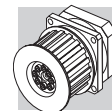


SL



BONFIGLIOLI



SUMMARY

Chapter Contents

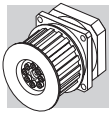


1 General information	2
1.1 Symbols and units of measurement	2
1.2 Features of SL series	3
1.3 Selecting the gear unit	4
1.4 Ordering code	5
2 Technical specifications	6
SL 070	6
SL 090	6
SL 120	6
3 Mass moment of inertia	7
SL 070	7
SL 090	7
SL 120	7
4 Dimensions	8
SL 070	8
SL 090	10
SL 120	12

Revisions

Refer to page 14 for the catalogue revision index.

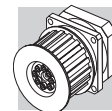
Visit www.tecnoingranaggi.it to search for catalogues with up-to-date revisions.



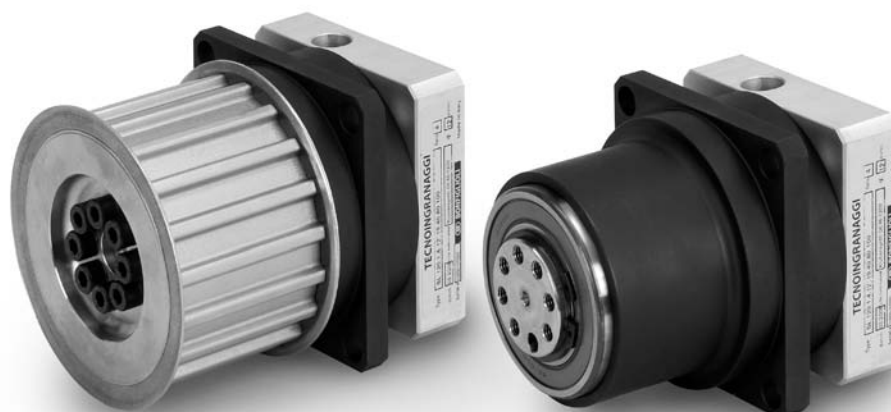
1 GENERAL INFORMATION

1.1 SYMBOLS AND UNITS OF MEASUREMENT

A_n	[N]	The admissible thrust force can be applied axially to the shaft under study along. The catalogue value is calculated for an output speed $n_2 = 100 \text{ min}^{-1}$
C_t	$\left[\frac{\text{Nm}}{\text{arcmin}} \right]$	Torsional stiffness
i	-	Gear ratio is expressed as the relationship of the input speed to the output speed: $i = \frac{n_1}{n_2}$
I	-	Intermittence is defined as the relationship of the operating time to the cycle time
f_c	-	Cycle factor . An adjusting factor that is to be accounted for when selecting gear unit operating under continuous duty S1
f_z	-	Service factor
M_{a2}	[Nm]	Maximum acceleration torque acceptable for a duty with $I < 60\%$
M_{n2}	[Nm]	Nominal output torque
M_{p2}	[Nm]	Emergency stop torque . The value cannot apply more than 1000 times over the entire life of the gear unit and should not recur in normal operating conditions
J	[Kgcm ²]	Mass moment of inertia of the gear unit
L_{10}	[h]	Average service life of bearings
n_1	[min ⁻¹]	Nominal input speed (continuous duty S1). It is the reference speed for duties with intermittence $I \geq 60\%$ and/or operating time $\geq 20 \text{ min}$
n_{1max}	[min ⁻¹]	Maximum momentary input speed . The speed the unit can be driven at occasionally and in non-repetitive conditions. For cyclic duty, type S5, it cannot be applied continuously for more than 30 seconds
R_n	[N]	Admissible radial force . Its value must be equal to, or greater than, the radial force actually applying.
T_c	[°C]	Housing temperature . Under no circumstances it should exceed 90°C
φ_s	[arcmin]	Standard backlash is calculated in static conditions and with the application of a torque equal to 2% of the nominal torque for the gear unit
φ_R	[arcmin]	Reduced backlash is calculated in static conditions and with the application of a torque equal to 2% of the nominal torque for the gear unit
η	[%]	Dynamic efficiency is calculated through the relationship of output torque to torque applied to input shaft under nominal conditions: $\eta_d = \frac{M_2}{M_1 \times i} \times 100$
Z	-	Number of accelerations/switches per hour

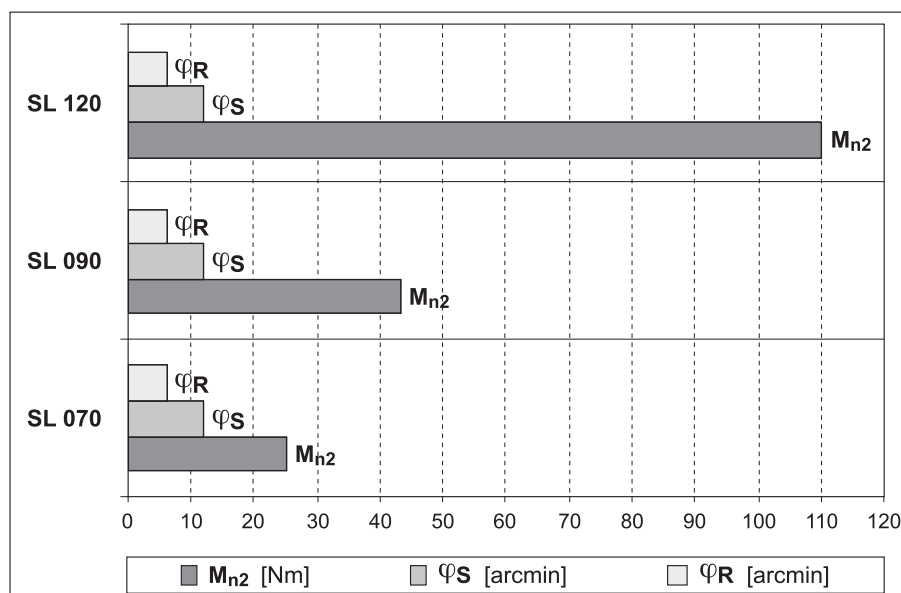


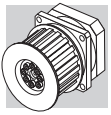
1.2 FEATURES OF SL SERIES



The new **SL** Series from Tecnoingranaggi knows no rivals in compactness, efficiency and optimisation for timing belt pulley drive systems. Reduced backlash units from the **SL** Series are the ideal complement to conveyor belt servo-drives and all other applications needing to combine high precision with ultra-compact size.

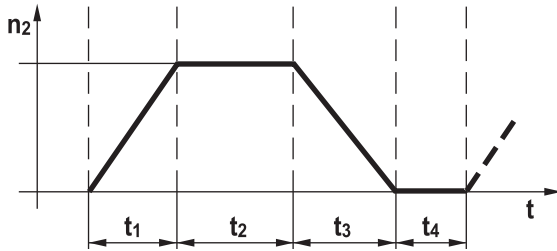
- Available with either standard ($\varphi_S = 12'$) or reduced backlash ($\varphi_R = 6'$)
- Single-stage configuration: transmission ratios $i = 3, 4, 5, 7, 10$
- Radial ball bearings, suitably rated for an average service life of 20,000 hours under nominal operating conditions
- Units are factory packed with synthetic grease of viscosity ISO VG220, suitable for operation in any mounting position and ambient temperature ranging from 0°C to 40°C . In the absence of contamination the lubricant requires no periodical changes.
- Degree of protection IP64
- Noise level $LP \leq 70 \text{ dB(A)} @ n_1 = 3000 \text{ min}^{-1}$
- Numerous input configurations





1.3 SELECTING THE GEAR UNIT

- Determine intermittence I:



$$I [\%] = \frac{t_1 + t_2 + t_3}{t_1 + t_2 + t_3 + t_4}$$

- t_1 = starting time
- t_2 = operating time at constant speed
- t_3 = stopping time
- t_4 = rest time

- 1) Determine the applicable duty for the application:

	Z ≤ 1000	Z > 1000
I < 60%	S5	S1
I ≥ 60%	S1	S1

S5 cyclic duty

- 2) Search the gear unit for which the condition is verified:

$$M_{a2} \geq M_{1max} \times i \times \eta$$

M_{1max} = Maximum acceleration torque of motor

S1 continuous duty

- 2) Determine service factor f_z :

Z	f_z
Z ≤ 1000	1.00
1000 < Z ≤ 1500	1.25
1500 < Z ≤ 2000	1.50
2000 < Z ≤ 2500	1.75
2500 < Z ≤ 3000	2.00
Z > 3000	Contact us

- 3) Determine cycle factor f_c :

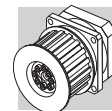
I	20%...60%	80%	100%
f_c	1.0	1.2	1.4

- 4) Search the gear unit for which the condition is verified:

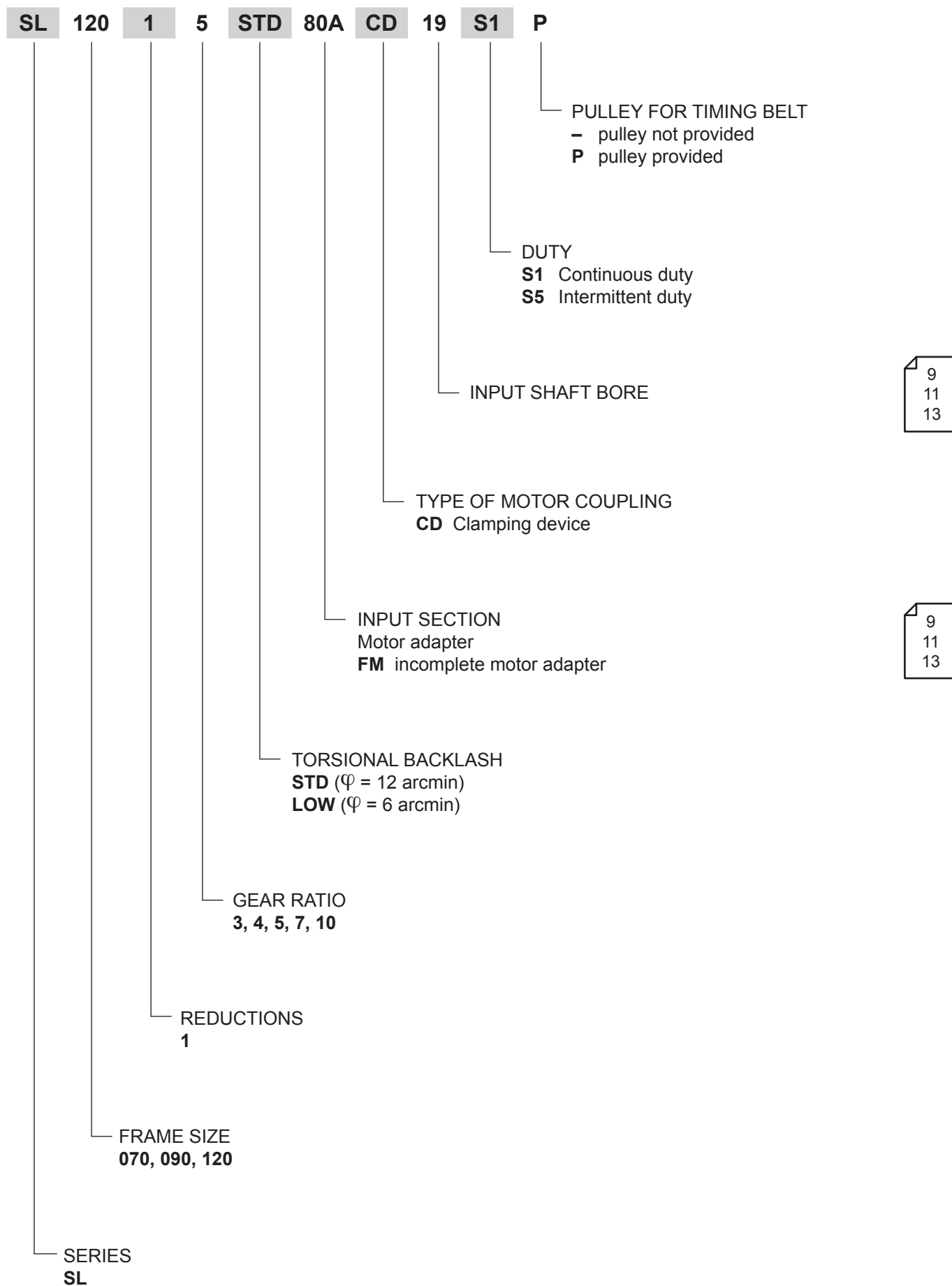
$$M_{n2} \geq M_{1max} \times i \times \eta \times f_z \times f_c$$

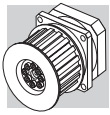


Under no circumstances the maximum speed $[n_{1max}]$ permitted for the gear unit should be exceeded. Should the surface temperature exceed 90°C it is recommended that speed is reduced, or an auxiliary cooling system is provided.



1.4 ORDERING CODE



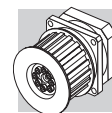


2 TECHNICAL SPECIFICATIONS

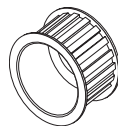
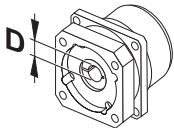
SL 070										
	M_{n2}	M_{a2}	M_{p2}	n_1	n_{1max}	φ_S	φ_R	C_t	R_n	η
	[Nm]	[Nm]	[Nm]	[min ⁻¹]	[min ⁻¹]	[arcmin]	[arcmin]	$\left[\frac{Nm}{arcmin} \right]$	[N]	%
SL 070 i = 3	18	30	60	3300	4000	12'	6'	3	3500	97
SL 070 i = 4	25	35	70	3500	5000					
SL 070 i = 5	25	35	70	3500	5000					
SL 070 i = 7	25	35	70	3700	5000					
SL 070 i = 10	18	30	60	4000	6000					

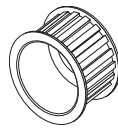
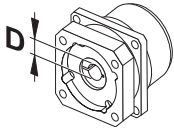
SL 090										
	M_{n2}	M_{a2}	M_{p2}	n_1	n_{1max}	φ_S	φ_R	C_t	R_n	η
	[Nm]	[Nm]	[Nm]	[min ⁻¹]	[min ⁻¹]	[arcmin]	[arcmin]	$\left[\frac{Nm}{arcmin} \right]$	[N]	%
SL 090 i = 3	37	70	150	2900	3500	12'	6'	7	4500	97
SL 090 i = 4	43	80	160	3100	4500					
SL 090 i = 5	43	80	160	3200	4500					
SL 090 i = 7	43	80	160	3500	4500					
SL 090 i = 10	37	70	150	4000	6000					

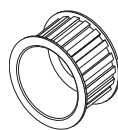
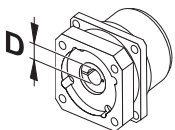
SL 120										
	M_{n2}	M_{a2}	M_{p2}	n_1	n_{1max}	φ_S	φ_R	C_t	R_n	η
	[Nm]	[Nm]	[Nm]	[min ⁻¹]	[min ⁻¹]	[arcmin]	[arcmin]	$\left[\frac{Nm}{arcmin} \right]$	[N]	%
SL 120 i = 3	95	160	300	2500	3500	12'	6'	22	10000	97
SL 120 i = 4	110	190	360	2800	4500					
SL 120 i = 5	110	190	360	3000	4500					
SL 120 i = 7	110	190	360	3000	4500					
SL 120 i = 10	95	160	300	3500	5000					

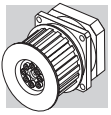


3 MASS MOMENT OF INERTIA

SL 070					
	J [kgcm ²]				
					
	$6 \leq D \leq 9.52$		$11 \leq D \leq 14$		
SL 070 i = 3	0.14		0.16		3.86
SL 070 i = 4	0.09		0.11		
SL 070 i = 5	0.07		0.09		
SL 070 i = 7	0.05		0.07		
SL 070 i = 10	0.04		0.06		

SL 090					
	J [kgcm ²]				
					
	$8 \leq D \leq 12.7$		$14 \leq D \leq 19$		
SL 090 i = 3	0.72		0.81		10.95
SL 090 i = 4	0.49		0.58		
SL 090 i = 5	0.39		0.48		
SL 090 i = 7	0.31		0.40		
SL 090 i = 10	0.27		0.35		

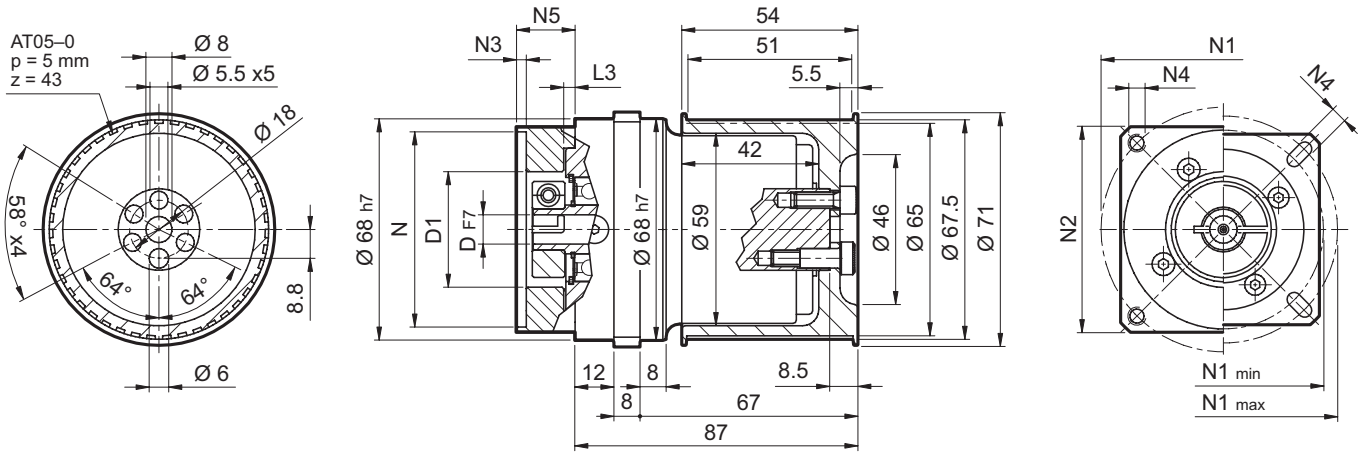
SL 120					
	J [kgcm ²]				
					
	$11 \leq D \leq 12.7$	$14 \leq D \leq 19$	$22 \leq D \leq 24$	$28 \leq D \leq 32$	
SL 120 i = 3	2.10	2.18	2.81	3.25	50.62
SL 120 i = 4	1.23	1.30	1.93	2.37	
SL 120 i = 5	0.89	0.96	1.59	2.03	
SL 120 i = 7	0.58	0.66	1.28	1.72	
SL 120 i = 10	0.41	0.49	1.11	1.55	



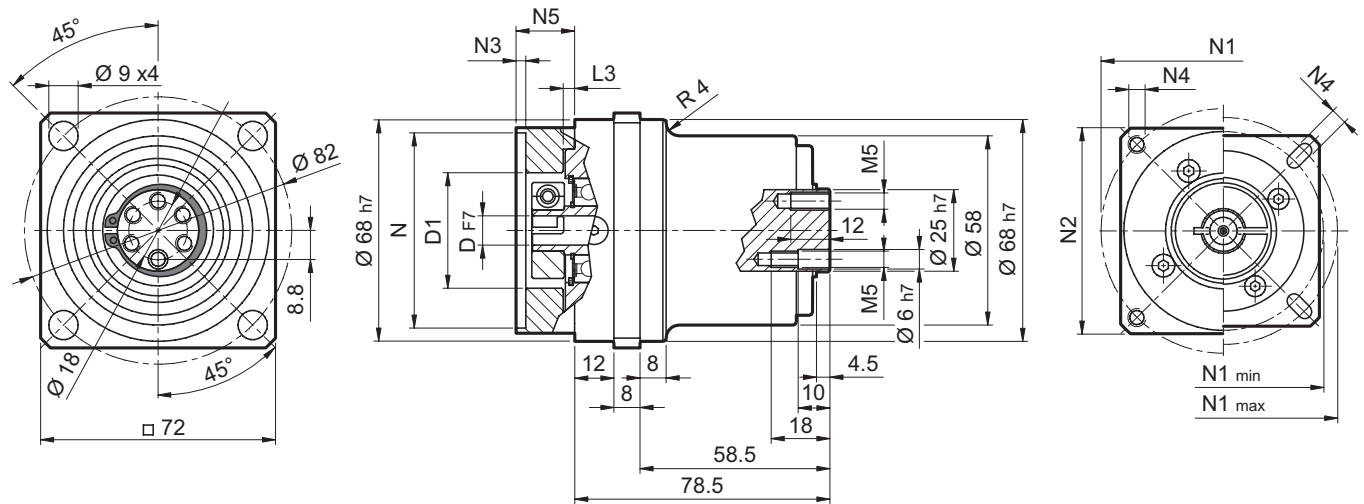
SL 070

4 DIMENSIONS

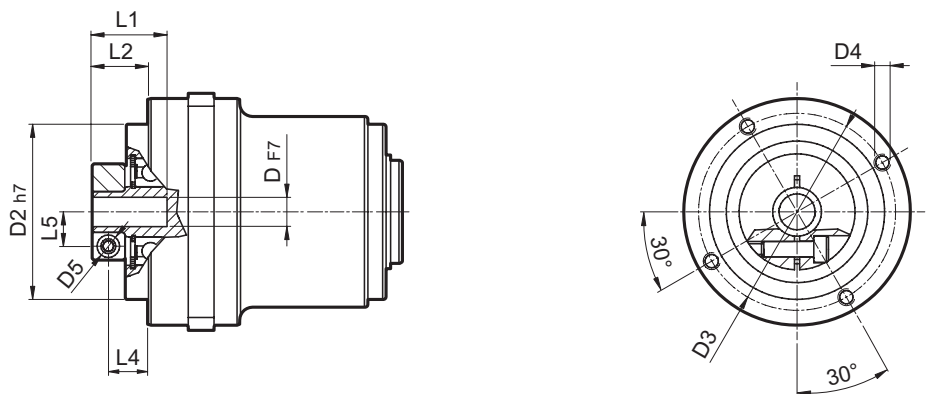
SL 070 ... P



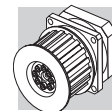
SL 070 ...



SL 070 ... FM

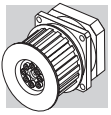


kg	≈ 1.6	≈ 0.5



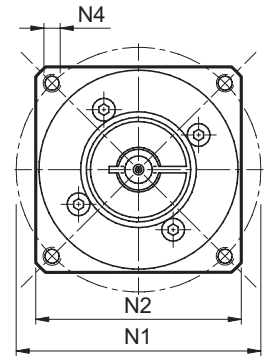
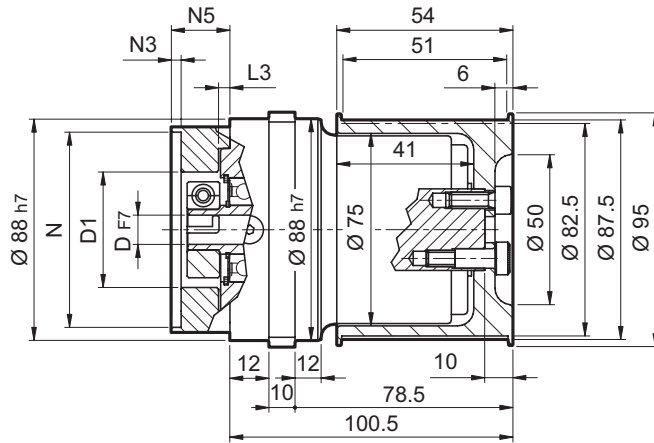
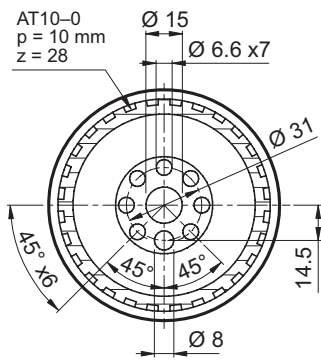
											N	N1		N2	N3	N4	N5	
												min	max					
25AH	6	6.35	7	8	9	9.52	-	-	-	-	25	39	56					
26AH	6	6.35	7	8	9	9.52	-	-	-	-	26	39	56					
28AH	6	6.35	7	8	9	9.52	-	-	-	-	28	39	56					
30AH	6	6.35	7	8	9	9.52	-	-	-	-	30	39	56					
32AH	6	6.35	7	8	9	9.52	-	-	-	-	32	40	56	55	3.5	4.5	25	25
34AH	6	6.35	7	8	9	9.52	-	-	-	-	34	42	56					
36AH	6	6.35	7	8	9	9.52	-	-	-	-	36	44	56					
39AH	6	6.35	7	8	9	9.52	-	-	-	-	39	47	56					
40AH	6	6.35	7	8	9	9.52	-	-	-	-	40	48	56					
38A	6	6.35	7	8	9	9.52	11	12	12.7	-	38.1	66.6	60	3	M4x10	18	25	
40B	6	6.35	7	8	9	9.52	11	12	12.7	-	40	63	60	3	M4x10	18	25	
50A	6	6.35	7	8	9	9.52	11	12	12.7	-	50	60	60	3	M4x10	18	25	
50B	6	6.35	7	8	9	9.52	11	12	12.7	14	50	65	60	3	M5x12	23	30	
50BH	6	6.35	7	8	9	9.52	11	12	12.7	14	50	65	60	3	5	23	30	
50C	6	6.35	7	8	9	9.52	11	12	12.7	14	50	70	60	3	M4x10	23	30	
55MH	6	6.35	7	8	9	9.52	11	12	12.7	-	55	80	65	2	5.5	16	23	
60A	6	6.35	7	8	9	9.52	11	12	12.7	-	60	75	63	3	M5x12	18	25	
60B	6	6.35	7	8	9	9.52	11	12	12.7	14	60	75	63	3	M5x12	23	30	
60C	6	6.35	7	8	9	9.52	11	12	12.7	14	60	85	75	3	M5x12	23	30	
60D	6	6.35	7	8	9	9.52	11	12	12.7	14	60	90	75	3	M5x12	23	30	
70A	6	6.35	7	8	9	9.52	11	12	12.7	14	70	85	75	3	M6x15	23	30	
70B	6	6.35	7	8	9	9.52	11	12	12.7	14	70	90	75	3	M5x12	23	30	
73A	6	6.35	7	8	9	9.52	11	12	12.7	14	73	98.4	85	3	M5x12	25	32	
80A	6	6.35	7	8	9	9.52	11	12	12.7	14	80	100	85	3	M6x15	23	30	

				D1	D2	D3	D4	D5	L1	L2	L3	L4	L5
SL 070	6	6.35	7	32.5	50	42.5	M4x8	M4	21.7	13.2	3	8.2	8
	8	9	9.52	32.5	50	42.5	M4x8	M4	21.7	13.2	3	8.2	9
	11	12	12.7	35.5	50	42.5	M4x8	M4	22	13.5	3	8.5	11
	14			35.5	50	42.5	M4x8	M4	26.5	18	3	13	11.5

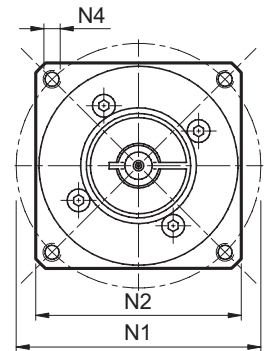
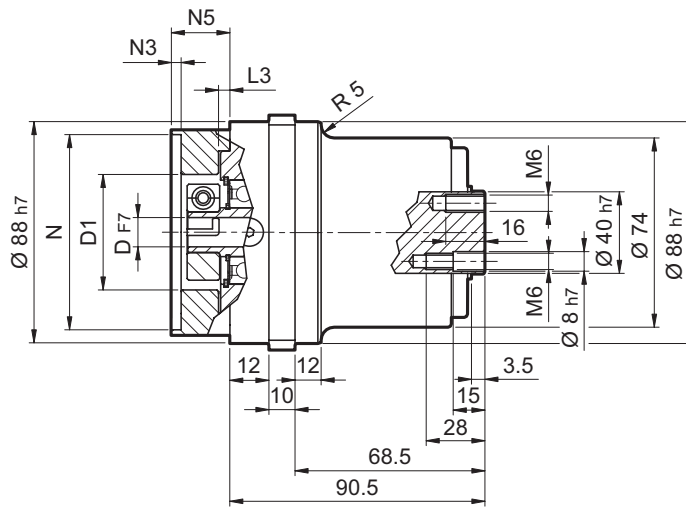
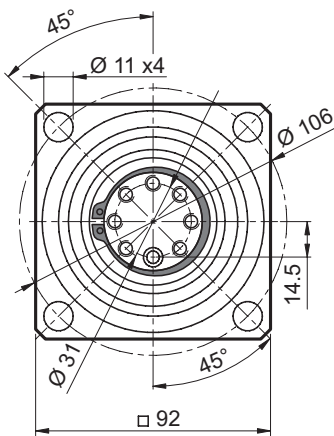


SL 090

SL 090 ... P

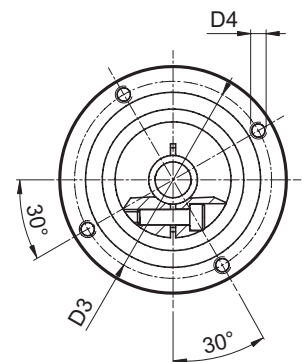
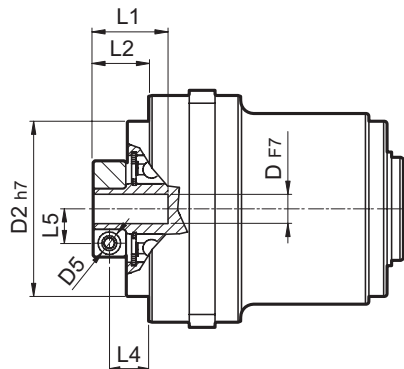


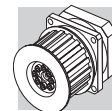
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
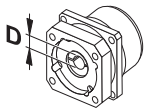
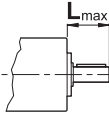



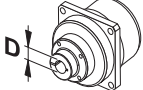
SL 090 ... FM

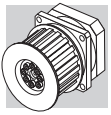
	≈ 3.3	≈ 0.8





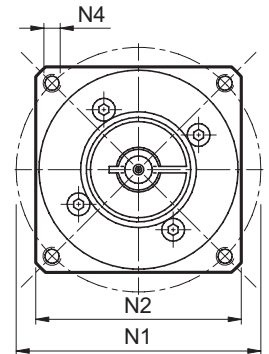
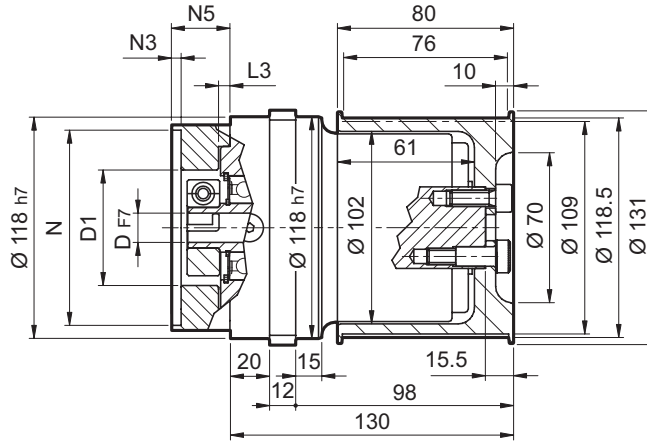
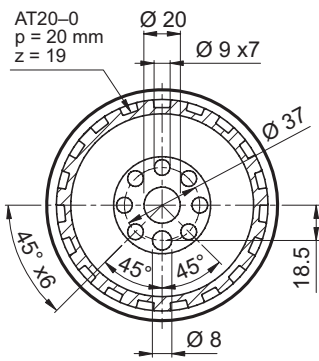
												N	N1	N2	N3	N4	N5		
45A	8	9	9.52	11	12	12.7	-	-	-	-	-	45	63	80	4	M4x10	34	40	
50A	8	9	9.52	11	12	12.7	14	-	-	-	-	50	65	80	4	M5x16	34	40	
50AH	8	9	9.52	11	12	12.7	14	-	-	-	-	50	65	80	4	5.5	34	40	
50C	8	9	9.52	11	12	12.7	14	-	-	-	-	50	70	80	4	M4x10	34	40	
50D	8	9	9.52	11	12	12.7	14	-	-	-	-	50	95	80	4	M6x10	34	40	
55A	8	9	9.52	11	12	12.7	14	15.875	16	17	19	19.05	55.5	127.5	105	4	M6x16	34	40
60A	8	9	9.52	11	12	12.7	14	-	-	-	-	60	75	80	4	M5x16	34	40	
60BH	8	9	9.52	11	12	12.7	14	-	-	-	-	60	75	80	4	5.5	34	40	
60C	8	9	9.52	11	12	12.7	14	15.875	16	-	-	-	60	90	80	4	M5x16	34	40
60D	8	9	9.52	11	12	12.7	14	15.875	16	-	-	-	60	85	80	4	M5x16	34	40
60MH	8	9	9.52	11	12	12.7	14	15.875	16	17	19	19.05	60	108.5	90	2	6.5	20	26
70A	8	9	9.52	11	12	12.7	14	15.875	16	17	19	19.05	70	85	80	4	M6x20	34	40
70BH	8	9	9.52	11	12	12.7	14	15.875	16	17	19	19.05	70	85	80	4	6.5	34	40
70C	8	9	9.52	11	12	12.7	14	15.875	16	17	19	19.05	70	90	80	4	M5x16	34	40
73A	8	9	9.52	11	12	12.7	14	-	-	-	-	-	73	98.4	85	4	M5x16	34	40
78AH	8	9	9.52	11	12	12.7	14	-	-	-	-	-	78	63.5	90	4	6.5	34	40
80A	8	9	9.52	11	12	12.7	14	15.875	16	17	19	19.05	80	100	90	4	M6x16	34	40
95A	8	9	9.52	11	12	12.7	14	15.875	16	17	19	19.05	95	115	100	4	M8x20	34	40
95B	8	9	9.52	11	12	12.7	14	15.875	16	17	19	19.05	95	130	115	4	M8x20	34	40
110A	8	9	9.52	11	12	12.7	14	15.875	16	17	19	19.05	110	130	115	4	M8x20	34	40
110B	8	9	9.52	11	12	12.7	14	15.875	16	17	19	19.05	110	145	120	6.5	M8x20	44	50
110C	8	9	9.52	11	12	12.7	14	15.875	16	17	19	19.05	110	145	120	6.5	M8x20	54	60

					D1	D2	D3	D4	D5	L1	L2	L3	L4	L5
SL 090	8	9	9.52		38	68	76.5	M6x10	M6	34	26.8	9.5	18.8	10.5
	11	12	12.7		43	68	76.5	M6x10	M6	34	26.8	9.5	18.8	12.5
	14	15.875	16	17	48	68	76.5	M6x10	M6	34	26.8	9.5	18.8	14.5
	19	19.05			51	68	76.5	M6x10	M6	34	26.8	9.5	18.8	16.5

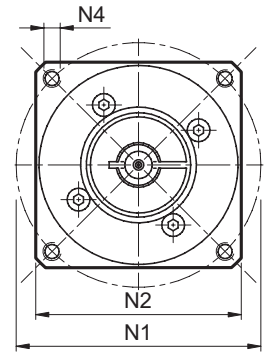
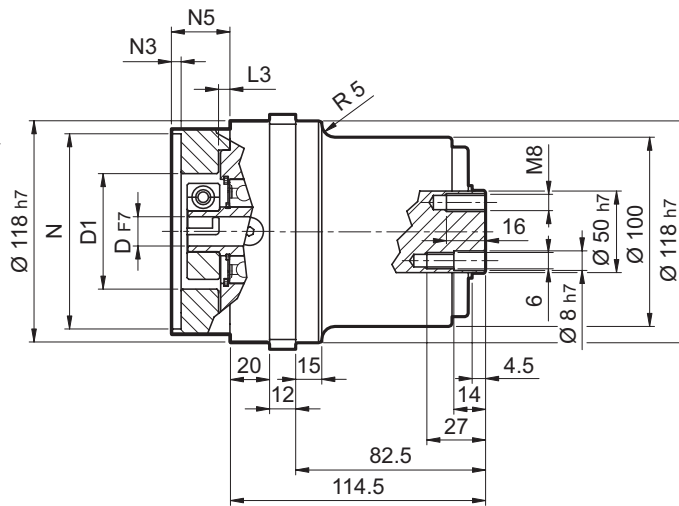
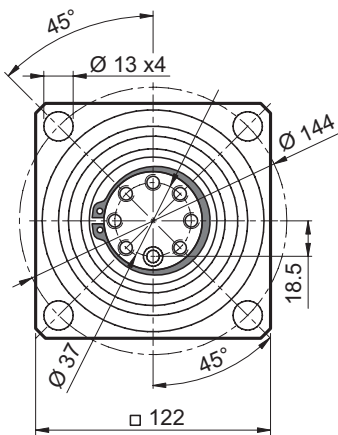


SL 120

SL 120 ... P

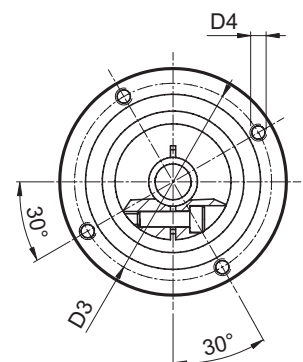
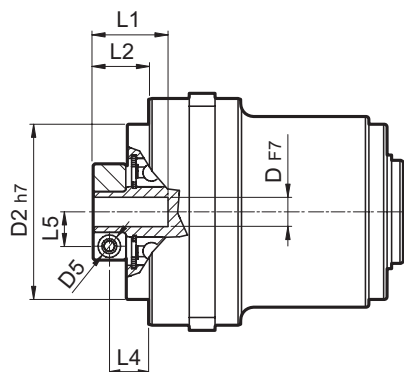


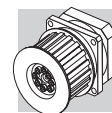
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
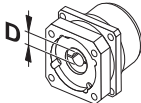
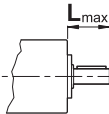



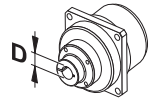
SL 120 ... FM

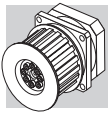
	≈ 7.3	≈ 2.6





										N	N1	N2	N3	N4	N5	
50A	12.7	14	15.875	16	19	-	-	-	-	50	95	100	5	M6x14	28	40
55A	12.7	14	15.875	16	19	-	-	-	-	55,5	125,7	105	5	M6x16	28	40
60A	12.7	14	15.875	16	19	-	-	-	-	60	75	100	5	M5x14	28	40
60AH	12.7	14	15.875	16	19	-	-	-	-	60	75	100	5	6.5	33	40
70A	12.7	14	15.875	16	19	-	-	-	-	70	85	100	5	M6x14	28	40
70AH	12.7	14	15.875	16	19	-	-	-	-	70	85	100	5	6	33	40
70C	12.7	14	15.875	16	19	-	-	-	-	70	90	100	5	M5x12	28	40
80A	12.7	14	15.875	16	19	-	-	-	-	80	100	100	5	M6x16	28	40
80AH	12.7	14	15.875	16	19	-	-	-	-	80	100	100	5	6.5	28	40
95A	12.7	14	15.875	16	19	-	-	-	-	95	115	100	5	M8x18	28	40
95B	12.7	14	15.875	16	19	22	24	-	-	95	115	100	5	M8x18	38	50
95C	12.7	14	15.875	16	19	-	-	-	-	95	130	115	5	M8x18	28	40
110A	12.7	14	15.875	16	19	-	-	-	-	110	130	115	5	M8x18	28	40
110B	12.7	14	15.875	16	19	22	24	-	-	110	130	115	6.5	M8x20	38	50
110C	12.7	14	15.875	16	19	22	24	-	-	110	145	120	6.5	M8x20	38	50
110D	12.7	14	15.875	16	19	22	24	28	-	110	145	120	6.5	M8x20	48	60
130A	12.7	14	15.875	16	19	22	24	-	-	130	165	140	6.5	M10x20	38	50
130B	12.7	14	15.875	16	19	22	24	28	32	130	165	140	6.5	M10x25	48	60

		D1	D2	D3	D4	D5	L1	L2	L3	L4	L5
SL 120	12.7	43	90	98	M6x15	M6	33.5	20	7.6	12.5	12.5
	14 16 15.875	48	90	98	M6x15	M6	33.5	20	7.6	12.5	14.5
	19	51	90	98	M6x15	M6	33.5	20	7.6	12.5	16.5
	22 24	56.5	90	98	M6x15	M6	36.5	23	7.6	14	19
	28	67	90	98	M6x15	M6	36.5	23	7.6	14	22.5
	32	71	90	98	M6x15	M6	38	24.5	7.6	15.5	24.5



INDEX OF REVISIONS (R)

R0

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HEADQUARTERS

TECNOINGRANAGGI RIDUTTORI s.r.l.
Via Davia, 5
40017 S. Giovanni in Persiceto
Bologna (ITALY)
Tel. (+39) 0516878111
Fax (+39) 0516878132
www.tecnoingranaggi.it
info@tecnoingranaggi.it