

Stepper Motor with GPL 22 – 80 Planet Gear



Stepper Motors with GPL 22 – 80 Planet Gear

- Stepper motor mounted gear
- Powerful 200 steps/rev. stepper motors
- 1 to 3 stage gears in different versions:
 - Standard version with gear backlash 20 to 50 angular minutes
 - Low backlash version with gear backlash 6 to 15', available for size 32 to 80
- For 0.1 to 38 Nm maximum permanent torques
- 100% permissible short-term overload
- Particularly adapted for permanent, alternate or intermittent operation
- Ideal for combination with toothed belt modules
- 4:1 to 256:1 reduction ratios depending on the gear type
- High efficiency
- Low gear inertia
- Standard gears:
 - GPL 22: IP 44 protection
 - GPL 32 to 80: IP 54, special version with IP 65 protection
- Options:
 - Incremental encoder for size 25 or over
 - Permanent magnet motor brake for size 52 or over
 - Incremental encoder and brake for size 52 or over
 - Stepper motor with mounted heat sink

Operating Principle

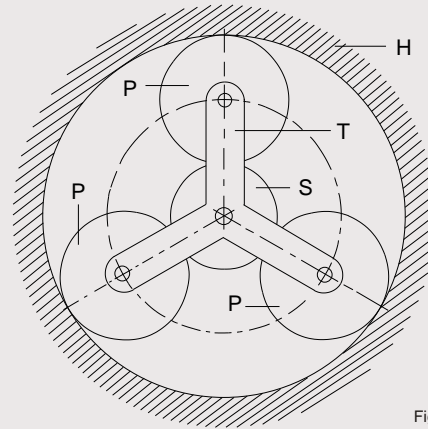


Fig. 1

The low-backlash GPL planet gear is of modular design with one, two or three consecutive stages.

For each stage, the drive input is effected via the sun wheel (S) and the output via the planet carrier (T).

The input power is distributed by the sun wheel to the planet wheels (P) and then transmitted to the output by means of the planet carrier.

The gear housing (H) performs as a ring gear and transmits the torque.

When is the Use of a Gear Required?

- To reduce the mass inertia and increase the output torque.
- Whenever a very low speed is required at the output.
- To increase the system's resolution.

How to Determine the Adapted Reduction Ratio:

To obtain good dynamic behavior, the reduction ratio must be determined accurately, particularly in the case of stepper motor drives.

The reduced external mass inertia ($J_{ext\ red}$) should not exceed 5 to 20 times the rotor mass inertia. In the case of high dynamic systems :

$$J_{ext\ red} < J_{Rotor}$$

The adapted reduction ratio can be obtained by the following formula:

$$i = \sqrt{\frac{J_{ext}}{J_{ext\ red}}}$$

Possible Combinations

Size (Gear)	Possible Combinations			
	Stepper Motor with Gear	Stepper Motor with Gear and Encoder	Stepper Motor with Gear and Motor Brake	Stepper Motor with Gear, Encoder and Motor Brake
22	IP 40 IP 44			
32	IP 40 IP 44	IP 20 IP 44		
42	IP 43 IP 44 IP 65	IP 20 IP 44 IP 65		
52	IP 43 IP 44 IP 65 ²⁾	IP 20 IP 44 IP 65	IP 00	
80	IP 54 IP 65	IP 54 IP 65	IP 54 IP 65	IP 54 IP 65

IP xx = Standard
IP xx = Special version (modified dimensions)

¹⁾ Motor types see table on page 3

²⁾ Only in combination with ZSS 57 stepper motor

Mechanical Characteristics

Gear	Stepper Motor ¹⁾	Stages	Reduction Ratios		Standard			Low-backlash			Torsional stiffness	Average mass inertia at drive	Wirkungsgrad (Vollast)	Permissible Loads		Protection Class	Temperaturbereich
					No-load Backlash	Max. Permanent Torque (S1) ²⁾	Emergency Stop Torque (S1) ²⁾	No-load Backlash	Max. Permanent Torque (S5) ³⁾	Emergency Stop Torque (S5) ³⁾				Radial Load at Center of Axis	Axial Load		
					Nm			Nm			Nm/arcmin	kgcm ²	%	N			
GPL 22	ZSS 19 ZSS 20 ZSS 25 ZSS 26	1	4:1 5:1	7:1	20'	0.1	0.2	-	-	-	0.19	0.008	96	30	24	IP 44	
		2	16:1 20:1 28:1	35:1 49:1	35'	0.5	1	-	-	-	0.21	0.006	90				
		3	64:1 80:1 112:1	140:1 196:1 245:1	50'	1.5	3	-	-	-	0.20	0.004	85				
GPL 32	ZSS 32 ZSS 33	1	4:1 4.5:1 5.2:1	6.25:1 8:1	20'	0.4	0.8	6'	0.8	1.6	0.3	0.015	96	80	65		
		2	16:1 18:1 20.8:1 25:1 29:1	32:1 36:1 41.6:1 50:1	35'	2	4	10'	4	6	0.32	0.012	90				
		3	72:1 81:1 100:1 130:1	144:1 200:1 225:1 256:1	50'	6	12	15'	6	12	0.3	0.011	85				
GPL 42	ZSS 41 ZSS 41/1 ZSS 42 ZSS 42/1 ZSS 43 ZSS 43/1	1	4:1 5:1	6:1	20'	0.7	1.4	6'	1.4	3	0.4	0.03	96	150	120	IP 54	
		2	14:1 16:1	20:1	35'	4	8	10'	8	12	0.42	0.024	90				
		3	56:1 64:1 80:1 100:1	120:1 144:1 184:1	50'	12	24	15'	12	24	0.4	0.024	85				
GPL 52	ZSS 52 ZSS 56 ZSS 57	1	4:1 4.5 5.2:1	6.25:1 8:1	20'	1.5	3	6'	3	6	1.2	0.06	96	250	200		
		2	16:1 18:1 20.8:1 25:1 29:1	32:1 36:1 41.6:1 50:1	35'	10	20	10'	20	30	1.3	0.055	90				
		3	72:1 81:1 100:1 130:1	144:1 200:1 225:1 256:1	50'	30	60	15'	30	60	1.35	0.05	85				
GPL 80	RSS 79 RSH 79 RSS 80 RSH 80	1	4:1		20'	3	6	6'	6	12	1.5	0.12	96	400	320		
		2	14:1 16:1	20:1 24:1	35'	15	30	10'	30	38	1.5	0.08	90				
		3	56:1	64:1	50'	38	75	15'	38	75	1.4	0.075	85				

-30 bis +90 °C

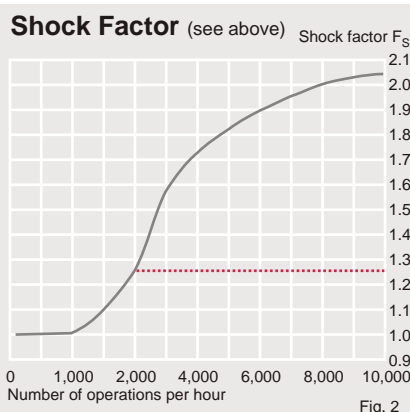
1) For technical data please refer to the motor data sheets

2) Valid for S1 operation mode (continuous operation). The gearbox's operating time exceeds 15 minutes without a break or the duty cycle is greater than 60%.

In no case the gearbox housing temperature may exceed 70 °C.

3) Valid for S5 operation mode (cyclical operation). The gearbox's duty cycle is less than 60%. The number of operations per hour can range anywhere from a few to several thousand.

If the number of operations exceeds 1000 per hour, the maximum torque occurring has to be multiplied by a shock factor (see fig. 2) to take into account the additional dynamic load.



Material

Gear housing:
 GPL 22: stainless steel
 GPL 32 – 80: rustproof for normal environmental conditions

Output shaft bearing: 2 deep groove ball bearings

Grease Lubrication

Maintenance-free permanent lubrication with grease of the very highest quality (Lubcon Turmgrease N 502).
 The gear boxes are delivered with the cavities filled about 30% with grease. After three years or every 10,000 hours of operation we recommend servicing.

Ordering Data

ZSS32.200.1,2-GPL32/16 SPA

Stepper motor type _____

Size _____

Number of steps _____

Winding _____

Gear _____

Reduction Ratio _____

Backlash _____
 ST = Standard backlash
 SPA = Very low backlash

Options: see motor data sheets

Stepper Motor with GPL 22 Gear

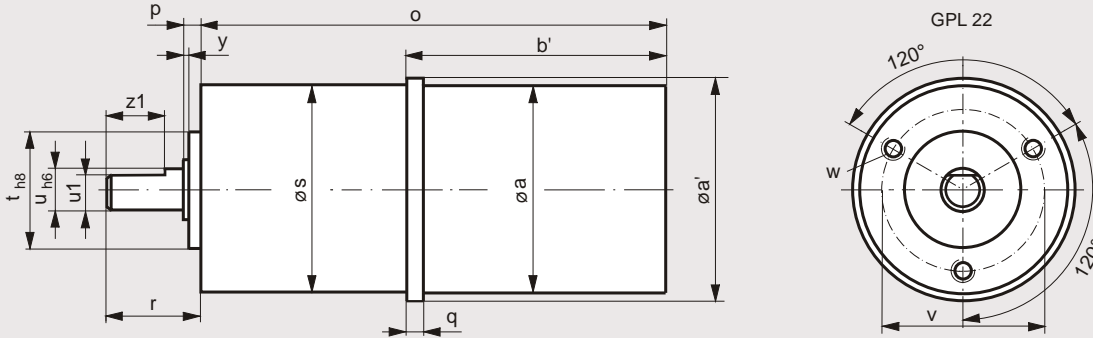


Fig. 3

Stepper Motor with GPL 32 – 80 Gear

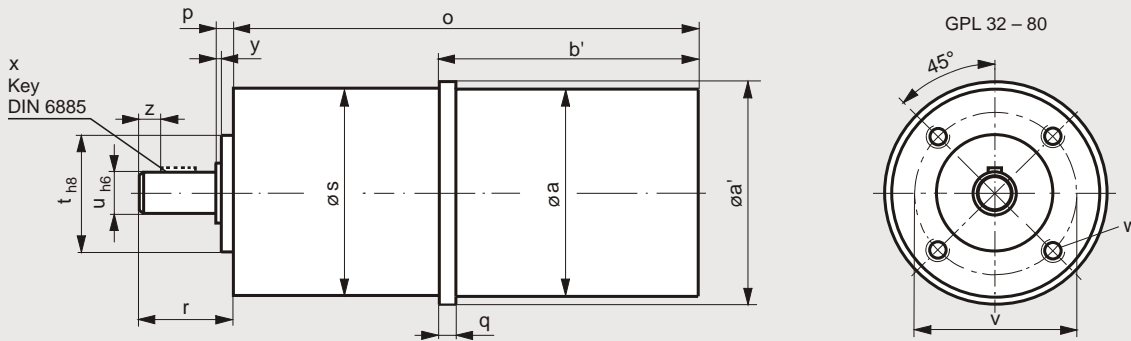


Fig. 4

Dimensions

Getriebe	1)	2)	Dimensions in mm																	Weight (Gear)						
			Stages				p	q	r	s	t	u	u1	v	w	x	y	z	z1	Stages						
			a	a'	b'	o														kg	kg	kg				
GPL 22		ZSS 19	19	22	29	50	57	64	2.5	4.5	15	22	12	4	3.5	16	M2,5x4	-	0,5	-	8	0.050	0.075	0.100		
		ZSS 20			45.5	66.5	73.5	80.5																		
		ZSS 25	25	25,5	33.5	54.5	61.5	68.5																		
		ZSS 26			49.5	70.5	77.5	84.5																		
GPL 32		ZSS 32	32	33	40.5	69.5	78.5	87.5	4	5	20	32	20	6	-	26	M3x5	-	-	-	0.135	0.180	0.250			
		ZSS 33			59.5	88.5	97.5	106.5																		
GPL 42		ZSS 41	42	43	53	88	100.5	113	4	7	22.5	42	25	8	-	32	M4x8	3x3x14	1	2,25	-	0.275	0.350	0.425		
		ZSS 41/1																								
		ZSS 42					68	103																	115.5	128
		ZSS 42/1					83	118																	130.5	143
GPL 52		ZSS 52	52	53	82.5	123.5	138	152.5	4	9	24	52	32	12	-	40	M5x8	4x4x16	2	-	0.475	0.600	0.725			
		ZSS 56			74	115	130	144																		
		ZSS 57	56,4	57	90	131	145	160																		
GPL 80		RSS 79	80	80	125	168.5	186.5	204.5	5	23.1	35	80	50	14	-	65	M6x12	5x5x20	2.5	5	-	1.500	2.100	2.750		
		RSH 79																								
		RSS 80					147	190.5																	208.5	226.5

1) Dimensions for IP 65 protection mode on request.
 2) Technical data see motor or data sheets.