

HARMONIC
DRIVE
SYSTEMS

INC
TOKYO JAPAN

ENGINEERING SPECIFICATION

Specifications of the flat and hollow shaft servo actuator

Low voltage type

SHA25 SHA32

| APPD | CHKD | BY |
|---------------------------|--------------------------|-----------------------------|
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| | | | | | | CLASS | SPEC NO. |
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ENGINEERING SPECIFICATION

1. Application

This specification applies to the following flat and hollow shaft servo actuator designed for low voltage power supply, DC20V to 90V.

SHA25A***SG-B09*LV-10S17bA-*

SHA32A***SG-B12*LV-10S17bA-*

2. Main Specifications

The main specifications for SHA25A are shown in Table 1 and SHA32 are shown in Table 2.

Table 1 Specifications of SHA25

| Item | Model | SHA25A | | | | |
|--|-------------------|---|------------|------------|------------|------------|
| | | 51 | 81 | 101 | 121 | 161 |
| Max. torque <small>Note 2</small> | Nm | 100 | 163 | 204 | 217 | 229 |
| Allowable continuous torque <small>Note 2</small> | Nm | 28 | 46 | 57 | 69 | 81 |
| Max. rotational speed <small>Note 3</small> | r/min | 75 | 47 | 38 | 32 | 24 |
| Torque constant | Nm/A | 5.3 | 8.5 | 10.6 | 12.7 | 16.9 |
| Max. current <small>Note 2</small> | Arms | 25.5 | | | 23 | 19 |
| Allowable continuous current <small>Note 2</small> | Arms | 8.5 | | | | 7.8 |
| EMF constant | V/(r/min) | 0.60 | 0.95 | 1.18 | 1.42 | 1.89 |
| Phase resistance (at 20°C) | Ω | 0.095 | | | | |
| Phase inductance | mH | 0.23 | | | | |
| Moment of Inertia (without brake) | kg·m ² | 0.56 | 1.42 | 2.2 | 3.2 | 5.6 |
| Moment of Inertia (with brake) | kg·m ² | 0.69 | 1.74 | 2.7 | 3.9 | 6.9 |
| Reduction ratio | — | 1:51 | 1:81 | 1:101 | 1:121 | 1:161 |
| Permissible moment load | Nm | 258 | | | | |
| Moment stiffness | Nm/rad | 39.2×10 ⁴ | | | | |
| Uni-directional positional accuracy | arc·sec | 50 | 40 | 40 | 40 | 40 |
| Encoder type | — | Magnetic absolute encoder | | | | |
| Single motor revolution | — | 2 ¹⁷ (131,072) | | | | |
| Encoder resolution | — | 2 ¹⁶ (65,536) | | | | |
| Motor multi revolution counter | — | 2 ¹⁶ (65,536) | | | | |
| Output resolution | Pulse/rev | 6,684,672 | 10,616,832 | 13,238,272 | 15,859,712 | 21,102,592 |
| Mass (without brake) | kg | 3.1 | | | | |
| Mass (with brake) | kg | 3.3 | | | | |
| Motor insulation | — | Insulation resistance : 100MΩ MIN (DC 500V) Dielectric strength : 1200V/1min, Insulation class : E | | | | |

Note1) The table shows typical output values of actuator.

Note2) When combined with a DEP-090-36 (by Copley).



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Note3) When DC48V is supplied into servo-driver.

Table 2 Specifications of SHA32

| Item | Model | SHA32A | | | | |
|--|-------------------|---|------------|------------|------------|------------|
| | | 51 | 81 | 101 | 121 | 161 |
| Max. torque <small>Note 2</small> | Nm | 146 | 238 | 298 | 357 | 477 |
| Allowable continuous torque <small>Note 2</small> | Nm | 37 | 61 | 77 | 93 | 126 |
| Max. rotational speed <small>Note 3</small> | r/min | 50 | 31 | 25 | 21 | 16 |
| Torque constant | Nm/A | 7.9 | 12.8 | 16.0 | 19.1 | 25.4 |
| Max. current <small>Note 2</small> | Arms | 25.5 | | | | |
| Allowable continuous current <small>Note 2</small> | Arms | 8.5 | | | | |
| EMF constant | V/(r/min) | 0.90 | 1.43 | 1.79 | 2.1 | 2.8 |
| Phase resistance (at 20°C) | Ω | 0.056 | | | | |
| Phase inductance | mH | 0.2 | | | | |
| Moment of Inertia (without brake) | kg·m ² | 2.0 | 5.1 | 8.0 | 11 | 20 |
| Moment of Inertia (with brake) | kg·m ² | 2.3 | 5.9 | 9.2 | 13 | 23 |
| Reduction ratio | — | 1:51 | 1:81 | 1:101 | 1:121 | 1:161 |
| Permissible moment load | Nm | 580 | | | | |
| Moment stiffness | Nm/rad | 100×10 ⁴ | | | | |
| Uni-directional positional accuracy | arc·sec | 50 | 40 | 40 | 40 | 40 |
| Encoder type | — | Magnetic absolute encoder | | | | |
| Single motor revolution Encoder resolution | — | 2 ¹⁷ (131,072) | | | | |
| Motor multi revolution counter | — | 2 ¹⁶ (65,536) | | | | |
| Output resolution | Pulse/rev | 6,684,672 | 10,616,832 | 13,238,272 | 15,859,712 | 21,102,592 |
| Mass (without brake) | kg | 5.9 | | | | |
| Mass (with brake) | kg | 6.2 | | | | |
| Motor insulation | — | Insulation resistance : 100MΩ MIN (DC 500V) Dielectric strength : 1200V/1min, Insulation class : E | | | | |

Note1) The table shows typical output values of actuator.

Note2) When combined with a DEP-090-36 (by Copley).

Note3) When DC48V is supplied into servo-driver.

3. Operable Range

Please refer operable range of each figures for different gear ratio at the under the following conditions. Figure1 show SHA25A and Figure2 show SHA32A for each gear ratio. For definitions please refer to the SHA technical documentation.

Conditions: DEP-090-36 Copley driver with DC48V input voltage.

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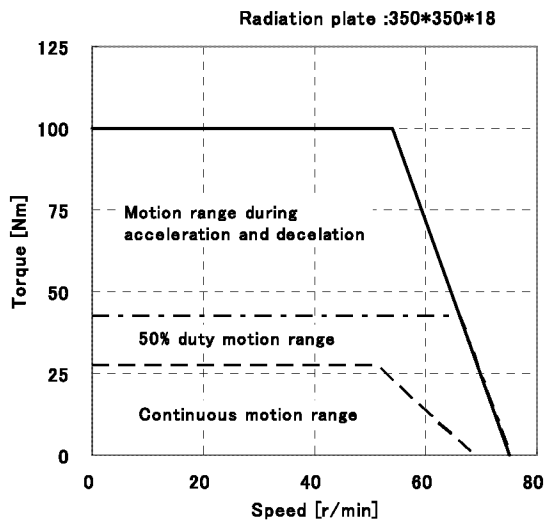


Fig.1-1 SHA25A51

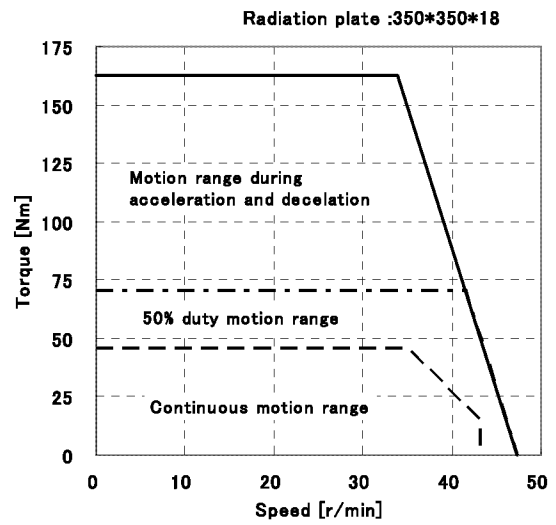


Fig.1-2 SHA25A81

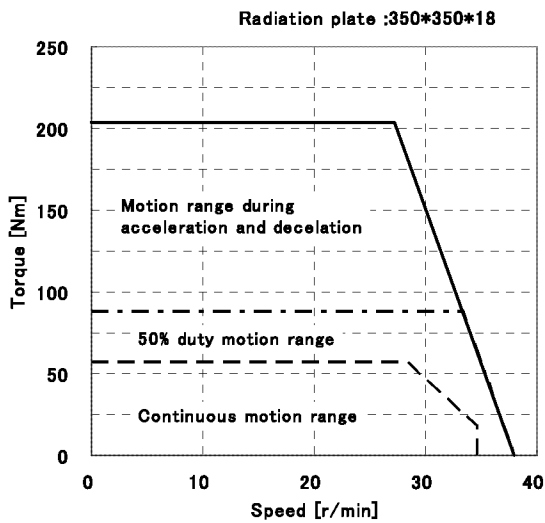


Fig.1-3 SHA25A101

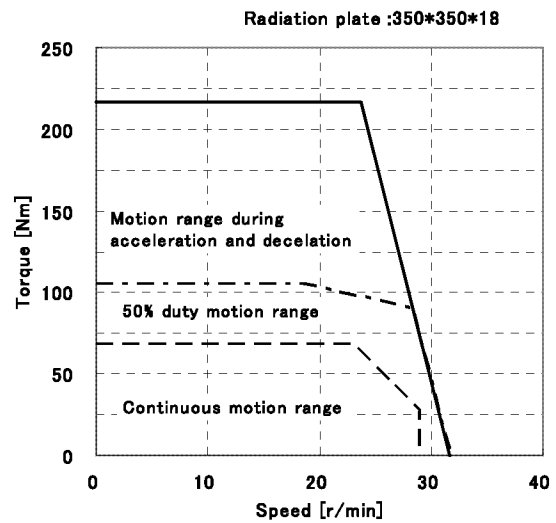



Fig.1-4 SHA25A121

| | | | | | | | |
|---|-----------|---------------|----|------|------|-----------|-----------|
| | | | | | | CLASS | SPEC NO. |
|  | Feb-14-11 | Correct error | — | — | — | | B2T0258-A |
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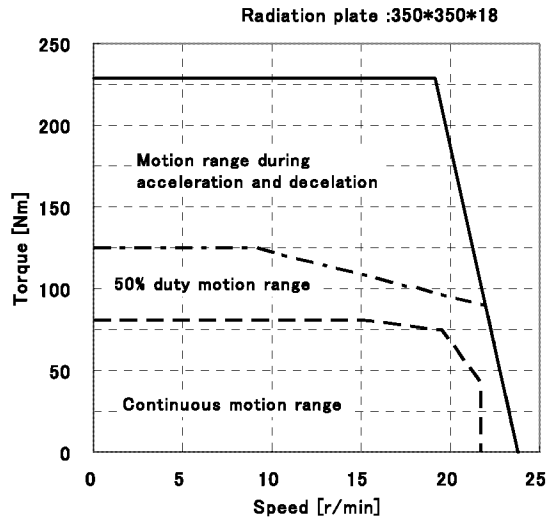


Fig.1-5 SHA25A161

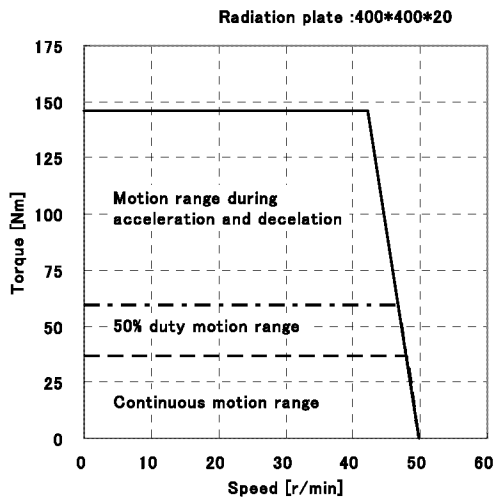


Fig.2-1 SHA32A51

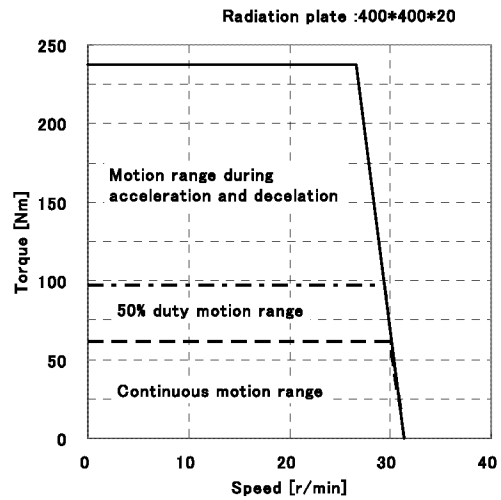



Fig.2-2 SHA32A81

| | | | | | | | |
|---|-----------|---------------|----|------|------|-----------|-----------|
| | | | | | | CLASS | SPEC NO. |
|  | Feb-14-11 | Correct error | — | — | — | | B2T0258-A |
| REV | DATE | DESCRIPTION | BY | CHKD | APPD | SHEET NO. | 5 OF 6 |

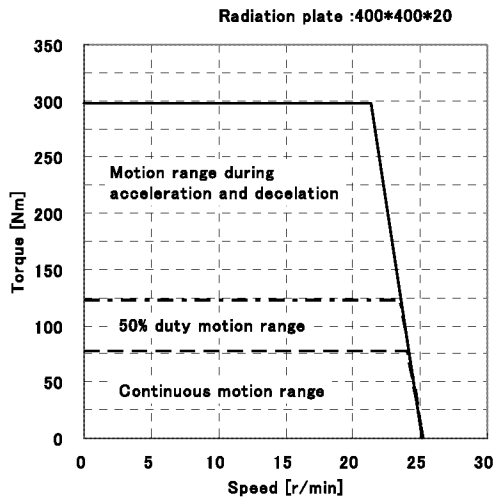


Fig.2-3 SHA32A101

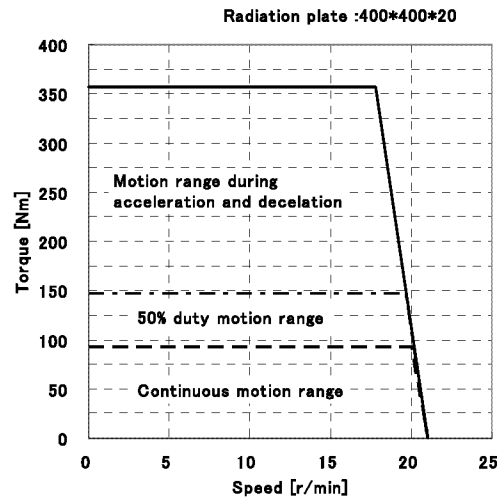


Fig.2-4 SHA32A121

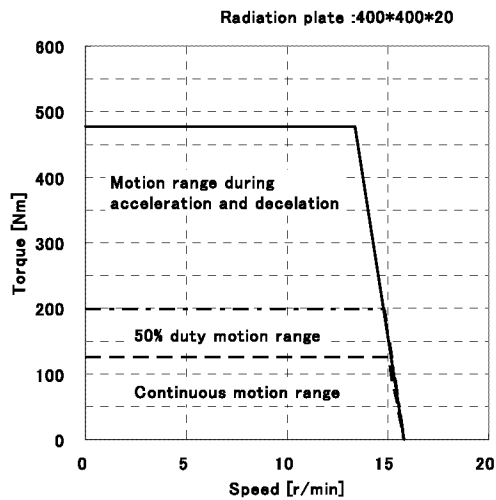



Fig.2-5 SHA32A161

4. Others

Please refer to the SHA technical documentation for further information.

| | | | | | | | |
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Appendix

1. Comparison of SHA25 Operable range – Low voltage winding type VS. 100V and 200V winding –

———— : Motion range during acceleration and deceleration - - - - - : 50% duty motion range - - - - - : Continuous motion range Radiation plate: 350*350*18

| Winding | Input (V) | Gear ratio | | | | |
|-------------|-----------|------------|------|-------|-------|-------|
| | | 1/51 | 1/81 | 1/101 | 1/121 | 1/161 |
| Low Voltage | DC48 | | | | | |
| | DC72 | | | | | |
| | DC90 | | | | | |
| AC100 | AC100 | | | | | |
| | AC200 | | | | | |

Appendix

2. Comparison of SHA32 Operable range – Low voltage winding type VS. 200V winding –

————: Motion range during acceleration and deceleration - - - - - : 50% duty motion range - - - - - : Continuous motion range Radiation plate: 400*400*20

| Winding | Input (V) | Gear ratio | | | | |
|-------------|-----------|------------|------|-------|-------|-------|
| | | 1/51 | 1/81 | 1/101 | 1/121 | 1/161 |
| Low Voltage | DC48 | | | | | |
| | DC72 | | | | | |
| AC200 | DC90 | | | | | |
| | AC200 | | | | | |