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

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℃
Ambient temperature (storage):-20～60℃
Relative humidity:20～80%RH(no condensation)
Enclosure: Totally closed, self-cooling (IP44 equivalent)
Vibration:24.5m/s^2
Shock resistance:294m/s^2

Lubricant：Harmonic grease SK-1A[3)]

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.

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℃)	Ω	0.07
Phase inductance	mH	0.03
Number of paired poles		6
Insulation class		F
Voltage strength		AC500V/1min
Insulation resistance		100MΩ or more (by DC500V insulation tester)
Phase sequence		U→V→W (with CW rotation facing encoder end)

note 1) Maximun 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

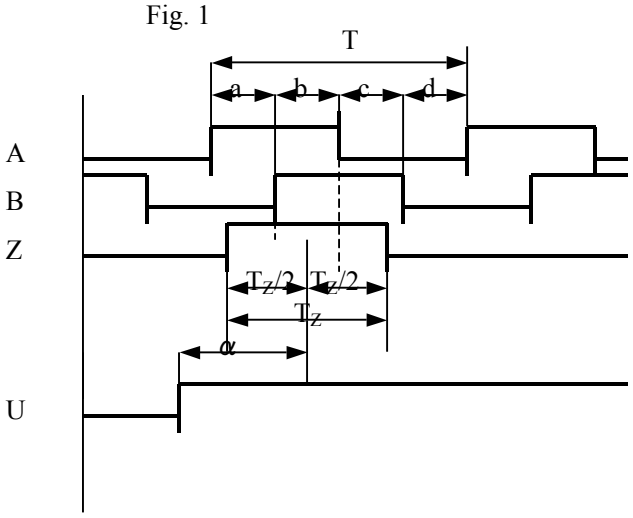
Item		Unit	Specification
Type			Incremental, Rectangular wave, 14-wires
Output signal			A, B, Z, U, V, W
Number of pulse	A,B	P/R	2500
	U,V,W	P/R	6
	Z	P/R	1
Power supply voltage		V	+5DC±5%
Current consumption [1)]		mA	350 max.
Output circuit form			Line driver (equivalent to AM26LS31C)
Maximum response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

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

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. 1



a,b,c,d = 1/4T ± 1/10T

(a+b),(b+c) = 1/2T ± 1/8T

Tz = 1/2T ～ 3/2T

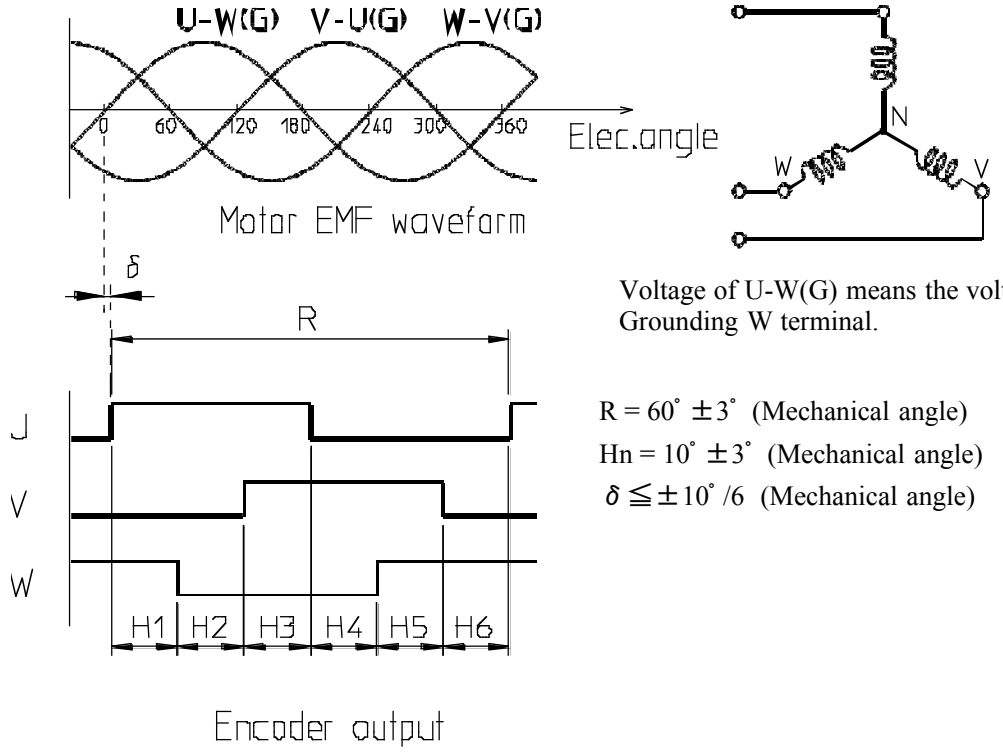
(The Z phase includes a HIGH state in case of both of A and B phase is HIGH state.)

T = 360˚ /2500

$\alpha \leqq \pm 10^{\circ}/6$ (Mechanical angle)

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).

Fig. 2



Voltage of U-W(G) means the voltage of U terminal Grounding W terminal.

R = 60˚ ±3˚ (Mechanical angle)

Hn = 10˚ ±3˚ (Mechanical angle)

$\delta \leqq \pm 10^{\circ}/6$ (Mechanical angle)

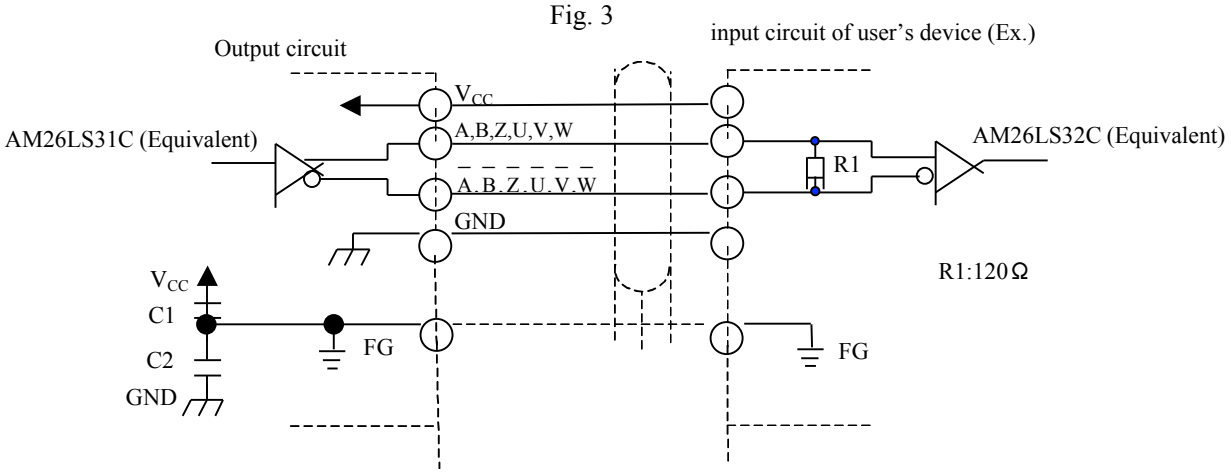
4-3 Encoder leads
Color code of encoder leads shown in Table 4

Table 4

Color	Signal	Color	Signal
Red	V_{CC}	Black	GND
Green	A	Green/White	$\overline{A}$
Gray	B	Gray/White	$\overline{B}$
Yellow	Z	Yellow/White	$\overline{Z}$
Brown	U	Brown/White	$\overline{U}$
Blue	V	Blue/White	$\overline{V}$
Orange	W	Orange/White	$\overline{W}$

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