

PG ALP

Low cost Planetary Gearbox



UL: 03-05-03



AC M2n - Product-Manual

UL: 03-06-01



NX - Product-Manual

UL: 03-01-02



AC R - Product-Manual

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Made in Germany, 2005

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Thanks for your confidence choosing our product.

These operating instructions present themselves as an overview of the technical data and features.

Please read the operating instructions before operating the product.

If you have any questions, please contact your nearest SSD Drives representative. Improper application of the product in combination with dangerous voltage can lead to injuries.

In addition, damage can also occur to motors or other products. Therefore please observe our safety precautions strictly.

Safety precautions

We assume that, as an expert, you are familiar with the relevant safety regulations, especially in accordance with VDE 0100, VDE 0113, VDE 0160, EN 50178, the accident prevention regulations of the employers liability insurance company and the DIN regulations and that you are able to use and apply them. As well, relevant European Directives must be observed.

Depending on the kind of application, additional regulations e.g. UL, DIN are subject to be observed.

If our products are operated in connection with components from other manufacturers, their operating instructions are also subject to be observed strictly.

The planetary gearbox PG APL is used for **economical** servo requirements.

The output end has a **B14 building**-on possibility as a standard feature.

The output shaft comes with the featherkey way and the featherkey as a standard feature.

Choice of the gearbox:



PLEASE BE SURE TO OBSERVE THE MOTOR / GEARBOX ASSIGNMENTS, WHEN SELECTING THE GEARBOX !

a) Motor

Only motors are to be used, with which it is guaranteed, that by the nominal and max. torques as well as nominal and max. speeds of the motor, the gearbox cannot be destroyed.

b) Controller

The nominal and max. currents provided from the controller must be so dimensioned that no damage at the gearbox can occur by too high motor torques!

Option – possibilities:

a) possible

- reduced backlash (R)

b) not possible

- smooth output shaft

- output flange B5

1.1 Model Code

Marking	Standard								Option
	a	b	c	d	e	f	g	h	i
Model:	PG	ALP	XX	XXX	.X	-X	-0B	-XXX	

Marking	Description	
a	PG	= Planetary Gearbox
b	ALP	= Version <u>A</u> LP, <u>l</u> ow cost, <u>P</u> lanetary Gearbox
c		= Size:
	05	= 50mm □ flange
	07	= 70mm □ flange
	09	= 90mm □ flange
	12	= 120mm □ flange
	15	= 155mm □ flange
d		= Ratios:
	003..100	
e		= Reduction stages:
	1, 2	= 1- or 2-stage
f		= Backlash:
	S	= Standard (12' / 15' → 1 / 2 stages)
	R	= Reduced (10' resp. 8' / 13' resp. 10' → 1 / 2 stages)
g		= Mounting position
	-BE	= Any mounting position
h		= Motor adapter code
	-XXX	= Explanation see next page
i		= Options:
	No entry	= there not possible

1.2 Typical Example

A typical example of an order corresponding to the Model Code would be:

Model: PG ALP 05005.1-S-BE-000

PG	=	Planetary Gearbox
A	=	Code Manufacturing enterprise
LP	=	Low cost
05	=	Gearbox size
005	=	Ratio
.1	=	Reduction stage
-S	=	Backlash - standard (= 12')
-BE	=	Any mounting position
-000	=	Motor adapter code (see next page)

1.3 Explanation motor adapter code h

-XXX	Drive end (motor) motor shaft (D*E)	SSD Drives Motor – Size	
		(BG)	(NX)
	0 = (9*24)mm	0	-
	1 = (14*30)mm	1	-
	2 = (19*40)mm	2	NX4
	3 = (24*50)mm	3	NX6
	4 = (32*58)mm	4	NX8
	5 = (11*23)mm	01	NX2, NX3
	7 = (6*20)mm	Y	-
-XXX	hole-circle diameter		
	0 = 63mm	0	NX2
	1 = 100mm	1	NX4
	2 = 115mm	2	-
	3 = 165mm	3	NX8
	4 = 215mm	4	-
	5 = 75mm	01	NX3
	6 = 130mm	-	NX6
	7 = 46mm	Y	-
-XXX	centring collar diameter		
	0 = 40mm	0	NX2
	1 = 80mm	1	NX4
	2 = 95mm	2	-
	3 = 130mm	3	NX8
	4 = 180mm	4	-
	5 = 60mm	01	NX3
	6 = 110mm	-	NX6
	7 = 30mm	Y	-

D = Motor shaft diameter

E = Motor shaft lenght

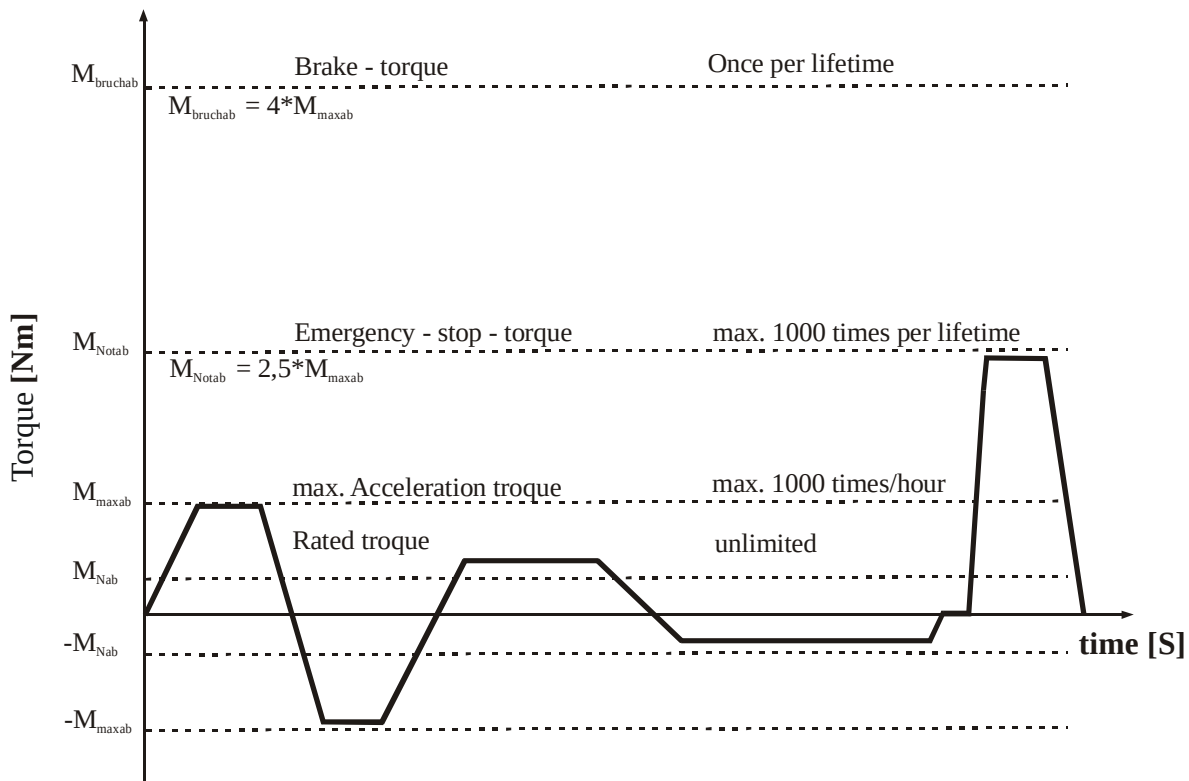
2.1 General technical dates

➤ Rated output torque	M_{Nab}	5,2 ... 320	Nm
➤ Backlash - Standard 1-stage / 2-stage - Reduziert 1-stage / 2-stage	φ	12' / 15' 10' resp. 8' / 13' resp. 10'	arcmin
➤ Mounting on SSD Drives - Motors - Type: AC M... and AC R... / Size - Type: NX... / Size	-	Y ... 4 2 ... 8	-
➤ Gear Input speed - Rated speed - maximum speed at reduced service life at reduced torque	n_N n_{max}	2000 ... 4000 4800 ... 8000	min^{-1} min^{-1}
➤ Ratios	i	003...100	-
➤ Efficiency (optimum) 1- stage - gear 2- stage - gear	-	97 95	%
➤ Operating life at rated input speed and rated output torque and maximum 1000 cycles per hour.	-	ca. 20.000	h
➤ Standard Shaft - Input end (motor shaft) - Output end		smooth, without featherkey with featherkey way and featherkey	-
➤ Temperature - Ambient temperature - Operating temperature	-	0 ...+40 -10 ...+90	°C
➤ Degree of protection	-	IP 64	-
➤ Mounting position Standard	-	beliebig	-
➤ Noise level at input speed 3000 min-1 PG ALP 05 / 07 / 09 / 12 / 15	-	≤ 68 / 70 / 72 / 74 / 75	dB(A)

2.2 Definition Built-in position

The Built-in position are measured at a new gearbox, with 2% (of the rated torque) load and blocked gearbox input shaft.

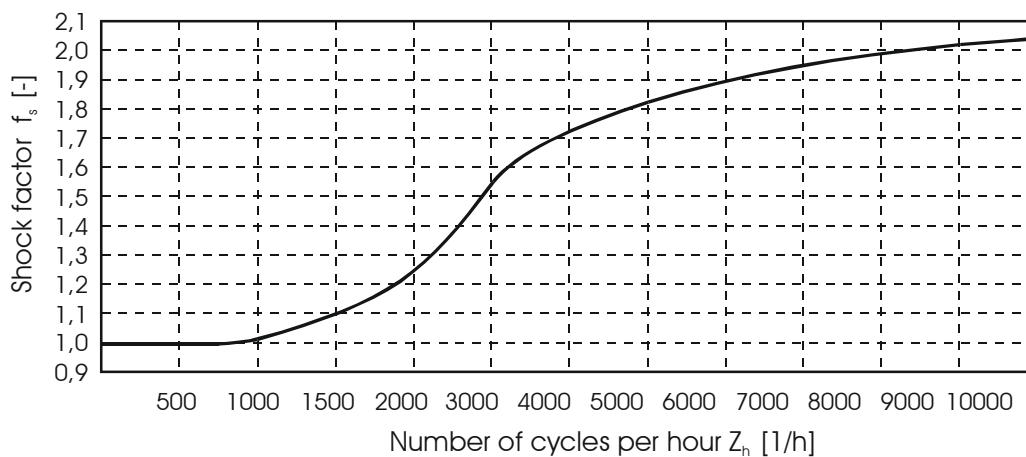
2.3 Definitions of the torques



2.4 Shock factor

Rapid reversals in combination with short acceleration times many cause vibration within assembly.

The resulting overloads should be calculated using the shock factor f_s .



2.5 Gearbox

PG ALP05	Symbols						Unit
Stage	-	1-stage			2-stage		
Backlash Standard / Reduced	ϕ	$\leq 12 / \leq 10$			$\leq 15 / \leq 13$		
Ratios	i	5	10	25	50	100	-
Mass moment of inertia	¹⁾ J_G	0,055			0,055		
Weight	m	0,75			0,95		
Input -rated speed -maximum speed	n_N	4000			4000		
	n_{max}	8000			8000		
Output -rated torque -max. acceleration torque -emergency stop torque	M_{Nab}	5,7	5,2	5,7	5,7	5,2	Nm
	²⁾ M_{maxab}	12,0	11,0	12,0	12,0	11,0	Nm
	³⁾ M_{Notab}	26			26		

PG ALP07	Symbols											Unit
Stage	-	1-stage				2-stage					-	
Backlash Standard / Reduced	φ	≤12 / ≤8				≤15 / ≤10					arcmin	
Ratios	i	3	5	7	10	15	25	30	50	100	-	
Mass moment of inertia	¹⁾ J _G	0,28				0,28					10-4Kg ^m ²	
Weight	m	2,00				2,40					Kg	
Input -rated speed -maximum speed	n _N	3700				3700					min ⁻¹	
	n _{max}	6000				6000					min ⁻¹	
Output -rated torque -max. acceleration torque -emergency stop torque	M _{Nab}	16,5	18,0	18,0	16,5	16,5	18,0	16,5	18,0	16,5	Nm	
	²⁾ M _{maxab}	32,0	35,5	35,0	32,0	32,0	35,0	32,0	35,0	32,0	Nm	
	³⁾ M _{Notab}	75				75					Nm	

PG ALP09	Symbols											Unit
Stage	-	1-stage				2-stage					-	
Backlash Standard / Reduced	φ	≤12 / ≤8				≤15 / ≤10					arcmin	
Ratios	i	3	5	7	10	15	25	30	50	100	-	
Mass moment of inertia	¹⁾ J _G	1,77				1,77					10-4Kgm ²	
Weight	m	4,00				5,00					Kg	
Input -rated speed -maximum speed	n _N	3400				3400					min ⁻¹	
	n _{max}	6000				6000					min ⁻¹	
Output -rated torque -max. acceleration torque -emergency stop torque	M _{Nab}	40,0	45,0	45,0	40,0	40,0	45,0	40,0	45,0	40,0	Nm	
	²⁾ M _{maxab}	80,0	90,0	90,0	80,0	80,0	90,0	80,0	90,0	80,0	Nm	
	³⁾ M _{Notab}	190				190					Nm	

¹⁾ J_G = approx. Measures (dependent on the shaft ϕ)

²⁾ M_{maxab} with max. 1000 cycles per hour

³⁾ M_{Notab} max. 1000times during the gearbox - lifetime admissible.

Gearbox

PG ALP12	Symbols											Unit
Stage	-	1-stage				2-stage					-	
Backlash Standard / Reduced	φ	≤ 12 / ≤ 8				≤ 15 / ≤ 10					arcmin	
Ratios	i	3	5	7	10	15	25	30	50	100	-	
Mass moment of inertia	¹⁾ J _G	5,42				5,49					10-4Kgm ²	
Weight	m	8,60				11,00					Kg	
Input -rated speed	n _N	2600				2600					min ⁻¹	
-maximum speed	n _{max}	4800				4800					min ⁻¹	
Output -rated torque	M _{Nab}	100	110	110	100	100	110	100	110	100	Nm	
-max. acceleration torque	²⁾ M _{maxab}	200	220	220	200	200	220	200	220	200	Nm	
-emergency stop torque	³⁾ M _{Notab}	480				480					Nm	

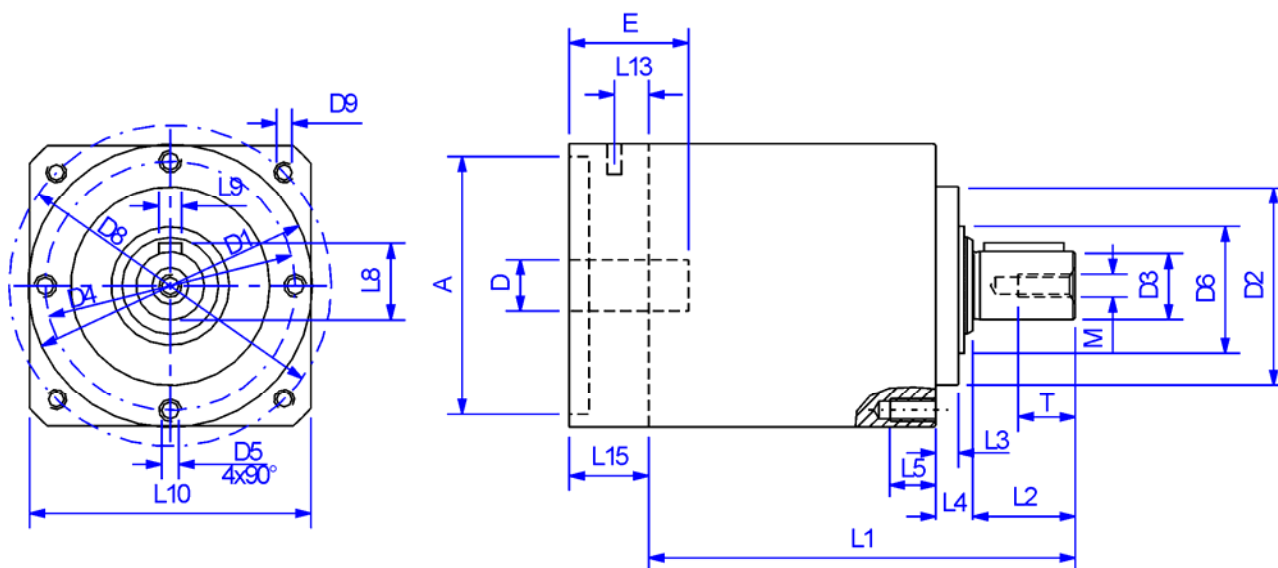
PG ALP15	Symbols						Unit
Stage	-	1-stage		2-stage			-
Backlash Standard / Reduced	φ	≤12 / ≤8		≤15 / ≤10			arcmin
Ratios	i	5	10	25	50	100	-
Mass moment of inertia	¹⁾ J _G	25,73		5,60			10-4Kgm ²
Weight	m	17,00		21,00			Kg
Input -rated speed	n _N	2000		2000			min ⁻¹
-maximum speed	n _{max}	3600		3600			min ⁻¹
Output -rated torque	M _{Nab}	320	190	320	320	190	Nm
-max. acceleration torque	²⁾ M _{maxab}	450	350	450	450	350	Nm
-emergency stop torque	³⁾ M _{Notab}	1000		1000			Nm

¹⁾ J_G = approx. Measures (dependent on the shaft $\varnothing$)

²⁾ M_{maxab} with max. 1000 cycles per hour

³⁾ M_{Notab} max. 1000times during the gearbox - lifetime admissible.

3.1 Dimension drawing gearbox

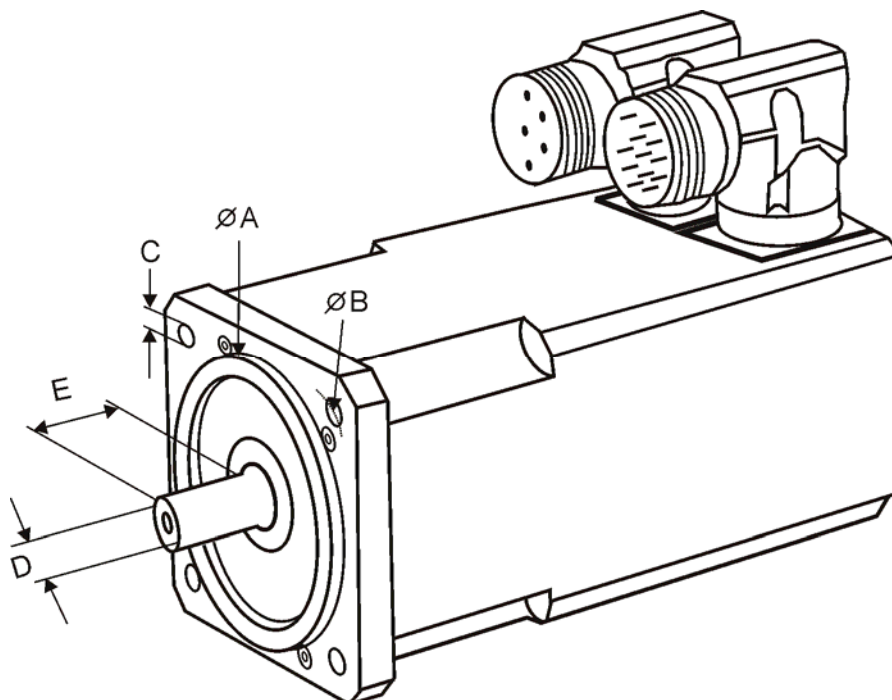


3.2 Dimension table gearbox

Typ		PG APL 05				PG APL 07				PG APL 09				PG APL 12				PG APL 15			
Size		05				07				09				12				15			
Stages		1		2		1		2		1		2		1		2		1		2	
D1		50				70				90				120				155			
D2		35				52				68				90				120			
D3		12				16				22				32				40			
D4		44				62				80				108				140			
D5		M4				M5				M6				M8				M10			
D6		17				25				40				50				65			
A		1)				1)				1)				1)				1)			
D8		1)				1)				1)				1)				1)			
D9	Thread	1)				1)				1)				1)				1)			
D	max.	11				16				24				32				42		32	
L1		73,5	89			104	124			126	152,5			172	204,5			219,5	250		
L2		18				28				36				58				82			
L3		4				5				5				6				8			
L4		6,5				8				10				12				15			
L5		8				10				12				16				20			
L6		14				25				32				50				70			
L7		2				2				2				4				6			
L8		13,5				18				24,5				35				43			
L9		4				5				6				10				12			
L10	+/-1	50				70				90				120				150		120	
L12		3,5				4				5				8				6		8	
L13		6				5,6				8,5				10				16,5		10	
E	min.	13				15				21				28				35		28	
E	max.	20	25	20	25	23	30	23	30	30	40	30	40	40	50	40	50	50	60	40	50
L15	Adapter plate	14	19	14	19	15	22	15	22	22	32	22	32	28	38	28	38	36	46	28	38
M		M4				M5				M8				M12				M16			
T		8				10				13				22				32			

1) Dimensions depend on motor to be mounted
all dimensions in "mm"

3.3 Dimension of the SSD Drives Servo motor flange



Motor flange for AC Servo motors , Type: AC G, M., R

Size (BG)	D7	D8	D9 (hole)	D10 x L14
Y	30	46	4,3	6 x 20
0	40	63	5,8	9 x 24
01	60	75	5,5	11 x 23
1	80	100	7,0	14 x 30
2	95	115	9,0	19 x 40
3	130	165	11,0	24 x 50
4	180	215	14,0	32 x 58

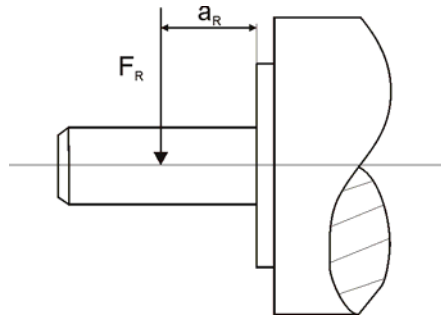
Motor flange for AC Servo motors , Type: NX

Size	D7	D8	D9 (hole)	D10 x L14
2	40	63	5,5	11 x 25
3	60	75	5,5	11 x 23
4	80	100	7,0	19 x 40
6	110	130	9,0	24 x 50
8	130	165	12,0	32 x 58

all dimensions in "mm"

4.1 Radial Shaft Loads

4.1.1 Representation of the Definition

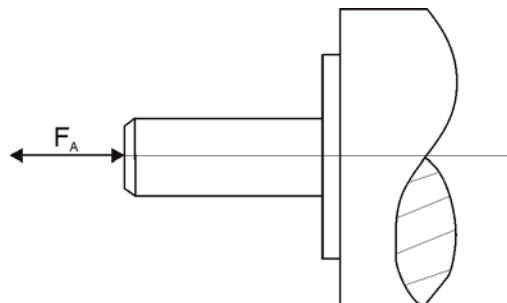


4.1.2 Technical Data of the Max. Radial FR (N) Shaft Loads at $n_{ab} = 100 \text{ min}^{-1}$

Model:	Size	Backlash		Permissible Shaft Loads	
		1-stage	2-stage	a_R	F_R
(-)	(-)	(φ)		(mm)	(N)
PG ALP 05	05	$\leq 12' / \leq 10'$	$\leq 15' / \leq 13'$	9	650
PG ALP 07	07	$\leq 12' / \leq 8'$	$\leq 15' / \leq 10'$	14	1450
PG ALP 09	09	$\leq 12' / \leq 8'$	$\leq 15' / \leq 10'$	18	2400
PG ALP 12	12	$\leq 12' / \leq 8'$	$\leq 15' / \leq 10'$	29	4600
PG ALP 15	15	$\leq 12' / \leq 8'$	$\leq 15' / \leq 10'$	41	7500

4.2 Axial Shaft Loads

4.2.1 Representation of the Definition



4.2.2 Technical Data of the Max. Axial Shaft Loads

Model:	Size	Backlash		Permissible Shaft Loads
		1-stage	2-stage	
(-)	(-)	(φ)		F_A
				(N)
PG ALP 05	05	$\leq 12' / \leq 10'$	$\leq 15' / \leq 13'$	700
PG ALP 07	07	$\leq 12' / \leq 8'$	$\leq 15' / \leq 10'$	1550
PG ALP 09	09	$\leq 12' / \leq 8'$	$\leq 15' / \leq 10'$	1900
PG ALP 12	12	$\leq 12' / \leq 8'$	$\leq 15' / \leq 10'$	4000
PG ALP 15	15	$\leq 12' / \leq 8'$	$\leq 15' / \leq 10'$	6000

5.1 Fundamental principles Motor - Gear - Combinations

Calculation basics

$$M_{nab} \text{ Getriebe} \geq M_N \text{ Motor} * i \text{ Getriebe}$$

$$M_{max} \text{ Getriebe} \geq 2 * M_N \text{ Motor} * i \text{ Getriebe}$$

$$M_n \text{ Motor} \geq 2 * M_{leer} \text{ Getriebe}$$

$$n_{max} \text{ Getriebe} > n_N \text{ Motor}$$

$$J_M \text{ Motor} \geq 2 * J_G \text{ Getriebe}$$

5.2 Assignment list: Gear / Motor

PG ALP05			Servo motors				
Ratio	1-stage	5	AC M2n0045	AC M2n0070	NX110..	NX205..	NX210 ..
		10	AC M2n0045	NX 110..	NX205..		
	2-stage	25					
		50					
		100					

PG ALP07			Servo motors				
Ratio	1-stage	3	AC M2n0090	AC M2n0150	AC M2n0220	AC M2n0290	NX310 ..
		5	AC M2n0090	AC M2n0150	AC M2n0220	AC M2n0290	NX310 ..
		7	AC M2n0090	AC M2n0150	AC M2n0220	NX310 ..	
		10	AC M2n0090	AC M2n0150			
	2-stage	15	AC M2n0090				
		25					
		30					
		50					
		100					

PG ALP09			Servo motors				
Ratio	1-stage	3	AC M2n0650	AC M2n830	AC M2n960	AC M2n1200	NX 620. NX630..
		5	AC M2n0650	AC M2n830	NX430	NX620 ..	NX630.
		7	NX430 ..	NX620 ..			
		10					
	2-stage	15					
		25					
		30					
		50					
		100					

Assignment list: Gear / Motor

PG ALP12		Servo motors						
Ratio	1-stage	3	AC M2n 2000	NX 630 ..	NX 820 ..	NX 840EAK	NX 840EAJ	NX840EAQ
		5	AC M2n 2000	NX 630..	NX 820 ..	NX 840EAK		
		7	NX 630 ..	NX 820 ..				
		10	NX 630 EAG					
	2-stage	15						
		25						
		30						
		50						
		100						

PG ALP15			Servo motors					
Ratio	1-stage	5	NX 840 EAK	NX 840 EAJ	NX 840 EAQ	NX 860 EAD	NX 860 EAJ	
		10						
	2-stage	25						
		50						
		100						

5.3 Assignment for special combinations

The given below combinations are applicable only customized resp. project-specific.



Responsible to technical check !

The customer is responsible to check all technical details, when used the given below combinations !

Definitions:

D	Gear	Input - speed	to high
J		moment of inertia	to high
R		friction torque	to high
M	Motor	torque	to high
P		shaft with key	Mounting without key
S	Standard - combination		

Example:

DJM = Input speed, moment of inertia gear and motor - torque to high

			Servo motors														
			AC M2n0012	AC M2n0010	AC M2n0030	AC M2n0045	AC M2n0070	AC M2n0130	AC G0060	AC G0090	AC G0170	AC G0190	NX 110	NX 205	NX 210	NX 310	
PG ALP05	Ratio	1-stage	5	J	J	J	S	S	M	P	P	PM	PM	S	S	S	M
			10	J	J	J	S	M	M	PM	PM	PM	PM	S	S	M	M
	2-stage	25	J	J	M	M	M	M	PM	PM	PM	PM	M	M	M	M	
		50	J	J	M	M	M	M	PM	PM	PM	PM	M	M	M	M	
		100	M	M	M	M	M	M	PM	PM	PM	PM	M	M	M	M	

		Servo motors															
PG ALP07		AC M2n0012	AC M2n0010	AC M2n0030	AC M2n0045	AC M2n0070	AC M2n0130	AC M2n0055	AC M2n0090	AC M2n0150	AC M2n0220	AC M2n0290	AC G0060	AC G0090	AC G0170	AC G0190	NX 310
Übersetzung 1-stage	3	R	R	J	J	J	J	J	S	S	S	S	PJ	PJ	P	P	S
	5	R	R	J	J	J	J	J	S	S	S	S	PJ	PJ	P	P	S
	7	R	R	J	J	J	J	J	S	S	S	M	PJ	PJ	P	P	S
	10	R	R	J	J	J	J	J	S	S	M	M	PJ	PJ	PM	PM	M
2-stage	15	R	R	J	J	J	J	J	S	M	M	M	PJ	PJ	PM	PM	M
	25	R	R	J	J	J	J	J	M	M	M	M	PJ	PM	PM	PM	M
	30	R	R	J	J	J	J	J	M	M	M	M	PM	PM	PM	PM	M
	50	R	R	J	J	J	J	M	M	M	M	M	PM	PM	PM	PM	M
	100	R	R	M	M	M	M	M	M	M	M	M	PM	PM	PM	PM	M

Motor - Gear - Combinations Assignment

5

Assignment for special combinations



Responsible to technical check !

PG ALP09			Servo motors																
			AC M2n0055	AC M2n0090	AC M2n0150	AC M2n0220	AC M2n0290	AC M2n0320	AC M2n0480	AC M2n0650	AC M2n0830	AC M2n0960	AC M2n1200	AC M2n2000	NX 310	NX 420	NX 430	NX 620	NX 630
Ratio	1-stage	3	R	J	J	J	J	J	J	S	S	S	S	M	J	J	S	S	S
		5	R	J	J	J	J	J	J	S	S	M	M	M	J	J	S	S	S
		7	R	J	J	J	J	J	J	M	M	M	M	M	J	J	S	S	M
		10	R	J	J	J	J	J	JM	M	M	M	M	M	J	J	M	M	M
	2-stage	15	R	J	J	J	JM	JM	JM	M	M	M	M	M	J	JM	M	M	M
		25	R	J	J	JM	JM	JM	JM	M	M	M	M	M	J	JM	M	M	M
		30	R	J	JM	JM	JM	JM	JM	M	M	M	M	M	JM	JM	M	M	M
		50	R	J	JM	JM	JM	JM	JM	M	M	M	M	M	JM	JM	M	M	M
		100	RM	JM	JM	JM	JM	JM	JM	M	M	M	M	M	JM	JM	M	M	M

PG ALP12			Servo motors															
			AC M2n0320	AC M2n0480	AC M2n0650	AC M2n0830	AC M2n0960	AC M2n1200	AC M2n2000	NX 620	NX 630	NX 820	NX 840	NX 860	AC R1500	AC R2400	AC RL3400	AC RL 5300
Ratio	1-stage	3	J	J	J	J	J	J	S	J	S	S	S	S	S	S	M	M
		5	J	J	J	J	J	J	S	J	S	S	M	M	S	M	M	M
		7	J	J	J	J	J	J	M	J	S	S	M	M	S	M	M	M
		10	J	J	J	J	J	JM	M	J	S	M	M	M	M	M	M	M
	2-stage	15	J	J	J	JM	JM	JM	M	JM	M	M	M	M	M	M	M	M
		25	J	JM	JM	JM	JM	JM	M	JM	M	M	M	M	M	M	M	M
		30	J	JM	JM	JM	JM	JM	M	JM	M	M	M	M	M	M	M	M
		50	JM	JM	JM	JM	JM	JM	M	JM	M	M	M	M	M	M	M	M
		100	JM	JM	JM	JM	JM	JM	M	JM	M	M	M	M	M	M	M	M

			Servo motors											
PG ALP15			AC M2n0960	AC M2n1200	AC M2n2000	NX 620 EAV	NX 630 EAK	NX 820 EAL	NX 840	NX 860	AC R1500	AC R2400	AC RL 3400	AC RL 5300
Ratio	1-stage	5	DJ	DJ	DJ	J	J	DJ	S	S	S	S	S	M
		10	DJ	DJ	DJM	J	J	DJ	M	M	S	M	M	M
	2-stage	25	DJ	DJM	DJM	J	M	DM	M	M	M	M	M	M
		50	DJM	DJM	DJM	JM	M	DM	M	M	M	M	M	M
		100	DJM	DJM	DJM	JM	M	DM	M	M	M	M	M	M

In General:

we recommend building on and removing the gearboxes at SSD Drives!

Motor Mounting

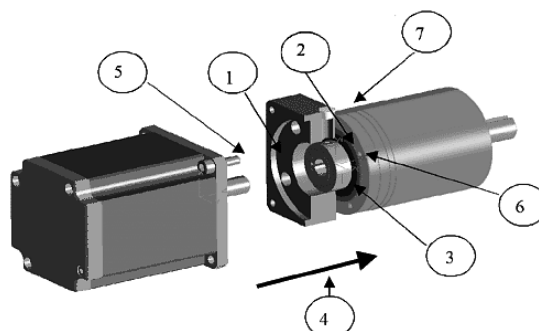
These gearboxes can be mounted on virtually any motor with the aid of simple adapter parts.
The input shaft of the gearbox is **connected** to the motor shaft via a bearing supported socket.
The motor is **centered** by these sockets. This makes it unnecessary to center the motor by means of the flange. The bore in the adapter plate is just a clearing hole.

The **key** is removed from motors in which such a key has been fitted. The groove must also be lined up with the slot in the bushing (vertical to the set screw).

Attention: In case of motors with shaft collar respectively with a great transitional radius and in case of motors with shafts that are longer than the value allowed for the specific gearbox:
The shaft collar respectively the radius or the shaft end may already fit closely to socket. If in this case the motor and the gearbox are screwed together, it may cause the destruction or the damaging of the motor and/or of the gearbox because of distortions. In cases like this, please check the edges with the help of measuring or checking the measures according to the information given in our chapter "Dimensions" and the information given by the manufacturer of the motor (other manufacturers – motor). In both cases the problems can be solved by using a broader adapter plate respectively an intermediate flange.

6.1 Mounting on motors

1. Clean the motor shaft, the hole in the clamping hub socket and bushing. Similarly clean the plain surfaces on the motor and the gear unit.
2. Turn the clamping hub socket such that the screws are approachable through the hole in the adapter plate. Check if the slot in the bushing is vertical to the set screw.
3. Check if the **slot** in the bushing is **90° to the set screw** (align if necessary).
Please pay attention to the coloured mark!
4. Put the motor (we recommend the vertical position) onto the gearbox without force (max. axial load see table 6.2)
5. Screw the motor and the adapter plate crosswise together.
6. Tighten the set screws to the specified torque according to the table 6.2.
7. Close the hole in the adapter plate with the plug.



6.2 Tightening torque and width across flats

Gearbox-Size		Motor shaft Ø	Transferable torque at the input	Width across flats	Tightening torque set screws	max. axial load mounting - force
		[mm]	[Nm]	[mm]	[Nm]	[N]
05		9	11,0	3	5,6	45
		11	13,2			
07		9	15,2	4	9,5	80
		14	23,7			
09		14	28,2	5	23,0	100
		19	51,7			
12		19	80,0	6	45,0	150
		28	117,7			
15	1-stage	32	88,0	8	78,0	180
		42	92,0			
	2-stage	19	80,0	6	45,0	150
		28	117,7			

7.1 Lubrification and Maintenance

All PG ALP – Gearboxes are maintenance-free. It is no necessary to change the lubricant.

7.2 Safety of machines - EEC Directive - CE Certification

Gears or also gearmotors are no machines in sense of the EC machine guideline **98/37/EG**.

For this reason, the EC conformity declaration and CE marking is also dropped.

This image shows a single page of white paper with horizontal blue lines, resembling notebook paper. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

Version	Modification	Chapter	Date	Name	Comment
V01.32EH99	new		09.09.1999	K. Stadler	
V0201	re-worked completely Mounting instructions Separation German / English	6 all	 19.06.2001	 N. Dreilich	 Format
V0301	Technical Data General Definition Built-in position Definitions of the torques Shock factor Gearbox size Lubrification and Maintenance	2.1 2.2 2.3 2.4 2.5 6			new new new new complemented new
V0404	SSD Drives		22.10.2004	N .Dreilich	Logo
V0505	complet revised (PGAPL)	-	18.07.2005	N. Dreilich	replaced PGAL

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