



# Rotary Actuators

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ONE AND FOR ALL



# ROTARY ACTUATORS

> ONE AND FOR ALL

**Zhejiang Laifual Drive Co., Ltd.**  
www.laifualgroup.com



# SIX MAJOR ADVANTAGES

To assist your product development and production



## Perfect R&D Support

Perfect supported by our R&D team, enable picking up the model fastly, support the product innovation.



## Wonderful Precision Control

High-resolution encoder for greater acceleration control.



## Easy to use and maintain

Easy to disassemble and install, lower cost.



## Modular Design

Shorten the time for products to enter the market, makes the operation more easier, improve the product development and the productivity.

## Wide Product Range

With 4 major product series for high and low voltage, covers different application.



## Adaptable Structure

Small size, light weight, easy integration into various devices.

## LIS Series

Built-in servo drive, higher integrated, smaller size and more flexible

## MIC Series

Flange installation structure, small size and high torque, good dynamic performance, low noise.

## LTS Series

Unique cascade design, power supply and communication cables can be cascaded to match the cylinder wall to quickly assemble variety robots with simple cables.

## MIS Series

Extra large hollow shaft, going through the tube, cable and fibre, can support maximum diameter 50mm.

Lasifusa

# FIVE CORE COMPONENTS

## INDEPENDENT R&D, MANUFACTURED BY OUR OWN FACTORY!

**Laifual**

1. Use high-performance MCU, main frequency up to 6000MHz, strong capability of calculation.
2. Easy to integrate and deploy, supports multi communication protocol, convenient for customer.
3. High dynamic response, adopt advanced closed loop control technology, enable high-precision motion control and fast response.

### Innovated servo drive

### Housing

I and T type for choice

### Absolute Encoder

1. Dynamic support working voltage range 2V-5.5V, compatible with different motor option.
2. Ultra-low power, static power consumption 100mA, dynamic power 150mA.
3. Higher precision (support maximum 23BITS), can support both single / dual encoder.
4. Strong anti-interference ability, passed level 3 EMC testing.

### Framless Motor

1. Unique electromagnetic design for high precision, high efficiency magnetic field control, maximise motor output torque and energy efficiency.
2. Simple structure, big hollow shaft and flat design, ensures both motor performance and small size and light weight.
3. With high permeability silicon steel material, improve the power density.
4. Adopt the magnets with high remanence and high coercivity and the use of enamelled wires with a high temperature resistance grade ensure the high temperature resistance of the motor.
5. Use epoxy resin potting process for stator, improve heat dissipation and insulation performance.

### Electromagnetic Brake

1. Simple and reliable structural design, with the advantages of big hollow shaft, flat, light weight, low temperature rise, etc.
2. Higher performance production technology, use epoxy resin potting process for coils, improved heat dissipation and insulation performance.
3. Use higher performance spring materials, improve brake response speed and product reliability.
4. Innovatively developed friction plate materials, improve the lifespan, lower the noise.

### Strain Wave Gears

1. Wide range of products, offering the reduction ratio from 50 to 160, support the development of more joint actuators.
2. Independent R&D and self-production for strain wave gears, with the features of high reliability, high precision, high torque, long lifespan, big reduction ratio and small size.

# CORE ADVANTAGE

35+ Patents and Certificates

75%

## Powerful R&D Capability

The core R&D team members with rich experience are from the industry TOP enterprises, including doctoral and master's degree or above accounted for more than 75%.

## Professional R&D Team

Promote the R&D Progress, Support the Product Innovation.  
Software development, Structure development, Motor development, Application testing, Prodcution, Quality control.



35000<sub>M<sup>2</sup></sub>  
Indepedent Production Line

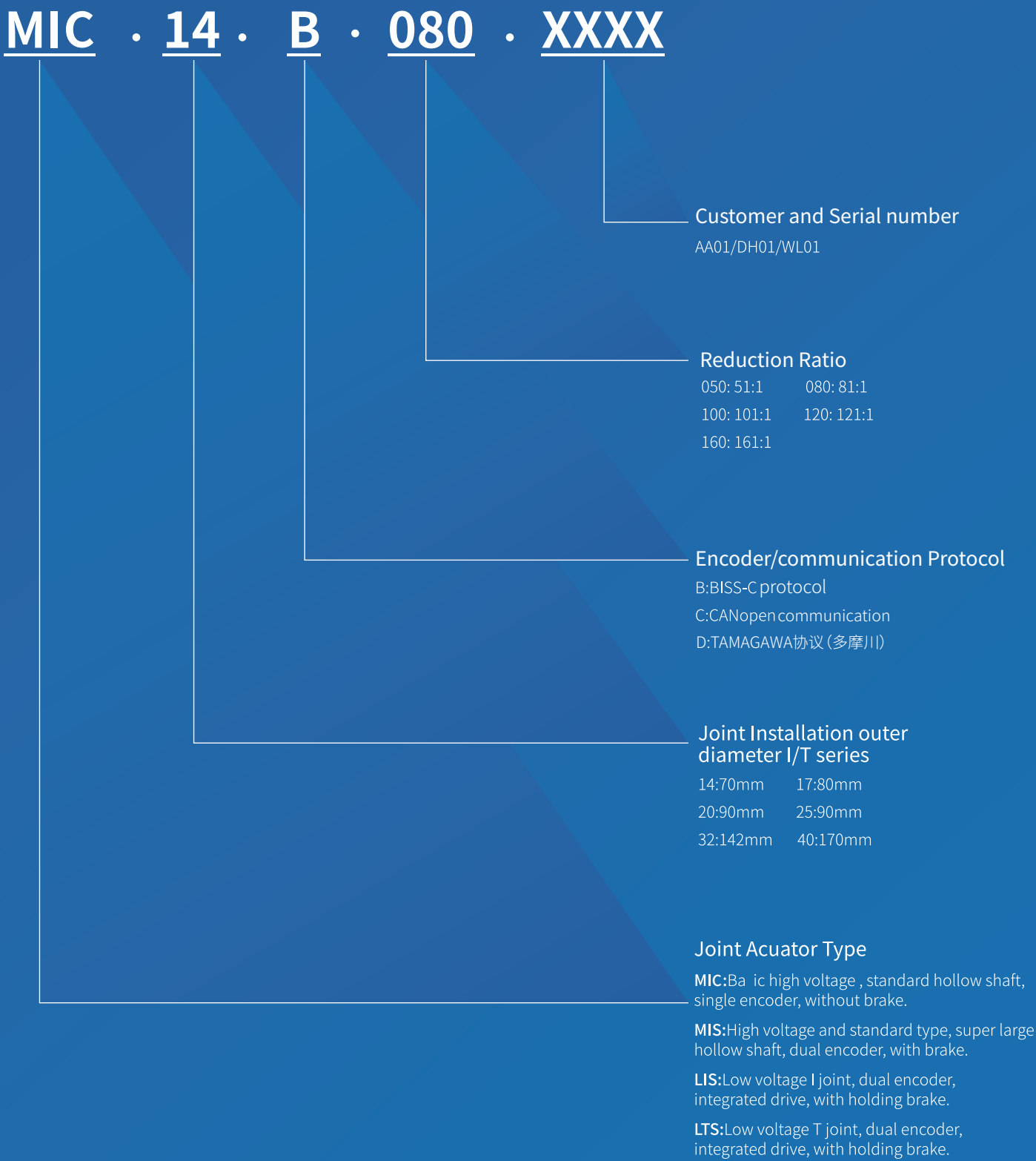
About 1530m<sup>2</sup> R&D testing production line, 35,000m<sup>2</sup> facility is under construction. Mass production is available from us.



## Standardized Production Process High Quality and Fast Delivery

With rich Strain Wave Gears experience, we have standardized production process, support high quality and fast delivery.

# MODEL INTERPRETATION



# MIC Series ROTARY ACTUATORS



### High Torque, Small Size

The maximum output torque reach to about 900Nm



### High Precision

Absolutely positioning accuracy can be controlled in 20 arc



### Strong Environmental adaptation, IP 65 protection

Meet the requirements of neutral salt spray and change to humid heat



### Maintenance Free

Maintenance free and no need to replace the oil during the full life cycle



### Long Life Span

High precision remains after 15,000 hours working

# LTS Series ROTARY ACTUATORS



### High Torque, Small Size

The maximum output torque reach to about 400Nm



### High Precision

Absolutely positioning accuracy can be controlled in 20 arc



### Big hollow shaft

Easy for going through the cable,tube and lasering



### Low vibration

Ultra low noise and vibration, good dynamic performance



### Strong Environmental adaptation,IP 65 protection

Meet the requirements of neutral salt spray and change to humid heat



### Maintenance Free

Maintenance free and no need to oil change during, the full life cycle



### Long Life Span

High precision remains after 15,000 hours working

# MIS Series ROTARY ACTUATORS



### High Precision

Absolutely positioning accuracy can be controlled in 20 arc



### Big hollow shaft

Easy for going through the cable, tube and lasering



### Maintenance Free

Maintenance free and no need to replace the oil during the full life cycle



### Long Life Span

High precision remains after 15,000 hours working



### Low vibration

Ultra low noise and vibration, good dynamic performance



# LIS Series ROTARY ACTUATORS



### High Torque, Small Size

The maximum output torque reach to about 400Nm



### High Precision

Absolutely positioning accuracy can be controlled in 20 arc



### Big hollow shaft

Easy for going through the cable,tube and lasering



### Low vibration

Ultra low noise and vibration, good dynamic performance



### Strong Environmental adaptation,IP 65 protection

Meet the requirements of neutral salt spray and change to humid heat



### Maintenance Free

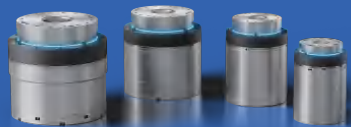
Maintenance free and no need to oil change during, the full life cycle



### Long Life Span

High precision remains after 15,000 hours working

# MIC Series Introduction



Basic high voltage , standard hollow shaft,single encoder, without brake.

Hollow shaft Dia: standard hollow shaft

Compact and lightweight, with uncompromising power.

Shortened outer diameter increases the maximum torque/ volume ratio to approximately twice that of conventional products.

Product features \*Optional waterproof function

- 1.High torque, small size: the maximum output torque reach to about 900Nm
- 2.High precision: Absolutely positioning accuracy can be controlled in 20 arc
- 3.Strong Environmental adaptation, IP 65 protection: Meet the requirements of neutral salt spray and change to humid heat
- 4.Maintenance Free: Maintenance free and no need to oil change during the full life cycle
- 5.Long Life Span :High precision remains after 15,000 hours working



| Model                                             |                    | 20                                                                                                                |       |       |       |  | 25         |       |       |       |       | 32       |       |       |       |       | 40       |       |  |  |
|---------------------------------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------|-------|-------|-------|--|------------|-------|-------|-------|-------|----------|-------|-------|-------|-------|----------|-------|--|--|
| Brand                                             |                    | CMD                                                                                                               |       |       |       |  |            |       |       |       |       |          |       |       |       |       |          |       |  |  |
| Harmonic Drive-reduction ratio                    |                    | 51                                                                                                                | 81    | 101   | 121   |  | 51         | 81    | 101   | 121   | 51    | 81       | 101   | 121   | 51    | 81    | 101      | 121   |  |  |
| Permissible Peak Torque at Start and Stop         | N·m                | 73                                                                                                                | 96    | 107   | 113   |  | 127        | 178   | 204   | 217   | 281   | 395      | 433   | 459   | 523   | 675   | 738      | 802   |  |  |
| Permissible Maximum Value for Average Load Torque | N·m                | 44                                                                                                                | 61    | 64    | 64    |  | 72         | 113   | 140   | 140   | 140   | 217      | 281   | 281   | 255   | 369   | 484      | 586   |  |  |
| Permissible Maximum Momentary Torque              | N·m                | 127                                                                                                               | 165   | 191   | 191   |  | 242        | 332   | 369   | 395   | 497   | 738      | 841   | 892   | 892   | 1270  | 1400     | 1530  |  |  |
| Rated Torque of Motor                             | N·m                | 1.23                                                                                                              | 1.08  | 0.91  | 0.76  |  | 2.02       | 1.99  | 1.98  | 1.65  | 3.23  | 3.15     | 3.27  | 2.73  | 7.14  | 6.51  | 6.85     | 6.92  |  |  |
| Maximum torque of Motor                           | N·m                | 2.04                                                                                                              | 1.69  | 0.51  | 1.33  |  | 3.56       | 3.14  | 2.89  | 2.56  | 6.48  | 5.74     | 5.04  | 4.46  | 14.65 | 11.90 | 10.44    | 9.47  |  |  |
| Maximum Rotate Speed                              | rpm                | 117.6                                                                                                             | 74.1  | 59.4  | 49.6  |  | 109.8      | 69.1  | 55.4  | 46.3  | 94.1  | 59.3     | 47.5  | 39.7  | 78.4  | 49.4  | 39.6     | 33.1  |  |  |
| Rated Rotate Speed                                | rpm                | 58.8                                                                                                              | 37.0  | 29.7  | 24.8  |  | 58.8       | 37.0  | 29.7  | 24.8  | 58.8  | 37.0     | 29.7  | 24.8  | 39.2  | 24.7  | 19.8     | 16.5  |  |  |
| Maximum Current                                   | Arms               | 5.17                                                                                                              | 4.28  | 3.82  | 3.37  |  | 8.15       | 7.19  | 6.61  | 5.87  | 10.94 | 9.68     | 8.51  | 7.53  | 20.49 | 17.82 | 15.62    | 14.17 |  |  |
| Rated Current                                     | Arms               | 3.11                                                                                                              | 2.72  | 2.29  | 1.91  |  | 4.62       | 4.57  | 4.54  | 3.79  | 5.45  | 5.32     | 5.52  | 4.61  | 9.99  | 9.74  | 10.24    | 10.35 |  |  |
| Torque Constant                                   | Nm/Arms            | 0.40                                                                                                              | 0.40  | 0.40  | 0.40  |  | 0.44       | 0.44  | 0.44  | 0.44  | 0.59  | 0.59     | 0.59  | 0.59  | 0.72  | 0.67  | 0.67     | 0.67  |  |  |
| Motor Phase resistance                            | Ohms               | 1.56                                                                                                              | 1.56  | 1.56  | 1.56  |  | 0.51       | 0.51  | 0.51  | 0.51  | 0.46  | 0.46     | 0.46  | 0.46  | 0.298 | 0.298 | 0.298    | 0.298 |  |  |
| Motor Phase Inductance                            | mH                 | 3.67                                                                                                              | 3.67  | 3.67  | 3.67  |  | 1.75       | 1.75  | 1.75  | 1.75  | 2.5   | 2.5      | 2.5   | 2.5   | 0.99  | 0.99  | 0.99     | 0.99  |  |  |
| Back-EMF                                          | Vrms/krpm          | 26.72                                                                                                             | 26.72 | 26.72 | 26.72 |  | 27.51      | 27.51 | 27.51 | 27.51 | 42.1  | 42.1     | 42.1  | 42.1  | 53.7  | 53.7  | 53.7     | 53.7  |  |  |
| Pole number                                       |                    | 8                                                                                                                 | 8     | 8     | 8     |  | 10         | 10    | 10    | 10    | 8     | 8        | 8     | 8     | 10    | 10    | 10       | 10    |  |  |
| Supply Voltage                                    | V                  |                                                                                                                   |       |       |       |  | AC220V     |       |       |       |       |          |       |       |       |       |          |       |  |  |
| Motor Insulation                                  |                    | Thermal Class:F(155°C)                                                                                            |       |       |       |  |            |       |       |       |       |          |       |       |       |       |          |       |  |  |
|                                                   |                    | Insulaing Resistance :above 500MΩ (DC500V)                                                                        |       |       |       |  |            |       |       |       |       |          |       |       |       |       |          |       |  |  |
|                                                   |                    | Withstanding Voltage and Insulation:AC1500V(1min), <5mA                                                           |       |       |       |  |            |       |       |       |       |          |       |       |       |       |          |       |  |  |
| Hollow shaft Siz                                  | mm                 | φ20                                                                                                               |       |       |       |  | φ31        |       |       |       |       | φ136     |       |       |       |       | φ46      |       |  |  |
| Dimensions                                        | mm                 | φ90×103                                                                                                           |       |       |       |  | φ110×113.5 |       |       |       |       | φ142×140 |       |       |       |       | φ170×169 |       |  |  |
| Absolutely Encoder                                | Encoder Type       | Dual Absolute                                                                                                     |       |       |       |  |            |       |       |       |       |          |       |       |       |       |          |       |  |  |
|                                                   | Encoder Resolution | Single 17bit/Muilt 16bit                                                                                          |       |       |       |  |            |       |       |       |       |          |       |       |       |       |          |       |  |  |
| Brake                                             | Brake type         | electromagnetic brake                                                                                             |       |       |       |  |            |       |       |       |       |          |       |       |       |       |          |       |  |  |
|                                                   | Braking method     | Power-off brake (powered by 24V DC to release the brake, and after release, voltage is reduced to 12V to hold it) |       |       |       |  |            |       |       |       |       |          |       |       |       |       |          |       |  |  |
| One way Positioning Accuracy                      | Arc sec            | 60                                                                                                                |       |       |       |  | 60         |       |       |       |       |          |       |       |       |       |          |       |  |  |
| Repeated Positioning Accuracy                     | Arc sec            | 20                                                                                                                |       |       |       |  |            |       |       |       |       |          |       |       |       |       |          |       |  |  |
| Overturning Stiffness                             | ×10^4 Nm/rad       | 23.5                                                                                                              | 27.3  | 27.3  | 27.3  |  | 34.7       | 42.8  | 42.8  | 42.8  | 87.5  | 113.6    | 113.6 | 113.6 | 149.5 | 187.4 | 187.4    | 187.4 |  |  |
| Torsional Stiffness                               | ×10^4 Nm/rad       | 1.8                                                                                                               | 2.3   | 2.3   | 2.3   |  | 3.4        | 4.6   | 4.6   | 4.6   | 7.6   | 9.9      | 9.9   | 9.9   | 14    | 18.6  | 18.6     | 18.6  |  |  |
| Moment of Inertia                                 | kg*mm^2            | 116                                                                                                               |       |       |       |  | 280        |       |       |       |       | 680      |       |       |       |       | 1819.4   |       |  |  |
| Weight                                            | kg                 | 1.9                                                                                                               |       |       |       |  | 3.5        |       |       |       |       | 6.5      |       |       |       |       | 8.3      |       |  |  |

# MIS Series Introduction



High voltage and standard type,super large hollow shaft, dual encoder, with brake.

Hollow shaft Dia:Super large hollow shaft

Highly integrated, fully independent design and production

CMD MIS series high-voltage modules are made of self-developed high-torque harmonic gearboxes, high-quality frameless motors, absolute encoders, electromagnetic brakes and other electromechanical products.

Product features \*Optional waterproof function

- 1.High precision: Absolutely positioning accuracy can be controlled in 20 arc
- 2.Big hollow shaft: Easy for going through the cable,tube and lasering
- 3.Maintenance Free: Maintenance free and no need to oil change during the full life cycle
- 4.Long Life Span :High precision remains after 15,000 hours working
- 5.Low vibration: Ultra low noise and vibration, good dynamic performance



| Model                                             |                    | 14           |                                                                                                                   |       | 17    |         |       |       | 20    |         |       |       | 25      |       |                                                                                                |            | 32    |       |          |       | 40    |       |       |       |       |       |
|---------------------------------------------------|--------------------|--------------|-------------------------------------------------------------------------------------------------------------------|-------|-------|---------|-------|-------|-------|---------|-------|-------|---------|-------|------------------------------------------------------------------------------------------------|------------|-------|-------|----------|-------|-------|-------|-------|-------|-------|-------|
| Brand                                             |                    | CMD          |                                                                                                                   |       |       |         |       |       |       |         |       |       |         |       |                                                                                                |            |       |       |          |       |       |       |       |       |       |       |
| Harmonic Drive-reduction ratio                    |                    | 51           | 81                                                                                                                | 101   | 51    | 81      | 101   | 121   |       | 51      | 81    | 101   | 121     | 51    | 81                                                                                             | 101        | 121   | 51    | 81       | 101   | 121   | 51    | 81    | 101   | 121   |       |
| Permissible Peak Torque at Start and Stop         |                    | N·m          | 23                                                                                                                | 30    | 36    | 44      | 56    | 70    | 70    |         | 73    | 96    | 107     | 113   | 127                                                                                            | 178        | 204   | 217   | 281      | 395   | 433   | 459   | 523   | 675   | 738   | 802   |
| Permissible Maximum Value for Average Load Torque |                    | N·m          | 9                                                                                                                 | 14    | 14    | 34      | 35    | 51    | 51    |         | 44    | 61    | 64      | 64    | 72                                                                                             | 113        | 140   | 140   | 140      | 217   | 281   | 281   | 255   | 369   | 484   | 586   |
| Permissible Maximum Momentary Torque              |                    | N·m          | 46                                                                                                                | 61    | 70    | 91      | 113   | 143   | 112   |         | 127   | 165   | 191     | 191   | 242                                                                                            | 332        | 369   | 395   | 497      | 738   | 841   | 892   | 892   | 1270  | 1400  | 1530  |
| Rated Torque of Motor                             |                    | N·m          | 0.25                                                                                                              | 0.25  | 0.20  | 0.95    | 0.62  | 0.72  | 0.60  |         | 1.23  | 1.08  | 0.91    | 0.76  | 2.02                                                                                           | 1.99       | 1.98  | 1.65  | 3.23     | 3.15  | 3.27  | 2.73  | 7.14  | 6.51  | 6.85  | 6.92  |
| Maximum torque of Motor                           |                    | N·m          | 0.64                                                                                                              | 0.53  | 0.51  | 1.23    | 0.99  | 0.99  | 0.83  |         | 2.04  | 1.69  | 1.51    | 1.33  | 3.56                                                                                           | 3.14       | 2.89  | 2.56  | 6.48     | 5.74  | 5.04  | 4.46  | 14.65 | 11.90 | 10.44 | 9.47  |
| Maximum Rotate Speed                              |                    | rpm          | 117.6                                                                                                             | 74.1  | 59.4  | 117.6   | 74.1  | 59.4  | 49.6  |         | 117.6 | 74.1  | 59.4    | 49.6  | 109.8                                                                                          | 69.1       | 55.4  | 46.3  | 94.1     | 59.3  | 47.5  | 39.7  | 78.4  | 49.4  | 39.6  | 33.1  |
| Rated Rotate Speed                                |                    | rpm          | 58.8                                                                                                              | 37.0  | 29.7  | 58.8    | 37.0  | 29.7  | 24.8  |         | 58.8  | 37.0  | 29.7    | 24.8  | 58.8                                                                                           | 37.0       | 29.7  | 24.8  | 58.8     | 37.0  | 29.7  | 24.8  | 39.2  | 24.7  | 19.8  | 16.5  |
| Maximum Current                                   |                    | Arms         | 2.45                                                                                                              | 2.01  | 1.93  | 2.89    | 2.31  | 2.32  | 1.94  |         | 5.17  | 4.28  | 3.82    | 3.37  | 8.15                                                                                           | 7.19       | 6.61  | 5.87  | 10.94    | 9.68  | 8.51  | 7.53  | 21.92 | 17.82 | 15.62 | 14.17 |
| Rated Current                                     |                    | Arms         | 0.96                                                                                                              | 0.94  | 0.75  | 2.23    | 1.45  | 1.69  | 1.41  |         | 3.11  | 2.72  | 2.29    | 1.91  | 4.62                                                                                           | 4.57       | 4.54  | 3.79  | 5.45     | 5.32  | 5.52  | 4.61  | 10.69 | 9.74  | 10.24 | 10.35 |
| Torque Constant                                   |                    | Nm/Arms      | 0.26                                                                                                              | 0.26  | 0.26  | 0.43    | 0.43  | 0.43  | 0.43  |         | 0.40  | 0.40  | 0.40    | 0.40  | 0.44                                                                                           | 0.44       | 0.44  | 0.44  | 0.59     | 0.59  | 0.59  | 0.59  | 0.67  | 0.67  | 0.67  | 0.67  |
| Motor Phase resistance                            |                    | Ohms         | 3.71                                                                                                              | 3.71  | 3.71  | 3.060   | 3.060 | 3.060 | 3.060 |         | 1.56  | 1.56  | 1.56    | 1.56  | 0.51                                                                                           | 0.51       | 0.51  | 0.51  | 0.47     | 0.47  | 0.47  | 0.47  | 0.15  | 0.15  | 0.15  | 0.15  |
| Motor Phase Inductance                            |                    | mH           | 3.41                                                                                                              | 3.41  | 3.41  | 6.4     | 6.4   | 6.4   | 6.4   |         | 3.67  | 3.67  | 3.67    | 3.67  | 1.75                                                                                           | 1.75       | 1.75  | 1.75  | 1.48     | 1.48  | 1.48  | 1.48  | 0.98  | 0.98  | 0.98  | 0.98  |
| Back-EMF                                          |                    | Vrms/krpm    | 20.73                                                                                                             | 20.73 | 20.73 | 30.72   | 30.72 | 30.72 | 30.72 |         | 26.72 | 26.72 | 26.72   | 26.72 | 27.51                                                                                          | 27.51      | 27.51 | 27.51 | 39.4     | 39.4  | 39.4  | 39.4  | 44.14 | 44.14 | 44.14 | 44.14 |
| Pole number                                       |                    |              | 8                                                                                                                 | 8     | 8     | 8       | 8     | 8     | 8     |         | 8     | 8     | 8       | 8     | 10                                                                                             | 10         | 10    | 10    | 10       | 10    | 10    | 10    | 10    | 10    | 10    | 10    |
| Supply Voltage                                    |                    | V            | AC 220V                                                                                                           |       |       |         |       |       |       |         |       |       |         |       |                                                                                                |            |       |       |          |       |       |       |       |       |       |       |
| Motor Insulation                                  |                    |              | Thermal Class:F(155℃)                                                                                             |       |       |         |       |       |       |         |       |       |         |       |                                                                                                |            |       |       |          |       |       |       |       |       |       |       |
|                                                   |                    |              | Insulaing Resistance:Above 500MΩ (DC500V)                                                                         |       |       |         |       |       |       |         |       |       |         |       |                                                                                                |            |       |       |          |       |       |       |       |       |       |       |
|                                                   |                    |              | Withstanding Voltage and Insulation:AC1500V(1minute), <5mA                                                        |       |       |         |       |       |       |         |       |       |         |       |                                                                                                |            |       |       |          |       |       |       |       |       |       |       |
| Hollow shaft Siz                                  |                    | mm           | φ14                                                                                                               |       |       | φ14     |       |       |       | φ14     |       |       | φ18.4   |       |                                                                                                | φ30        |       |       | φ30      |       |       |       |       |       |       |       |
| Dimensions                                        |                    | mm           | φ70×90                                                                                                            |       |       | φ80×101 |       |       |       | φ90×101 |       |       | φ110×90 |       |                                                                                                | φ142×109.5 |       |       | φ170×143 |       |       |       |       |       |       |       |
| Absolutely Encoder                                | Encoder Type       |              | Single Absolute                                                                                                   |       |       |         |       |       |       |         |       |       |         |       |                                                                                                |            |       |       |          |       |       |       |       |       |       |       |
|                                                   | Encoder Resolution |              | Single 17bit/Muilt 16bit                                                                                          |       |       |         |       |       |       |         |       |       |         |       |                                                                                                |            |       |       |          |       |       |       |       |       |       |       |
| Brake                                             | Brake type         |              | Electromagnetic brake                                                                                             |       |       |         |       |       |       |         |       |       |         |       | Permanent Magnetic Brake                                                                       |            |       |       |          |       |       |       |       |       |       |       |
|                                                   | Braking method     |              | Power-off brake (powered by 24V DC to release the brake, and after release, voltage is reduced to 12V to hold it) |       |       |         |       |       |       |         |       |       |         |       | Power-off brake (engaged by default, released with a 24V DC supply, without voltage reduction) |            |       |       |          |       |       |       |       |       |       |       |
| One way Positioning Accuracy                      |                    | Arc sec      | 60                                                                                                                |       |       |         |       |       |       |         |       |       |         |       | 60                                                                                             |            |       |       |          |       |       |       |       |       |       |       |
| Repeated Positioning Accuracy                     |                    | Arc sec      | 20                                                                                                                |       |       |         |       |       |       |         |       |       |         |       | 20                                                                                             |            |       |       |          |       |       |       |       |       |       |       |
| Overturning Stiffness                             |                    | ×10^4 Nm/rad | 7.05                                                                                                              | 9.8   | 9.8   | 22.8    | 25.8  | 25.8  | 25.8  |         | 23.5  | 27.3  | 27.3    | 27.3  | 34.7                                                                                           | 42.8       | 42.8  | 42.8  | 87.5     | 113.6 | 113.6 | 113.6 | 149.5 | 187.4 | 187.4 | 187.4 |
| Torsional Stiffness                               |                    | ×10^4 Nm/rad | 0.46                                                                                                              | 0.6   | 0.6   | 1.07    | 1.3   | 1.3   | 1.3   |         | 1.8   | 2.3   | 2.3     | 2.3   | 3.4                                                                                            | 4.6        | 4.6   | 4.6   | 7.6      | 9.9   | 9.9   | 9.9   | 14    | 18.6  | 18.6  | 18.6  |
| Moment of Inertia                                 |                    | kg*mm^2      | 37.6                                                                                                              |       |       | 58      |       |       |       | 123.1   |       |       | 201     |       |                                                                                                | 625        |       |       | 1271.8   |       |       |       |       |       |       |       |
| Weight                                            |                    | kg           | 1.08                                                                                                              |       |       | 1.6     |       |       |       | 2.1     |       |       | 1.85    |       |                                                                                                | 5.35       |       |       | 9.6      |       |       |       |       |       |       |       |



Low voltage T joint, dual encoder,integrated drive, with holding, brake.

Hollow Shaft Dia: Standard hollow shaft

Highly integrated, fully independent design and production

CMD LTS series low-voltage modules are made of self-developed high-torque harmonic gearboxes, high-quality frameless motors, absolute encoders, integrated drive, electromagnetic brakes and other electromechanical products.

Product features \*Optional waterproof function

- 1.High torque, small size: the maximum output torque reach to about 400Nm
- 2.High precision: Absolutely positioning accuracy can be controlled in 20 arc
- 3.Big hollow shaft: Easy for going through the cable,tube and lasering
- 4.Low vibration: Ultra low noise and vibration, good dynamic performance
- 5.Strong Environmental adaptation, IP 65 protection: Meet the requirements of neutral salt spray and change to humid heat
- 6.Maintenance Free: Maintenance free and no need to oil change during the full life cycle
- 7.Long Life Span :High precision remains after 15,000 hours working



| Model                                             |  | 14                 |                                                                                                                   |      | 17   |           |       |       |       | 20         |       |       |             | 25    |       |             |       | 32    |             |         |       | 40    |                                                                                                |        |        |        |
|---------------------------------------------------|--|--------------------|-------------------------------------------------------------------------------------------------------------------|------|------|-----------|-------|-------|-------|------------|-------|-------|-------------|-------|-------|-------------|-------|-------|-------------|---------|-------|-------|------------------------------------------------------------------------------------------------|--------|--------|--------|
| Brand                                             |  | CMD                |                                                                                                                   |      |      |           |       |       |       |            |       |       |             |       |       |             |       |       |             |         |       |       |                                                                                                |        |        |        |
| Harmonic Drive-reduction ratio                    |  | 51                 | 81                                                                                                                | 101  | 51   | 81        | 101   | 121   |       | 51         | 81    | 101   | 121         | 51    | 81    | 101         | 121   | 51    | 81          | 101     | 121   | 51    | 81                                                                                             | 101    | 121    |        |
| Permissible Peak Torque at Start and Stop         |  | N·m                | 23                                                                                                                | 30   | 36   | 44        | 56    | 70    | 70    |            | 73    | 96    | 107         | 113   | 127   | 178         | 204   | 217   | 281         | 395     | 433   | 459   | 523                                                                                            | 675    | 738    | 802    |
| Permissible Maximum Value for Average Load Torque |  | N·m                | 9                                                                                                                 | 14   | 14   | 34        | 35    | 51    | 51    |            | 44    | 61    | 64          | 64    | 72    | 113         | 140   | 140   | 140         | 217     | 281   | 281   | 255                                                                                            | 369    | 484    | 586    |
| Permissible Maximum Momentary Torque              |  | N·m                | 46                                                                                                                | 61   | 70   | 91        | 113   | 143   | 112   |            | 127   | 165   | 191         | 191   | 242   | 332         | 369   | 395   | 497         | 738     | 841   | 892   | 892                                                                                            | 1270   | 1400   | 1530   |
| Rated Torque of Motor                             |  | N·m                | 0.25                                                                                                              | 0.25 | 0.20 | 0.95      | 0.62  | 0.72  | 0.60  |            | 1.23  | 1.08  | 0.91        | 0.76  | 2.02  | 1.99        | 1.98  | 1.65  | 3.23        | 3.15    | 3.27  | 2.73  | 7.14                                                                                           | 6.51   | 6.85   | 6.92   |
| Maximum torque of Motor                           |  | N·m                | 0.64                                                                                                              | 0.53 | 0.51 | 1.23      | 0.99  | 0.99  | 0.83  |            | 2.04  | 1.69  | 1.51        | 1.33  | 3.56  | 3.14        | 2.89  | 2.56  | 6.48        | 5.74    | 5.04  | 4.46  | 14.65                                                                                          | 11.90  | 10.44  | 9.47   |
| Itself inertia of Motor                           |  | kg*mm^2            | 4.19                                                                                                              | 4.19 | 4.19 | 22.65     | 22.65 | 22.65 | 22.65 |            | 36.51 | 36.51 | 36.51       | 36.51 | 63.5  | 63.5        | 63.5  | 63.5  | 220.5       | 220.5   | 220.5 | 220.5 | 989.25                                                                                         | 990.25 | 991.25 | 992.25 |
| Maximum Rotate Speed                              |  | rpm                | 107.8                                                                                                             | 67.9 | 54.5 | 98.0      | 61.7  | 49.5  | 41.3  |            | 78.4  | 49.4  | 39.6        | 33.1  | 78.4  | 49.4        | 39.6  | 33.1  | 58.8        | 37.0    | 29.7  | 24.8  | 49.0                                                                                           | 30.9   | 24.8   | 20.7   |
| Rated Rotate Speed                                |  | rpm                | 58.8                                                                                                              | 37.0 | 29.7 | 58.8      | 37.0  | 29.7  | 24.8  |            | 58.8  | 37.0  | 29.7        | 24.8  | 58.8  | 37.0        | 29.7  | 24.8  | 39.2        | 24.7    | 19.8  | 16.5  | 39.2                                                                                           | 24.7   | 19.8   | 16.5   |
| Maximum Current                                   |  | Arms               | 8.25                                                                                                              | 6.77 | 6.52 | 13.48     | 10.80 | 10.83 | 9.04  |            | 19.59 | 15.15 | 13.54       | 11.94 | 29.65 | 26.16       | 24.05 | 21.35 | 43.09       | 38.14   | 33.53 | 33.19 | 84.01                                                                                          | 68.27  | 59.86  | 54.30  |
| Rated Current                                     |  | Arms               | 3.23                                                                                                              | 3.16 | 2.53 | 10.42     | 6.75  | 7.89  | 6.59  |            | 11.81 | 9.63  | 8.10        | 6.76  | 16.81 | 16.61       | 16.50 | 13.77 | 21.47       | 20.95   | 21.76 | 20.32 | 40.96                                                                                          | 37.32  | 39.26  | 39.67  |
| Torque Constant                                   |  | Nm/Arms            | 0.08                                                                                                              | 0.08 | 0.08 | 0.09      | 0.09  | 0.09  | 0.09  |            | 0.10  | 0.11  | 0.11        | 0.11  | 0.12  | 0.12        | 0.12  | 0.12  | 0.15        | 0.15    | 0.15  | 0.15  | 0.17                                                                                           | 0.17   | 0.17   | 0.17   |
| Motor Phase resistance                            |  | Ohms               | 0.39                                                                                                              | 0.39 | 0.39 | 0.140     | 0.140 | 0.140 | 0.140 |            | 0.11  | 0.11  | 0.11        | 0.11  | 0.05  | 0.05        | 0.05  | 0.05  | 0.032       | 0.032   | 0.032 | 0.032 | 0.014                                                                                          | 0.014  | 0.014  | 0.014  |
| Motor Phase Inductance                            |  | mH                 | 0.3                                                                                                               | 0.3  | 0.3  | 0.3       | 0.3   | 0.3   | 0.3   |            | 0.24  | 0.24  | 0.24        | 0.29  | 0.24  | 0.24        | 0.24  | 0.24  | 0.17        | 0.17    | 0.17  | 0.17  | 0.067                                                                                          | 0.067  | 0.067  | 0.067  |
| Back-EMF                                          |  | Vrms/krpm          | 6.15                                                                                                              | 6.15 | 6.15 | 6.67      | 6.67  | 6.67  | 6.67  |            | 6.78  | 6.78  | 6.78        | 6.78  | 7.78  | 7.78        | 7.78  | 7.78  | 10.07       | 10.07   | 10.07 | 10.07 | 11.56                                                                                          | 11.56  | 11.56  | 11.56  |
| Pole number                                       |  |                    | 8                                                                                                                 | 8    | 8    | 8         | 8     | 8     | 8     |            | 8     | 8     | 8           | 8     | 5     | 5           | 5     | 5     | 8           | 8       | 8     | 8     | 10                                                                                             | 10     | 10     | 10     |
| Supply Voltage                                    |  | V                  | DC 48V                                                                                                            |      |      |           |       |       |       |            |       |       |             |       |       |             |       |       |             |         |       |       |                                                                                                |        |        |        |
| Motor Insulation                                  |  |                    | Thermal Class:F(155°C)                                                                                            |      |      |           |       |       |       |            |       |       |             |       |       |             |       |       |             |         |       |       |                                                                                                |        |        |        |
|                                                   |  |                    | Insulaing Resistance :Above 500MΩ (DC500V)                                                                        |      |      |           |       |       |       |            |       |       |             |       |       |             |       |       |             |         |       |       |                                                                                                |        |        |        |
|                                                   |  |                    | Withstanding Voltage and Insulation:AC1500V(1minute), <5mA                                                        |      |      |           |       |       |       |            |       |       |             |       |       |             |       |       |             |         |       |       |                                                                                                |        |        |        |
| Hollow shaft Siz                                  |  | mm                 | 18                                                                                                                |      |      | 18        |       |       |       | 14         |       |       | 18          |       |       | 30          |       |       | 30          |         |       |       |                                                                                                |        |        |        |
| Dimensions                                        |  | mm                 | 74*99.5*86.5                                                                                                      |      |      | 85*113*97 |       |       |       | 96*120*108 |       |       | 115*143*131 |       |       | 148*169*170 |       |       | 177*203*201 |         |       |       |                                                                                                |        |        |        |
| Absolutely Encoder                                |  | Encoder Type       | Dual Absolute                                                                                                     |      |      |           |       |       |       |            |       |       |             |       |       |             |       |       |             |         |       |       |                                                                                                |        |        |        |
|                                                   |  | Encoder Resolution | Single 17bit/Muilt 16bit                                                                                          |      |      |           |       |       |       |            |       |       |             |       |       |             |       |       |             |         |       |       |                                                                                                |        |        |        |
| Brake                                             |  | Brake type         | Electromagnetic brake                                                                                             |      |      |           |       |       |       |            |       |       |             |       |       |             |       |       |             |         |       |       | Permanent Magnetic Brake                                                                       |        |        |        |
|                                                   |  | Braking method     | Power-off brake (powered by 24V DC to release the brake, and after release, voltage is reduced to 12V to hold it) |      |      |           |       |       |       |            |       |       |             |       |       |             |       |       |             |         |       |       | Power-off brake (engaged by default, released with a 24V DC supply, without voltage reduction) |        |        |        |
| One way Positioning Accuracy                      |  | Arc sec            | 60                                                                                                                |      |      |           |       |       |       |            |       |       |             |       |       |             |       |       |             |         |       |       |                                                                                                |        |        |        |
| Repeated Positioning Accuracy                     |  | Arc sec            | 20                                                                                                                |      |      |           |       |       |       |            |       |       |             |       |       |             |       |       |             |         |       |       |                                                                                                |        |        |        |
| Overturning Stiffness                             |  | ×10^4 Nm/rad       | 7.05                                                                                                              | 9.8  | 9.8  | 22.8      | 25.8  | 25.8  | 25.8  |            | 23.5  | 27.3  | 27.3        | 27.3  | 34.7  | 42.8        | 42.8  | 42.8  | 87.5        | 113.6   | 113.6 | 113.6 | 149.5                                                                                          | 187.4  | 187.4  | 187.4  |
| Torsional Stiffness                               |  | ×10^4 Nm/rad       | 0.46                                                                                                              | 0.6  | 0.6  | 1.07      | 1.3   | 1.3   | 1.3   |            | 1.8   | 2.3   | 2.3         | 2.3   | 3.4   | 4.6         | 4.6   | 4.6   | 7.6         | 9.9     | 9.9   | 9.9   | 14                                                                                             | 18.6   | 18.6   | 18.6   |
| Moment of Inertia                                 |  | kg*mm^2            | 61.2                                                                                                              |      |      | 71.2      |       |       |       |            | 83.42 |       |             | 226.5 |       |             | 893.6 |       |             | 2477.85 |       |       |                                                                                                |        |        |        |
| Weight                                            |  | kg                 | 1.4                                                                                                               |      |      | 2.2       |       |       |       |            | 2.7   |       |             | 4.7   |       |             | 8     |       |             | 12.9    |       |       |                                                                                                |        |        |        |



Low voltage T joint, dual encoder,integrated drive, with holding, brake.

Hollow Shaft Dia: Standard hollow shaft

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CMD LIS series low-voltage modules are made of self-developed high-torque harmonic gearboxes, high-quality frameless motors, absolute encoders, integrated drive, electromagnetic brakes and other electromechanical products.

Product features \*Optional waterproof function

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- 6.Maintenance Free: Maintenance free and no need to oil change during the full life cycle
- 7.Long Life Span :High precision remains after 15,000 hours working



| Model                                             |  | 14                 |                                                                                                                   |      | 17   |        |       |       |       | 20       |       |       |         | 25    |                                                                                                |           |       | 32    |          |       |       | 40    |        |        |        |        |
|---------------------------------------------------|--|--------------------|-------------------------------------------------------------------------------------------------------------------|------|------|--------|-------|-------|-------|----------|-------|-------|---------|-------|------------------------------------------------------------------------------------------------|-----------|-------|-------|----------|-------|-------|-------|--------|--------|--------|--------|
| Brand                                             |  | CMD                |                                                                                                                   |      |      |        |       |       |       |          |       |       |         |       |                                                                                                |           |       |       |          |       |       |       |        |        |        |        |
| Harmonic Drive-reduction ratio                    |  | 51                 | 81                                                                                                                | 101  | 51   | 81     | 101   | 121   |       | 51       | 81    | 101   | 121     | 51    | 81                                                                                             | 101       | 121   | 51    | 81       | 101   | 121   | 51    | 81     | 101    | 121    |        |
| Permissible Peak Torque at Start and Stop         |  | N·m                | 23                                                                                                                | 30   | 36   | 44     | 56    | 70    | 70    |          | 73    | 96    | 107     | 113   | 127                                                                                            | 178       | 204   | 217   | 281      | 395   | 433   | 459   | 523    | 675    | 738    | 802    |
| Permissible Maximum Value for Average Load Torque |  | N·m                | 9                                                                                                                 | 14   | 14   | 34     | 35    | 51    | 51    |          | 44    | 61    | 64      | 64    | 72                                                                                             | 113       | 140   | 140   | 140      | 217   | 281   | 281   | 255    | 369    | 484    | 586    |
| Permissible Maximum Momentary Torque              |  | N·m                | 46                                                                                                                | 61   | 70   | 91     | 113   | 143   | 112   |          | 127   | 165   | 191     | 191   | 242                                                                                            | 332       | 369   | 395   | 497      | 738   | 841   | 892   | 892    | 1270   | 1400   | 1530   |
| Rated Torque of Motor                             |  | N·m                | 0.25                                                                                                              | 0.25 | 0.20 | 0.95   | 0.62  | 0.72  | 0.60  |          | 1.23  | 1.08  | 0.91    | 0.76  | 2.02                                                                                           | 1.99      | 1.98  | 1.65  | 3.23     | 3.15  | 3.27  | 2.73  | 7.14   | 6.51   | 6.85   | 6.92   |
| Maximum torque of Motor                           |  | N·m                | 0.64                                                                                                              | 0.53 | 0.51 | 1.23   | 0.99  | 0.99  | 0.83  |          | 2.04  | 1.69  | 1.51    | 1.33  | 3.56                                                                                           | 3.14      | 2.89  | 2.56  | 6.48     | 5.74  | 5.04  | 4.46  | 14.65  | 11.90  | 10.44  | 9.47   |
| Itself inertia of Motor                           |  | kg*mm^2            | 4.19                                                                                                              | 4.19 | 4.19 | 22.65  | 22.65 | 22.65 | 22.65 |          | 36.51 | 36.51 | 36.51   | 36.51 | 91.4                                                                                           | 91.4      | 91.4  | 91.4  | 361.2    | 361.2 | 361.2 | 361.2 | 989.25 | 990.25 | 991.25 | 992.25 |
| Maximum Rotate Speed                              |  | rpm                | 107.8                                                                                                             | 67.9 | 54.5 | 98.04  | 61.73 | 49.50 | 41.32 |          | 78.4  | 49.4  | 39.6    | 33.1  | 78.4                                                                                           | 49.4      | 39.6  | 33.1  | 58.8     | 37.0  | 29.7  | 24.8  | 49.0   | 30.9   | 24.8   | 20.7   |
| Rated Rotate Speed                                |  | rpm                | 58.8                                                                                                              | 37.0 | 29.7 | 58.82  | 37.04 | 29.70 | 24.79 |          | 58.8  | 37.0  | 29.7    | 24.8  | 58.8                                                                                           | 37.0      | 29.7  | 24.8  | 39.2     | 24.7  | 19.8  | 16.5  | 39.2   | 24.7   | 19.8   | 16.5   |
| Maximum Current                                   |  | Arms               | 8.25                                                                                                              | 6.77 | 6.52 | 13.48  | 10.80 | 10.83 | 9.04  |          | 19.59 | 15.15 | 13.54   | 11.94 | 32.42                                                                                          | 28.61     | 26.30 | 23.35 | 38.93    | 34.45 | 30.29 | 26.80 | 84.01  | 68.27  | 59.86  | 54.30  |
| Rated Current                                     |  | Arms               | 3.23                                                                                                              | 3.16 | 2.53 | 10.42  | 6.75  | 7.89  | 6.59  |          | 11.81 | 9.63  | 8.10    | 6.76  | 18.38                                                                                          | 18.16     | 18.05 | 15.07 | 19.40    | 18.93 | 19.66 | 16.41 | 40.96  | 37.32  | 39.26  | 39.67  |
| Torque Constant                                   |  | Nm/Arms            | 0.08                                                                                                              | 0.08 | 0.08 | 0.09   | 0.09  | 0.09  | 0.09  |          | 0.10  | 0.11  | 0.11    | 0.11  | 0.11                                                                                           | 0.11      | 0.11  | 0.11  | 0.17     | 0.17  | 0.17  | 0.17  | 0.17   | 0.17   | 0.17   | 0.17   |
| Motor Phase resistance                            |  | Ohms               | 0.39                                                                                                              | 0.39 | 0.39 | 0.14   | 0.14  | 0.14  | 0.14  |          | 0.11  | 0.11  | 0.11    | 0.11  | 0.032                                                                                          | 0.032     | 0.032 | 0.032 | 0.036    | 0.036 | 0.036 | 0.036 | 0.014  | 0.014  | 0.014  | 0.014  |
| Motor Phase Inductance                            |  | mH                 | 0.3                                                                                                               | 0.3  | 0.3  | 0.3    | 0.3   | 0.3   | 0.3   |          | 0.24  | 0.24  | 0.24    | 0.29  | 0.11                                                                                           | 0.11      | 0.11  | 0.11  | 0.12     | 0.12  | 0.12  | 0.12  | 0.067  | 0.067  | 0.067  | 0.067  |
| Back-EMF                                          |  | Vrms/krpm          | 6.15                                                                                                              | 6.15 | 6.15 | 6.67   | 6.67  | 6.67  | 6.67  |          | 6.78  | 6.78  | 6.78    | 6.78  | 6.88                                                                                           | 6.88      | 6.88  | 6.88  | 11.2     | 11.2  | 11.2  | 11.2  | 11.56  | 11.56  | 11.56  | 11.56  |
| Pole number                                       |  |                    | 8                                                                                                                 | 8    | 8    | 8      | 8     | 8     | 8     |          | 8     | 8     | 8       | 8     | 10                                                                                             | 10        | 10    | 10    | 10       | 10    | 10    | 10    | 10     | 10     | 10     | 10     |
| Supply Voltage                                    |  | V                  | DC 48V                                                                                                            |      |      |        |       |       |       |          |       |       |         |       |                                                                                                |           |       |       |          |       |       |       |        |        |        |        |
| Motor Insulation                                  |  |                    | Thermal Class:F(155°C)                                                                                            |      |      |        |       |       |       |          |       |       |         |       |                                                                                                |           |       |       |          |       |       |       |        |        |        |        |
|                                                   |  |                    | Insulaing Resistance:Above 500MΩ (DC500V)                                                                         |      |      |        |       |       |       |          |       |       |         |       |                                                                                                |           |       |       |          |       |       |       |        |        |        |        |
|                                                   |  |                    | Withstanding Voltage and Insulation:AC1500V(1minute), <5mA                                                        |      |      |        |       |       |       |          |       |       |         |       |                                                                                                |           |       |       |          |       |       |       |        |        |        |        |
| Hollow shaft Siz                                  |  | mm                 | φ14                                                                                                               |      |      | φ14    |       |       |       | φ14      |       |       | φ18.4   |       |                                                                                                | φ30       |       |       | φ30      |       |       |       |        |        |        |        |
| Dimensions                                        |  | mm                 | φ70×75.2                                                                                                          |      |      | φ80×88 |       |       |       | φ90×92.9 |       |       | φ110×80 |       |                                                                                                | φ142×97.5 |       |       | φ170×133 |       |       |       |        |        |        |        |
| Absolutely Encoder                                |  | Encoder Type       | Dual Absolute                                                                                                     |      |      |        |       |       |       |          |       |       |         |       |                                                                                                |           |       |       |          |       |       |       |        |        |        |        |
|                                                   |  | Encoder Resolution | Single 17bit/Muilt 16bit                                                                                          |      |      |        |       |       |       |          |       |       |         |       |                                                                                                |           |       |       |          |       |       |       |        |        |        |        |
| Brake                                             |  | Brake type         | Electromagnetic brake                                                                                             |      |      |        |       |       |       |          |       |       |         |       | Permanent Magnetic Brake                                                                       |           |       |       |          |       |       |       |        |        |        |        |
|                                                   |  | Braking method     | Power-off brake (powered by 24V DC to release the brake, and after release, voltage is reduced to 12V to hold it) |      |      |        |       |       |       |          |       |       |         |       | Power-off brake (engaged by default, released with a 24V DC supply, without voltage reduction) |           |       |       |          |       |       |       |        |        |        |        |
| One way Positioning Accuracy                      |  | Arc sec            | 60                                                                                                                |      |      |        |       |       |       |          |       |       |         |       | 60                                                                                             |           |       |       |          |       |       |       |        |        |        |        |
| Repeated Positioning Accuracy                     |  | Arc sec            | 20                                                                                                                |      |      |        |       |       |       |          |       |       |         |       | 20                                                                                             |           |       |       |          |       |       |       |        |        |        |        |
| Overturning Stiffness                             |  | ×10^4 Nm/rad       | 7.05                                                                                                              | 9.8  | 9.8  | 22.8   | 25.8  | 25.8  | 25.8  |          | 23.5  | 27.3  | 27.3    | 27.3  | 34.7                                                                                           | 42.8      | 42.8  | 42.8  | 87.5     | 113.6 | 113.6 | 113.6 | 149.5  | 187.4  | 187.4  | 187.4  |
| Torsional Stiffness                               |  | ×10^4 Nm/rad       | 0.46                                                                                                              | 0.6  | 0.6  | 1.07   | 1.3   | 1.3   | 1.3   |          | 1.8   | 2.3   | 2.3     | 2.3   | 3.4                                                                                            | 4.6       | 4.6   | 4.6   | 7.6      | 9.9   | 9.9   | 9.9   | 14     | 18.6   | 18.6   | 18.6   |
| Moment of Inertia                                 |  | kg*mm^2            | 37.6                                                                                                              |      |      | 58     |       |       | 106.3 |          |       | 201   |         |       | 625                                                                                            |           |       |       |          |       |       |       |        |        |        |        |
| Weight                                            |  | kg                 | 1                                                                                                                 |      |      | 1.6    |       |       | 2     |          |       | 3.1   |         |       | 5.3                                                                                            |           |       |       |          |       |       |       |        |        |        |        |