



APEX DYNAMICS, INC.



AT-L >



AT-FL >



AT-H >



AT-FH >



AT-C >



AT SERIES

*High Precision Spiral
Bevel Gearboxes*

AT-FC >



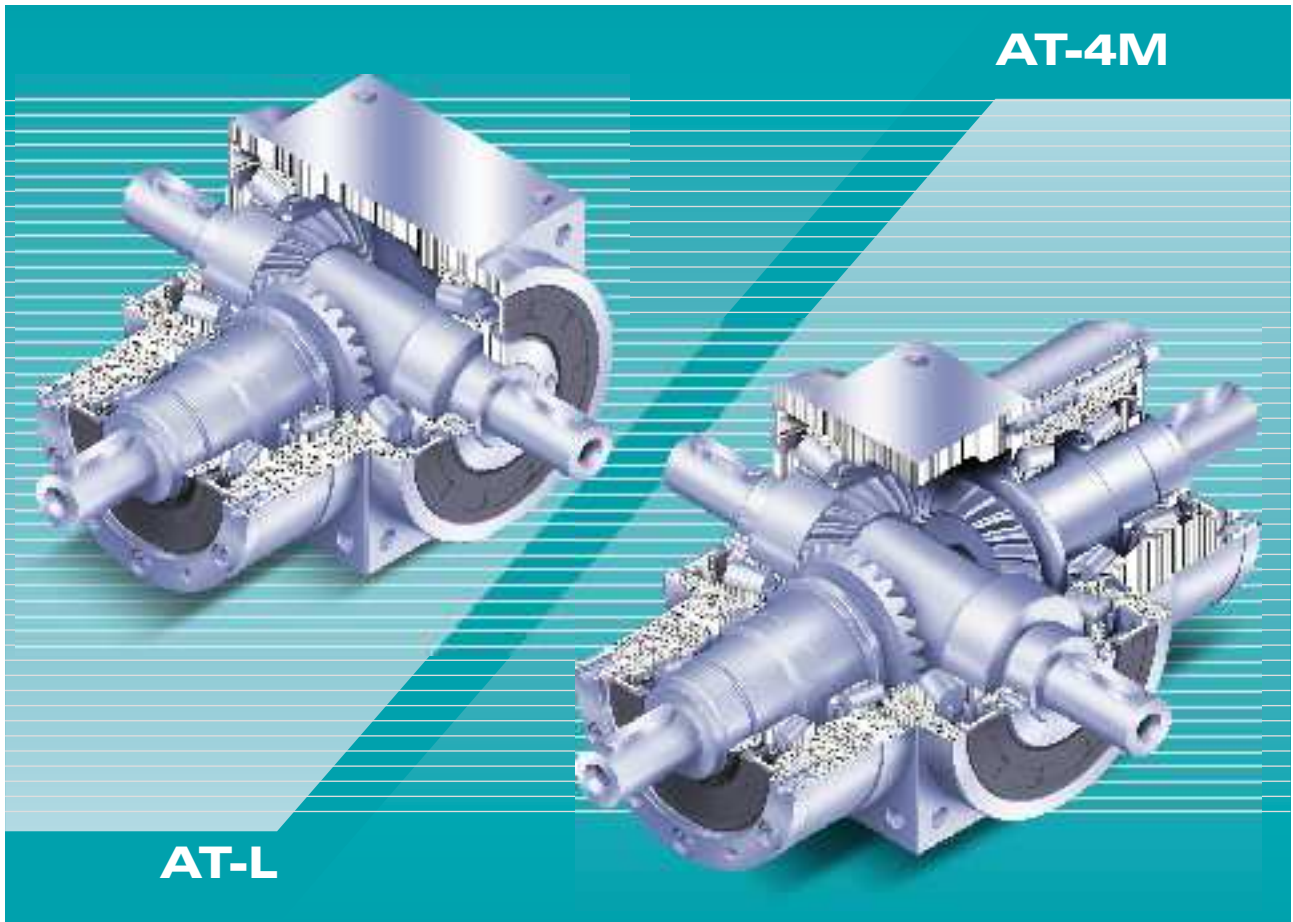
AT-4M >



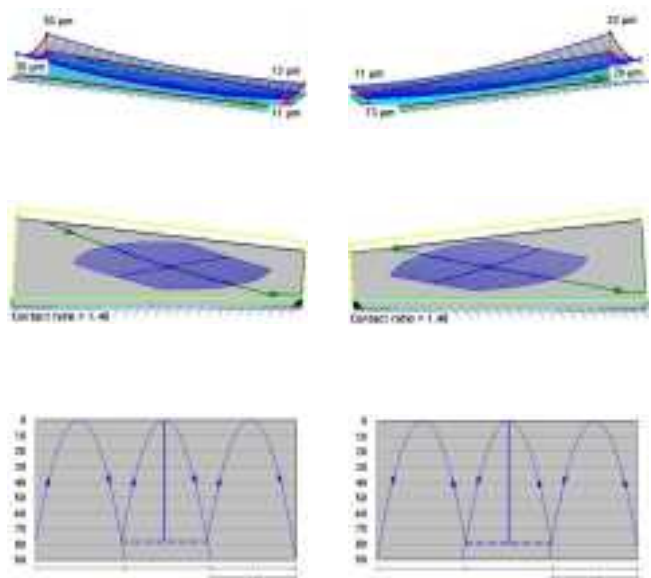
Stainless

AT Series

Characteristic Highlights



- Single Piece Stainless Steel housing for maximum rigidity and corrosion resistance. Multiple precision machined surfaces for ease of installation.
- Gearing design is optimized by state of the art software for highest performance. Carburized high tensile alloy steel is precision ground to exceed DIN 5 specifications.
- Stainless steel input and output shaft with multiple design configurations to meet all industrial requirements.
- High precision ground spiral bevel gear sets are combined with optimized planetary geometry to create ratios up to 500:1.
- High torque. Low backlash and compact design are ideal for all servo application.
- Maintenance free, lubricated for life.



AT Shaft Type Series Specifications

Gearbox Performance

| Model No. | | Stage | Ratio ¹ | AT065 L | AT075 L | AT090 L | AT110 L | AT140 L | AT170 L | AT210 L | AT240 L | AT280 L |
|---|--------|-------|--------------------|------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | | | AT065 L1 | AT075 L1 | AT090 L1 | AT110 L1 | AT140 L1 | AT170 L1 | AT210 L1 | AT240 L1 | AT280 L1 |
| | | | | AT065 H | AT075 H | AT090 H | AT110 H | AT140 H | AT170 H | AT210 H | AT240 H | AT280 H |
| | | | | AT065 C | AT075 C | AT090 C | AT110 C | AT140 C | AT170 C | AT210 C | AT240 C | AT280 C |
| | | | | AT065 R1 | AT075 R1 | AT090 R1 | AT110 R1 | AT140 R1 | AT170 R1 | AT210 R1 | AT240 R1 | AT280 R1 |
| | | | | AT065 LM | AT075 LM | AT090 LM | AT110 LM | AT140 LM | AT170 LM | AT210 LM | AT240 LM | AT280 LM |
| | | | | AT065 RM | AT075 RM | AT090 RM | AT110 RM | AT140 RM | AT170 RM | AT210 RM | AT240 RM | AT280 RM |
| | | | | AT065 4M | AT075 4M | AT090 4M | AT110 4M | AT140 4M | AT170 4M | AT210 4M | AT240 4M | AT280 4M |
| 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 |
| Max. Acceleration Torque T _{2B} | Nm | 1 | 1~5 | 1.5 times of Nominal Output Torque | | | | | | | | |
| 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 |
| Standard Backlash* | arcmin | 1 | 1~5 | ≤6 | ≤6 | ≤6 | ≤6 | ≤6 | ≤6 | ≤6 | ≤6 | ≤6 |
| Max. Radial Load F _{1rB} ² Input d1 | N | 1 | 1~5 | 700 | 950 | 1,450 | 2,100 | 2,700 | 3,800 | 7,800 | 9,600 | 10,500 |
| Max. Radial Load F _{2rB} ³ Output d2 | N | 1 | 1~5 | 900 | 1,100 | 1,700 | 2,700 | 4,800 | 6,600 | 11,500 | 16,000 | 18,000 |
| Max. Axial Load F _{1aB} ² Input d1 | N | 1 | 1~5 | 350 | 425 | 725 | 1,050 | 1,350 | 1,900 | 3,900 | 4,800 | 5,250 |
| Max. Axial Load F _{2aB} ³ Output d2 | N | 1 | 1~5 | 450 | 550 | 850 | 1,350 | 2,400 | 3,300 | 5,750 | 8,500 | 9,000 |
| Service Life | hr | 1 | 1~5 | 20,000* | | | | | | | | |
| Efficiency η | % | 1 | 1~5 | ≥98% | | | | | | | | |
| Operating Temp | °C | 1 | 1~5 | -30°C ~ +100°C | | | | | | | | |
| Lubrication | | 1 | 1~5 | Synthetic lubrication oils | | | | | | | | |
| Noise Level (n ₁ =1500rpm, No Load) | dB (A) | 1 | 1~5 | ≤68 | ≤70 | ≤74 | ≤76 | ≤77 | ≤78 | ≤80 | ≤82 | ≤83 |

1. Ratio (i=N_{in}/N_{out})

2. Apply to the input shaft center @ n_{1B}

3. Apply to the output shaft center @ n_{1B}

*S1 service life 10,000 hrs

* Backlash is measured at 2% Nominal Output Torque T_{2N}

★ AT-LM / RM / 4M OFFER RATIO 1 : 1 ONLY.

Gearbox Inertia

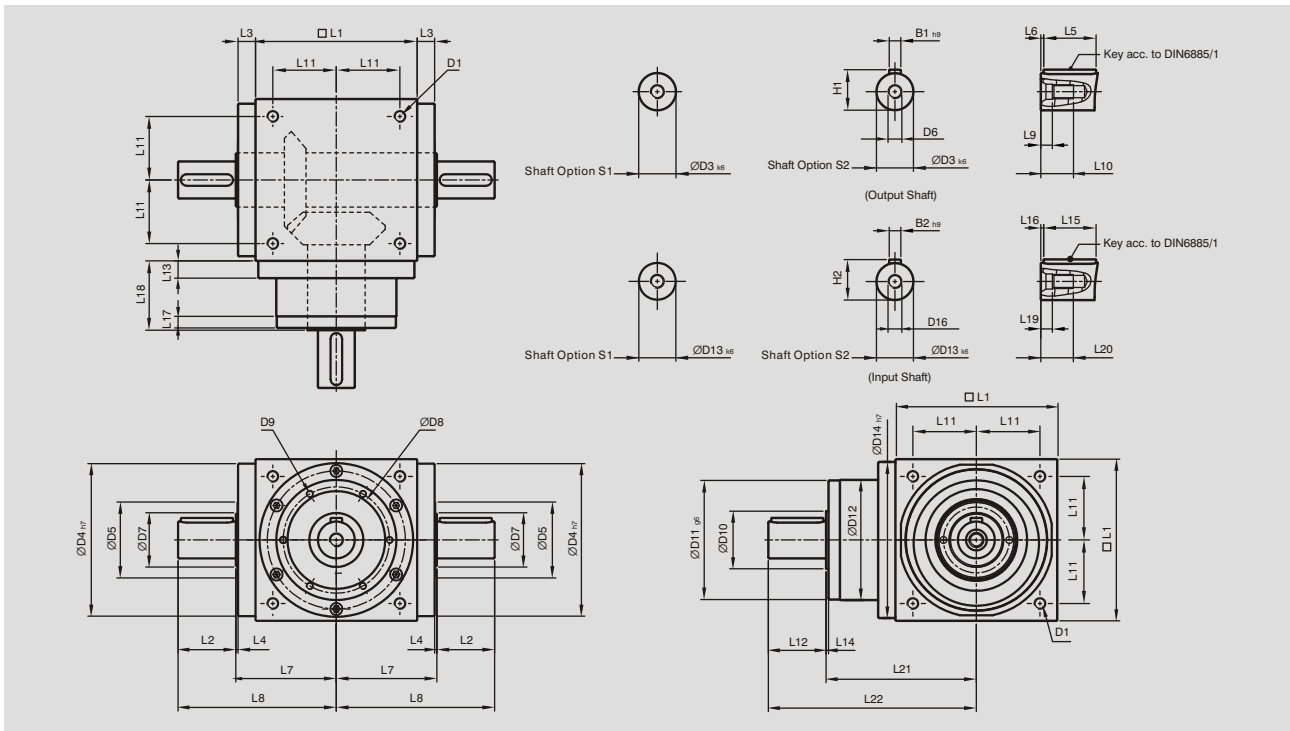
| Model No. | | Stage | Ratio ¹ | AT065 L | AT075 L | AT090 L | AT110 L | AT140 L | AT170 L | AT210 L | AT240 L | AT280 L |
|--|----------------------|-------|--------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | | | AT065 L1 | AT075 L1 | AT090 L1 | AT110 L1 | AT140 L1 | AT170 L1 | AT210 L1 | AT240 L1 | AT280 L1 |
| | | | | AT065 H | AT075 H | AT090 H | AT110 H | AT140 H | AT170 H | AT210 H | AT240 H | AT280 H |
| | | | | AT065 C | AT075 C | AT090 C | AT110 C | AT140 C | AT170 C | AT210 C | AT240 C | AT280 C |
| | | | | AT065 R1 | AT075 R1 | AT090 R1 | AT110 R1 | AT140 R1 | AT170 R1 | AT210 R1 | AT240 R1 | AT280 R1 |
| | | | | AT065 LM | AT075 LM | AT090 LM | AT110 LM | AT140 LM | AT170 LM | AT210 LM | AT240 LM | AT280 LM |
| | | | | AT065 RM | AT075 RM | AT090 RM | AT110 RM | AT140 RM | AT170 RM | AT210 RM | AT240 RM | AT280 RM |
| | | | | AT065 4M | AT075 4M | AT090 4M | AT110 4M | AT140 4M | AT170 4M | AT210 4M | AT240 4M | AT280 4M |
| Mass Moments of Inertia J ₁ | kg · cm ² | 1 | 1 | 0.51 | 1.30 | 3.16 | 7.70 | 23.57 | 58.99 | 195.40 | 369.34 | 799.12 |
| | | | 1.5 | 0.64 | 1.16 | 2.82 | 6.74 | 19.37 | 49.28 | 155.45 | 283.58 | 595.78 |
| | | | 2 | 0.44 | 1.11 | 2.70 | 6.31 | 17.75 | 45.35 | 140.24 | 249.74 | 511.76 |
| | | | 3 | 0.43 | 1.09 | 2.66 | 6.17 | 17.18 | 44.01 | 134.95 | 237.71 | 483.06 |
| | | | 4 | 0.43 | 1.09 | 2.65 | 6.13 | 17.06 | 43.70 | 133.58 | 234.72 | 476.26 |
| | | | 5 | 0.43 | 1.09 | 2.65 | 6.12 | 17.02 | 43.60 | 133.14 | 233.67 | 473.58 |

Weight

| Model No. | Stage | Ratio ¹ | AT065 | AT075 | AT090 | AT110 | AT140 | AT170 | AT210 | AT240 | AT280 |
|-----------|-------|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| L Series | 1 | 1~5 | 2.6 | 4.2 | 6.8 | 11.6 | 19.8 | 34.8 | 66.2 | 98.1 | 155.7 |
| L1 Series | 1 | 1~5 | 2.6 | 4.1 | 6.7 | 11.5 | 19.5 | 34.2 | 65.1 | 96.6 | 153.4 |
| H Series | 1 | 1~5 | 2.5 | 3.9 | 6.4 | 11.0 | 18.1 | 31.6 | 60.0 | 89.4 | 143.4 |
| C Series | 1 | 1~5 | 2.8 | 4.2 | 6.9 | 11.4 | 19.6 | 33.7 | 63.3 | 97.9 | 149.1 |
| R1 Series | 1 | 1~5 | 2.6 | 4.1 | 6.7 | 11.5 | 19.5 | 34.2 | 65.1 | 96.6 | 153.4 |
| LM Series | 1 | 1 | 3.5 | 5.6 | 9.0 | 15.2 | 24.1 | 42.4 | 81.4 | 122.0 | 190.9 |
| RM Series | 1 | 1 | 3.5 | 5.6 | 9.0 | 15.2 | 24.1 | 42.4 | 81.4 | 122.0 | 190.9 |
| 4M Series | 1 | 1 | 3.5 | 5.6 | 9.1 | 15.4 | 24.8 | 42.6 | 82.5 | 123.5 | 193.3 |

AT-L Series

Dimensions (1-stage, Ratio $i=1\sim5$)

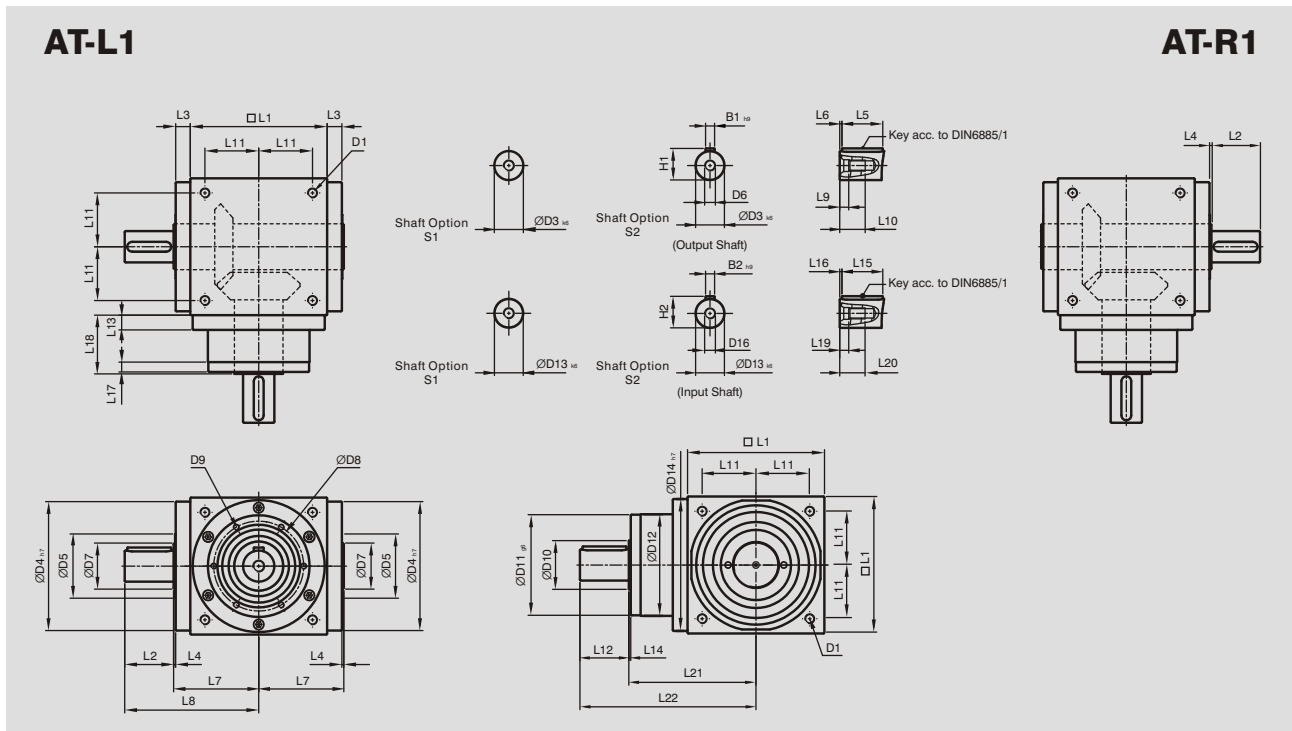


[unit: mm]

| Dimension | AT065 L | AT075 L | AT090 L | AT110 L | AT140 L | AT170 L | AT210 L | AT240 L | AT280 L |
|-------------------|---------|---------|---------|----------|----------|------------|------------|------------|-----------|
| 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 |
| D8 | 53 | 62 | 76 | 95 | 92 | 114 | 142 | 160 | 176 |
| D9 | 4xM4xL7 | 4xM5xL8 | 4xM5xL8 | 6xM6xL10 | 6xM6xL10 | 6xM8xL12.5 | 6xM8xL12.5 | 6xM8xL12.5 | 6xM10xL15 |
| D10 | 15.4 | 20.4 | 25.8 | 35.8 | 49.8 | 59.3 | 79.3 | 92.3 | 102.3 |
| D11 _{g6} | 62.9 | 72.9 | 87 | 107 | 103 | 127 | 158 | 178 | 198 |
| D12 | 62 | 72 | 86 | 106 | 104 | 128 | 160 | 180 | 200 |
| D13 _{k6} | 13 | 16 | 18 | 22 | 32 | 40 | 50 | 55 | 60 |
| D14 _{h7} | 63 | 73 | 88 | 108 | 135 | 165 | 205 | 235 | 275 |
| D16 | M4 | M5 | M5 | M8 | M12 | M16 | M16 | M16 | M20 |
| 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 |
| L12 | 19.5 | 30 | 35 | 40 | 50 | 60 | 75 | 85 | 110 |
| L13 | 13 | 15 | 15 | 15 | 15 | 15 | 20 | 25 | 25 |
| L14 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| L15 | 16 | 25 | 28 | 32 | 45 | 50 | 70 | 80 | 100 |
| L16 | 2 | 2.5 | 3.5 | 4 | 2.5 | 5 | 2.5 | 2.5 | 5 |
| L17 | 6 | 8 | 8 | 8 | 10 | 10 | 10 | 10 | 10 |
| L18 | 43 | 52.5 | 55 | 60 | 60 | 70 | 90 | 105 | 120 |
| L19 | 4.5 | 4.8 | 4.8 | 7.2 | 10 | 12 | 12 | 12 | 15 |
| L20 | 10 | 12.5 | 12.5 | 19 | 28 | 36 | 36 | 36 | 42 |
| L21 | 75.5 | 90 | 100 | 115 | 130 | 155 | 195 | 225 | 260 |
| L22 | 95 | 120 | 135 | 155 | 180 | 215 | 270 | 310 | 370 |
| B1 _{h9} | 5 | 5 | 6 | 6 | 10 | 12 | 14 | 16 | 18 |
| B2 _{h9} | 5 | 5 | 6 | 6 | 10 | 12 | 14 | 16 | 18 |
| H1 | 15 | 18 | 20.5 | 24.5 | 35 | 43 | 53.5 | 59 | 64 |
| H2 | 15 | 18 | 20.5 | 24.5 | 35 | 43 | 53.5 | 59 | 64 |

AT-L1 / R1 Series

Dimensions (1-stage, Ratio $i=1\sim 5$)

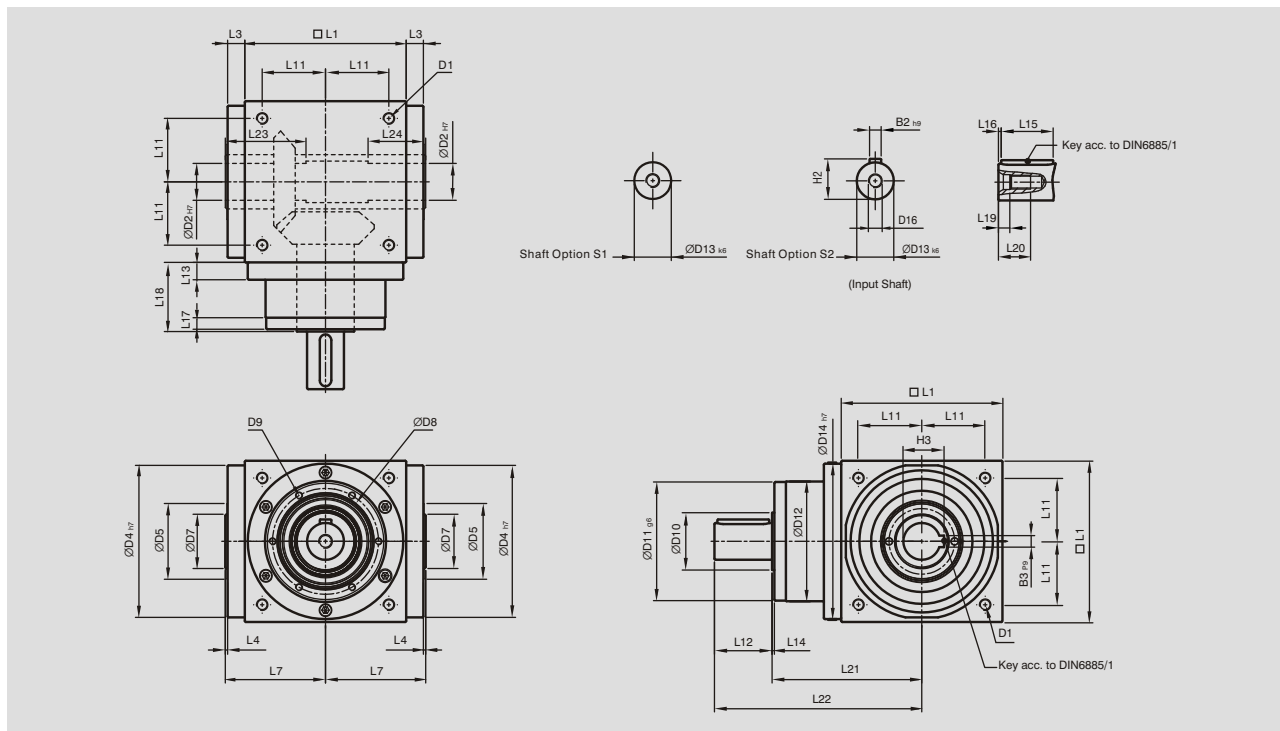


[unit: mm]

| Dimension | AT065 L1/R1 | AT075 L1/R1 | AT090 L1/R1 | AT110 L1/R1 | AT140 L1/R1 | AT170 L1/R1 | AT210 L1/R1 | AT240 L1/R1 | AT280 L1/R1 |
|-------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 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 |
| D8 | 53 | 62 | 76 | 95 | 92 | 114 | 142 | 160 | 176 |
| D9 | 4xM4xL7 | 4xM5xL8 | 4xM5xL8 | 6xM6xL10 | 6xM6xL10 | 6xM8xL12.5 | 6xM8xL12.5 | 6xM8xL12.5 | 6xM10xL15 |
| D10 | 15.4 | 20.4 | 25.8 | 35.8 | 49.8 | 59.3 | 79.3 | 92.3 | 102.3 |
| D11 _{g6} | 62.9 | 72.9 | 87 | 107 | 103 | 127 | 158 | 178 | 198 |
| D12 | 62 | 72 | 86 | 106 | 104 | 128 | 160 | 180 | 200 |
| D13 _{k6} | 13 | 16 | 18 | 22 | 32 | 40 | 50 | 55 | 60 |
| D14 _{h7} | 63 | 73 | 88 | 108 | 135 | 165 | 205 | 235 | 275 |
| D16 | M4 | M5 | M5 | M8 | M12 | M16 | M16 | M16 | M20 |
| 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 |
| L12 | 19.5 | 30 | 35 | 40 | 50 | 60 | 75 | 85 | 110 |
| L13 | 13 | 15 | 15 | 15 | 15 | 15 | 20 | 25 | 25 |
| L14 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| L15 | 16 | 25 | 28 | 32 | 45 | 50 | 70 | 80 | 100 |
| L16 | 2 | 2.5 | 3.5 | 4 | 2.5 | 5 | 2.5 | 2.5 | 5 |
| L17 | 6 | 8 | 8 | 8 | 10 | 10 | 10 | 10 | 10 |
| L18 | 43 | 52.5 | 55 | 60 | 60 | 70 | 90 | 105 | 120 |
| L19 | 4.5 | 4.8 | 4.8 | 7.2 | 10 | 12 | 12 | 12 | 15 |
| L20 | 10 | 12.5 | 12.5 | 19 | 28 | 36 | 36 | 36 | 42 |
| L21 | 75.5 | 90 | 100 | 115 | 130 | 155 | 195 | 225 | 260 |
| L22 | 95 | 120 | 135 | 155 | 180 | 215 | 270 | 310 | 370 |
| B1 _{h9} | 5 | 5 | 6 | 6 | 10 | 12 | 14 | 16 | 18 |
| B2 _{h9} | 5 | 5 | 6 | 6 | 10 | 12 | 14 | 16 | 18 |
| H1 | 15 | 18 | 20.5 | 24.5 | 35 | 43 | 53.5 | 59 | 64 |
| H2 | 15 | 18 | 20.5 | 24.5 | 35 | 43 | 53.5 | 59 | 64 |

AT-H Series

Dimensions (1-stage, Ratio $i=1\sim5$)

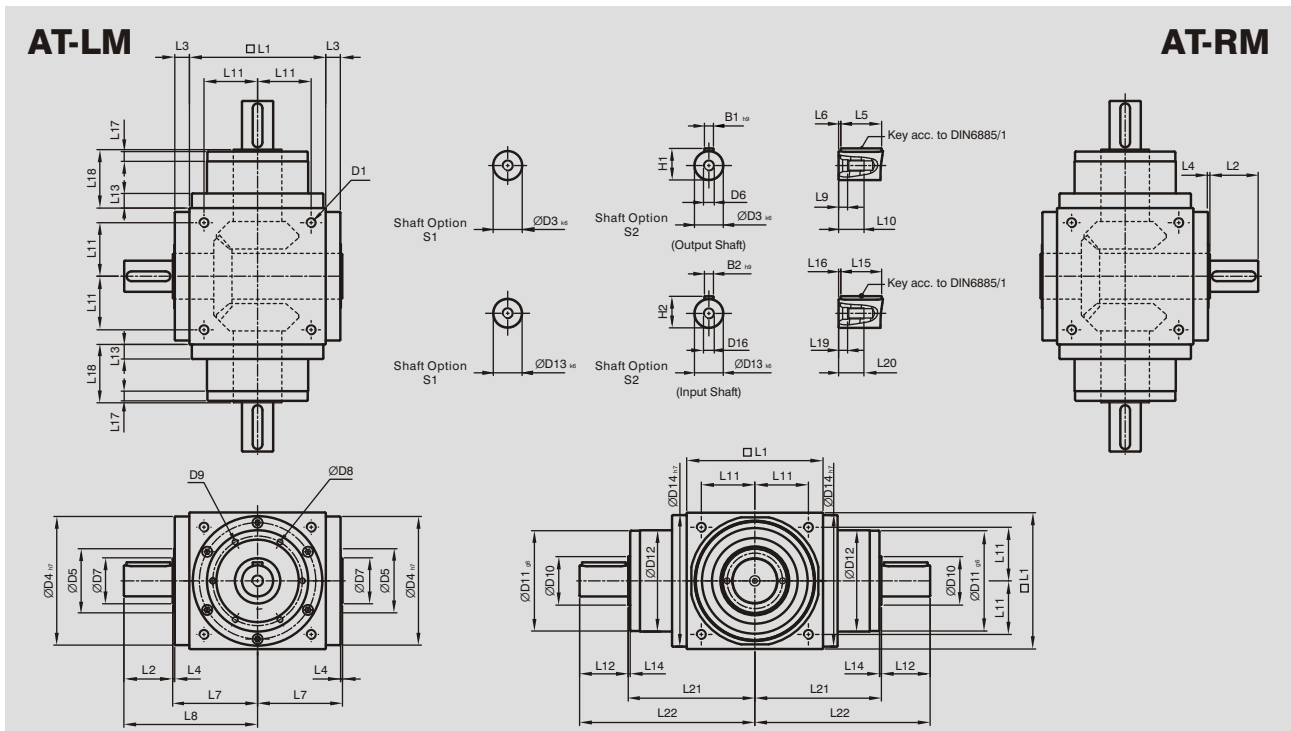


[unit: mm]

| Dimension | AT065 H | AT075 H | AT090 H | AT110 H | AT140 H | AT170 H | AT210 H | AT240 H | AT280 H |
|-------------------|---------|---------|---------|----------|----------|------------|------------|------------|-----------|
| D1 | M4 | M6 | M6 | M8 | M10 | M12 | M16 | M16 | M16 |
| D2 _{H7} | 13 | 14 | 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 |
| D7 | 21 | 22 | 28 | 33 | 47 | 55 | 75 | 85 | 110 |
| D8 | 53 | 62 | 76 | 95 | 92 | 114 | 142 | 160 | 176 |
| D9 | 4xM4xL7 | 4xM5xL8 | 4xM5xL8 | 6xM6xL10 | 6xM6xL10 | 6xM8xL12.5 | 6xM8xL12.5 | 6xM8xL12.5 | 6xM10xL15 |
| D10 | 15.4 | 20.4 | 25.8 | 35.8 | 49.8 | 59.3 | 79.3 | 92.3 | 102.3 |
| D11 _{G6} | 62.9 | 72.9 | 87 | 107 | 103 | 127 | 158 | 178 | 198 |
| D12 | 62 | 72 | 86 | 106 | 104 | 128 | 160 | 180 | 200 |
| D13 _{K6} | 13 | 16 | 18 | 22 | 32 | 40 | 50 | 55 | 60 |
| D14 _{H7} | 63 | 73 | 88 | 108 | 135 | 165 | 205 | 235 | 275 |
| D16 | M4 | M5 | M5 | M8 | M12 | M16 | M16 | M16 | M20 |
| L1 | 65 | 75 | 90 | 110 | 140 | 170 | 210 | 240 | 280 |
| L3 | 13 | 14.5 | 15 | 15 | 15 | 15 | 20 | 25 | 25 |
| L4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| L7 | 47.5 | 54 | 62 | 72 | 87 | 102 | 127 | 147 | 167 |
| L11 | 27 | 30 | 36 | 44 | 55 | 67 | 85 | 95 | 110 |
| L12 | 19.5 | 30 | 35 | 40 | 50 | 60 | 75 | 85 | 110 |
| L13 | 13 | 15 | 15 | 15 | 15 | 15 | 20 | 25 | 25 |
| L14 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| L15 | 16 | 25 | 28 | 32 | 45 | 50 | 70 | 80 | 100 |
| L16 | 2 | 2.5 | 3.5 | 4 | 2.5 | 5 | 2.5 | 2.5 | 5 |
| L17 | 6 | 8 | 8 | 8 | 10 | 10 | 10 | 10 | 10 |
| L18 | 43 | 52.5 | 55 | 60 | 60 | 70 | 90 | 105 | 120 |
| L19 | 4.5 | 4.8 | 4.8 | 7.2 | 10 | 12 | 12 | 12 | 15 |
| L20 | 10 | 12.5 | 12.5 | 19 | 28 | 36 | 36 | 36 | 42 |
| L21 | 75.5 | 90 | 100 | 115 | 130 | 155 | 195 | 225 | 260 |
| L22 | 95 | 120 | 135 | 155 | 180 | 215 | 270 | 310 | 370 |
| L23 | 40 | 47 | 52 | 53 | 70 | 80 | 95 | 115 | 115 |
| L24 | 30 | 32 | 35 | 35 | 50 | 55 | 65 | 80 | 80 |
| B2 _{H9} | 5 | 5 | 6 | 6 | 10 | 12 | 14 | 16 | 18 |
| B3 _{P9} | 5 | 5 | 6 | 6 | 10 | 12 | 14 | 16 | 18 |
| H2 | 15 | 18 | 20.5 | 24.5 | 35 | 43 | 53.5 | 59 | 64 |
| H3 | 15.3 | 16.3 | 20.8 | 24.8 | 35.3 | 43.3 | 53.8 | 59.3 | 64.4 |

AT-LM / RM Series

Dimensions (1-stage, Ratio i=1)

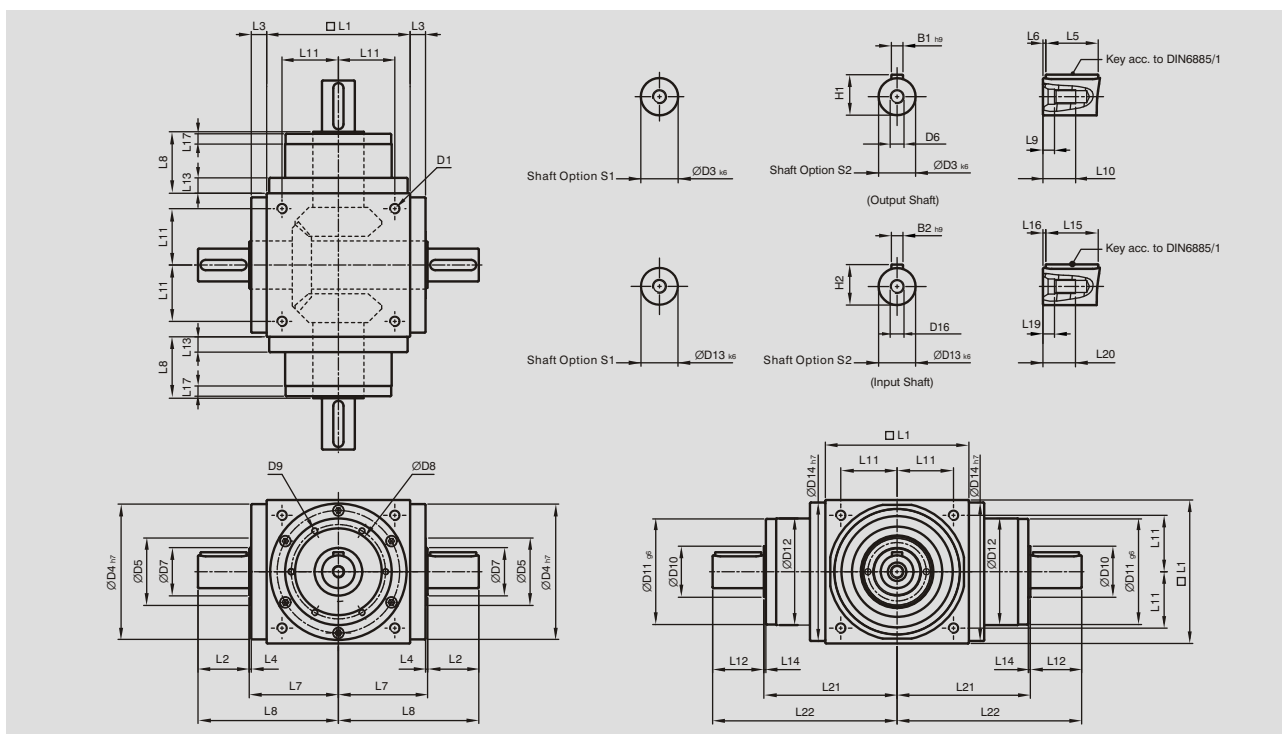


[unit: mm]

| Dimension | AT065LM/RM | AT075LM/RM | AT090LM/RM | AT110LM/RM | AT140LM/RM | AT170LM/RM | AT210LM/RM | AT240LM/RM | AT280LM/RM |
|-------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 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 |
| D8 | 53 | 62 | 76 | 95 | 92 | 114 | 142 | 160 | 176 |
| D9 | 4xM4xL7 | 4xM5xL8 | 4xM5xL8 | 6xM6xL10 | 6xM6xL10 | 6xM8xL12.5 | 6xM8xL12.5 | 6xM8xL12.5 | 6xM10xL15 |
| D10 | 15.4 | 20.4 | 25.8 | 35.8 | 49.8 | 59.3 | 79.3 | 92.3 | 102.3 |
| D11 _{g6} | 62.9 | 72.9 | 87 | 107 | 103 | 127 | 158 | 178 | 198 |
| D12 | 62 | 72 | 86 | 106 | 104 | 128 | 160 | 180 | 200 |
| D13 _{k6} | 13 | 16 | 18 | 22 | 32 | 40 | 50 | 55 | 60 |
| D14 _{h7} | 63 | 73 | 88 | 108 | 135 | 165 | 205 | 235 | 275 |
| D16 | M4 | M5 | M5 | M8 | M12 | M16 | M16 | M16 | M20 |
| 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 |
| L12 | 19.5 | 30 | 35 | 40 | 50 | 60 | 75 | 85 | 110 |
| L13 | 13 | 15 | 15 | 15 | 15 | 15 | 20 | 25 | 25 |
| L14 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| L15 | 16 | 25 | 28 | 32 | 45 | 50 | 70 | 80 | 100 |
| L16 | 2 | 2.5 | 3.5 | 4 | 2.5 | 5 | 2.5 | 2.5 | 5 |
| L17 | 6 | 8 | 8 | 8 | 10 | 10 | 10 | 10 | 10 |
| L18 | 43 | 52.5 | 55 | 60 | 60 | 70 | 90 | 105 | 120 |
| L19 | 4.5 | 4.8 | 4.8 | 7.2 | 10 | 12 | 12 | 12 | 15 |
| L20 | 10 | 12.5 | 12.5 | 19 | 28 | 36 | 36 | 36 | 42 |
| L21 | 75.5 | 90 | 100 | 115 | 130 | 155 | 195 | 225 | 260 |
| L22 | 95 | 120 | 135 | 155 | 180 | 215 | 270 | 310 | 370 |
| B1 _{h9} | 5 | 5 | 6 | 6 | 10 | 12 | 14 | 16 | 18 |
| B2 _{h9} | 5 | 5 | 6 | 6 | 10 | 12 | 14 | 16 | 18 |
| H1 | 15 | 18 | 20.5 | 24.5 | 35 | 43 | 53.5 | 59 | 64 |
| H2 | 15 | 18 | 20.5 | 24.5 | 35 | 43 | 53.5 | 59 | 64 |

AT-4M Series

Dimensions (1-stage, Ratio i=1)



[unit: mm]

| Dimension | AT065 4M | AT075 4M | AT090 4M | AT110 4M | AT140 4M | AT170 4M | AT210 4M | AT240 4M | AT280 4M |
|-----------|----------|----------|----------|----------|----------|------------|------------|------------|-----------|
| 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 |
| D8 | 53 | 62 | 76 | 95 | 92 | 114 | 142 | 160 | 176 |
| D9 | 4xM4xL7 | 4xM5xL8 | 4xM5xL8 | 6xM6xL10 | 6xM6xL10 | 6xM8xL12.5 | 6xM8xL12.5 | 6xM8xL12.5 | 6xM10xL15 |
| D10 | 15.4 | 20.4 | 25.8 | 35.8 | 49.8 | 59.3 | 79.3 | 92.3 | 102.3 |
| D11 g6 | 62.9 | 72.9 | 87 | 107 | 103 | 127 | 158 | 178 | 198 |
| D12 | 62 | 72 | 86 | 106 | 104 | 128 | 160 | 180 | 200 |
| D13 k6 | 13 | 16 | 18 | 22 | 32 | 40 | 50 | 55 | 60 |
| D14 h7 | 63 | 73 | 88 | 108 | 135 | 165 | 205 | 235 | 275 |
| D16 | M4 | M5 | M5 | M8 | M12 | M16 | M16 | M16 | M20 |
| 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 |
| L12 | 19.5 | 30 | 35 | 40 | 50 | 60 | 75 | 85 | 110 |
| L13 | 13 | 15 | 15 | 15 | 15 | 15 | 20 | 25 | 25 |
| L14 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| L15 | 16 | 25 | 28 | 32 | 45 | 50 | 70 | 80 | 100 |
| L16 | 2 | 2.5 | 3.5 | 4 | 2.5 | 5 | 2.5 | 2.5 | 5 |
| L17 | 6 | 8 | 8 | 8 | 10 | 10 | 10 | 10 | 10 |
| L18 | 43 | 52.5 | 55 | 60 | 60 | 70 | 90 | 105 | 120 |
| L19 | 4.5 | 4.8 | 4.8 | 7.2 | 10 | 12 | 12 | 12 | 15 |
| L20 | 10 | 12.5 | 12.5 | 19 | 28 | 36 | 36 | 36 | 42 |
| L21 | 75.5 | 90 | 100 | 115 | 130 | 155 | 195 | 225 | 260 |
| L22 | 95 | 120 | 135 | 155 | 180 | 215 | 270 | 310 | 370 |
| B1 h9 | 5 | 5 | 6 | 6 | 10 | 12 | 14 | 16 | 18 |
| B2 h9 | 5 | 5 | 6 | 6 | 10 | 12 | 14 | 16 | 18 |
| H1 | 15 | 18 | 20.5 | 24.5 | 35 | 43 | 53.5 | 59 | 64 |
| H2 | 15 | 18 | 20.5 | 24.5 | 35 | 43 | 53.5 | 59 | 64 |

AT Flange Type Series

Specifications

Gearbox Performance

| Model No. | Stage | Ratio | AT065 FL | AT075 FL | AT090 FL | AT110 FL | AT140 FL | AT170 FL | AT210 FL | AT240 FL | AT280 FL | | |
|--|--|--------|-----------|----------------------------|------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|--------|-------|
| | | | AT065 FL1 | AT075 FL1 | AT090 FL1 | AT110 FL1 | AT140 FL1 | AT170 FL1 | AT210 FL1 | AT240 FL1 | AT280 FL1 | | |
| Nominal Output Torque T_{2N} | 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 | 1,692 | | |
| | | 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 | | |
| | Max. Acceleration Torque T_{2B} | Nm | 1,2,3 | 1~500 | 1.5 times of Nominal Output Torque | | | | | | | | |
| | | | | | 1 | 1~5 | 7,500 | 6,500 | 5,500 | 4,500 | 3,500 | 3,000 | 2,200 |
| | 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 |
| | Standard Backlash* | arcmin | 3 | 75~500 | - | - | - | 8,000 | 8,000 | 6,000 | 6,000 | 6,000 | 6,000 |
| | | | 1 | 1~5 | ≤6 | ≤6 | ≤6 | ≤6 | ≤6 | ≤6 | ≤6 | ≤6 | ≤6 |
| Max. Radial Load F_{2RB} ² Output d2 | N | 1,2,3 | 1~500 | 2 | 7~50 | ≤8 | ≤8 | ≤8 | ≤8 | ≤8 | ≤8 | ≤8 | |
| | | | | 3 | 75~500 | - | - | - | ≤10 | ≤10 | ≤10 | ≤10 | ≤10 |
| Max. Axial Load F_{2aB} ² Output d2 | N | 1,2,3 | 1~500 | 1 | 1~5 | 900 | 1,100 | 1,700 | 2,700 | 4,800 | 6,600 | 11,500 | |
| | | | | 2,3 | 7~500 | 450 | 550 | 850 | 1,350 | 2,400 | 3,300 | 5,750 | 8,500 |
| Service Life | hr | 1,2,3 | 1~500 | 20,000* | | | | | | | | | |
| Efficiency η | % | 1 | 1~5 | ≥98% | | | | | | | | | |
| | | 2,3 | 7~500 | ≥94% | | | | | | | | | |
| Operating Temp | °C | 1,2,3 | 1~500 | -30°C ~ +100°C | | | | | | | | | |
| Lubrication | | 1,2,3 | 1~500 | Synthetic lubrication oils | | | | | | | | | |
| 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 ($i=N_1/N_{out}$)

* S1 service life 10,000 hrs

2. Apply to the output shaft center @ n_{1B}

* Backlash is measured at 2% Nominal Output Torque T_{2N}

AT Flange Type Series Specifications

Gearbox Inertia

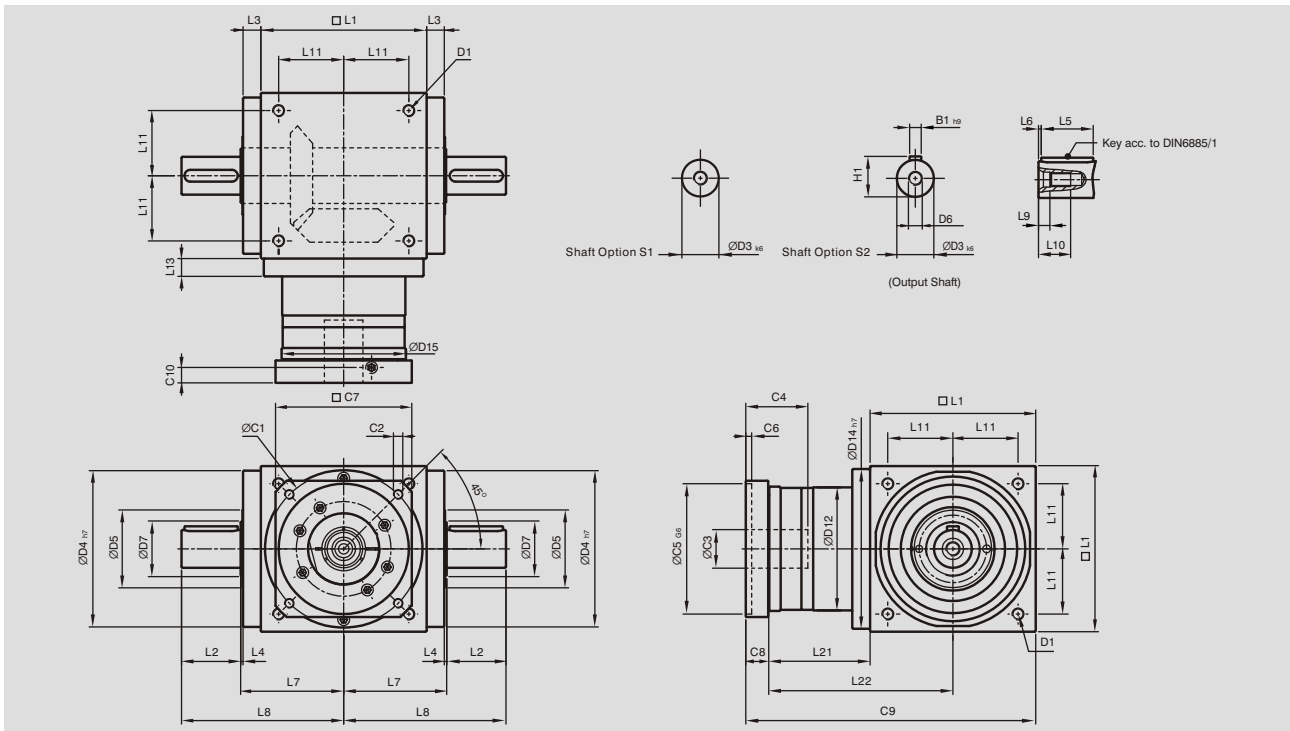
| Model No. | Stage | Ratio | AT065 FL | AT075 FL | AT090 FL | AT110 FL | AT140 FL | AT170 FL | AT210 FL | AT240 FL | AT280 FL | |
|--|-------|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|
| | | | AT065 FL1 | AT075 FL1 | AT090 FL1 | AT110 FL1 | AT140 FL1 | AT170 FL1 | AT210 FL1 | AT240 FL1 | AT280 FL1 | |
| | | | AT065 FH | AT075 FH | AT090 FH | AT110 FH | AT140 FH | AT170 FH | AT210 FH | AT240 FH | AT280 FH | |
| | | | AT065 FC | AT075 FC | AT090 FC | AT110 FC | AT140 FC | AT170 FC | AT210 FC | AT240 FC | AT280 FC | |
| | | | AT065 FR1 | AT075 FR1 | AT090 FR1 | AT110 FR1 | AT140 FR1 | AT170 FR1 | AT210 FR1 | AT240 FR1 | AT280 FR1 | |
| Mass Moments of Inertia J ₁ | 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 |
| | | | 50 | 0.15 | 0.15 | 0.50 | 2.79 | 2.79 | 2.79 | 9.89 | 29.20 | 29.20 |
| | | | 3 | 75 | - | - | - | 2.80 | 2.80 | 2.80 | 9.96 | 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 | |

Weight

| Model No. | Stage | Ratio | AT065 | AT075 | AT090 | AT110 | AT140 | AT170 | AT210 | AT240 | AT280 |
|------------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| FL Series | 1 | 1~5 | 2.8 | 4.4 | 7.1 | 12.1 | 20.9 | 36.1 | 69.4 | 101.2 | 158.3 |
| | 2 | 7~50 | 3.2 | 4.8 | 8.1 | 14.3 | 24.2 | 38.5 | 74.1 | 112.4 | 171.0 |
| | 3 | 75~500 | - | - | - | 13.9 | 23.7 | 38.8 | 73.4 | 110.2 | 168.7 |
| FL1 Series | 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 |
| FH Series | 1 | 1~5 | 2.6 | 4.1 | 6.7 | 11.4 | 18.9 | 32.9 | 63.2 | 92.5 | 146.0 |
| | 2 | 7~50 | 3.1 | 4.6 | 7.7 | 13.6 | 22.4 | 35.3 | 67.9 | 103.7 | 158.7 |
| | 3 | 75~500 | - | - | - | 13.3 | 21.9 | 35.6 | 67.2 | 101.5 | 156.5 |
| FC Series | 1 | 1~5 | 2.9 | 4.4 | 7.2 | 11.8 | 20.4 | 35.0 | 66.5 | 96.0 | 151.7 |
| | 2 | 7~50 | 3.3 | 4.9 | 8.2 | 14.1 | 24.1 | 37.4 | 71.2 | 107.2 | 164.4 |
| | 3 | 75~500 | - | - | - | 13.7 | 23.5 | 37.5 | 70.5 | 105.0 | 162.2 |
| FR1 Series | 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 |

AT-FL Series

Dimensions (1-stage, Ratio $i=1\sim5$)



[unit: mm]

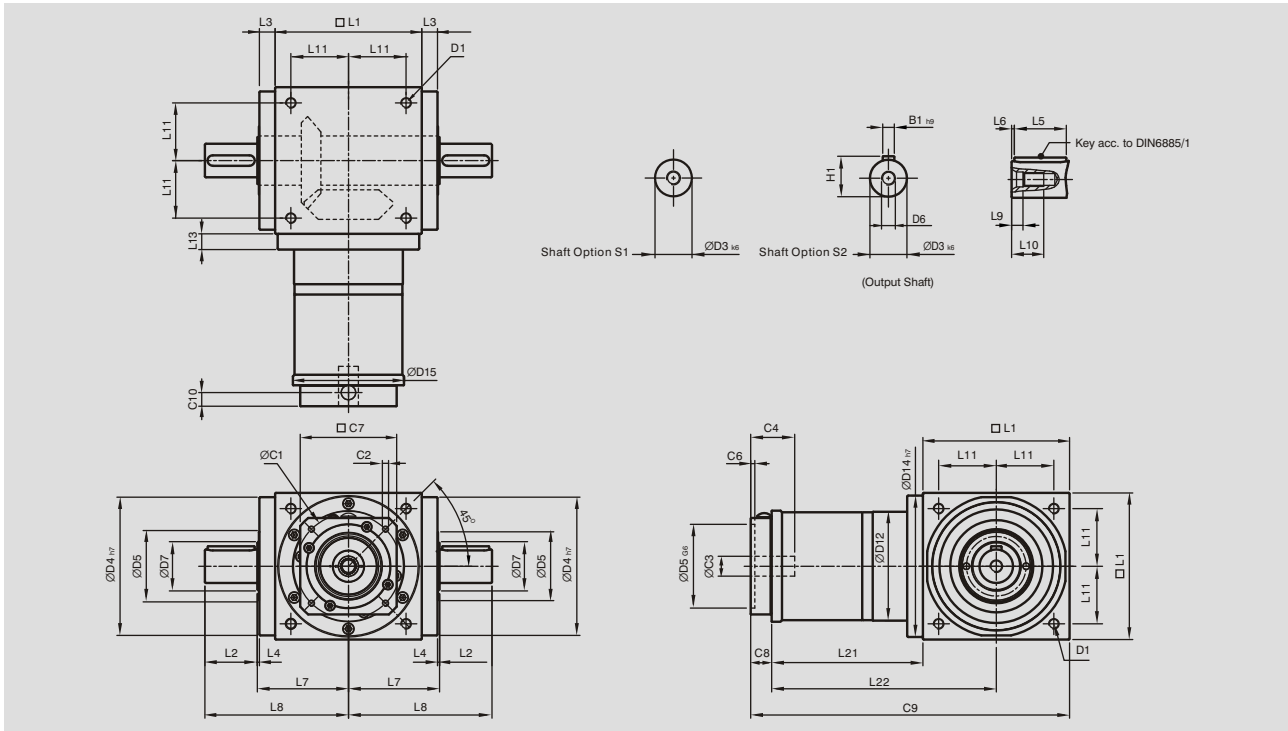
| Dimension | AT065 FL | AT075 FL | AT090 FL | AT110 FL | AT140 FL | AT170 FL | AT210 FL | AT240 FL | AT280 FL |
|--------------------|-------------|-----------------------|----------|----------|----------|----------|----------|----------|----------|
| D1 | M4 | M6 | M6 | M8 | M10 | M12 | M16 | M16 | 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 ³ | 46 | 70 | 100 | 100 | 130 | 165 | 215 | 215 | 235 |
| C2 ³ | M4 | M5 | M6 | M6 | M8 | M10 | M12 | M12 | M12 |
| C3 ³ | ★ ≤11 / ≤12 | ★ ≤14 / ≤15.875 / ≤16 | ≤19 | ≤24 | ≤32 | ≤38 | ≤42 | ≤48 | ≤55 |
| C4 ³ | 30 | 34 | 40 | 40 | 50 | 60 | 85 | 85 | 116 |
| C5 ³ G6 | 30 | 50 | 80 | 80 | 110 | 130 | 180 | 180 | 200 |
| C6 ³ | 3.5 | 8 | 4 | 4 | 5 | 6 | 6 | 6 | 6 |
| C7 ³ | 42 | 60 | 90 | 90 | 115 | 142 | 190 | 190 | 220 |
| C8 ³ | 19.5 | 19 | 17 | 17 | 19.5 | 22.5 | 29 | 29 | 63 |
| C9 ³ | 133.5 | 154.5 | 170 | 196.5 | 245 | 287.5 | 369 | 413.5 | 478 |
| C10 ³ | 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 |

3. C1~C10 are motor specific dimensions (metric std shown). Refer to Apexdyna.com and Design Tool to view your specific motor mounting system.

★ AT065 FLM1 offers C3 ≤12 option. ★ AT075 FLM1 offers C3 ≤16 option. ★ AT075 FLM2 offers C3 ≤15.875 option.

AT-FL Series

Dimensions (2-stage, Ratio $i=7\sim 50$)



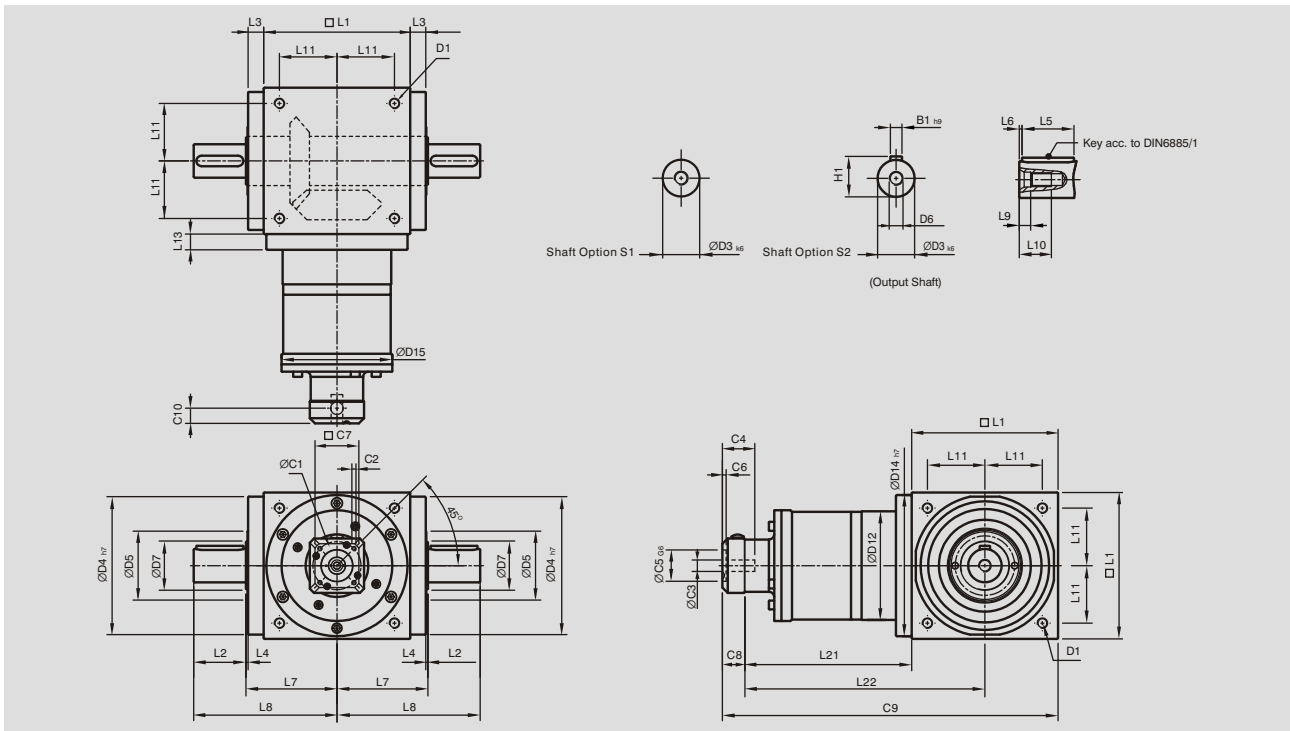
[unit: mm]

| Dimension | AT065 FL | AT075 FL | AT090 FL | AT110 FL | AT140 FL | AT170 FL | AT210 FL | AT240 FL | AT280 FL |
|-------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 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 ⁴ | 46 | 46 | 70 | 100 | 100 | 100 | 130 | 165 | 165 |
| C2 ⁴ | M4 | M4 | M5 | M6 | M6 | M6 | M8 | M10 | M10 |
| C3 ⁴ | ≤12 | ≤12 | ≤16 | ≤24 | ≤24 | ≤24 | ≤32 | ≤38 | ≤38 |
| C4 ⁴ | 30 | 30 | 34 | 40 | 40 | 40 | 50 | 60 | 60 |
| C5 ⁴ _{G6} | 30 | 30 | 50 | 80 | 80 | 80 | 110 | 130 | 130 |
| C6 ⁴ | 3.5 | 3.5 | 8 | 4 | 4 | 4 | 5 | 6 | 6 |
| C7 ⁴ | 42 | 42 | 60 | 92 | 92 | 92 | 115 | 142 | 142 |
| C8 ⁴ | 21.5 | 21.5 | 21.5 | 20 | 20 | 20 | 24 | 31 | 31 |
| C9 ⁴ | 161.5 | 181 | 210.5 | 252 | 304.5 | 347.5 | 440.5 | 510 | 559 |
| C10 ⁴ | 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 |

4. C1-C10 are motor specific dimensions (metric std shown). Refer to Apexdyna.com and Design Tool to view your specific motor mounting system.

AT-FL Series

Dimensions (3-stage, Ratio $i=75\sim 500$)



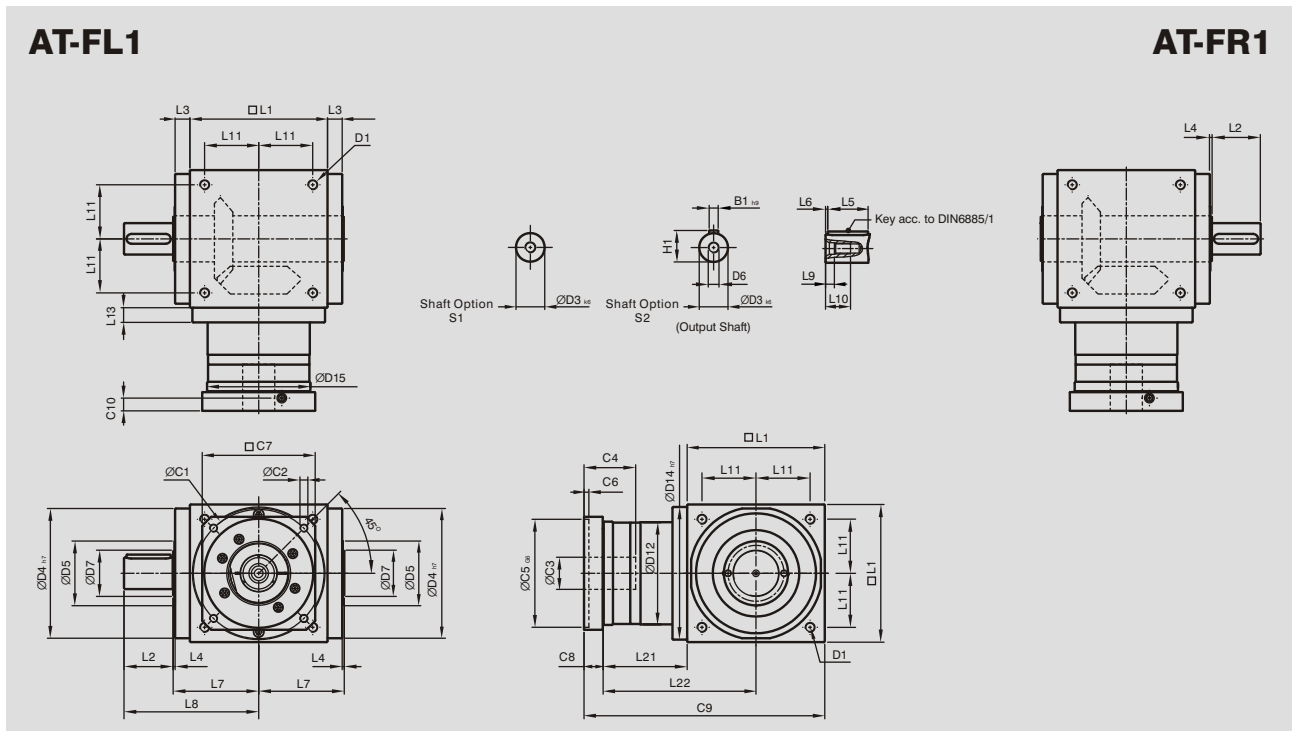
[unit: mm]

| Dimension | AT110 FL | AT140 FL | AT170 FL | AT210 FL | AT240 FL | AT280 FL |
|-------------------------------|----------|----------|----------|----------|----------|----------|
| 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 ⁵ | 46 | 46 | 70 | 70 | 100 | 100 |
| C2 ⁵ | M4 | M4 | M5 | M5 | M6 | M6 |
| C3 ⁵ | ≤12 | ≤12 | ≤16 | ≤16 | ≤24 | ≤24 |
| C4 ⁵ | 30 | 30 | 34 | 34 | 40 | 40 |
| C5 ⁵ _{G6} | 30 | 30 | 50 | 50 | 80 | 80 |
| C6 ⁵ | 3.5 | 3.5 | 8 | 8 | 4 | 4 |
| C7 ⁵ | 42 | 42 | 60 | 60 | 92 | 92 |
| C8 ⁵ | 21.5 | 21.5 | 21.5 | 21.5 | 20 | 20 |
| C9 ⁵ | 268 | 321 | 375 | 457.5 | 529 | 578 |
| C10 ⁵ | 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 |

5. C1~C10 are motor specific dimensions (metric std shown). Refer to Apexdyna.com and Design Tool to view your specific motor mounting system.

AT-FL1 / FR1 Series

Dimensions (1-stage, Ratio $i=1\sim5$)



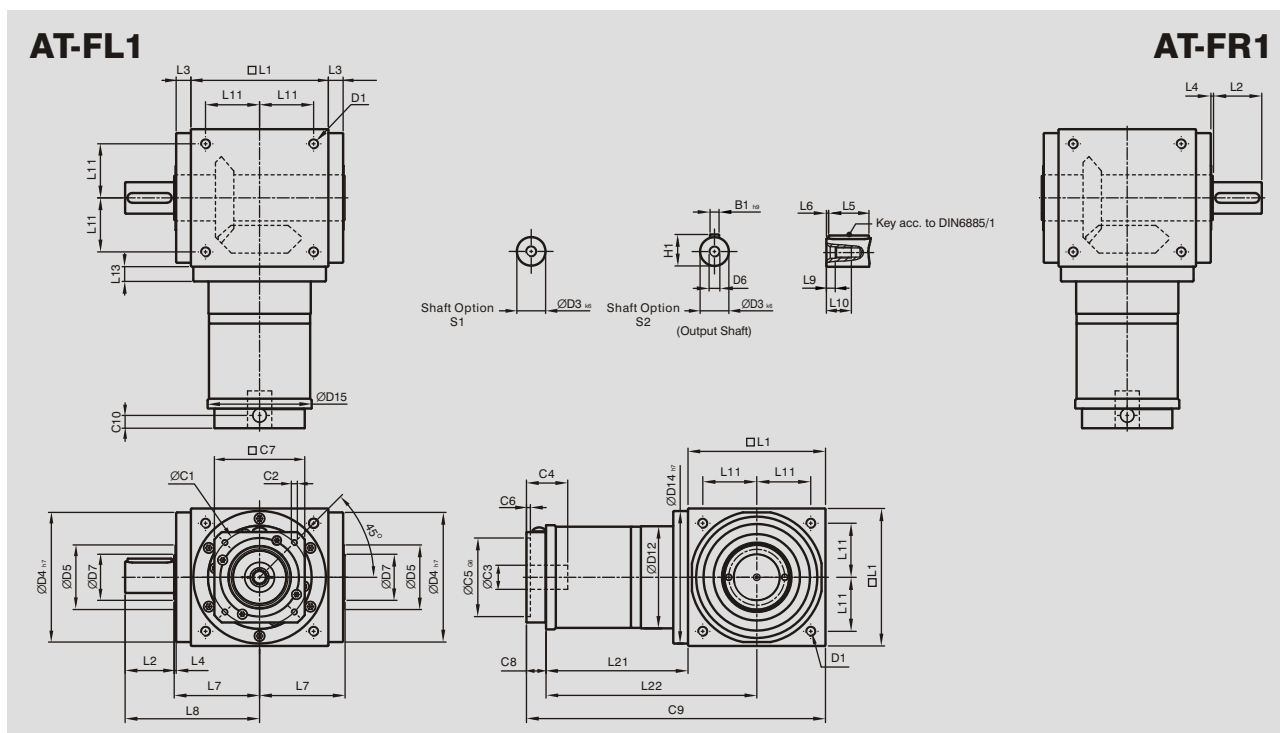
[unit: mm]

| Dimension | 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 |
|--------------------|---------------|-----------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| 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). Refer to Apexdyna.com and Design Tool to view your specific motor mounting system.
 ★ AT065 FL1/FR1M1 offers C3 ≤12 option. ★ AT075 FL1/FR1M1 offers C3 ≤16 option. ★ AT075 FL1/FR1M2 offers C3 ≤15.875 option.

AT-FL1 / FR1 Series

Dimensions (2-stage, Ratio $i=7\sim 50$)



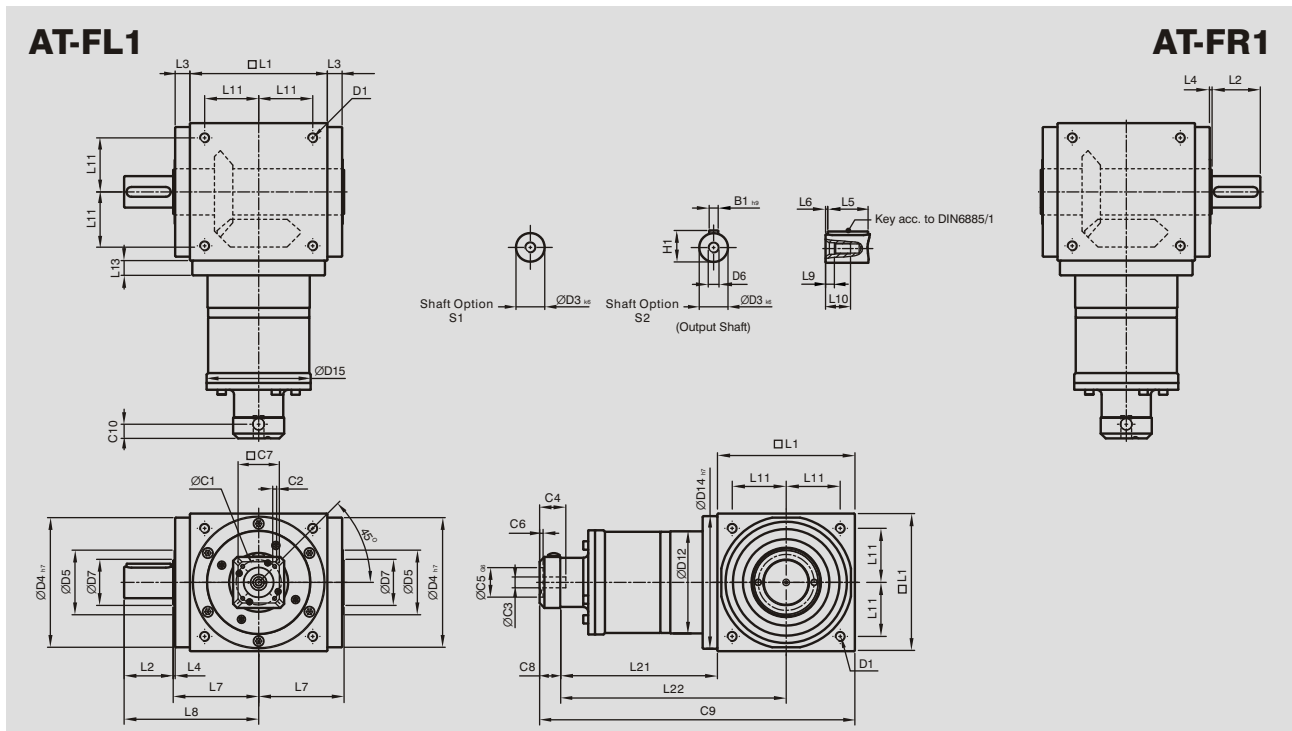
[unit: mm]

| Dimension | 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 |
|-------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| 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 | 14.55 | 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). Refer to Apexdyna.com and Design Tool to view your specific motor mounting system.

AT-FL1 / FR1 Series

Dimensions (3-stage, Ratio $i=75\sim 500$)



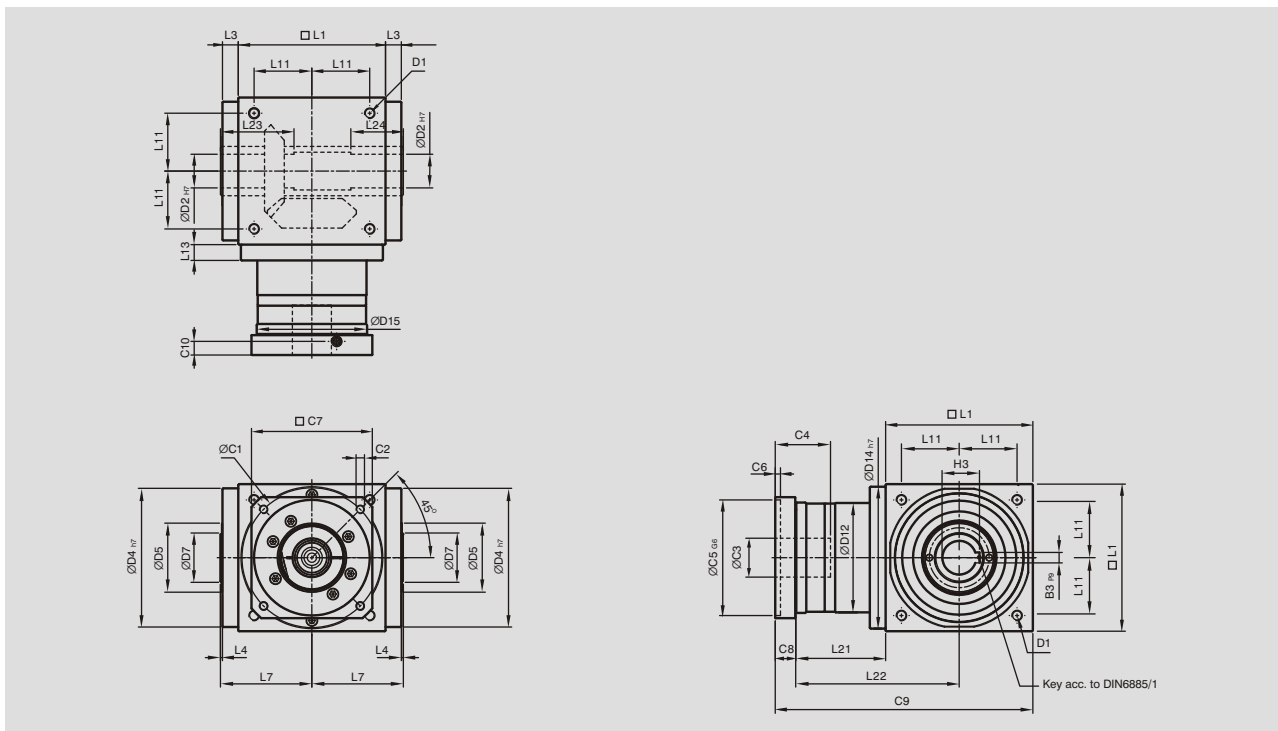
[unit: mm]

| Dimension | AT110 FL1/FR1 | AT140 FL1/FR1 | AT170 FL1/FR1 | AT210 FL1/FR1 | AT240 FL1/FR1 | AT280 FL1/FR1 |
|--------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| 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). Refer to Apexdyna.com and Design Tool to view your specific motor mounting system.

AT-FH Series

Dimensions (1-stage, Ratio i=1~5)



[unit: mm]

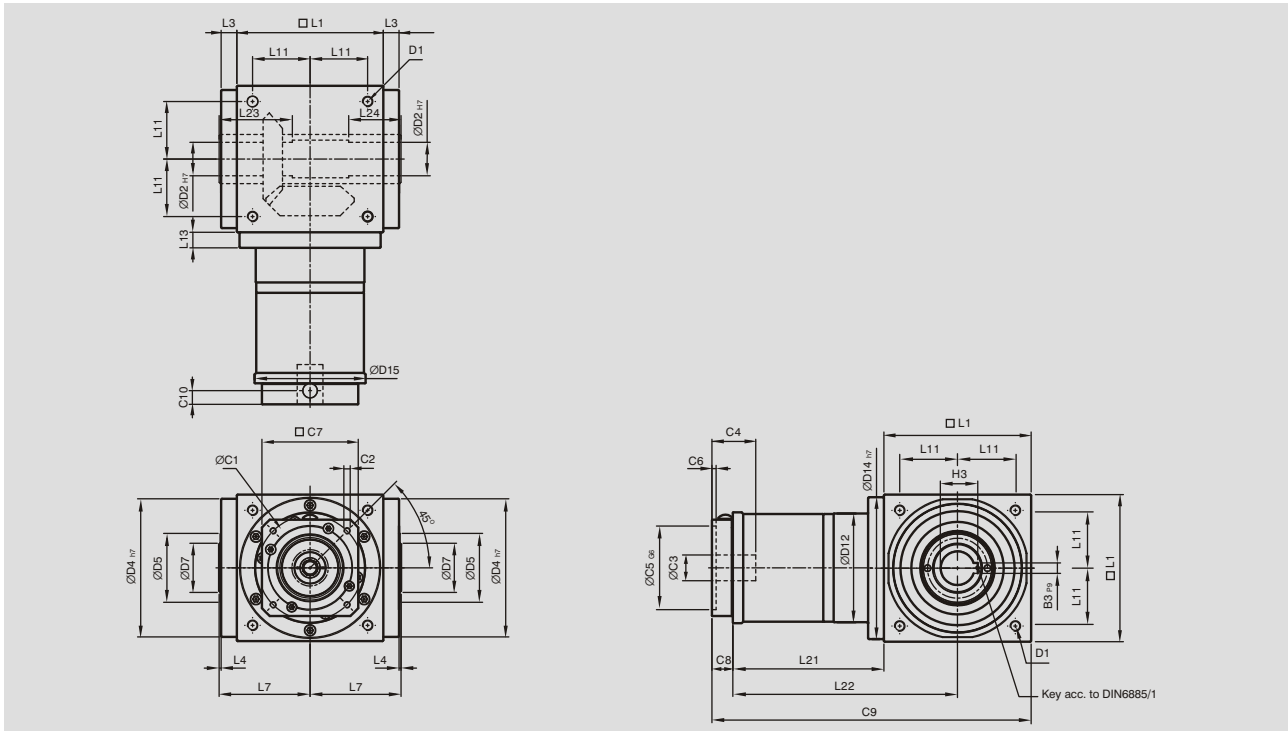
| Dimension | AT065FH | AT075FH | AT090FH | AT110FH | AT140FH | AT170FH | AT210FH | AT240FH | AT280FH |
|--------------------|-------------|-----------------------|---------|---------|---------|---------|---------|---------|---------|
| D1 | M4 | M6 | M6 | M8 | M10 | M12 | M16 | M16 | M16 |
| D2 h7 | 13 | 14 | 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 |
| 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 |
| L3 | 13 | 14.5 | 15 | 15 | 15 | 15 | 20 | 25 | 25 |
| L4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| L7 | 47.5 | 54 | 62 | 72 | 87 | 102 | 127 | 147 | 167 |
| 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 |
| L23 | 40 | 47 | 52 | 53 | 70 | 80 | 95 | 115 | 115 |
| L24 | 30 | 32 | 35 | 35 | 50 | 55 | 65 | 80 | 80 |
| C1 ⁹ | 46 | 70 | 100 | 100 | 130 | 165 | 215 | 215 | 235 |
| C2 ⁹ | M4 | M5 | M6 | M6 | M8 | M10 | M12 | M12 | M12 |
| C3 ⁹ | ★ ≤11 / ≤12 | ★ ≤14 / ≤15.875 / ≤16 | ≤19 | ≤24 | ≤32 | ≤38 | ≤42 | ≤48 | ≤55 |
| C4 ⁹ | 30 | 34 | 40 | 40 | 50 | 60 | 85 | 85 | 116 |
| C5 ⁹ G6 | 30 | 50 | 80 | 80 | 110 | 130 | 180 | 180 | 200 |
| C6 ⁹ | 3.5 | 8 | 4 | 4 | 5 | 6 | 6 | 6 | 6 |
| C7 ⁹ | 42 | 60 | 90 | 90 | 115 | 142 | 190 | 190 | 220 |
| C8 ⁹ | 19.5 | 19 | 17 | 17 | 19.5 | 22.5 | 29 | 29 | 63 |
| C9 ⁹ | 133.5 | 154.5 | 170 | 196.5 | 245 | 287.5 | 369 | 413.5 | 478 |
| C10 ⁹ | 13.25 | 13.5 | 10.75 | 10.75 | 13 | 15 | 20.75 | 20.75 | 53.5 |
| B3 P9 | 5 | 5 | 6 | 6 | 10 | 12 | 14 | 16 | 18 |
| H3 | 15.3 | 16.3 | 20.8 | 24.8 | 35.3 | 43.3 | 53.8 | 59.3 | 64.4 |

9. C1~C10 are motor specific dimensions (metric std shown). Refer to Apexdyna.com and Design Tool to view your specific motor mounting system.

★ AT065FHM1 offers C3 ≤12 option. ★ AT075FHM1 offers C3 ≤16 option. ★ AT075FHM2 offers C3 ≤15.875 option.

AT-FH Series

Dimensions (2-stage, Ratio $i=7\sim 50$)



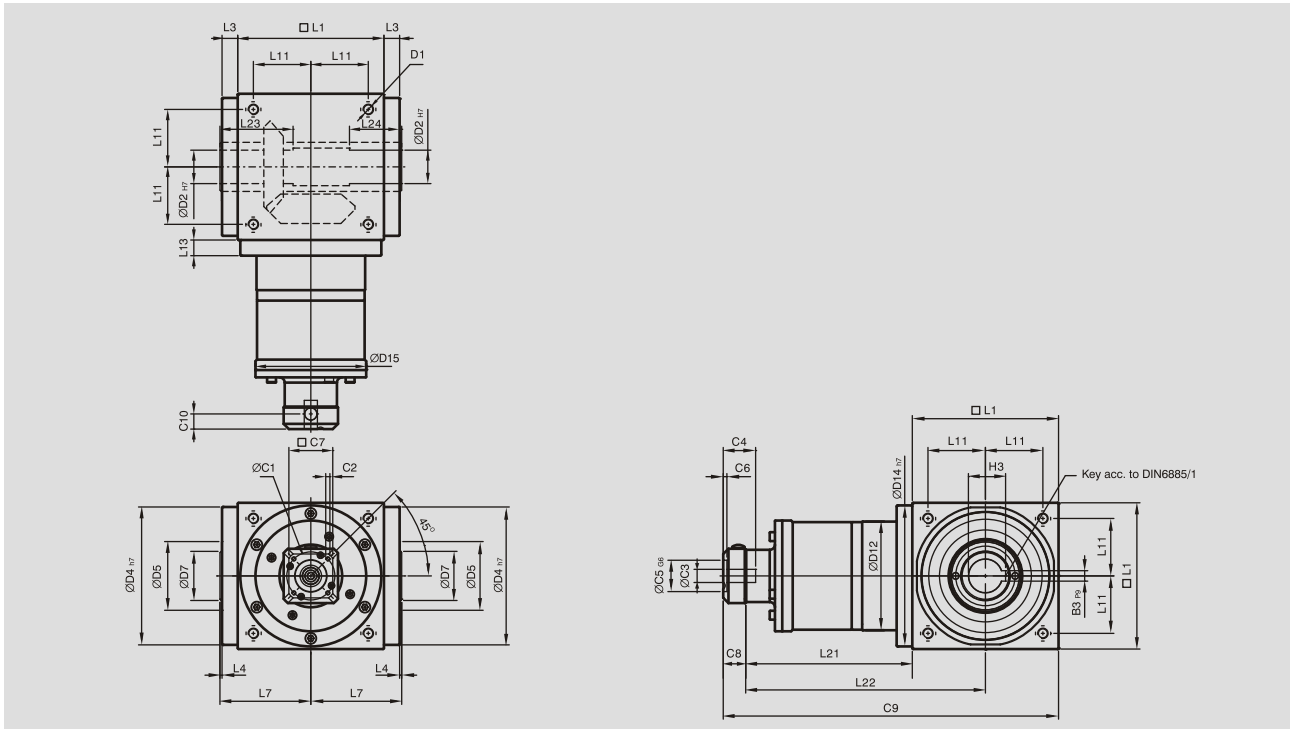
[unit: mm]

| Dimension | AT065FH | AT075FH | AT090FH | AT110FH | AT140FH | AT170FH | AT210FH | AT240FH | AT280FH |
|---------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| D1 | M4 | M6 | M6 | M8 | M10 | M12 | M16 | M16 | M16 |
| D2 _{H7} | 13 | 14 | 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 |
| 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 |
| L3 | 13 | 14.5 | 15 | 15 | 15 | 15 | 20 | 25 | 25 |
| L4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| L7 | 47.5 | 54 | 62 | 72 | 87 | 102 | 127 | 147 | 167 |
| 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 |
| L23 | 40 | 47 | 52 | 53 | 70 | 80 | 95 | 115 | 115 |
| L24 | 30 | 32 | 35 | 35 | 50 | 55 | 65 | 80 | 80 |
| C1 ¹⁰ | 46 | 46 | 70 | 100 | 100 | 100 | 130 | 165 | 165 |
| C2 ¹⁰ | M4 | M4 | M5 | M6 | M6 | M6 | M8 | M10 | M10 |
| C3 ¹⁰ | ≤12 | ≤12 | ≤16 | ≤24 | ≤24 | ≤24 | ≤32 | ≤38 | ≤38 |
| C4 ¹⁰ | 30 | 30 | 34 | 40 | 40 | 40 | 50 | 60 | 60 |
| C5 ¹⁰ G6 | 30 | 30 | 50 | 80 | 80 | 80 | 110 | 130 | 130 |
| C6 ¹⁰ | 3.5 | 3.5 | 8 | 4 | 4 | 4 | 5 | 6 | 6 |
| C7 ¹⁰ | 42 | 42 | 60 | 92 | 92 | 92 | 115 | 142 | 142 |
| C8 ¹⁰ | 21.5 | 21.5 | 21.5 | 20 | 20 | 20 | 24 | 31 | 31 |
| C9 ¹⁰ | 161.5 | 181 | 210.5 | 252 | 304.5 | 347.5 | 440.5 | 510 | 559 |
| C10 ¹⁰ | 14.5 | 14.5 | 15.5 | 13 | 13 | 13 | 16 | 21 | 21 |
| B3 P9 | 5 | 5 | 6 | 6 | 10 | 12 | 14 | 16 | 18 |
| H3 | 15.3 | 16.3 | 20.8 | 24.8 | 35.3 | 43.3 | 53.8 | 59.3 | 64.4 |

10. C1~C10 are motor specific dimensions (metric std shown). Refer to Apexdyna.com and Design Tool to view your specific motor mounting system.

AT-FH Series

Dimensions (3-stage, Ratio $i=75\sim 500$)



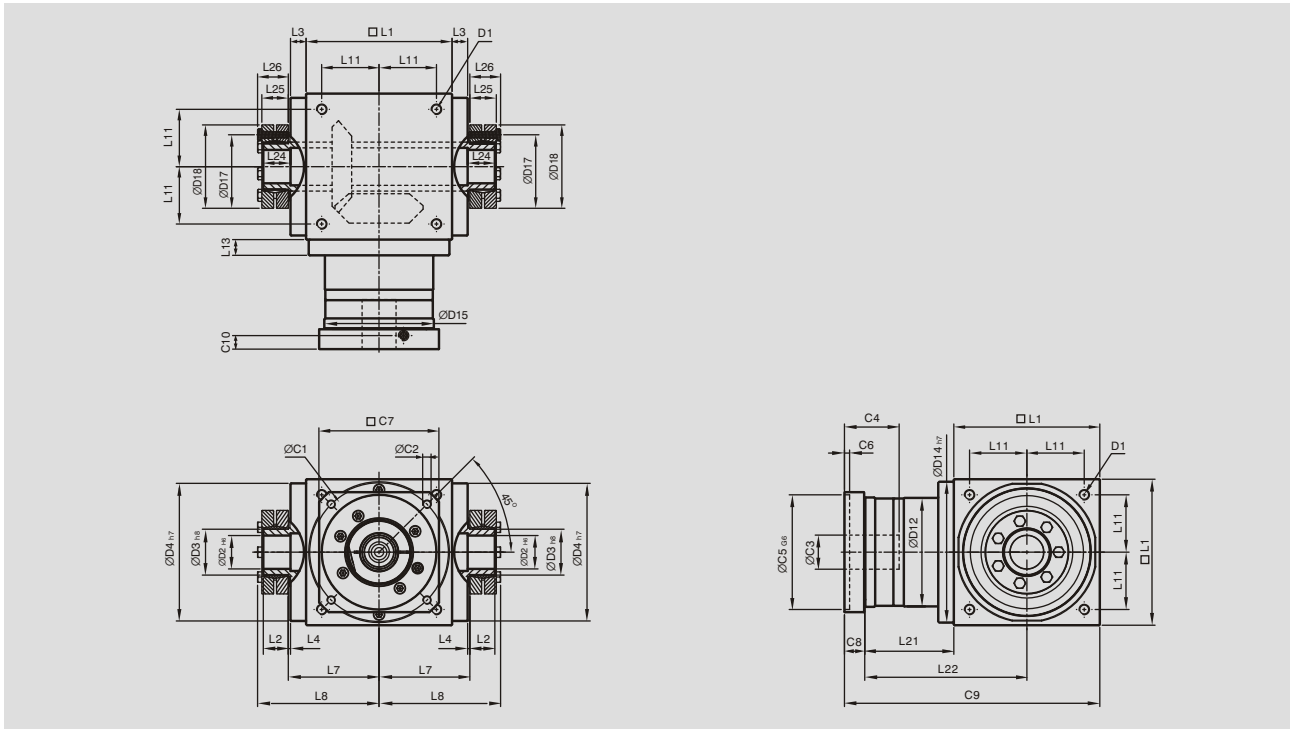
[unit: mm]

| Dimension | AT110FH | AT140FH | AT170FH | AT210FH | AT240FH | AT280FH |
|--------------------------------|---------|---------|---------|---------|---------|---------|
| D1 | M8 | M10 | M12 | M16 | M16 | M16 |
| D2 _{H7} | 22 | 32 | 40 | 50 | 55 | 60 |
| D4 _{H7} | 108 | 135 | 165 | 205 | 235 | 275 |
| D5 | 53 | 68 | 83 | 104 | 124 | 144 |
| 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 |
| L3 | 15 | 15 | 15 | 20 | 25 | 25 |
| L4 | 2 | 2 | 2 | 2 | 2 | 2 |
| L7 | 72 | 87 | 102 | 127 | 147 | 167 |
| 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 |
| L23 | 53 | 70 | 80 | 95 | 115 | 115 |
| L24 | 35 | 50 | 55 | 65 | 80 | 80 |
| C1 ¹¹ | 46 | 46 | 70 | 70 | 100 | 100 |
| C2 ¹¹ | M4 | M4 | M5 | M5 | M6 | M6 |
| C3 ¹¹ | ≤12 | ≤12 | ≤16 | ≤16 | ≤24 | ≤24 |
| C4 ¹¹ | 30 | 30 | 34 | 34 | 40 | 40 |
| C5 ¹¹ _{G6} | 30 | 30 | 50 | 50 | 80 | 80 |
| C6 ¹¹ | 3.5 | 3.5 | 8 | 8 | 4 | 4 |
| C7 ¹¹ | 42 | 42 | 60 | 60 | 92 | 92 |
| C8 ¹¹ | 21.5 | 21.5 | 21.5 | 21.5 | 20 | 20 |
| C9 ¹¹ | 268 | 321 | 375 | 457.5 | 529 | 578 |
| C10 ¹¹ | 14.5 | 14.5 | 15.5 | 15.5 | 13 | 13 |
| B3 _{P9} | 6 | 10 | 12 | 14 | 16 | 18 |
| H3 | 24.8 | 35.3 | 43.3 | 53.8 | 59.3 | 64.4 |

11. C1-C10 are motor specific dimensions (metric std shown). Refer to Apexdyna.com and Design Tool to view your specific motor mounting system.

AT-FC Series

Dimensions (1-stage, Ratio $i=1\sim5$)



● Standard accessory includes 2 shrink disk power lock units.

[unit: mm]

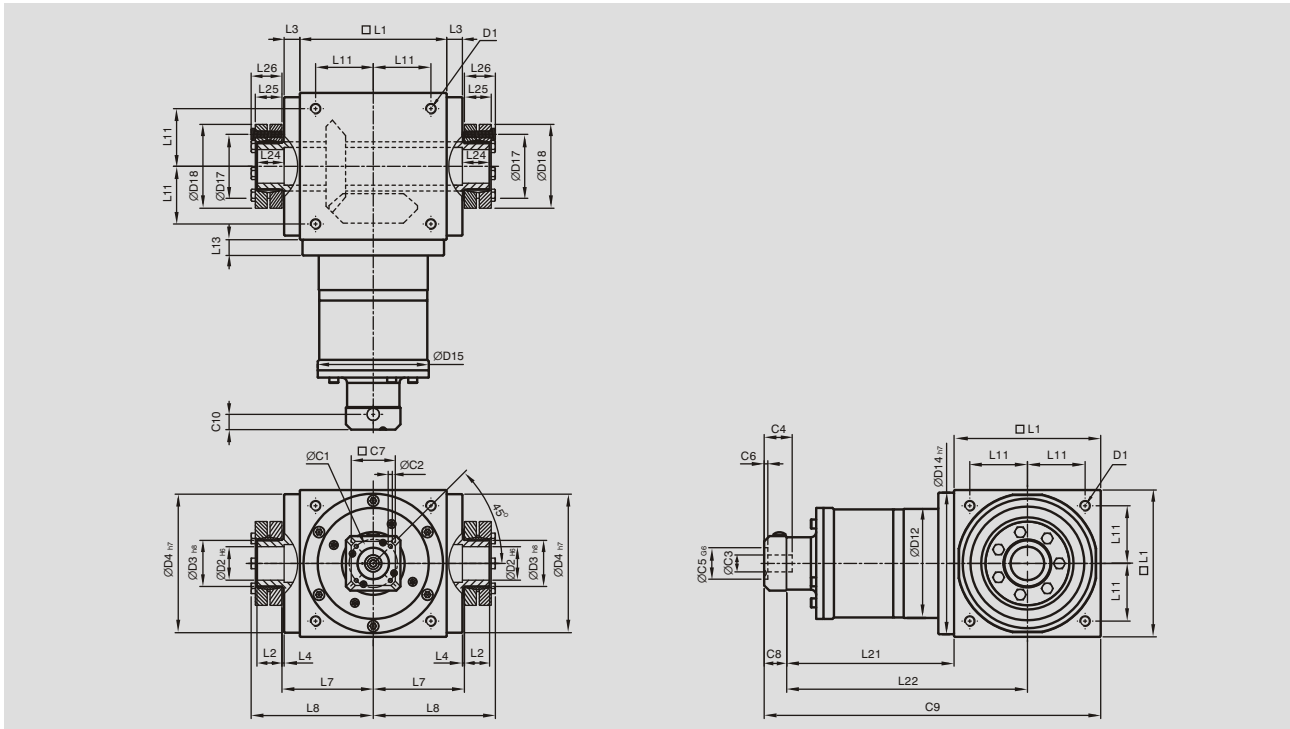
| Dimension | AT065FC | AT075FC | AT090FC | AT110FC | AT140FC | AT170FC | AT210FC | AT240FC | AT280FC |
|---------------------|-------------|-----------------------|---------|---------|---------|---------|---------|---------|---------|
| D1 | M4 | M6 | M6 | M8 | M10 | M12 | M16 | M16 | M16 |
| D2 H6 | 13 | 14 | 18 | 22 | 32 | 40 | 50 | 55 | 60 |
| D3 h8 | 16 | 16 | 22 | 25 | 44 | 50 | 62 | 68 | 75 |
| D4 h7 | 63 | 73 | 88 | 108 | 135 | 165 | 205 | 235 | 275 |
| 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 | 130 | 158 | 178 | 198 |
| D17 | 26 | 26 | 36 | 38 | 61 | 70 | 86 | 86 | 100 |
| D18 | 41 | 41 | 50 | 50 | 80 | 90 | 110 | 115 | 138 |
| L1 | 65 | 75 | 90 | 110 | 140 | 170 | 210 | 240 | 280 |
| L2 | 14 | 14 | 18 | 18 | 24 | 26 | 29 | 29 | 30.5 |
| L3 | 13 | 14.5 | 15 | 15 | 15 | 15 | 20 | 25 | 25 |
| L4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| L7 | 47.5 | 54 | 62 | 72 | 87 | 102 | 127 | 147 | 167 |
| L8 | 66 | 72.5 | 85 | 95 | 116.5 | 113.5 | 161.5 | 181.5 | 205 |
| 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 |
| L23 | 15 | 15 | 20 | 20 | 26 | 28 | 31 | 31 | 32.5 |
| L24 | 15 | 15 | 20 | 20 | 26 | 28 | 31 | 31 | 32.5 |
| L25 | 15 | 15 | 19.5 | 19.5 | 25.5 | 27.5 | 30.5 | 30.5 | 32.5 |
| L26 | 18.5 | 18.5 | 23 | 23 | 29.5 | 31.5 | 34.5 | 34.5 | 38 |
| C1 ¹² | 46 | 70 | 100 | 100 | 130 | 165 | 215 | 215 | 235 |
| C2 ¹² | M4 | M5 | M6 | M6 | M8 | M10 | M12 | M12 | M12 |
| C3 ¹² | ★ ≤11 / ≤12 | ★ ≤14 / ≤15.875 / ≤16 | ≤19 | ≤24 | ≤32 | ≤38 | ≤42 | ≤48 | ≤55 |
| C4 ¹² | 30 | 34 | 40 | 40 | 50 | 60 | 85 | 85 | 116 |
| C5 ¹² G6 | 30 | 50 | 80 | 80 | 110 | 130 | 180 | 180 | 200 |
| C6 ¹² | 3.5 | 8 | 4 | 4 | 5 | 6 | 6 | 6 | 6 |
| C7 ¹² | 42 | 60 | 90 | 90 | 115 | 142 | 190 | 190 | 220 |
| C8 ¹² | 19.5 | 19 | 17 | 17 | 19.5 | 22.5 | 29 | 29 | 63 |
| C9 ¹² | 133.5 | 154.5 | 170 | 196.5 | 245 | 287.5 | 369 | 413.5 | 478 |
| C10 ¹² | 13.25 | 13.5 | 10.75 | 10.75 | 13 | 15 | 20.75 | 20.75 | 53.5 |

12. C1~C10 are motor specific dimensions (metric std shown). Refer to Apexdyna.com and Design Tool to view your specific motor mounting system.

★ AT065FCM1 offers C3 ≤12 option. ★ AT075FCM1 offers C3 ≤16 option. ★ AT075FCM2 offers C3 ≤15.875 option.

AT-FC Series

Dimensions (3-stage, Ratio $i=75\sim 500$)



● Standard accessory includes 2 shrink disk power lock units.

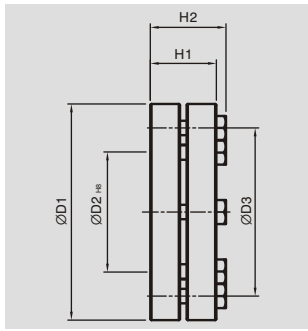
[unit: mm]

| Dimension | AT110FC | AT140FC | AT170FC | AT210FC | AT240FC | AT280FC |
|--------------------------------|---------|---------|---------|---------|---------|---------|
| D1 | M8 | M10 | M12 | M16 | M16 | M16 |
| D2 ^{H6} | 22 | 32 | 40 | 50 | 55 | 60 |
| D3 ^{h8} | 25 | 44 | 50 | 62 | 68 | 75 |
| D4 ^{h7} | 108 | 135 | 165 | 205 | 235 | 275 |
| D12 | 106 | 104 | 128 | 160 | 180 | 200 |
| D14 ^{h7} | 108 | 135 | 165 | 205 | 235 | 275 |
| D15 | 107 | 106 | 127 | 158 | 178 | 198 |
| D17 | 38 | 61 | 70 | 86 | 86 | 100 |
| D18 | 50 | 80 | 90 | 110 | 115 | 138 |
| L1 | 110 | 140 | 170 | 210 | 240 | 280 |
| L2 | 18 | 24 | 26 | 29 | 29 | 30.5 |
| L3 | 15 | 15 | 15 | 20 | 25 | 25 |
| L4 | 2 | 2 | 2 | 2 | 2 | 2 |
| L7 | 72 | 87 | 102 | 127 | 147 | 167 |
| L8 | 95 | 116.5 | 133.5 | 161.5 | 181.5 | 205 |
| 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 |
| L23 | 20 | 26 | 28 | 31 | 31 | 32.5 |
| L24 | 20 | 26 | 28 | 31 | 31 | 32.5 |
| L25 | 19.5 | 25.5 | 27.5 | 30.5 | 30.5 | 32.5 |
| L26 | 23 | 29.5 | 31.5 | 34.5 | 34.5 | 38 |
| C1 ¹⁴ | 46 | 46 | 70 | 70 | 100 | 100 |
| C2 ¹⁴ | M4 | M4 | M5 | M5 | M6 | M6 |
| C3 ¹⁴ | ≤12 | ≤12 | ≤16 | ≤16 | ≤24 | ≤24 |
| C4 ¹⁴ | 30 | 30 | 34 | 34 | 40 | 40 |
| C5 ¹⁴ _{G6} | 30 | 30 | 50 | 50 | 80 | 80 |
| C6 ¹⁴ | 3.5 | 3.5 | 8 | 8 | 4 | 4 |
| C7 ¹⁴ | 42 | 42 | 60 | 60 | 92 | 92 |
| C8 ¹⁴ | 21.5 | 21.5 | 21.5 | 21.5 | 20 | 20 |
| C9 ¹⁴ | 268 | 321 | 375 | 457.5 | 529 | 578 |
| C10 ¹⁴ | 14.5 | 14.5 | 15.5 | 15.5 | 13 | 13 |

14. C1~C10 are motor specific dimensions (metric std shown). Refer to Apexdyna.com and Design Tool to view your specific motor mounting system.

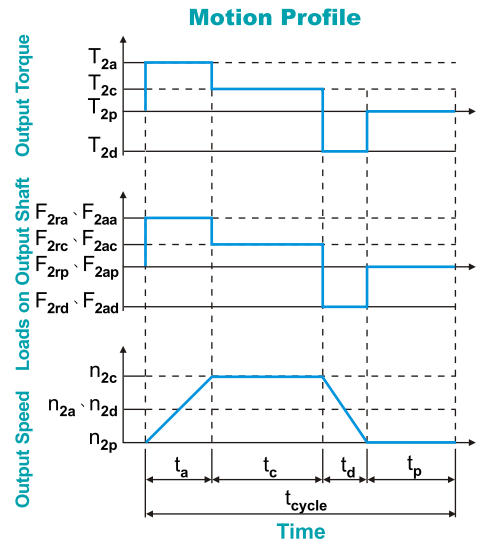
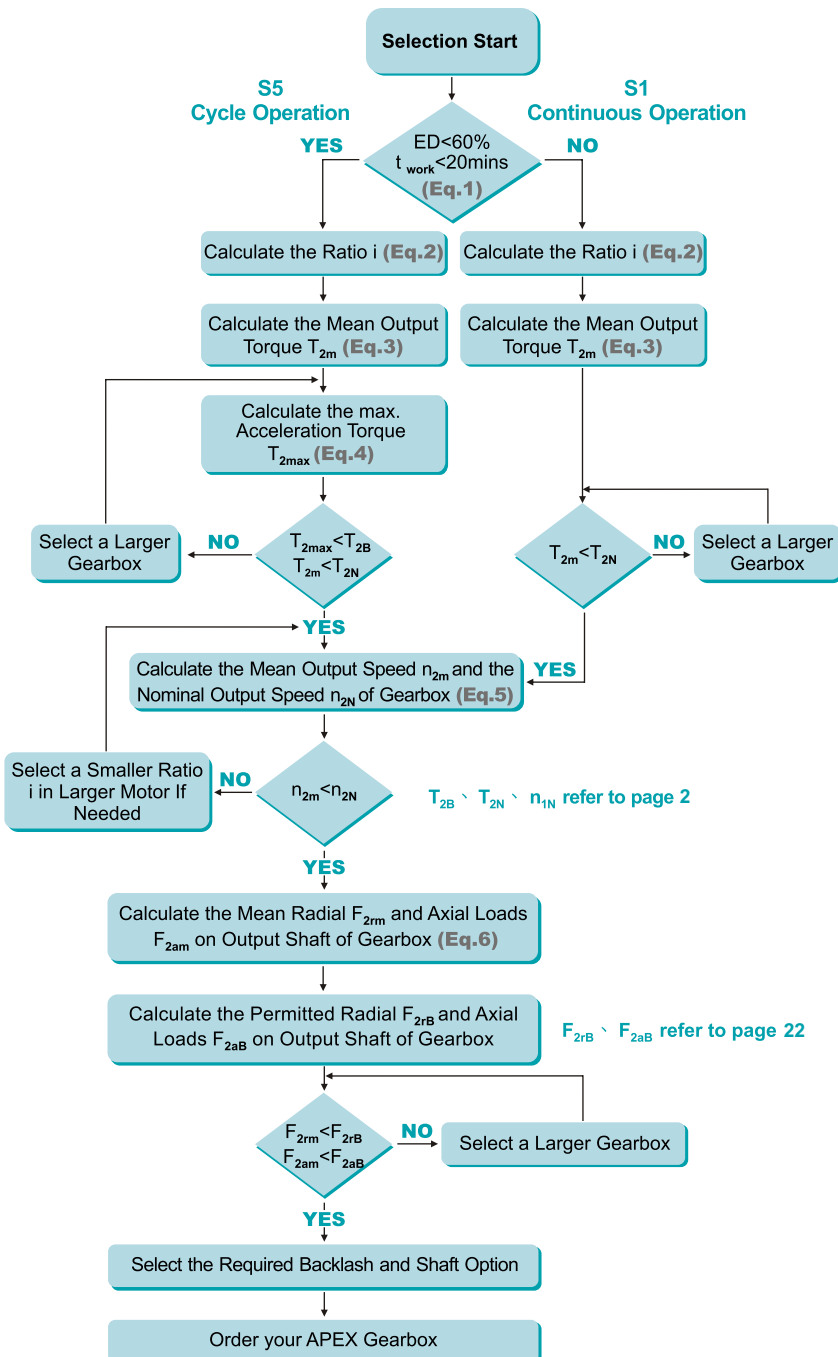
Shrink Disc Power Lock

[unit: mm]



| C / FC Series | D1 | D2 | D3 | H1 | H2 |
|---------------|-----|----|-----|------|------|
| SSD-d16xdw14 | 41 | 16 | 26 | 15 | 18.5 |
| SSD-d22xdw18 | 50 | 22 | 36 | 19.5 | 23 |
| SSD-d25xdw22 | 50 | 25 | 38 | 19.5 | 23 |
| SSD-d44xdw32 | 80 | 44 | 61 | 25.5 | 29.5 |
| SSD-d50xdw40 | 90 | 50 | 70 | 27.5 | 31.5 |
| SSD-d62xdw50 | 110 | 62 | 86 | 30.5 | 34.5 |
| SSD-d68xdw55 | 115 | 68 | 86 | 30.5 | 34.5 |
| SSD-d75xdw60 | 138 | 75 | 100 | 32.5 | 38 |

Selection of the Optimum Gearbox



$$1. ED = \frac{t_a + t_c + t_d}{t_{\text{cycle}}} \times 100\%, t_{\text{work}} = t_a + t_c + t_d$$

Index : a. Acceleration, c. Constant, d. Deceleration, p. Pause (Eq.1)

$$2. i \cong \frac{n_m}{n_{\text{work}}}$$

n_m Output Speed of the Motor (Eq.2)

n_{work} Working Speed

$$3. T_{2m} = \sqrt[3]{\frac{n_{2a}^3 \times t_a \times T_{2a}^3 + n_{2c}^3 \times t_c \times T_{2c}^3 + n_{2d}^3 \times t_d \times T_{2d}^3}{n_{2a}^3 \times t_a + n_{2c}^3 \times t_c + n_{2d}^3 \times t_d}}$$

$$4. T_{2max} = T_{mB} \times i \times K_s \times \eta$$

where K_s is

| K_s | No. of Cycles / hr |
|-----------------|--------------------|
| 1.0 | 0~1,000 |
| 1.1 | 1,000 ~ 1,500 |
| 1.3 | 1,500 ~ 2,000 |
| 1.6 | 2,000 ~ 3,000 |
| 1.8 | 3,000 ~ 5,000 |
| 2.0 | 5,000 ~ 9,000 |
| 2.05 | 9,000 ~ 10,000 |
| not recommended | above 10,000 |

Recommended (for S5 Cycle Operation)

The general design is given for

$$\frac{J_L}{i^2} \leq 4 \times J_m$$

The optimal design is given for

$$\frac{J_L}{i^2} \cong J_m$$

J_L Load Inertia

J_m Motor Inertia

T_{mB} Max. Output Torque of the Motor

η Efficiency of the Gearbox

(Eq.4)

$$5. n_{2a} = n_{2d} = \frac{1}{2} \times n_{2c}$$

$$n_{2m} = \frac{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}{t_a + t_c + t_d}$$

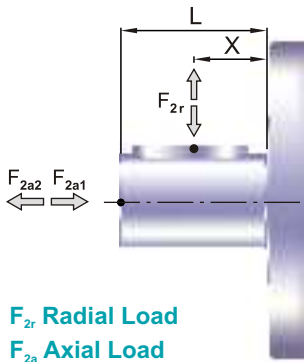
$$n_{2N} = \frac{n_{1N}}{i}$$

(Eq.5)

$$6. F_{2rm} = \sqrt[3]{\frac{n_{2a} \times t_a \times F_{2ra}^3 + n_{2c} \times t_c \times F_{2rc}^3 + n_{2d} \times t_d \times F_{2rd}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

$$F_{2am} = \sqrt[3]{\frac{n_{2a} \times t_a \times F_{2aa}^3 + n_{2c} \times t_c \times F_{2ac}^3 + n_{2d} \times t_d \times F_{2ad}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

(Eq.6)



F_{2r} Radial Load

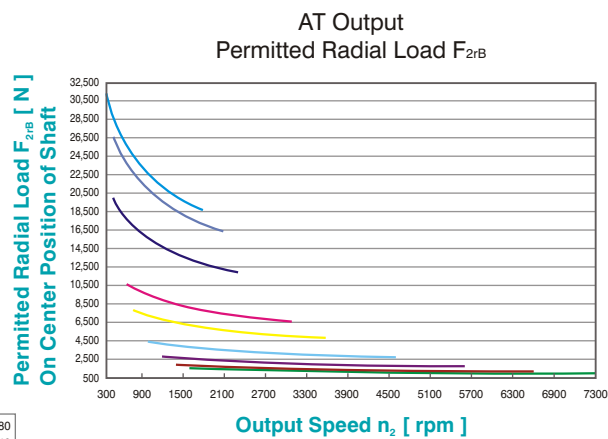
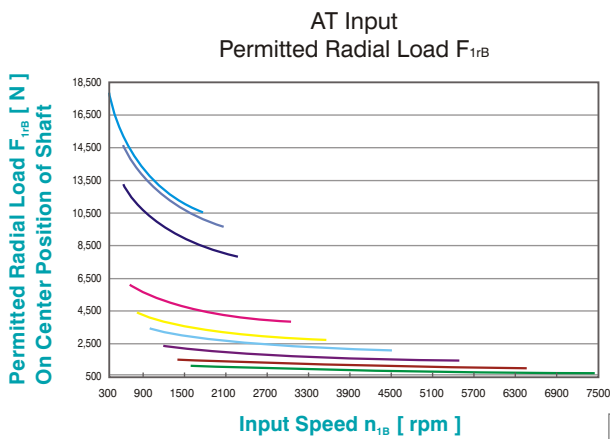
F_{2a} Axial Load

Permitted Radial and Axial Loads on Input and Output Shaft of the Gearbox

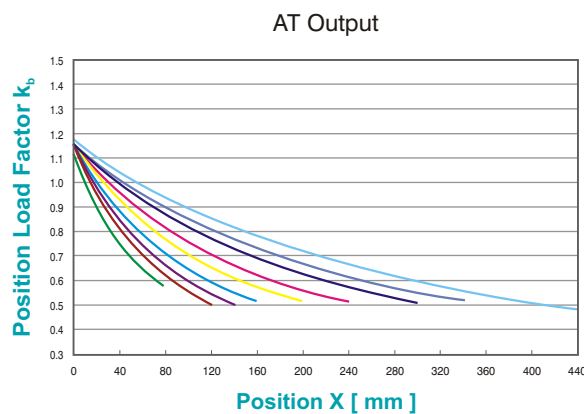
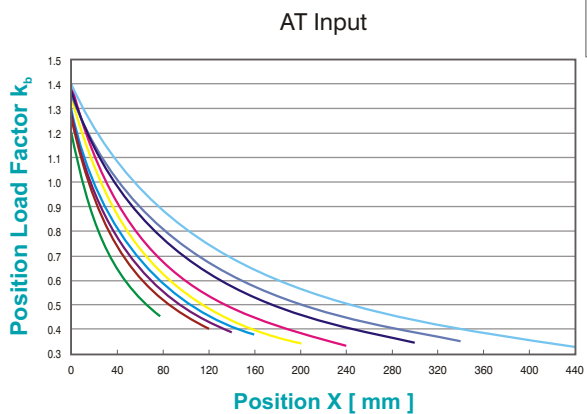
The permitted radial and axial loads on output shaft of the gearbox depend on the design of the gearbox supporting bearings.

APEX use the extension straddle oversized Tapered Roller bearing design.

It can take heavy loads from both axes.



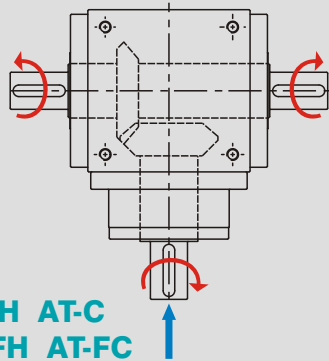
If radial force F_{2r} is exert on the center of the output shaft $X=1/2 \times L$. Under various operating condition the lifetime is over 30,000 hours. The permitted radial load is given on left diagram.



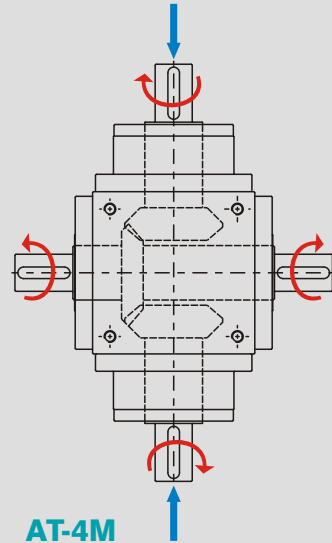
If radial force F_{2r} is not exert on the center of the output shaft $X < 1/2 \times L$ or $X > 1/2 \times L$. The permitted radial and axial loads can be calculated by the position load factor k_b on the left diagram.

Rotation Direction

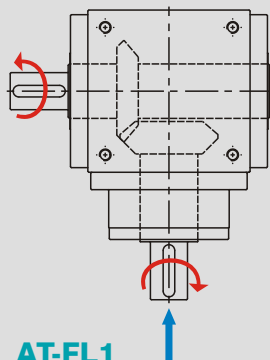
AT-L AT-H AT-C
AT-FL AT-FH AT-FC



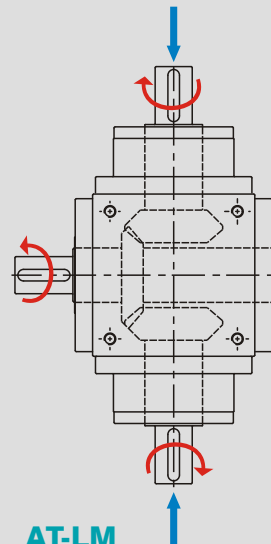
AT-4M



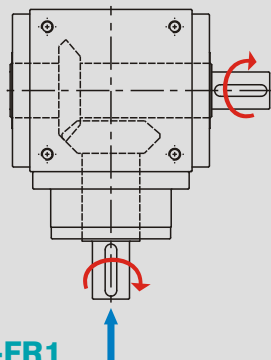
AT-L1 AT-FL1



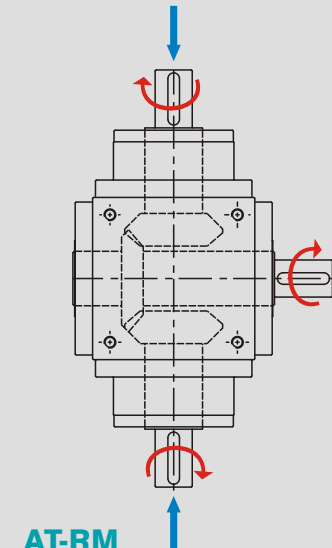
AT-LM



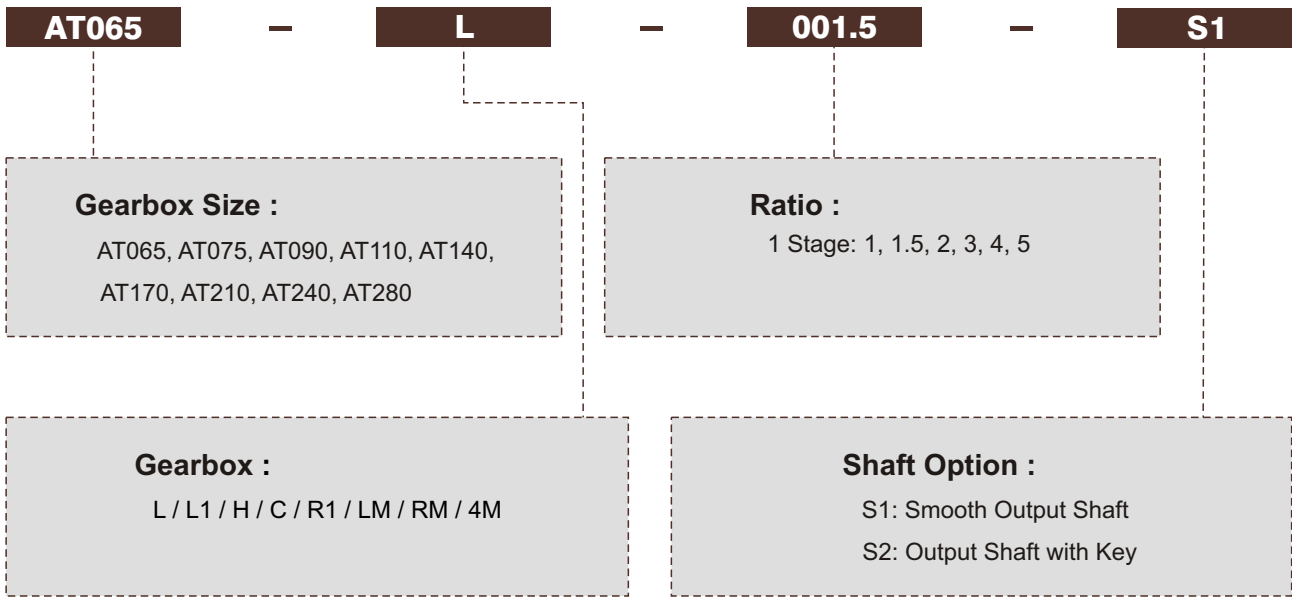
AT-R1 AT-FR1



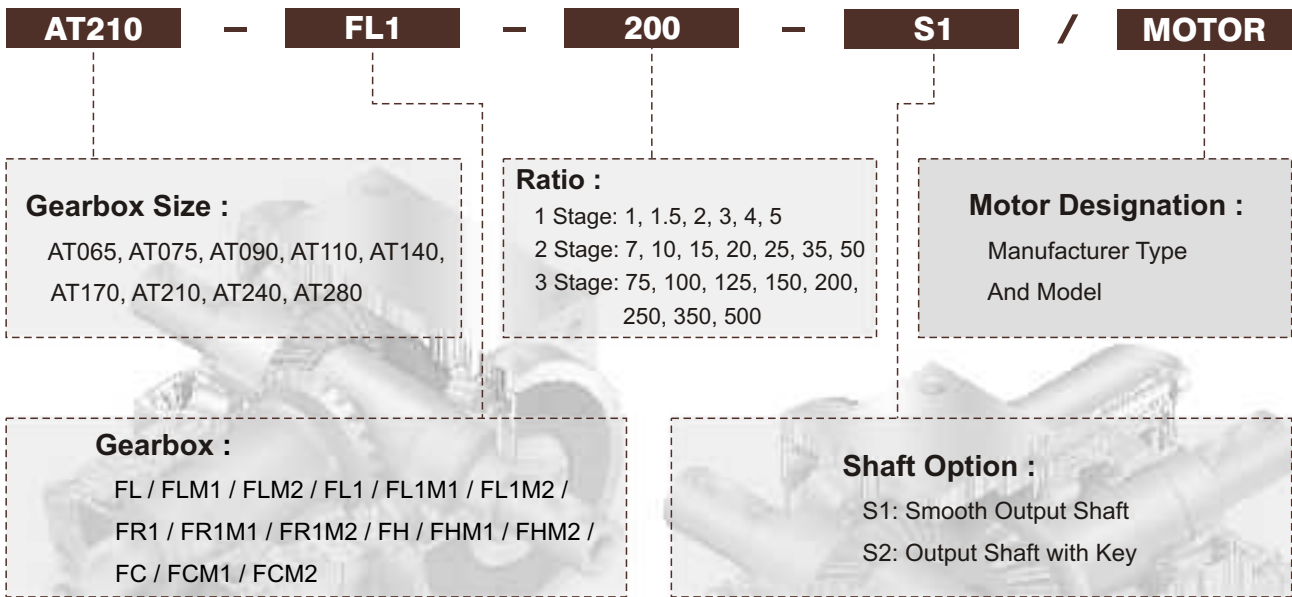
AT-RM



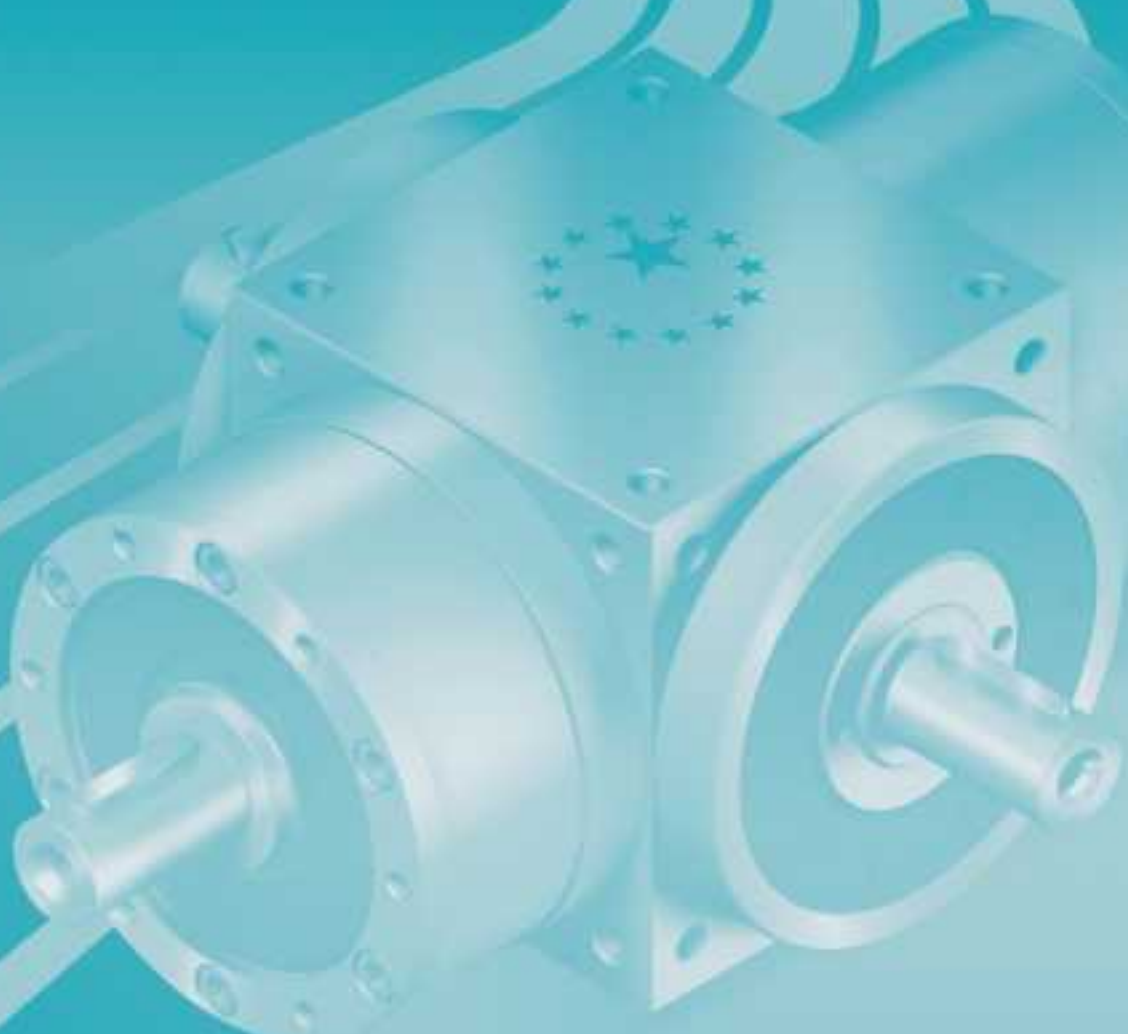
Ordering Code



Ordering Example: AT065-L-001.5-S1



Ordering Example: AT210-FL1-200-S1 / SIEMENS 1FK6 032-6AK71



AT SERIES

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