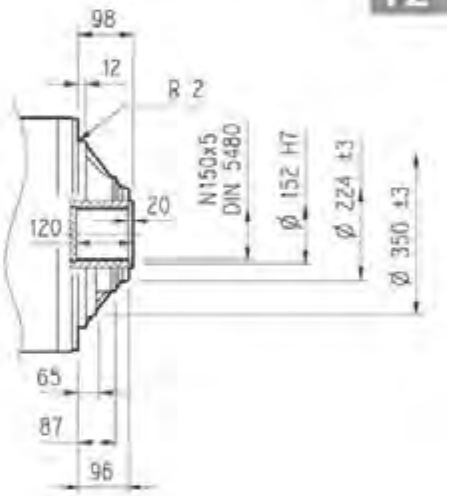


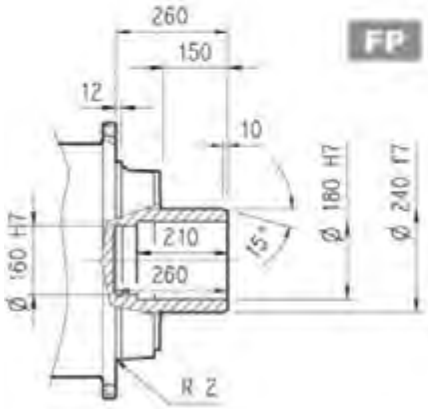
HZ



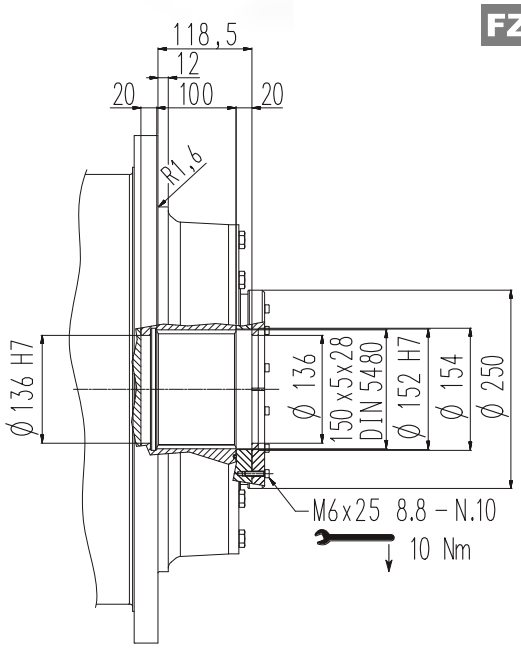
FZ



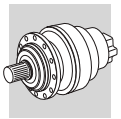
FP



FZP



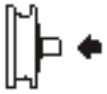
FP	M_{2max} = 115000 Nm

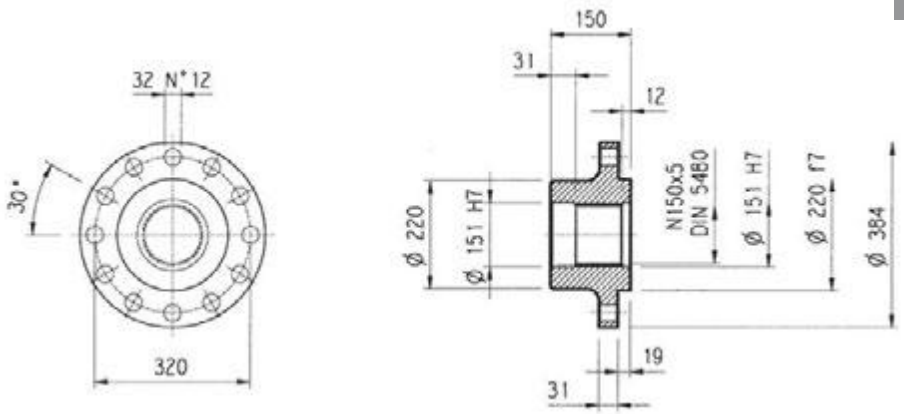


314M L | 314M R | 3/V 14M L

Flange

W0A

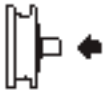


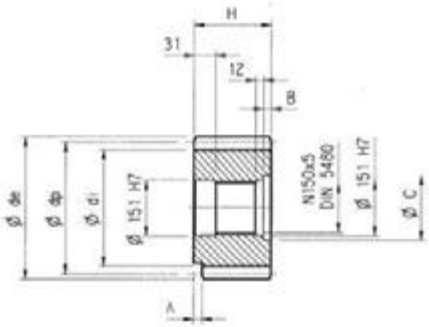


Material: Steel C40

Pinions

P...



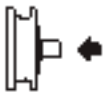


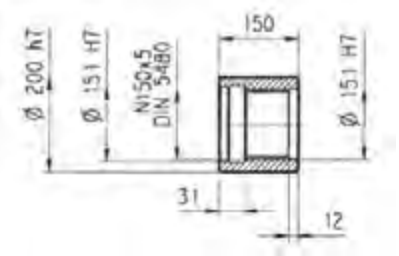
α = 20°

	m	z	x	dp	di	de	H	A	B	C	Material
PRG1	18	16	0.500	288	261	342	160	—	10	166	Steel 18NiCrMo5 case hardened
PRG2	18	16	0.617	288	271	339	150	30	—	—	Steel 39NiCrMo3 hardened and tempered

Sleeve coupling

M0A

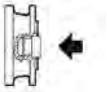


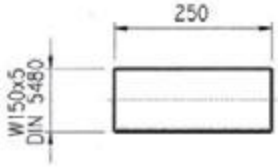


Material: Steel 16CrNi4

Splined bars

B0A

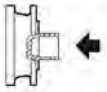


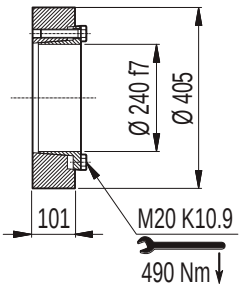


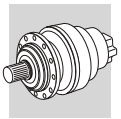
Material: Case hardening steel 18NiCrMo5 UNI 5331
must be case hardened 50-55 HRC

Shrink disc

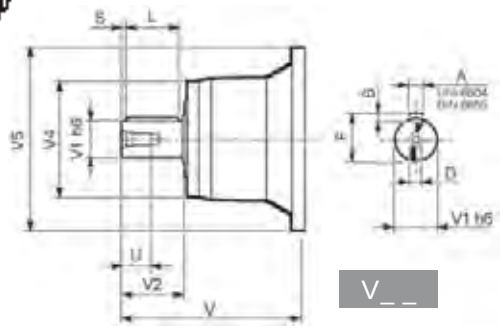
G0A



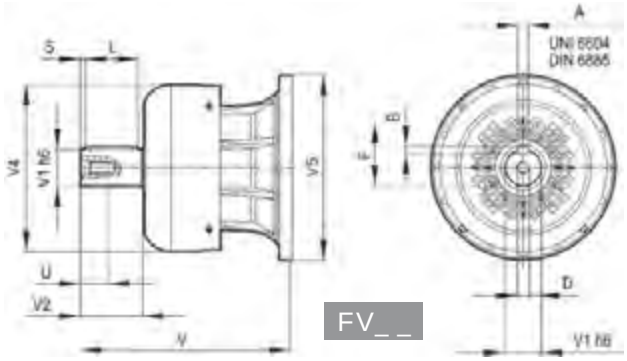




314M L 314M R



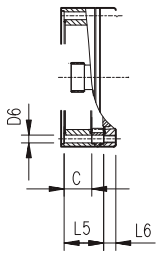
V__

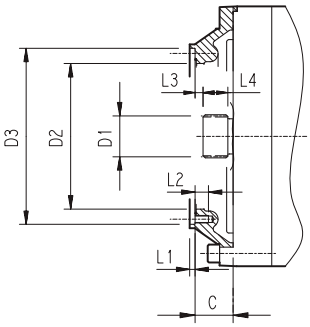


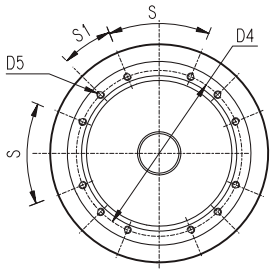
FV__

		V	V1	V2	V4	V5	A	B	F	L	S	D	U
314M L2	**V10B**	377	80	130	200	400	22	14	85	110	10	M16	36
	FV10B	457	80	130	347.5	400	22	14	85	110	10	M16	36
314M L3	**V06B**	307	60	105	155	292	18	11	64	90	7.5	M16	36
	FV06B	357	60	105	309	292	18	11	64	90	7.5	M16	36
314M L4	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36
314M R3 (B) (C)	**V06B**	307	60	105	155	292	18	11	64	90	7.5	M16	36
	FV06B	357	60	105	309	292	18	11	64	90	7.5	M16	36
314M R4	**V01A**	137.5	24	36	120	186	8	7	27	30	3	M8	19
	V01B	158	38	58	120	186	10	8	41	50	4	M12	28

314M L 314M R

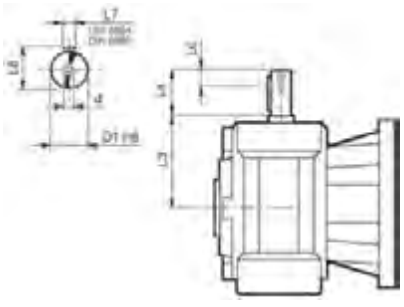






		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
314M L1	**V9AL**	120	100x94 DIN 5482	295	336 H7	370	M16 n°15	—	8	21	13	55	—	—	24°	24°	L
314M L2	**V9AC**	88	70x64 DIN 5482	200	282 H7	266	M12 n°12	—	4	22	11	32	—	—	45°	45°	C
314M L3	**V9AB**	45	58x53 DIN 5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B
314M L4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	—	4	18	9	18	—	—	45°	45°	A
314M R3 (B) (C)	**V9AB**	45	58x53 DIN 5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B
314M R4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	11	4	—	9	18	37	18	45°	45°	A

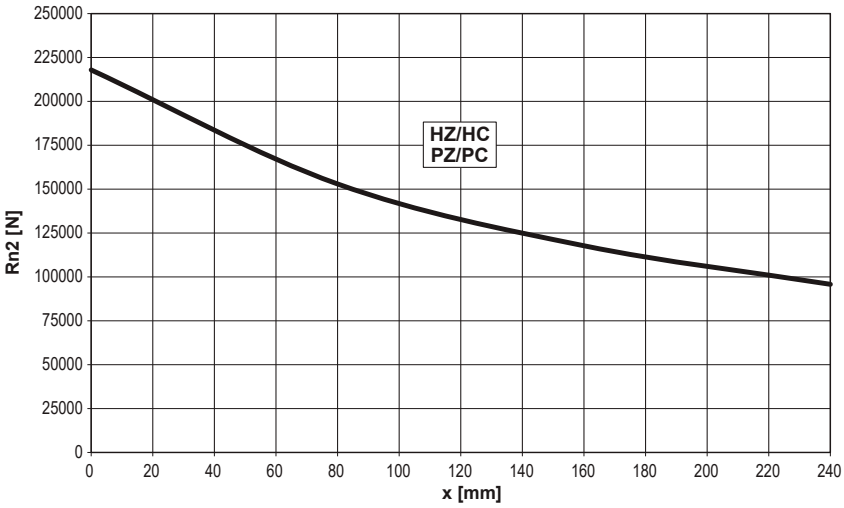
3/V 14M L

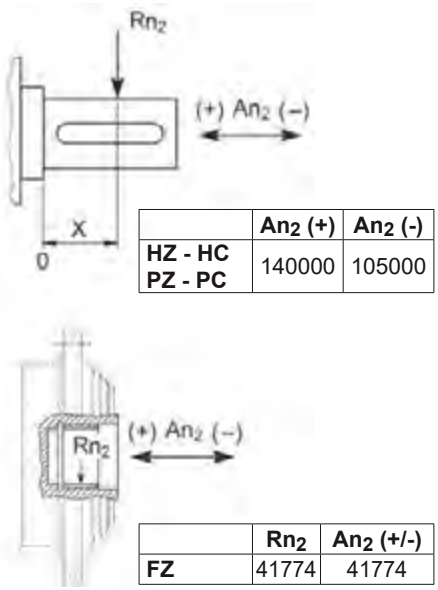


	D1 h6	L3	L4	L6	L7	L8	d
3/V 14M L3_HS	40	214.5	70	20	12	43	M8
3/V 14M L4_HS	35	185	65	20	10	38	M8

314M L | 314M R | 3/V 14M L

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$



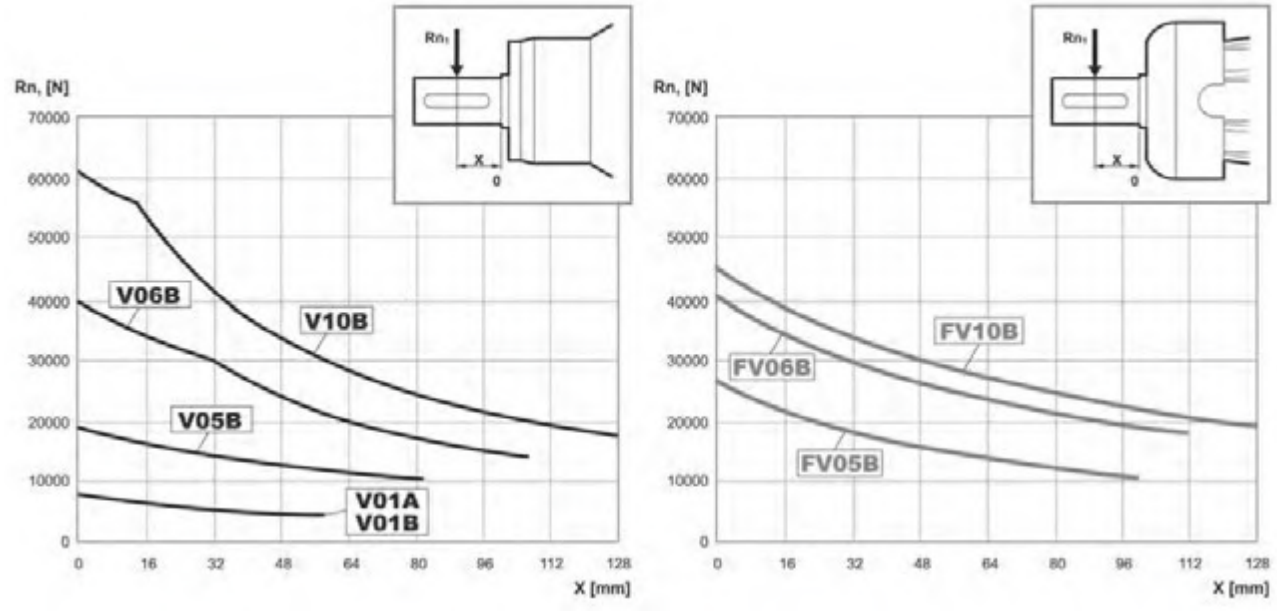


	An_2 (+)	An_2 (-)
HZ - HC PZ - PC	140000	105000

	Rn_2	An_2 (+/-)
FZ	41774	41774

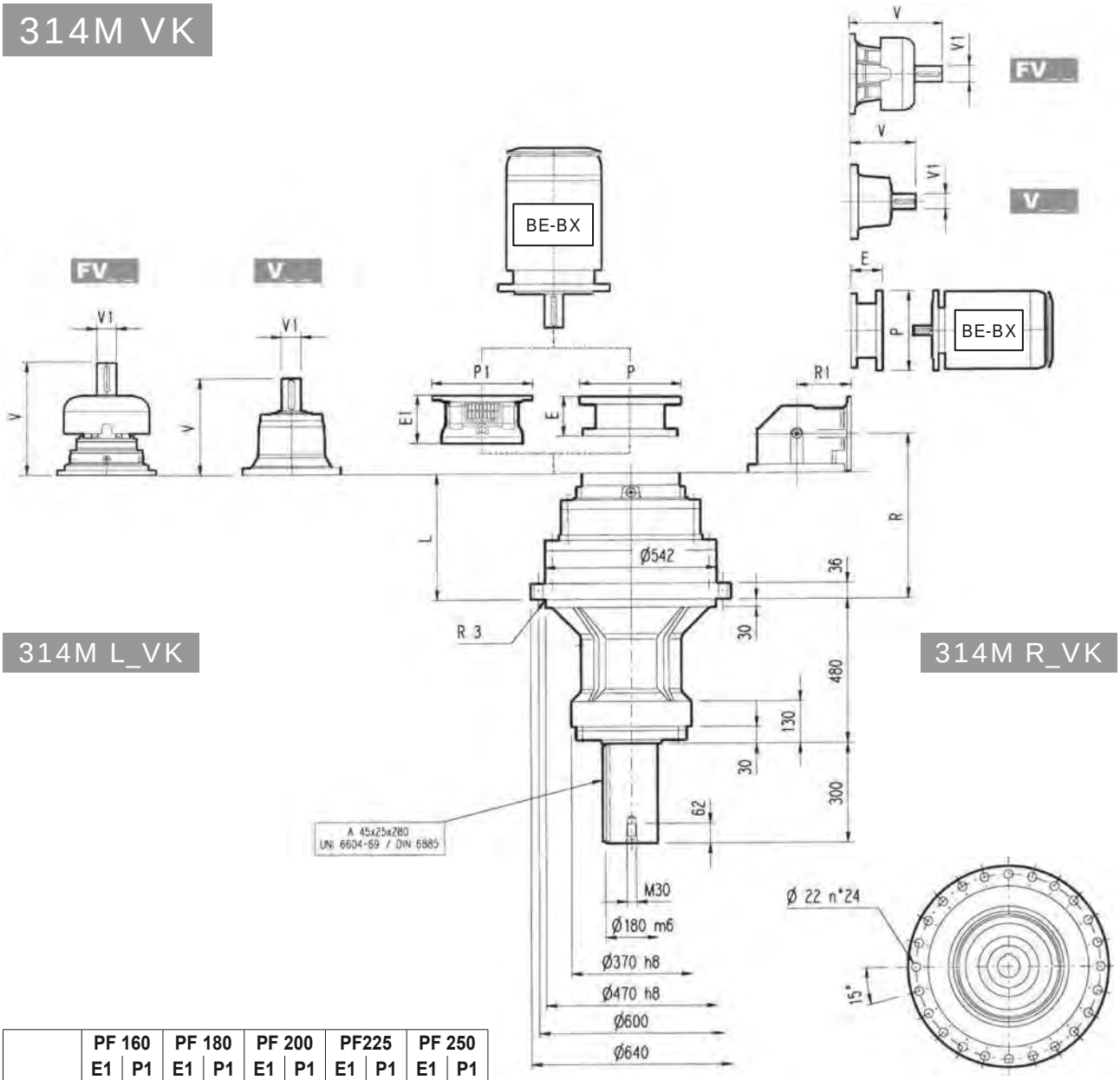
Load corrective factor fh_2 on shafts	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
	fh_2	**FZ**	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HZ - HC - PZ - PC	**2.00**	**1.52**	**1.23**	**1.00**	**0.62**	**0.50**

Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$



Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

314M VK



314M L_VK

314M R_VK

	PF 160		PF 180		PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1	E1	P1	E1	P1
314M L2	—	—	—	—	—	—	254	550	254	550
314M L3	—	—	167	390	197	400	197	450	207	550
314M L4	165	400	165	400	195	400	197	450	—	—

NOTE: For R design contact Bonfiglioli Technical service

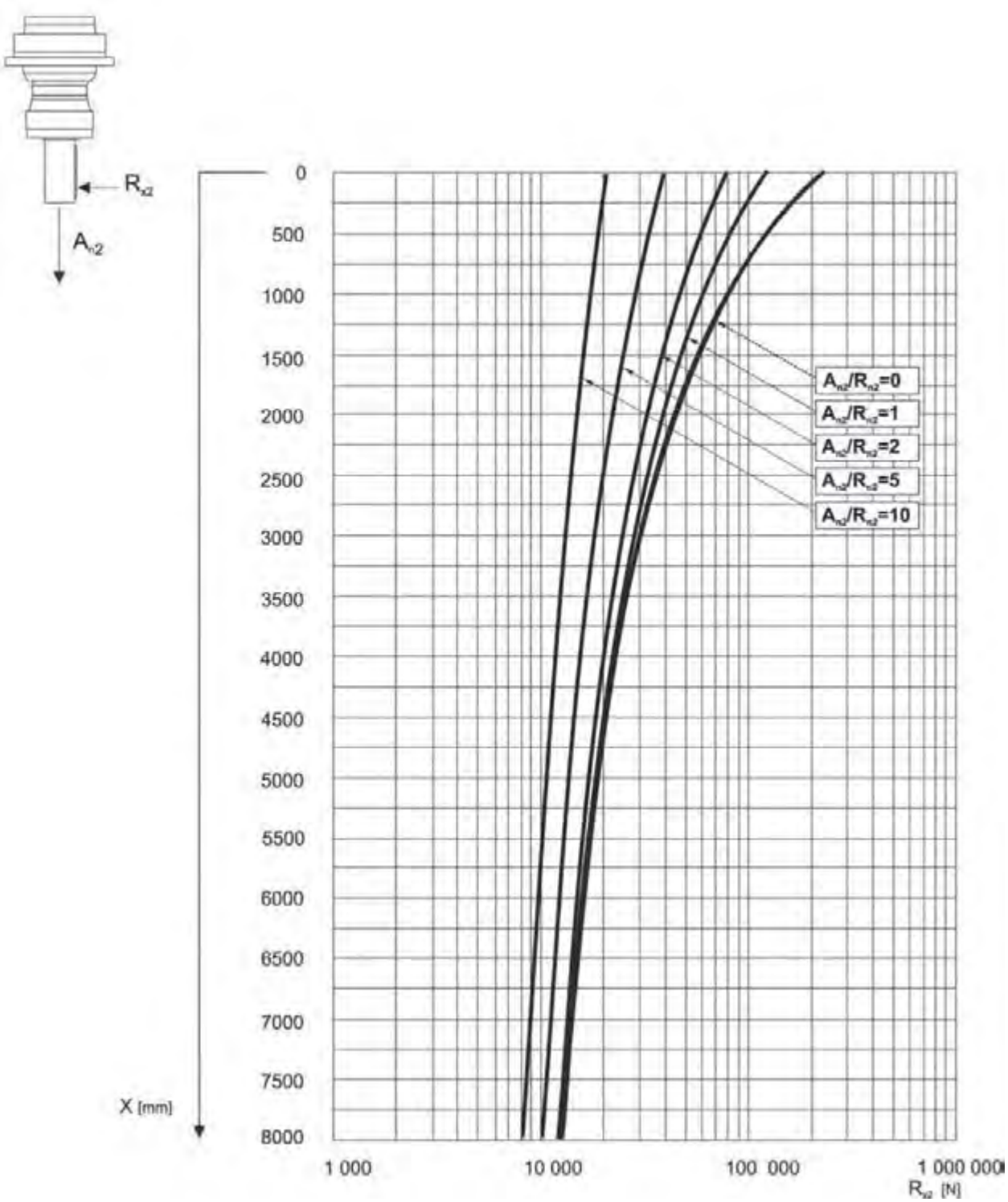
	L		V	V1		V	V1		V	V1		V	V1		P132		P160		P180		P200		P225		P250	
															E	P	E	P	E	P	E	P	E	P	E	P
314M L2	386	650	348	80	55	—	—	—	457	80	63	—	—	—	—	—	—	—	—	—	271	400	301	450	281	550
314M L3	519	700	315	80	35	313	60	28	357	60	28	—	—	—	—	—	153	350	153	350	183	400	213	450	193	550
314M L4	608	710	239	48	15	—	—	—	276	48	17	—	—	—	114	300	144	350	144	350	174	400	—	—	—	—

	R	R1		V	V1		V	V1		V	V1		V	V1	
314M R3 (B)	611	345	720	307	60	23	—	—	—	357	60	28	—	—	—
314M R3 (C)	611	390	730	307	60	23	—	—	—	357	60	28	—	—	—
314M R4	638	225	690	137.5	24	6	158	38	7	—	—	—	—	—	—

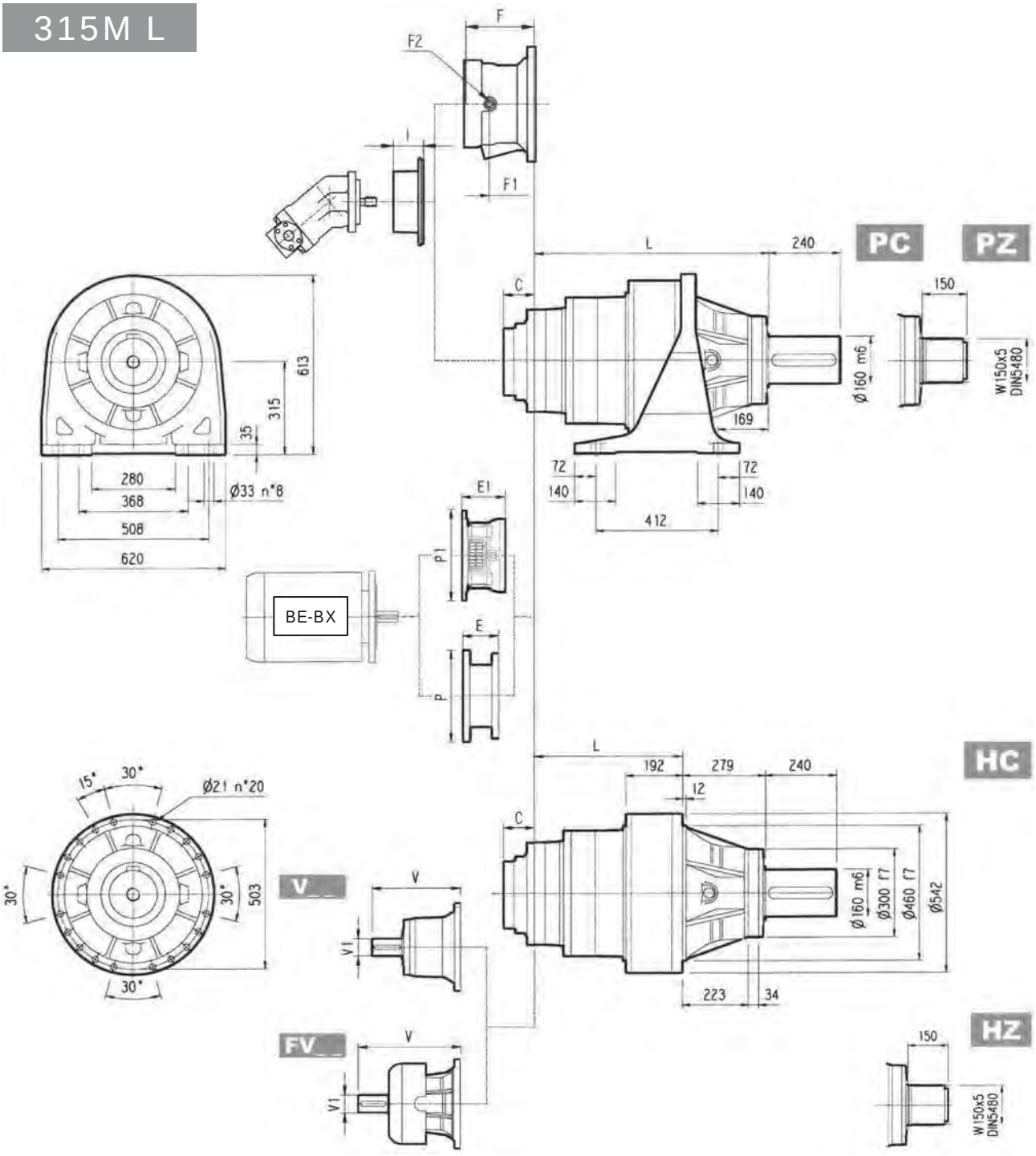
	P71		P80		P90		P100		P112		P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P
314M R3 (B)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	152	350	182	400	212	450	193	550
314M R3 (C)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	152	350	182	400	212	450	193	550
314M R4	65	160	84	200	84	200	94	250	94	250	114	300	144	350	—	—	—	—	—	—	—	—

314M VK

The diagram below allows the calculation of permitted overhung load R_{x2} on the output shaft of gearbox, with radial force applying at a distance x from shaft shoulder.
The curves are relevant to value resulting from the relationship of trust load A_{n2} to radial load R_{n2}, based on n_2 = 10 min^{-1} and 10000 hrs theoretical lifetime.



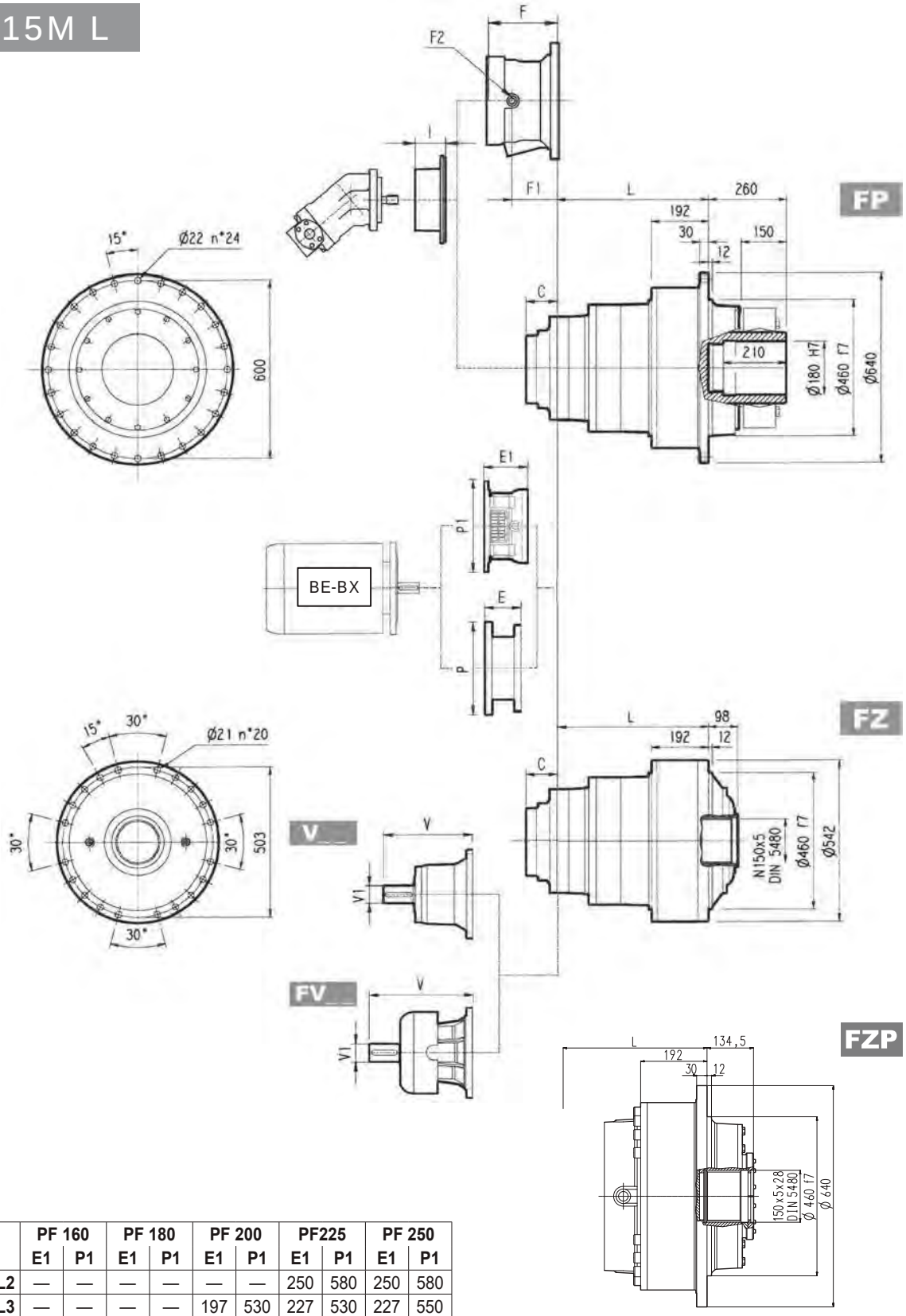
315M L



	L							
	PC - PZ	HC - HZ	FZ - FZP	FP	PC - PZ	HC - HZ	FZ - FZP	FP
315M L1	453	174	174	174	500	370	280	330
315M L2	665	386	386	386	585	455	365	415
315M L3	798	519	519	519	630	500	410	460
315M L4	887	608	608	608	642	512	422	472

	V	V1	kg	V	V1	kg	V	V1	kg	V	V1	kg	C	Input	I	F	F1	F2	Type	Input	kg
315M L1	556	120	125	—	—	—	—	—	—	—	—	—	116	E		—	—	—	—	—	—
315M L2	348	80	55	—	—	—	456	80	85	—	—	—	81	D		232	185	1/4 G	6	B	35
315M L3	315	80	35	313	60	28	375	80	48	363	60	34	51	B	467	201	153	1/4 G	6	B	28
315M L4	239	48	15	—	—	—	276	48	17	—	—	—	37	A		145	95	1/4 G	5	A	16

315M L



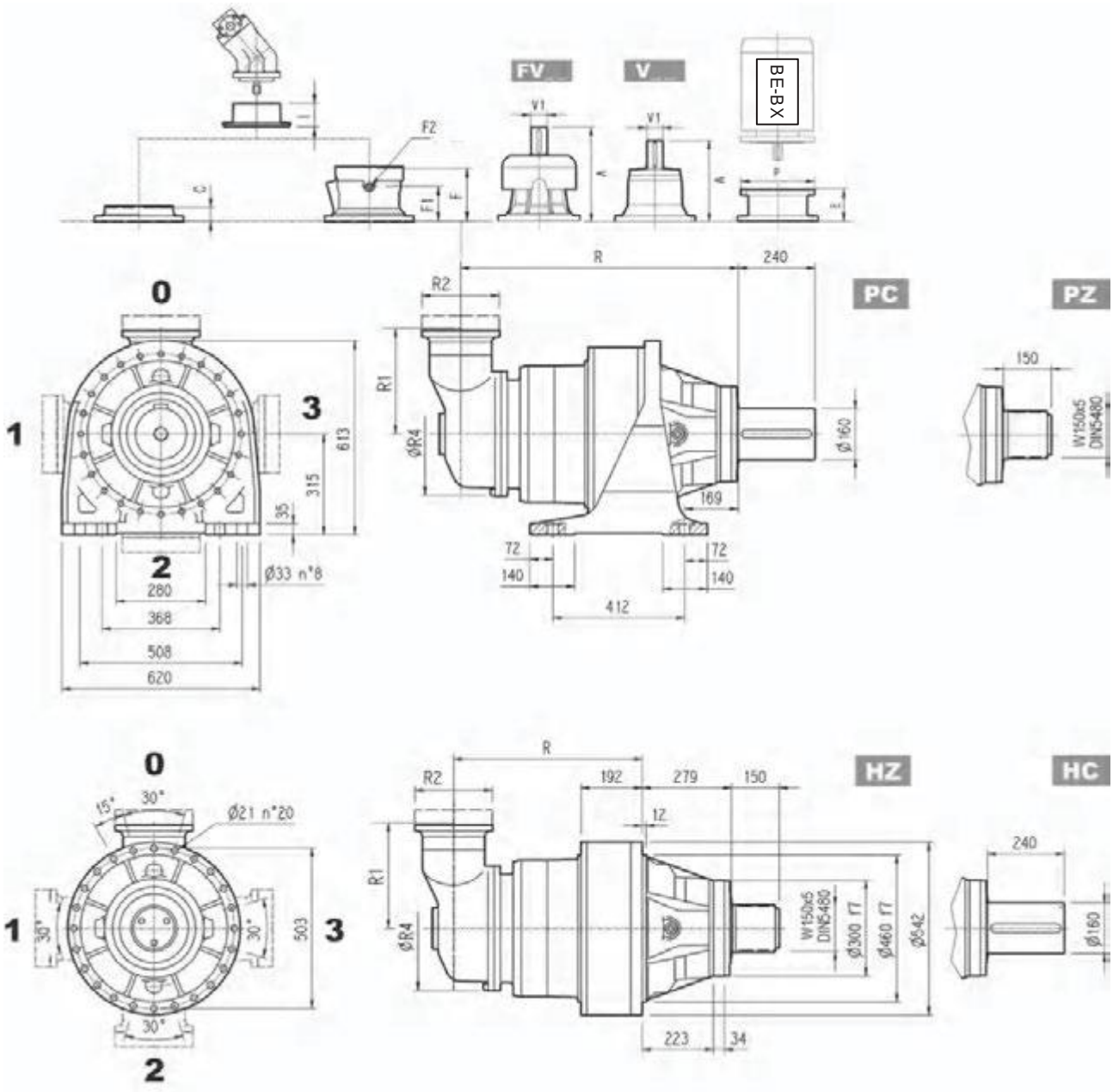
	PF 160		PF 180		PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1	E1	P1	E1	P1
315M L2	—	—	—	—	—	—	250	580	250	580
315M L3	—	—	—	—	197	530	227	530	227	550
315M L4	165	400	165	400	195	400	195	450	—	—

NOTE: For R design contact Bonfiglioli Technical service

FP	M_{2max} = 135000 Nm

	P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P
315M L2	—	—	—	—	—	—	267	400	297	450	297	550
315M L3	—	—	—	—	195	350	186	400	216	450	215	550
315M L4	114	300	144	350	144	350	174	400	—	—	—	—

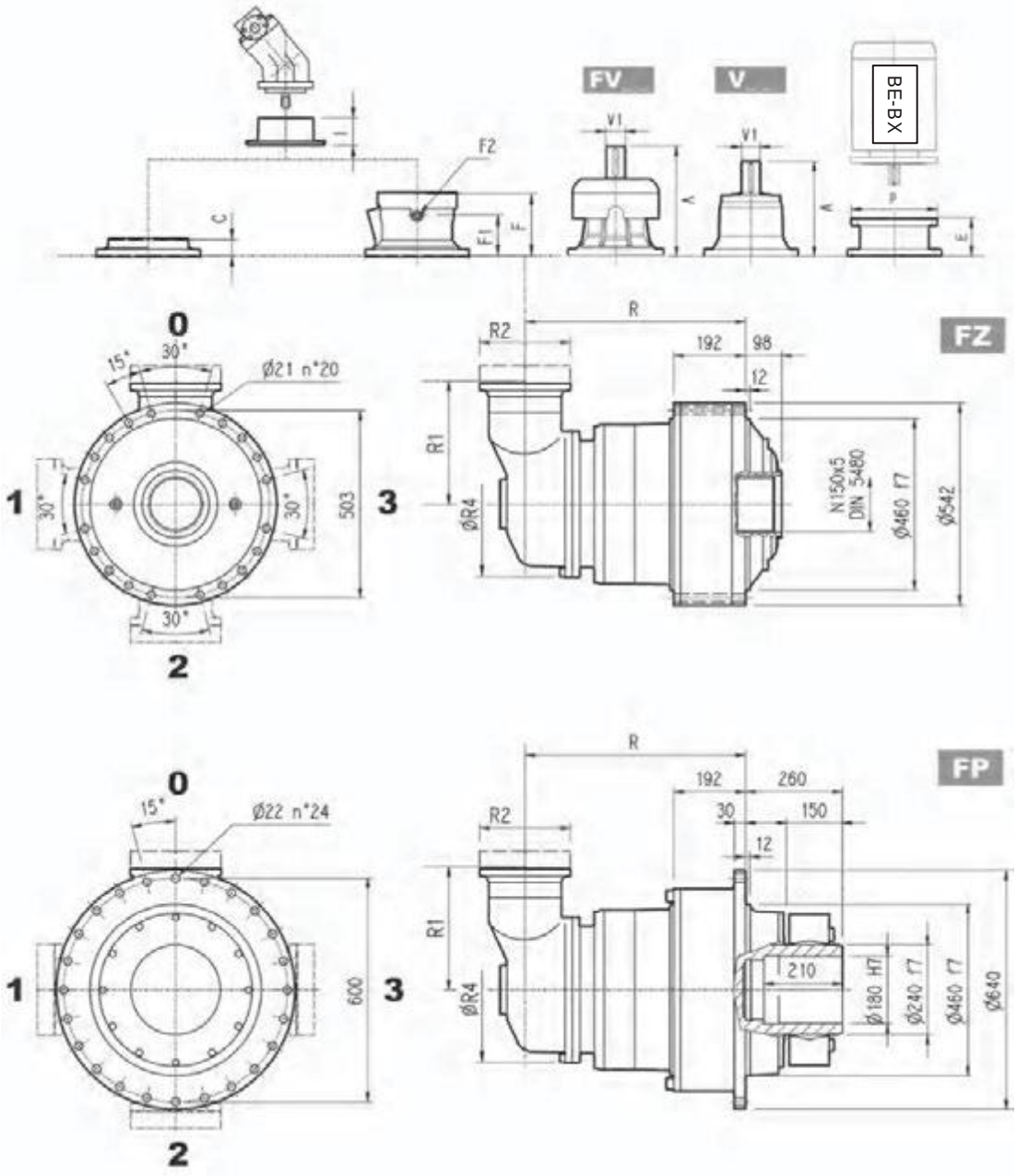
315M R

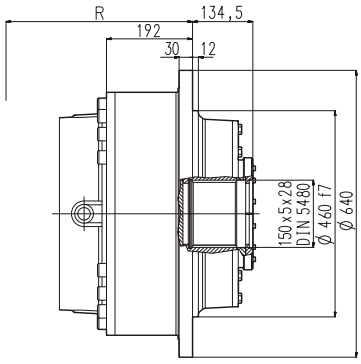


	R				R1	R2	R4	Kg			
	PC-PZ	HC-HZ	FZ - FZP	FP				PC-PZ	HC-HZ	FZ - FZP	FP
315M R3 (B)	890	611	611	611	345	292	400	720	590	500	550
315M R3 (C)	890	611	611	611	390	292	480	730	600	510	560
315M R4	917	638	638	638	225	245	345	680	550	460	510

	V	V1	Kg	V	V1	Kg	V	V1	Kg	V	V1	Kg	C	Input	I	F	F1	F2	Type	Input	Kg
315M R3 (B)	307	60	23	—	—	—	357	60	28	—	—	—	45	B		195	147	1/4 G	6	B	28
315M R3 (C)	307	60	23	—	—	—	357	60	28	—	—	—	45	B		195	147	1/4 G	6	B	28
315M R4	239	48	15	—	—	—	276	48	17	—	—	—	37	A	467	145	95	1/4 G	5	A	16

315M R

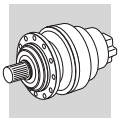




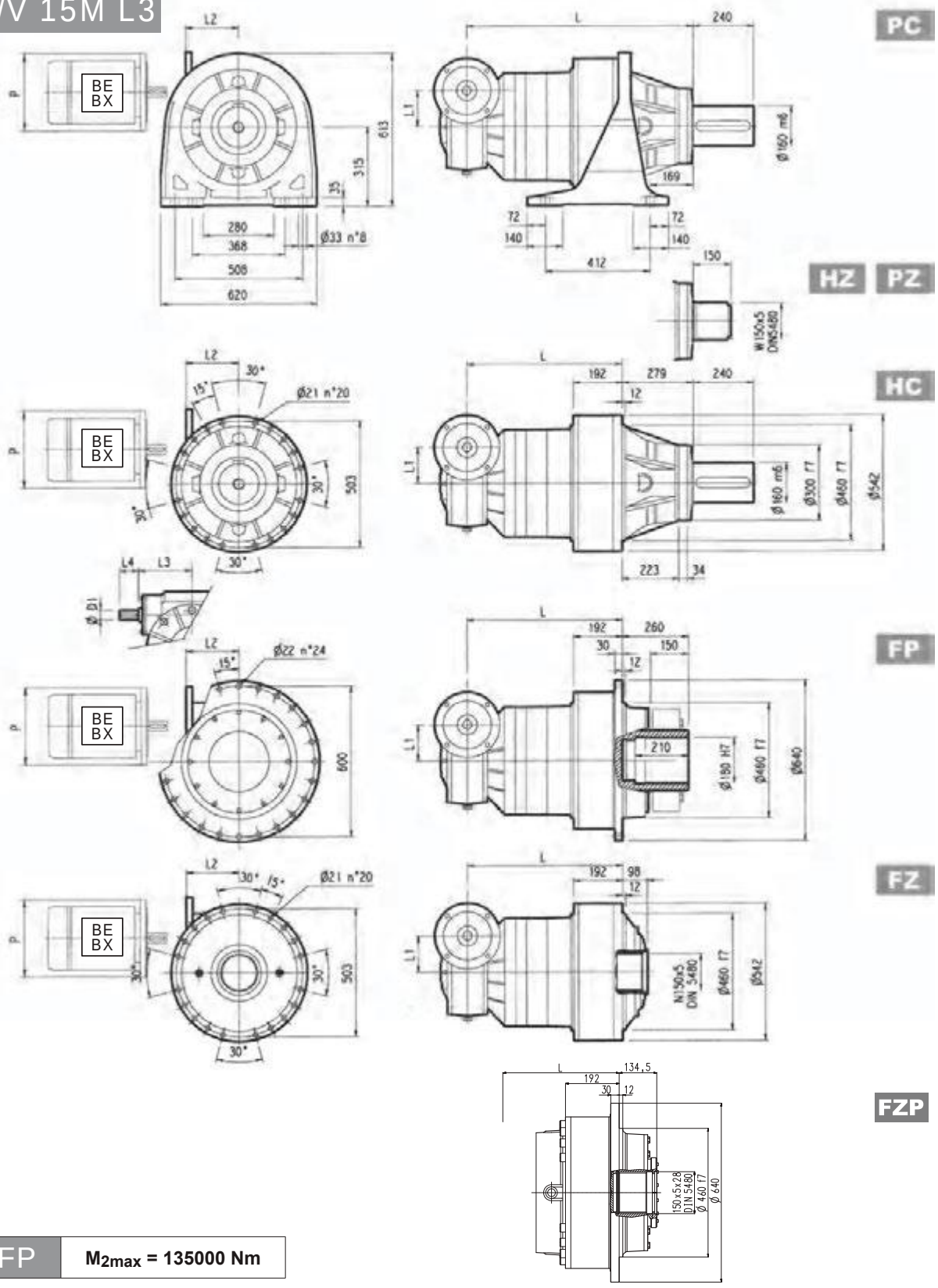
FP

M_{2max} = 135000 Nm

	P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P
315M R3 (B)	—	—	—	—	152	350	182	400	212	450	193	550
315M R3 (C)	—	—	—	—	152	350	182	400	212	450	193	550
315M R4	114	300	144	350	144	350	174	400	—	—	—	—



3/V 15M L3

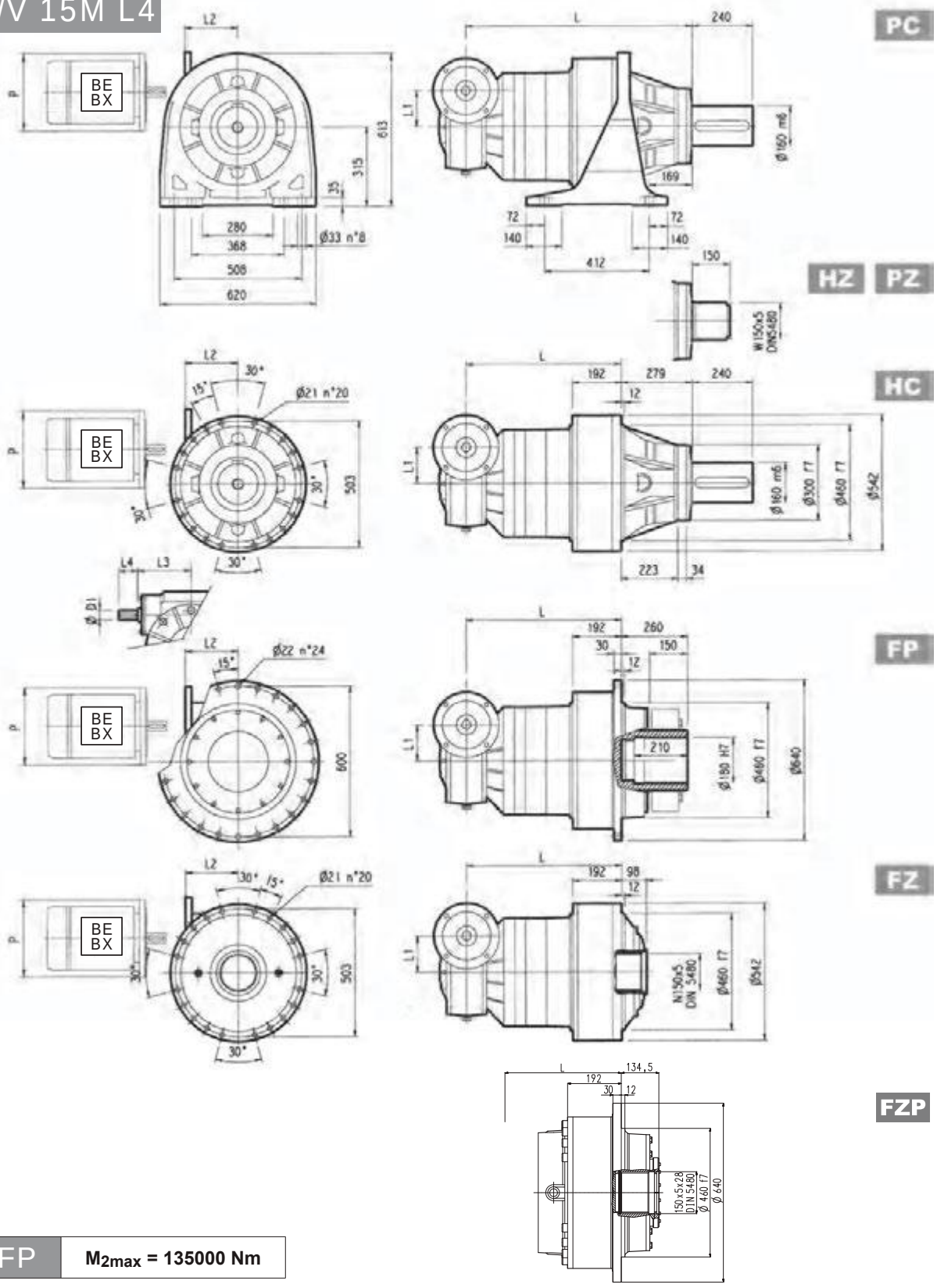


FP M_{2max} = 135000 Nm

	L				L1	L2	D1	L3	L4	Kg			
	PC - PZ	HC - HZ	FZ - FZP	FP						PC - PZ	HC - HZ	FZ - FZP	FP
3/V 15M L3	885	606	606	606	210	—	48	230	110	800	670	575	625

	P100	P112	P132		P160		P180		P200		P225	
	P	P	L2	P	L2	P	L2	P	L2	P	L2	P
3/V 15M L3	—	—	485	300	460	350	460	350	485	400	490	450

3/V 15M L4



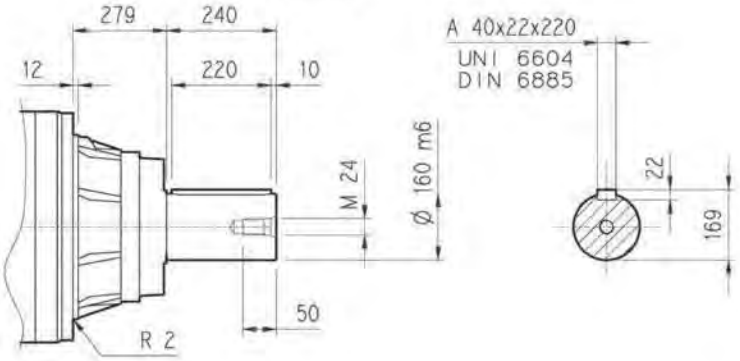
FP | **M_{2max} = 135000 Nm**

	L				L1	L2	D1	L3	L4	Kg			
	PC - PZ	HC - HZ	FZ - FZP	FP						PC - PZ	HC - HZ	FZ - FZP	FP
3/V 15M L4	989	710	710	710	150	190	35	185	65	690	560	470	520

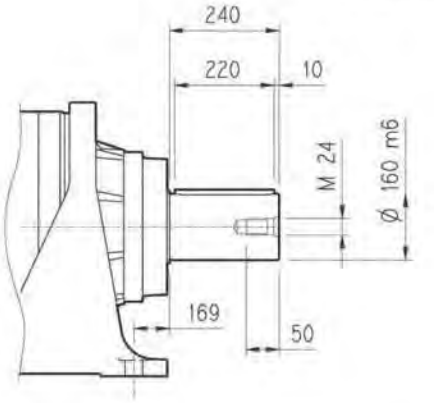
	P100	P112	P132		P160		P180		P200		P225	
	P	P	L2	P	L2	P	L2	P	L2	P	L2	P
3/V 15M L4	250	250	—	300	—	350	—	—	—	—	—	—

315M L | 315M R | 3/V 15M L

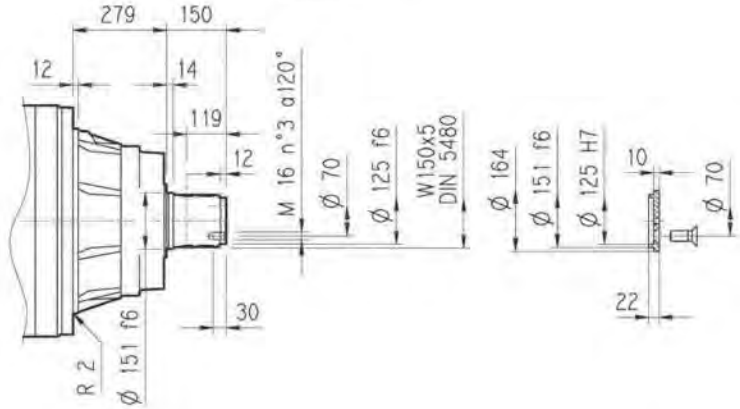
HC



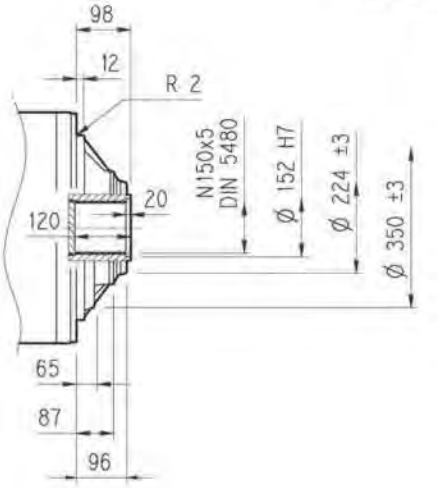
PC



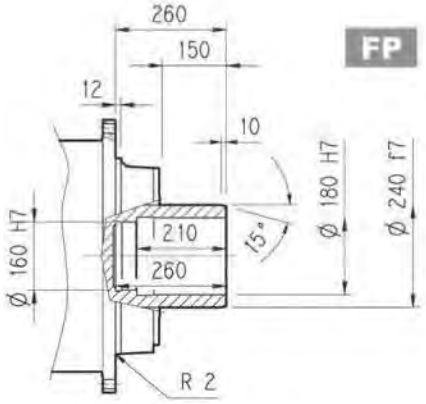
HZ



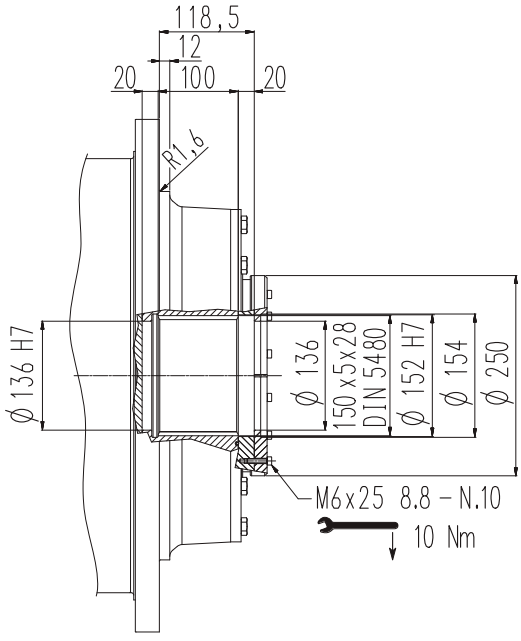
FZ



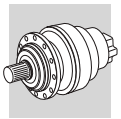
FP



FZP



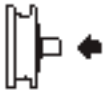
FP	M_{2max} = 135000 Nm

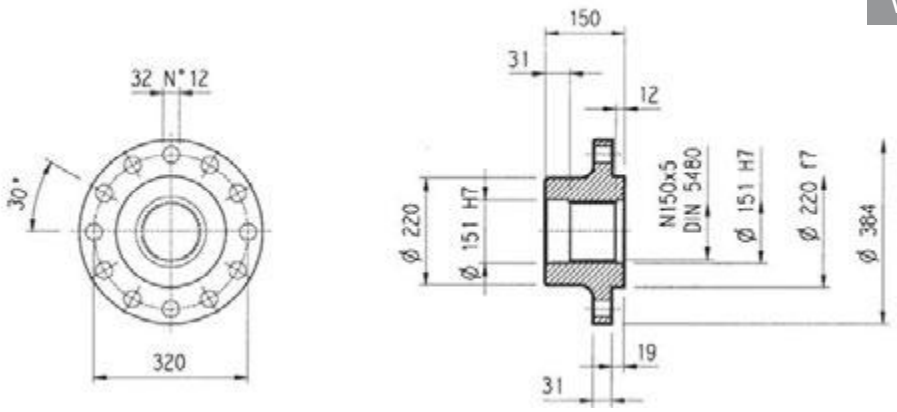


315M L | 315M R | 3/V 15M L

Flange

W0A

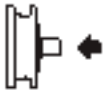


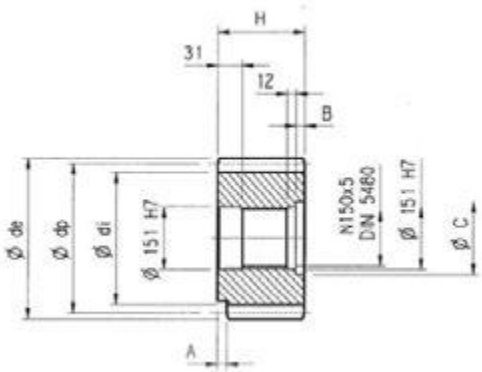


Material: Steel C40

Pinions

P...



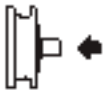


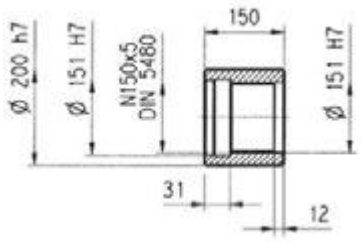
α = 20°

	m	z	x	dp	di	de	H	A	B	C	Material
PRG1	18	16	0.500	288	261	342	160	—	10	166	Steel 18NiCrMo5 case hardened
PRG2	18	16	0.617	288	271	339	150	30	—	—	Steel 39NiCrMo3 hardened and tempered

Sleeve coupling

M0A

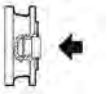


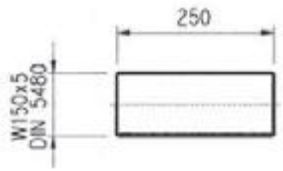


Material: Steel 16CrNi4

Splined bars

B0A

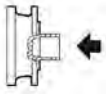


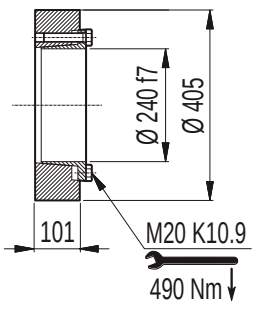


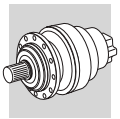
Material: Case hardening steel 18NiCrMo5 UNI 5331
must be case hardened 50-55 HRC

Shrink disc

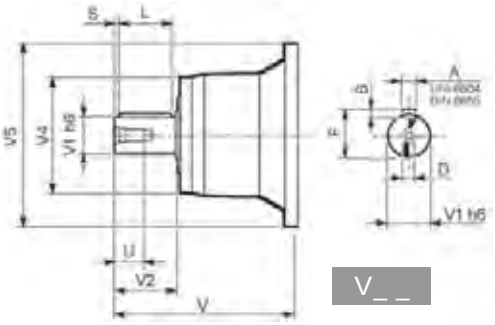
G0A



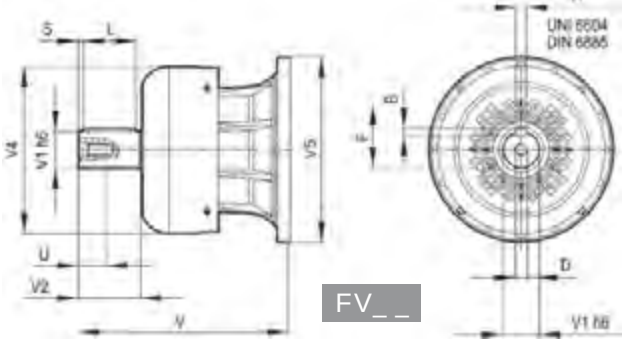




315M L 315M R



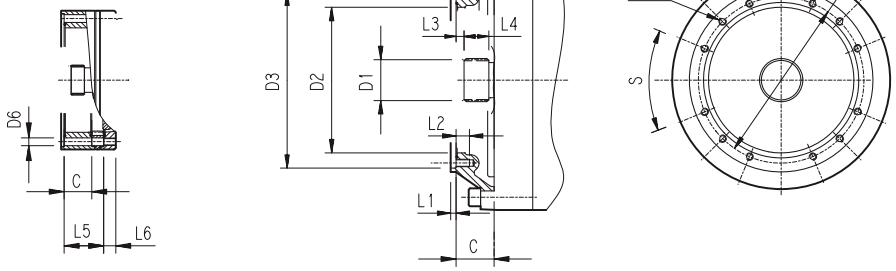
V__



FV__

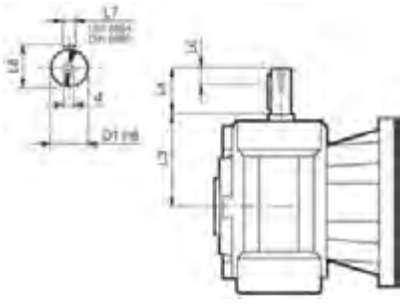
		V	V1	V2	V4	V5	A	B	F	L	S	D	U
315M L1	**V15B**	556	120	210	230	542	32	18	127	180	15	M24	50
315M L2	**V11B**	348	80	130	200	418	22	14	85	110	10	M16	36
	FV11B	456	80	130	347.5	428	22	14	85	110	10	M16	36
315M L3	**V07B**	315	80	130	200	345	22	14	85	110	10	M16	36
	FV07B	375	80	130	347.5	348	22	14	85	110	10	M16	36
	V07A	313	60	105	155	345	18	11	64	90	7.5	M16	36
	FV07A	363	60	105	309	348	18	11	64	90	7.5	M16	36
315M L4	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36
315M R3 (B) (C)	**V06B**	307	60	105	155	292	18	11	64	90	7.5	M16	36
	FV06B	357	60	105	309	292	18	11	64	90	7.5	M16	36
315M R4	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36

315M L 315M R



		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
315M L1	**V9AE**	116	100x94 DIN 5482	340	412 H7	390	M16 n°18	—	7	30	8	55	—	—	20°	20°	E
315M L2	**V9AD**	81	80x74 DIN 5482	270	335 H7	314	M16 n°8	—	5	30	8.5	40	—	—	60°	30°	D
315M L3	**V9AB**	51	58x53 DIN 5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B
315M L4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	—	4	18	9	18	—	—	45°	45°	A
315M R4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	11	4	18	9	18	—	—	45°	45°	A
315M R3 (B) (C)	**V9AB**	45	58x53 DIN 5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B

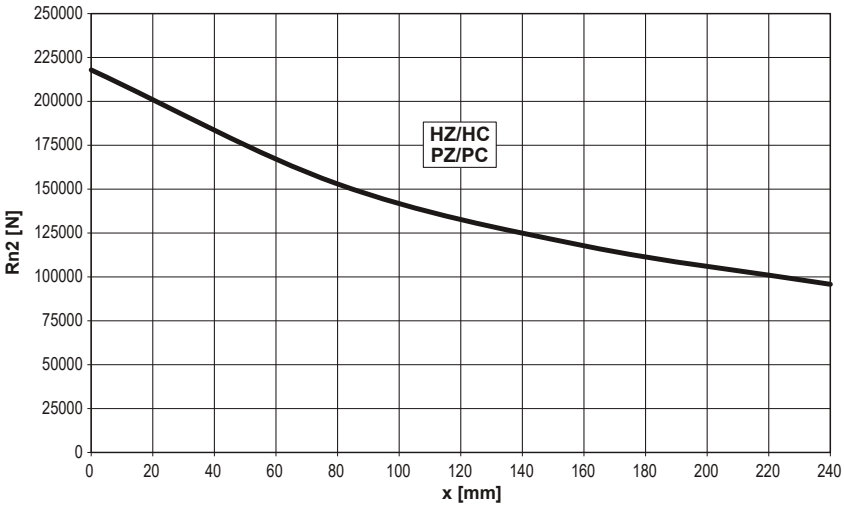
3/V 15M L

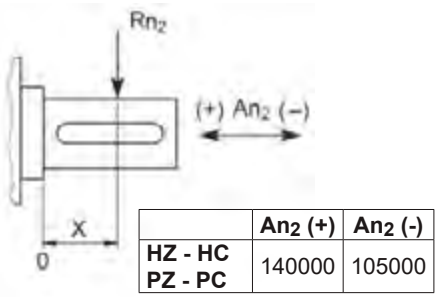


	D1 h6	L3	L4	L6	L7	L8	d
3/V 15M L3_HS	48	230	110	40	14	51.5	M16
3/V 15M L4_HS	35	185	65	20	10	38	M8

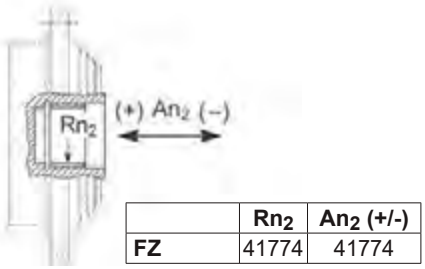
315M L | 315M R | 3/V 15M L

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$





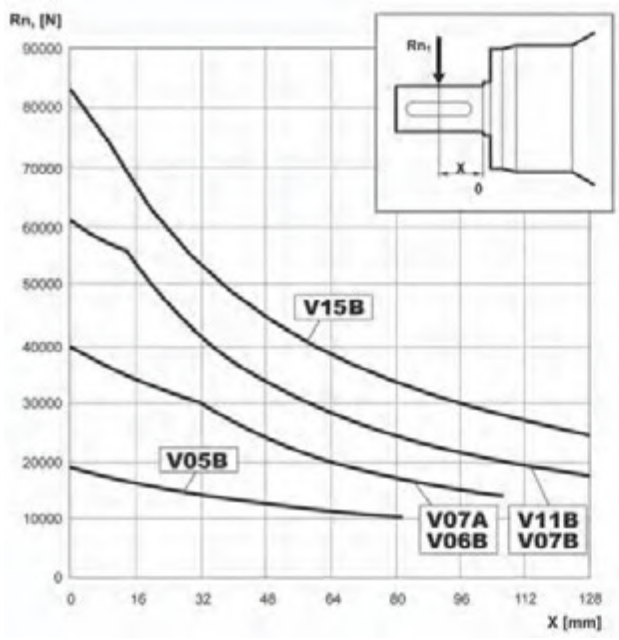
	An2 (+)	An2 (-)
HZ - HC PZ - PC	140000	105000

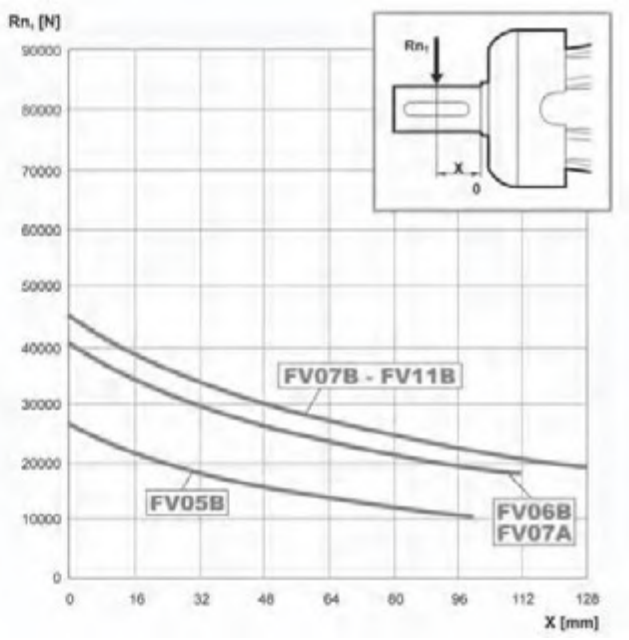


	Rn2	An2 (+/-)
FZ	41774	41774

Load corrective factor fh_2 on shafts	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
	fh_2	FZ	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HZ - HC - PZ - PC	**2.00**	**1.52**	**1.23**	**1.00**	**0.62**	**0.50**

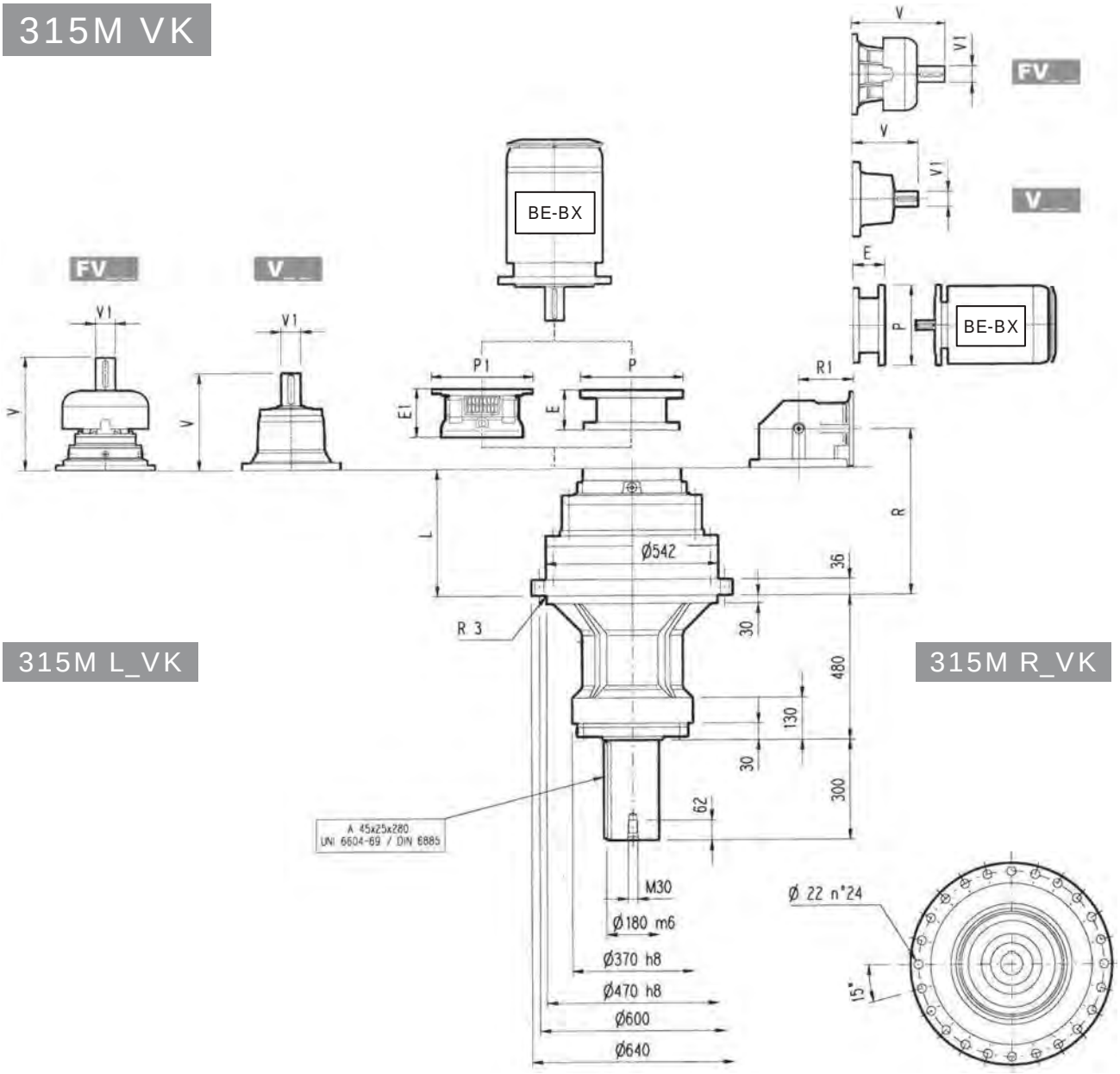
Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$





Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

315M VK



315M L_VK

315M R_VK

	PF 160		PF 180		PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1	E1	P1	E1	P1
315M L2	—	—	—	—	—	—	250	580	250	580
315M L3	—	—	—	—	197	530	227	530	227	550
315M L4	165	400	165	400	195	400	195	450	—	—

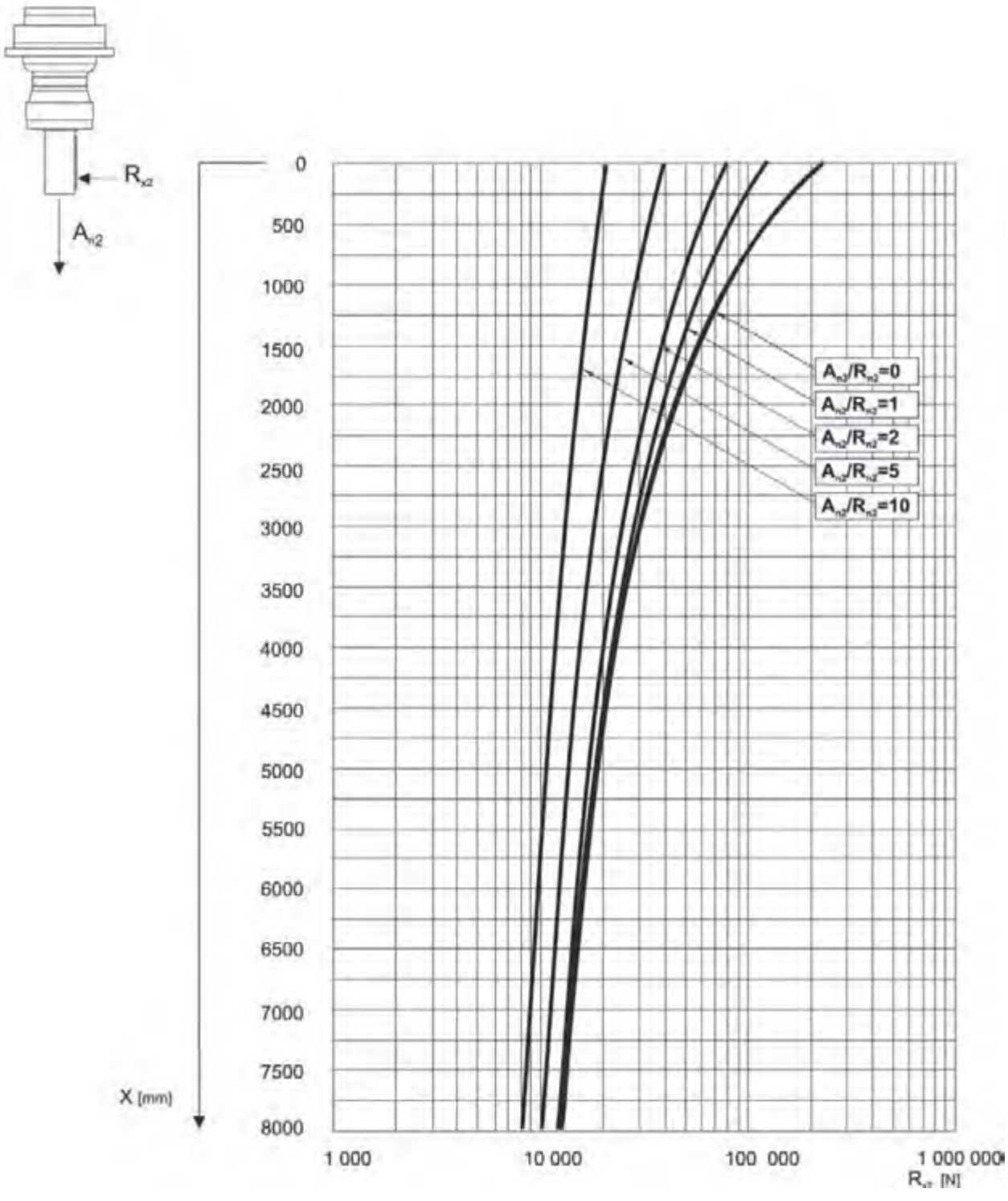
NOTE: For R design contact Bonfiglioli Technical service

	L		V	V1		V	V1		V	V1		V	V1		P132		P160		P180		P200		P225		P250	
															E	P	E	P	E	P	E	P	E	P	E	P
315M L2	386	650	348	80	55	—	—	—	456	80	85	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
315M L3	519	700	315	80	35	313	60	28	375	80	48	363	60	34	—	—	—	—	195	350	186	400	216	450	215	550
315M L4	608	710	239	48	15	—	—	—	276	48	17	—	—	—	114	300	144	350	144	350	174	400	—	—	—	—

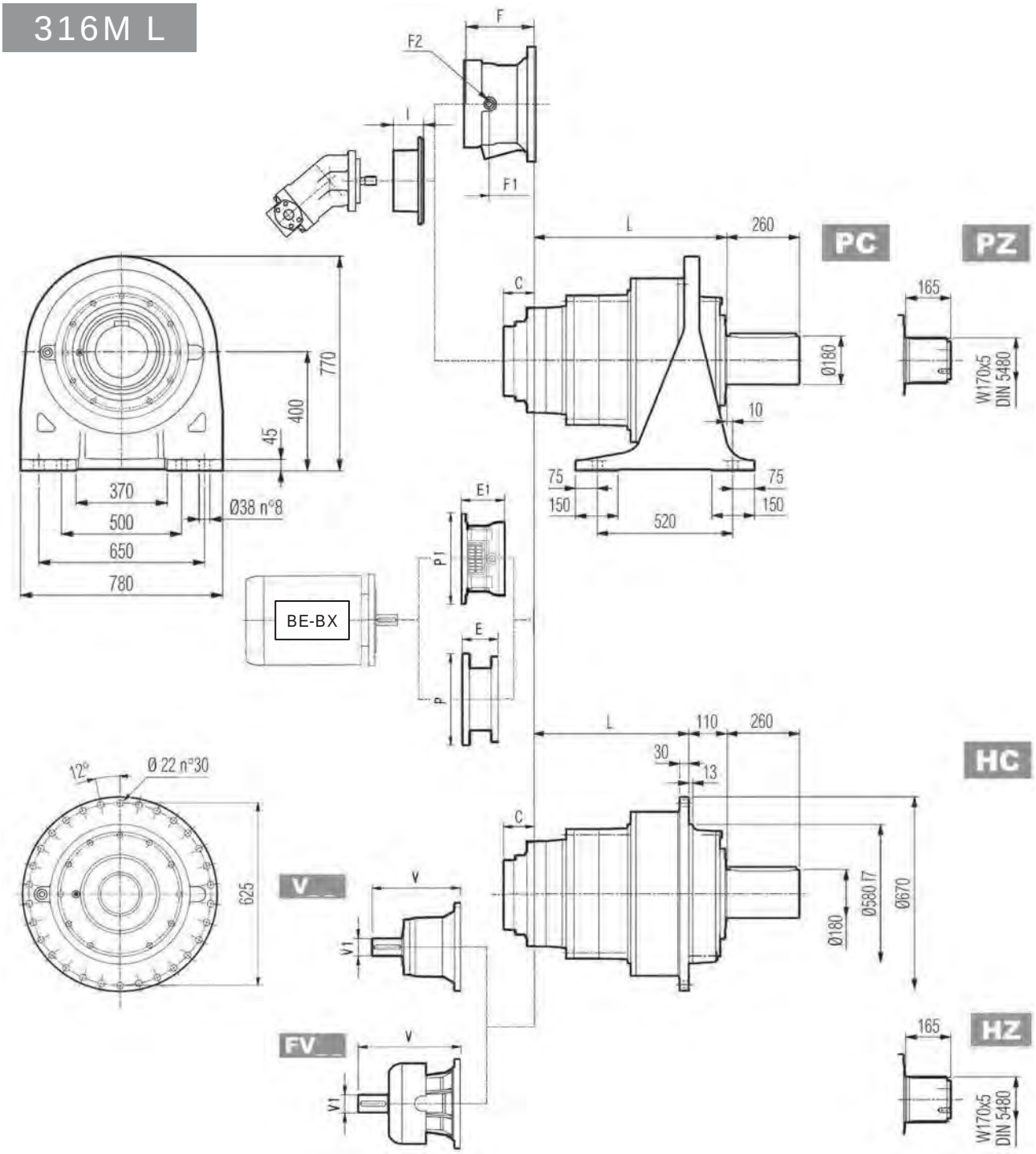
	R	R1		V	V1		V	V1		V	V1		V	V1		P132		P160		P180		P200		P225		P250	
																E	P	E	P	E	P	E	P	E	P	E	P
315M R3 (B)	611	345	720	307	60	23	—	—	—	357	60	28	—	—	—	—	—	—	—	152	350	182	400	212	450	193	550
315M R3 (C)	611	390	730	307	60	23	—	—	—	357	60	28	—	—	—		—	—	—	152	350	182	400	212	450	193	550
315M R4	638	225	690	239	48	15	—	—	—	276	48	17	—	—	—	114	300	144	350	144	350	174	400	—	—	—	—

315M VK

The diagram below allows the calculation of permitted overhung load R_{x2} on the output shaft of gearbox, with radial force applying at a distance x from shaft shoulder.
The curves are relevant to value resulting from the relationship of trust load A_{n2} to radial load R_{n2}, based on n_2 = 10 min^{-1} and 10000 hrs theoretical lifetime.



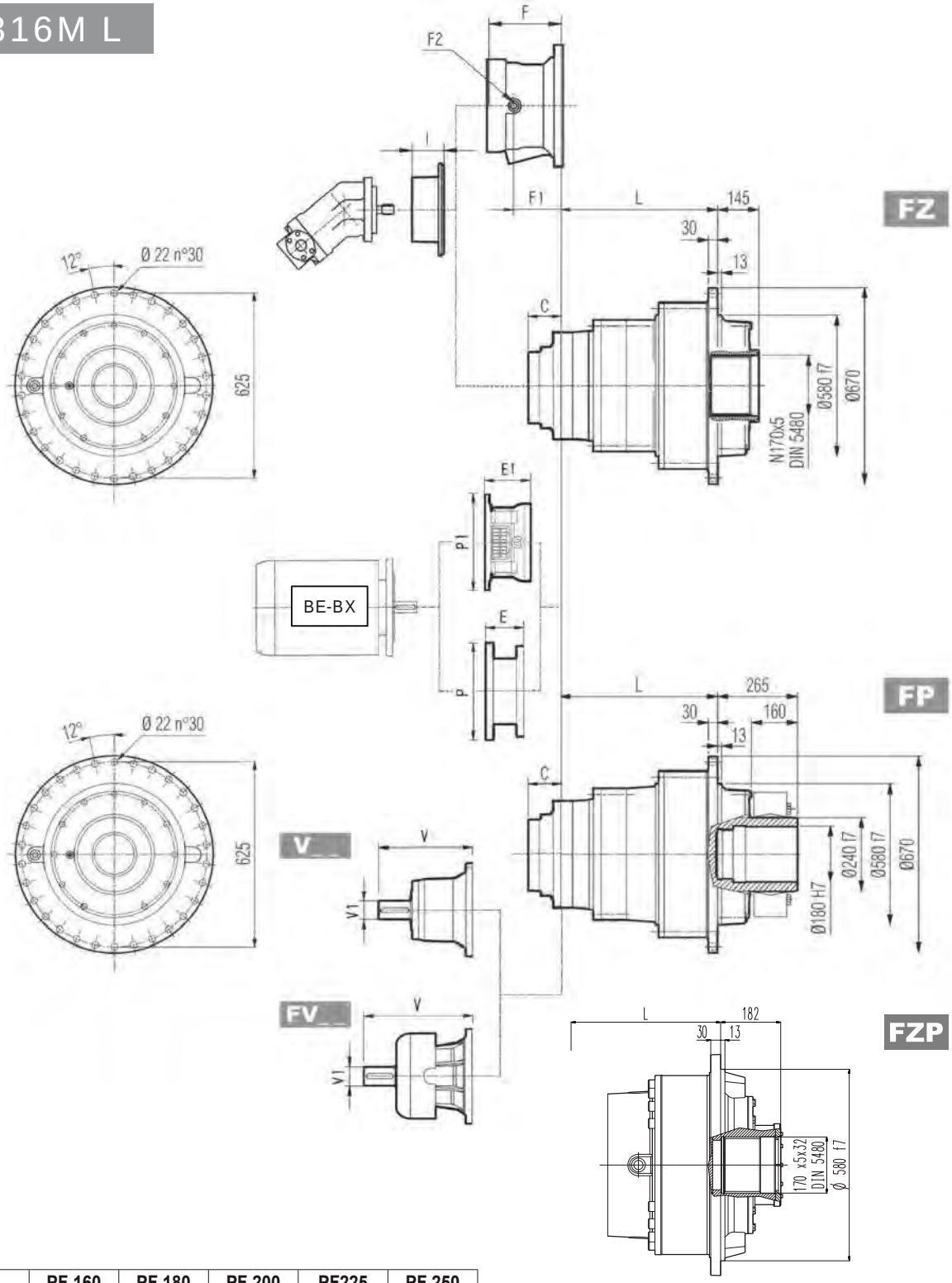
316M L



	L				Kg			
	PC - PZ	HC - HZ	FZ - FZP	FP	PC - PZ	HC - HZ	FZ - FZP	FP
316M L1	289	179	179	179	700	500	430	450
316M L2	541	431	431	431	790	590	520	540
316M L3	674	564	564	564	840	640	570	590
316M L4	763	653	653	653	860	660	590	610

	V	V1	Kg	V	V1	Kg	V	V1	Kg	V	V1	Kg	C	Input	I	F	F1	F2	Type	Input	Kg
316M L1	—	—	—	—	—	—	—	—	—	—	—	—	156	E		—	—	—	—	—	—
316M L2	348	80	55	—	—	—	456	80	85	—	—	—	81	D		—	—	—	—	—	—
316M L3	315	80	35	313	60	28	375	80	48	363	60	34	51	B	467	201	153	1/4 G	6	B	28
316M L4	239	48	15	—	—	—	276	48	17	—	—	—	37	A		145	95	1/4 G	5	A	16

316M L



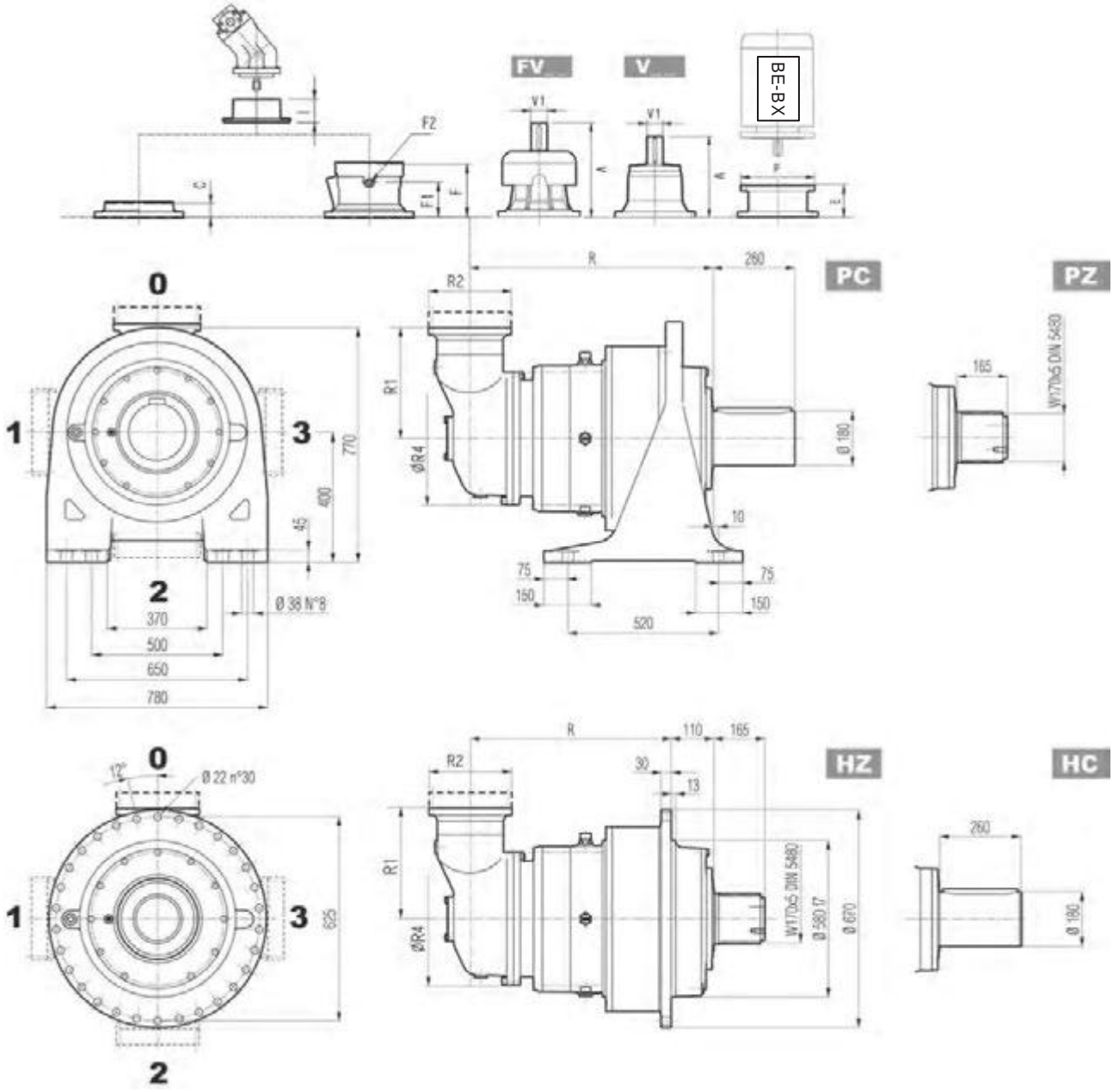
	PF 160		PF 180		PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1	E1	P1	E1	P1
316M L2	—	—	—	—	—	—	250	580	250	580
316M L3	—	—	—	—	197	530	227	530	227	550
316M L4	165	400	165	400	195	400	195	450	—	—

NOTE: For R design contact Bonfiglioli Technical service

FP	M_{2max} = 178000 Nm

	P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P
316M L2	—	—	—	—	—	—	267	400	297	450	297	550
316M L3	—	—	—	—	195	350	186	400	216	450	215	550
316M L4	114	300	144	350	144	350	174	400	—	—	—	—

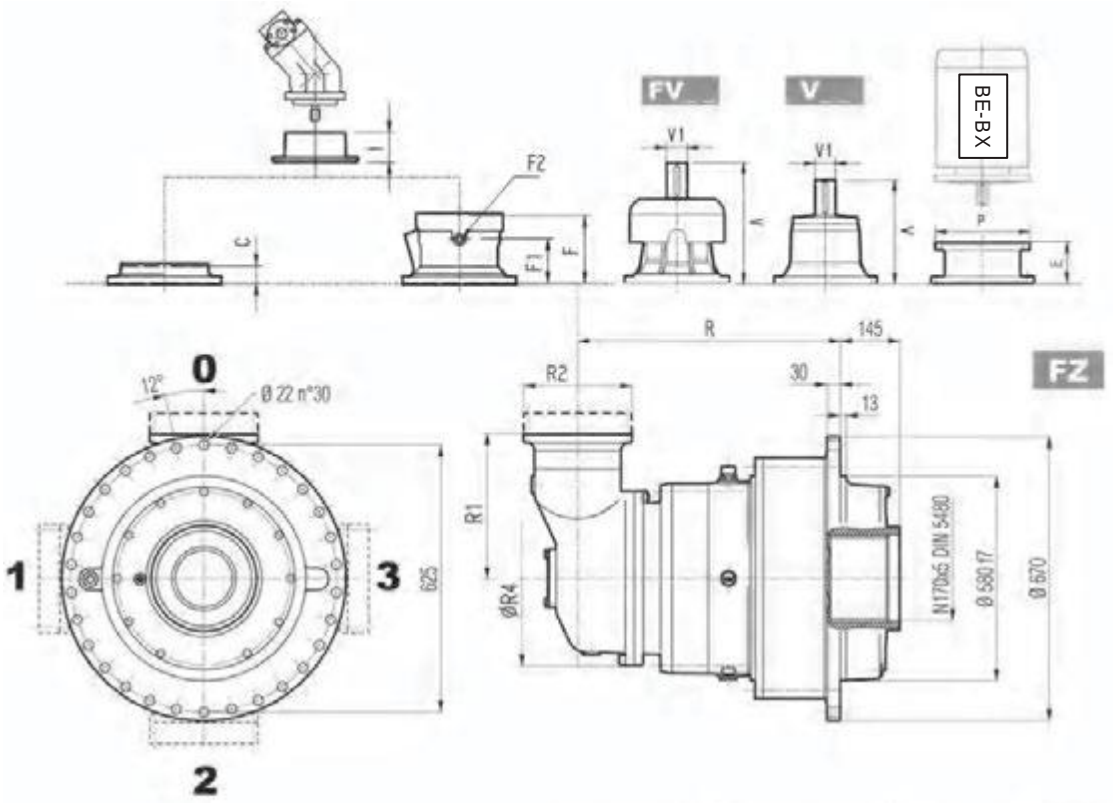
316M R

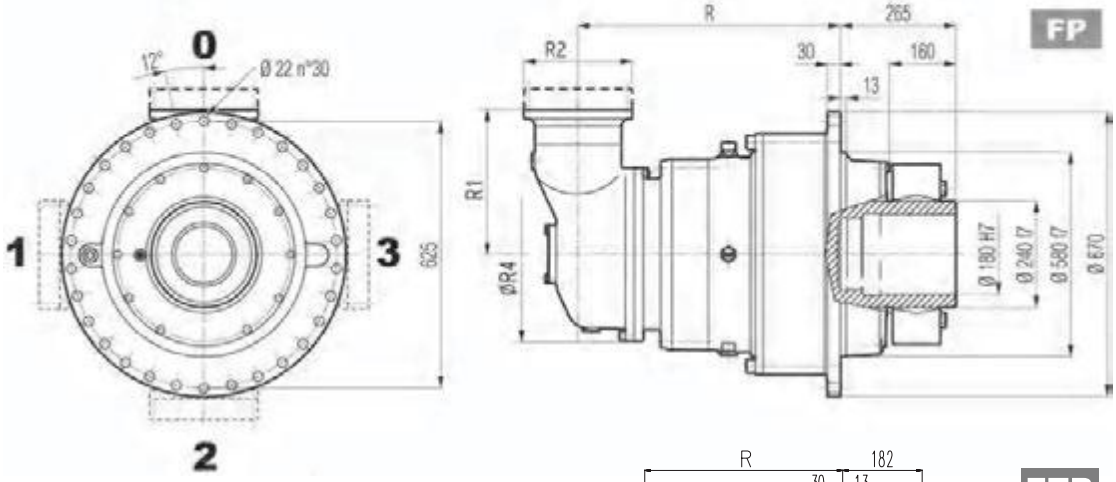


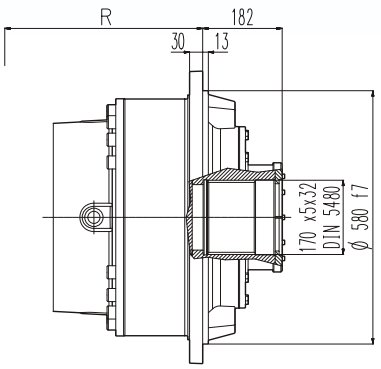
	R				R1	R2	R4	Kg			
	PC-PZ	HC-HZ	FZ - FZP	FP				PC-PZ	HC-HZ	FZ - FZP	FP
316M R3 (B)	766	656	656	656	345	292	400	910	710	640	660
316M R3 (C)	766	656	656	656	390	292	480	920	720	650	670
316M R4	793	683	683	683	225	245	345	890	690	620	640

	V	V1	Kg	V	V1	Kg	V	V1	Kg	V	V1	Kg	C	Input	I	F	F1	F2	Type	Input	Kg
316M R3 (B)	307	60	23	—	—	—	357	60	28	—	—	—	45	B		195	147	1/4 G	6	B	28
316M R3 (C)	307	60	23	—	—	—	357	60	28	—	—	—	45	B		195	147	1/4 G	6	B	28
316M R4	239	48	15	—	—	—	276	48	17	—	—	—	37	A	467	145	95	1/4 G	5	A	16

316M R



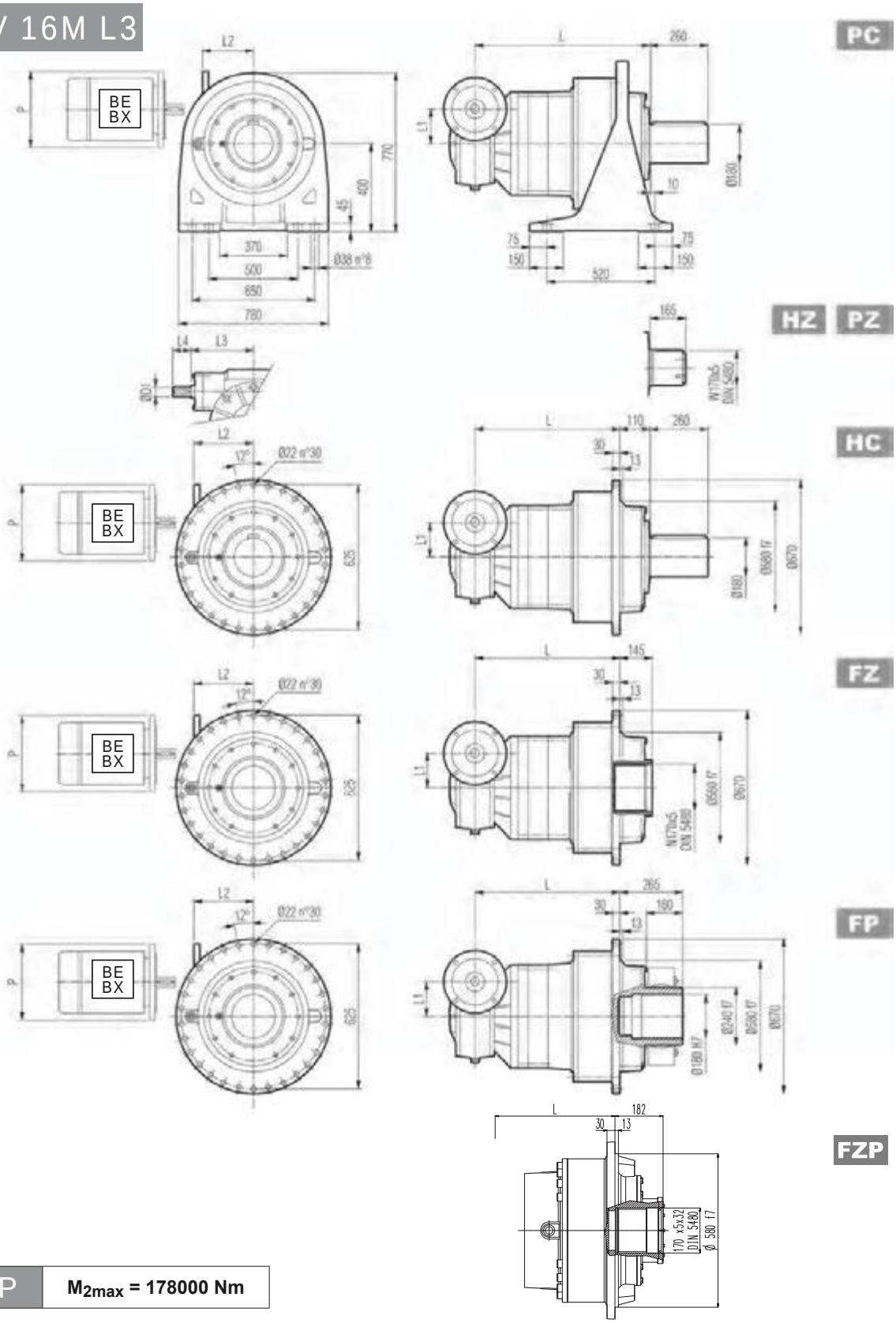




FP M_{2max} = 178000 Nm

	P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P
316M R3 (B)	—	—	—	—	152	350	182	400	212	450	193	550
316M R3 (C)	—	—	—	—	152	350	182	400	212	450	193	550
316M R4	114	300	144	350	144	350	174	400	—	—	—	—

3/V 16M L3

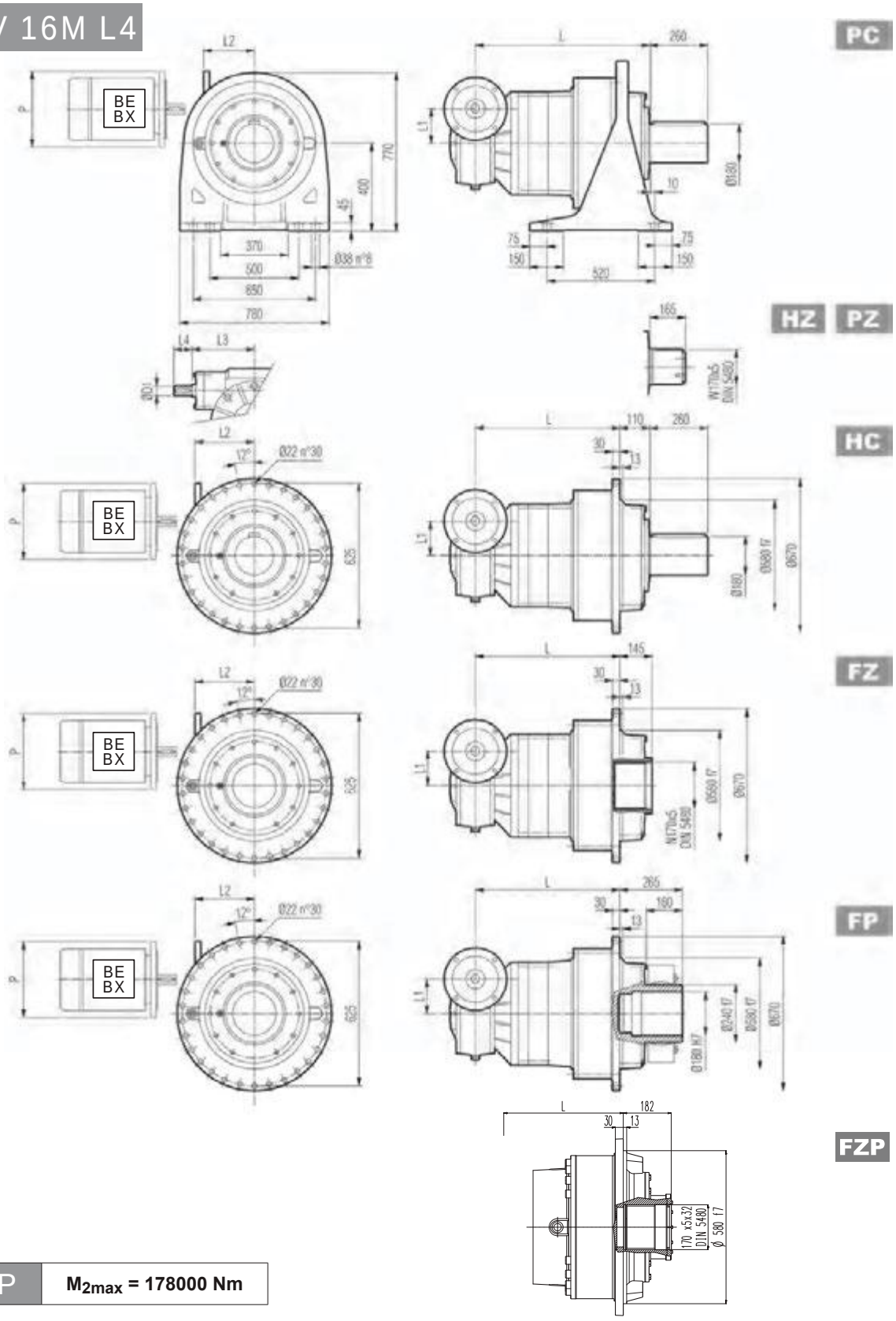


FP	M_{2max} = 178000 Nm

	L				L1	D1	L3	L4	kg			
	PC - PZ	HC - HZ	FZ - FZP	FP					PC - PZ	HC - HZ	FZ - FZP	FP
3/V 16M L3	812	702	702	702	250	55	274	110	1100	900	830	850

	P132		P160		P180		P200		P225	
	L2	P	L2	P	L2	P	L2	P	L2	P
3/V 16M L3	531	300	506	350	506	350	531	400	536	450

3/V 16M L4



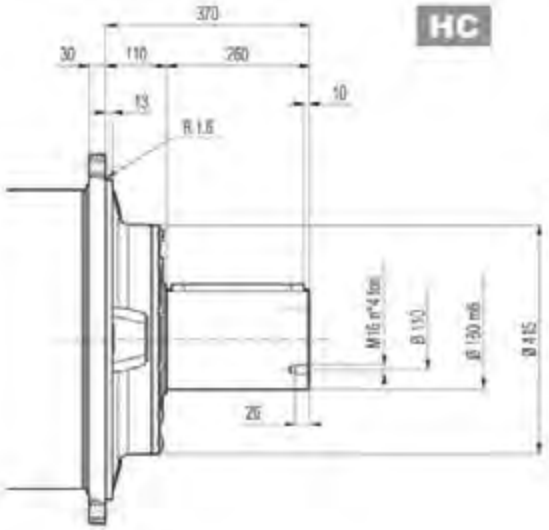
FP | M_{2max} = 178000 Nm

	L				L1	D1	L3	L4	kg			
	PC - PZ	HC - HZ	FZ - FZP	FP					PC - PZ	HC - HZ	FZ - FZP	FP
3/V 16M L4	865	755	755	755	150	35	185	65	900	700	630	650

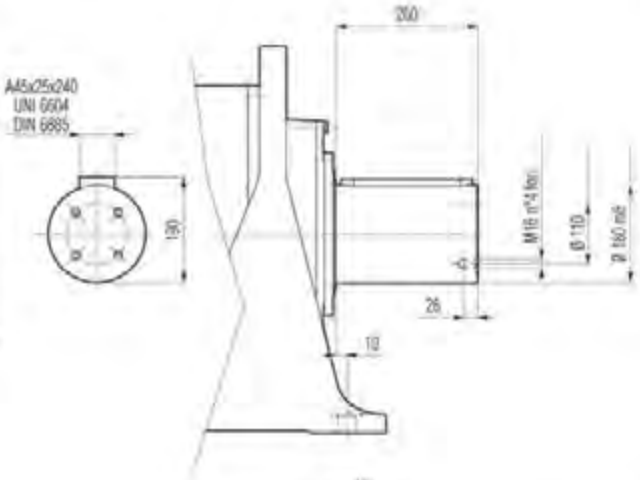
	P100		P112		P132		P160	
	L2	P	L2	P	L2	P	L2	P
3/V 16M L4	190	250	190	250	190	300	190	350

316M L | 316M R | 3/V 16M L

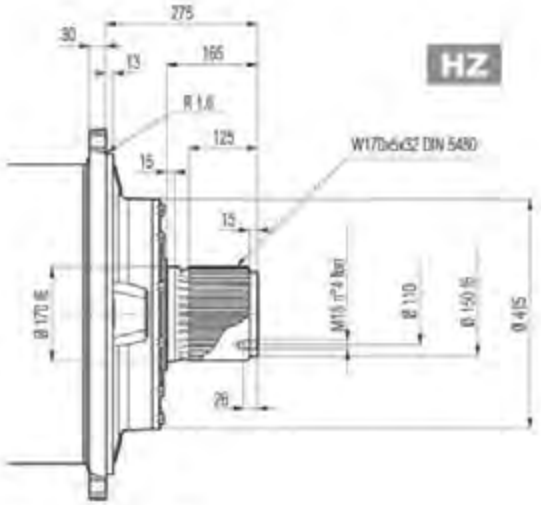
HC



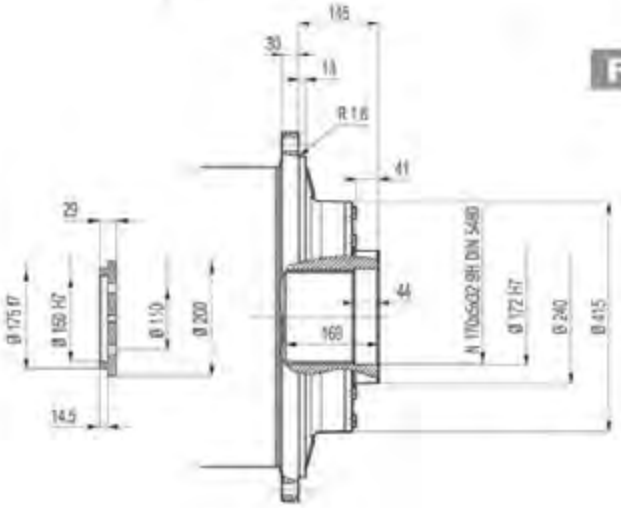
PC



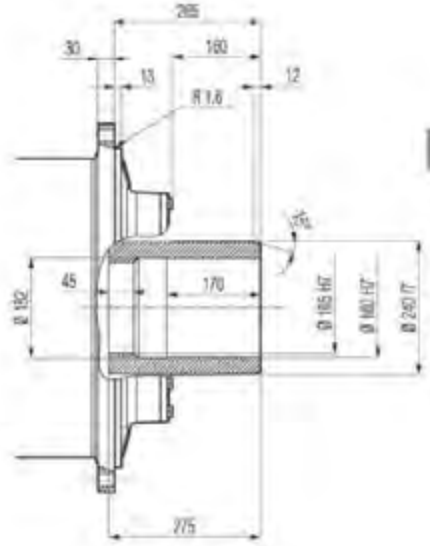
HZ



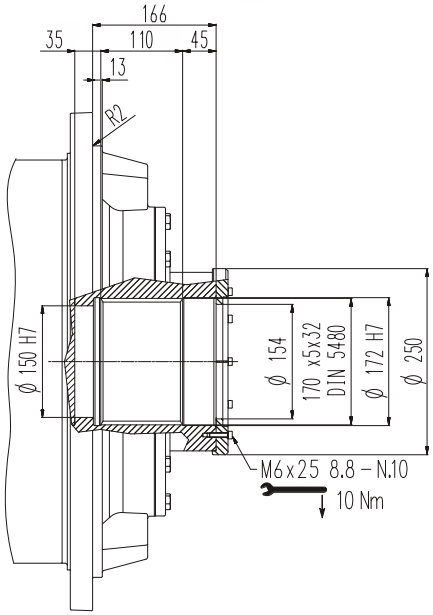
FZ



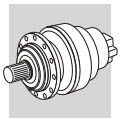
FP



FZP



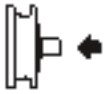
FP	M_{2max} = 178000 Nm

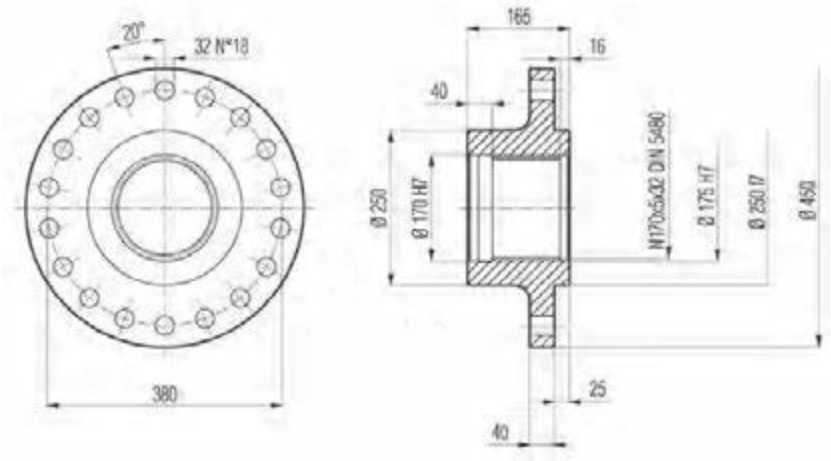


316M L | 316M R | 3/V 16M L

Flange

W0A

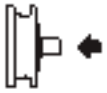


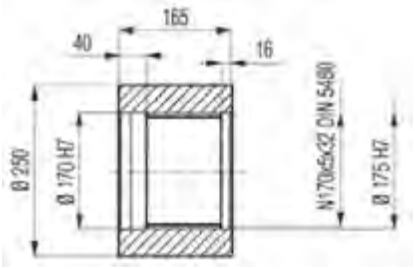


Material: Steel C40

Sleeve coupling

M0A

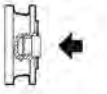


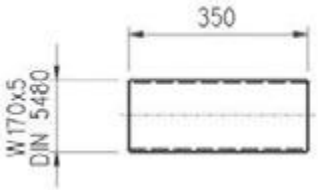


Material: Steel C40

Splined bars

B0A

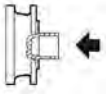


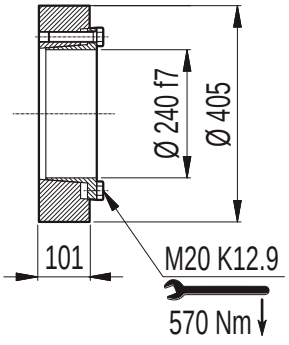


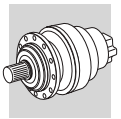
Material: Case hardening steel 18NiCrMo5 UNI 5331
must be case hardened 50-55 HRC

Shrink disc

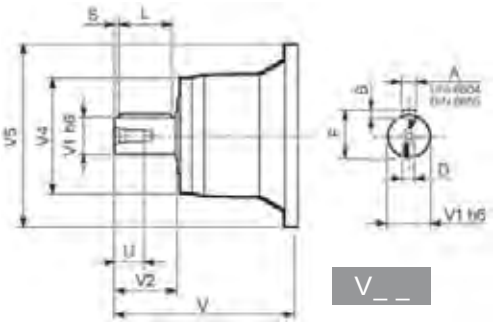
G0A

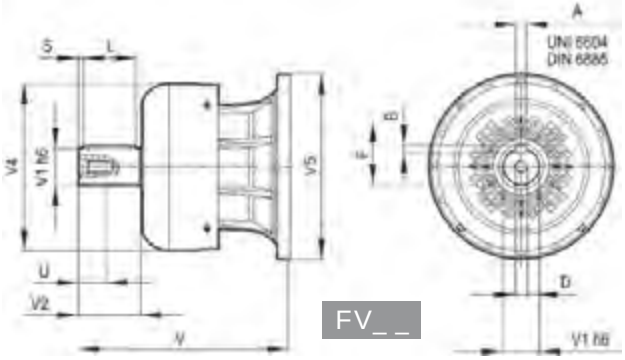






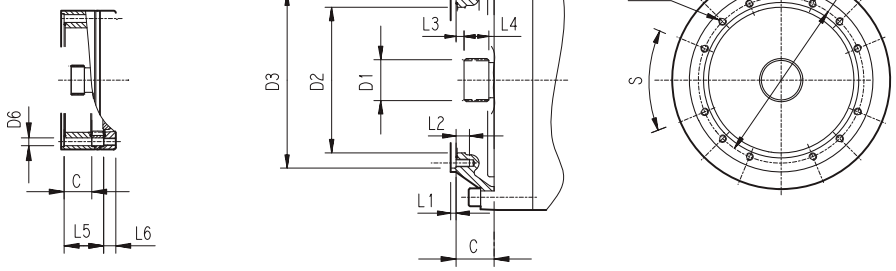
316M L 316M R





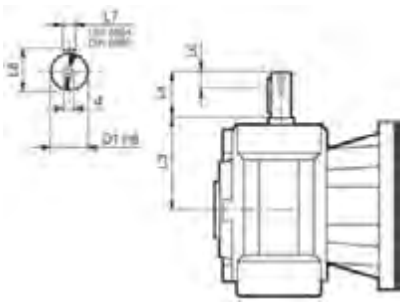
		V	V1	V2	V4	V5	A	B	F	L	S	D	U
316M L2	**V11B**	348	80	130	200	418	22	14	85	110	10	M16	36
	FV11B	456	80	130	347.5	428	22	14	85	110	10	M16	36
316M L3	**V07B**	315	80	130	200	345	22	14	85	110	10	M16	36
	FV07B	375	80	130	347.5	348	22	14	85	110	10	M16	36
	V07A	313	60	105	155	345	18	11	64	90	7.5	M16	36
	FV07A	363	60	105	309	348	18	11	64	90	7.5	M16	36
316M L4	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36
316M R3 (B) (C)	**V06B**	307	60	105	155	292	18	11	64	90	7.5	M16	36
	FV06B	357	60	105	309	292	18	11	64	90	7.5	M16	36
316M R4	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36

316M L 316M R



		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
316M L1	**V9AE**	116	100x94 DIN 5482	340	412 H7	390	M16 n° 18	—	7	30	8	55	—	—	20°	20°	E
316M L2	**V9AD**	81	80x74 DIN 5482	270	335 H7	314	M16 n° 8	—	5	30	8.5	40	—	—	60°	30°	D
316M L3	**V9AB**	51	58x53 DIN 5482	195	236 H7	222	M10 n° 12	—	4	18	11	22	—	—	45°	22.5°	B
316M L4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n° 8	—	4	18	9	18	—	—	45°	45°	A
316M R3 (B) (C)	**V9AB**	45	58x53 DIN 5482	195	236 H7	222	M10° 12	—	4	18	11	22	—	—	45°	22.5°	B
316M R4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n° 8	11	4	18	9	18	—	—	45°	45°	A

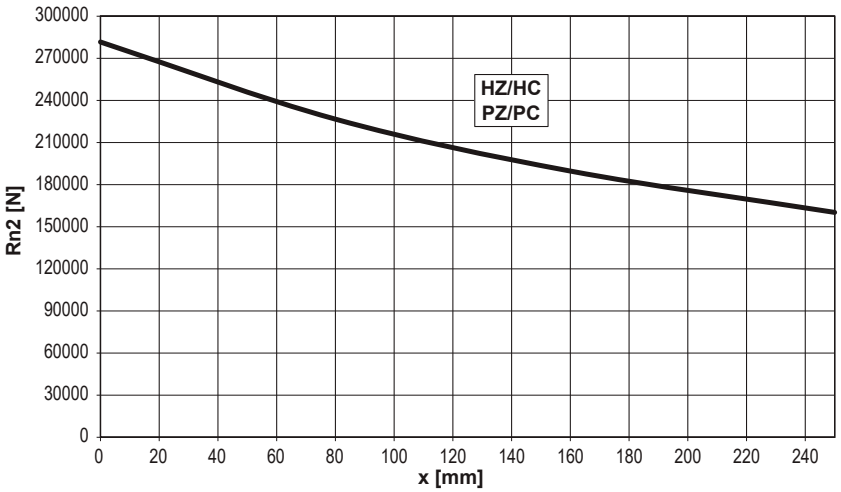
3/V 16M L

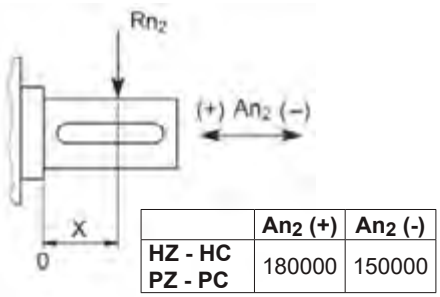


	D1 h6	L3	L4	L6	L7	L8	d
3/V 16M L3_HS	55	274	110	40	16	59	M16
3/V 16M L4_HS	35	185	65	20	10	38	M8

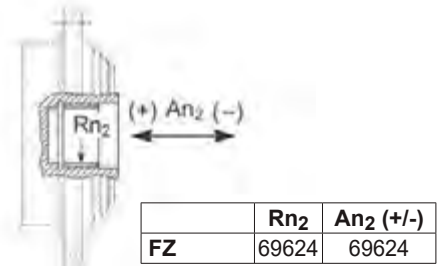
316M L | 316M R | 3/V 16M L

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$





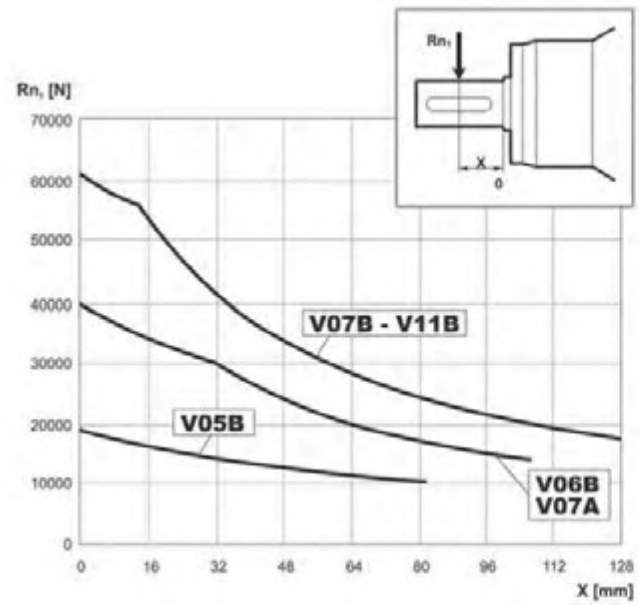
	An2 (+)	An2 (-)
HZ - HC PZ - PC	180000	150000

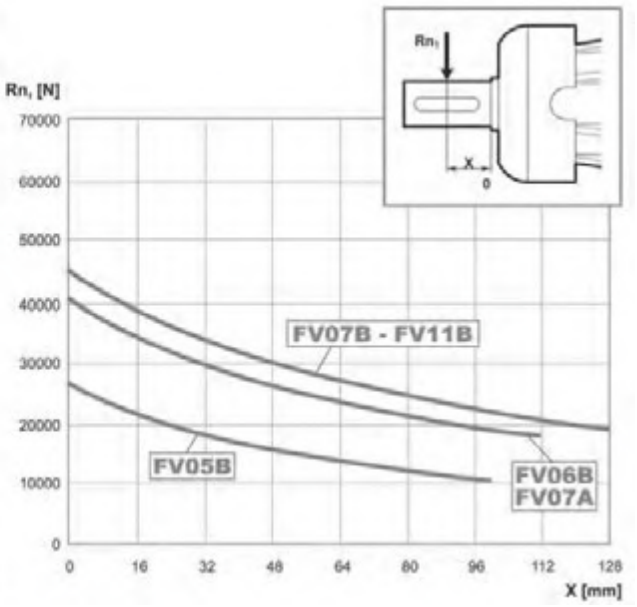


	Rn2	An2 (+/-)
FZ	69624	69624

	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
Load corrective factor fh_2 on shafts	fh_2	FZ	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HC - PC	**1.16**	**1.00**	**1.00**	**1.00**	**0.62**	**0.50**
		HZ - PZ	**1.19**	**1.02**	**1.02**	**1.00**	**0.62**	**0.50**

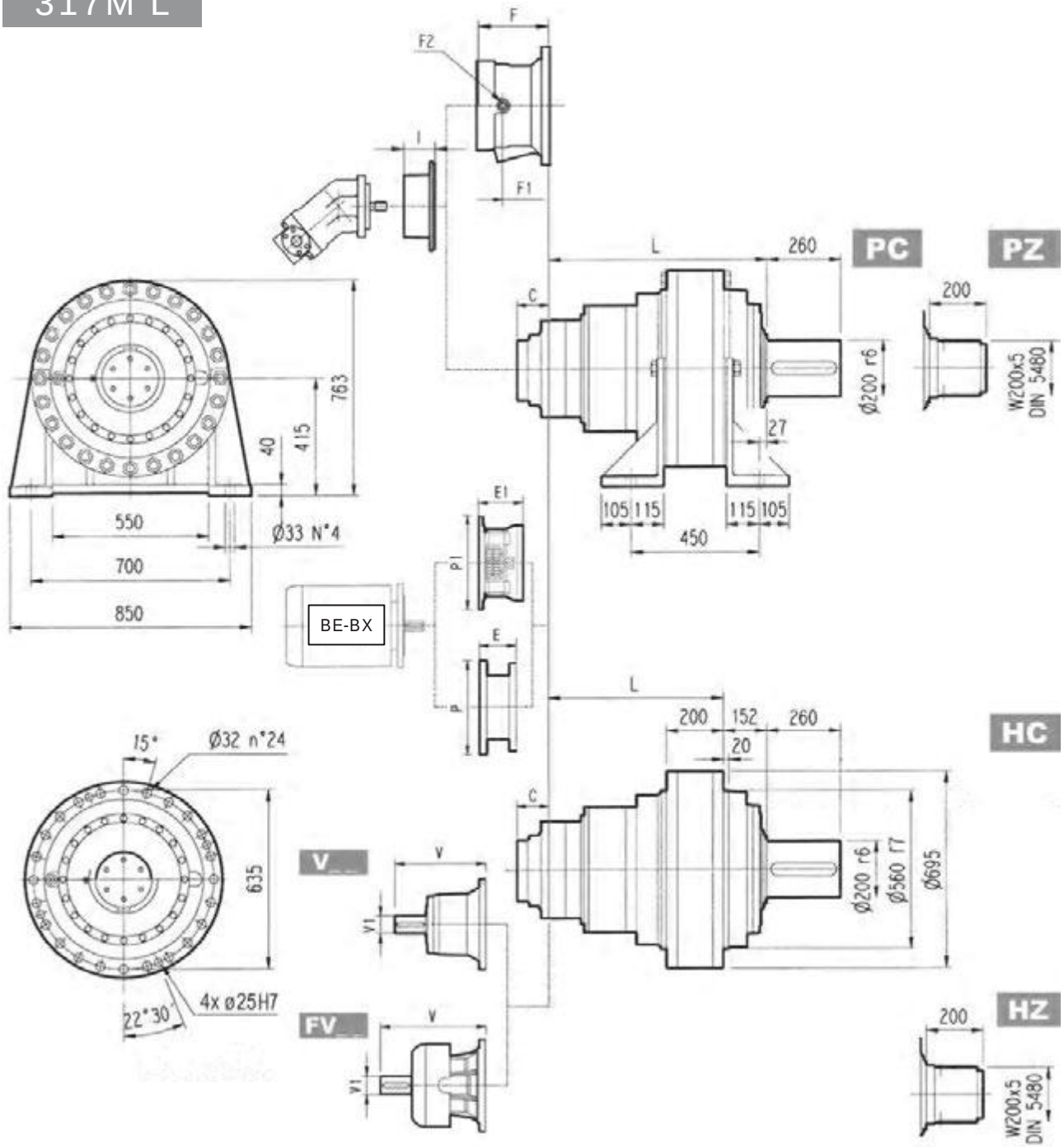
Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$





Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

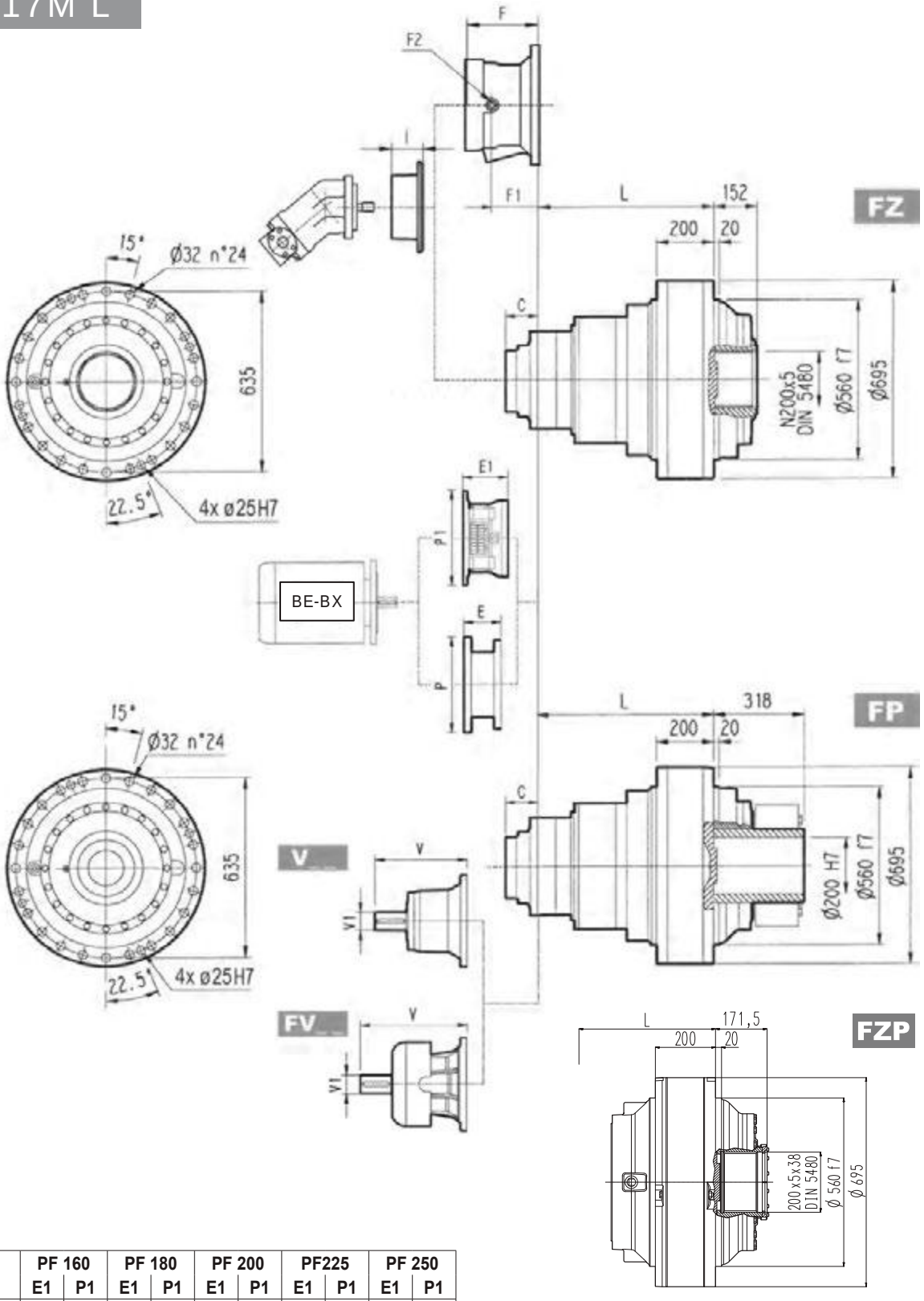
317M L



	L							
	PC - PZ	HC - HZ	FZ - FZP	FP	PC - PZ	HC - HZ	FZ - FZP	FP
317M L1	315	163	163	163	950	800	750	800
317M L2	624	472	472	472	1080	930	880	930
317M L3	774	622	622	622	1140	990	940	990
317M L4	862	710	710	710	1152	1000	952	1000

	V	V1	Kg	V	V1	Kg	V	V1	Kg	V	V1	Kg	C	Input	I	F	F1	F2	Type	Input	Kg
317M L1	—	—	—	—	—	—	—	—	—	—	—	—	181	F		—	—	—	—	—	—
317M L2	343	80	55	—	—	—	451	80	71	—	—	—	75	D		—	—	—	—	—	—
317M L3	315	80	35	313	60	28	375	80	48	363	60	34	51	B	467	201	153	1/4 G	6	B	28
317M L4	239	48	15	—	—	—	276	48	17	—	—	—	37	A		145	95	1/4 G	5	A	16

317M L



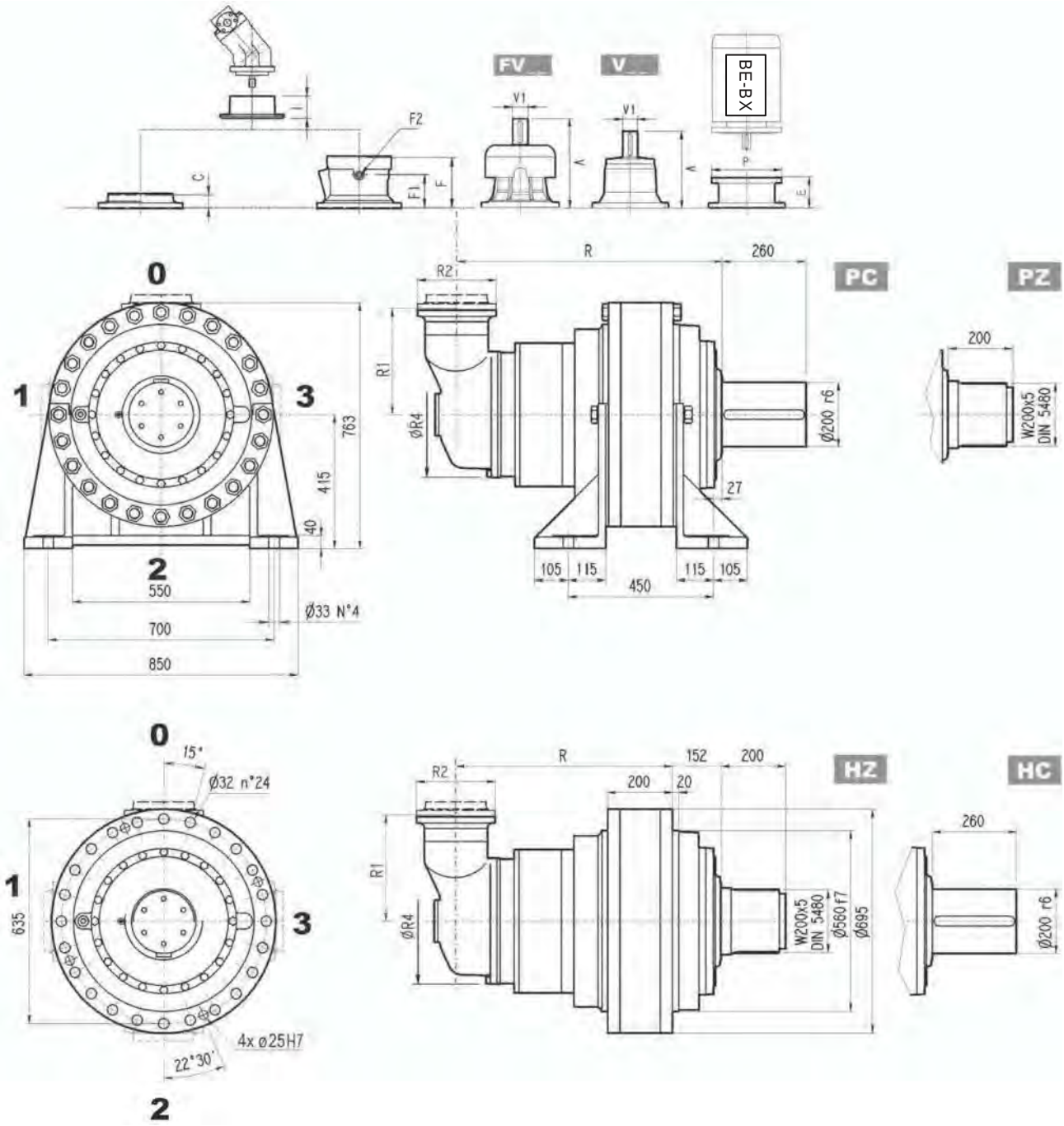
	PF 160		PF 180		PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1	E1	P1	E1	P1
317M L3	—	—	—	—	197	530	227	530	227	550
317M L4	165	400	165	400	195	400	195	450	—	—

NOTE: For R design contact Bonfiglioli Technical service

FP M_{2max} **= 242000 Nm**

	P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P
317M L3	—	—	—	—	196	350	186	400	216	450	216	550
317M L4	114	300	144	350	144	350	174	400	—	—	—	—

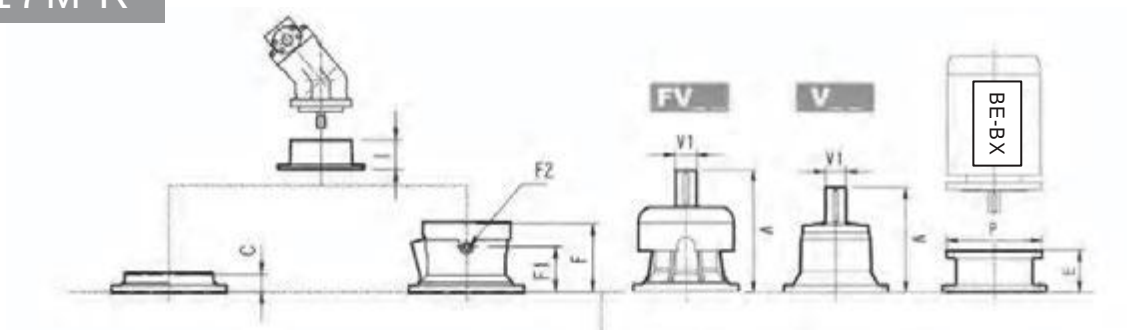
317M R

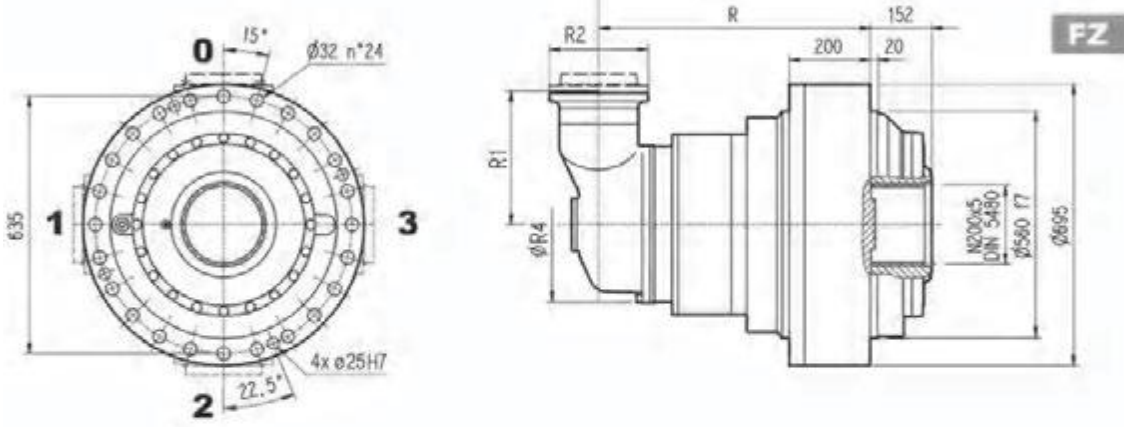


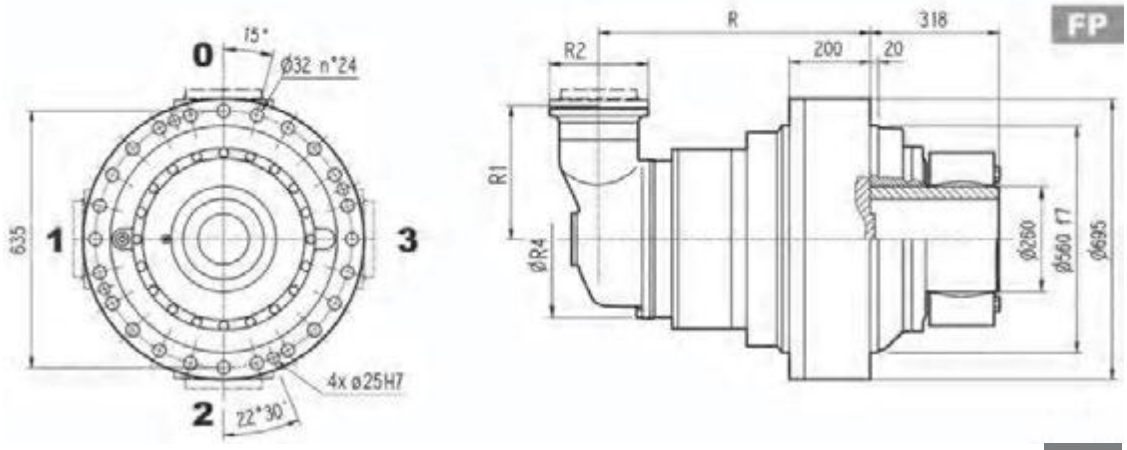
	R				R1	R2	R4	Kg			
	PC-PZ	HC-HZ	FZ - FZP	FP				PC-PZ	HC-HZ	FZ - FZP	FP
317M R3 (B)	853	701	701	701	345	292	400	1210	1060	1010	1060
317M R3 (C)	853	701	701	701	390	292	480	1220	1070	1020	1070
317M R4	892	740	740	740	225	245	345	1190	1040	990	1040

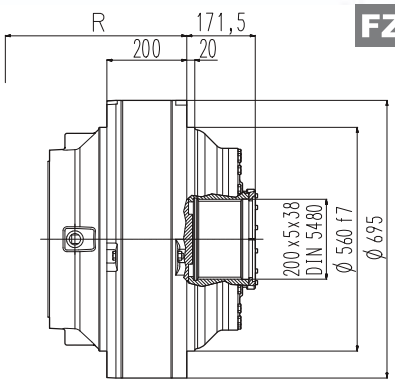
	V	V1	Kg	V	V1	Kg	V	V1	Kg	V	V1	Kg	C	Input	I	F	F1	F2	Type	Input	Kg
317M R3 (B)	307	60	23	—	—	—	357	60	28	—	—	—	45	B		195	147	1/4 G	6	B	28
317M R3 (C)	307	60	23	—	—	—	357	60	28	—	—	—	45	B		195	147	1/4 G	6	B	28
317M R4	239	48	15	—	—	—	276	48	17	—	—	—	37	A	467	105	65	1/4 G	4	A	10

317M R





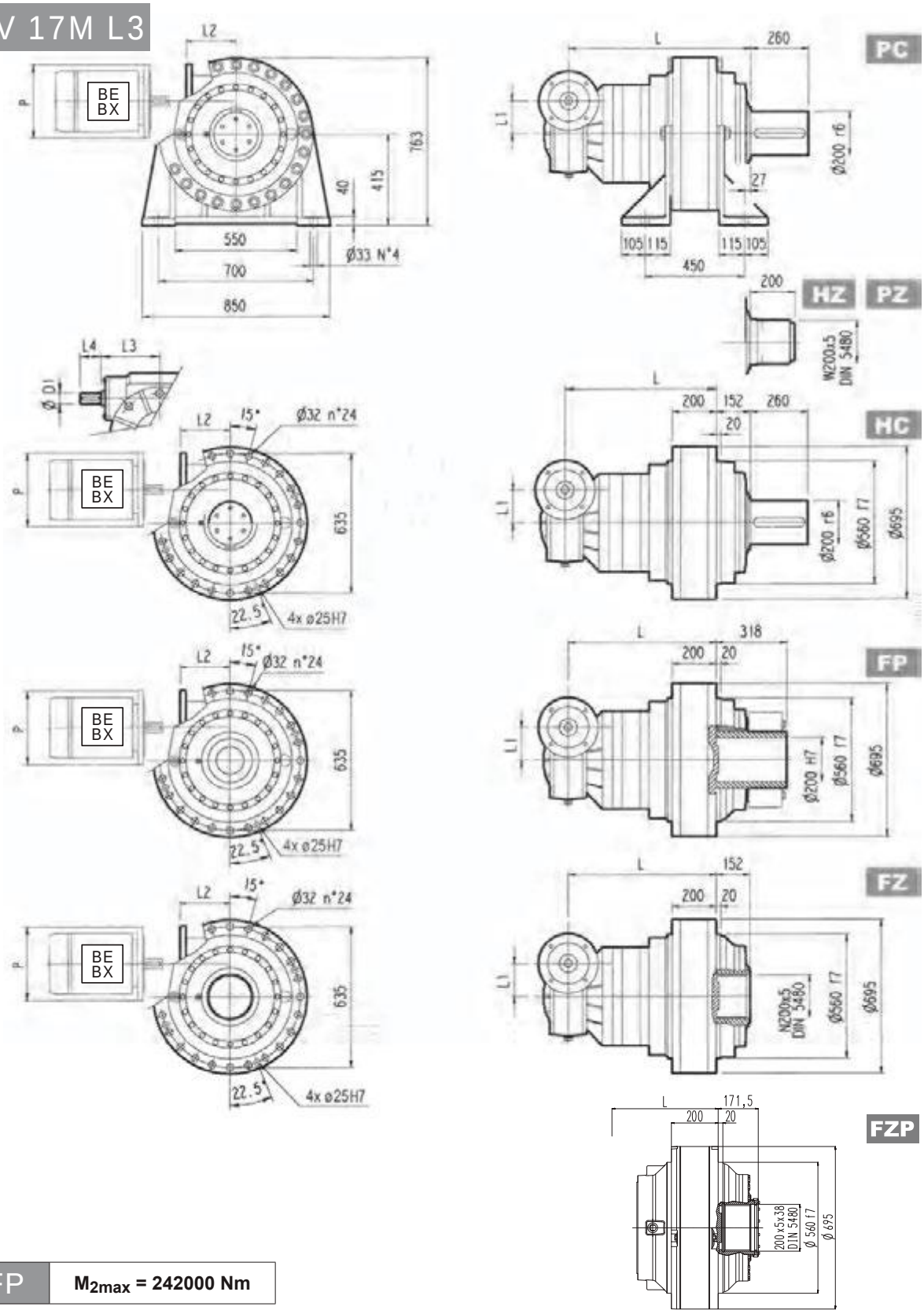




FP | **M_{2max} = 242000 Nm**

	P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P
317M R3 (B)	—	—	—	—	152	350	182	400	212	450	193	550
317M R3 (C)	—	—	—	—	152	350	182	400	212	450	193	550
317M R4	114	300	144	350	144	350	174	400	—	—	—	—

3/V 17M L3



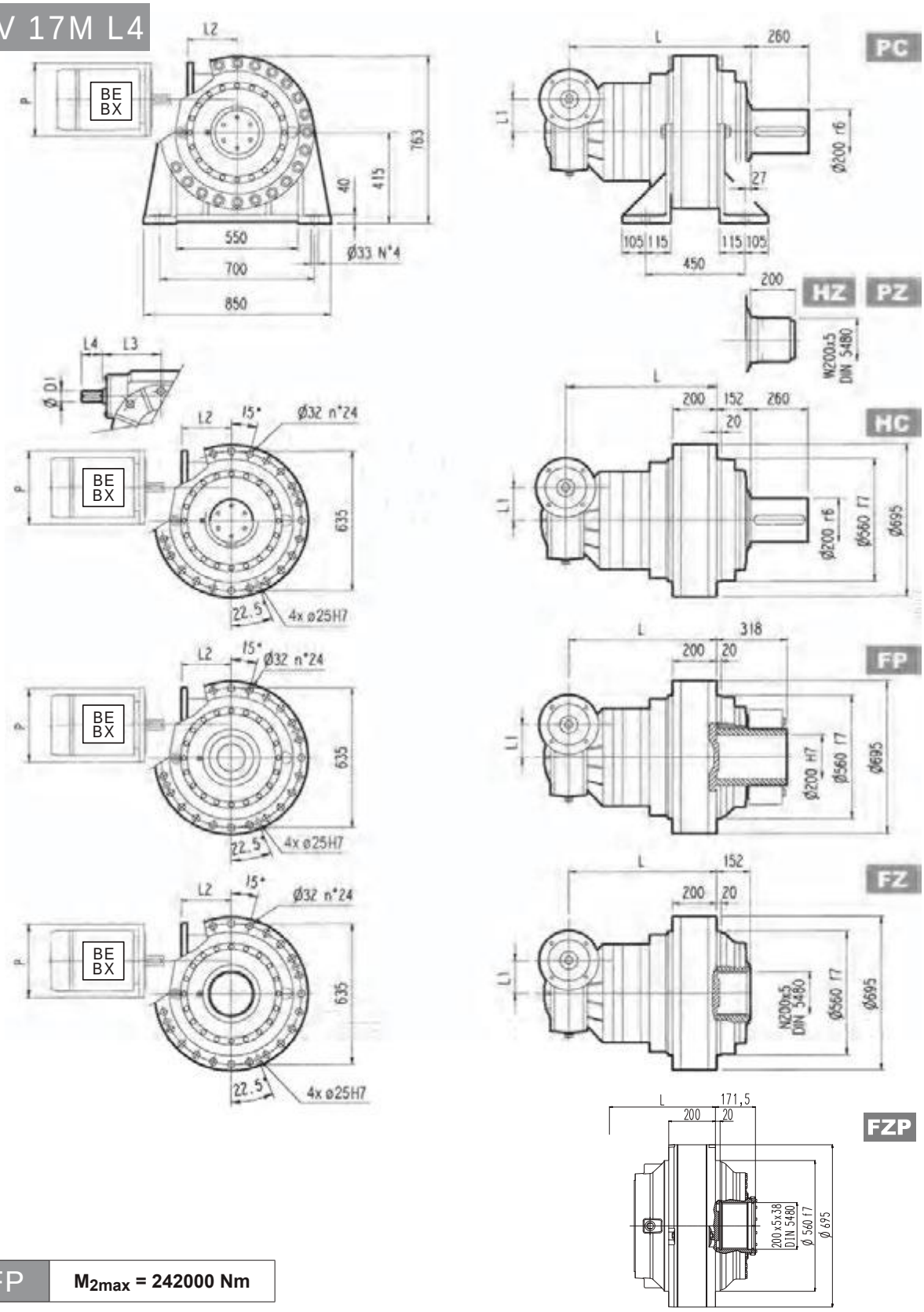
FP

M_{2max} = 242000 Nm

	L				L1	D1	L3	L4	Kg			
	PC - PZ	HC - HZ	FZ - FZP	FP					PC - PZ	HC - HZ	FZ - FZP	FP
3/V 17M L3	894	745	745	745	250	55	276	110	1400	1250	1200	1250

	P132		P160		P180		P200		P225	
	L2	P	L2	P	L2	P	L2	P	L2	P
3/V 17M L3	531	300	506	350	506	350	531	400	536	450

3/V 17M L4

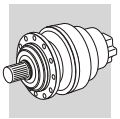


FP

M_{2max} = 242000 Nm

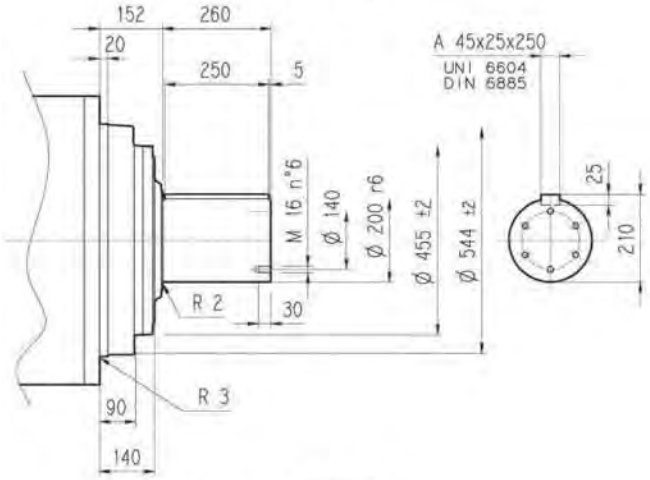
	L				L1	D1	L3	L4	Kg			
	PC - PZ	HC - HZ	FZ - FZP	FP					PC - PZ	HC - HZ	FZ - FZP	FP
3/V 17M L4	975	823	823	823	185.4	40	214.5	70	1250	1090	1040	1090

	P100	P112	P132		P160		P180	
	P	P	L2	P	L2	P	L2	P
3/V 17M L4	250	250	217	300	217	350	217	350

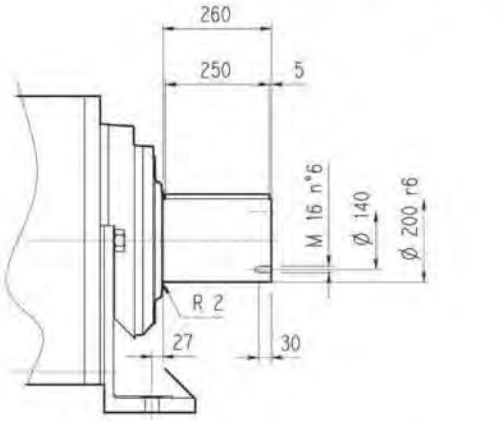


317M L | 317M R | 3/V 17M L

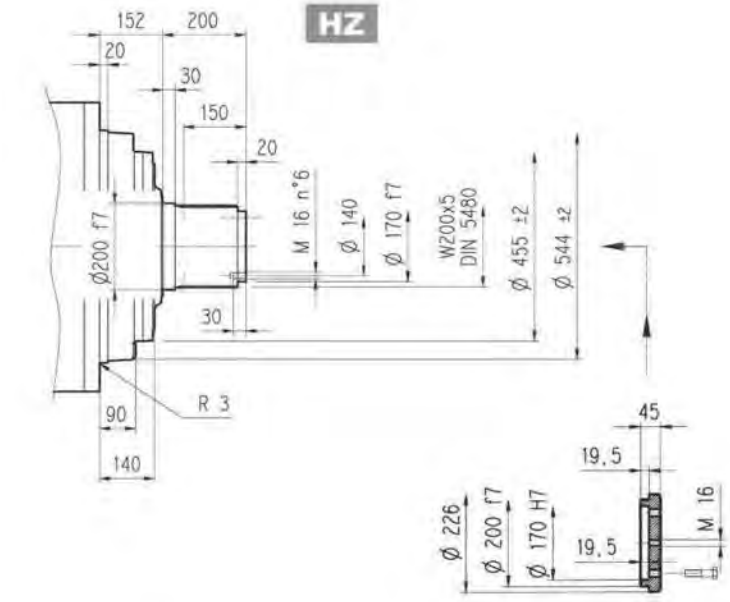
HC



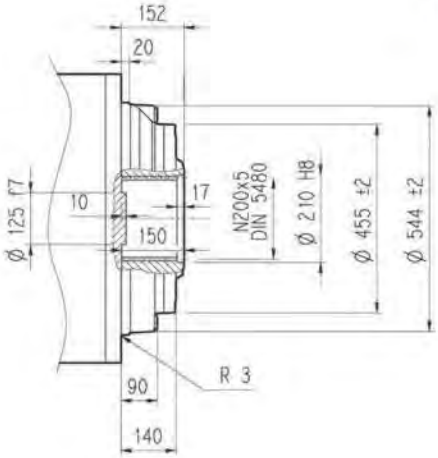
PC



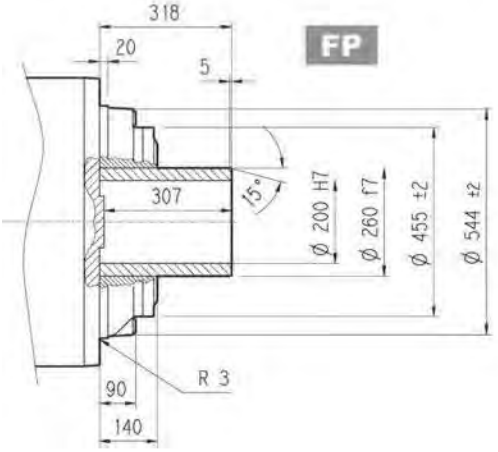
HZ



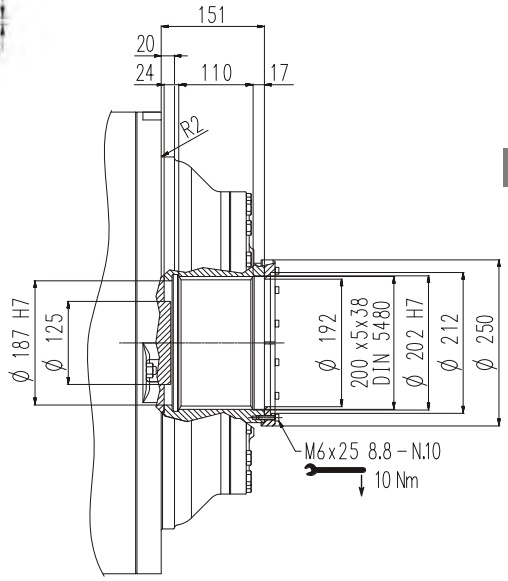
FZ



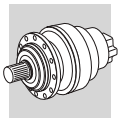
FP



FZP



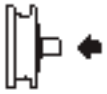
FP	M_{2max} = 242000 Nm

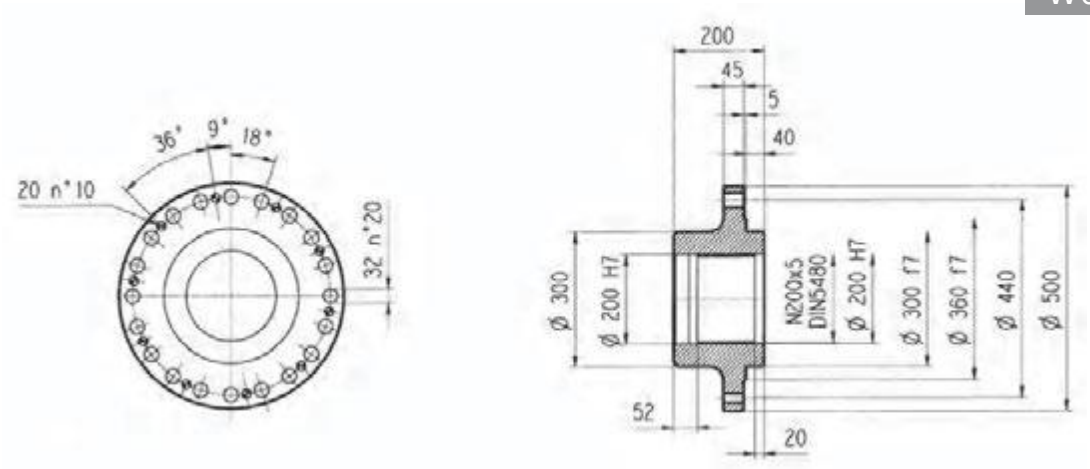


317M L | 317M R | 3/V 17M L

Flange

W0A

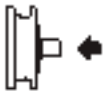


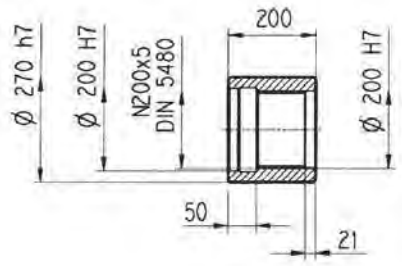


Material: Steel C40

Sleeve coupling

M0A

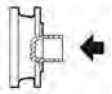


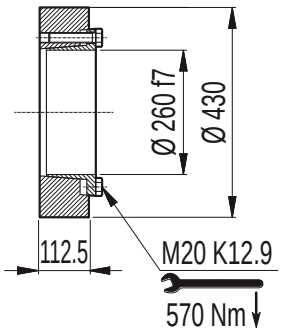


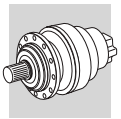
Material: Steel 16CrNi4

Shrink disc

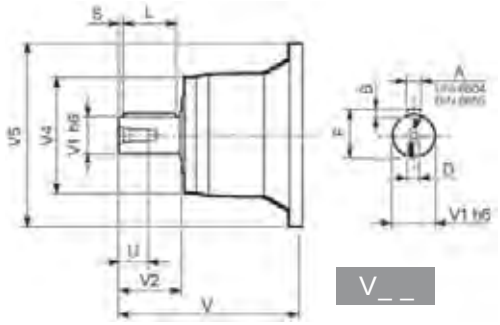
G0A

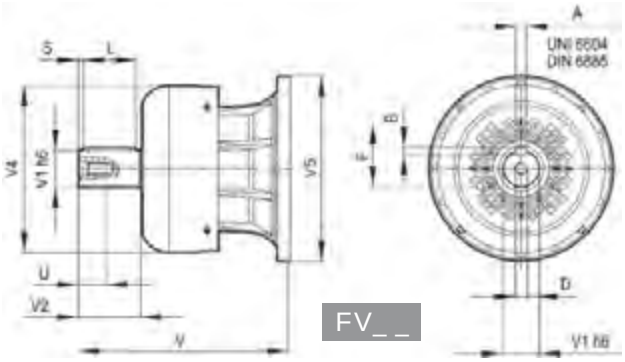






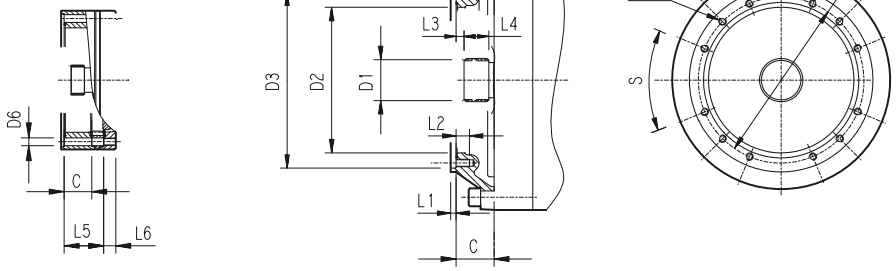
317M L 317M R





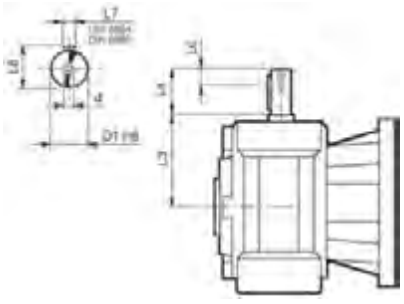
		V	V1	V2	V4	V5	A	B	F	L	S	D	U
317M L2	**V11B**	343	80	130	200	445	22	14	85	110	10	M16	36
	FV11B	451	80	130	347.5	445	22	14	85	110	10	M16	36
317M L3	**V07B**	315	80	130	200	345	22	14	85	110	10	M16	36
	FV07B	375	80	130	347.5	348	22	14	85	110	10	M16	36
	V07A	313	60	105	155	345	18	11	64	90	7.5	M16	36
	FV07A	363	60	105	309	348	18	11	64	90	7.5	M16	36
317M L4	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36
317M R3 (B) (C)	**V06B**	307	60	105	155	292	18	11	64	90	7.5	M16	40
	FV06B	357	60	105	309	292	18	11	64	90	7.5	M16	36
317M R4	**V05B**	239	48	82	155	245	14	9	51.5	70	6	M16	36
	FV05B	276	48	82	219.5	244	14	9	51.5	70	6	M16	36

317M L 317M R



		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
317M L1	**V9AF**	181	120x3 DIN 5480	365	390 g7	415	M16 n°36	—	4	30	3	65	—	—	20°	20°	F
317M L2	**V9AD**	75	80x74 DIN 5482	270	335 H7	314	M16 n°8	—	5	30	8.5	40	—	—	60°	30°	D
317M L3	**V9AB**	51	58x53 DIN 5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B
317M L4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	—	4	18	9	18	—	—	45°	45°	A
317M R4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M10 n°8	11	4	18	9	18	—	—	45°	45°	A
317M R3 (B) (C)	**V9AB**	45	58x53 DIN 5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B

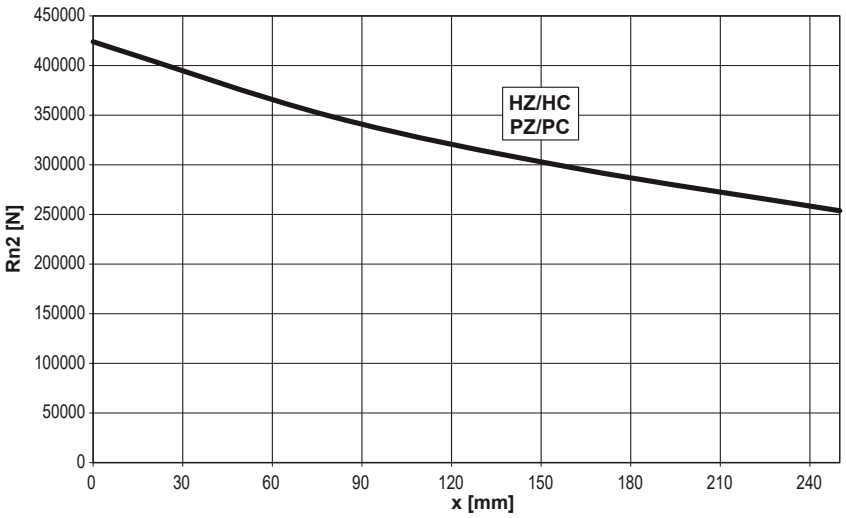
3/V 17M L

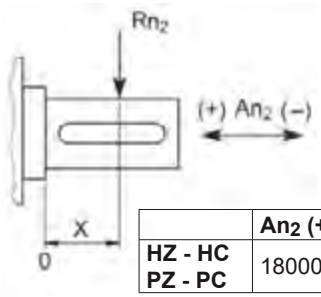


	D1 h6	L3	L4	L6	L7	L8	d
3/V 17M L3_HS	55	276	110	40	16	59	M16
3/V 17M L4_HS	40	214.5	70	20	12	43	M8

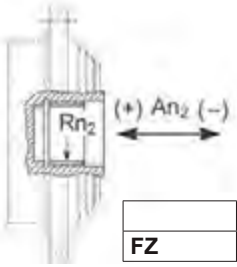
317M L | 317M R | 3/V 17M L

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$





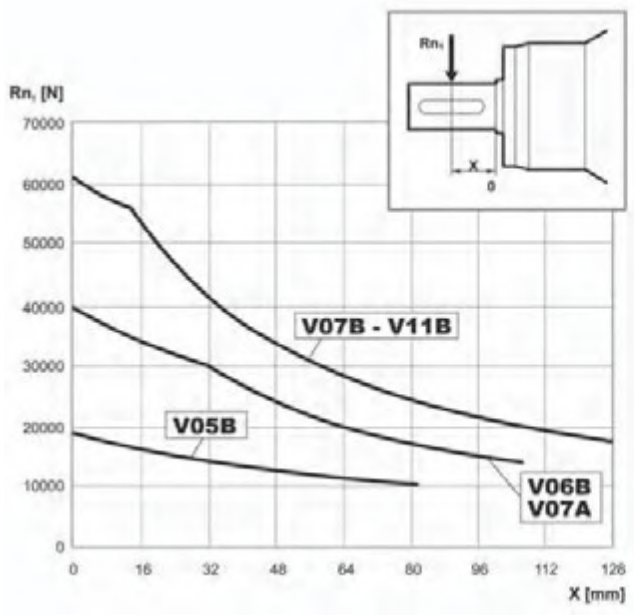
	An2 (+)	An2 (-)
HZ - HC PZ - PC	180000	150000

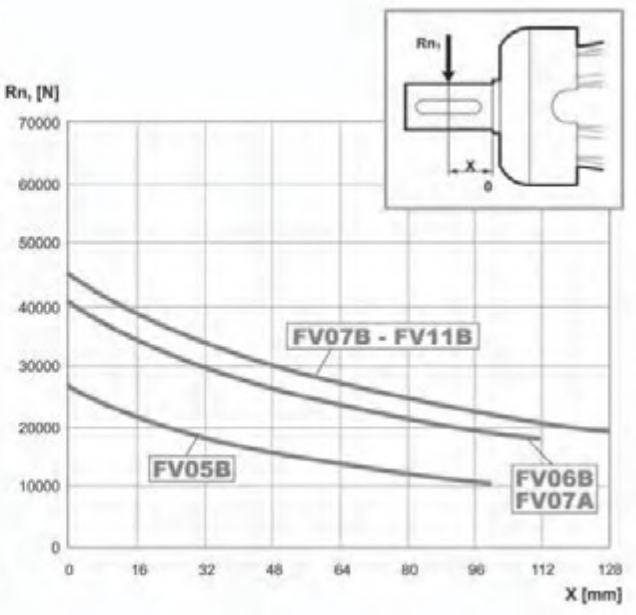


	Rn2	An2 (+/-)
FZ	69624	69624

Load corrective factor fh_2 on shafts	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
	fh_2	FZ	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HZ - HC - PZ - PC	**1.50**	**1.50**	**1.23**	**1.00**	**0.62**	**0.50**

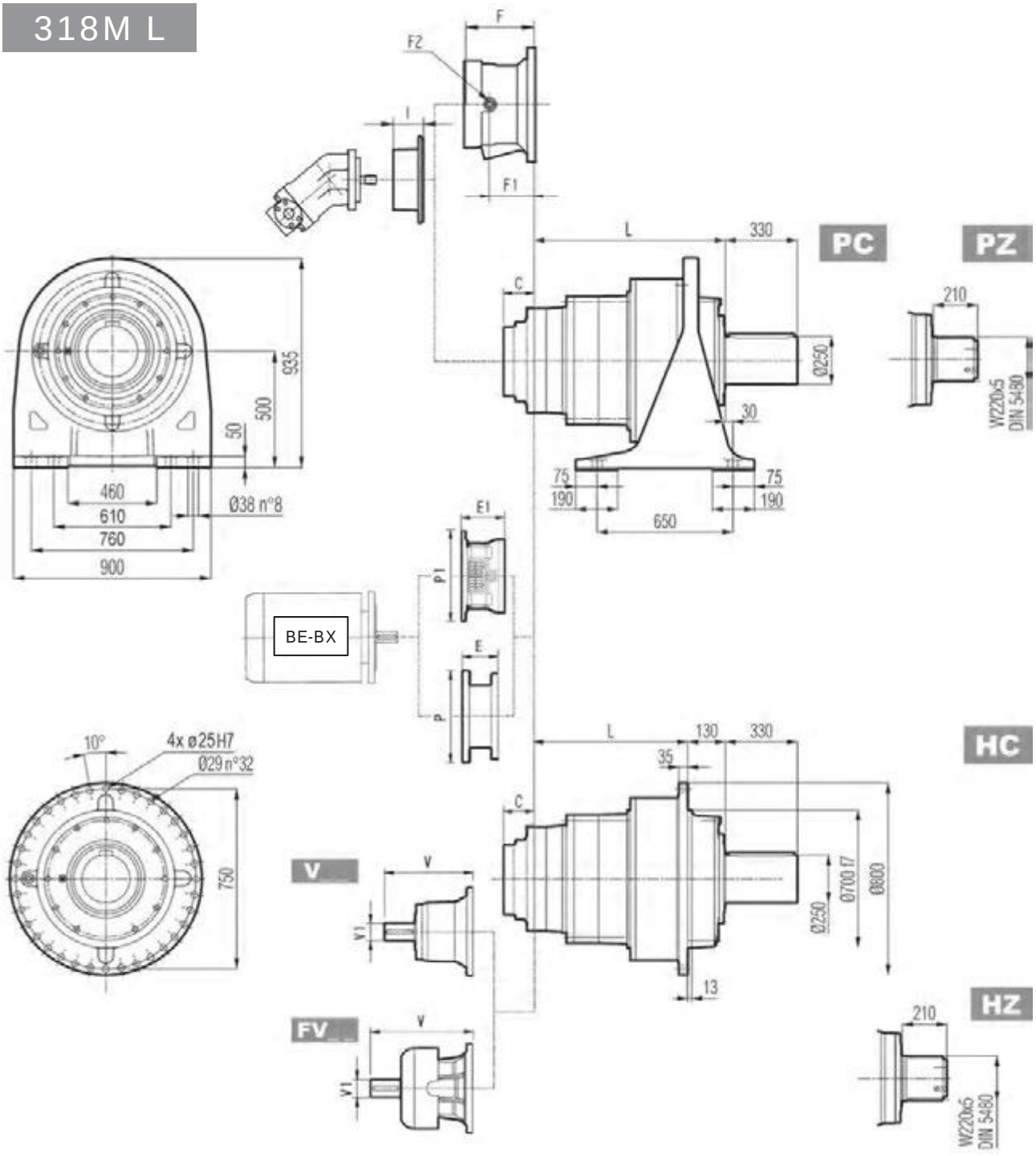
Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$





Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

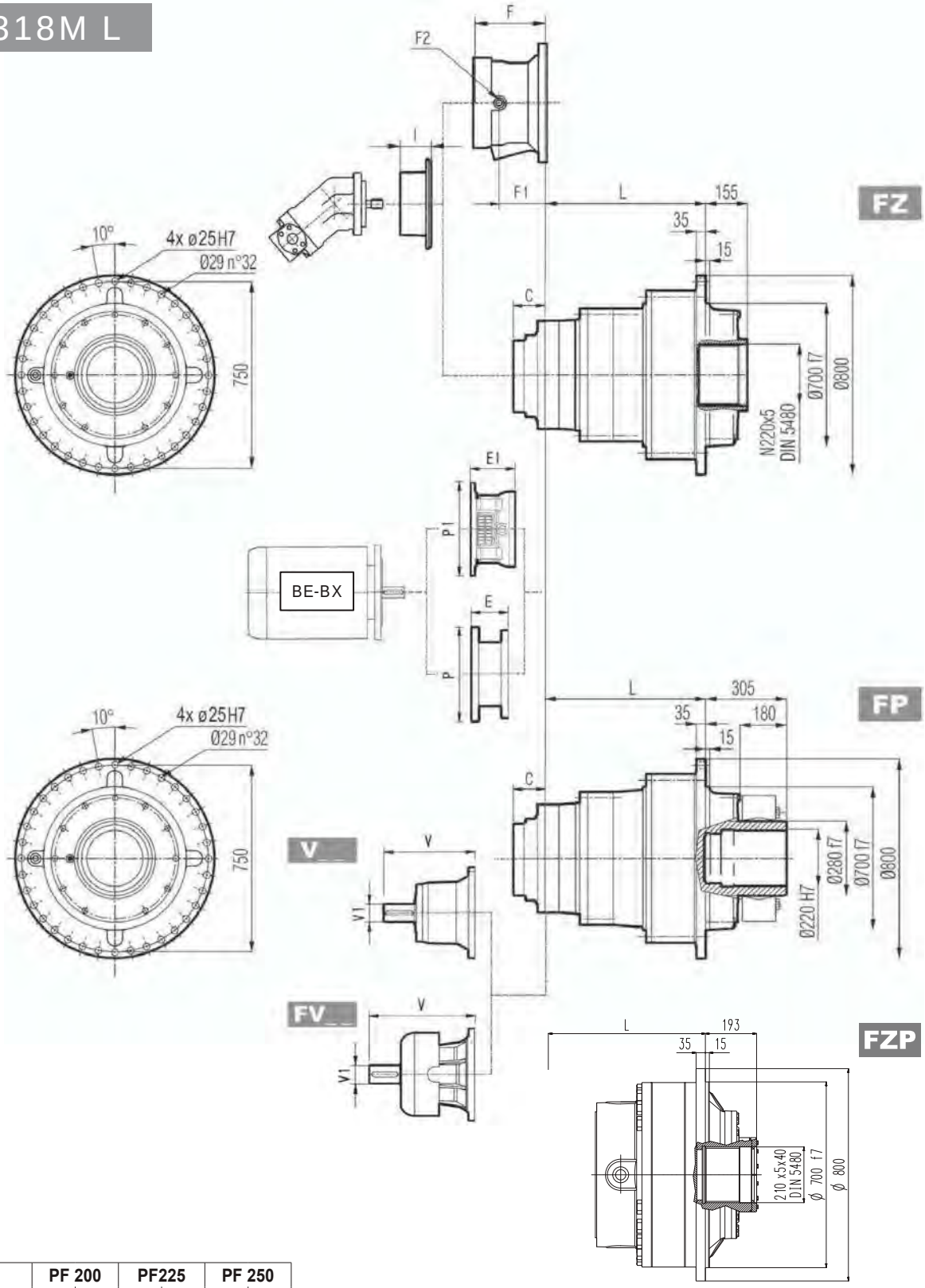
318M L



	L							
	PC - PZ	HC - HZ	FZ - FZP	FP	PC - PZ	HC - HZ	FZ - FZP	FP
318M L1	332	202	202	202	1250	950	800	830
318M L2	677	547	547	547	1500	1200	1050	1080
318M L3	889	759	759	759	1600	1300	1150	1180
318M L4	1022	892	892	892	1650	1350	1200	1230

	V	V1	kg	V	V1	kg	V	V1	kg	V	V1	kg	C	Input	I	F	F1	F2	Type	Input	kg
318M L1	—	—	—	—	—	—	—	—	—	—	—	—	208	G		—	—	—	—	—	—
318M L2	556	120	125	—	—	—	—	—	—	—	—	—	116	E		—	—	—	—	—	—
318M L3	348	80	55	—	—	—	456	80	85	—	—	—	81	D	467	232	185	1/4 G	6	B	28
318M L4	315	80	35	313	60	28	375	80	48	363	60	34	51	B		201	153	1/4 G	6	B	28

318M L



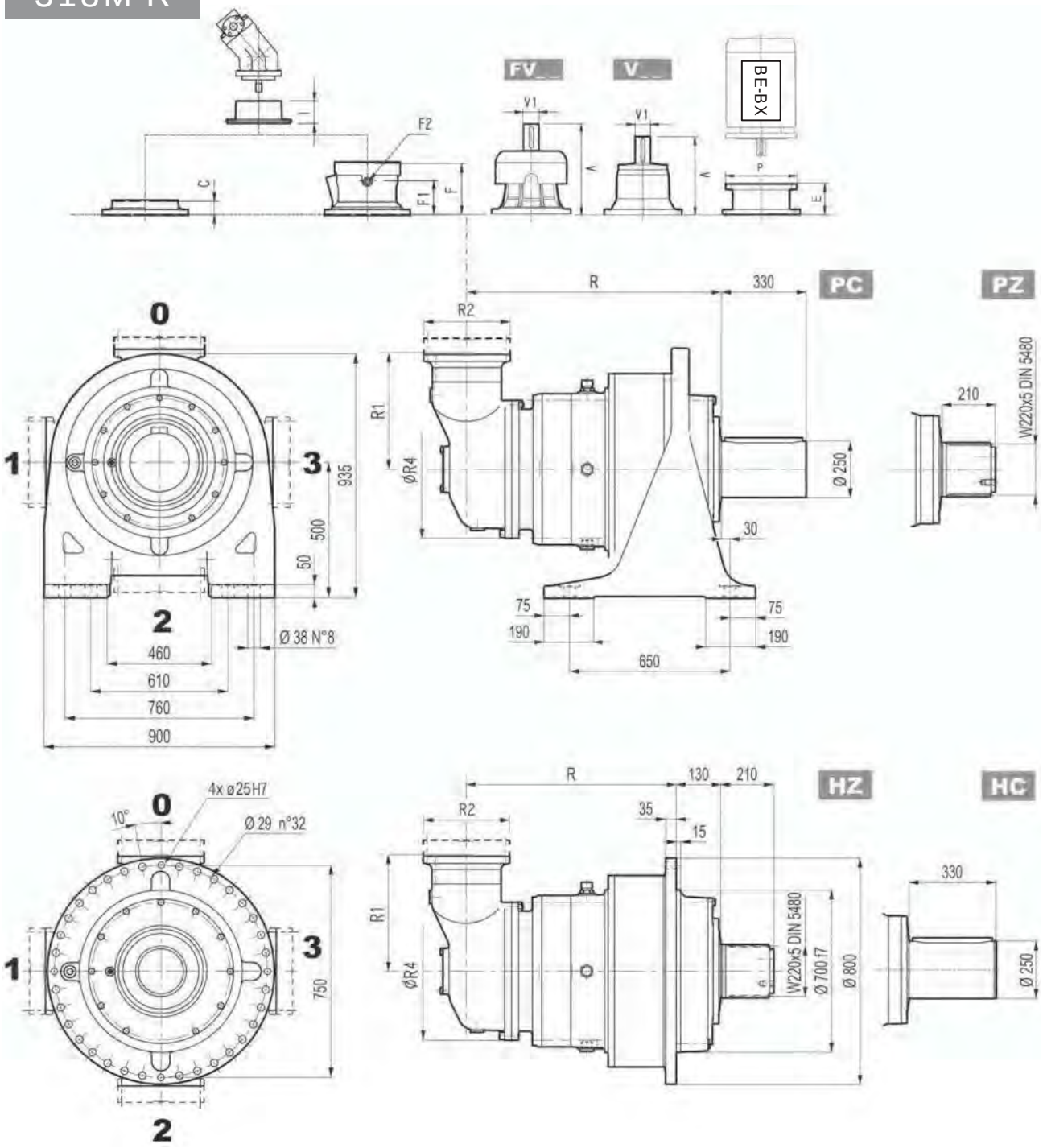
	PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1
318M L3	—	—	250	580	250	580
318M L4	197	530	227	530	227	550

NOTE: For R design contact Bonfiglioli Technical service

FP | **M_{2max} = 322000 Nm**

	P180		P200		P225		P250	
	E	P	E	P	E	P	E	P
318M L3	—	—	267	400	297	450	297	550
318M L4	195	350	186	400	216	450	215	550

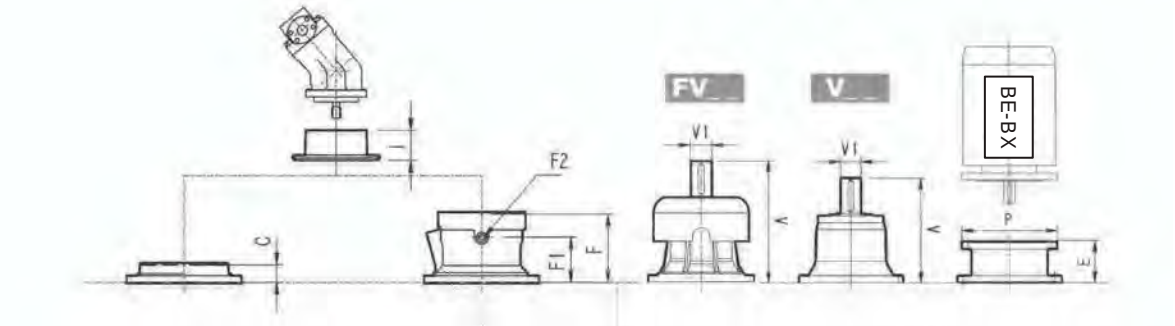
318M R

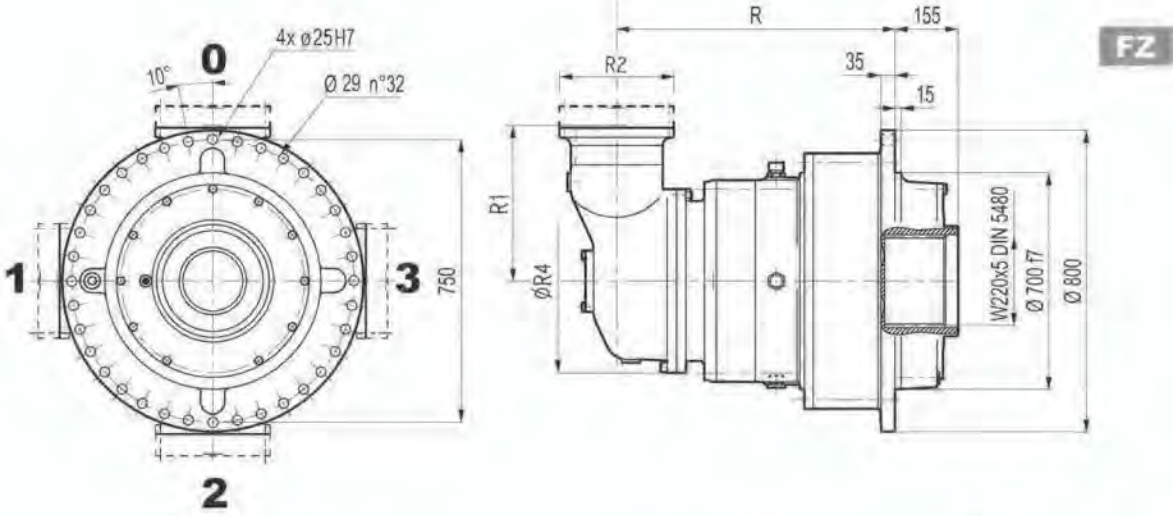


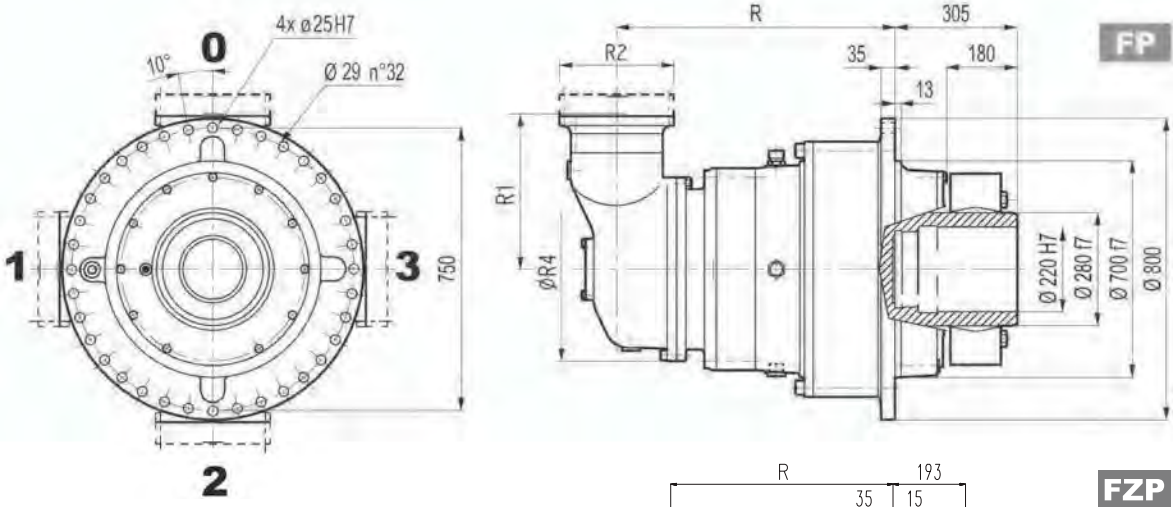
	R				R1	R2	R4	Kg			
	PC-PZ	HC-HZ	FZ - FZP	FP				PC-PZ	HC-HZ	FZ - FZP	FP
318M R4 (B)	1115	985	985	985	345	292	400	1720	1420	1270	1300
318M R4 (C)	1115	985	985	985	390	292	480	1730	1430	1280	1310

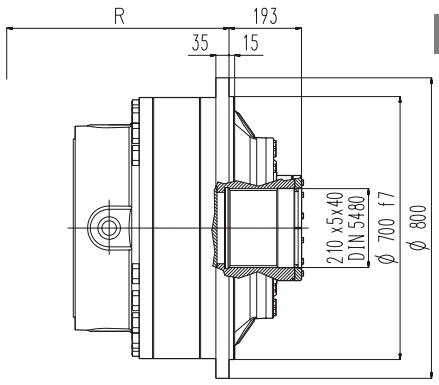
	V	V1	Kg	V	V1	Kg	V	V1	Kg	V	V1	Kg	C	Input	I	F	F1	F2	Type	Input	Kg
318M R4 (B)	307	60	23	—	—	—	357	60	28	—	—	—	45	B	467	195	147	1/4 G	6	B	28
318M R4 (C)	307	60	23	—	—	—	357	60	28	—	—	—	45	B		195	147	1/4 G	6	B	28

318M R





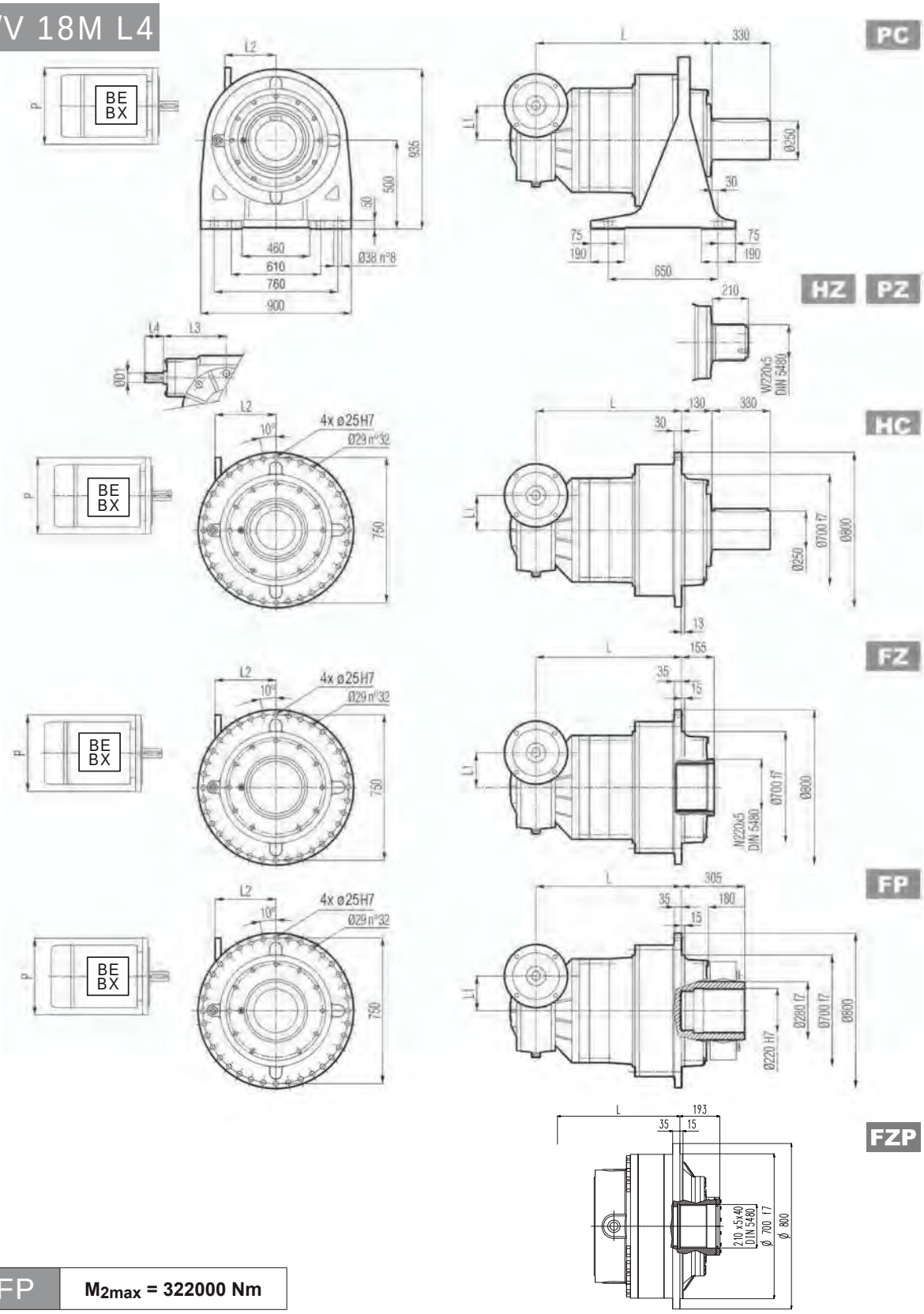




FP | **M_{2max} = 322000 Nm**

	P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P
318M R4 (B)	—	—	—	—	152	350	182	400	212	450	193	550
318M R4 (C)	—	—	—	—	152	350	182	400	212	450	193	550

3/V 18M L4

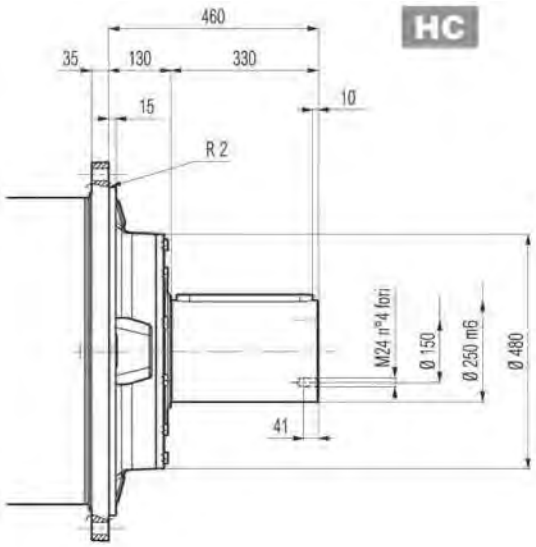


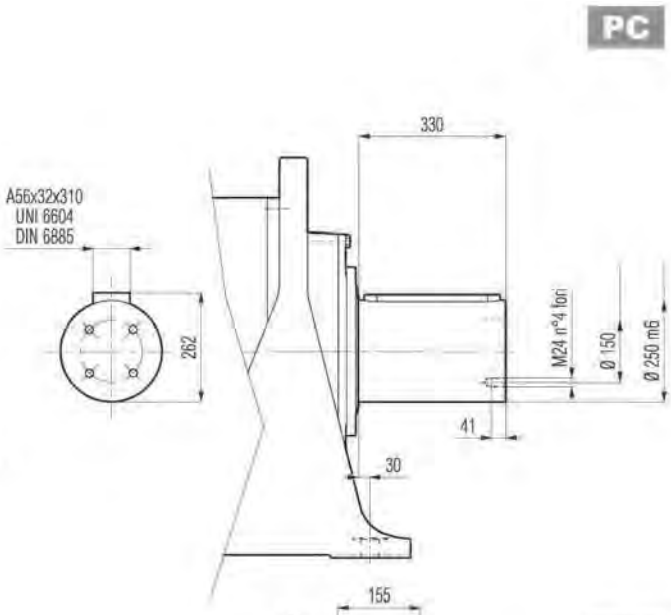
FP	M_{2max} = 322000 Nm

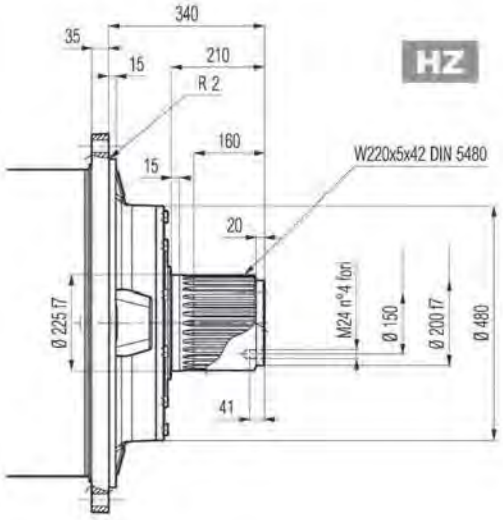
	L				L1	D1	L3	L4	Kg			
	PC - PZ	HC - HZ	FZ - FZP	FP					PC - PZ	HC - HZ	FZ - FZP	FP
3/V 18M L4	1114	984	984	984	210	48	230	110	1810	1510	1360	1390

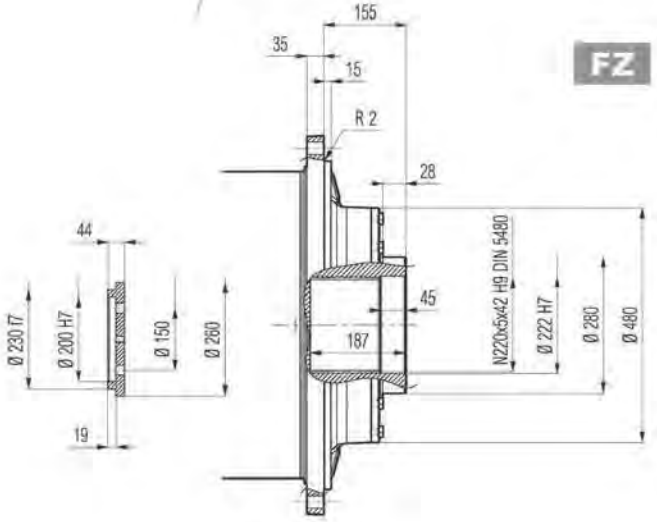
	P132		P160		P180		P200		P225	
	L2	P	L2	P	L2	P	L2	P	L2	P
3/V 18M L4	485	300	460	350	460	350	485	400	490	450

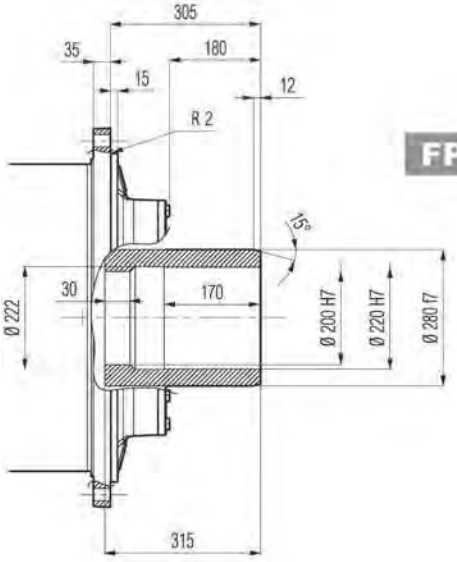
318M L | 318M R | 3/V 18M L4

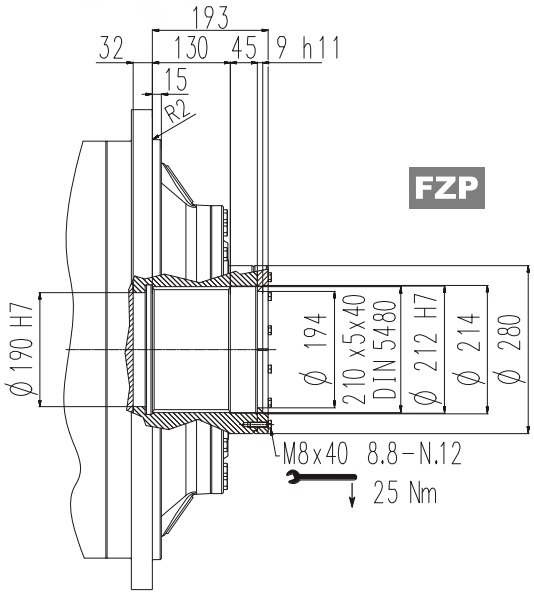




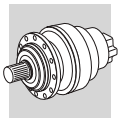








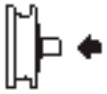
FP	M_{2max} = 322000 Nm

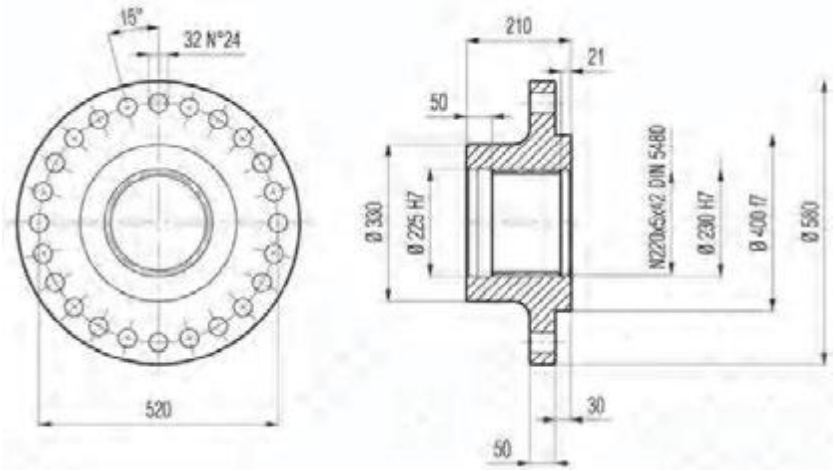


318M L | 318M R | 3/V 18M L4

Flange

W0A

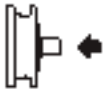


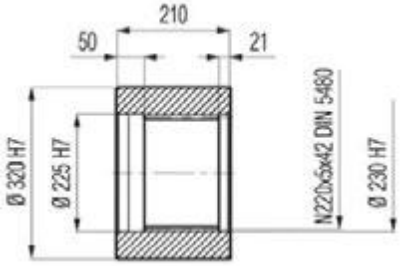


Material: Steel C40

Sleeve coupling

M0A

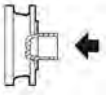


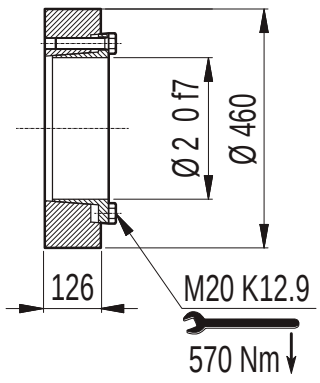


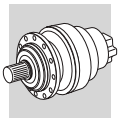
Material: Steel C40

Shrink disc

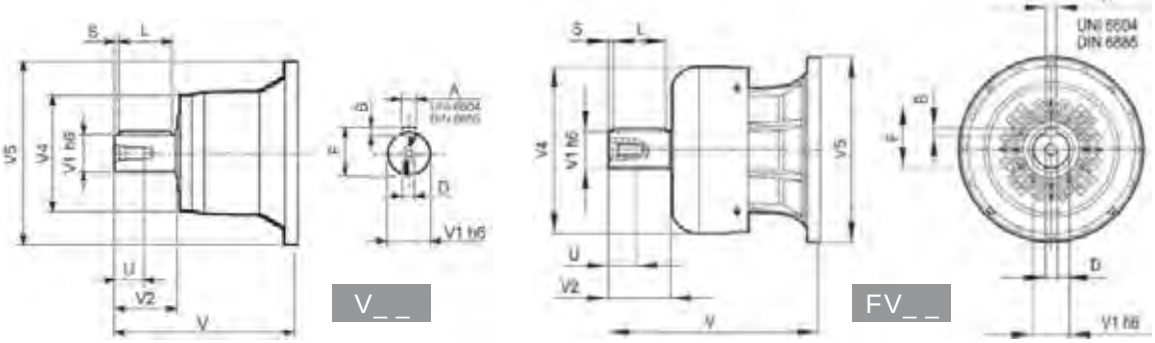
G0A





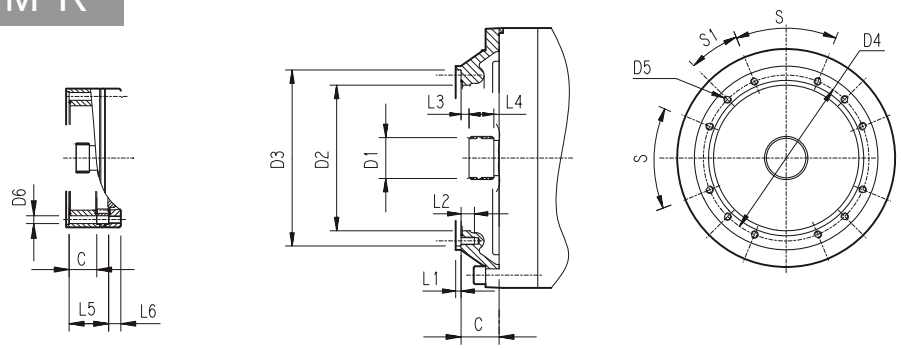


318M L 318M R



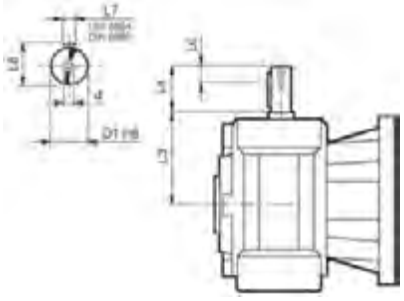
		V	V1	V2	V4	V5	A	B	F	L	S	D	U
318M L2	**V15B**	556	120	210	230	542	32	18	127	180	15	M24	50
318M L3	**V11B**	348	80	130	200	428	22	14	85	110	10	M16	36
	FV11B	456	80	130	347.5	428	22	14	85	110	10	M16	36
318M L4	**V07B**	315	80	130	200	345	22	14	85	110	10	M16	36
	FV07B	375	80	130	347.5	348	22	14	85	110	10	M16	36
	V07A	313	60	105	155	345	18	11	64	90	7.5	M16	36
	FV07A	363	60	105	309	348	18	11	64	90	7.5	M16	36
318M R4 (B) (C)	**V06B**	307	60	105	155	292	18	11	64	90	7.5	M16	36
	FV06B	357	60	105	309	292	18	11	64	90	7.5	M16	36

318M L 318M R

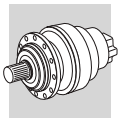


		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
318M L1	Please consult Bonfiglioli Technical Service																
318M L2	**V9AE**	116	100x94 DIN 5482	340	412 H7	390	M16 n° 18	—	7	30	8	55	—	—	20°	20°	E
318M L3	**V9AD**	81	80x74 DIN 5482	270	335 H7	314	M16 n° 8	—	5	30	8.5	40	—	—	60°	30°	D
318M L4	**V9AB**	51	58x53 DIN 5482	195	236 H7	222	M16 n° 12	—	4	18	11	22	—	—	45°	22.5°	B
318M R4 (B) (C)	**V9AB**	45	58x53 DIN 5482	195	236 H7	222	M10 n° 10	—	4	18	11	22	—	—	45°	22.5°	B

3/V 18M L4

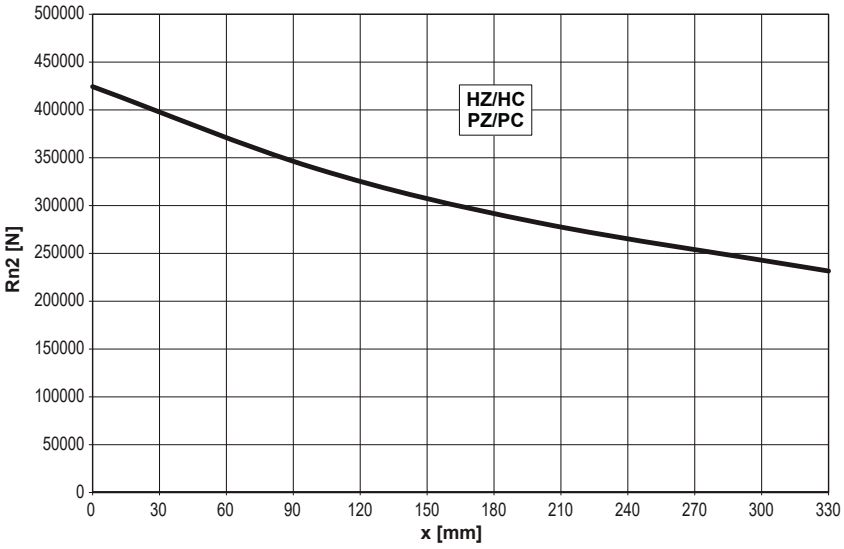


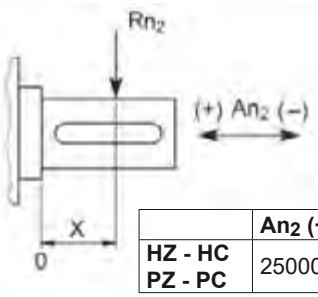
	D1 h6	L3	L4	L6	L7	L8	d
3/V 18M L4_HS	48	230	110	40	14	51.5	M16



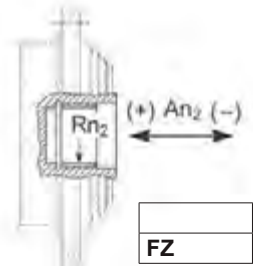
318M L | 318M R | 3/V 18M L4

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$





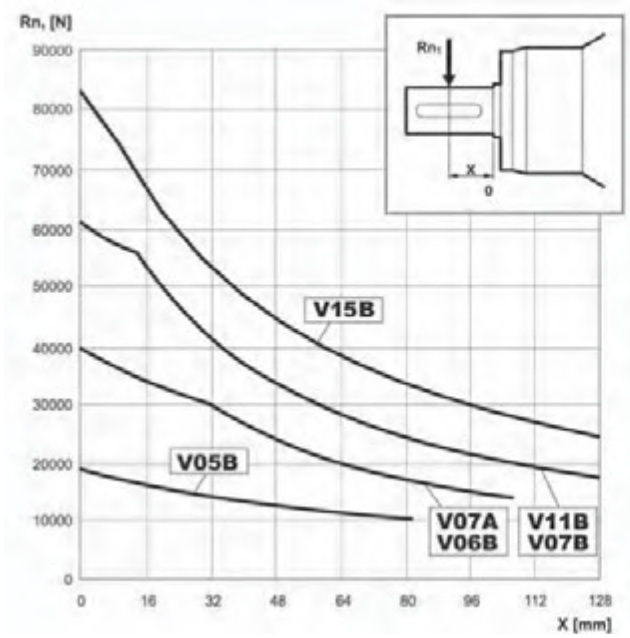
	An_2 (+)	An_2 (-)
HZ - HC PZ - PC	250000	225000

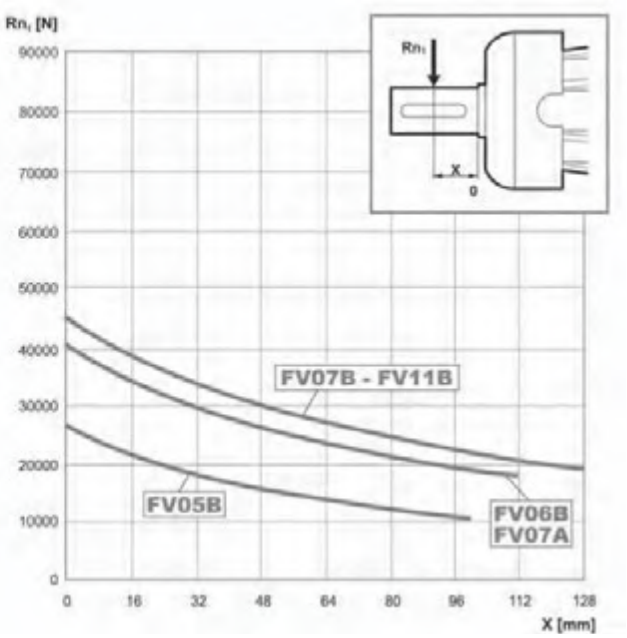


	Rn_2	An_2 (+/-)
FZ	92832	92832

	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
Load corrective factor fh_2 on shafts	fh_2	FZ	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HC - PC	**1.96**	**1.52**	**1.23**	**1.00**	**0.62**	**0.50**
		HZ - PZ	**1.15**	**1.00**	**1.00**	**1.00**	**0.62**	**0.50**

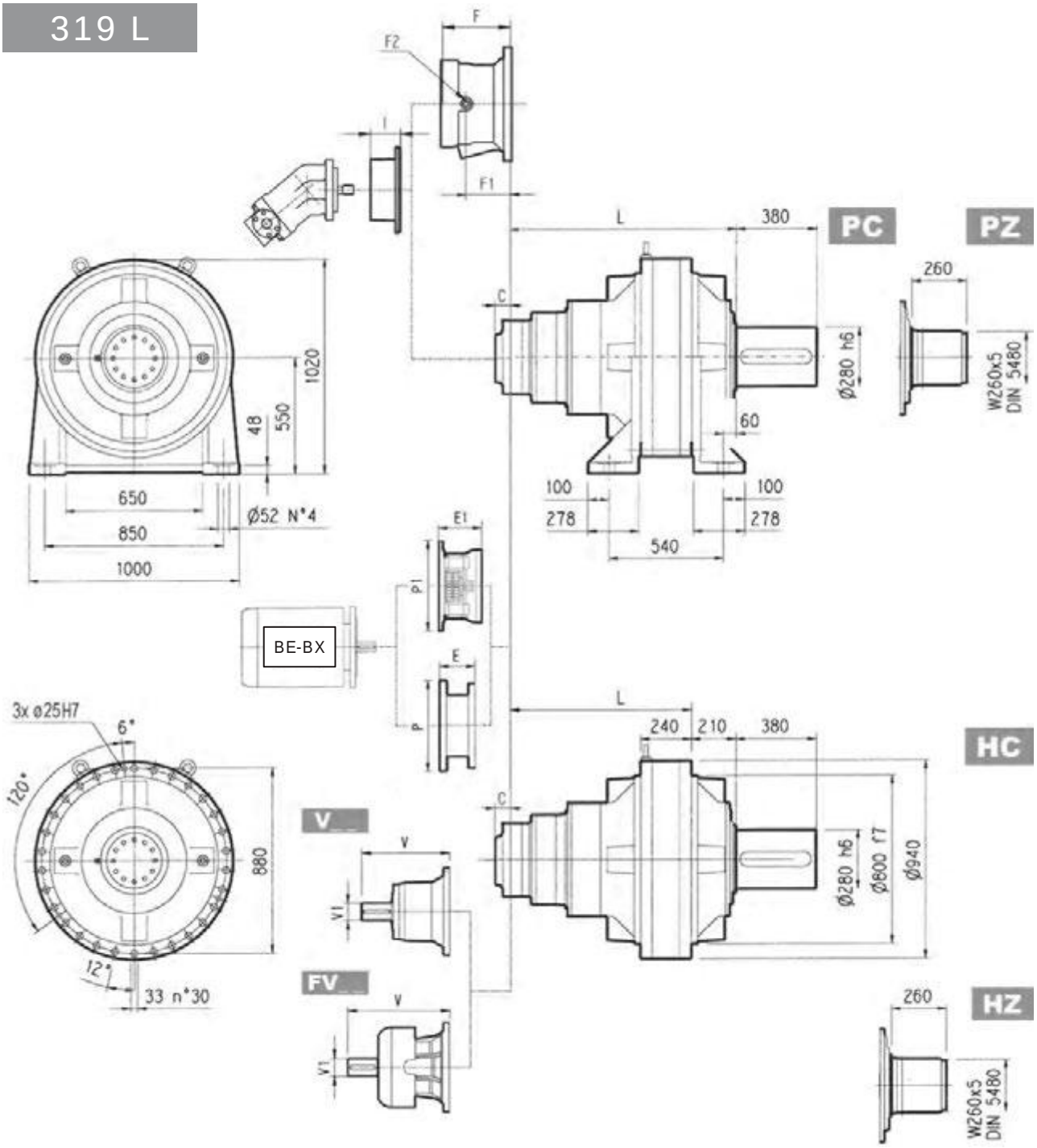
Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$





Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

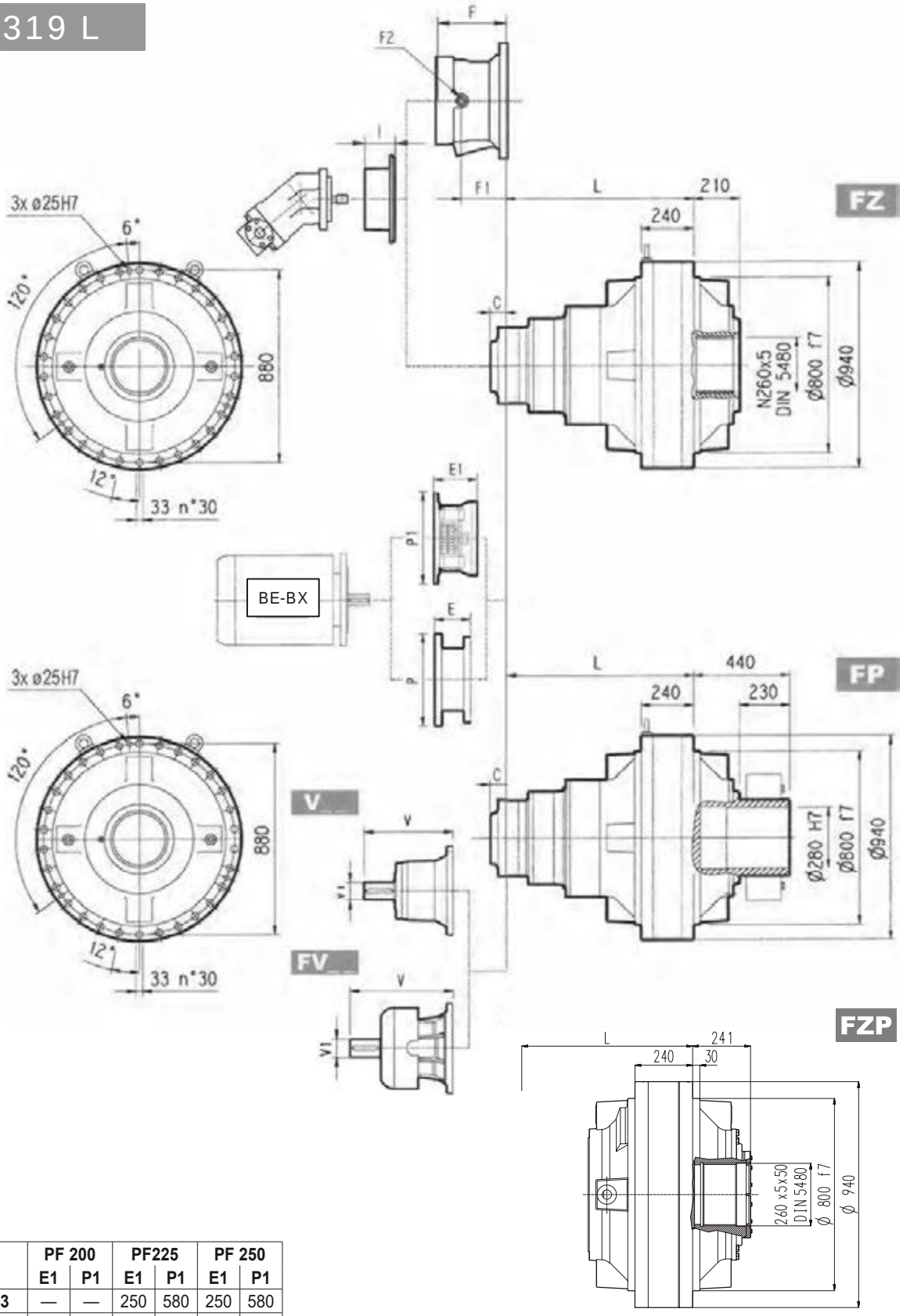
319 L



	L							
	PC - PZ	HC - HZ	FZ - FZP	FP	PC - PZ	HC - HZ	FZ - FZP	FP
319 L1	395	185	185	185	2100	1800	1700	1700
319 L2	778	568	568	568	2350	2050	1950	1950
319 L3	990	780	780	780	2435	2135	2035	2035
319 L4	1123	913	913	913	2480	2180	2080	2080

	V	V1	Kg	V	V1	Kg	V	V1	Kg	V	V1	Kg	C	Input	I	F	F1	F2	Type	Input	Kg
319 L1	—	—	—	—	—	—	—	—	—	—	—	—	245	G		—	—	—	—	—	—
319 L2	556	120	125	—	—	—	—	—	—	—	—	—	116	E		—	—	—	—	—	—
319 L3	348	80	55	—	—	—	456	80	85	—	—	—	81	D	467	232	185	1/4 G	6	B	28
319 L4	315	80	35	313	60	28	375	80	48	363	60	34	51	B		201	153	1/4 G	6	B	28

319 L



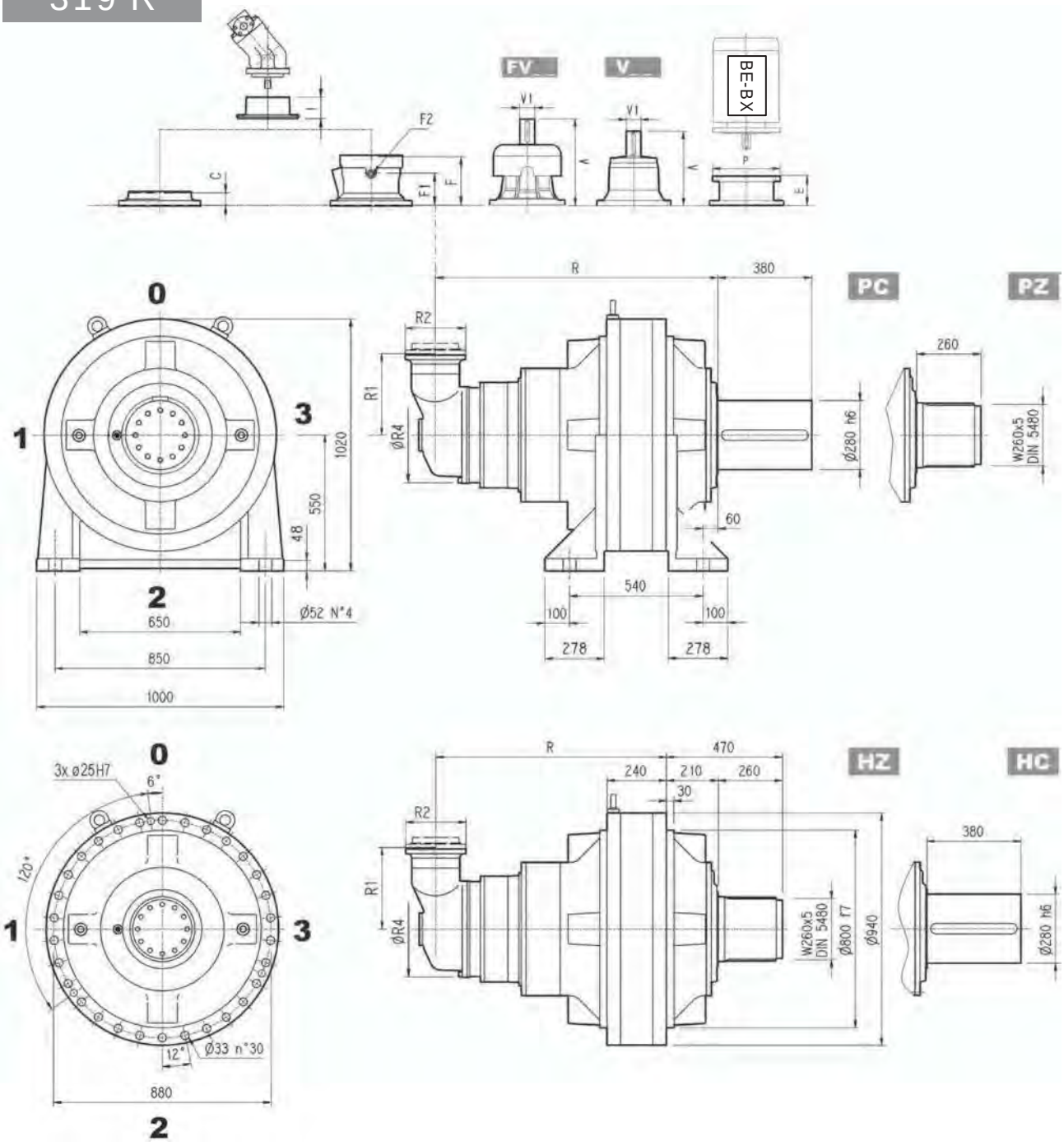
	PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1
319 L3	—	—	250	580	250	580
319 L4	197	530	227	530	227	550

NOTE: For R design contact Bonfiglioli Technical service

FP	**M_{2max} = 480000 Nm**

	P180		P200		P225		P250	
	E	P	E	P	E	P	E	P
319 L3	—	—	267	400	297	450	297	550
319 L4	195	350	186	400	216	450	216	550

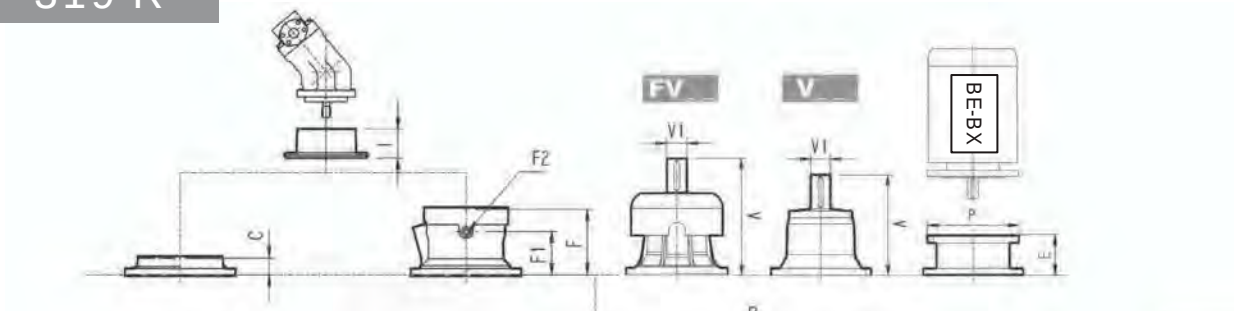
319 R

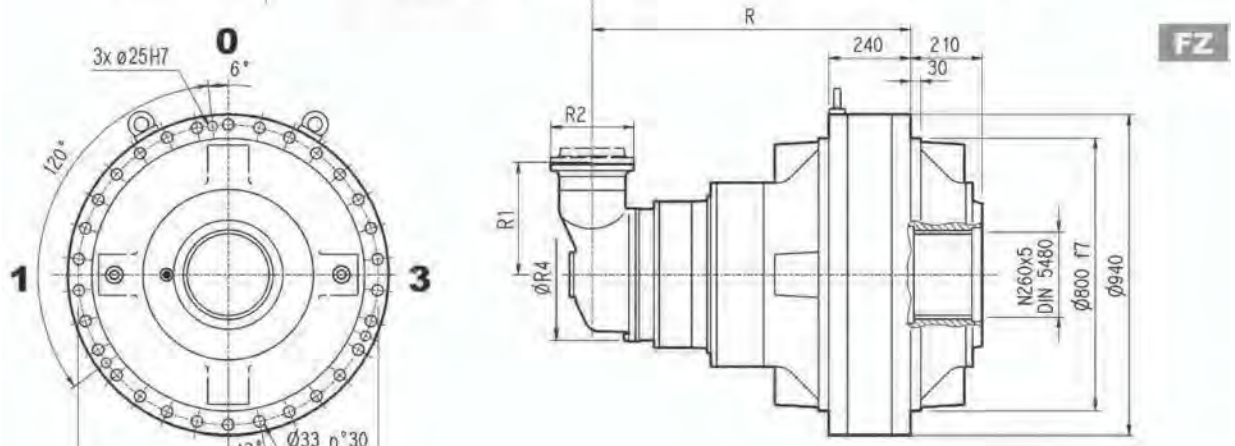


	R				R1	R2	R4	Kg			
	PC-PZ	HC-HZ	FZ - FZP	FP				PC-PZ	HC-HZ	FZ - FZP	FP
319 R4 (B)	1215	1005	1005	1005	345	292	400	2560	2260	2160	2160
319 R4 (C)	1215	1005	1005	1005	390	292	480	2580	2280	2180	2180

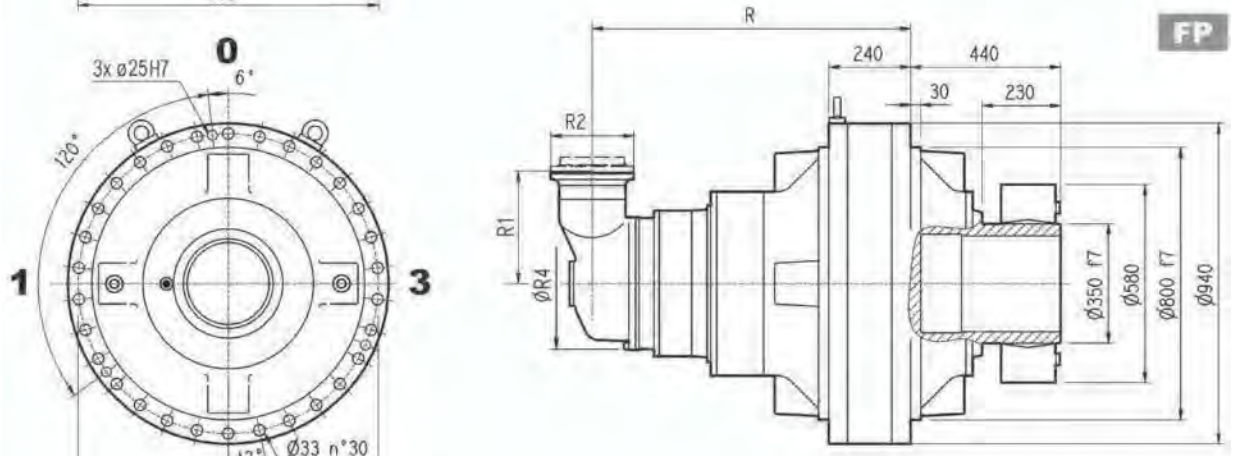
	V	V1	Kg	V	V1	Kg	V	V1	Kg	V	V1	Kg	C	Input	I	F	F1	F2	Type	Input	Kg
319 R4 (B)	307	60	23	—	—	—	357	60	28	—	—	—	45	B	467	195	147	1/4 G	6	B	28
319 R4 (C)	307	60	23	—	—	—	357	60	28	—	—	—	45	B		195	147	1/4 G	6	B	28

319 R

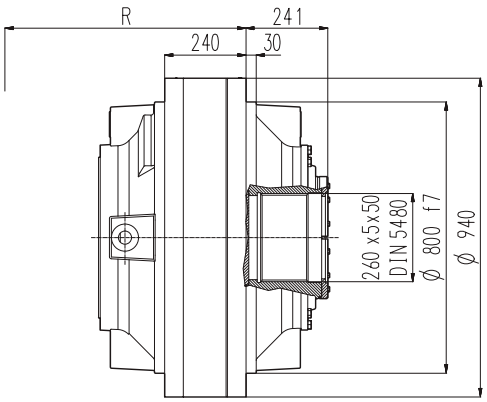




FZ



FP

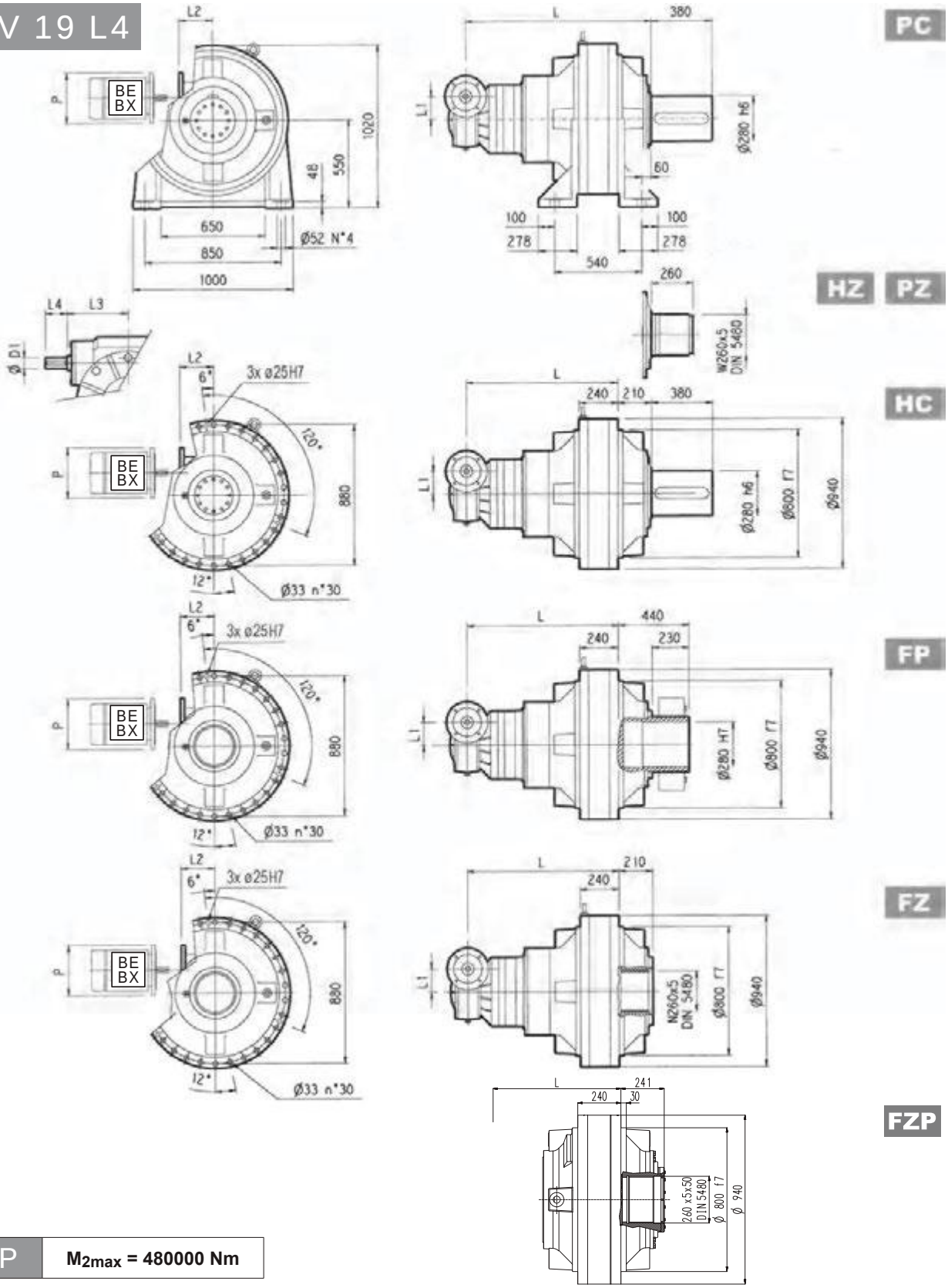


FZP

FP M_{2max} = 480000 Nm

	P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P
319 R4 (B)	—	—	—	—	152	350	182	400	212	450	193	550
319 R4 (C)	—	—	—	—	152	350	182	400	212	450	193	550

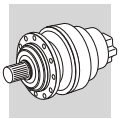
3/V 19 L4



FP | **M_{2max} = 480000 Nm**

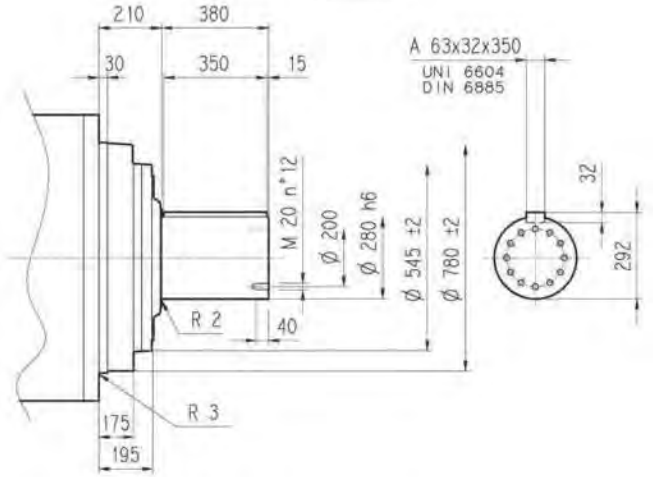
	L				L1	D1	L3	L4	Kg			
	PC - PZ	HC - HZ	FZ - FZP	FP					PC - PZ	HC - HZ	FZ - FZP	FP
3/V 19 L4	1210	1000	1000	1000	210	48	230	110	2650	2350	2250	2250

	P132		P160		P180		P200		P225	
	L2	P	L2	P	L2	P	L2	P	L2	P
3/V 19 L4	485	300	460	350	460	350	485	400	490	450

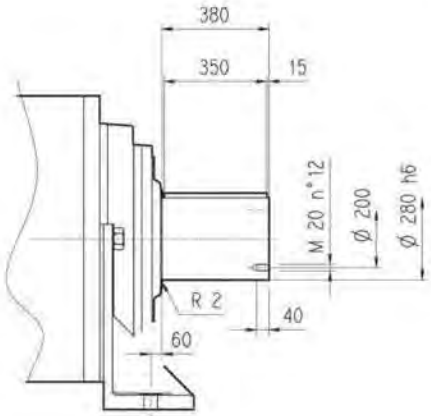


319 L | 319 R | 3/V 19 L4

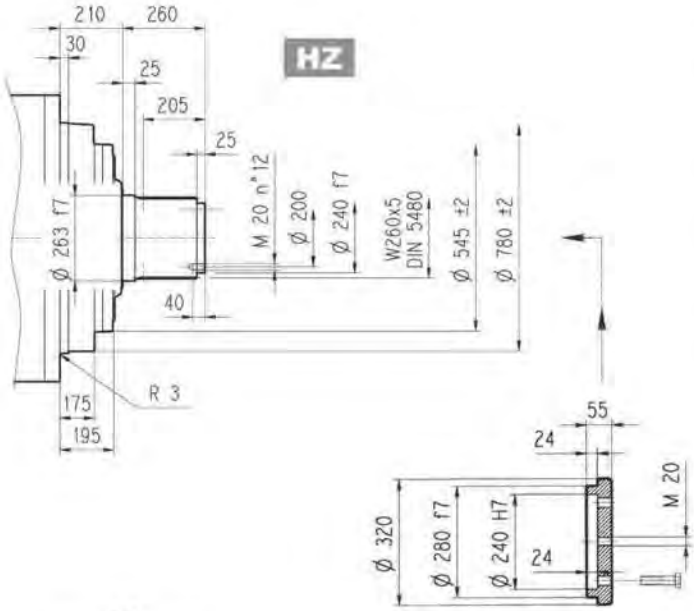
HC



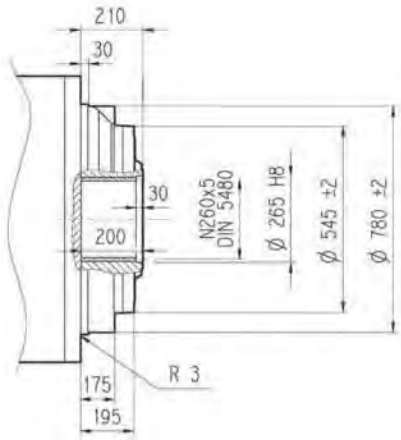
PC



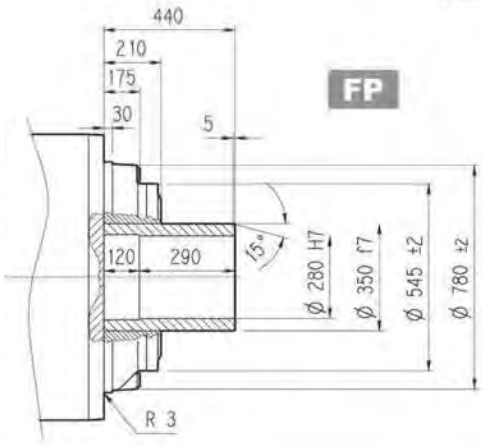
HZ



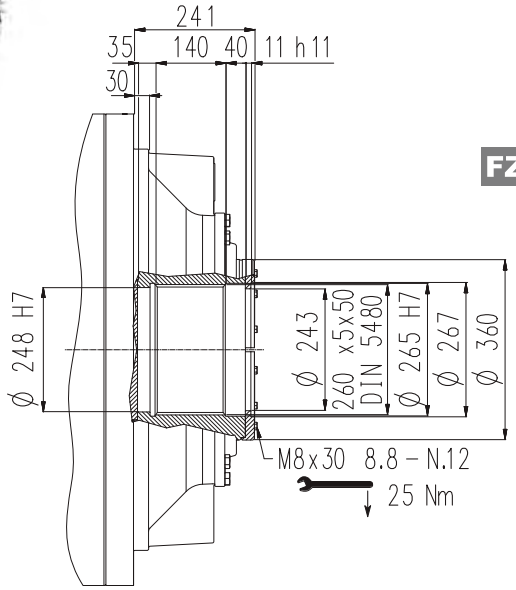
FZ



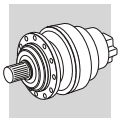
FP



FZP



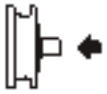
FP	M_{2max} = 480000 Nm

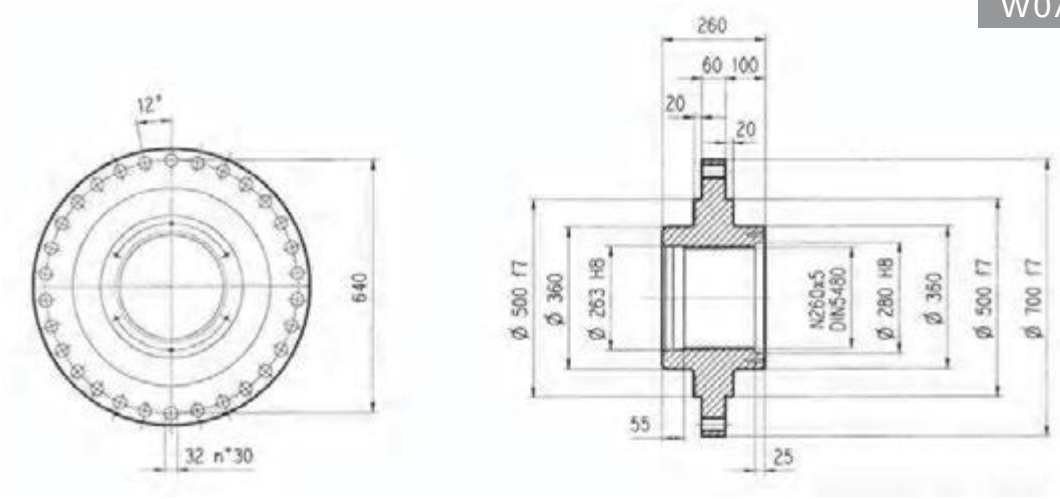


319 L | 319 R | 3/V 19 L4

Flange

W0A

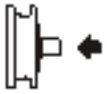


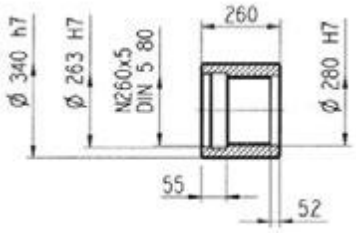


Material: Steel C40

Sleeve coupling

M0A

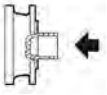


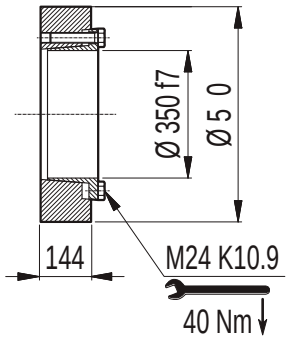


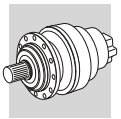
Material: Steel 16CrNi4

Shrink disc

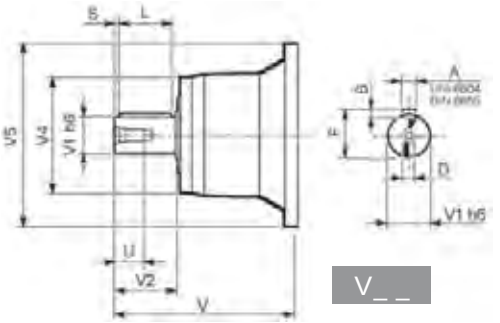
G0A

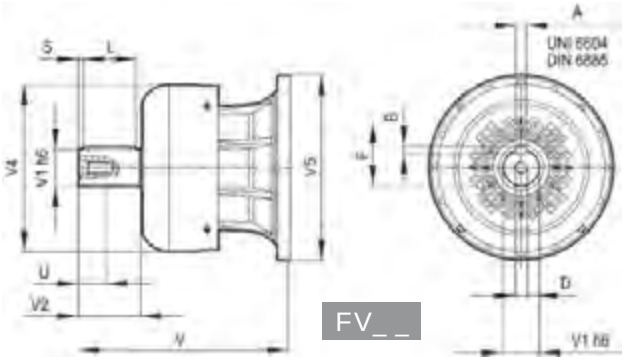






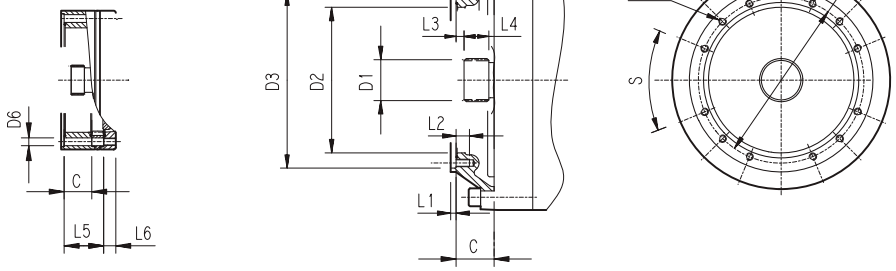
319 L 319 R





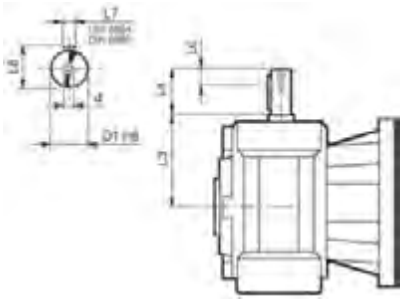
		V	V1	V2	V4	V5	A	B	F	L	S	D	U
319 L2	**V15B**	556	120	210	230	542	32	18	127	180	15	M24	50
319 L3	**V11B**	348	80	130	200	428	22	14	85	110	10	M16	36
	FV11B	456	80	130	347.5	428	22	14	85	110	10	M16	36
319 L4	**V07B**	315	80	130	200	345	22	14	85	110	10	M16	36
	FV07B	375	80	130	347.5	348	22	14	85	110	10	M16	36
	V07A	313	60	105	155	345	18	11	64	90	7.5	M16	36
	FV07A	363	60	105	309	348	18	11	64	90	7.5	M16	36
319 R4 (B) (C)	**V06B**	307	60	105	155	292	18	11	64	90	7.5	M16	36
	FV06B	357	60	105	309	292	18	11	64	90	7.5	M16	36

319 L 319 R

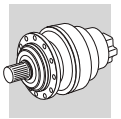


		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
319 L1	**V9AG**	245	150x5x28 DIN 5480	444	474 g7	503	M20 n°20	20	5	40	20	82	—	—	30°	15°	G
319 L2	**V9AE**	116	100x94 DIN 5482	340	412 H7	390	M16 n°18	—	7	30	8	55	—	—	20°	20°	E
319 L3	**V9AD**	81	80x74 DIN 5482	270	335 H7	314	M16 n°8	—	5	30	8.5	40	—	—	60°	30°	D
319 L4	**V9AB**	51	58x53 DIN 5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B
319 R4	**V9AA**	37	40x36 DIN 5482	140	178 H7	165	M12 n°8	11	4	18	9	18	—	—	45°	45°	A
319 R4 (B) (C)	**V9AB**	45	58x53 DIN 5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B

3/V 19 L4

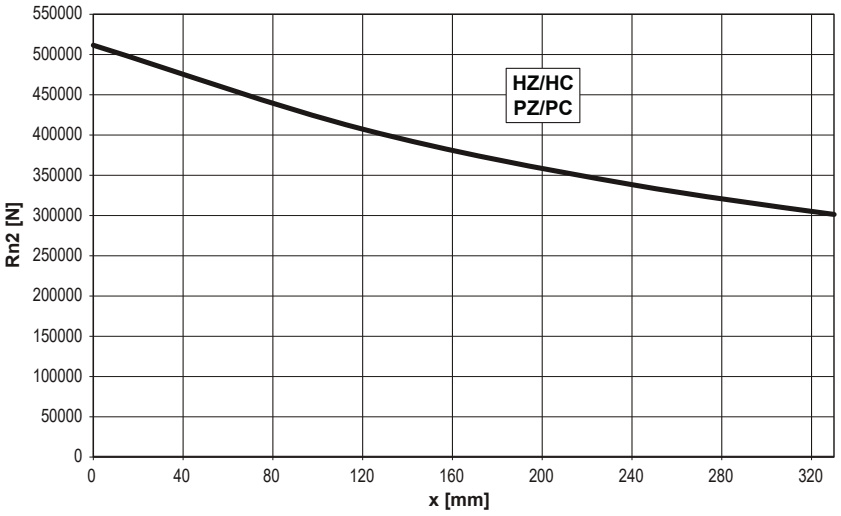


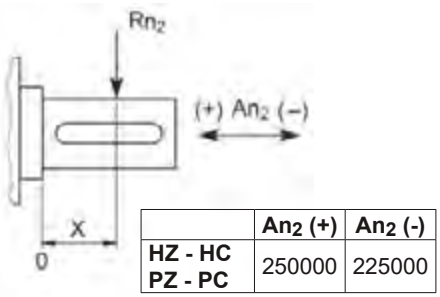
	D1 h6	L3	L4	L6	L7	L8	d
3/V 19 L4_HS	48	230	110	40	14	51.5	M16



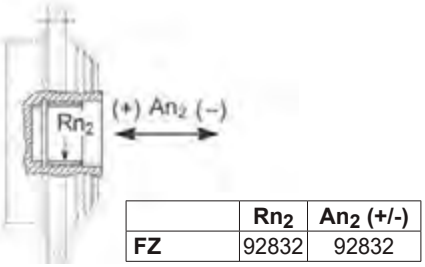
319 L | 319 R | 3/V 19 L4

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$





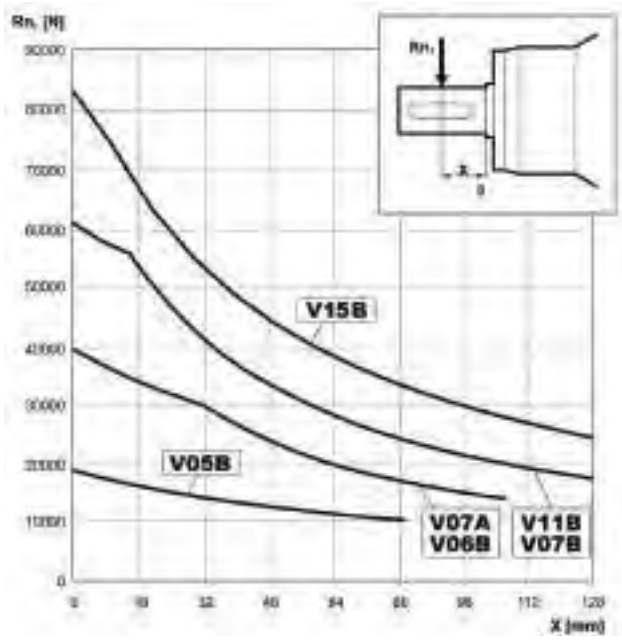
	An2 (+)	An2 (-)
HZ - HC PZ - PC	250000	225000

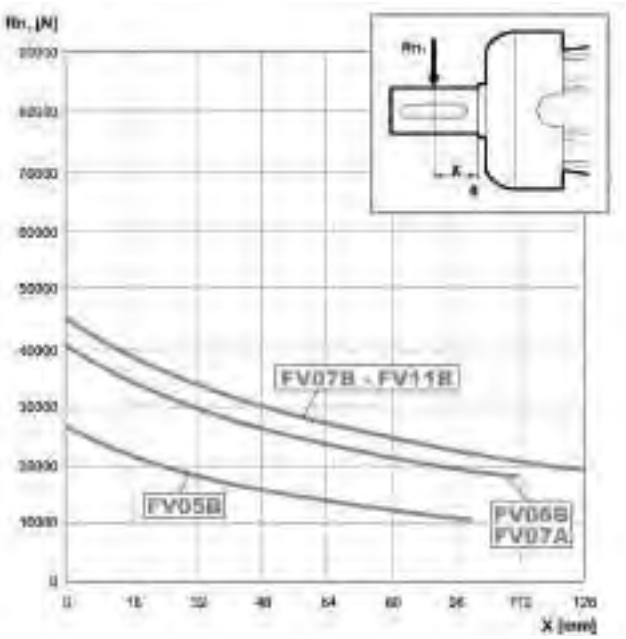


	Rn2	An2 (+/-)
FZ	92832	92832

Load corrective factor fh_2 on shafts	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
	fh_2	FZ	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HZ - HC - PZ - PC	**1.75**	**1.52**	**1.23**	**1.00**	**0.62**	**0.50**

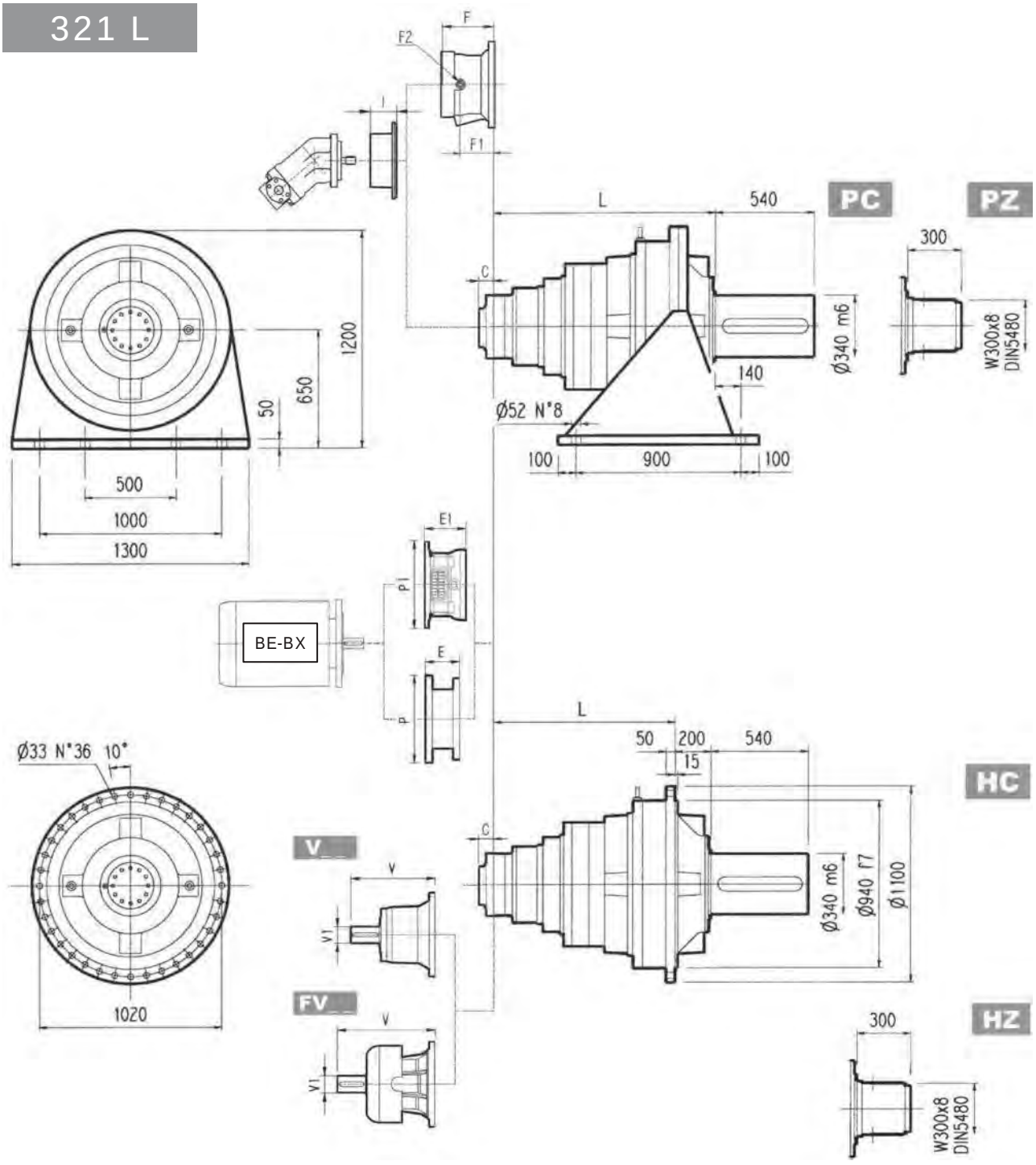
Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$





Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

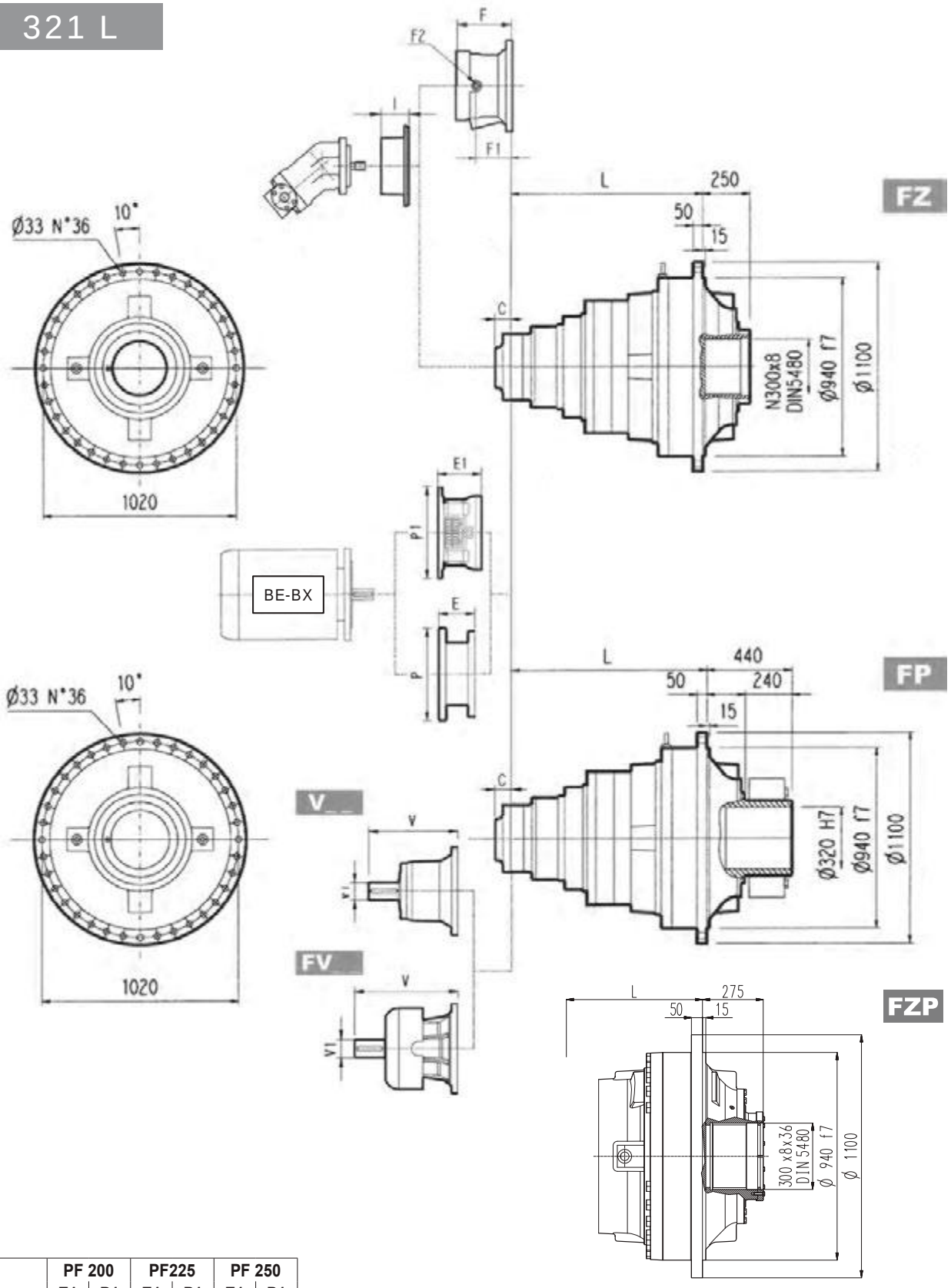
321 L



	L							
	PC - PZ	HC - HZ	FZ - FZP	FP	PC - PZ	HC - HZ	FZ - FZP	FP
321 L2	795	595	595	595	3000	2700	2600	2600
321 L3	1104	904	904	904	3120	2820	2720	2720
321 L4	1253	1053	1053	1053	3180	2880	2780	2780

	V	V1	Kg	V	V1	Kg	V	V1	Kg	V	V1	Kg	C	Input	I	F	F1	F2	Type	Input	Kg
321 L2	—	—	—	—	—	—	—	—	—	—	—	—	181	F		—	—	—	—	—	—
321 L3	343	80	55	—	—	—	451	80	71	—	—	—	75	D		—	—	—	—	—	—
321 L4	315	80	35	313	60	28	375	80	48	363	60	34	51	B	467	201	153	1/4 G	6	B	28

321 L



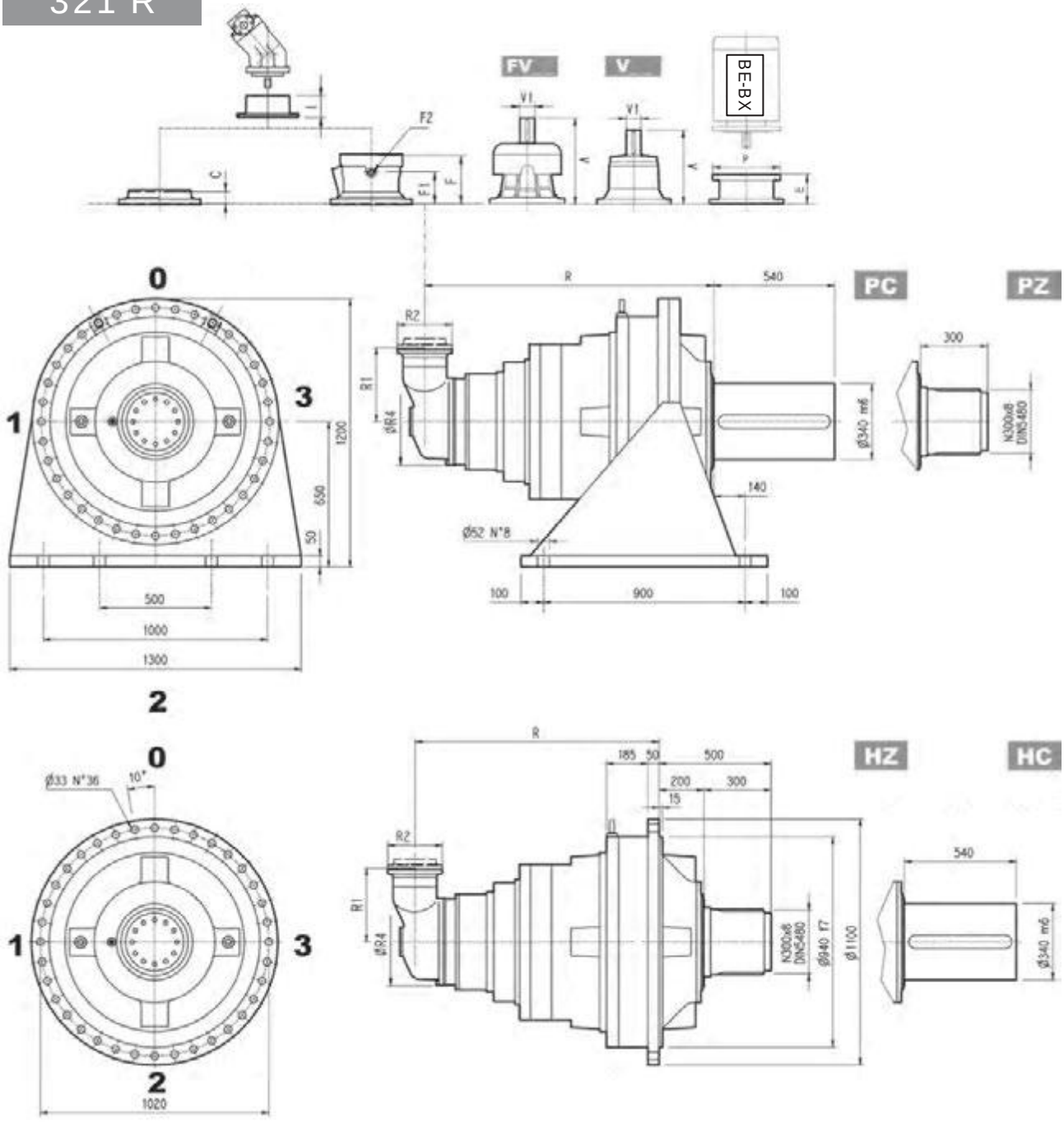
	PF 200		PF225		PF 250	
	E1	P1	E1	P1	E1	P1
321 L4	197	530	227	530	227	550

NOTE: For R design contact Bonfiglioli Technical service

FP	M_{2max} = 720000 Nm

	P180		P200		P225		P250	
	E	P	E	P	E	P	E	P
321 L4	195	350	186	400	216	450	216	550

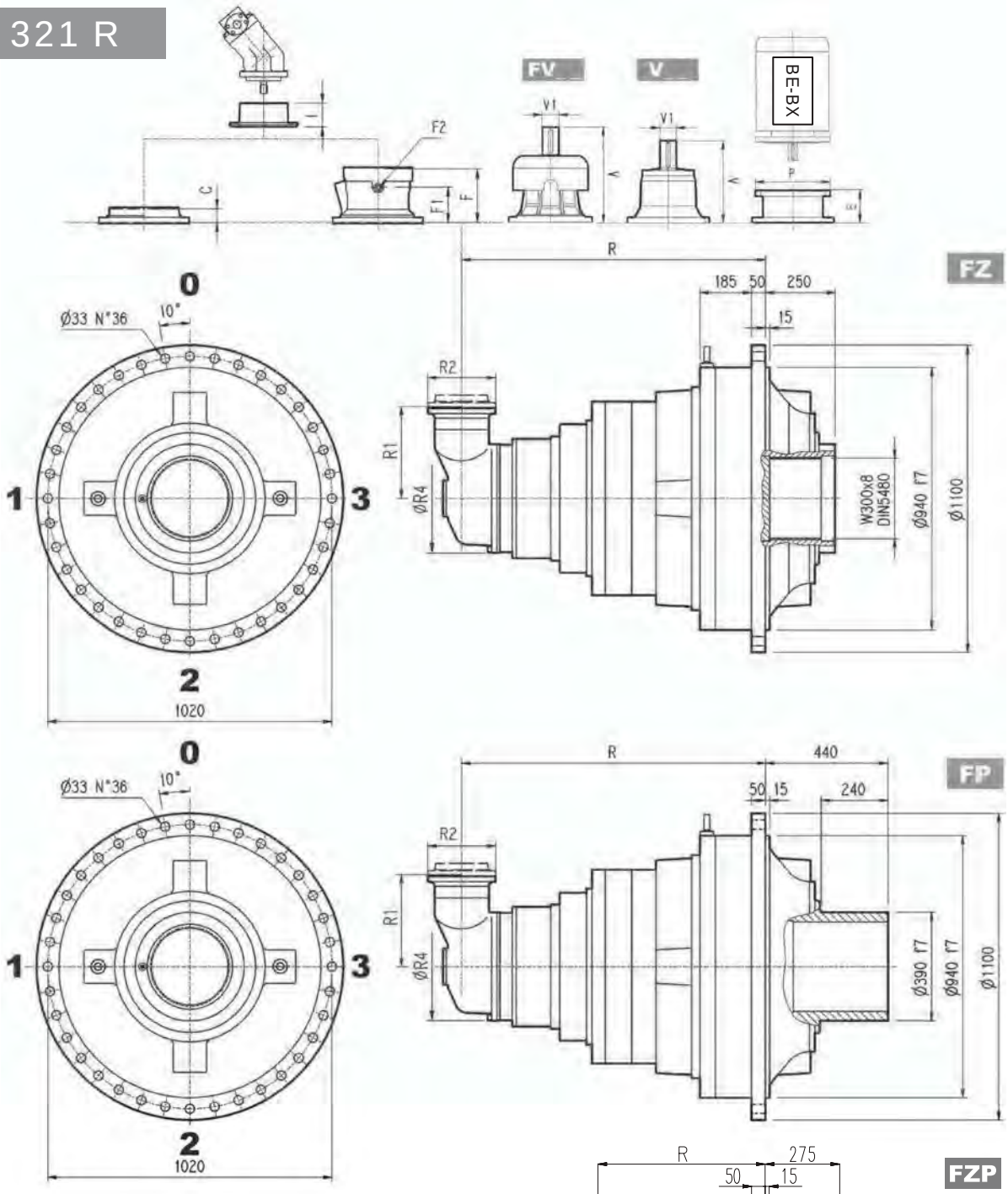
321 R



	R				R1	R2	R4	Kg			
	PC-PZ	HC-HZ	FZ - FZP	FP				PC-PZ	HC-HZ	FZ - FZP	FP
321 R4 (B)	1334	1134	1134	1134	345	292	400	3250	2950	2850	2850
321 R4 (C)	1334	1134	1134	1134	390	292	480	3260	2960	2860	2860

	V	V1	Kg	V	V1	Kg	V	V1	Kg	V	V1	Kg	C	Input	I	F	F1	F2	Type	Input	Kg
321 R4 (B)	307	60	23	—	—	—	357	60	28	—	—	—	45	B	467	195	147	1/4 G	6	B	28
321 R4 (C)	307	60	23	—	—	—	357	60	28	—	—	—	45	B		195	147	1/4 G	6	B	28

321 R

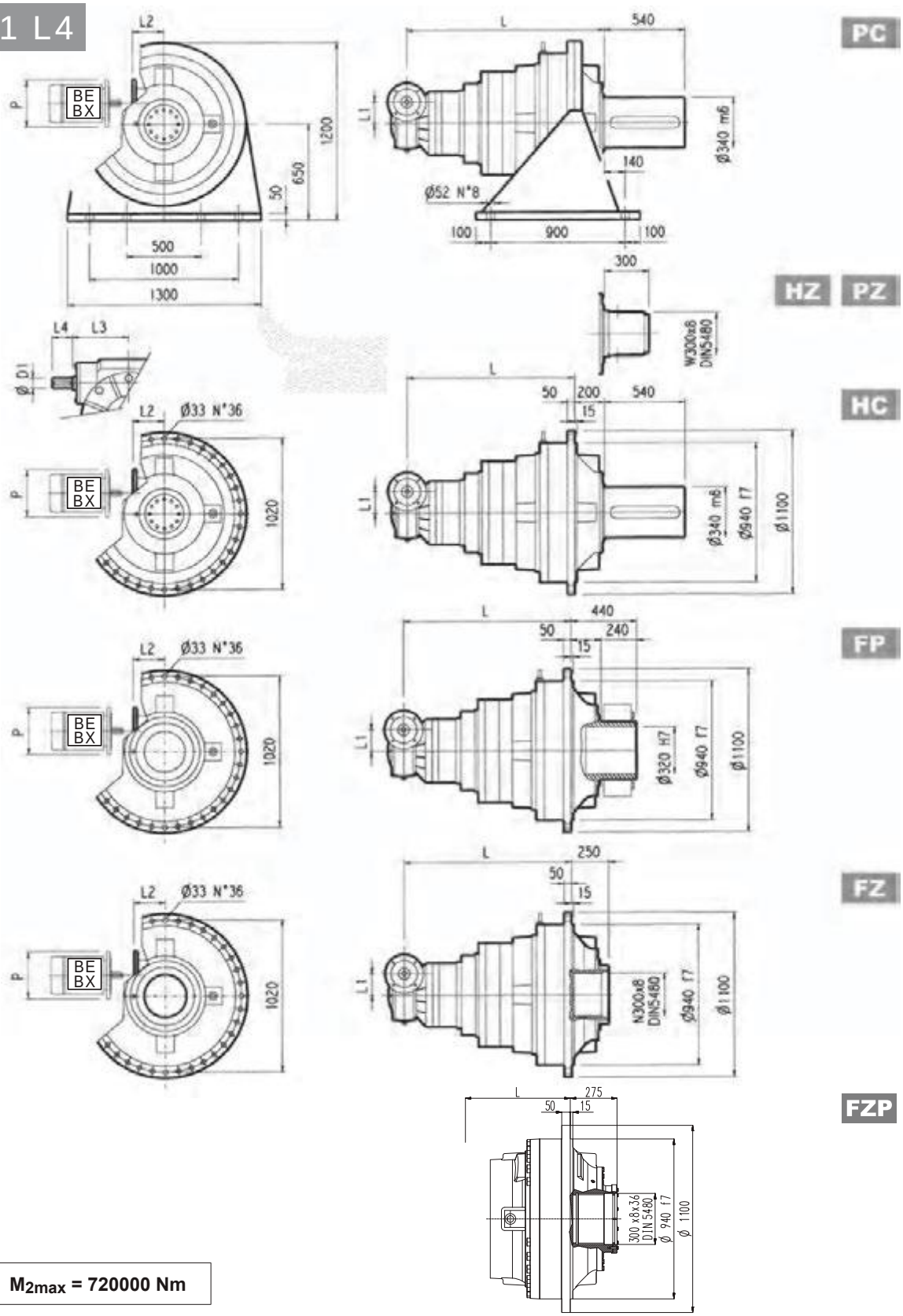


FP

M_{2max} = 720000 Nm

	P132		P160		P180		P200		P225		P250	
	E	P	E	P	E	P	E	P	E	P	E	P
321 R4 (B)	—	—	—	—	152	350	182	400	212	450	193	550
321 R4 (C)	—	—	—	—	152	350	182	400	212	450	193	550

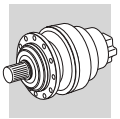
3/V 21 L4



FP — M_{2max} = 720000 Nm

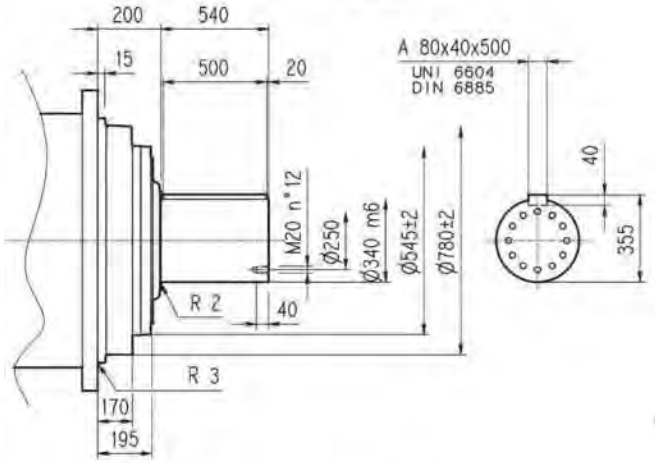
	L				L1	L2	D1	L3	L4	Kg			
	PC - PZ	HC - HZ	FZ - FZP	FP						PC - PZ	HC - HZ	FZ - FZP	FP
3/V 21 L4	1374	1174	1174	1174	250	—	55	276	110	3430	3130	3030	3030

	P132		P160		P180		P200		P225	
	L2	P	L2	P	L2	P	L2	P	L2	P
3/V 21 L4	531	300	506	350	506	350	531	400	536	450

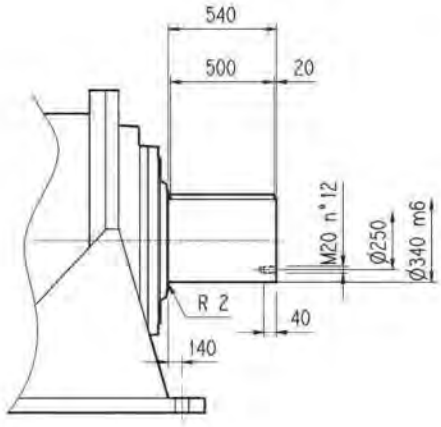


321 L | 321 R | 3/V 21 L4

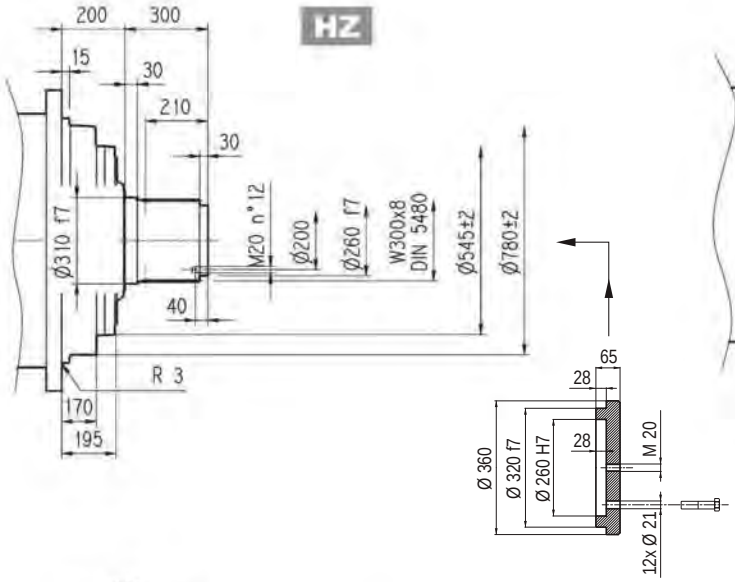
HC



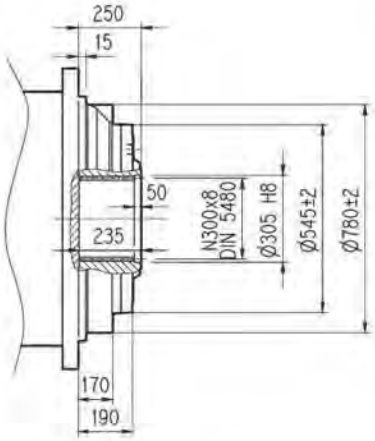
PC



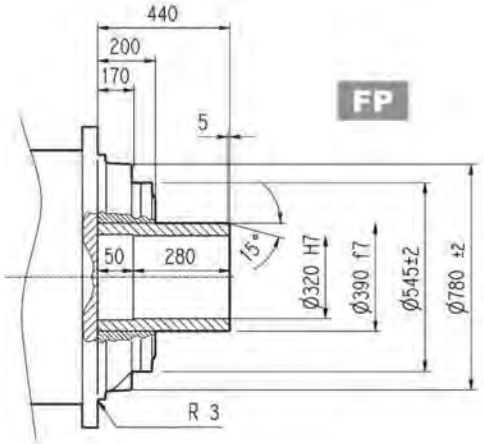
HZ



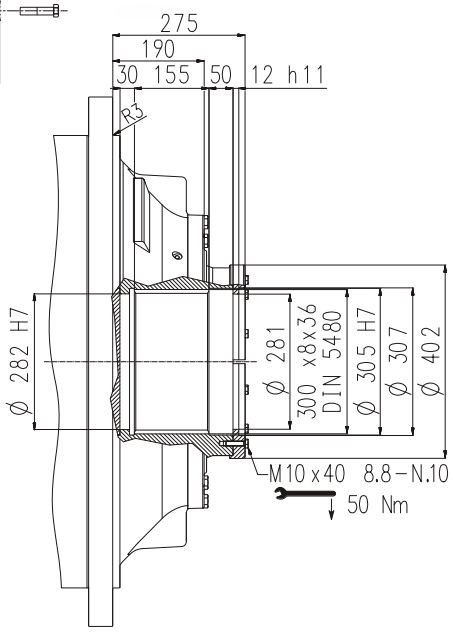
FZ



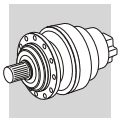
FP



FZP



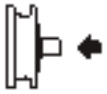
FP	M_{2max} = 720000 Nm

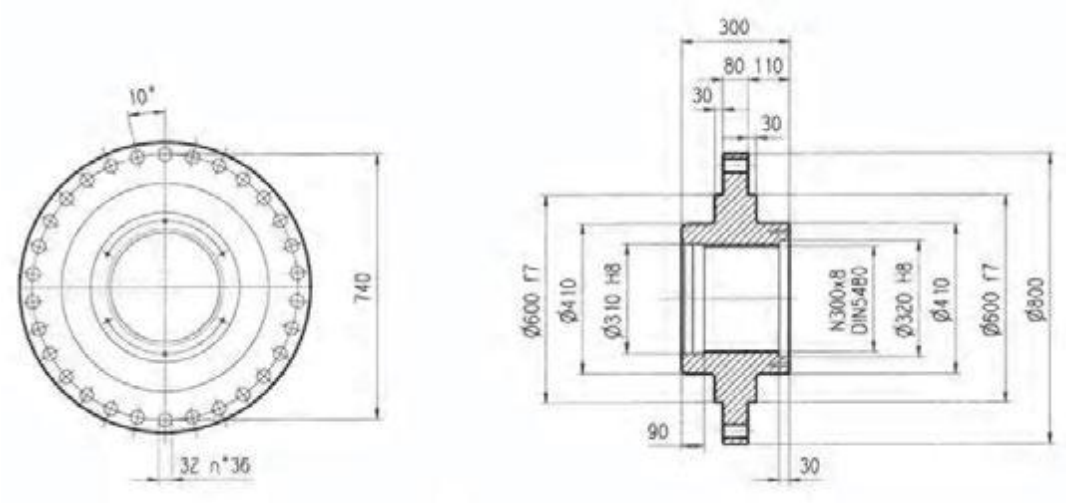


321 L | 321 R | 3/V 21 L4

Flange

W0A

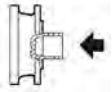


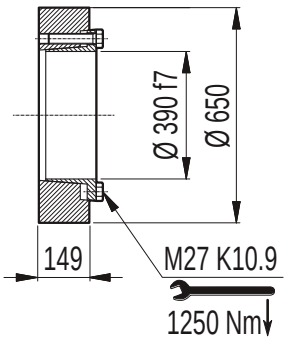


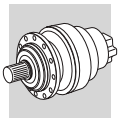
Material: Steel C40

Shrink disc

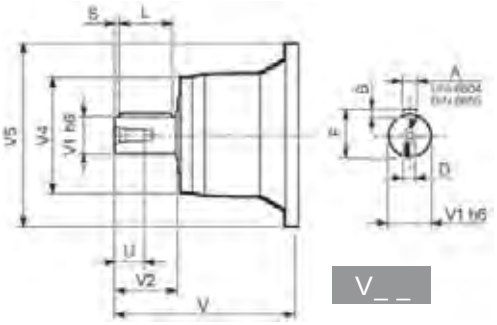
G0A

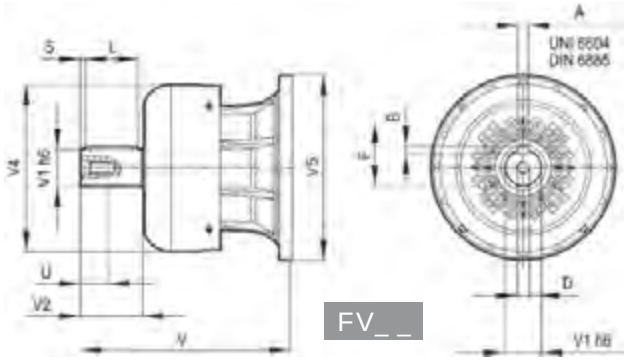






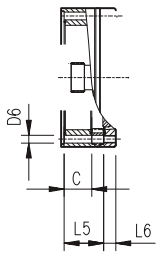
321 L 321 R

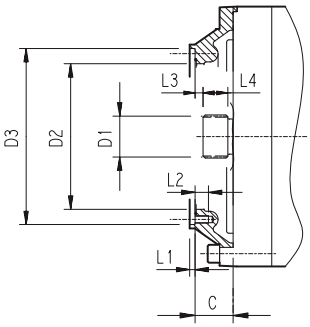


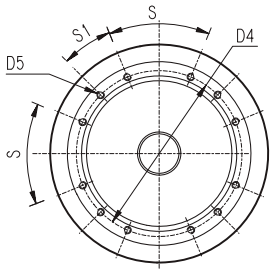


		V	V1	V2	V4	V5	A	B	F	L	S	D	U
321 L3	**V11B**	343	80	130	200	445	22	14	85	110	10	M16	36
	FV11B	451	80	130	347.5	445	22	14	85	110	10	M16	36
321 L4	**V07B**	315	80	130	200	345	22	14	85	110	10	M16	36
	FV07B	375	80	130	347.5	348	22	14	85	110	10	M16	36
	V07A	313	60	105	155	345	18	11	64	90	7.5	M16	36
	FV07A	363	60	105	309	348	18	11	64	90	7.5	M16	36
321 R4 (B) (C)	**V06B**	307	60	105	155	292	18	11	64	90	7.5	M16	36
	FV06B	357	60	105	309	292	18	11	64	90	7.5	M16	36

321 L 321 R

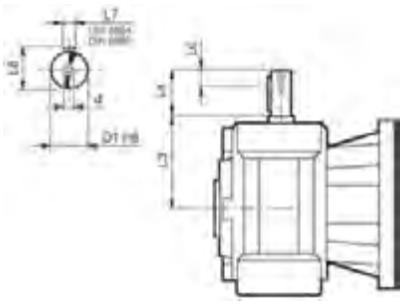






		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
321 L1	Please consult Bonfiglioli Technical Service																
321 L2	**V9AF**	181	120x3 DIN 5480	365	390 f7	415	M16 n°18	—	4	30	3	65	—	—	20°	20°	F
321 L3	**V9AD**	75	80x74 DIN 5482	270	335 H7	314	M16 n°8	—	5	30	8.5	40	—	—	60°	30°	D
321 L4	**V9AB**	51	58x53 DIN 5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B
321 R4 (B) (C)	**V9AB**	45	58x53 DIN 5482	195	236 H7	222	M10 n°12	—	4	18	11	22	—	—	45°	22.5°	B

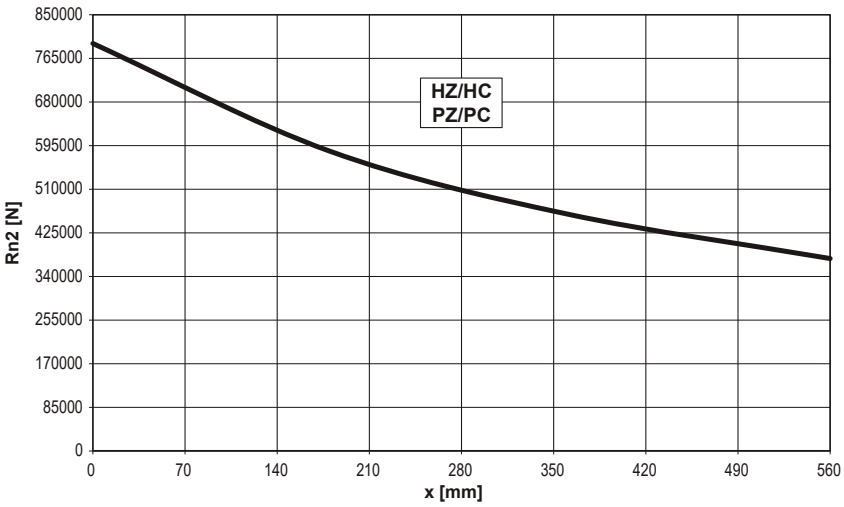
3/V 21 L4

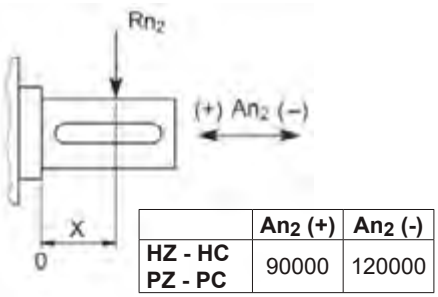


	D1 h6	L3	L4	L6	L7	L8	d
3/V 21 L4_HS	55	276	110	40	16	59	M16

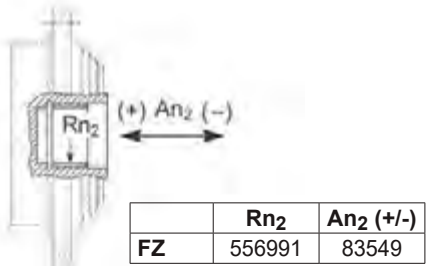
321 L | 321 R | 3/V 21 L4

Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$





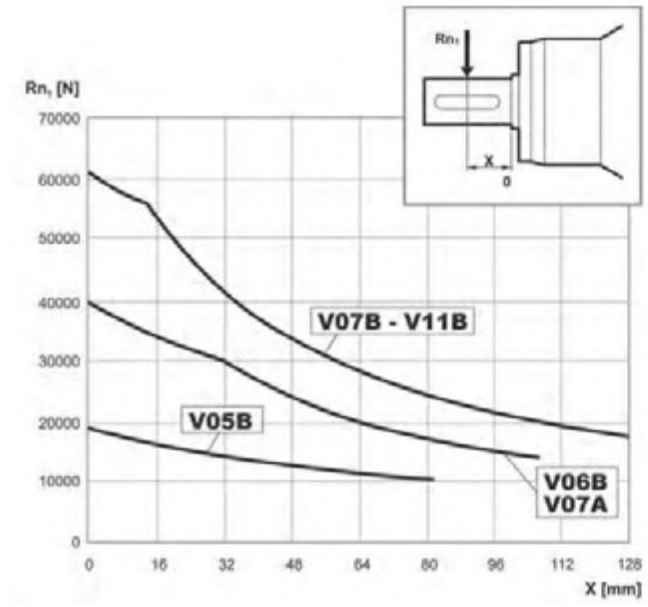
	An2 (+)	An2 (-)
HZ - HC PZ - PC	90000	120000

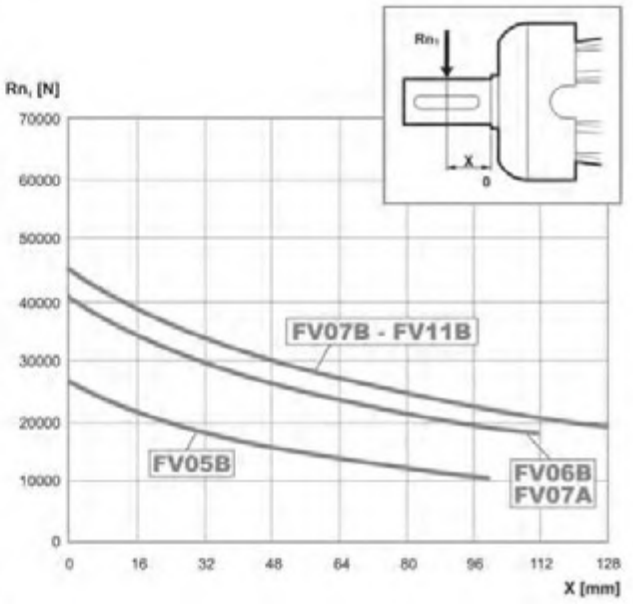


	Rn2	An2 (+/-)
FZ	556991	83549

Load corrective factor fh_2 on shafts	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
	fh_2	FZ	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**
		HZ - HC - PZ - PC	**1.54**	**1.35**	**1.23**	**1.00**	**0.62**	**0.50**

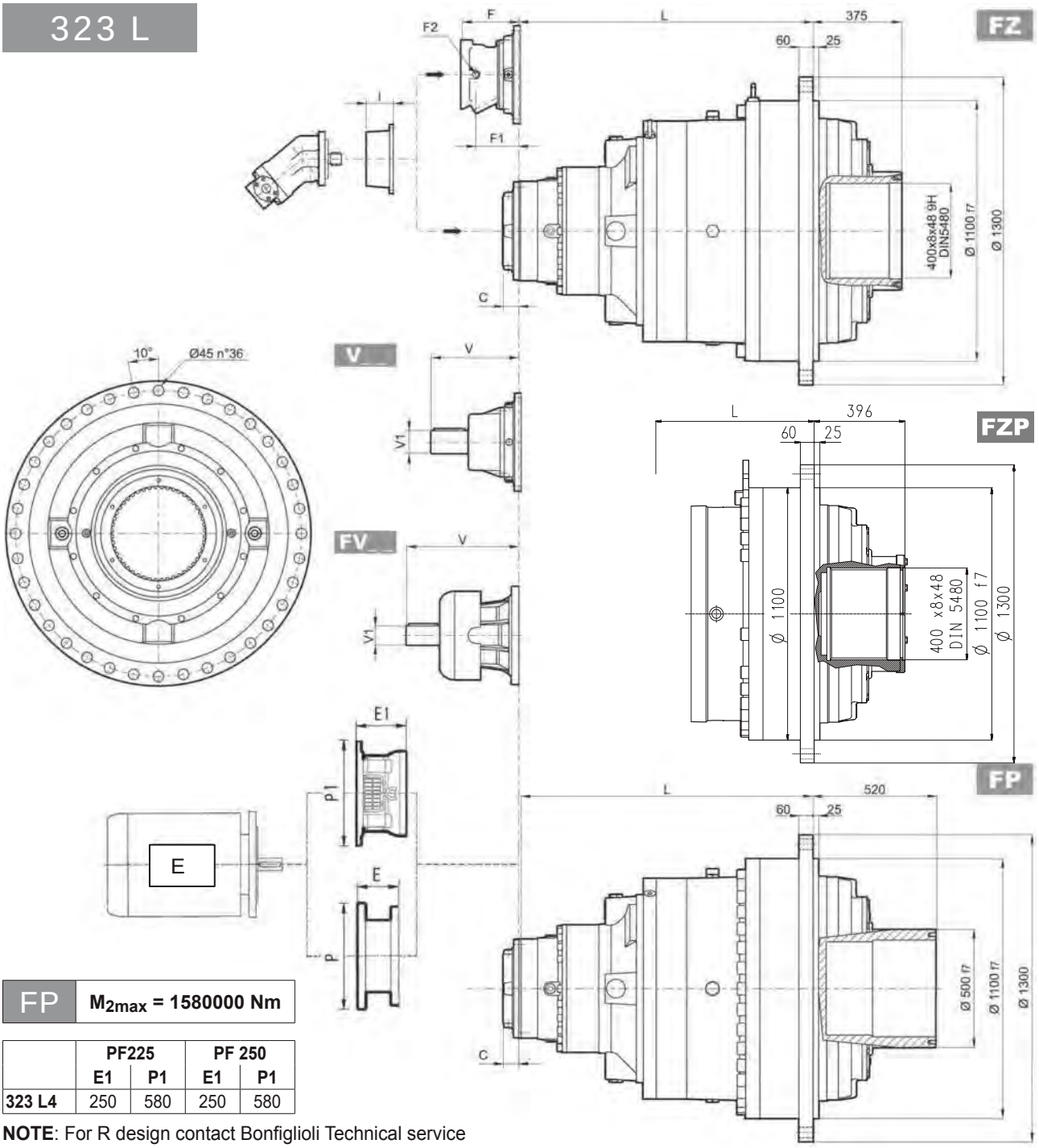
Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$





Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

323 L



FP	M_{2max} = 1580000 Nm

	PF225		PF 250	
	E1	P1	E1	P1
323 L4	250	580	250	580

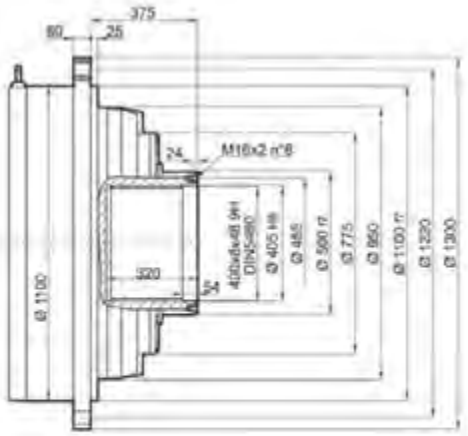
NOTE: For R design contact Bonfiglioli Technical service

	L		Kg							
	FZ - FZP	FP	FZ - FZP	FP	V	V1	Kg	V	V1	Kg
323 L1	Please consult Bonfiglioli Technical Service									
323 L2	666	666	4450	4550	—	—	—	—	—	—
323 L3	1049	1049	4750	4850	556	120	125	—	—	—
323 L4	1261	1261	4900	5000	315	80	35	456	80	85

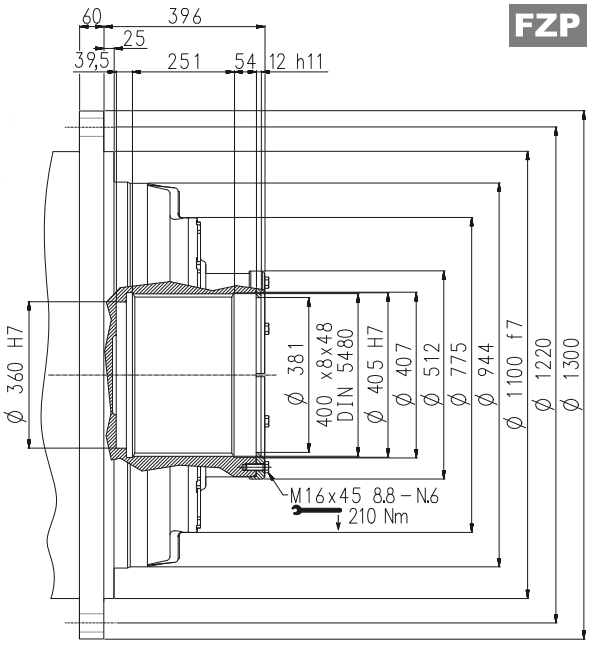
										P200		P225		P250	
	C	Input	I	F	F1	F2	Type	Input		E	P	E	P	E	P
323 L1	—	—		—	—	—	—	—	—	—	—	—	—	—	—
323 L2	245	G		—	—	—	—	—	—	—	—	—	—	—	—
323 L3	116	E		—	—	—	—	—	—	—	—	—	—	—	—
323 L4	81	D	467	201	48	1/4 G	6	B	22	267	400	297	450	297	550

323 L

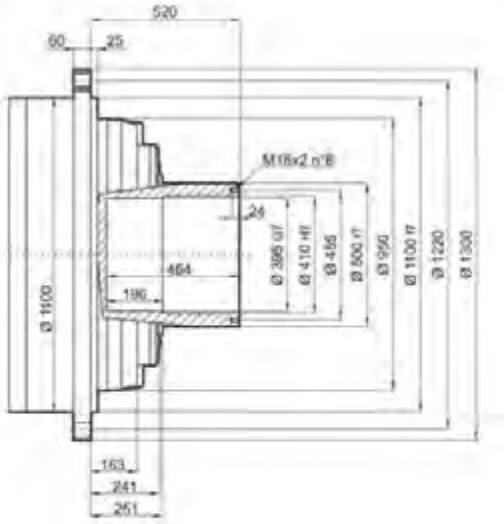
FZ



FZP

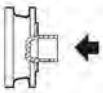


FP

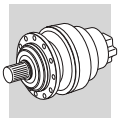


Shrink disc

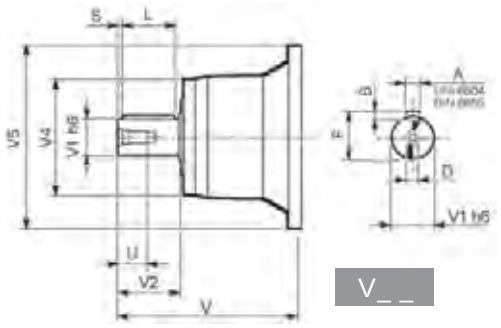
G0A

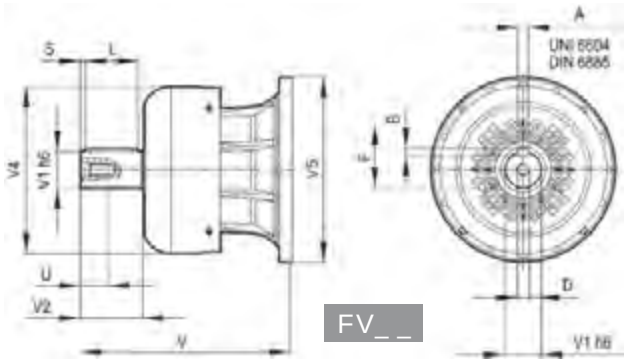


FP | M_{2max} = 1580000 Nm



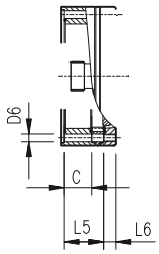
323 L

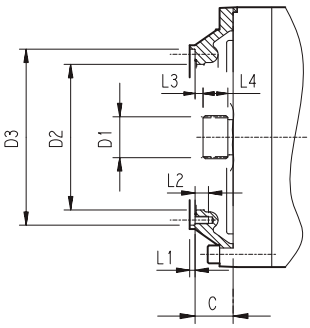


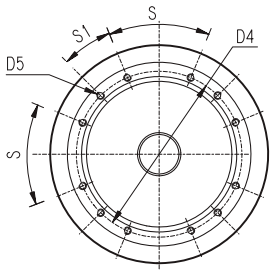


		V	V1	V2	V4	V5	A	B	F	L	S	D	U
323 L3	**V15B**	556	120	210	230	542	32	18	127	180	15	M24	50
323 L4	**V11B**	343	80	130	200	445	22	14	85	110	10	M16	36
	FV11B	451	80	130	347.5	445	22	14	85	110	10	M16	36

323 L



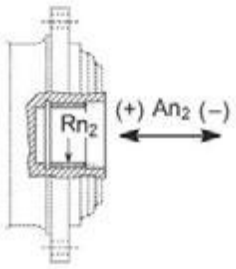




		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
323 L1	Please consult Bonfiglioli Technical Service																
323 L2	**V9AG**	245	150x5x28 DIN 5480	444	474 g7	503	M20 n°20	20	5	40	20	82	—	—	30°	15°	G
323 L3	**V9AE**	116	100x94 DIN 5482	340	412 H7	390	M16 n°18	—	7	30	8	55	—	—	20°	20°	E
323 L4	**V9AD**	81	80x74 DIN 5482	270	335 H7	314	M16 n°8	—	5	30	8.5	40	—	—	60°	30°	D

323 L

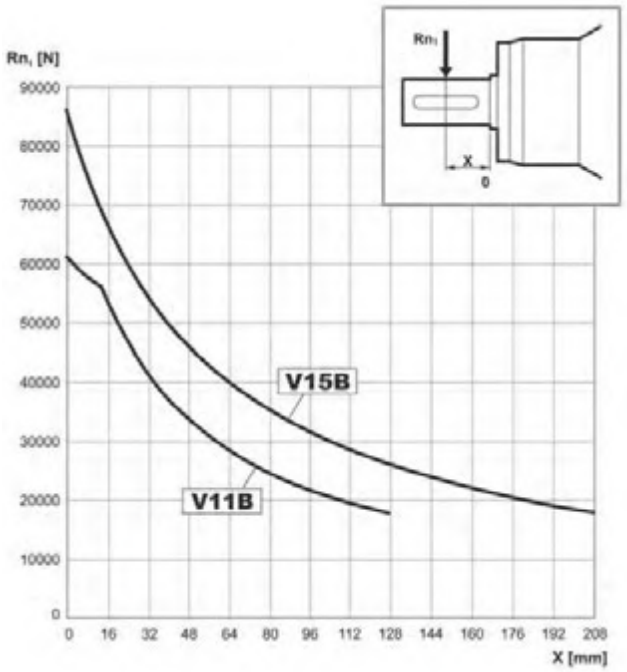
Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$

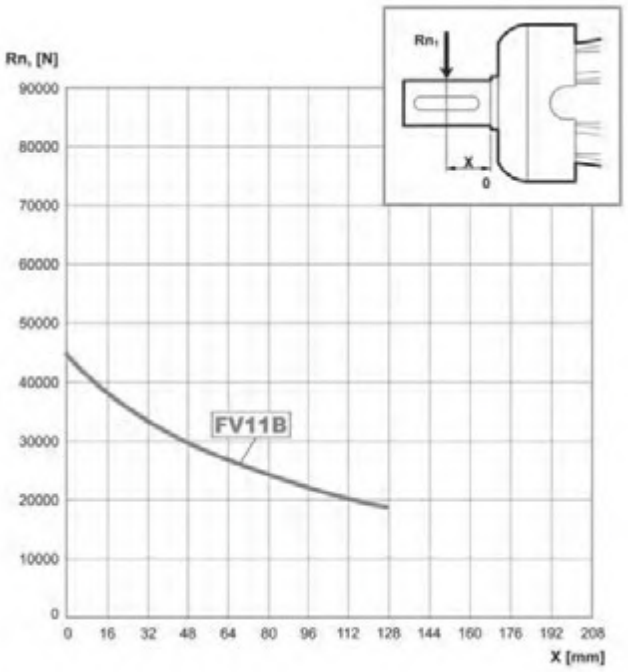


	Rn_2	An_2 (+)	An_2 (-)
FZ	510575	174060	69624

Load corrective factor fh_2 on shafts	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
	fh_2	**FZ**	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**

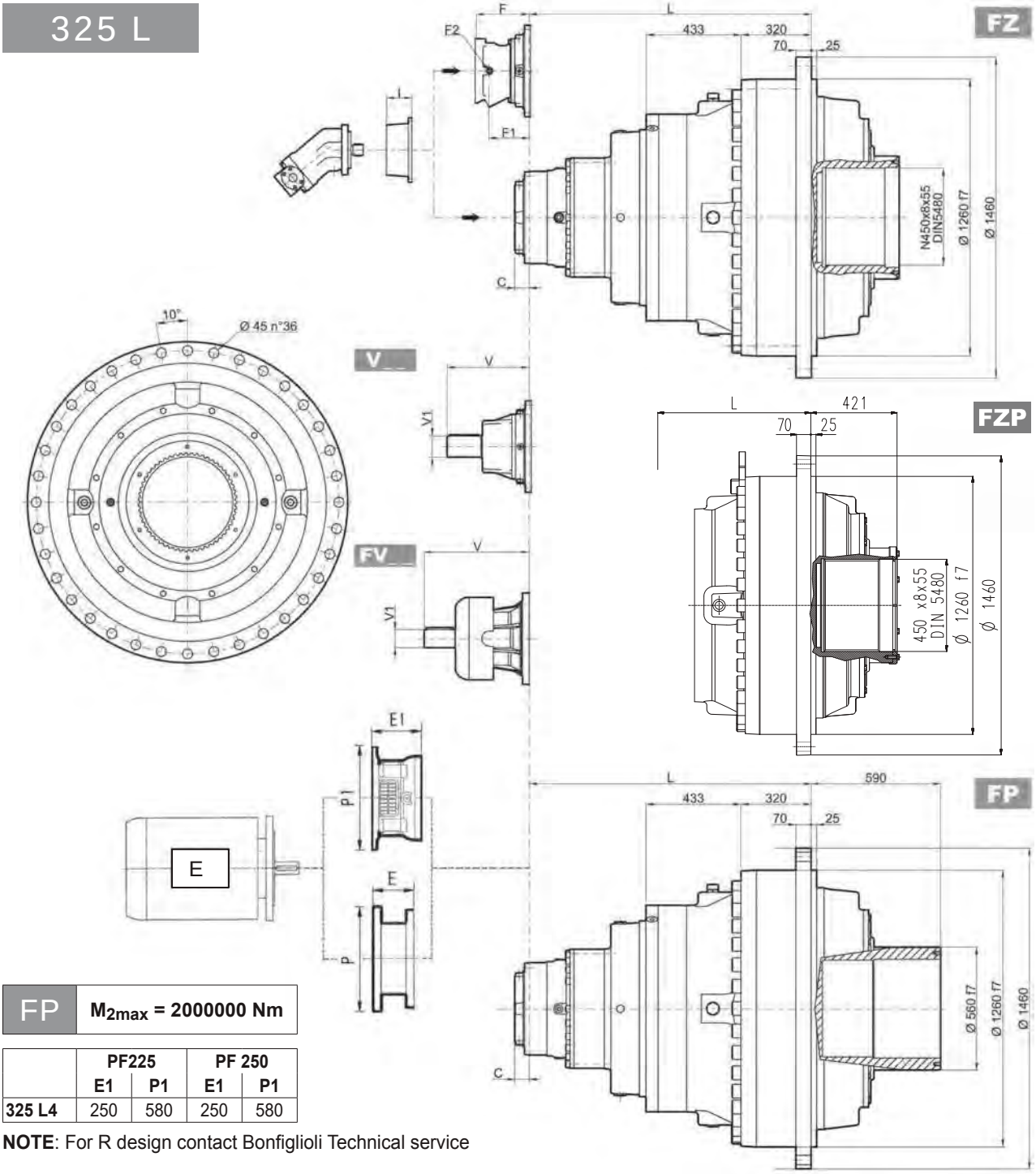
Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$





Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

325 L



FP M_{2max} = 2000000 Nm

	PF225		PF 250	
	E1	P1	E1	P1
325 L4	250	580	250	580

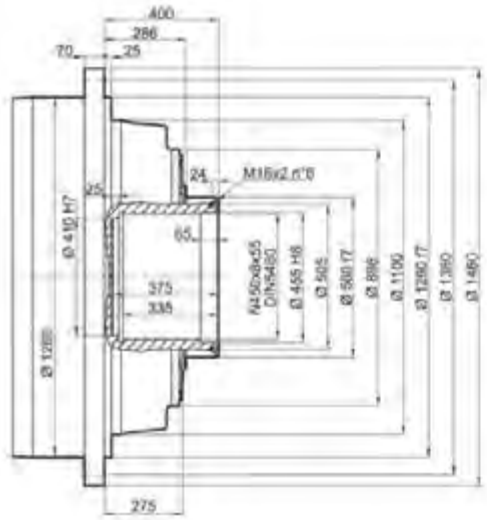
NOTE: For R design contact Bonfiglioli Technical service

	L		Kg							
	FZ - FZP	FP	FZ - FZP	FP	V	V1	Kg	V	V1	Kg
325 L1	Please consult Bonfiglioli Technical Service									
325 L2	698	698	5700	5900	—	—	—	—	—	—
325 L3	1081	1081	6000	6200	556	120	125	—	—	—
325 L4	1293	1293	6150	6350	315	80	35	456	80	85

										P200		P225		P250	
	C	Input	I	F	F1	F2	Type	Input		E	P	E	P	E	P
325 L1	—	—		—	—	—	—	—	—	—	—	—	—	—	—
325 L2	245	G		—	—	—	—	—	—	—	—	—	—	—	—
325 L3	116	E		—	—	—	—	—	—	—	—	—	—	—	—
325 L4	81	D	467	201	48	1/4 G	6	B	22	267	400	297	450	297	550

325 L

FZ



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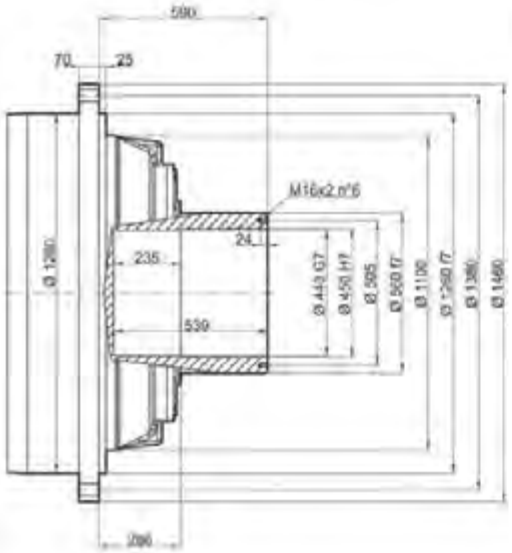
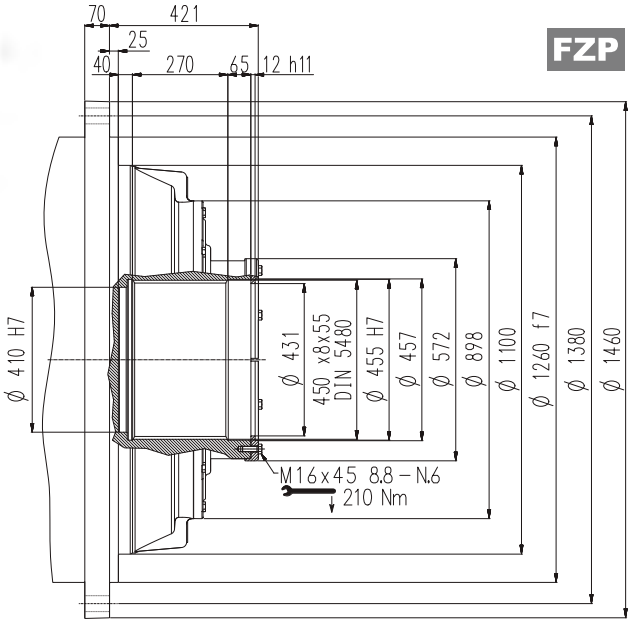
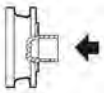


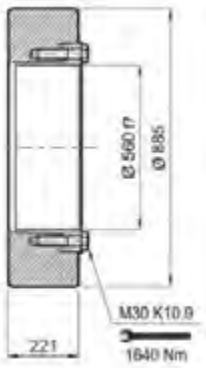
FZP



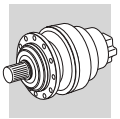
Shrink disc



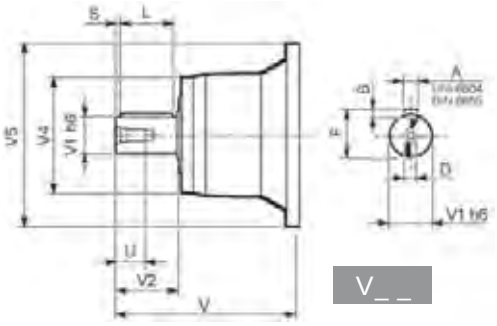
G0A

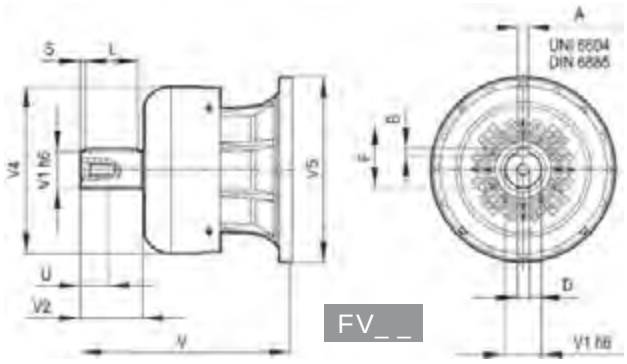


FP	M_{2max} = 2000000 Nm



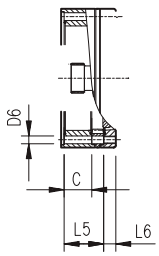
325 L

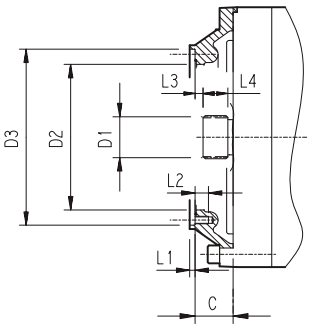


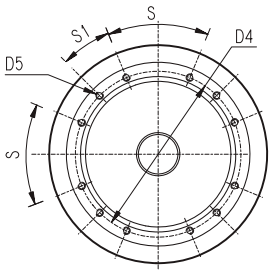


		V	V1	V2	V4	V5	A	B	F	L	S	D	U
325 L3	**V15B**	556	120	210	230	542	32	18	127	180	15	M24	50
325 L4	**V11B**	343	80	130	200	445	22	14	85	110	10	M16	36
	FV11B	451	80	130	347.5	445	22	14	85	110	10	M16	36

325 L



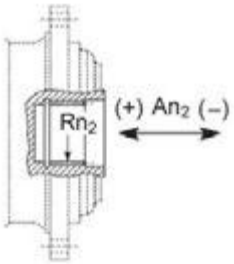




		C	D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	L6	S	S1	Input
325 L1	Please consult Bonfiglioli Technical Service																
325 L2	**V9AG**	245	150x5x28 DIN 5480	444	474 g7	503	M20 n°20	20	5	40	20	82	—	—	30°	15°	G
325 L3	**V9AE**	116	100x94 DIN 5482	340	412 H7	390	M16 n°18	—	7	30	8	55	—	—	20°	20°	E
325 L4	**V9AD**	81	80x74 DIN 5482	270	335 H7	314	M16 n°8	—	5	30	8.5	40	—	—	60°	30°	D

325 L

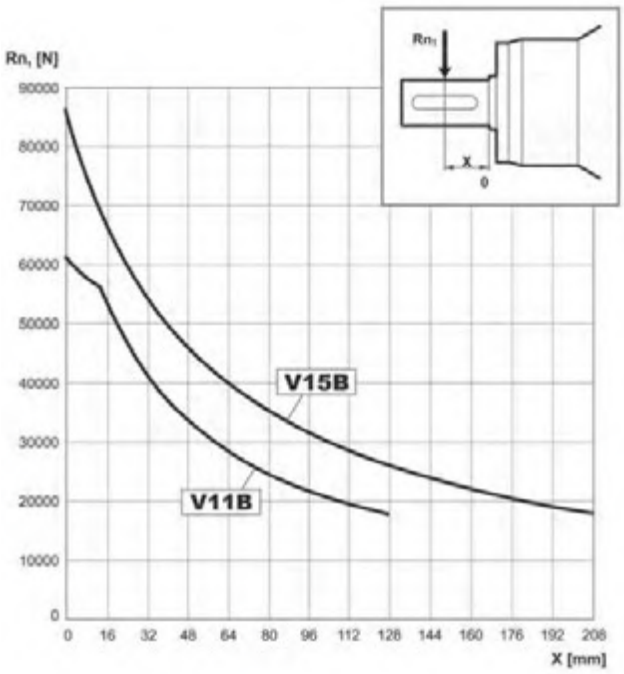
Permissible radial and axial loads on output shaft with $Fh_2 : n_2 \cdot h = 100000$

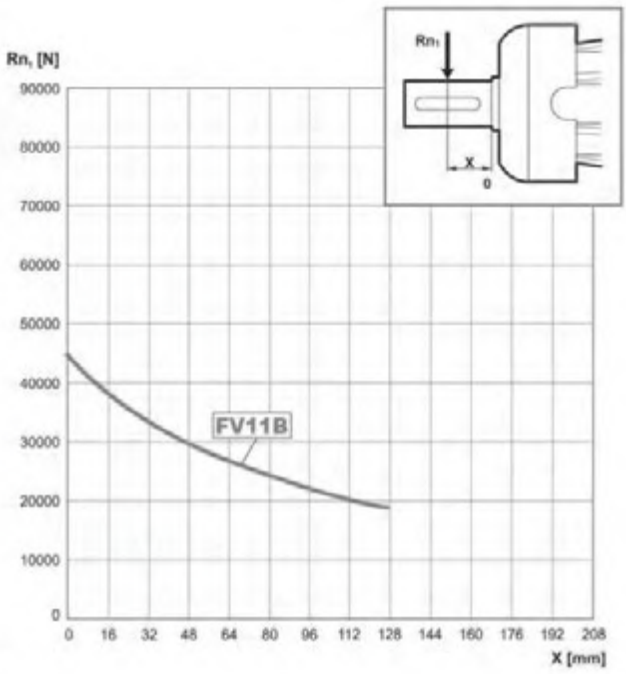


	Rn_2	An_2 (+)	An_2 (-)
FZ	510575	174060	69624

Load corrective factor fh_2 on shafts	$Fh_2 = n_2 \cdot h$		10000	25000	50000	100000	500000	1000000
	fh_2	**FZ**	**2.15**	**1.59**	**1.26**	**1.00**	**0.58**	**0.46**

Permissible radial loads on input shaft with $Fh_1 : n_1 \cdot h = 250000$

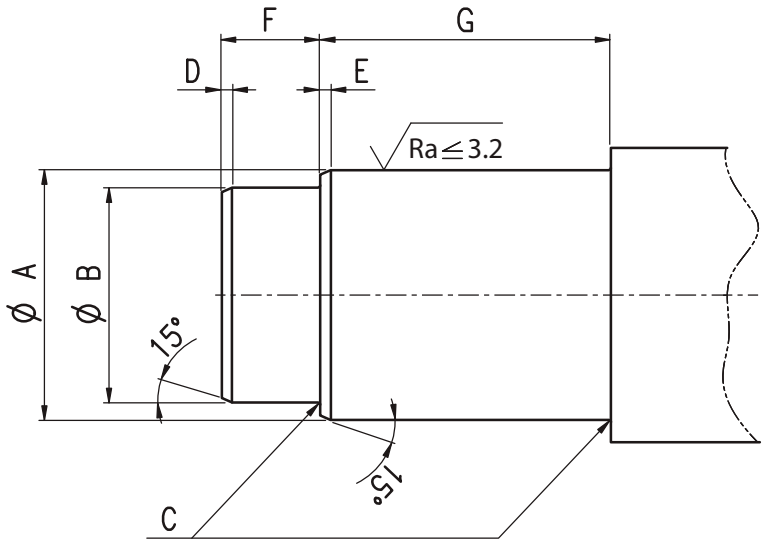




Load corrective factor fh_1 on shafts	$Fh_1 = n_1 \cdot h$	250000	500000	1000000	2000000	5000000	10000000
	fh_1	**1**	**0.79**	**0.63**	**0.50**	**0.37**	**0.29**

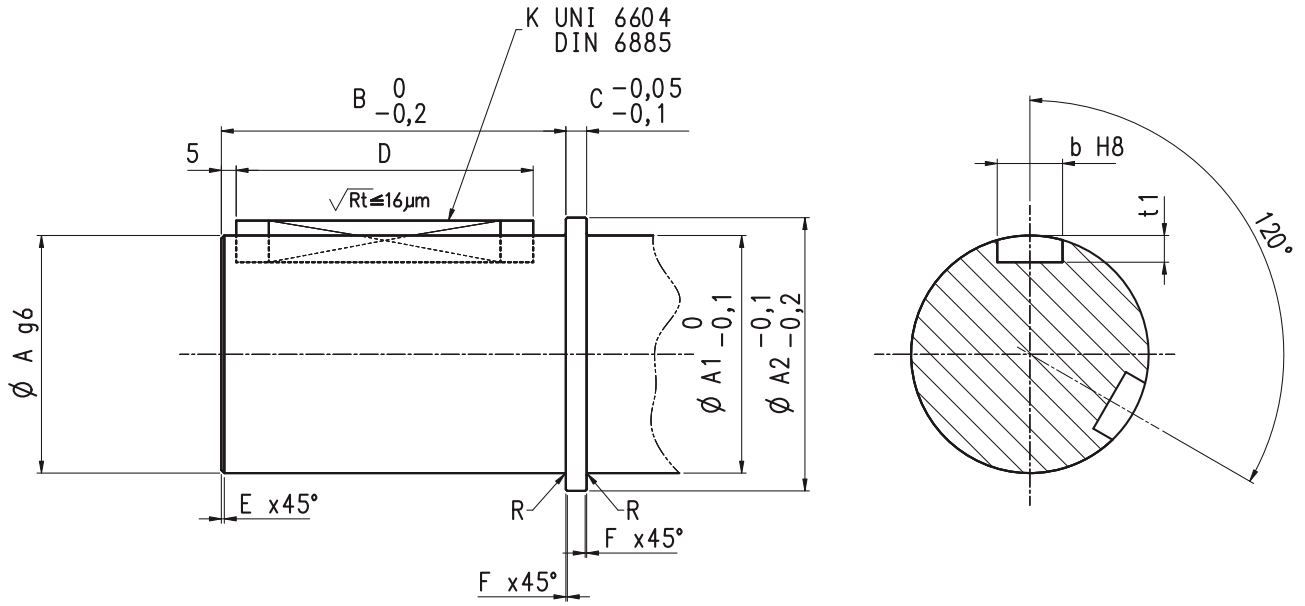
CUSTOMER'S SHAFT

FP



	A Ø H7 - g6 [mm]	B Ø H7 - g6 [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	Shaft material
300	42	35	1.6	2	2	18	38	Suggested material: Steel with tensile strength $\sigma_R \geq 700MPa$
301	52	35	1.6	2	2	18	38	
303 - 304 - 305	75	65	1.6	2	2	30	65	
306	90	75	1.6	3	3	55	85	
307	100	85	1.6	3	3	40	95	
309	120	—	1.6	—	3	—	140	
310M	130	—	1.6	—	3	—	155	
311M	135	—	1.6	—	3	—	150	
313M	140	130	2	3	3	45	150	
314M	180	160	1.6	3	3	50	200	
315M	180	160	1.6	3	3	50	200	
316M	180	165	1.6	3	3	90	180	
317M	200	—	1.6	—	3	—	250	
318M	220	200	2	3	3	130	180	
319	280	—	2	—	3	—	300	
321	320	—	2	—	3	—	300	
323	410	—	2	—	3	—	250	
325	450	—	2	—	3	—	300	

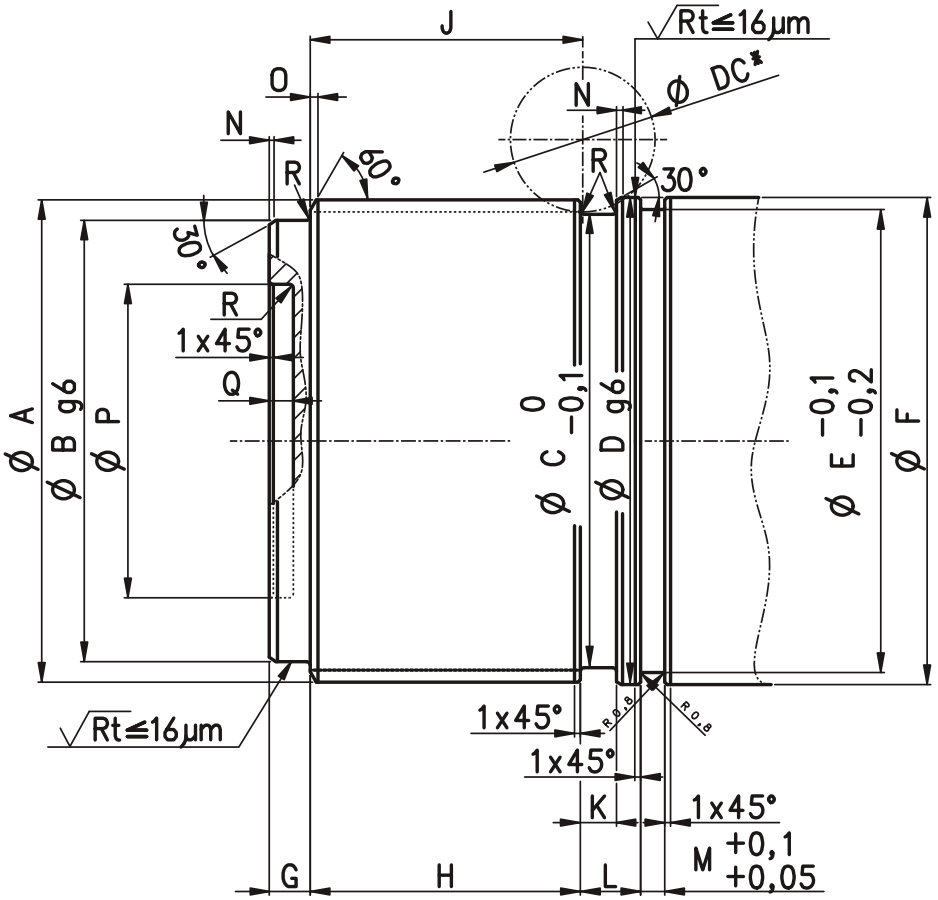
F K



	A	B	A1	A2	C	Shaft material	Keyways dimensions		b	t_1	E	F	R
	Ø shaft	Length					Keyways UNI 6604 / DIN 6885				Chamfer dimensions		Fillets
	[mm]	[mm]	[mm]	[mm]	[mm]	Suggested material: Steel with tensile strength $\sigma_R \geq 900$MPa	—	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
300	35 g6	64	35	39	4		N°2 x 120°	10x8x50	10 H8	Dimension according to UNI6604 / DIN 6885 standard.	1 x 45°	0.5 x 45°	(*)
301	35 g6	64	35	43	5		N°2 x 120°	10x8x50	10 H8		1 x 45°	0.5 x 45°	0.5
303 - 304 - 305	65 g6	95	65	75	6		N°2 x 120°	18x11x80	18 H8		1 x 45°	0.5 x 45°	0.8
306	80 g6	116	80	92	7		N°2 x 120°	22x14x100	22 H8		1 x 45°	0.5 x 45°	0.8
307	90 g6	141	90	102	8		N°2 x 120°	25x14x125	25 H8		2 x 45°	1 x 45°	0.8
309	120 g6	128	120	136	10		N°2 x 120°	32x18x110	32 H8		2 x 45°	1 x 45°	1.6
310M	130 g6	138	130	146	10		N°2 x 120°	32x18x120	32 H8		2 x 45°	1 x 45°	1.6

(*) Relief groove (UNI 4386 - 75 E0.6x0.3)

F P

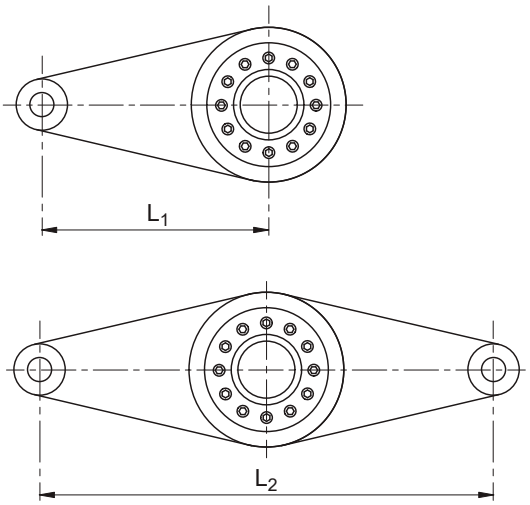


	A	B	C	Shaft material	D	E	F	G	H	K	J	L	M	N	O	P	Q	R	DC*
	Splined shaft DIN 5480	Ø H7 - g6	Relief groove diameter																
	[mm]	[mm]	[mm]		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
311M	120x3x38	108	112	Suggested material: Steel with tensile strength $\sigma_R \geq 900MPa$	124	112	124	19	69	9	70	18,5	6	1	1.6	—	—	1.6	60
313M	140x5x26	110	132		142	132	142	26	83	18	84	30	6	1	2	—	—	3	60
314M	150x5x28	136	136		152	136	152	16	103	8	104	20	8	1	2	—	—	1.6	60
315M	150x5x28	136	136		152	136	152	16	103	8	104	20	8	1	2	—	—	1.6	60
316M	170x5x32	150	154		172	154	172	30	113	20	114	45	9	1	3	—	—	3	60
317M	200x5x38	187	186		202	192	202	16	100	19	101	33	9	1	3.5	130	10	1.6	60
318M	210x5x40	190	194		212	194	212	27	133	20	134	45	9	2	3	—	—	3	60
319	260x5x50	248	243		265	243	265	29	144	20	145	40	11	2	3	—	—	3	60
321	300x8x36	282	281		305	281	305	25	158	25	159	50	12	2	3	—	—	3	70
323	400x8x48	360	381		405	381	405	35	254	26	256	53,5	12	2	4	—	—	5	70
325	450x8x55	410	431		455	431	455	34	272	24	274	66	12	2	4	—	—	5	70

* Max cutter diameter

TORQUE ARM

	L1 [mm]	L2 [mm]
300	300	450
301	580	
303	350	500
304		
305	370	
306	410	600
307	490	700
309	600	900
310M	1030	1000
311M	800	1100
313M	900	1200
314M	1100	1400
315M		
316M	1280	1500
317M	1300	1600
318M	1900	1800
319	1500	2000
321	1500	
323	1750	3000
325	2050	3200



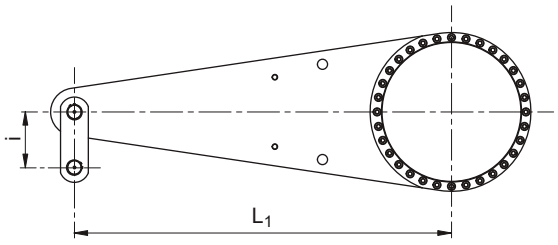
NOTE: Drawings for illustration purpose only

Suggested material: S275JR - UNI EN 10025 or S355JR - UNI EN 10025.

TORQUE ARM KIT FOR FP VERSIONS

If requested, it's possible to install a specific "Torque arm" Kit on 300M series gearboxes. For detailed information please contact our Technical Service .

	L1 [mm]	i [mm]
300	300	55
301	580	
303	350	80
304		
305	370	
306	410	115
307	490	
309	600	
310M	1030	135
311M	800	155
313M	900	160
314M	1100	200
315M		
316M	1280	210
317M	1300	240
318M	1900	280
319	1500	320
321	1500	360
323	1750	400
325	2050	440



NOTE: Draw for illustration purpose only

Suggested material: S275JR - UNI EN 10025 or S355JR - UNI EN 10025.

H1 SYMBOLS AND UNITS OF MEASURE

Symbols	Units of Measure	Description
V	[cm^3]	Rot. displacement
p	[bar]	Pressure
pA. pB	[bar]	Pressure in A and B connections
Q	[l/min]	Flow rate
ηt		Efficiency
ηmh		Hydraulic-mechanical efficiency

Symbols	Units of Measure	Description
ηv		Volumetric efficiency
n	[min^{-1}]	Angular speed
M	[Nm]	Actual torque onto the motor shaft
cont		General value, for continuous duty
int		General value, intermittent duty

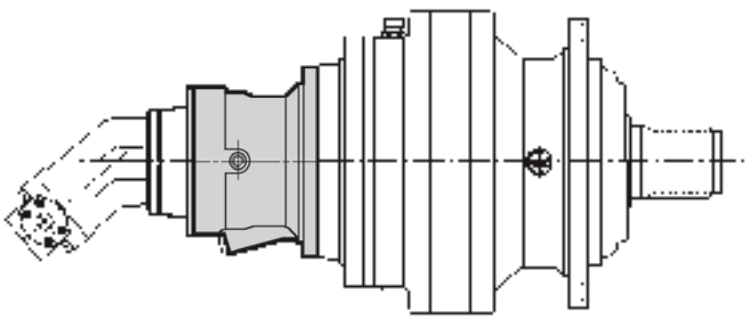
H2 NEGATIVE MULTIDISC BRAKE

DESCRIPTION

TRASMITAL's fail-safe parking brake is an oil immersed multidisc unit on the input side of the gearbox. The brake is operated when there is no hydraulic pressure and is released when the minimum release pressure is applied.
Use of parking brake is necessary whenever the driven system must be kept at standstill even under external forces and/or torques.

Applications:

- winches
- slewing drives
- parking brake on mobile equipment
- general industrial applications



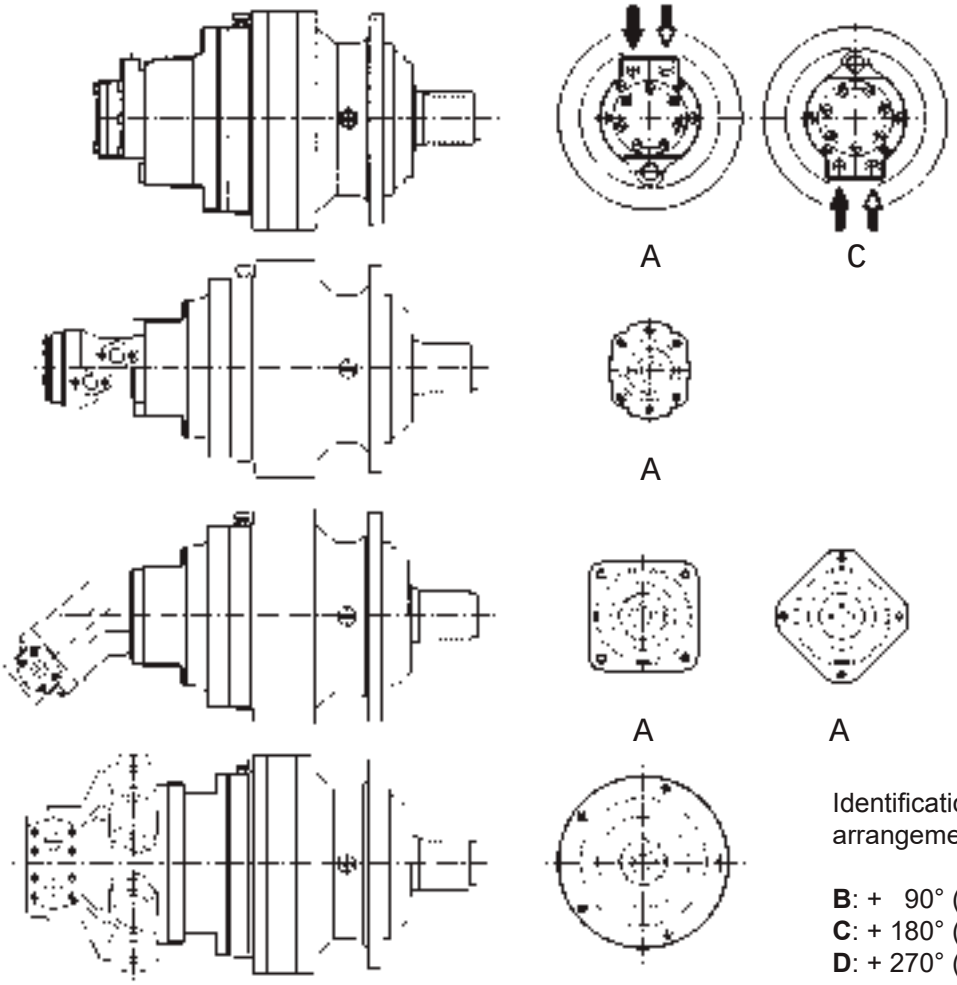
H2.1 Brake technical data

(A 31)

		Type																	
		4.							5.					6.					
		A	B	D	F	H	K	L	B	C	E	G	K	B	C	E	G	K	L
Static braking torque Mb	Nm ±10%	50	100	160	260	330	400	440	400	500	630	800	1000	900	1200	1600	2200	2750	3300
Min. opening pressure	bar	10	20	30	20	25	30	34	20	27	20	26	32	16	21	28	21	27	32
Max. operating pressure	bar	320																	
Oil volume for brake release	cm^3	6.65	6.65	6.65	6.65	6.65	6.65	6.65	13.96	13.96	13.96	13.96	13.96	37.2	37.2	37.2	37.2	37.2	37.2

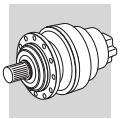
H3 INPUTS FOR HYDRAULIC MOTORS

The available motor adaptors and motor sizes are shown in the following pages.
The standard orientations (A) of the motor flanges are shown in the following scheme, taking into consideration the input side of the gearbox.

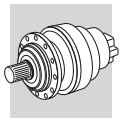


Identification codes of other arrangements:

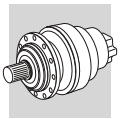
B: + 90° (clockwise)
C: + 180° (clockwise)
D: + 270° (clockwise)



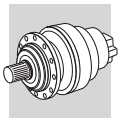
		SAE Standard J744c											
		SAE A 16/32 z9	SAE A ø15,875	SAE B 16/32 z13	SAE B ø22,2	SAE BB 16/32 z15	SAE BB ø25,4	SAE C 12/24 z14	SAE C ø31,7	SAE CC 12/24 z17	SAE C ø38,1	SAE D 8/16 z13	SAE E 8/16 z13
		S5AM	S5AN	S5BA	S5BB	S5BM	S5BN	S5CA	S5CB	S5CP	S5CQ	S5DA	S5EA
	CODE	I											
300	L1-L2-L3-L4	42	42	52	52	52	52	64	64	80	80	81	
	R2-R3-R4	42	42	52	52	52	52	64	64	80	80	81	
301	L1-L2-L3-L4	42	42	52	52	52	52	64	64	80	80	81	
	R2-R3-R4	42	42	52	52	52	52	64	64	80	80	81	
303	L1	42	42	52	52	52	52	64	64	80	80	81	
	L2-L3-L4	42	42	52	52	52	52	64	64	80	80	81	
	R2-R3-R4	42	42	52	52	52	52	64	64	80	80	81	
304	L1	42	42	52	52	52	52	64	64	80	80	81	
	L2-L3-L4	42	42	52	52	52	52	64	64	80	80	81	
	R2-R3-R4	42	42	52	52	52	52	64	64	80	80	81	
305	L1	42	42	52	52	52	52	64	64	80	80	81	
	L2-L3-L4	42	42	52	52	52	52	64	64	80	80	81	
	R2-R3-R4	42	42	52	52	52	52	64	64	80	80	81	
306	L1											101	113
	L2	42	42	52	52	52	52	64	64	80	80	81	
	L3-L4	42	42	52	52	52	52	64	64	80	80	81	
	R2-R3-R4	42	42	52	52	52	52	64	64	80	80	81	
307	L1											101	113
	L2	42	42	52	52	52	52	64	64	80	80	81	
	L3-L4	42	42	52	52	52	52	64	64	80	80	81	
	R2	42	42	52	52	52	52	64	64	80	80	81	
	R3-R4	42	42	52	52	52	52	64	64	80	80	81	
309	L1											101	113
	L2	42	42	52	52	52	52	64	64	80	80	81	
	L3-L4	42	42	52	52	52	52	64	64	80	80	81	
	R2	42	42	52	52	52	52	64	64	80	80	81	
	R3-R4	42	42	52	52	52	52	64	64	80	80	81	
310M	L1											146	158
	L2											101	113
	L3	42	42	52	52	52	52	64	64	80	80	81	
	L4	42	42	52	52	52	52	64	64	80	80	81	
	R2(B)-R2(C)											101	113
	R3-R4	42	42	52	52	52	52	64	64	80	80	81	
311M	L1												
	L2											101	113
	L3	42	42	52	52	52	52	64	64	80	80	81	
	L4	42	42	52	52	52	52	64	64	80	80	81	
	R2(B)-R2(C)											101	113
	R3-R4	42	42	52	52	52	52	64	64	80	80	81	
313M	L1												
	L2											101	113
	L3	42	42	52	52	52	52	64	64	80	80	81	
	L4	42	42	52	52	52	52	64	64	80	80	81	
	R2(B)-R2(C)											101	113
	R3-R4	42	42	52	52	52	52	64	64	80	80	81	
314M	L1												
	L2											146	113
	L3	42	42	52	52	52	52	64	64	80	80	81	
	L4	42	42	52	52	52	52	64	64	80	80	81	
	R3(B)-R3(C)											101	113
	R4	42	42	52	52	52	52	64	64	80	80	81	
315M	L1												
	L2												
	L3											101	113
	L4	42	42	52	52	52	52	64	64	80	80	81	
	R3(B)-R3(C)											101	113
	R4	42	42	52	52	52	52	64	64	80	80	81	
316M	L1												
	L2												
	L3											101	113
	L4	42	42	52	52	52	52	64	64	80	80	81	
	R3(B)-R3(C)											101	113
	R4	42	42	52	52	52	52	64	64	80	80	81	
317M	L1												
	L2												
	L3											101	113
	L4	42	42	52	52	52	52	64	64	80	80	81	
	R3(B)-R3(C)											101	113
	R4	42	42	52	52	52	52	64	64	80	80	81	
318M	L1												
	L2												
	L3												
	L4											101	113
	R4(B)-R4(C)											101	113
319	L1												
	L2												
	L3												
	L4											101	113
	R4(B)-R4(C)											101	113
321	L1												
	L2												
	L3												
	L4											101	113
	R4(B)-R4(C)											101	113



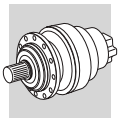
		CALZONI								CHAR-LYNN (EATON)								
		CALZONI MR190 N z8	CALZONI MR300 N z8	CALZONI MRP300 N z8	CALZONI MR450 N z8	CALZONI MR700 N z8	CALZONI MR1100 N z8	CALZONI MR1800 N z10	CALZONI MR2800 N z10	SERIE 2000 SAE A 1" 6B	SERIE 2000 SAE A ø25,4	SERIE 2000 SAE A ø32	SERIE 2000 SAE A 12/24 z14	SERIE 2000 BEARINGLESS 1.2/24 z12	SERIE 4000 SAE B ø31,75	SERIE 4000 SAE C 12/24 z17	SERIE 6000 SAE C ø38,1	SERIE 6000 SAE C 12/24 z17
	CODE	C0AA	C0AD	C0BL	C0AG	C0AL	C0AP	C0AS	C0AV	S5AQ	S5AS	D0AG	D0AH	E2AA	S5BP	S5CP	S5CQ	S5CP
										I								
300	L1-L2-L3-L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2-R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
301	L1-L2-L3-L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2-R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
303	L1	64	78	78						42	42	64	64	52	68	80	80	80
	L2-L3-L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2-R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
304	L1	64	78	78						42	42	64	64	52	68	80	80	80
	L2-L3-L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2-R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
305	L1	64	78	78						42	42	64	64	52	68	80	80	80
	L2-L3-L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2-R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
306	L1				98	102	133											
	L2	64	78	78						42	42	64	64	52	68	80	80	80
	L3-L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2-R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
307	L1				98	102	133											
	L2	64	78	78						42	42	64	64	52	68	80	80	80
	L3-L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2	64	78	78						42	42	64	64	52	68	80	80	80
	R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
309	L1				98	102	133											
	L2	64	78	78						42	42	64	64	52	68	80	80	80
	L3-L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2	64	78	78						42	42	64	64	52	68	80	80	80
	R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
310M	L1				143	147	178											
	L2				98	102	133											
	L3	64	78	78						42	42	64	64	52	68	80	80	80
	L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2(B)-R2(C)				98	102	133											
	R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
311M	L1					130	130	165	200									
	L2				98	102	133											
	L3	64	78	78						42	42	64	64	52	68	80	80	80
	L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2(B)-R2(C)				98	102	133											
	R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
313M	L1					130	130	165	200									
	L2				98	102	133											
	L3	64	78	78						42	42	64	64	52	68	80	80	80
	L4	64	78	78						42	42	64	64	52	68	80	80	80
	R2(B)-R2(C)				98	102	133											
	R3-R4	64	78	78						42	42	64	64	52	68	80	80	80
314M	L1																	
	L2				98	102	133											
	L3	64	78	78						42	42	64	64	52	68	80	80	80
	L4	64	78	78						42	42	64	64	52	68	80	80	80
	R3(B)-R3(C)				98	102	133											
	R4	64	78	78						42	42	64	64	52	68	80	80	80
315M	L1																	
	L2					130	130	165	200									
	L3				98	102	133											
	L4	64	78	78						42	42	64	64	52	68	80	80	80
	R3(B)-R3(C)				98	102	133											
	R4	64	78	78						42	42	64	64	52	68	80	80	80
316M	L1																	
	L2					130	130	165	200									
	L3				98	102	133											
	L4	64	78	78						42	42	64	64	52	68	80	80	80
	R3(B)-R3(C)				98	102	133											
	R4	64	78	78						42	42	64	64	52	68	80	80	80
317M	L1																	
	L2					130	130	165	200									
	L3				98	102	133											
	L4	64	78	78						42	42	64	64	52	68	80	80	80
	R3(B)-R3(C)				98	102	133											
	R4	64	78	78						42	42	64	64	52	68	80	80	80
318M	L1																	
	L2																	
	L3					130	130	165	200									
	L4				98	102	133											
	R4(B)-R4(C)				98	102	133											
319	L1																	
	L2																	
	L3					130	130	165	200									
	L4				98	102	133											
	R4(B)-R4(C)				98	102	133											
321	L1																	
	L2																	
	L3					130	130	165	200									
	L4				98	102	133											
	R4(B)-R4(C)				98	102	133											



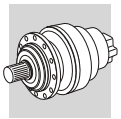
		SAUER DANFOSS (orbit)									DENISON Hydraulics							
		OMP-OMR 50/315 ø25	OMP-OMR 50/315 SAE 1" 6B	OMS 80/315 ø32	OMS 80/315 12/24 z14	OMSS 80/315 12/24 z12	OMT 160/400 ø40	OMT 160/400 12/24 z17	OMTS 160/400 12/24 z16	OMVS 315/800 10/20 z16	M6-M7-M8 *3** 12/24 z14	M11-M14 *3** 8/16 z13	M3 B 16/32 z9	M4C-M4SC 16/32 z13	M4D-M4SD 12/24 z14	M4DC-M4S DC 12/24 z14	M4E-M4SE 12/24 z14	M5BS 16/32 z13
	CODE	S5AP	S5AQ	D0AG	D0AH	D0AL	D0AM	D0AN	D0AQ	D0AU	S5CA	S5EA	S5AM	S5BA	S5CA	S5CA	S5CA	S5BA
										I								
300	L1-L2-L3-L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2-R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
301	L1-L2-L3-L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2-R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
303	L1	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L2-L3-L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2-R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
304	L1	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L2-L3-L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2-R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
305	L1	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L2-L3-L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2-R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
306	L1									70		113						
	L2	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L3-L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2-R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
307	L1									70		113						
	L2	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L3-L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
309	L1									70		113						
	L2	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L3-L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
310M	L1									115		158						
	L2									70		113						
	L3	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2(B)-R2(C)									70		113						
	R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
311M	L1																	
	L2									70		113						
	L3	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2(B)-R2(C)									70		113						
	R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
313M	L1																	
	L2									70		113						
	L3	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R2(B)-R2(C)									70		113						
	R3-R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
314M	L1																	
	L2									70		113						
	L3	42	42	64	64	37		112	57		64		42	52	64	64	64	52
	L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R3(B)-R3(C)									70		113						
	R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
315M	L1																	
	L2																	
	L3									70		113						
	L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R3(B)-R3(C)									70		113						
	R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
316M	L1																	
	L2																	
	L3									70		113						
	L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R3(B)-R3(C)									70		113						
	R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
317M	L1																	
	L2																	
	L3									70		113						
	L4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
	R3(B)-R3(C)									70		113						
	R4	42	42	64	64	37	112	112	57		64		42	52	64	64	64	52
318M	L1																	
	L2																	
	L3																	
	L4									70		113						
	R4(B)-R4(C)									70		113						
319	L1																	
	L2																	
	L3																	
	L4									70		113						
	R4(B)-R4(C)									70		113						
321	L1																	
	L2																	
	L3																	
	L4									70		113						
	R4(B)-R4(C)									70		113						



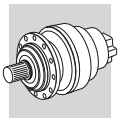
		LINDE							
		MMF 43 16/32 z15	MMF 63 12/24 z14	HMF 28-35-02 16/32 z15	HMF 50-02 16/32 z21	HMF-HMV 75-02 16/32 z21	HMF-HMV 105-02 16/32 z23	HMF-HMV 135-02 16/32 z27	BMF-BMV 186 50x2 Z24
		S5BM	S5CA	S5BM	S5CE	S5CE	S5CD	S5DC	I5AF
	CODE	I							
300	L1-L2-L3-L4	52	64	52	64	64	64	81	
	R2-R3-R4	52	64	52	64	64	64	81	
301	L1-L2-L3-L4	52	64	52	64	64	64	81	
	R2-R3-R4	52	64	52	64	64	64	81	
303	L1	52	64	52	64	64	64	81	
	L2-L3-L4	52	64	52	64	64	64	81	
	R2-R3-R4	52	64	52	64	64	64	81	
304	L1	52	64	52	64	64	64	81	
	L2-L3-L4	52	64	52	64	64	64	81	
	R2-R3-R4	52	64	52	64	64	64	81	
305	L1	52	64	52	64	64	64	81	
	L2-L3-L4	52	64	52	64	64	64	81	
	R2-R3-R4	52	64	52	64	64	64	81	
306	L1							101	121
	L2	52	64	52	64	64	64	81	
	L3-L4	52	64	52	64	64	64	81	
	R2-R3-R4	52	64	52	64	64	64	81	
307	L1							101	121
	L2	52	64	52	64	64	64	81	
	L3-L4	52	64	52	64	64	64	81	
	R2	52	64	52	64	64	64	81	
	R3-R4	52	64	52	64	64	64	81	
309	L1							101	121
	L2	52	64	52	64	64	64	81	
	L3-L4	52	64	52	64	64	64	81	
	R2	52	64	52	64	64	64	81	
	R3-R4	52	64	52	64	64	64	81	
310M	L1							146	166
	L2							101	121
	L3	52	64	52	64	64	64	81	
	L4	52	64	52	64	64	64	81	
	R2(B)-R2(C)							101	121
	R3-R4	52	64	52	64	64	64	81	
311M	L1								
	L2							101	121
	L3	52	64	52	64	64	64	81	
	L4	52	64	52	64	64	64	81	
	R2(B)-R2(C)							101	121
	R3-R4	52	64	52	64	64	64	81	
313M	L1								
	L2							101	121
	L3	52	64	52	64	64	64	81	
	L4	52	64	52	64	64	64	81	
	R2(B)-R2(C)							101	121
	R3-R4	52	64	52	64	64	64	81	
314M	L1								
	L2							101	121
	L3	52	64	52	64	64	64	81	
	L4	52	64	52	64	64	64	81	
	R3(B)-R3(C)							101	121
	R4	52	64	52	64	64	64	81	
315M	L1								
	L2								
	L3							101	121
	L4	52	64	52	64	64	64	81	
	R3(B)-R3(C)							101	121
	R4	52	64	52	64	64	64	81	
316M	L1								
	L2								
	L3							101	121
	L4	52	64	52	64	64	64	81	
	R3(B)-R3(C)							101	121
	R4	52	64	52	64	64	64	81	
317M	L1								
	L2								
	L3							101	121
	L4	52	64	52	64	64	64	81	
	R3(B)-R3(C)							101	121
	R4	52	64	52	64	64	64	81	
318M	L1								
	L2								
	L3								
	L4							101	121
	R4(B)-R4(C)							101	121
319	L1								
	L2								
	L3								
	L4							101	121
	R4(B)-R4(C)							101	121
321	L1								
	L2								
	L3								
	L4							101	121
	R4(B)-R4(C)							101	121



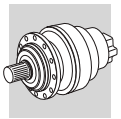
		BRUENINGHAUS HYDROMATIK (BOSCH REXROTH)															
		A2FM10-12-16 25x1.25 z18	A2FM23-28-32 A6VM 28 30x2 z14	A2FM23-28 ø25	A2FM45 32x2 z14	A2FM45-56 30x2 z14	A2FM56-63 A6VM55 35x2 z16	A2FM80-90 A6VM80 40x2 z18	A2FM80 35x2 z16	A2FM107-125 A6VM107 45x2 z21	A2FM107 A6VM107 40x2 z18	A2FM160-180 A6VM160 50x2 z24	A2FM160 A6VM160 45x2 z21	A2FM200 A6VM200 50x2 z24	A6VM250 50x2 z24	A2FM250 50x2 z24	A10FM45.30W A10VM63 16/32 z15
	CODE	H0AA	H0AE	H0AH	H0AI	H0BA	H0BC	H0BG	H0BI	H0CA	H0CC	H0CE	H0CG	H0CI	H0DA	H0DE	S5BM
		I															
300	L1-L2-L3-L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2-R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
301	L1-L2-L3-L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2-R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
303	L1	42	52	52	64	64	64	75	75	101	101		101				52
	L2-L3-L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2-R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
304	L1	42	52	52	64	64	64	75	75	101	101		101				52
	L2-L3-L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2-R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
305	L1	42	52	52	64	64	64	75	75	101	101		101				52
	L2-L3-L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2-R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
306	L1											101	101	101	113	113	
	L2	42	52	52	64	64	64	75	75	101	101		101				52
	L3-L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2-R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
307	L1											101	101	101	113	113	
	L2	42	52	52	64	64	64	75	75	101	101		101				52
	L3-L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2	42	52	52	64	64	64	75	75	101	101		101				52
	R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
309	L1											101	101	101	113	113	
	L2	42	52	52	64	64	64	75	75	101	101		101				52
	L3-L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2	42	52	52	64	64	64	75	75	101	101		101				52
	R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
310M	L1											146	146	146	158	158	
	L2											101	101	101	113	113	
	L3	42	52	52	64	64	64	75	75	101	101		101				52
	L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2(B)-R2(C)											101	101	101	113	113	
	R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
311M	L1																
	L2											101	101	101	113	113	
	L3	42	52	52	64	64	64	75	75	101	101		101				52
	L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2(B)-R2(C)											101	101	101	113	113	
	R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
313M	L1																
	L2											101	101	101	113	113	
	L3	42	52	52	64	64	64	75	75	101	101		101				52
	L4	42	52	52	64	64	64	75	75	101	101		101				52
	R2(B)-R2(C)											101	101	101	113	113	
	R3-R4	42	52	52	64	64	64	75	75	101	101		101				52
314M	L1																
	L2											101	101	101	113	113	
	L3	42	52	52	64	64	64	75	75	101	101		101		113		52
	L4	42	52	52	64	64	64	75	75	101	101		101				52
	R3(B)-R3(C)											101	101	101	113	113	
	R4	42	52	52	64	64	64	75	75	101	101		101				52
315M	L1																
	L2																
	L3											101	101	101	113	113	
	L4	42	52	52	64	64	64	75	75	101	101		101				52
	R3(B)-R3(C)											101	101	101	113	113	
	R4	42	52	52	64	64	64	75	75	101	101		101				52
316M	L1																
	L2																
	L3											101	101	101	113	113	
	L4	42	52	52	64	64	64	75	75	101	101		101				52
	R3(B)-R3(C)											101	101	101	113	113	
	R4	42	52	52	64	64	64	75	75	101	101		101				52
317M	L1																
	L2																
	L3											101	101	101	113	113	
	L4	42	52	52	64	64	64	75	75	101	101		101				52
	R3(B)-R3(C)											101	101	101	113	113	
	R4	42	52	52	64	64	64	75	75	101	101		101				52
318M	L1																
	L2																
	L3																
	L4											101	101	101	113	113	
	R4(B)-R4(C)											101	101	101	113	113	
319	L1																
	L2																
	L3																
	L4											101	101	101	113	113	
	R4(B)-R4(C)											101	101	101	113	113	
321	L1																
	L2																
	L3																
	L4											101	101	101	113	113	
	R4(B)-R4(C)											101	101	101	113	113	



		SAI							KAWASAKI STAFFA		
		GM05 UNI 8953	GM1 UNI 8953	GM1/P1/S1 35x2 z16	GM2 UNI 8953	GM3 UNI 8953	GM4/GM5 UNI 8953	SAI L7 (9) N80x3 z25	B030 z17	B045 z17	HM (HD)B150 HM (HD)B200 5/10 z16
		S2BA	S2AB	S2CE	S2AF	S2DN	S2BF	S2BH	S1AB	S1AC	S1AL
	CODE	I									
300	L1-L2-L3-L4	73	37	57							
	R2-R3-R4	73	37	57							
301	L1-L2-L3-L4	73	37	57							
	R2-R3-R4	73	37	57							
303	L1	73	37	57							
	L2-L3-L4	73	37	57							
	R2-R3-R4	73	37	57							
304	L1	73	37	57							
	L2-L3-L4	73	37	57							
	R2-R3-R4	73	37	57							
305	L1	73	37	57							
	L2-L3-L4	73	37	57							
	R2-R3-R4	73	37	57							
306	L1		74		98	98	105		135	140	
	L2	73	37	57							
	L3-L4	73	37	57							
	R2-R3-R4	73	37	57							
307	L1		74		98	98	105		135	140	
	L2	73	37	57							
	L3-L4	73	37	57							
	R2	73	37	57							
	R3-R4	73	37	57							
309	L1		74		98	98	105		135	140	
	L2	73	37	57							
	L3-L4	73	37	57							
	R2	73	37	57							
	R3-R4	73	37	57							
310M	L1		119		143	143	150		180	185	
	L2		74		98	98	105		135	140	
	L3	73	37	57							
	L4	73	37	57							
	R2(B)-R2(C)		74		98	98	105		135	140	
	R3-R4	73	37	57							
311M	L1				135		150	90			187
	L2		74		98	98	105		135	140	
	L3	73	37	57							
	L4	73	37	57							
	R2(B)-R2(C)		74		98	98	105		135	140	
	R3-R4	73	37	57							
313M	L1				135		150	90			187
	L2		74		98	98	105		135	140	
	L3	73	37	57							
	L4	73	37	57							
	R2(B)-R2(C)		74		98	98	105		135	140	
	R3-R4	73	37	57							
314M	L1										
	L2		74		98	98	105		135	140	
	L3	73	37	57							
	L4	73	37	57							
	R3(B)-R3(C)		74		98	98	105		135	140	
	R4	73	37	57							
315M	L1										
	L2				135		150	90			187
	L3		74		98	98	105		135	140	
	L4	73	37	57							
	R3(B)-R3(C)		74		98	98	105		135	140	
	R4	73	37	57							
316M	L1										
	L2				135		150	90			187
	L3		74		98	98	105		135	140	
	L4	73	37	57							
	R3(B)-R3(C)		74		98	98	105		135	140	
	R4	73	37	57							
317M	L1										
	L2				135		150	90			187
	L3		74		98	98	105		135	140	
	L4	73	37	57							
	R3(B)-R3(C)		74		98	98	105		135	140	
	R4	73	37	57							
318M	L1										
	L2										
	L3				135		150	90			187
	L4		74		98	98	105		135	140	
	R4(B)-R4(C)		74		98	98	105		135	140	
319	L1										
	L2										
	L3				135		150	90			187
	L4		74		98	98	105		135	140	
	R4(B)-R4(C)		74		98	98	105		135	140	
321	L1										
	L2										
	L3				135		150	90			187
	L4		74		98	98	105		135	140	
	R4(B)-R4(C)		74		98	98	105		135	140	



		SAUER DANFOSS (piston)														
		OMF-SMF-OMV -SMV 1-038 16/32 z13	SMF 2/033-052-070 16/32 z21	SMF 2/089 16/32 z23	SMF 2/119 16/32 z27	SMF 2/166-227 16/32 z27	SMF 4/023 90M042 16/32 z13	SMF 4/046 90M042 16/32 z15	90 M055 16/32 z21	90 M075-M100 16/32 z23	90 M130 16/32 z27	51 V 060 12/24 z14	51 V 080 12/24 z14	51 V 110 8/16 z13	51 V 160 8/16 z13	51 V 250 8/16 z15
	CODE	S5BA	S5CE	S5CD	S5DC	S5EC	S5BA	S5BM	S5CE	S5CD	S5DC	S5CA	S5CA	S5DA	S5DA	S5ED
									I							
300	L1-L2-L3-L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2-R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
301	L1-L2-L3-L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2-R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
303	L1	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L2-L3-L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2-R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
304	L1	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L2-L3-L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2-R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
305	L1	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L2-L3-L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2-R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
306	L1				101	113					101			101	101	113
	L2	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L3-L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2-R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
307	L1				101	113					101			101	101	113
	L2	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L3-L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
309	L1				101	113					101			101	101	113
	L2	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L3-L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
310M	L1				146	158					146			146	146	158
	L2				101	113					101			101	101	113
	L3	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2(B)-R2(C)				101	113					101			101	101	113
	R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
311M	L1															
	L2				101	113					101			101	101	113
	L3	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2(B)-R2(C)				101	113					101			101	101	113
	R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
313M	L1															
	L2				101	113					101			101	101	113
	L3	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R2(B)-R2(C)				101	113					101			101	101	113
	R3-R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
314M	L1															
	L2				101	113					101			101	101	113
	L3	52	64	64	81		52	52	64	64	81	64	64	81	81	
	L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R3(B)-R3(C)				101	113					101			101	101	113
	R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
315M	L1															
	L2															
	L3				101	113					101			101	101	113
	L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R3(B)-R3(C)				101	113					101			101	101	113
	R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
316M	L1															
	L2															
	L3				101	113					101			101	101	113
	L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R3(B)-R3(C)				101	113					101			101	101	113
	R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
317M	L1															
	L2															
	L3				101	113					101			101	101	113
	L4	52	64	64	81		52	52	64	64	81	64	64	81	81	
	R3(B)-R3(C)				101	113					101			101	101	113
	R4	52	64	64	81		52	52	64	64	81	64	64	81	81	
318M	L1															
	L2															
	L3															
	L4				101	113					101			101	101	113
	R4(B)-R4(C)				101	113					101			101	101	113
319	L1															
	L2															
	L3															
	L4				101	113					101			101	101	113
	R4(B)-R4(C)				101	113					101			101	101	113
321	L1															
	L2															
	L3															
	L4				101	113					101			101	101	113
	R4(B)-R4(C)				101	113					101			101	101	113



		TRW-TORQMOTOR (PARKER)					VICKERS (EATON)				WHITE				
		MAG 04-32 SAE 1" 6B	MAF 06-40 SAE 1" 6B	MAB 06-32 SAE 1" 6B	MAB 06-32 SAE A ø25	MAE 10-68 SAE 1" 6B	MFE 19 16/32 z15	25M**A11 16/32 z13	35-45 M**A11 12/24 z14	50 M**A11 8/16 z13	HS 02-15 SAE A ø25	HS 02-15 SAE A 1" 6B	RS 08-24 SAE A ø25	RS 08-24 SAE A 1" 6B	REO 06-45 SAE A 1" 6B
		S5AQ	S5AQ	S5AQ	S5AP	S5AQ	S5BM	S5BA	S5CA	S5DA	S5AP	S5AQ	S5AP	S5AQ	S5AP
	CODE	I													
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	R2-R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
301	L1-L2-L3-L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2-R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
303	L1	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	L2-L3-L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2-R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
304	L1	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	L2-L3-L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2-R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
305	L1	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	L2-L3-L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2-R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
306	L1									101					
	L2	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	L3-L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2-R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
307	L1									101					
	L2	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	L3-L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
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	R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
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	L3-L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
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	L2									101					
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311M	L1														
	L2									101					
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	L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2(B)-R2(C)									101					
	R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
313M	L1														
	L2									101					
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	L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R2(B)-R2(C)									101					
	R3-R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
314M	L1														
	L2									101					
	L3	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R3(B)-R3(C)									101					
	R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
315M	L1														
	L2														
	L3									101					
	L4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
	R3(B)-R3(C)									101					
	R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
316M	L1														
	L2														
	L3									101					
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317M	L1														
	L2														
	L3									101					
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	R4	42	42	42	42	42	52	52	64	81	42	42	42	42	42
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	L2														
	L3														
	L4									101					
	R4(B)-R4(C)									101					
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	L2														
	L3														
	L4									101					
	R4(B)-R4(C)									101					
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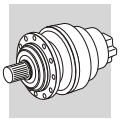
	R4(B)-R4(C)									101					



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		F11-5 CK ø18	F11-10 CK ø20	F11-19 CK ø25	F11-19 CD 25x1.25 z18	F12-30 MF*I*D 30x2 z14	F12-40 MF*I*D 32x2 z14	F12-60 MF*I*D 35x2 z16	F12-80 MF*I*D 40x2 z18	F12-110 MF*I*D 45x2 z21	F11-150/250 S+S	8/16 z13 V12 060 I*D	35x2 z16 V12 060 S*S	12/24 z14 V12 080 N*D	40x2 z18 V12 080 S*S	12/24 z14 V12 110 I*D	45x2 z21	V12 110 S*S 8/16 z13	V12 160 S*S 8/16 z13	V12 160 N*C 45x2 z21
		V0AA	V0AC	V0AE	V0AG	H0AE	H0AI	H0BC	H0BG	H0CA	S5DA	H0BC	S5CA	H0BG	S5CA	H0CA		S5DA	S5DA	H0CG
	CODE										I									
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	R2-R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
301	L1-L2-L3-L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2-R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
303	L1	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L2-L3-L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2-R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
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	L2-L3-L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2-R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
305	L1	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L2-L3-L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2-R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
306	L1										101							101	101	
	L2	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L3-L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2-R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
307	L1										101							101	101	
	L2	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L3-L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
309	L1										101							101	101	
	L2	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L3-L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
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	R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
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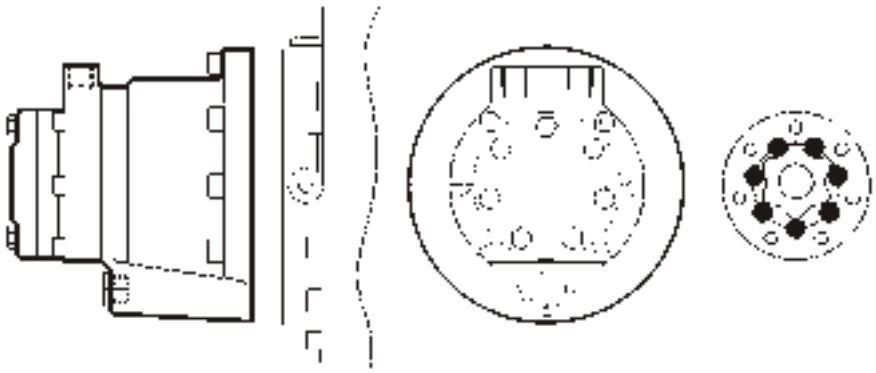
	L2										101							101	101	
	L3	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2(B)-R2(C)										101							101	101	
	R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
311M	L1																			
	L2										101							101	101	
	L3	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2(B)-R2(C)										101							101	101	
	R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
313M	L1																			
	L2										101							101	101	
	L3	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R2(B)-R2(C)										101							101	101	
	R3-R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
314M	L1																			
	L2										101							101	101	
	L3	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R3(B)-R3(C)										101							101	101	
	R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
315M	L1																			
	L2																			
	L3										101							101	101	
	L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R3(B)-R3(C)										101							101	101	
	R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
316M	L1																			
	L2																			
	L3										101							101	101	
	L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R3(B)-R3(C)										101							101	101	
	R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
317M	L1																			
	L2																			
	L3										101							101	101	
	L4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
	R3(B)-R3(C)										101							101	101	
	R4	64	52	53	53	52	64	64	75	101	81	64	64	75	64	101		81	81	101
318M	L1																			
	L2																			
	L3																			
	L4										101							101	101	
	R4(B)-R4(C)										101							101	101	
319	L1																			
	L2																			
	L3																			
	L4										101							101	101	
	R4(B)-R4(C)										101							101	101	
321	L1																			
	L2																			
	L3																			
	L4										101							101	101	
	R4(B)-R4(C)										101							101	101	

H4 HYDRAULIC MOTORS

GENERAL FEATURES

Gearboxes belonging to the series 300M can be supplied complete with MG hydraulic motors manufactured by BONFIGLIOLI TRASMITAL. These motors were designed to provide compact and energy efficient gearmotors.
Before ordering, you should consult with the Technical Service Bonfiglioli.



H4.1 MG hydraulic motors

Design characteristics:

- Orbit system with GEROLER® rollers between rotor and stator
- Distributor on output shaft
- Displacements from 50 to 250 cm^3
- Max. pressure 175 bar
- Max. flow rate 48 lt/min
- High efficiency
- Hydraulic brake can be included in the motor overall dimensions
- Inner brake directly controlled by the motor with no valves or outer circuits required.

H5 TECHNICAL FEATURES

H5.1 Displacement V [cm^3]

Geometrical volume produced as a result of each motor rotation corresponding to the theoretical volume of hydraulic oil necessary for a rotation of the driving shaft

H5.2 Pressure p [bar]

Hydraulic pressure applied to the motor when running.

H5.3 Flow rate Q [l / min]

Hydraulic oil flow through the motor when running.

H5.4 Efficiency η_t

Total efficiency of the hydraulic motor given by:

$$\eta_t = \eta mh \times \eta v \quad (38)$$

H5.5 Mechanical-hydraulic efficiency ηmh

This is the ratio of actual torque to theoretical torque at the driving shaft. Value depending on inner losses due to mechanical friction as well as hydraulic fluid pressure losses, calculated as follows:

$$\eta mh = \frac{2\pi \times 10 \times M}{(pA - pB) \times V} \quad (39)$$

H5.6 Hydraulic efficiency ηv

This is the ratio of motor actual speed to motor theoretical speed. Value depending on the motor inner blow-by between high and low pressure volumes. This value is given by the following formula:

$$\eta v = \frac{n \times V}{Q \times 1000} \quad (40)$$

H5.7 Angular speed n [min-1]

Hydraulic motor rotation speed. Value resulting from the following formula:

$$n = \frac{Q \times 1000}{V} \times \eta v \quad (41)$$

H5.8 Torque M [Nm]

Actual torque transmitted by the hydraulic motor. Value given by the following formula:

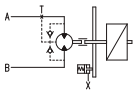
$$M = \frac{(p\,A - p\,B) \times V}{2\pi \times 10} \times \eta mh \quad (42)$$

H6 DESIGNATION

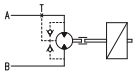
MG 050 _R P010

PORTS

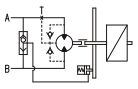
P010 = oil ports on motor housing direct — with brake



without brake



B02P = oil ports with valve brake pilot — with brake



CONSTRUCTIVE SERIES

DISPLACEMENT

050	51.60	cm³	**160**	159.60	cm³
080	80.30	cm³	**200**	199.80	cm³
100	99.80	cm³	**250**	249.30	cm³
125	125.70	cm³			

ORBIT MOTOR TYPE MG

H7 DISPLACEMENT SELECTION

Displacement V of the hydraulic motor should be selected together with the gearbox.

Once the output torque and speed n_2 for the gearbox M_{r2} is known, proceed as follows:

Define the control pressure value pA-pB ≤ 175 bar for the motor.

Calculate the gearbox displacement value called Veq with the following formula:

$$Veq = \frac{2\pi \times 10 \times M_{r2}}{(pA - pB) \times \eta mh \times \eta d} \ [cm^3] \quad (43)$$

where ηmh, for example, is equal to 0.85;
η_d: gearbox dynamic efficiency, consider 0.94.

Calculate the value for flow rate Q, necessary for feeding the hydraulic motor, with the following formula:

$$Q = \frac{n_2 \times Veq}{1000 \times \eta v} \ [l/min] \quad (44)$$

where ηv, for example, is equal to 0.90.

− Select the gearbox size with M_{r2} and n_2.

− Look up the diagram (A23) for the gearmotor with equivalent displacement value Veq and select:
- a motor that fulfils the p int. and Q requirements and at the same time.
- the indicative value of reduction ratio i. Please consider that ratio should be obtained with as few reduction stages as possible, to save on gearmotor costs and contain dimensions.

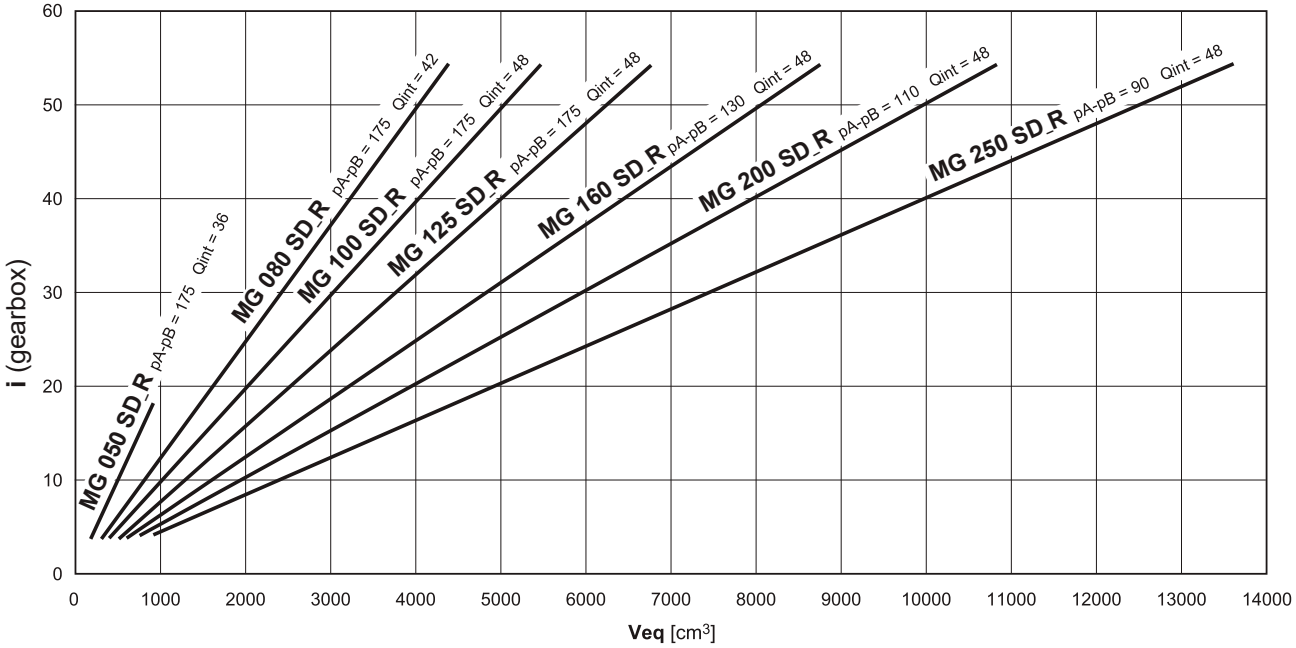
Once you have determined the value of M_2 and the indicative value of i, select the gearbox and check your selection as indicated in chapt. 14.5.

H8 CHECKING

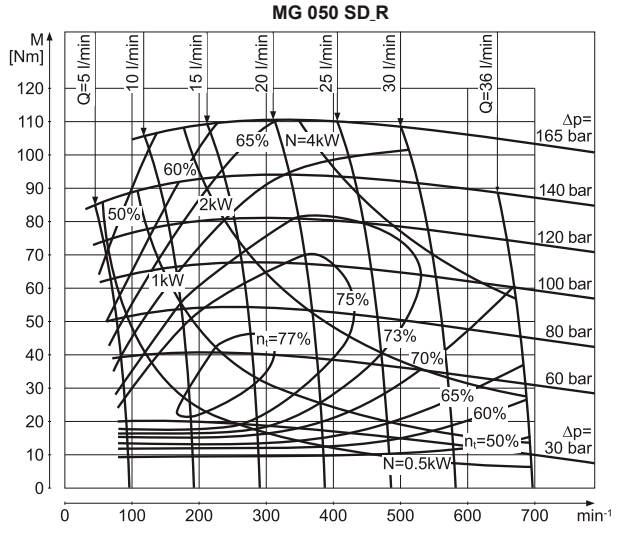
Check that pressure, efficiency and flow rate values correspond with values indicated in Table (A33 and A34) on motor technical features.

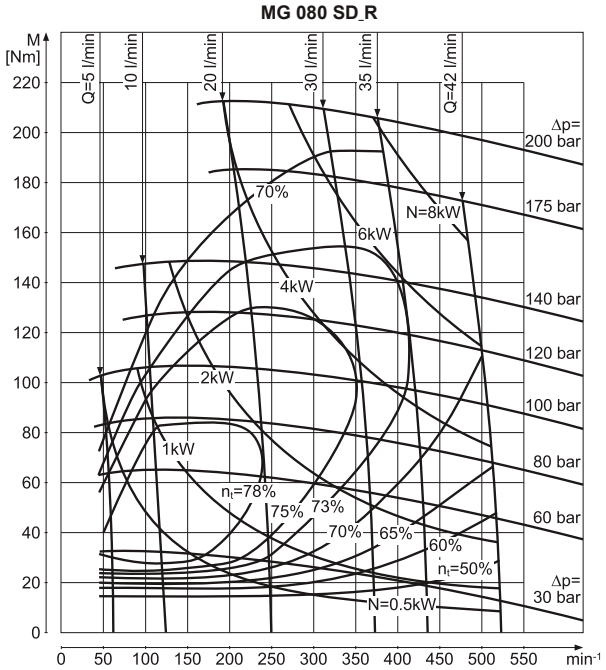
H9 TECHNICAL DATA MG MOTORS

(A 32)



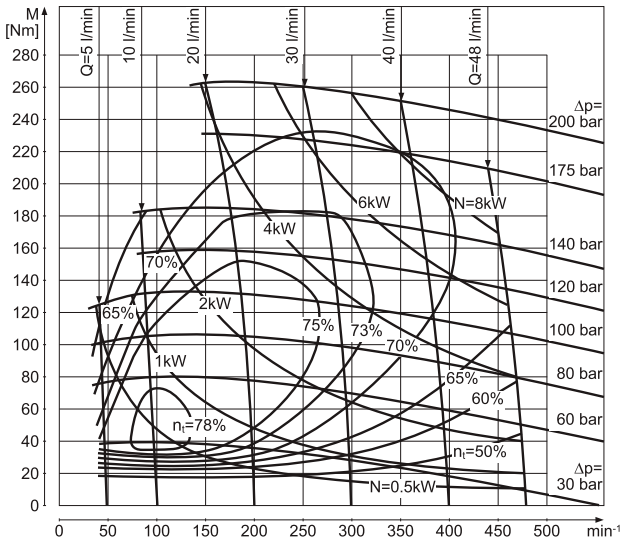
(A 33)



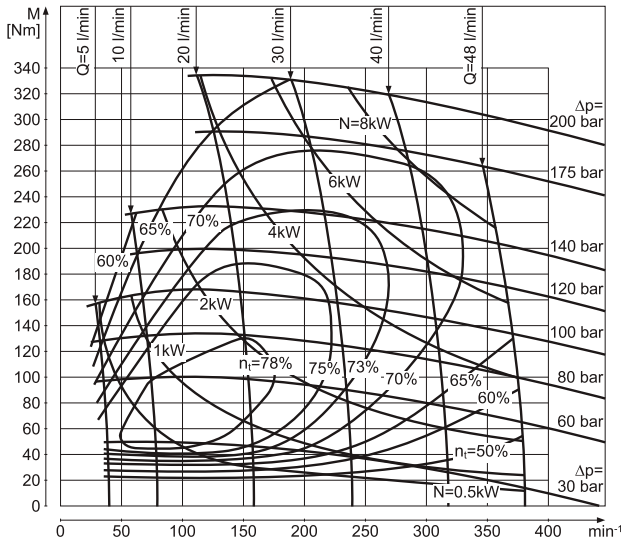


(A 34)

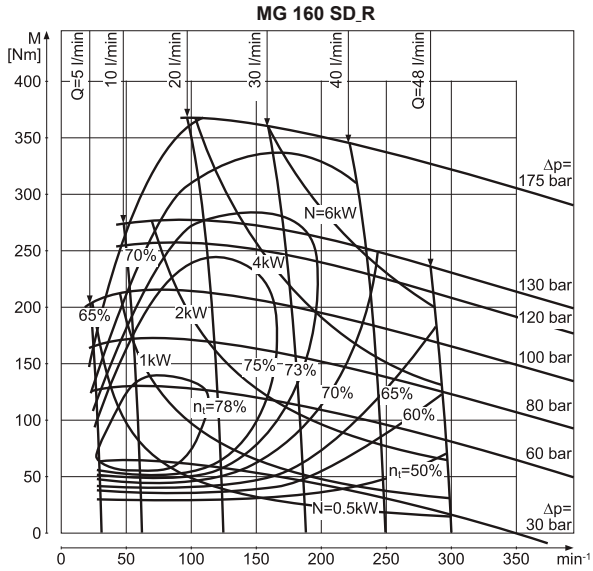
MG 100 SD_R



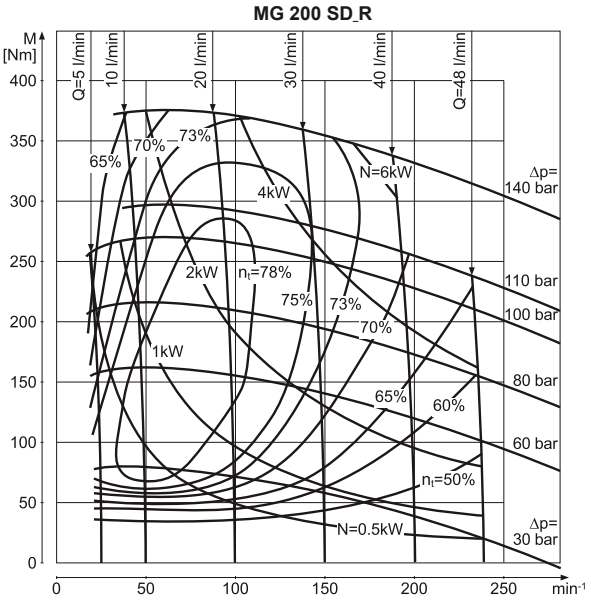
MG 125 SD_R



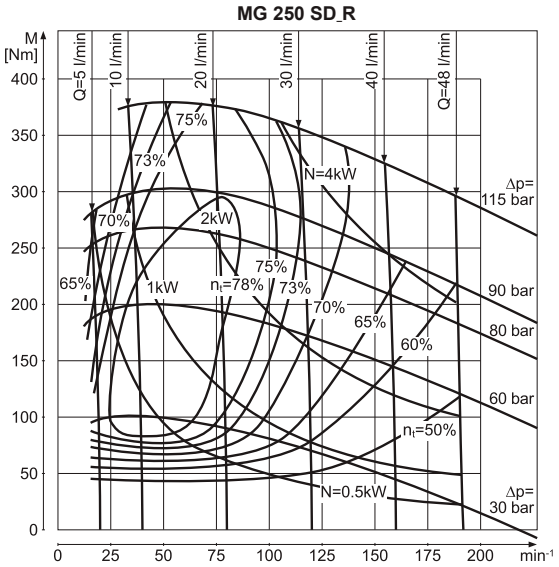
MG 160 SD_R



MG 200 SD_R

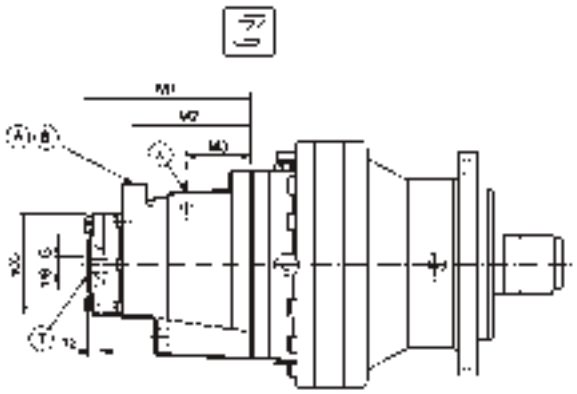


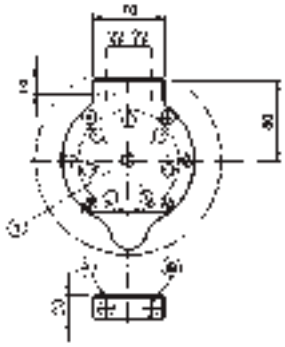
MG 250 SD_R

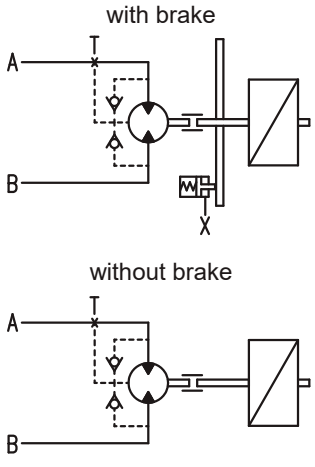


H10 DIMENSIONS MG MOTORS

MG- P010



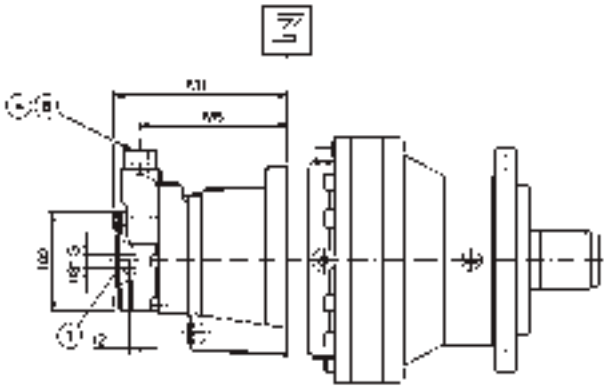


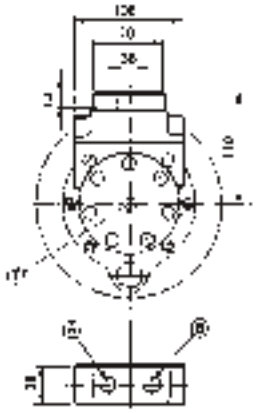


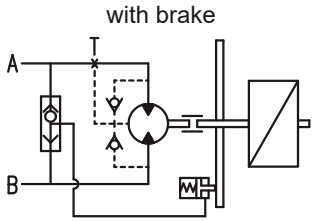
PORTS

A - B = 3/8" G 19TPI
T = 1/8" G 28TPI
X = 1/4 G 19TPI

MG- B02P







(A 35)

Suitable gearbox	Motor							Execution		
	MG 050	**MG 080**	**MG 100**	**MG 125**	**MG 160**	**MG 200**	**MG 250**	**P010**		**B02P**
	M1							M2	M3	M5
300 L1 - L2 - R2	162	167	171	175	181			113	60	143
301 L1 - L2 - R2	162	167	171	175	181	188	197	113	60	143
303 L1					203	210	219	135	77	165
303 L2 - R2	162	167	171	175	181	188	197	113	60	143
304 L1				197	203	210	219	135	77	165
304 L2 - R2	162	167	171	175	181	188	197	113	60	143
305 L1					203	210	219	135	77	165
305 L2 - R2	162	167	171	175	181	188	197	113	60	143
306 L2					203	210	219	135	77	165
306 R2 - R3	162	167	171	175	181	188	197	113	60	143
307 L2					203	210	219	135	77	165
307 R2 - R3	162	167	171	175	181	188	197	113	60	143

H11 TECHNICAL DATABRAKES FOR MG MOTORS

(A 36)

		Brake TYPE 3				Brake TYPE 4			
		3E	**3I**	**3L**	**3N**	**4K**	**4N**	**4R**	**4U**
Brake torque Mf	Nm]	120	200	280	350	260	320	430	620
Min. opening pressure	[bar]	16	28	28	35	25	30	24	34
Max. operating pressure	[bar]	200							
Oil volume for brake release	[cc]	6.43	6.43	6.43	6.43	6.65	6.65	6.65	6.65

(A 37)

Suitable gearbox	Motor													
	MG 050		**MG 080**		**MG 100**		**MG 125**		**MG 160**		**MG 200**		**MG 250**	
	Mf [Nm]		Mf [Nm]		Mf [Nm]		Mf [Nm]		Mf [Nm]		Mf [Nm]		Mf [Nm]	
300 L1 - L2	120	**3E**	200	**3I**	280	**3L**	350	**3N**	350	**3N**				
300 R2	120	**3E**	200	**3I**	280	**3L**								
301 L1 - L2			200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**	350	**3N**
301 R2	120	**3E**	200	**3I**	280	**3L**	350	**3N**	350	**3N**				
303 L1									430	**4R**	430	**4R**	430	**4R**
303 L2	120	**3E**	200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**		
303 R2	120	**3E**	200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**		
304 L1							350	**3N**	430	**4R**	430	**4R**	430	**4R**
304 L2	120	**3E**	200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**		
304 R2	120	**3E**	200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**		
305 L1									430	**4R**	430	**4R**	430	**4R**
305 L2	120	**3E**	200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**		
305 R2	120	**3E**	200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**		
306 L2			260	**4K**	260	**4K**	430	**4R**	430	**4R**	430	**4R**	430	**4R**
306 R2 - R3			200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**		
307 L2					260	**4K**	430	**4R**	430	**4R**	430	**4R**	430	**4R**
307 R2 - R3			200	**3I**	280	**3L**	350	**3N**	350	**3N**	350	**3N**	350	**3N**

H12 INSTALLATION

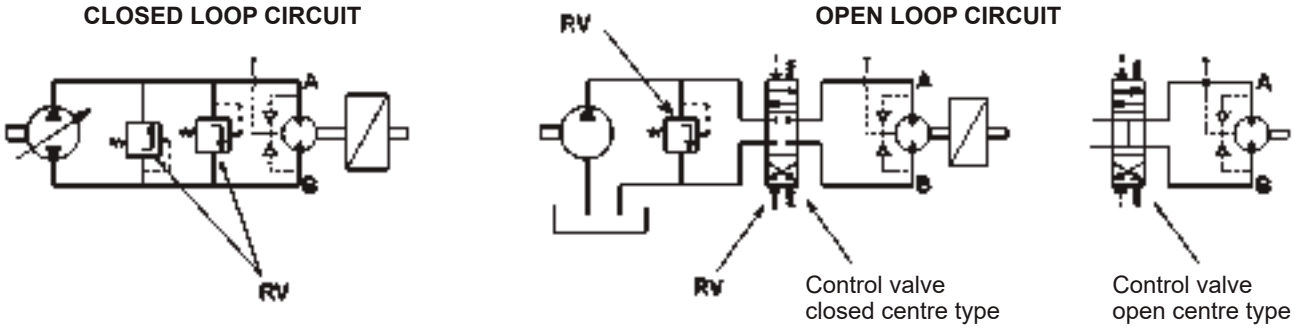
Further to standards on gearbox installation, refer to chapter 15, comply with the following hydraulic motor installation instructions.

a) Connection to the hydraulic circuit

Motors can be connected either to closed or open circuits.
In case of an open circuit, solenoid valve or control distributor can be of the closed or open center type.

The hydraulic motor delivery side should always have a max. pressure valve set to a value not exceeding the p_{int} value allowed for the hydraulic motor. See hydraulic diagrams (A29).

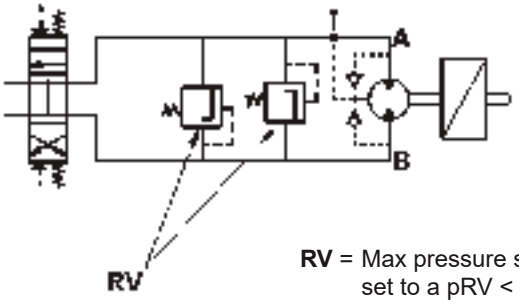
(A 38)



RV = Max pressure valve set to a pRV < pmax

If not possible, because the circuits control other devices needing a higher pressure and/or a closed center control valve is fitted and the motor controls parts with a high moment of inertia, max. pressure secondary valves should be as close as possible to the motor. See diagram (A39).

(A 39)

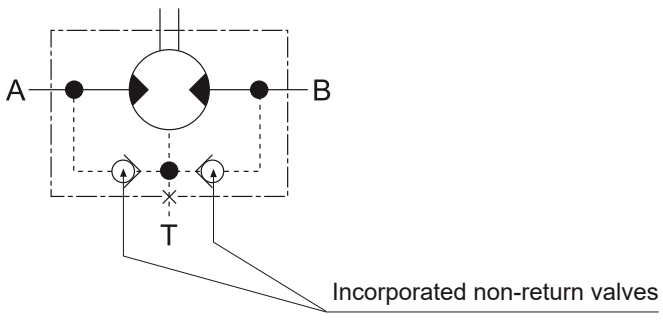


RV = Max pressure secondary valve
set to a pRV < pmax

b) Connecting drain port T

These motors have a 1/8" G drain hole in the centre of the cover. The motor is supplied with the port closed by a metal plug (see figure below).
Two non-return valves are incorporated in the motor casing to maintain internal pressure at the same level as the low pressure line A or B if the drain port is not connected to the tank.

(A 40)

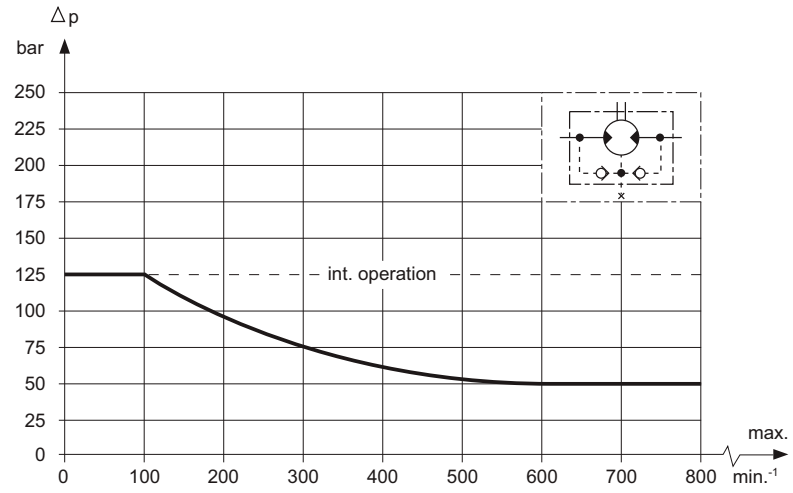


1) If the drain port is connected up, pressure at the shaft seal is always equal to the pressure in the drain line.

2) If the drain port is closed off, pressure at the shaft seal never exceeds pressure in the return line.

The maximum values for pressure in the drain line (case 1) or return line (case 2) are given in the following figure (for continuous and intermittent operating conditions).

(A 41)



The drain port must always be connected up when more motors are operated in series.

c) Brake control

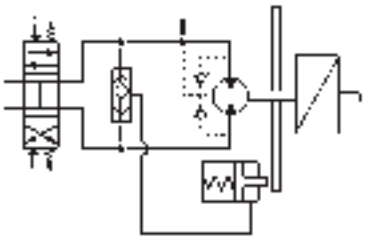
For gearmotors equipped with brakes, there are two motor versions available, i.e. the B02P or P010 executions.
In the B02P version, the motor has an in-built, direct brake control system. In the P010 version, an auxiliary branching is required to control the brake. See the following diagram.

(A 42)

OPEN LOOP CIRCUIT

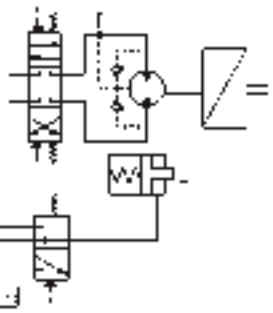
Control valve open centre type

Motor execution **B02P**



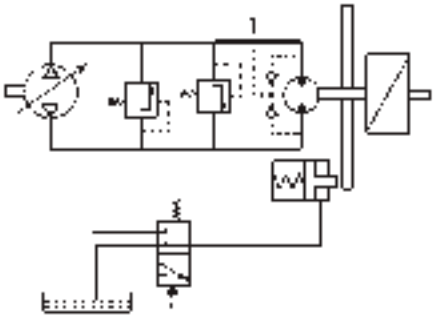
Control valve closed centre type

Motor execution **P010**



CLOSED LOOP CIRCUIT

Motor execution **P010**



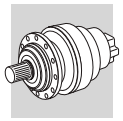
d) Hydraulic oil

Use hydraulic mineral oil with viscosity ISO VG 46 (46 Cst at t = 40°C).
It is recommended the oil temperature should be between +30°C and +70°C.

e) Oil filtering

For reliable motor operation and long life, it is important that the hydraulic circuit has a filter for a proper oil filtering according to the following degree:

degree 9 NAS 1638
degree 6 SAE
degree 18/15 SO DIS 4406



PLANETARY GEARBOX SERIES 300M ATEX CONFIGURATION

A1 SCOPE OF DOCUMENT

This Technical Bulletin serves as an aid for the selection of 300M series planetary gear units intended for installation in explosion risk areas, classified according to Directive 1999/92/EC.

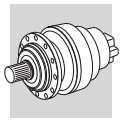
This Technical Bulletin is an integral part of the 300M series, and subsequent revisions, and has the following scope:
• describes the **constructional characteristics** of the reducers comply with the directive 2014/34/EU, where these differ from those of standard construction gear units - See section A4.2.
• specifies the **selection criteria** approved by the manufacturer that said gear units operate keeping the minimum security requirements required by the Directive 2014/34/EU - See section A4.4.

A2 INTRODUCTION TO THE ATEX DIRECTIVES

Under the provisions of Directive 2014/34/EU, an explosive atmosphere is defined as a mixture:
a) of **flammable substances**, whether gas, vapour, mist or dust;
b) with **air;**
c) in certain **atmospheric conditions**;
d) in which, following ignition, combustion spreads to the entire unburned mixture (note that in the case of dust, the entire quantity of dust is not always completely burnt after combustion).
An atmosphere which may potentially be transformed into an explosive atmosphere due to operating and/or ambient conditions is defined as a **potentially explosive atmosphere**. The products governed by Directive 2014/34/EU are intended for use only in a potentially explosive atmosphere defined in this way.

European harmonised ATEX standards
The European Union has issued two harmonisation guidelines in the area of health and safety. Directive 2014/34/EU stipulates the minimum safety requirements for products intended for use in explosion risk areas within the member countries of the European Union. The directive also assigns such equipment to **categories**, which are defined by the directive itself.
Directive 1999/92/EC defines the minimum health and safety requirements for the workplace, for working conditions and for the handling of products and materials in explosion risk areas. The directive also divides the workplace into zones and defines the criteria for the application of product **categories** in said **zones.**
The following table describes the **zones** into which the user of a plant, in which an explosive atmosphere may occur, is required to divide the equipment application areas.

Zones		**Formation frequency of a potentially explosive atmosphere**	**Type of danger**
Gaseous atmosphere G	**Dusty atmosphere** D		
0	20	Present continuously or for long periods	Permanent
1	21	Likely to occur in normal operation occasionally	Potential
2	22	Not likely to occur in normal operation but if it does occur will persist for short period only	Minimal



BONFIGLIOLI RIDUTTORI gear units selected in this catalogue are marked for installation in zones 1, 21, as highlighted in light gray in the above table and are also suitable for installation in areas with a lower level of protection (zones 2 and 22).
Starting from July 1, 2003, the Atex Directives apply throughout the European Union, and replace the divergent laws currently in force at national and European level in the field of explosive atmospheres.
The directives apply to mechanical, hydraulic and pneumatic equipment.

Levels of protection for the various categories of equipment
The various categories of equipment must be able to operate in conformity with the Manufacturer's operational specifications, at certain defined levels of protection.

Protection level	Category		Type of protection	Operating conditions
	Group I	Group II		
Very high	M1		Two independent means of protection or safety capable of operating even when two independent faults occur	The equipment remains powered and operational even in the presence of an explosive atmosphere
Very high		1	Two independent means of protection or safety capable of operating even when two independent faults occur	The equipment remains powered and operational in zones 0, 1, 2 (G) and/or zones 20, 21, 22 (D)
High	M2		Protection suitable for normal operation and heavy duty conditions	Power to the equipment is shut off in the presence of a potentially explosive atmosphere
High		2	Protection suitable for normal operation and frequent faults or equipment in which malfunction is normal.	The equipment remains powered and operational in zones 1, 2 (G) and/or zones 21, 22 (D)
Normal		3	Protection suitable for normal operation	The equipment remains powered and operational in zones 2 (G) and/or 22 (D)

Definition of groups (EN 1127-1)
Group I Applies to equipment intended for use underground in parts of mines and those parts of surface installations of such mines, liable to be endangered by firedamp and/or combustible dust.
Group II Applies to equipment intended for use in other places liable to be endangered by explosive atmospheres.

The areas highlighted in grey indicate the only categories in which BONFIGLIOLI RIDUTTORI products may be used. BONFIGLIOLI RIDUTTORI products may not therefore be installed in mines, classified in **Group I**. To summarise, the classification of equipment into groups, categories and zones is illustrated in the table below, where the availability of BONFIGLIOLI RIDUTTORI products is highlighted in grey.

Group	I mines, firedamp		II other potentially explosive areas (gas, dust)					
Category	M1	M2	1		2		3	
Atmosphere(1)			G	D	G	D	G	D
Zone			0	20	1	21	2	22
Type of protection gear unit(2)					Ex h Gb	Ex h Db	Ex h Gc	Ex h Dc

(1) **G** = gas **D** = dust
(2) as per 80079-36 and EN 80079-37

A3 USE, INSTALLATION AND MAINTENANCE

The instructions for safe storage, handling and use of the product are given in the unit's User, Installation and Service Manual.
This document must be kept in a suitable place, in the vicinity of the installed gear unit, as a reference for all persons authorised to work with or on the product throughout its service life.

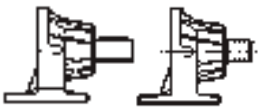
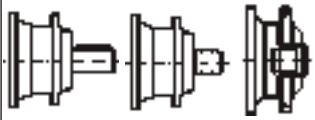
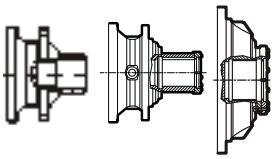
The Manufacturer reserves the right to modify, supplement or improve the Manual, in the interests of the User.

A4 PECULIARITIES OF 300M SERIES GEAR UNITS COMPLIANT WITH DIRECTIVE ATEX

A4.1 PRODUCT AVAILABILITY

Frame sizes : 300 to 325.

	 3...L		 3...R		 3/V	
Configurations	300...309, 310M...318M, 319	L 1	-	- -	-	- -
	300...309, 310M...318M, 319...321	L 2	300...306	R 2	-	- -
	300...309, 310M...318M, 319...321	L 3	300...309, 310M...317M	R 3	300...306	L 3
	300...309, 310M...318M, 319...325	L 4	300...309, 310M...318M, 319...321	R 4	-	- -

Versions	Foot mount		Flange mount			Shaft mount			Agitator (vertical)
									
	PC	PZ	MC/HC	MZ/HZ	FZ	FP	FDK	FZP	VK

Inputs	 P(IEC)	 V_	 Hydraulic motor connecting
			 Standard negative multidisc brake **6** = Type: **4, 5, 6** **A** = Braking torque: **A, B, C, ...**

NOTE:
- With the negative multi disc brake, you must always ensure a minimum pressure for opening the discs. This must be 20% higher than that of the table of the brakes.
- The pressure max. of brake control must not exceed 50 bar.

Accessories					
	P ...	B0A	M0A	G0A	W0A

A4.2 CONSTRUCTIONAL CHARACTERISTICS

• Only synthetic lubricants are used.
• Only VITON® gaskets are used.
• Oil seals are equipped with dust lips.
• Vent plugs are equipped with valves with anti-intrusion springs, to prevent contamination of the lubricant by solid particles.
• Oil filler, drain and level plugs are made from steel and equipped with aluminium lock washers.
• No external metal moving parts in contact with other parts.
• No plastic parts prone to accumulating static charges; if present, such parts are shielded.
• Each gear unit is supplied with an installation drawing indicating the following information:
- main technical characteristics
- installation specifications
- location of oil plugs for the specified mounting position
- lubrication instructions
• The units are fitted with an additional nameplate specifying the product category. For example:

A Manufacturer
B Product identification
C Product code
D Reduction ratio
E Serial number
F Date of manufacture
G Client product code
H Specific symbols of Atex marking

A4.3 OPERATIONAL CHARACTERISTICS

For installation in zones 21 and 22, the Customer must set out and implement a specific cleaning schedule for the unit's surfaces and recesses to prevent build ups of dust exceeding 5 mm in depth.

A4.4 SELECTING THE PRODUCT

The gear unit and gearmotor selection procedure is identical to that given in the 300M Series, and any future revisions thereof.
The following chapters contain variations to the procedure given in the catalogue, and subsequent revisions thereof as regards the selection of products compliant with 2014/34/EU, which supersede the procedure specified in the catalogue for units intended for installation in areas without risk of explosion.
These variations primarily affect the following:
• Application of an adjusting factor to the thermal capacity.
• Application of a service factor « f_s » with a greater safety margin.

- Thermal power « P_T » [kW]
Refer to section 14.5 “VERIFICATION” about calculation of the correct P_T value.

Only for L1 Atex configuration, the reference P_T value are listed in the table below. The are valid for:
- Maximum input speed as written
- Ambient temperature 40°C
- Horizontal mounting position
- Installation in large area (air speed > 1.4 m/s)
- Intermittent duty 20% based 60 min running

Please refer to Bonfiglioli Tecnical Service for other type of application.

L1	**P_{TB}** [kW] @ 20% intermittent duty	**$n_{1\ max}$** [min^{-1}] @ L1 ATEX
300	14	1000
301	16	
303	20	700
304	25	
305	25	
306	27	500
307	35	
309	35	
310M	37	400
311M	40	
313M	42	
314M	45	300
315M	45	
316M	45	
317M	55	200
318M	60	
319	70	

- Service factor in Atex gearboxes with Negative multidisc brake

<table>
<tr><td colspan="2"></td><td colspan="35">POS A, E, F, G Input speed [rpm]</td></tr>
<tr><td colspan="2"></td><td colspan="2">100</td><td colspan="2">200</td><td colspan="2">300</td><td colspan="2">400</td><td colspan="2">500</td><td colspan="2">600</td><td colspan="2">700</td><td colspan="2">800</td><td colspan="2">900</td><td colspan="2">1000</td><td colspan="2">1100</td><td colspan="2">1200</td><td colspan="2">1300</td><td colspan="2">1400</td><td colspan="2">1500</td><td colspan="2">1600</td><td colspan="2">1700</td><td>1800</td></tr>
<tr><td rowspan="4">300</td><td>L1</td><td colspan="13"></td><td colspan="22" bgcolor="#cccccc"></td></tr>
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<tr><td>L3</td><td colspan="35">85%</td></tr>
<tr><td>L4</td><td colspan="35">85%</td></tr>
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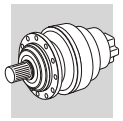
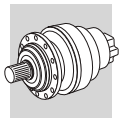
<tr><td>L4</td><td colspan="35">85%</td></tr>
<tr><td rowspan="4">309</td><td>L1</td><td colspan="9">85%</td><td colspan="26" bgcolor="#cccccc"></td></tr>
<tr><td>L2</td><td colspan="29">85%</td><td colspan="6">75%</td></tr>
<tr><td>L3</td><td colspan="35">85%</td></tr>
<tr><td>L4</td><td colspan="35">85%</td></tr>
<tr><td rowspan="4">310M</td><td>L1</td><td colspan="7">no brake</td><td colspan="28" bgcolor="#cccccc"></td></tr>
<tr><td>L2</td><td colspan="29">85%</td><td colspan="6" bgcolor="#cccccc"></td></tr>
<tr><td>L3</td><td colspan="29">85%</td><td colspan="6">75%</td></tr>
<tr><td>L4</td><td colspan="35">85%</td></tr>
<tr><td rowspan="4">311M</td><td>L1</td><td colspan="7">no brake</td><td colspan="28" bgcolor="#cccccc"></td></tr>
<tr><td>L2</td><td colspan="29">85%</td><td colspan="6" bgcolor="#cccccc"></td></tr>
<tr><td>L3</td><td colspan="29">85%</td><td colspan="6">75%</td></tr>
<tr><td>L4</td><td colspan="35">85%</td></tr>
<tr><td rowspan="4">313M</td><td>L1</td><td colspan="7">no brake</td><td colspan="28" bgcolor="#cccccc"></td></tr>
<tr><td>L2</td><td colspan="29">85%</td><td colspan="6" bgcolor="#cccccc"></td></tr>
<tr><td>L3</td><td colspan="29">85%</td><td colspan="6">75%</td></tr>
<tr><td>L4</td><td colspan="35">85%</td></tr>
<tr><td rowspan="4">315M</td><td>L1</td><td colspan="5">no brake</td><td colspan="30" bgcolor="#cccccc"></td></tr>
<tr><td>L2</td><td colspan="14"></td><td colspan="21" bgcolor="#cccccc"></td></tr>
<tr><td>L3</td><td colspan="20">85%</td><td colspan="9">80%</td><td colspan="6" bgcolor="#cccccc"></td></tr>
<tr><td>L4</td><td colspan="29">85%</td><td colspan="6">75%</td></tr>
<tr><td rowspan="4">316M</td><td>L1</td><td colspan="5">no brake</td><td colspan="30" bgcolor="#cccccc"></td></tr>
<tr><td>L2</td><td colspan="14">no brake</td><td colspan="21" bgcolor="#cccccc"></td></tr>
<tr><td>L3</td><td colspan="20">85%</td><td colspan="9">80%</td><td colspan="6" bgcolor="#cccccc"></td></tr>
<tr><td>L4</td><td colspan="29">85%</td><td colspan="6">75%</td></tr>
<tr><td rowspan="4">317M</td><td>L1</td><td colspan="3">no brake</td><td colspan="32" bgcolor="#cccccc"></td></tr>
<tr><td>L2</td><td colspan="9">no brake</td><td colspan="26" bgcolor="#cccccc"></td></tr>
<tr><td>L3</td><td colspan="20">85%</td><td colspan="7"></td><td colspan="8" bgcolor="#cccccc"></td></tr>
<tr><td>L4</td><td colspan="29">85%</td><td colspan="6">75%</td></tr>
<tr><td rowspan="4">318M</td><td>L1</td><td colspan="3">no brake</td><td colspan="32" bgcolor="#cccccc"></td></tr>
<tr><td>L2</td><td colspan="9">no brake</td><td colspan="26" bgcolor="#cccccc"></td></tr>
<tr><td>L3</td><td colspan="20">85%</td><td colspan="7">80%</td><td colspan="8" bgcolor="#cccccc"></td></tr>
<tr><td>L4</td><td colspan="20">85%</td><td colspan="9"></td><td colspan="6">75%</td></tr>
<tr><td rowspan="4">319</td><td>L1</td><td colspan="3">no brake</td><td colspan="32" bgcolor="#cccccc"></td></tr>
<tr><td>L2</td><td colspan="6">no brake</td><td colspan="29" bgcolor="#cccccc"></td></tr>
<tr><td>L3</td><td colspan="14">85%</td><td colspan="21" bgcolor="#cccccc"></td></tr>
<tr><td>L4</td><td colspan="20">85%</td><td colspan="9">80%</td><td colspan="6" bgcolor="#cccccc"></td></tr>
<tr><td rowspan="4">321</td><td>L1</td><td colspan="3">no brake</td><td colspan="32" bgcolor="#cccccc"></td></tr>
<tr><td>L2</td><td colspan="3">no brake</td><td colspan="32" bgcolor="#cccccc"></td></tr>
<tr><td>L3</td><td colspan="9">no brake</td><td colspan="26" bgcolor="#cccccc"></td></tr>
<tr><td>L4</td><td colspan="20">85%</td><td colspan="7">80%</td><td colspan="8" bgcolor="#cccccc"></td></tr>
</table>

(grey) Unusable speed



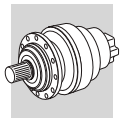
		POS O, Q, T, V Input speed [rpm] 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800
300	**L1**	85%
	L2	85% / 70%
	L3	85% / 70%
	L4	85% / 70%
301	**L1**	85%
	L2	85% / 70%
	L3	85% / 70%
	L4	85% / 70%
303	**L1**	60%
	L2	85% / 70%
	L3	85% / 70%
	L4	85% / 70%
305	**L1**	60%
	L2	85% / 70%
	L3	85% / 70%
	L4	85% / 70%
306	**L1**	50%
	L2	60% / 40%
	L3	85% / 70%
	L4	85% / 70%
307	**L1**	50%
	L2	60% / 40%
	L3	85% / 70%
	L4	85% / 70%
309	**L1**	50%
	L2	60% / 40%
	L3	85% / 70%
	L4	85% / 70%
310M	**L1**	no brake
	L2	50% / 15% / 10%
	L3	60% / 40%
	L4	85% / 70%
311M	**L1**	no brake
	L2	50% / 15% / 10%
	L3	60% / 40%
	L4	85% / 70%
313M	**L1**	no brake
	L2	50% / 15% / 10%
	L3	60% / 40%
	L4	85% / 70%
315M	**L1**	no brake
	L2	
	L3	50% / 15% / 10%
	L4	60% / 40%
316M	**L1**	no brake
	L2	
	L3	50% / 15% / 10%
	L4	60% / 40%
317M	**L1**	no brake
	L2	
	L3	50% / 15% / 10%
	L4	60% / 40%
318M	**L1**	no brake
	L2	
	L3	50% / 15% / 10%
	L4	60% / 40%
319	**L1**	no brake
	L2	no brake
	L3	50%
	L4	50% / 15% / 10%
321	**L1**	no brake
	L2	no brake
	L3	no brake
	L4	50% / 15% / 10%

Unusable speed



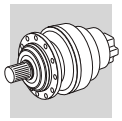
		POS B0, B2, I0, I2, J0, J2, M1, M3, P, R, U, W Input speed [rpm]																
		100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800
300	**R2**	85%									70%								
	R3	85%									70%								
	R4	85%									70%								
301	**R2**	85%									70%								
	R3	85%									70%								
	R4	85%									70%								
303	**R2**	85%									70%								
	R3	85%									70%								
	R4	85%									70%								
305	**R2**	85%									70%								
	R3	85%									70%								
	R4	85%									70%								
306	**R2**	85%									70%								
	R3	85%									70%								
	R4	85%									70%								
307	**R2**	60%														40%			
	R3	85%									70%								
	R4	85%									70%								
309	**R2**	60%														40%			
	R3	85%									70%								
	R4	85%									70%								
310M	**R2 (A)**	60%														40%			
	R2 (B)	50%						15%					10%						
	R3	85%									70%								
	R4	85%									70%								
311M	**R2 (A)**	60%														40%			
	R2 (B)	50%						15%					10%						
	R2 (C)	50%						15%					10%						
	R3	60%														40%			
	R4	85%									70%								
313M	**R2 (A)**	60%																	
	R2 (B)	50%						15%					10%						
	R2 (C)	50%						15%					10%						
	R3	60%														40%			
	R4	85%									70%								
315M	**R3 (A)**	60%																	
	R3 (B)	50%						15%					10%						
	R3 (C)	50%						15%					10%						
	R4	60%														40%			
316M	**R3 (B)**	50%						15%					10%						
	R3 (C)	50%						15%					10%						
	R4	60%														40%			
317M	**R3 (A)**	60%																	
	R3 (B)	50%						15%					10%						
	R3 (C)	50%						15%					10%						
	R4	60%														40%			
318M	**R4 (B)**	50%						15%					10%						
	R4 (C)	50%						15%					10%						
319	**R4 (B)**	60%																	
	R4 (C)	50%						15%					10%						
	R4 (C)	50%						15%					10%						
321	**R4 (B)**	60%																	
	R4 (C)	50%						15%					10%						
	R4 (C)	50%						15%					10%						

Unusable speed



		POS B1, B3, I1, I3, J1, J3, M0, M2 Input speed [rpm]																
		100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800
300	**R2**	85%																	
	R3	85%																	
	R4	85%																	
301	**R2**	85%																	
	R3	85%																	
	R4	85%																	
303	**R2**	85%																	
	R3	85%																	
	R4	85%																	
305	**R2**	85%																	
	R3	85%																	
	R4	85%																	
306	**R2**	85%																	
	R3	85%																	
	R4	85%																	
307	**R2**	85%														75%			
	R3	85%																	
	R4	85%																	
309	**R2**	85%														75%			
	R3	85%																	
	R4	85%																	
310M	**R2 (A)**	85%														75%			
	R2 (B)	85%																	
	R3	85%																	
	R4	85%																	
311M	**R2 (A)**	85%														75%			
	R2 (B)	85%																	
	R2 (C)	85%																	
	R3	85%														75%			
	R4	85%																	
313M	**R2 (A)**	60%																	
	R2 (B)	85%																	
	R2 (C)	85%																	
	R3	85%														75%			
	R4	85%																	
315M	**R3 (A)**	60%																	
	R3 (B)	85%																	
	R3 (C)	85%																	
	R4	85%														75%			
316M	**R3 (B)**	85%																	
	R3 (C)	85%																	
	R4	85%														75%			
317M	**R3 (A)**	85%																	
	R3 (B)	85%																	
	R3 (C)	85%																	
	R4	85%														75%			
318M	**R4 (B)**	85%																	
	R4 (C)	85%																	
319	**R4 (B)**	60%																	
	R4 (C)	85%																	
	R4 (C)	85%																	
321	**R4 (B)**	85%																	
	R4 (C)	85%																	
	R4 (C)	85%																	

Unusable speed



- Service factor « f_s »

Service factor « f_s »						
Duty	Starts / hour	Accumulated operating hours (h)				
		≤ 5000	10000	15000	25000	50000
		Daily operating hours (h)				
	z	h < 4	4 < h < 8	8 < h < 12	12 < h < 16	16 < h < 24
Uniform load	Z < 10	1.10	1.10	1.15	1.30	1.60
	10 < Z < 30	1.10	1.15	1.30	1.50	1.80
	30 < Z < 100	1.10	1.25	1.45	1.60	2.00
Moderate shock load	Z < 10	1.10	1.25	1.45	1.60	2.00
	10 < Z < 30	1.10	1.40	1.60	1.80	2.20
	30 < Z < 100	1.20	1.50	1.70	2.00	2.40
Heavy shock load	Z < 10	1.20	1.50	1.70	2.00	2.40
	10 < Z < 30	1.30	1.60	1.80	2.10	2.60
	30 < Z < 100	1.40	1.75	2.00	2.30	2.80

A5 ORDERING NUMBERS

A5.1 DESIGNATION OF IN-LINE (300M L) AND RIGHT ANGLE (300M R) GEAR UNITS

3	11M	L	2	16.7	Z

OUTPUT VERSION

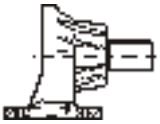

MZ: Splined male shaft


MC: Solid keyed shaft


HZ: Heavy duty splined male shaft

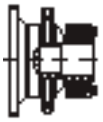

HC: Heavy duty solid keyed shaft

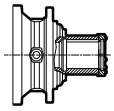

PZ: Foot base with splined shaft


PC: Foot base with solid keyed shaft


FZ / FZB: Hollow splined shaft


VK: Reinforced output with heavy duty keyed shaft for stirrers and mixer


FP: Hollow shaft for shrink disc

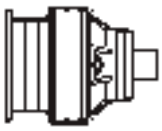

FDK: Hollow shaft with double keyway


FZP: Hollow splined shaft with axial blockage device (recommended for shaft mounted installation)

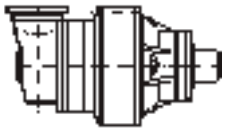
GEAR RATIO
Fill in the value of the gear ratio (including point and decimals) as listed in the selection charts
Ex.: 1/44.6 = 44.6 1/131 = 131

REDUCTIONS
1 - 2 - 3 - 4

DESIGN
L = In line



R = Right angle



GEARBOX FRAME SIZE

00 = 300	**06** = 306	**11M** = 311M	**17M** = 317M	**23** = 325
01 = 301	**07** = 307	**13M** = 313M	**18M** = 318M	**25** = 325
03 = 303	**09** = 309	**15M** = 315M	**19** = 319	
05 = 305	**10M** = 310M	**16M** = 316M	**21** = 321	

SERIES

-	V11B	A	A	W0A	EX	...

OPTIONS

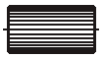
INPUT SHAFT PREFERENTIAL DIRECTION OF ROTATION
(applicable to angle gear units only)

RA = counterclockwise
RO = clockwise

CONFIGURATION COMPLIANT WITH THE OLD DIRECTIVE 94/9/EC AND AT THE NEW DIRECTIVE 2014/34/EU.

OUTPUT FITTINGS

P... = Pinions



B0A = Splined bar

M0A = Sleeve coupling

G0A = Shrink disc

W0A = Flange

MOTOR FLANGE ORIENTATION

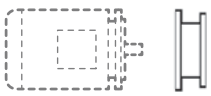
MOUNTING POSITION

	In mounting positions featuring a vertical output shaft, the gearbox will be equipped with an expansion tank. Please request the installation drawing to Bonfiglioli's Technical Service.	

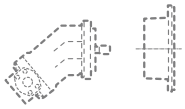
INPUT

Input keyed shaft

	V01A	V01B	V05B	V06B	V07A	V07B	V10B	V11B	V15B
diam.	Ø24	Ø38	Ø48	Ø60	Ø60	Ø80	Ø80	Ø80	Ø120



Electric motor connection **P** + motor size (80,90,100,132,160, ...)



Hydraulic Motor connection
BONFIGLIOLI TECHNICAL SERVICE

ONLY WITH HYDRAULIC MOTOR ADAPTOR

Standard negative multidisc brake
6 = Type: **4, 5, 6**
A = Braking torque: **A, B, C, ...**

Negative multidisc brake for MG hydraulic motor
SF = Without brake

A5.2 DESIGNATION OF COMBINED WORM+PLANETARY (3/V) GEAR UNITS

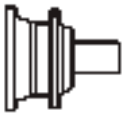
3/V	05	L	3	623	PC

OUTPUT VERSION

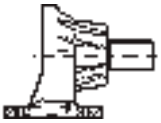

MZ: Splined male shaft

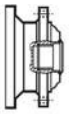

MC: Solid keyed shaft

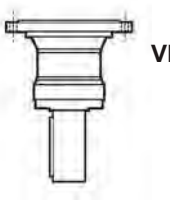

HZ: Heavy duty splined male shaft

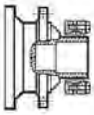

HC: Heavy duty solid keyed shaft

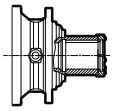

PZ: Foot base with splined shaft

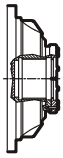

PC: Foot base with solid keyed shaft


FZ / FZB: Hollow splined shaft


VK: Reinforced output with heavy duty keyed shaft for stirrers and mixer


FP: Hollow shaft for shrink disc


FDK: Hollow shaft with double keyway


FZP: Hollow splined shaft with axial blockage device (recommended for shaft mounted installation)

GEAR RATIO
Fill in the value of the gear ratio (including point and decimals) as listed in the selection charts
Ex.: 1/773 = 773

REDUCTIONS
3

DESIGN
L = Combined 300 unit, 2 planetary stages + worm gear units

GEARBOX FRAME SIZE
00 = 3/V 00 **06** = 3/V 06
01 = 3/V 01
03 = 3/V 03
05 = 3/V 05

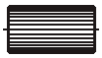
SERIES
Combined 300 gearboxes / Worm gear units

P80 B5 AF W0A EX

CONFIGURATION COMPLIANT WITH THE DIRECTIVE 2014/34/EU.

OUTPUT FITTINGS

P... = Pinions



B0A = Splined bar

M0A = Sleeve coupling

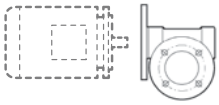
G0A = Shrink disc

W0A = Flange

MOUNTING POSITION

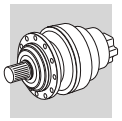
MOTOR EXECUTION
B5, B14

INPUT



Electric motor connection
P + motor size (80,90,100,132,160, ...)

Input keyed shaft
HS



A6 DECLARATION OF CONFORMITY

The Declaration of Conformity, is the document which attests to the conformity of the product to Directive 2014/34/EU.
The validity of the Declaration is bound to observance of the instructions given in the User, Installation and Service Manual for safe use of the product throughout its service life.
This can be downloaded from www.bonfiglioli.com where the manual is available in PDF format in a number of languages.
The instructions regarding ambient conditions are of particular importance inasmuch as failure to observe them during operation of the product renders the certificate null and void. In case of doubt regarding the validity of the certificate of conformity, contact the BONFIGLIOLI RIDUTTORI technical department.

INDEX OF REVISIONS

BR_CAT_300M_IE2-IE3_ENG_R04_0	
	Description
…	Added availability of BXN and MXN electric motors.
…	Updated technical data of 6” hydraulic brakes.
44	Added “Long Term Stock” option.
262…383	Updated dimensions of electric motors in conjunction with the 300… 313M gearboxes.
512…631	“Electric motors” section updated.

2022 09 30

Bonfiglioli

We have a relentless commitment to excellence, innovation & sustainability. Our team creates, distributes and services world-class power transmission & drive solutions to keep the world in motion.

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