

HarmonicDrive®

Flat Hollow Shaft AC Servo Motor

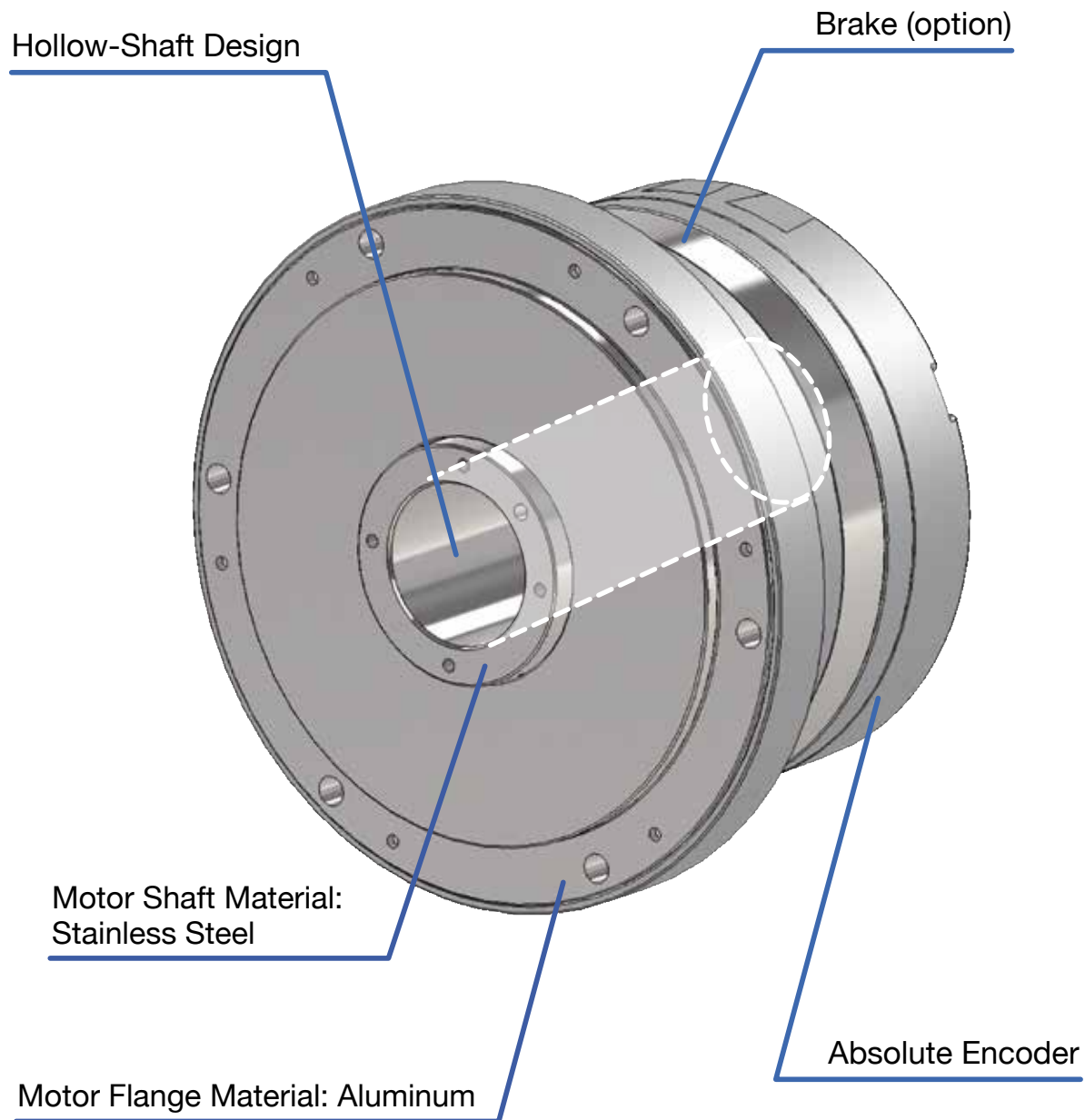
HMA Series



New high-performance, hollow-shaft servo motors are available in five sizes. Flat design features a large through-hole to allow cables, shafts or lasers to pass through the axis of rotation.

Features

- Hollow-shaft design to pass cables, pipes or lasers through the axis of rotation
- Flat design
- Five models with rated output from 163 to 1320 W
- Optional brake available without change in dimensions



Ordering Code

HMA **B** **09** **A** **200** - **10** **S17b** **A** - **C** - **SP**
 (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11)

| | | |
|-----|------------------------------------|---|
| (1) | Model Name | AC servo motor HMA series |
| (2) | Motor Version Symbol | A: Size 21A B: Size 09, 12, 15 C: Size 08 |
| (3) | Size | 08, 09, 12, 15, 21A |
| (4) | Brake | A: Without brake B: With brake |
| (5) | Applied Servo Driver Input Voltage | 100: 100 VAC (Only size 09 is compatible with 100 VAC) 200: 200 VAC |

| | | |
|------|-------------------------|---|
| (6) | Encoder Format | 10: A-format 2.5 Mbps, 1:1 connection |
| (7) | Encoder Resolution | S17b: 17-bit absolute encoder |
| (8) | Encoder Phase Angle | Phase difference between the motor U phase and the encoder origin A: 0 degrees |
| (9) | Connector Specification | C : With standard connectors N : Without connectors |
| (10) | Option Symbols | Y : Side exiting cable |
| (11) | Special Specifications | No symbol: Standard product SP: Special specification code |

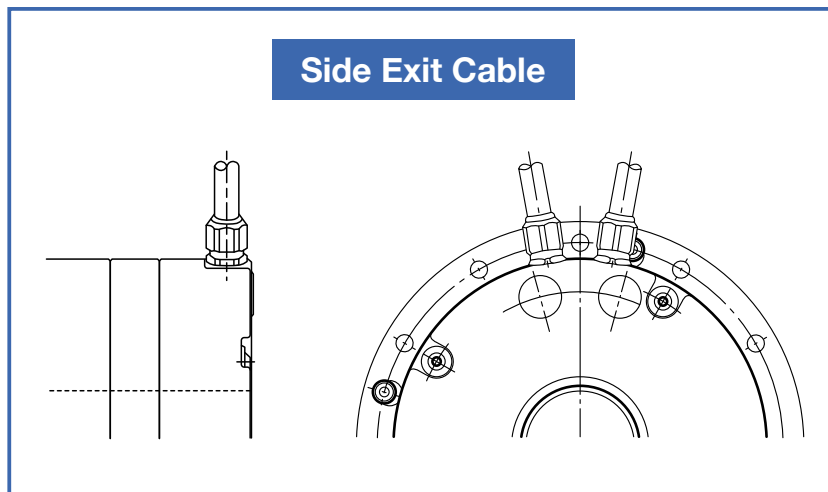
Option:

□ Side Exit Cable (Option: Y)

Cables (motor and encoder cable) exit from the side of the motor.

Use this option when there is not enough space in the rear of housing when installing a motor.

For size 08, contact us. Size 21A is not compatible.



Motor Specifications

| Item | | Model | HMAC08 | HMAB09 | | HMAB12 | HMAB15 | HMAA21A |
|---|--|---|---------------------------|----------------|------------|----------------|-------------------|-------------------|
| Combined driver | | | REL-230-18 | REL-230-18 | REL-230-36 | REL-230-36 | HA-800□-24D-E-200 | HA-800□-24D-E-200 |
| Input power supply voltage | V | | 200 | 200 | 100 | 200 | 200 | 200 |
| Rated output | W | | 163 | 251 | | 406 | 754 | 1320 |
| Instantaneous maximum torque ¹ | N·m | | 1.8 | 3.0 | | 6.6 | 13 | 33 |
| Rated torque ^{1,2} | N·m | | 0.52 | 0.80 | | 1.55 | 3.60 | 12.6 |
| Maximum speed ¹ | rpm | | 6,000 | 5,600 | 4,800 | 4,800 | 4,000 | 3,000 |
| Rated speed | rpm | | 3,000 | 3,000 | | 2,500 | 2,000 | 1,000 |
| Instantaneous maximum current ¹ | A _{rms} | | 6.5 | 8.9 | 15.4 | 18 | 29 | 55 |
| Rated current ^{1,2} | A _{rms} | | 2.1 | 2.5 | 4.3 | 4.2 | 7.8 | 20.0 |
| Torque constant ¹ | N·m/A _{rms} | | 0.35 | 0.41 | 0.24 | 0.44 | 0.54 | 0.72 |
| EMF constant ³ | V/(rpm) | | 0.037 | 0.043 | 0.025 | 0.046 | 0.057 | 0.075 |
| Phase resistance (20°C) | Ω | | 1.43 | 1.2 | 0.4 | 0.33 | 0.19 | 0.028 |
| Phase inductance | mH | | 2.5 | 3.0 | 1.0 | 1.4 | 1.2 | 0.29 |
| Moment of Inertia () indicates with brake | GD ² /4 | ×10 ⁻⁴ kg·m ² | 0.734 (0.828) | 1.78 (2.16) | | 6.45 (6.83) | 15.8 (19.8) | 125 (141) |
| | J | ×10 ⁻⁴ kgf·cm·s ² | 7.49 (8.45) | 18.2 (22.1) | | 65.8 (69.7) | 161 (202) | 1280 (1444) |
| Allowable radial load (static) | N | | 800 | 800 | | 1200 | 2400 | 4500 |
| | kgf | | 81.6 | 81.6 | | 122 | 245 | 459 |
| Allowable axial load (static) | N | | 1900 | 2400 | | 3600 | 5000 | 14000 |
| | kgf | | 194 | 245 | | 367 | 510 | 1429 |
| Rated radial load (At the rated speed) | N | | 175 | 185 | | 233 | 530 | 1040 |
| | kgf | | 17.9 | 18.9 | | 23.8 | 54.1 | 106.1 |
| Rated axial load (At the rated speed) | N | | 100 | 105 | | 130 | 180 | 880 |
| | kgf | | 10.2 | 10.7 | | 13.3 | 18.4 | 89.8 |
| Encoder type | | | Absolute encoder | | | | | |
| Encoder resolution capability | Single turn motor revolution | | 2 ¹⁷ (131,072) | | | | | |
| | Multi-turn revolution counter ⁴ | | 2 ¹⁶ (65,536) | | | | | |
| Weight () indicates with brake | kg | | 1.4 (1.5) | 2.0 (2.1) | | 3.4 (3.8) | 5.5 (6.2) | 17.5 (19.7) |
| Ambient environment specification | | Operating temperature: 0 to 40°C/Storage temperature: -20 to 60°C Operating/storage humidity: 20 to 80% RH (non-condensing) Vibration resistance: 25 m/s ² (frequency: 10 to 400 Hz) / impact resistance: 300 m/s ² Vibration resistance: 25 m/s ² (frequency: 10 to 400 Hz) / impact resistance: 300 m/s ² No dust, metal powder, corrosive gas, flammable gas, oil mist, or other similar material. Place indoors without being exposed to direct sunlight. Altitude: 1,000 m or less | | | | | | |
| Motor insulation | | Insulation resistance: 100 MΩ (500 VDC) or higher Dielectric strength voltage: 1500 VAC/min Insulation class: A | | | | | | |
| Mounting Direction | | Can be installed in any direction | | | | | | |
| Protection structure | | Totally enclosed self-cooled type (IP54) | | | | | | |

The values in the table above show typical values.

*1: When tested with HA-800.

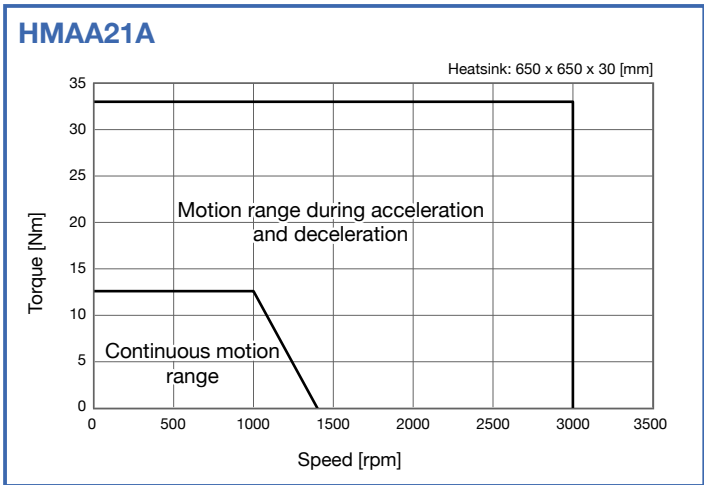
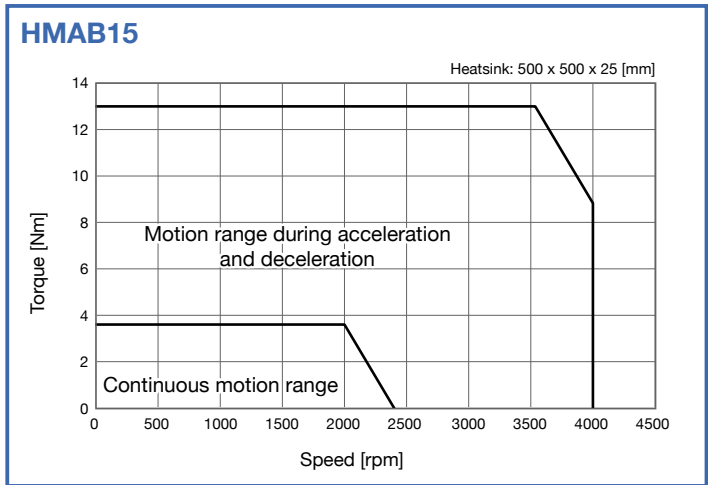
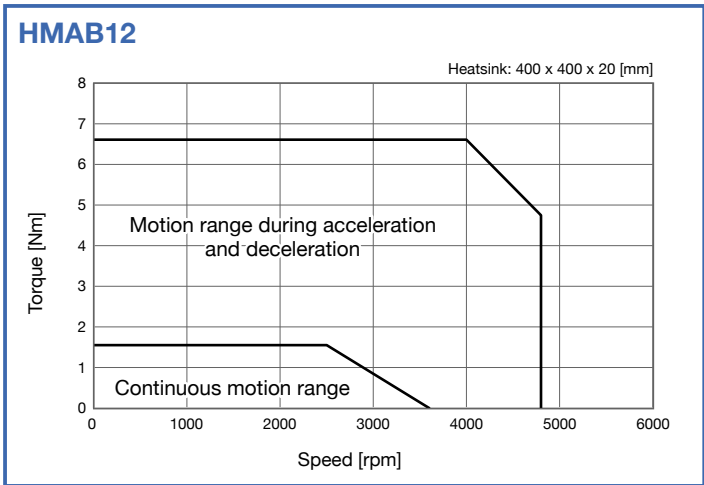
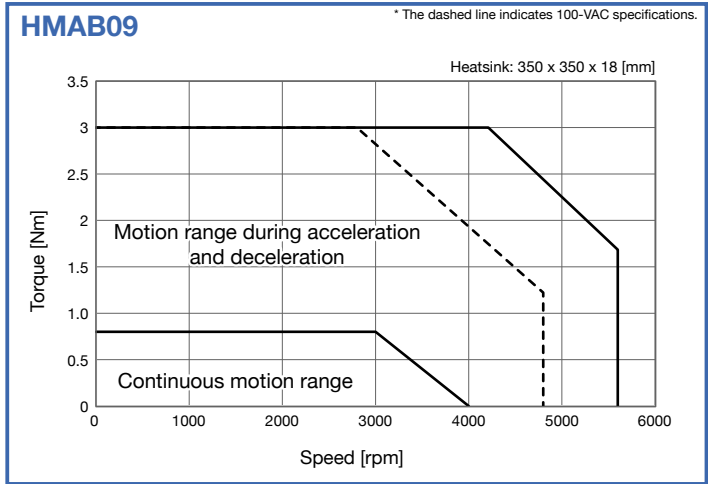
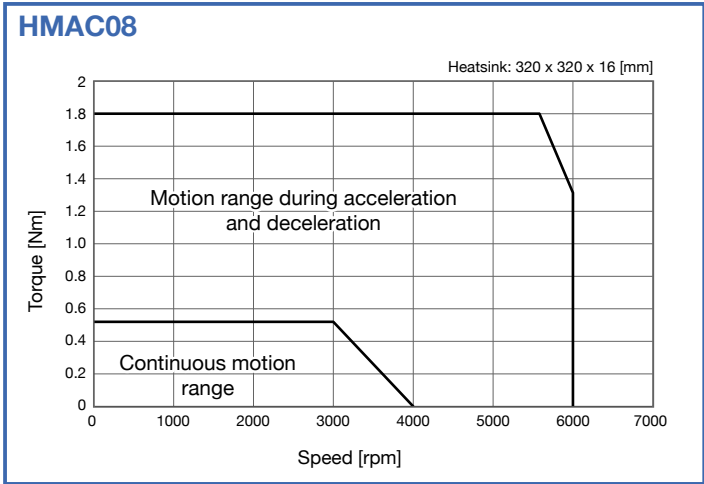
*2: This is the value for saturated temperature when installed on the next aluminum heatsink of the following size:

HMAC08: 320 x 320 x 16 [mm], HMAB09: 350 x 350 x 18 [mm], HMAB12: 400 x 400 x 20 [mm], HMAB15: 500 x 500 x 25 [mm], HMAA21A: 650 x 650 x 30 [mm]

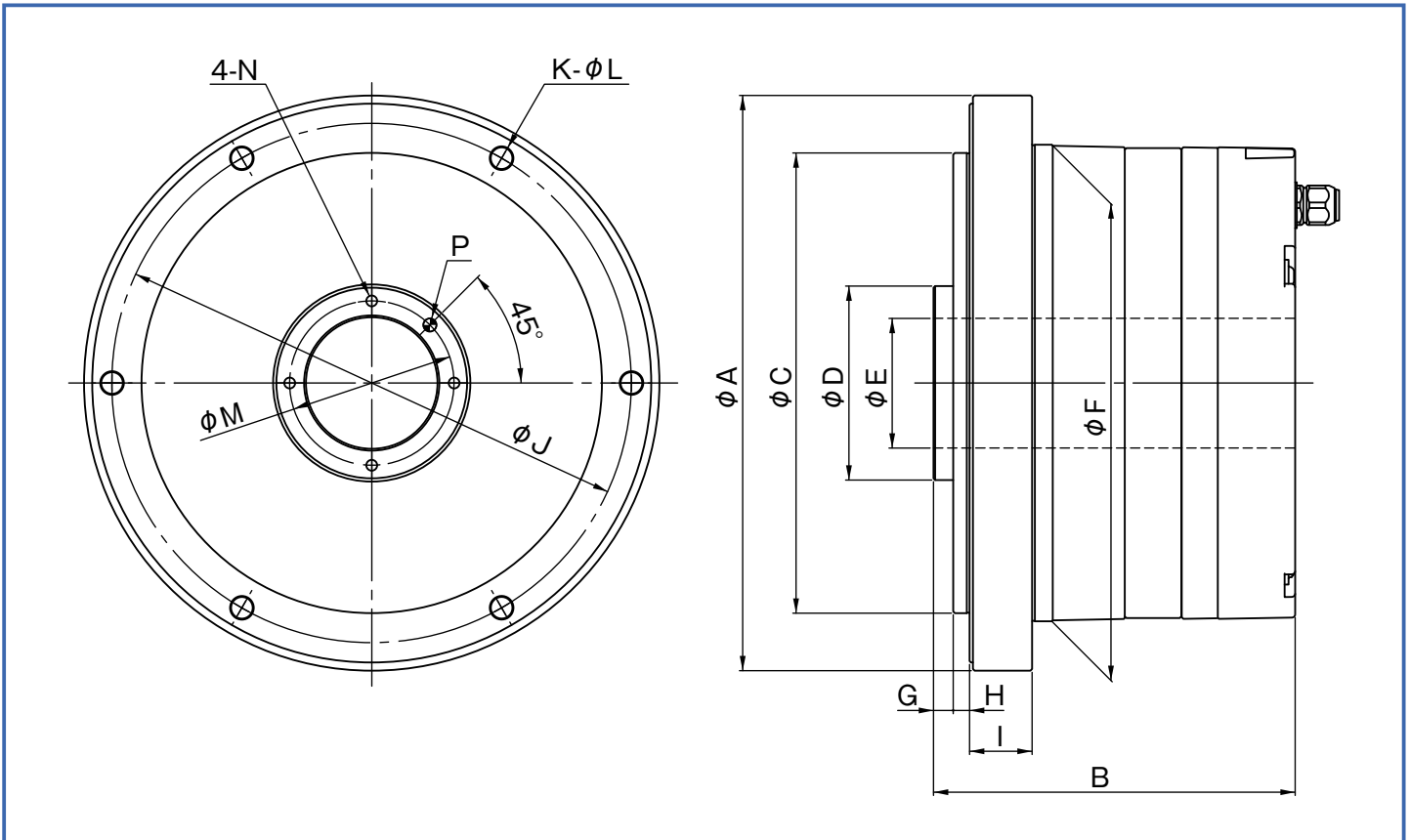
*3: This is the value of the phase EMF constant multiplied by 3.

*4: The range of the multi revolution counter is from -32,768 to 32,767.

Operable Range



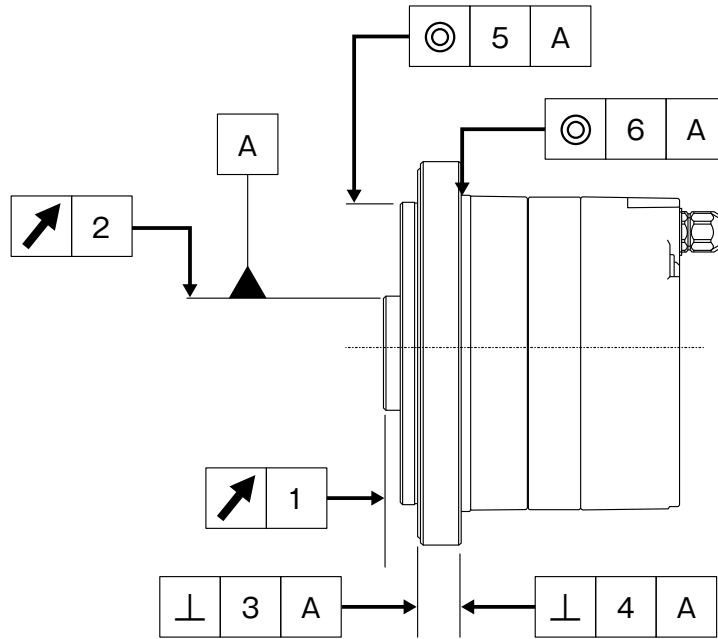
Outline Dimensions



(Unit: mm)

| Dimension | HMAC08 | HMAB09 | HMAB12 | HMAB15 | HMAA21A |
|----------------------|---------|---------|---------|---------|---------|
| φA | 94 | 114 | 146 | 175 | 247 |
| B | 89 | 88.5 | 95.5 | 110 | 157 |
| φC | 75 h7 | 90 h7 | 114 h7 | 140 h7 | 200 h7 |
| φD | 28 h6 | 34 h6 | 43 h6 | 59 h6 | 88 h6 |
| φE (hollow diameter) | 16 | 22 | 30 | 40 | 60 |
| φF | 77 h7 | 94 h7 | 122 h7 | 145 h7 | 210 h7 |
| G | 5 | 5 | 5 | 6 | 8 |
| H | 5 | 5 | 5 | 5 | 8 |
| I | 13 | 13 | 15 | 19 | 39 |
| φJ | 84 | 102 | 132 | 158 | 226 |
| K | 6 | 6 | 6 | 6 | 8 |
| φL | 3.4 | 4.5 | 5.5 | 6.6 | 9.0 |
| φM | 22 | 28 | 36 | 50 | 74 |
| N | M3X6 | M3X6 | M3X6 | M4X8 | M5X10 |
| P | Φ3 H7X5 | Φ3 H7X5 | Φ3 H7X5 | Φ4 H7X7 | Φ5 H7X8 |

Mechanical Accuracy



(Unit :mm)

| Accuracy Item | HMAC08 | HMAB09 | HMAB12 | HMAB15 | HMAA21A |
|--|--------|--------|--------|--------|---------|
| 1. Output shaft surface runout | 0.020 | 0.020 | 0.020 | 0.040 | 0.040 |
| 2. Output shaft radial runout | 0.020 | 0.020 | 0.020 | 0.040 | 0.040 |
| 3. Mounting surface squareness to the output shaft | 0.080 | 0.080 | 0.080 | 0.090 | 0.100 |
| 4. Mounting surface squareness to the output shaft | 0.060 | 0.065 | 0.065 | 0.085 | 0.090 |
| 5. Concentricity between the output shaft and actuator mounting diameter | 0.050 | 0.050 | 0.050 | 0.050 | 0.060 |
| 6. Concentricity between the output shaft and actuator mounting diameter | 0.045 | 0.045 | 0.045 | 0.055 | 0.065 |

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