



**HARMONIC
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ENGINEERING SPECIFICATION

Specifications of FHA-17C-E-SP with US type 14-Wires Encoder

| APPD | CHKD | BY |
|---------------------------|--------------------------|-----------------------------|
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|-----|----------------------|-----------|-----------|
| | | CLASS | SPEC No. |
| 1 | Add a Operable Range | | B2N1631-A |
| REV | DESCRIPTION | SHEET No. | 1 OF 6 |



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1. Specifications in this document should be applied for the following FHA-17C-US-E-SP series.

1) FHA-17C-***-US250-E-SP

2. Actuator

Table 1 show main specifications of the FHA-17C-E-SP with 14-wires encoder. Another specifications are same as that of standard actuator

Table 1 Specifications of FHA-17C

Ambient temperature (operation):0~40°C

Enclosure: Totally closed, self-cooling
(IP44 equivalent)

Ambient temperature (storage):-20~60°C

Vibration:24.5m/s²

Relative humidity:20~80%RH(no condensation)

Shock resistance:294m/s²

Lubricant : Harmonic grease SK-1A³⁾

| Item | Type Ratio | FHA-17C | | |
|-------------------------------------|-------------------|---------------------|-----------|-----------|
| | | 50 | 100 | 160 |
| Maximum torque | N·m | 39 | 57 | 64 |
| Maximum speed | r/min | 96 | 48 | 30 |
| Maximum current | A | 30 | 22 | 16 |
| Torque constant ¹⁾ | N·m/A | 1.5 | 3.0 | 4.8 |
| Voltage constant | V/(r/min) | 0.17 | 0.34 | 0.54 |
| Moment of inertia | kg·m ² | 0.17 | 0.67 | 1.7 |
| Continuous current | A | 11 | 11 | 7.7 |
| Continuous torque ²⁾ | N·m | 11 | 24 | 24 |
| Allowable radial load | kN | 2.9 | | |
| Allowable axial load | kN | 9.8 | | |
| Allowable torsional moment | N·m | 188 | | |
| Moment stiffness | N·m/rad | 2.2×10 ⁵ | | |
| Unidirectional positioning accuracy | Arc-sec. | 60 | 40 | 40 |
| Resolution | p/rev | 500,000 | 1,000,000 | 1,600,000 |
| Mass | kg | 2.5 | | |

note 1) Torque constant is specified considering an efficiency of gear.

note 2) Continuous torque is determined when continuous current is given using HDSI driver.

note 3) If another grease is used, quality assurance test has to be done.

| | | | |
|-----|----------------------|-------------|-----------|
| | | CLASS | SPEC No. |
| 1 | Add a Operable Range | | B2N1631-A |
| REV | DESCRIPTION | SHEET No. 2 | OF 6 |



ENGINEERING SPECIFICATION

3. Motor

Motor specifications shown in Table 2

Table 2

| Item | Type | FHA-17C |
|------------------------------|--------------------------------------|---|
| Input supply voltage | | DC24V |
| Maximum speed | r/min | 4800 |
| Maximum torque ¹⁾ | N · m | 0.87 or more |
| Voltage constant | V/(rad/s) | 0.032 |
| Moment of inertia | $\times 10^{-4}$ kg · m ² | 0.55 |
| Phase resistance (at 20°C) | Ω | 0.07 |
| Phase inductance | mH | 0.03 |
| Number of paired poles | | 6 |
| Insulation class | | F |
| Voltage strength | | AC500V/1min |
| Insulation resistance | | 100M Ω or more (by DC500V insulation tester) |
| Phase sequence | | U→V→W (with CW rotation facing encoder end) |

note 1) Maximum torque is determined when the current is 110% of theoretical value.

4. Encoder

4-1 Main specifications

Main specifications shown in Table 3

Table 3

| Item | Unit | Specification | |
|-----------------------------------|-------|---|------|
| Type | | Incremental, Rectangular wave, 14-wires | |
| Output signal | | A, B, Z, U, V, W | |
| Number of pulse | A,B | P/R | 2500 |
| | U,V,W | P/R | 6 |
| | Z | P/R | 1 |
| Power supply voltage | V | +5DC \pm 5% | |
| Current consumption ¹⁾ | mA | 350 max. | |
| Output circuit form | | Line driver (equivalent to AM26LS31C) | |
| Maximum response frequency | kHz | 200 | |

note 1) When R1 resistor shown in Fig. 3 below

| | | | |
|-----|----------------------|-----------|-----------|
| | | CLASS | SPEC No. |
| 1 | Add a Operable Range | | B2N1631-A |
| REV | DESCRIPTION | SHEET No. | 3 OF 6 |

4-2 Signal waveform

Fig. 1 shows A, B and Z signal and relationship with U signal with CW rotation facing the encoder end.

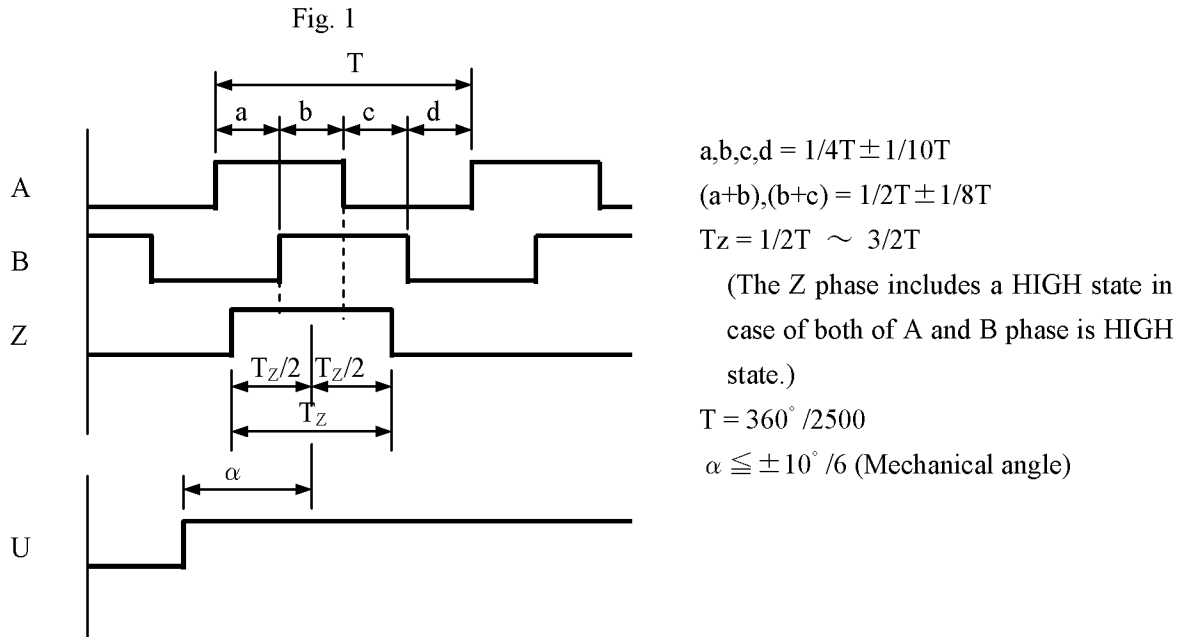
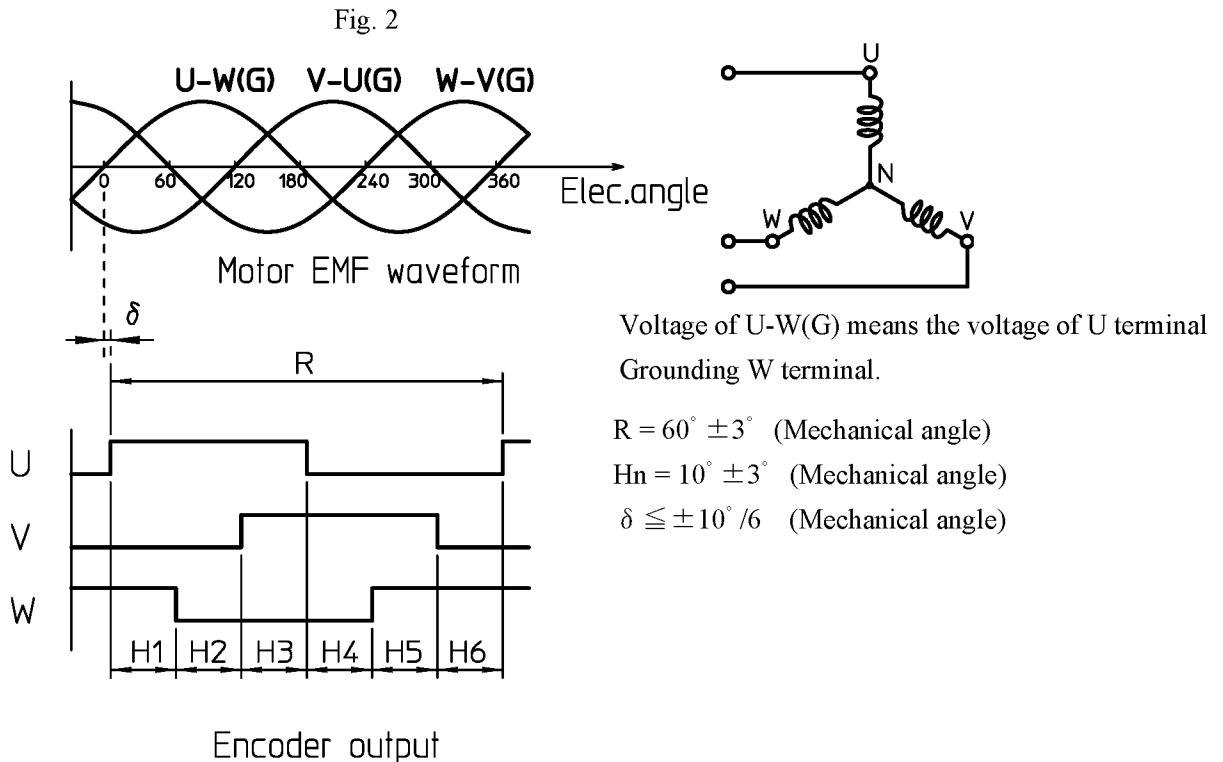


Fig 2 shows U, V and W signal and relationship with motor's EMF with CW rotation facing the encoder end (the end of the actuator output shaft).



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|-----|----------------------|-----------|-----------|
| | | CLASS | SPEC No. |
| 1 | Add a Operable Range | | B2N1631-A |
| REV | DESCRIPTION | SHEET No. | 4 OF 6 |

4-3 Encoder leads

Color code of encoder leads shown in Table 4

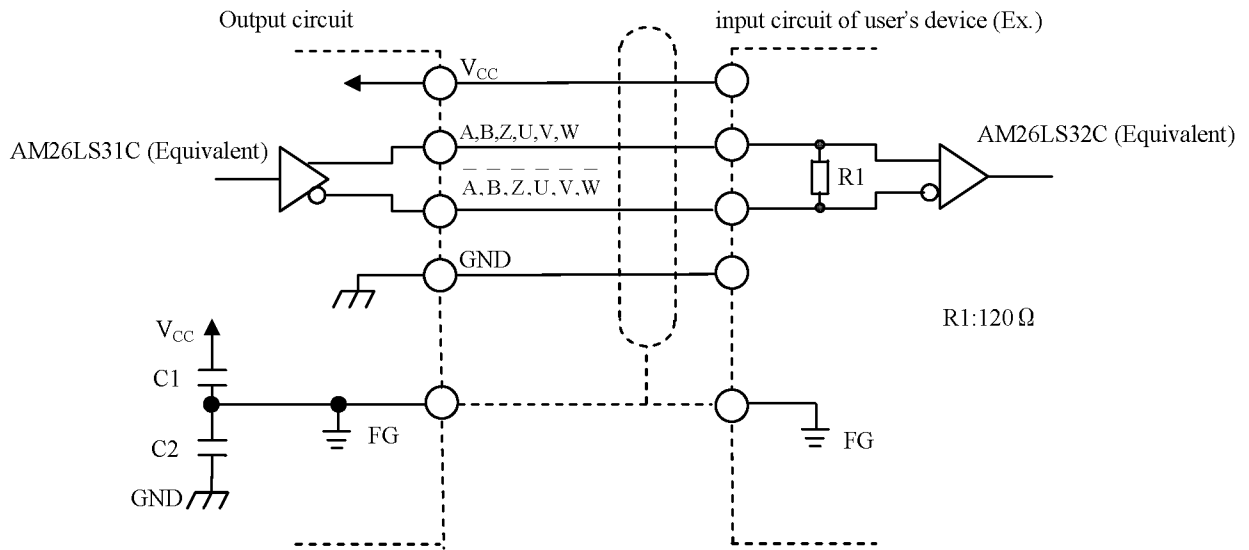
Table 4

| Color | Signal | Color | Signal |
|--------|-----------------|--------------|-----------|
| Red | V _{CC} | Black | GND |
| Green | A | Green/White | \bar{A} |
| Gray | B | Gray/White | \bar{B} |
| Yellow | Z | Yellow/White | \bar{Z} |
| Brown | U | Brown/White | \bar{U} |
| Blue | V | Blue/White | \bar{V} |
| Orange | W | Orange/White | \bar{W} |

4-4 Output circuit and example for receiving signal.

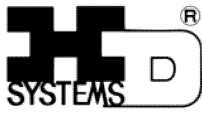
Fig 3 shows output circuit of encoder and example for input circuit to user's device

Fig. 3



Voltage strength of capacitor C1,C2 : 50V

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|-----|----------------------|-------------|-----------|
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| 1 | Add a Operable Range | | B2N1631-A |
| REV | DESCRIPTION | SHEET No. 5 | OF 6 |



ENGINEERING SPECIFICATION

5. Operable Range

Fig. 4 shows the range which can operate an actuator.

For definitions please refer to the FHA technical document.

Fig. 4-1

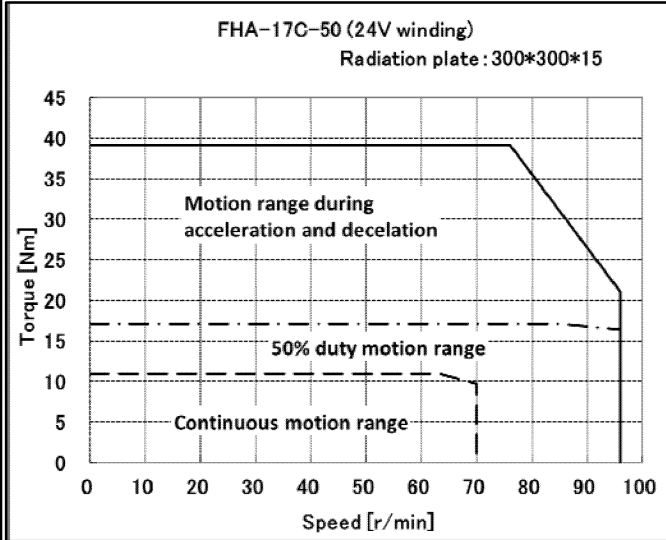


Fig. 4-2

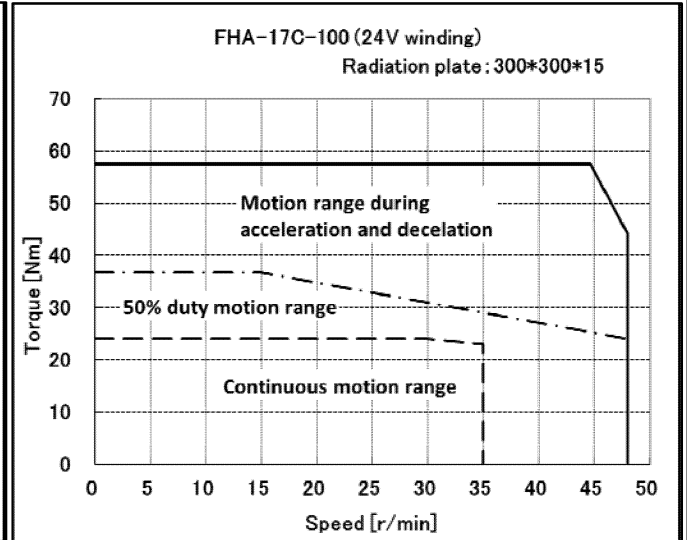


Fig. 4-3

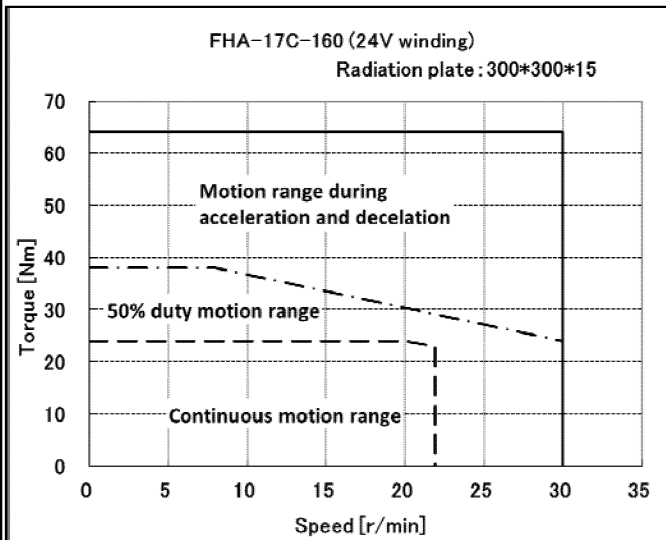


Fig.4 is the result of the calculation. Therefore, it will not be guaranteed.

We recommend the actual confirmation.

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