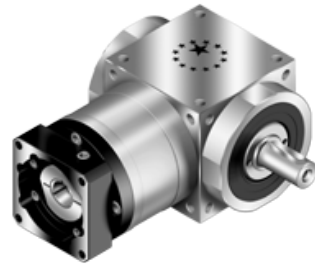


AT-FL1/FR1 series

Overview



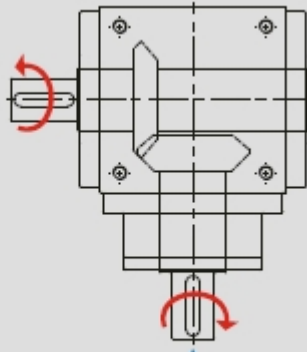
- Spiral bevel gearbox with one output shaft on left or right. Input with motor adapter.
- Stainless steel housing, aluminum black anodized motor adapter plate
- Stainless steel output shaft with or without key
- Spiral bevel gears, planetary part with spur gears
- Nominal torques:
 - T_{2N} : 12 Nm – 3.200 Nm
- Ratios
 - 1-stage : 1 / 1,5 / 2 / 3 / 4 / 5
 - 2-stage : 7 / 10 / 15 / 20 / 25 / 35 / 50
 - 3-stage : 75 / 100 / 125 / 150 / 200 / 250 / 350 / 500
- Low backlash
 - 1-stage : ≤ 6 arcmin
 - 2-stage : ≤ 8 arcmin
 - 3-stage : ≤ 10 arcmin
- High efficiency
 - 1-stage : $\geq 98\%$
 - 2-stage : $\geq 94\%$
 - 3-stage : $\geq 94\%$
- Easy mount
- Low Noise
- Compact structure
- Sizes available:
 - AT065FL1 / AT075FL1 / AT090FL1 / AT110FL1 / AT140FL1 / AT170FL1 / AT210FL1 / AT240FL1 / AT280FL1
 - AT065FR1 / AT075FR1 / AT090FR1 / AT110FR1 / AT140FR1 / AT170FR1 / AT210FR1 / AT240FR1 / AT280FR1

Specifications

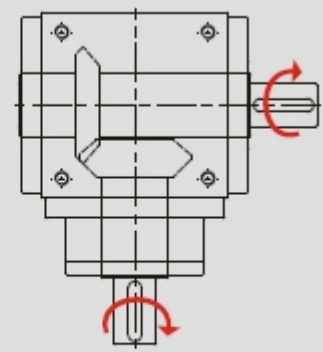
Model No.		Stage Ratio ¹		AT065 FL1/FR1	AT075 FL1/FR1	AT090 FL1/FR1	AT110 FL1/FR1	AT140 FL1/FR1	AT170 FL1/FR1	AT2101 FL1/FR1	AT240 FL1/FR1	AT280 FL1/FR1
Nominal Output Torque T _{2N}	Nm	1	1	25	45	78	150	360	585	1,300	2,150	3,200
			1.5	25	45	78	150	360	585	1,300	2,150	3,200
			2	24	42	68	150	330	544	1,220	2,010	3,050
			3	18	33	54	120	270	450	1,020	1,650	2,850
			4	13	28	48	100	224	376	860	1,410	2,300
			5	12	25	40	85	196	320	740	1,210	2,000
		2	7	12	12	33	91	91	91	195	358	358
			10	24	28	68	150	208	208	430	846	846
			15	18	33	54	120	270	312	645	1,269	1,269
			20	13	28	48	100	224	376	860	1,410	1,629
			25	12	25	40	85	196	320	740	1,210	2,000
			35	12	25	40	85	196	320	740	1,210	1,790
		3	50	12	25	40	85	196	320	740	1,210	1,465
			75	-	-	-	120	210	312	585	1,269	1,269
			100	-	-	-	100	224	376	780	1,410	1,692
			125	-	-	-	85	196	320	740	1,210	2,000
			150	-	-	-	120	135	312	390	975	975
			200	-	-	-	100	180	376	520	1,300	1,300
			250	-	-	-	85	196	320	650	1,210	1,625
			350	-	-	-	85	196	320	740	1,210	1,790
		500	-	-	-	85	196	320	740	1,210	1,465	
Max Acceleration Torque T _{2B}	Nm	1,2,3	1~500	1.5 times Nominal Output Torque T _{2N}								
Max. Acceleration Input Speed n _{1B}	rpm	1	1~5	7,500	6,500	5,500	4,500	3,500	3,000	2,200	2,000	1,700
		2	7~50	8,000	8,000	6,000	6,000	6,000	6,000	4,800	3,600	3,600
		3	75~500	-	-	-	8,000	8,000	6,000	6,000	6,000	6,000
Backlash*	arcmin	1	1~5	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6	≤ 6
		2	7~50	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8
		3	75~500	-	-	-	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Max. Radial Load F _{2rB} 2 Output d2	N	1,2,3	1~500	900	1,100	1,700	2,700	4,800	6,600	11,500	16,000	18,000
Max. Axial Load F _{2aB} 3 Output d2	N	1,2,3	1~500	450	550	850	1,350	2,400	3,300	5,750	8,500	9,000
Service Life	hr	1	1~5	20,000*								
Efficiency	%	1	1~5	≥ 98 %								
		2,3	7~500	≥ 94 %								
Weight	kg	1	1~5	2.7	4.3	7.1	11.9	20.3	35.5	68.3	99.6	156.0
		2	7~50	3.2	4.8	8.0	14.2	23.9	37.9	73.0	110.8	168.6
		3	75~500	-	-	-	13.8	23.4	38.2	72.3	108.6	166.4
Operating Temp	°C	1,2,3	1~500	-10°C~+90°C								
Lubrication		1,2,3	1~500	Synthetic lubrication, ISO VG 150								
Noise Level (n ₁ =1500 rpm, No Load)	dB(A)	1,2,3	1~500	≤71	≤72	≤76	≤77	≤78	≤79	≤81	≤83	≤84

1. Ratio (i=N in / N out)
2. Apply to the output shaft center @ 100 rpm
3. Apply to the output shaft center @ 100 rpm
- * S1 service life 10,000 hrs.
- * Backlash is measured at 2% Nominal Output Torque T_{2N}

Rotation Direction



AT-L1 AT-FL1



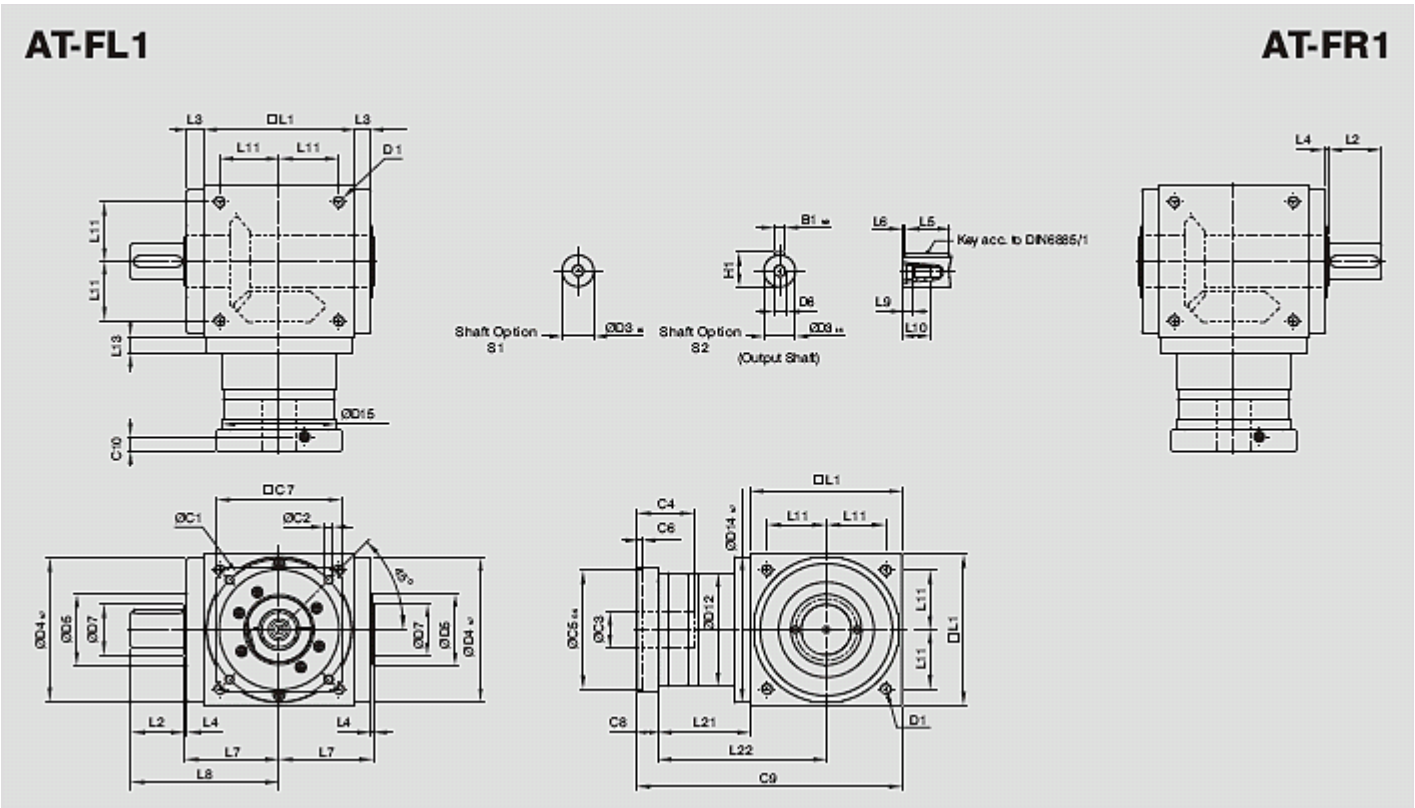
AT-R1 AT-FR1

Inertia

Model No.	Stage	Ratio ¹	AT065 FL1/FR1	AT075 FL1/FR1	AT090 FL1/FR1	AT110 FL1/FR1	AT140 FL1/FR1	AT170 FL1/FR1	AT210 FL1/FR1	AT240 FL1/FR1	AT280 FL1/FR1
Massa Moments of inertia J ₁ kg*cm ²	1	1	0.51	1.30	3.14	7.62	23.54	59.09	195.96	365.38	787.63
		1.5	0.46	1.15	2.80	6.65	19.34	49.38	156.02	279.62	584.28
		2	0.44	1.10	2.68	6.23	17.72	45.44	140.80	245.78	500.26
		3	0.43	1.09	2.64	6.08	17.16	44.11	135.51	233.75	471.56
		4	0.43	1.08	2.63	6.05	17.03	43.79	134.14	230.77	464.76
		5	0.43	1.08	2.63	6.04	16.99	43.69	133.71	229.71	462.08
	2	7	0.15	0.15	0.50	2.79	2.79	2.79	9.91	29.26	29.26
		10	0.15	0.15	0.50	2.80	2.80	2.80	9.96	29.43	29.43
		15	0.15	0.15	0.50	2.80	2.80	2.80	9.96	29.43	29.43
		20	0.15	0.15	0.50	2.80	2.80	2.80	9.96	29.43	29.43
		25	0.15	0.15	0.50	2.80	2.80	2.80	9.96	29.43	29.43
		35	0.15	0.15	0.50	2.79	2.79	2.79	9.91	29.26	29.26
	3	50	0.15	0.15	0.50	2.79	2.79	2.79	9.89	29.20	29.20
		75	-	-	-	2.80	2.80	2.80	9.96	29.43	29.43
		100	-	-	-	2.80	2.80	2.80	9.96	29.43	29.43
		125	-	-	-	2.80	2.80	2.80	9.96	29.43	29.43
		150	-	-	-	2.79	2.79	2.79	9.89	29.20	29.20
		200	-	-	-	2.79	2.79	2.79	9.89	29.20	29.20
		250	-	-	-	2.79	2.79	2.79	9.89	29.20	29.20
		350	-	-	-	2.79	2.79	2.79	9.89	29.20	29.20
		500	-	-	-	2.79	2.79	2.79	9.89	29.20	29.20

Sizes

AT-FL1/FR1 series 1-stage, ratio i = 1 ~ 5

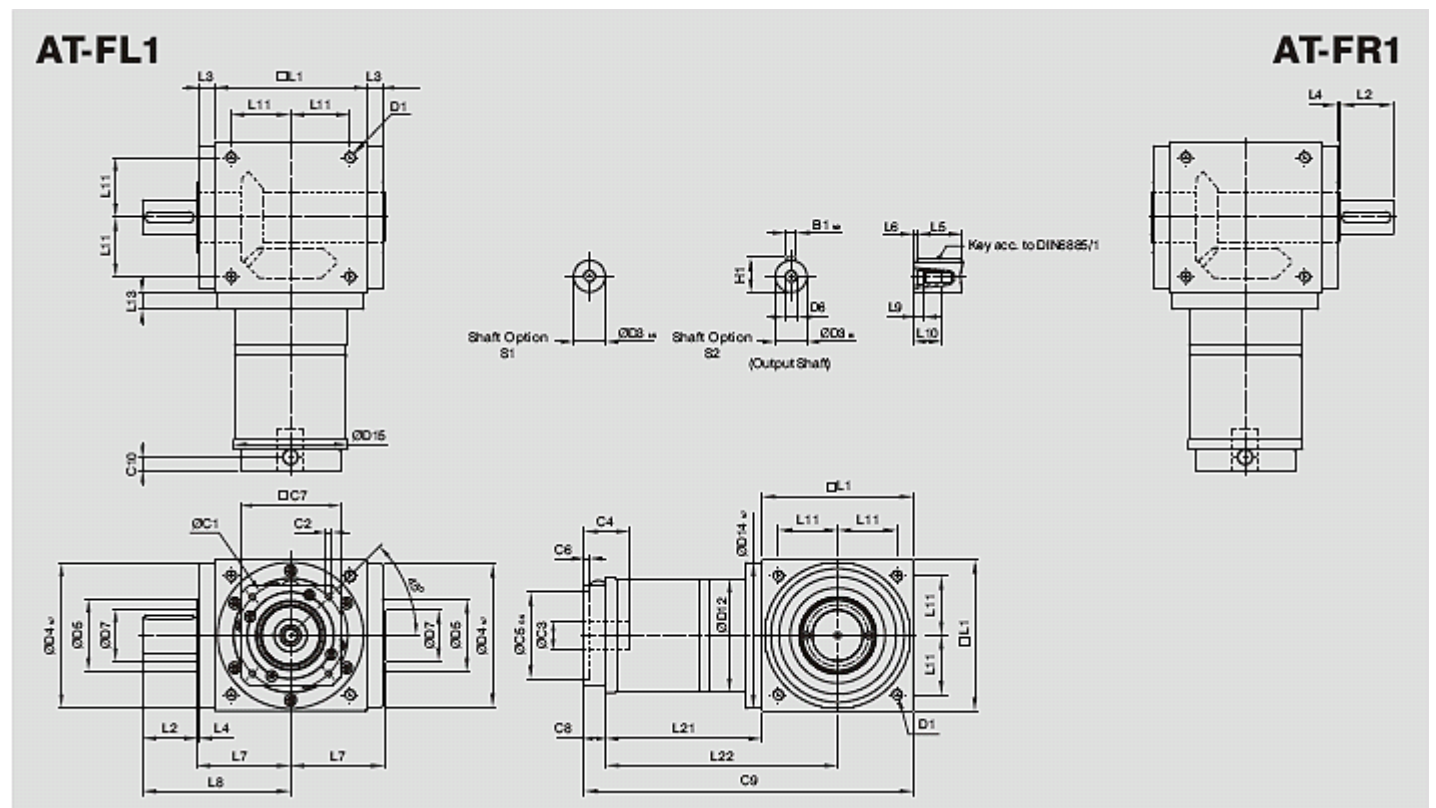


	AT065FL1 AT065FR1	AT075FL1 AT075FR1	AT090FL1 AT090FR1	AT110FL1 AT110FR1	AT140FL1 AT140FR1	AT170FL1 AT170FR1	AT210FL1 AT210FR1	AT240FL1 AT240FR1	AT280FL1 AT280FR1
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 _{k6}	13	16	18	22	32	40	50	55	60
D4 _{h7}	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D12	62	72	86	106	104	128	160	180	200
D14 _{h7}	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	105	127	158	178	198
L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	67	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	49	60.5	63	69.5	85.5	95	130	144.5	135
L22	81.5	98	108	124.5	155.5	180	235	264.5	275
C1 ⁶	46	70	100	100	130	165	215	215	235
C2 ⁶	M4	M5	M6	M6	M8	M10	M12	M12	M12
C3 ⁶	≤11 ≤12	≤14 ≤15.875 ≤16	≤19	≤24	≤32	≤38	≤42	≤48	≤55

C4 ⁶	30	34	40	40	50	60	85	85	116
C5 ⁶ _{G6}	30	50	80	80	110	130	180	180	200
C6 ⁶	3.5	8	4	4	5	6	6	6	6
C7 ⁶	42	60	90	90	115	142	190	190	220
C8 ⁶	19.5	19	17	17	19.5	22.5	29	29	63
C9 ⁶	133.5	154.5	170	196.5	245	287.5	369	413.5	478
C10 ⁶	13.25	13.5	10.75	10.75	13	15	20.75	20.75	53.5
B1 _{h9}	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64

6. C1~C10 are motor specific dimensions (metric std shown).

AT-FL1/FR1 series 2-stage, ratio $i = 7 \sim 50$



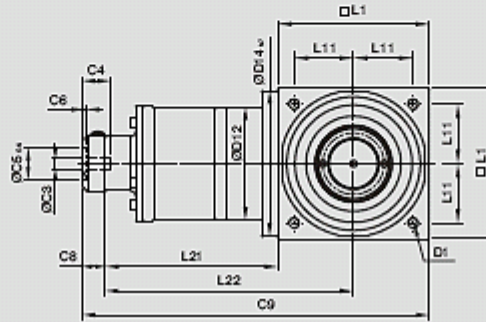
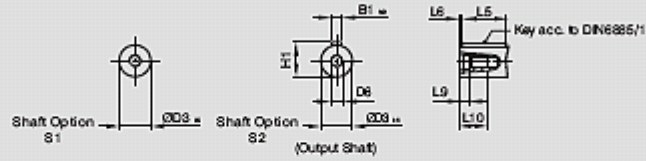
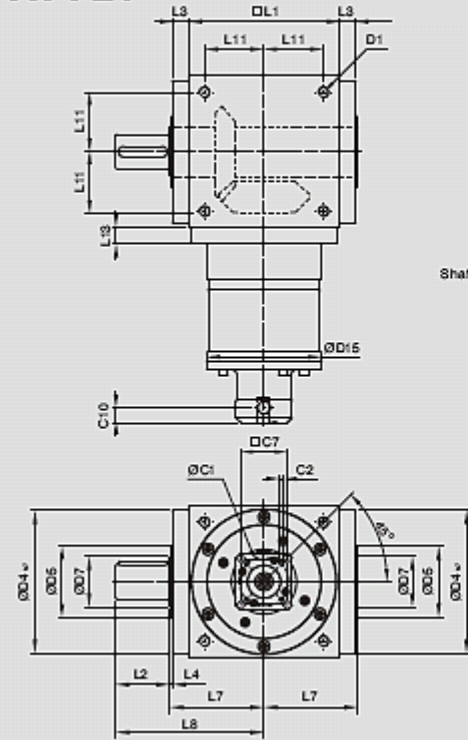
	AT065FL1 AT065FR1	AT075FL1 AT075FR1	AT090FL1 AT090FR1	AT110FL1 AT110FR1	AT140FL1 AT140FR1	AT170FL1 AT170FR1	AT210FL1 AT210FR1	AT240FL1 AT240FR1	AT280FL1 AT280FR1
D1	M4	M6	M6	M8	M10	M12	M16	M16	M16
D3 _{k6}	13	16	18	22	32	40	50	55	60
D4 _{h7}	63	73	88	108	135	165	205	235	275
D5	31	35	43	53	68	83	104	124	144
D6	M4	M5	M5	M8	M12	M16	M16	M16	M20
D7	21	22	28	33	47	55	75	85	110
D12	62	72	86	106	104	128	160	180	200
D14 _{h7}	63	73	88	108	135	165	205	235	275
D15	62.9	72.9	87	107	106	127	158	178	198

L1	65	75	90	110	140	170	210	240	280
L2	19.5	30	35	40	50	60	75	85	110
L3	13	14.5	15	15	15	15	20	25	25
L4	2	2	2	2	2	2	2	2	2
L5	16	25	28	32	45	50	70	80	100
L6	2	2.5	3.5	4	2.5	5	2.5	2.5	5
L7	47.5	54	62	72	87	102	127	147	167
L8	67	84	97	112	137	162	202	232	277
L9	4.5	4.8	4.8	7.2	10	12	12	12	15
L10	10	12.5	12.5	19	28	36	36	36	42
L11	27	30	36	44	55	67	85	95	110
L13	13	15	15	15	15	15	20	25	25
L21	75	84.5	99	122	144.5	157.5	206.5	239	248
L22	107.5	122	144	177	214.5	242.5	311.5	359	388
C1 ⁷	46	46	70	100	100	100	130	165	165
C2 ⁷	M4	M4	M5	M6	M6	M6	M8	M10	M10
C3 ⁷	≤12	≤12	≤16	≤24	≤24	≤24	≤32	≤38	≤38
C4 ⁷	30	30	34	40	40	40	50	60	60
C5 ⁷ _{G6}	30	30	50	80	80	80	110	130	130
C6 ⁷	3.5	3.5	8	4	4	4	5	6	6
C7 ⁷	42	42	60	92	92	92	115	142	142
C8 ⁷	21.5	21.5	21.5	20	20	20	24	31	31
C9 ⁷	161.5	181	210.5	252	304.5	347.5	440.5	510	559
C10 ⁷	14.5	14.5	15.5	13	13	13	16	21	21
B1 _{h9}	5	5	6	6	10	12	14	16	18
H1	15	18	20.5	24.5	35	43	53.5	59	64

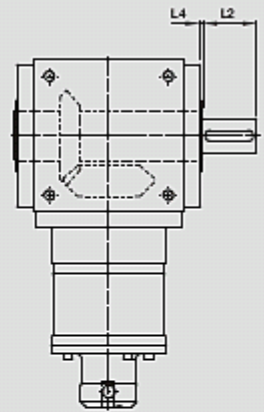
7. C1~C10 are motor specific dimensions (metric std shown).

AT-FL series 3-stage, ratio i = 75 ~ 500

AT-FL1



AT-FR1



	AT110FL1 AT110FR1	AT140FL1 AT140FR1	AT170FL1 AT170FR1	AT210FL1 AT210FR1	AT240FL1 AT240FR1	AT280FL1 AT280FR1
D1	M8	M10	M12	M16	M16	M16
D3 _{k6}	22	32	40	50	55	60
D4 _{h7}	108	135	165	205	235	275
D5	53	68	83	104	124	144
D6	M8	M12	M16	M16	M16	M20
D7	33	47	55	75	85	110
D12	106	104	128	160	180	200
D14 _{h7}	108	135	165	205	235	275
D15	107	106	127	158	178	198
L1	110	140	170	210	240	280
L2	40	50	60	75	85	110
L3	15	15	15	20	25	25
L4	2	2	2	2	2	2
L5	32	45	50	70	80	100
L6	4	2.5	5	2.5	2.5	5
L7	72	87	102	127	147	167
L8	112	137	162	202	232	277
L9	7.2	10	12	12	12	15
L10	19	28	36	36	36	42
L11	44	55	67	85	95	110
L13	15	15	15	20	25	25
L21	136.5	159.5	183.5	226	269	278
L22	191.5	229.5	268.5	331	389	418
C1 ⁸	46	46	70	70	100	100
C2 ⁸	M4	M4	M5	M5	M6	M6
C3 ⁸	≤12	≤12	≤16	≤16	≤24	≤24
C4 ⁸	30	30	34	34	40	40
C5 ⁸ _{G6}	30	30	50	50	80	80
C6 ⁸	3.5	3.5	8	8	4	4
C7 ⁸	42	42	60	60	92	92
C8 ⁸	21.5	21.5	21.5	21.5	20	20
C9 ⁸	268	321	375	457.5	529	578

C10 ⁸	14.5	14.5	15.5	15.5	13	13
B1 _{h9}	6	10	12	14	16	18
H1	24.5	35	43	53.5	59	64

8. C1~C10 are motor specific dimensions (metric std shown).