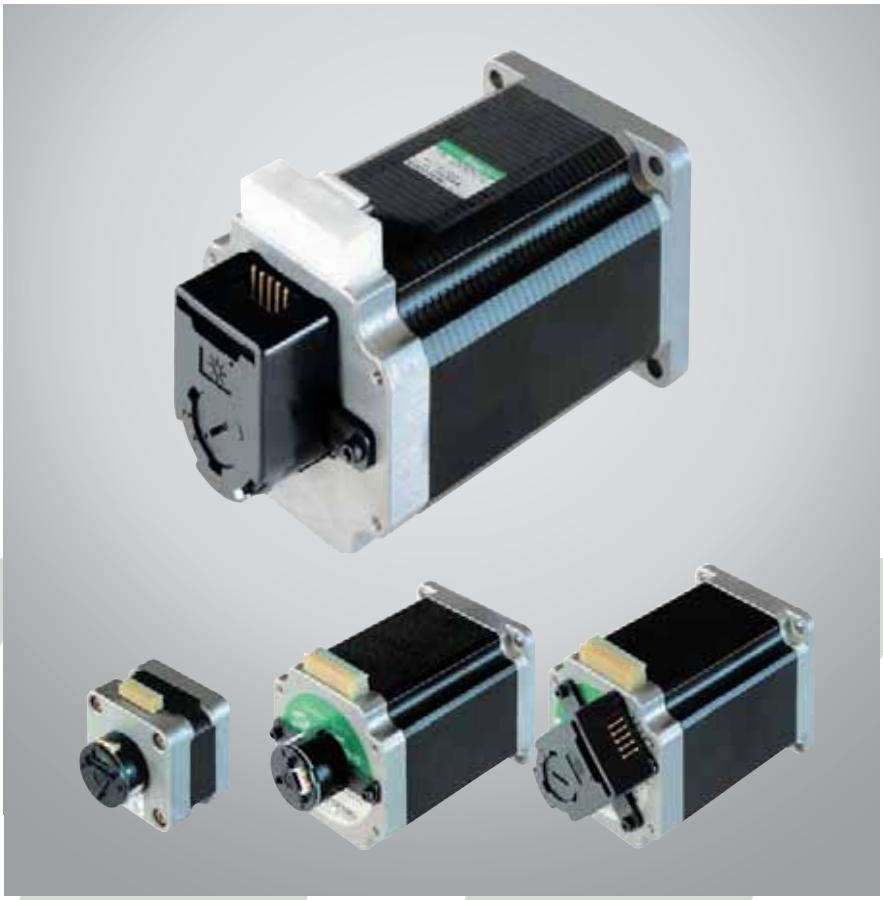
SANMOTION

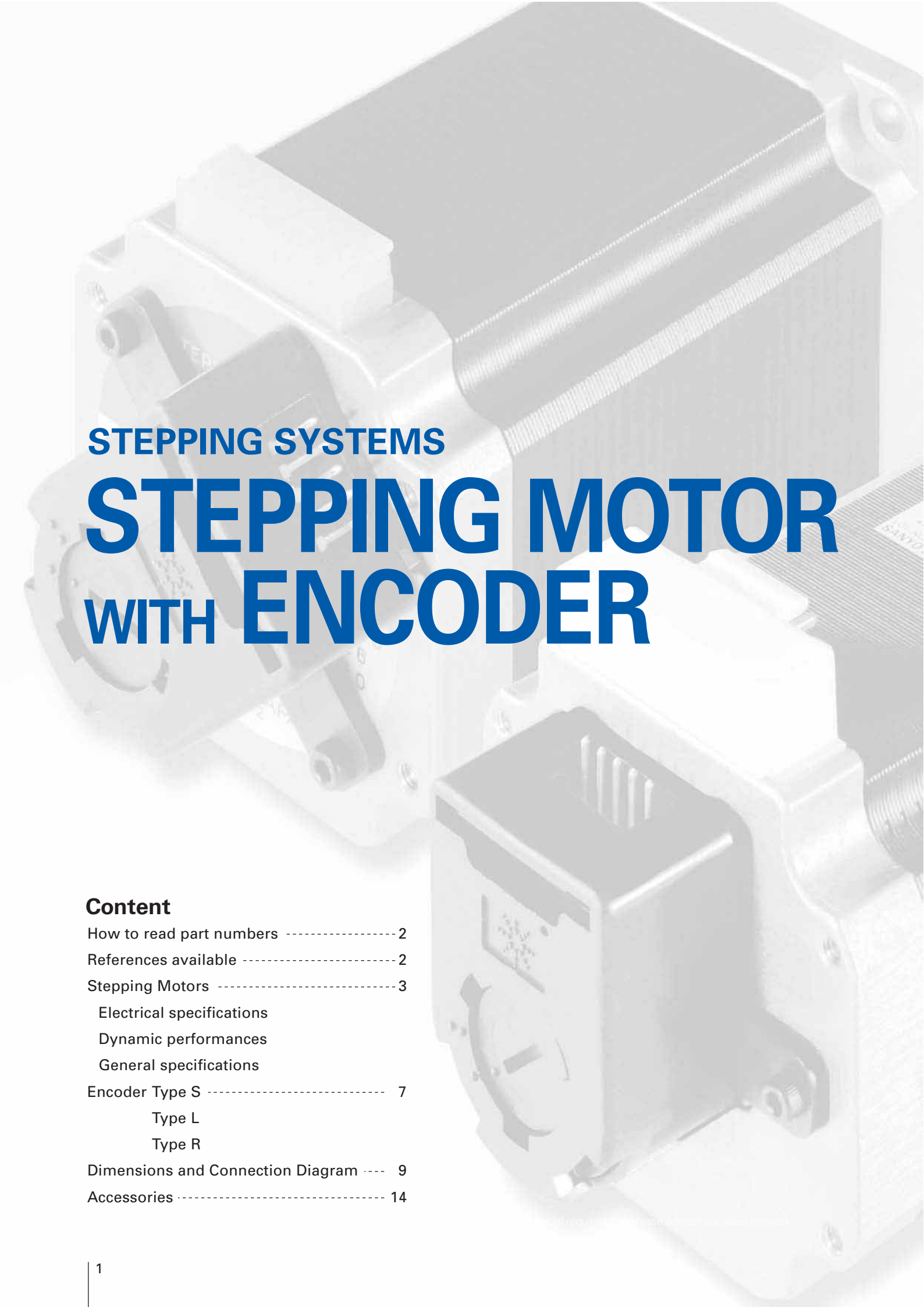
STEPPING SYSTEMS

STEPPING MOTOR WITH ENCODER



SANYO DENKI

English



STEPPING SYSTEMS

STEPPING MOTOR WITH ENCODER

Content

How to read part numbers

2H 5654 B20 S 2 40 Φ

Motor Technology
2H : 2 phase High Torque
2P : 2 phase 400 steps/rev
5H : 5 phase High Torque

Motor dimension
5654 =
Flange 56x56mm Length 54mm

Current per phase
B20 = Bipolar 2.0A U12 = Unipolar 1.2A
P15 = 1.5A 5 leads (5-phase)

Encoder family
Type S, L or R

2 : 2 channels
3 : 3 channels

Encoder Resolution
20 : 200 CPR. 40 : 400 CPR.
50 : 500 CPR.

Options
Ø : standard A→Z : customized products

References available

On above table are introduced available combinations between stepping motors and encoders.

			ENCODER RESOLUTION					
			200 CPR	400 CPR			500 CPR	
			R220	S240	S340	L240	S250	S350
MOTOR FLANGE SIZE	42mm sq	2H4233B05	✓	○	✓		○	○
		2H4238B17	✓	○	✓		○	○
		2H4241B05		○	✓		○	○
		2H4241U12		○	✓		○	○
		2H4248U12	✓	○	✓		○	○
	56mm sq	2H5654U10	✓	○	✓	✓	○	○
		2H5654U20	○	○	✓	✓	○	○
		2H5654B20	○	○	✓	✓	○	○
		2H5676B20	○	○	✓	✓	○	○
	60mm sq	2H6086U20	○	○	○	○	✓	✓
		2H6086B40	○	○	○	○	✓	✓
		5H6086P15	○	○	○	○	✓	✓

✓ : Set motor + encoder standard.
○ : Set motor + encoder on demand.

Stepping Motors

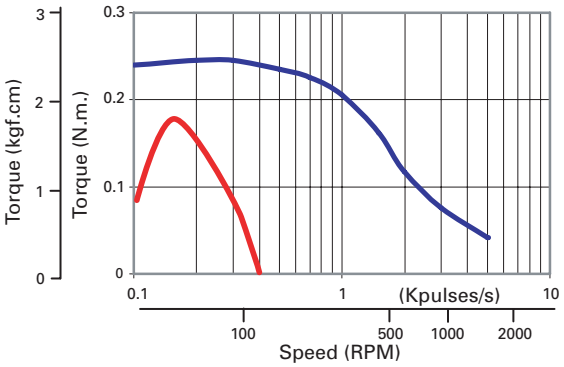
Hybrid
2-phase and 5-phase motors

Electrical specifications

P/N	Motor Base	Size mm	Step Angle °	Holding Torque N.m.	Winding type	Current per phase A	Resistance per phase Ω	Inductance mH	Rotor Inertia 10^{-4} kg • m²	Weight Kg	Encoder resolution CPR
2H4233B05	103H5205	42	1.8	0.26	Bipol	0.48	14	27	0.036	0.23	200, 400
2H4238B17	103H5208	42	1.8	0.39	Bipol	1.7	1.3	3.4	0.056	0.29	200, 400
2H4241B05	103H5209	42	1.8	0.42	Bipol	0.5	18	42	0.062	0.31	400
2H4241U12	103H5209	42	1.8	0.32	Unipol	1.2	3	3.9	0.062	0.31	400
2H4248U12	103H5210	42	1.8	0.37	Unipol	1.2	3.3	3.4	0.074	0.37	200, 400
2H5654U10	103H7123	56	1.8	0.83	Unipol	1	6.7	15	0.21	0.65	200, 400
2H5654U20	103H7123	56	1.8	0.83	Unipol	2	1.6	3.8	0.21	0.65	400
2H5654B20	103H7123	56	1.8	0.83	Bipol	2	0.8	3.8	0.21	0.65	400
2H5676B20	103H7126	56	1.8	1.27	Bipol	2	1.05	4.5	0.36	0.98	400
2H6086U20	103H7823	60	1.8	2.1	Unipol	2	2.7	5.6	0.84	1.34	500
2H6086B40	103H7823	60	1.8	2.7	Bipol	4	0.65	2.4	0.84	1.34	500
5H6086P15	103H7523	60	0.72	1.57	Penta	1.5	1.4	5.4	0.423	1.1	500

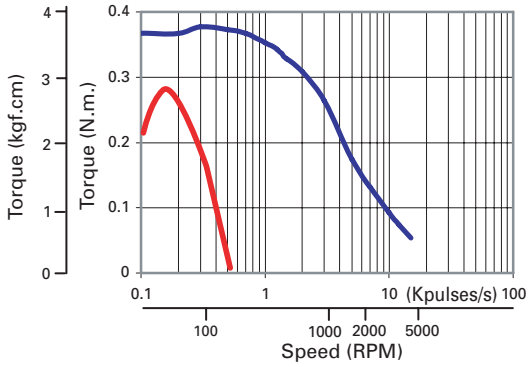
Dynamic performances

2H4233B05



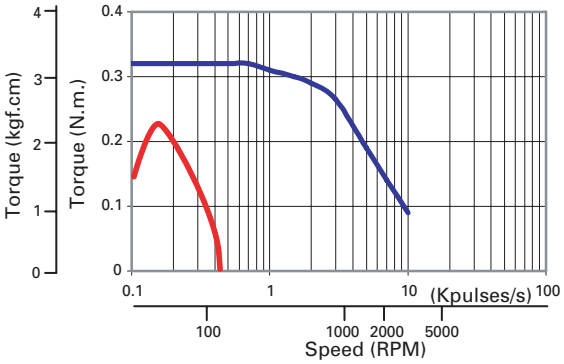
Driver : PMM-BD-4502
Power voltage : 36VDC
Current : 0.48A/phase bipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 0.94x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 0.8x10^{-4}$ kg.m^2]

2H4238B17



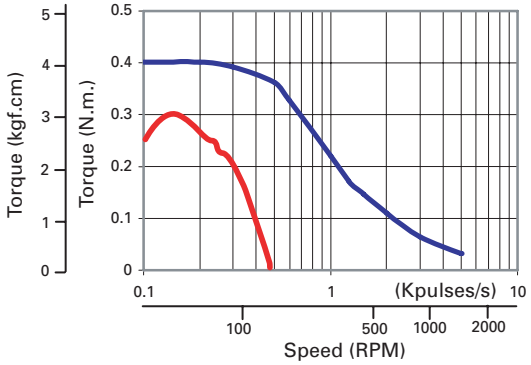
Driver : PMM-BD-4502
Power voltage : 36VDC
Current : 1.7A/phase bipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 0.94x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 0.8x10^{-4}$ kg.m^2]

2H4241U12



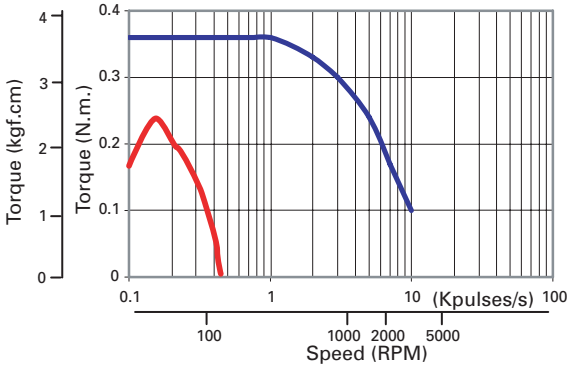
Driver : PMM-MD-23221-21
Power voltage : 36VDC
Current : 1.2A/phase unipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 0.94x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 0.8x10^{-4}$ kg.m^2]

2H4241B05



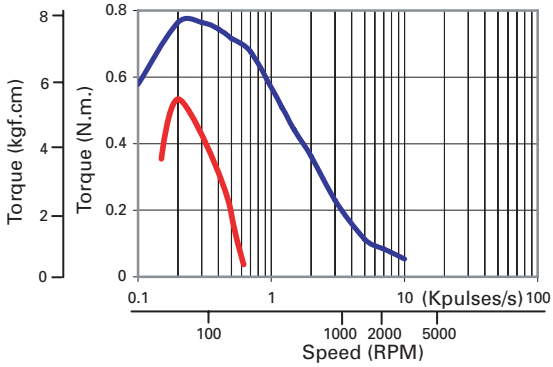
Driver : PMM-BD-4502
Power voltage : 36VDC
Current : 0.5A/phase bipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 0.94x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 0.21x10^{-4}$ kg.m^2]

2H4248U12



Driver : PMM-MD-23221-21
Power voltage : 36VDC
Current : 1.2A/phase
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 0.94x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 0.8x10^{-4}$ kg.m^2]

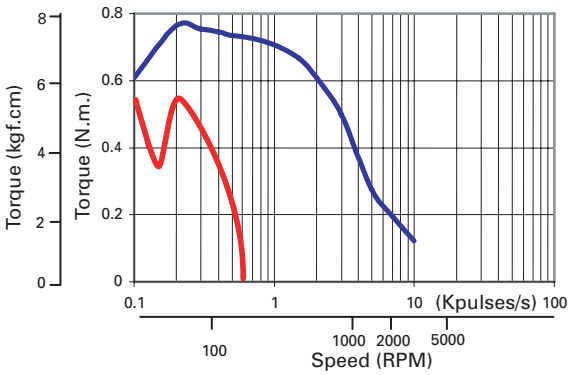
2H5654U10



Driver : PMM-MD-23221-10
Power voltage : 36VDC
Current : 1.0A/phase unipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 0.94x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 0.8x10^{-4}$ kg.m^2]

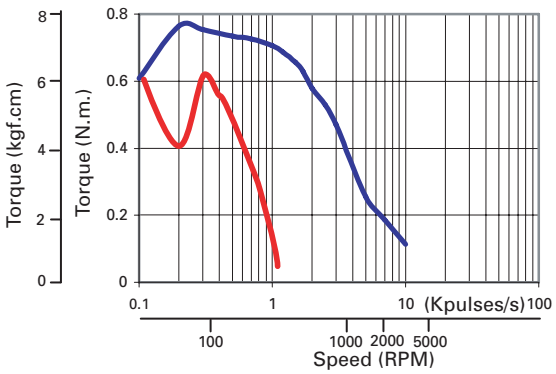
Dynamic performances

2H5654U20



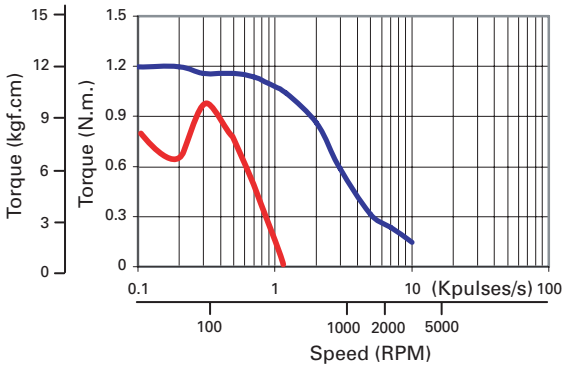
Driver : PMM-MD-23221-10
Power voltage : 36VDC
Current : 2.0A/phase unipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 0.94x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [JL1 = $0.8x10^{-4}$ kg.m^2]

2H5654B20



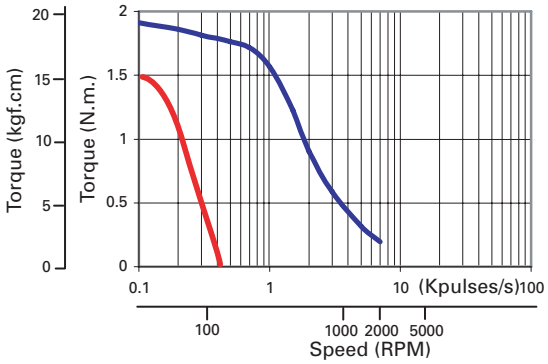
Driver : PMM-BD-4502
Power voltage : 36VDC
Current : 2.0A/phase bipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 0.94x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 0.21x10^{-4}$ kg.m^2]

2H5676B20



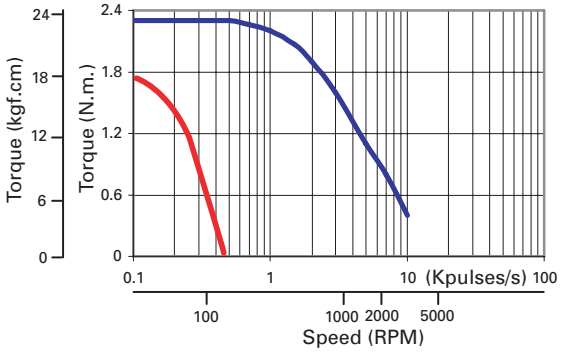
Driver : PMM-BD-4502
Power voltage : 36VDC
Current : 2.0A/phase bipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 2.6x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 2.6x10^{-4}$ kg.m^2]

2H6086U20



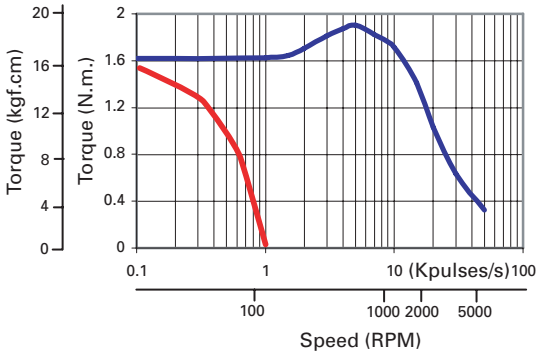
Driver : PMM-MD-23221-10
Power voltage : 36VDC
Current : 2.0A/phase unipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 7.4x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 7.4x10^{-4}$ kg.m^2]

2H6086B40



Driver : PMM-BA-4804
Power voltage : 100VAC
Current : 4.0A/phase bipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 7.4x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 7.4x10^{-4}$ kg.m^2]

5H6086P15

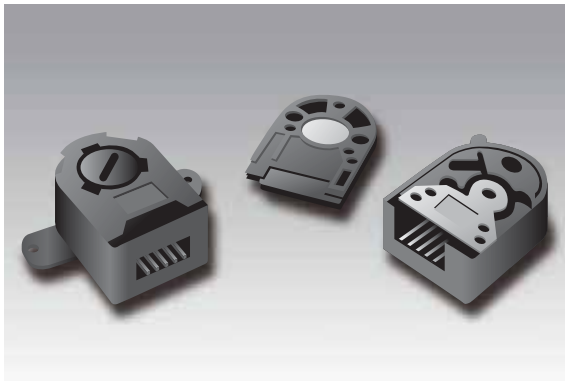


Driver : PMM-BA-5604
Power voltage : 36VDC
Current : 1,5A/phase
Excitation mode :
- Pull-out torque [$J_{L2} = 7.4x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 7.4x10^{-4}$ kg.m^2]

General specifications

	2H42□□	2H56□□	2H60□□	5H60□□
Insulation class	Classe B / 130℃			
Insulation resistance	100M or more when measured with a DC500V megohmeter between the motor wiring and the frame at normal temperature and humidity			
Withstand voltage	Not influenced when applied 1kVA (0.5kVA for 2H42), 50/60Hz between the motor wound wire and the frame for 1 minute (leak current 1mA) at room temperature and humidity			
Operating environment	Ambient temperature : -10℃ to +50℃			
	Ambient humidity : 20 to 90% (no condensation)			
Winding temperature rise	≤ 80 K			
Standing angle error	± 0.09°	±0.054°		± 0.09°
Axial play	≤ 0.075 mm (load 4.4 N)	≤ 0.75 mm (load 9 N)		
Radial play (1)	≤ 0.025 mm (load 4.4 N)			
Shaft run outs	0.025 mm			
Concentricity of mounting spigot relative to shaft	⌀ 0.05 mm	⌀ 0.075 mm		
Perpendicularity of mounting surface relative to shaft	0.1 mm	0.075 mm		
Allowable thrust load	10N	15N	20N	15N
Allowable radial load (1)	28N	75N	80N	115N

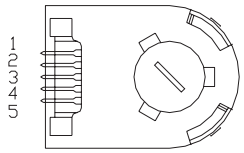
Note 1 : load point is the position 1/3 from the output shaft end.



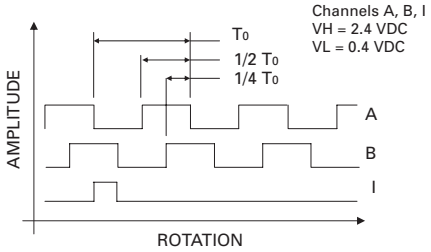
Encoder Type S

Optical incremental encoder TTL compatible
Operating Voltage : 4.5 to 5.5 VDC
Counts per Revolution : 400, 500
Max. Reply Frequency : 100 kHz

Diagram



Waveforms



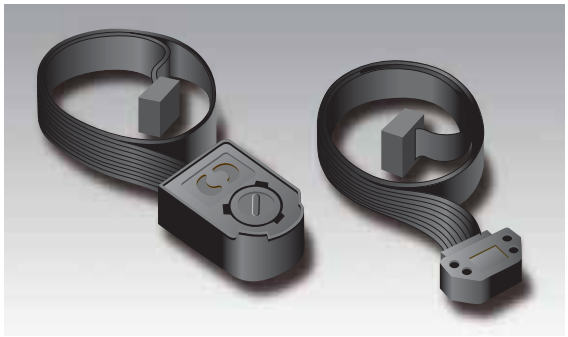
Connection

	2 Channel Encoder	3 Channel Encoder
Pin 1	GND	
Pin 2	NC	Channel I
Pin 3	Channel A	
Pin 4	5 VDC	
Pin 5	Channel B	

Suitable connector
Molex 2695-05, 2759
AMP 103686-4, 640442-5
BERG 65039-032, 4825X-000

Standard P/N

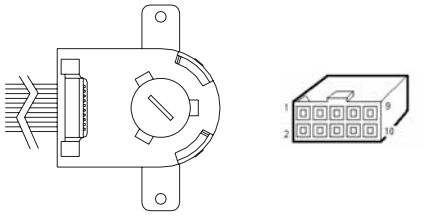
- ✓ S240 : 2 channels, 400 CPR
- ✓ S340 : 3 channels, 400 CPR
- ✓ S250 : 2 channels, 500 CPR
- ✓ S350 : 3 channels, 500 CPR



Encoder Type L

Optical incremental encoder Line Driver
Operating Voltage : 4.5 to 5.5VDC
Counts per Revolution : 400
Max. Reply Frequency : 100 kHz

Diagram

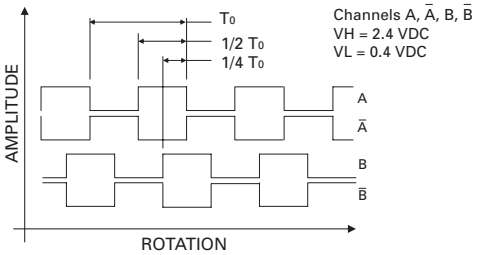


Connection

Pin 1	NC	Pin 6	A
Pin 2	+5 VDC	Pin 7	/B
Pin 3	GND	Pin 8	B
Pin 4	NC	Pin 9	NC
Pin 5	/A	Pin 10	NC

Leadwire output : 480mm - AWG28
Fitted with connector BERG HE10

Waveforms



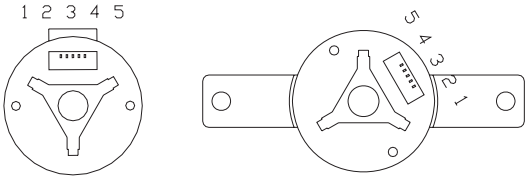
Standard P/N

- ✓ L240 : 2 channels, 400 CPR

Encoder Type R

Optical incremental encoder
Operating Voltage : 4.5 to 5.5 VDC
Counts per Revolution : 200
Max. Reply Frequency : 16 kHz

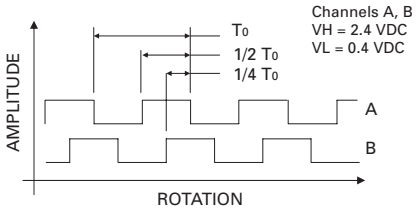
Diagram



Radial Output for 42mm flange motor

Axial Output for 56mm flange motor

Waveforms



Connection

Pin 1	GND
Pin 2	NC
Pin 3	Channel A
Pin 4	5 VDC
Pin 5	Channel B

Suitable connector Molex 51021-0500

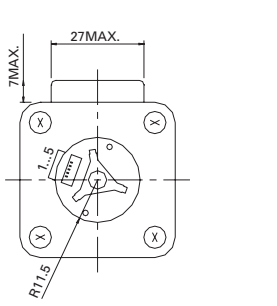
Standard P/N

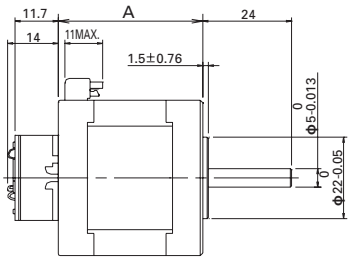
✓ R220 : 2 channels, 200 CPR

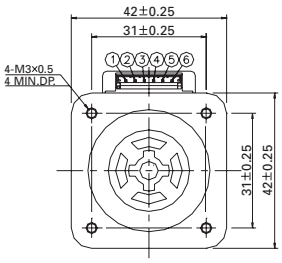
Dimensions and Connection Diagram

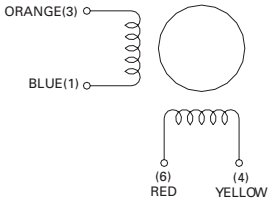
	R220	S240	S340	L240	S250	S350
2H4233B05	A1	A2	A2			
2H4238B17	A1	A2	A2			
2H4241B05		A2	A2			
2H4241U12		A3	A3			
2H4248U12	A4	A3	A3			
2H5654U10	B1	B2	B2	B3		
2H5654U20		B2	B2	B3		
2H5654B20		B4	B4	B5		
2H5676B20		B4	B4	B5		
2H6086U20					C1	C1
2H6086B40					C2	C2
5H6086P15					D1	D1

DIAGRAM A1







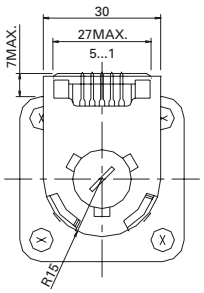


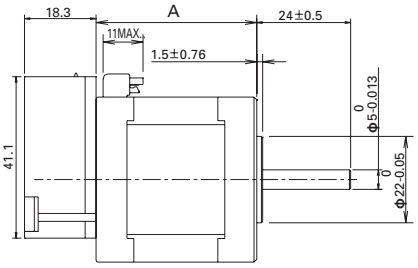
Encoder	R220
Pin 1	GND
Pin 2	NC
Pin 3	Ch A
Pin 4	5VDC
Pin 5	Ch B

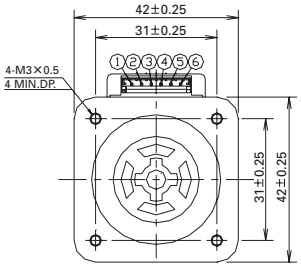
Motor Length	A (mm)
2H4233B05-	33
2H4238B17-	38

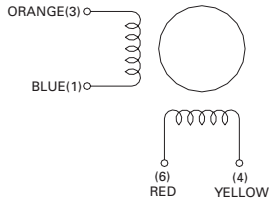
Unit : mm

DIAGRAM A2







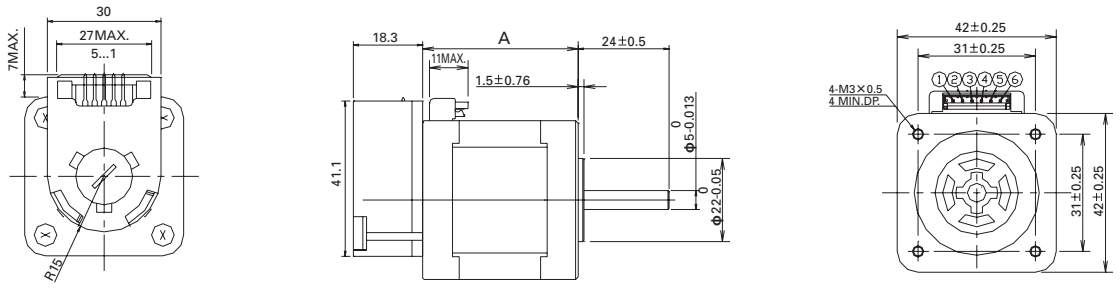


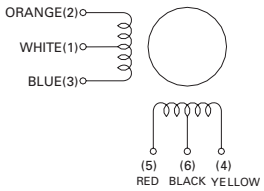
Encoder	S240	S340
Pin 1	GND	
Pin 2	NC	ChI
Pin 3	Ch A	
Pin 4	5 VDC	
Pin 5	Ch B	

Motor Length	A (mm)
2H4233B05-	33
2H4238B17-	38
2H4241B05-	41

Unit : mm

DIAGRAM A3



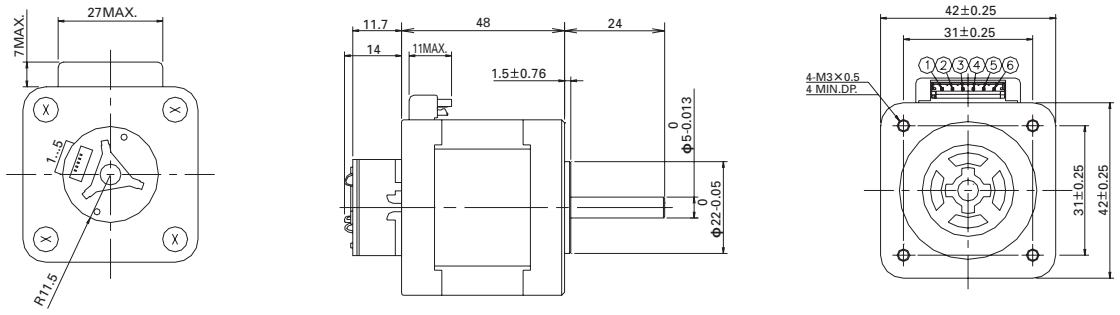


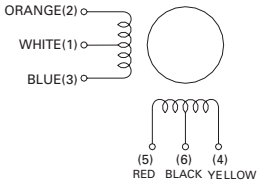
Encoder	S240	S340
Pin 1	GND	
Pin 2	NC	ChI
Pin 3	Ch A	
Pin 4	5 VDC	
Pin 5	Ch B	

Motor Length	A (mm)
2H4241U12-	41
2H4248B12-	48

Unit : mm

DIAGRAM A4 – MOTOR 2H4248U12



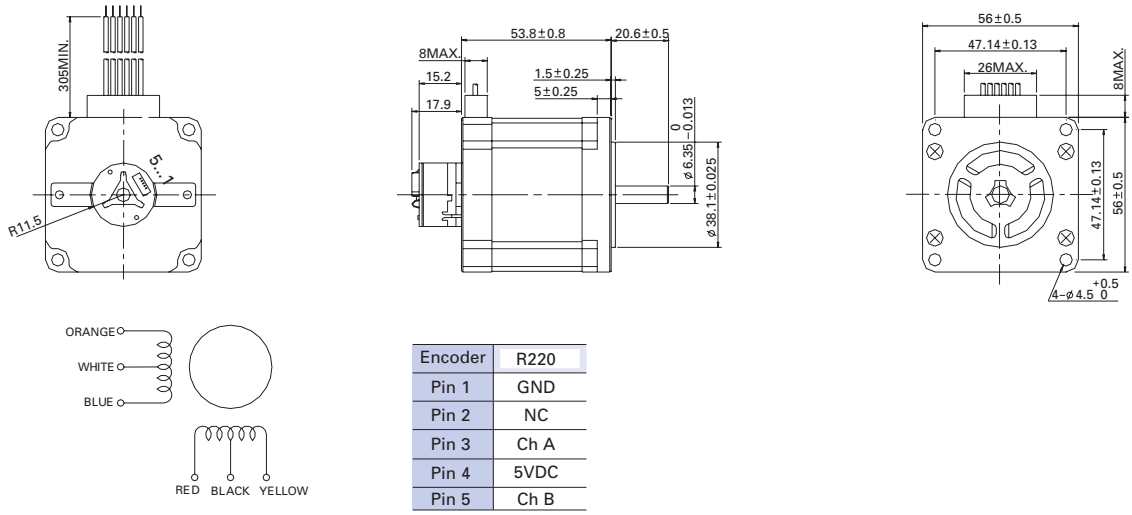


Encoder	R220
Pin 1	GND
Pin 2	NC
Pin 3	Ch A
Pin 4	5VDC
Pin 5	Ch B

Unit : mm

Dimensions and Connection Diagram

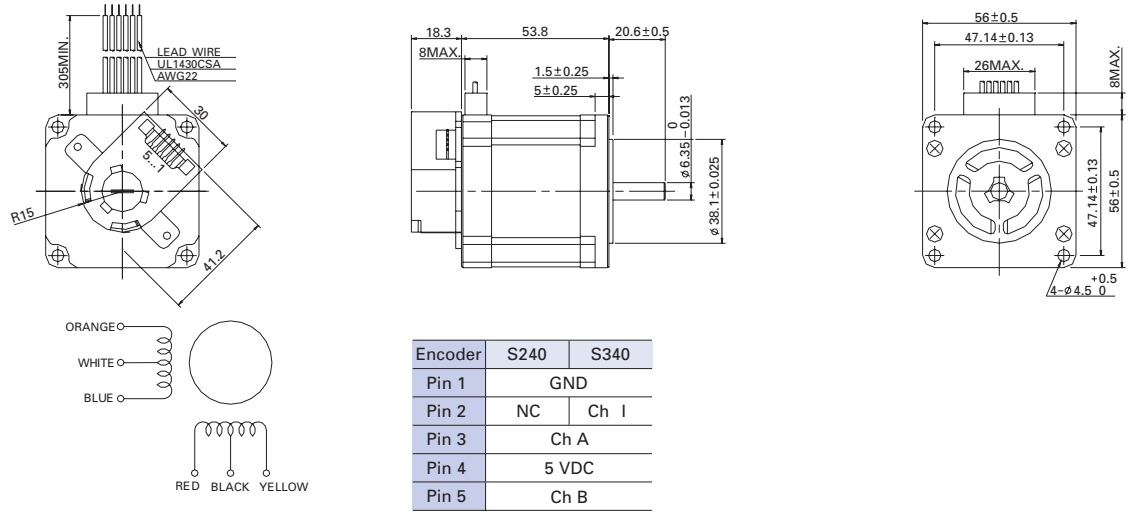
DIAGRAM B1 – MOTOR 2H5654U10



Encoder	R220
Pin 1	GND
Pin 2	NC
Pin 3	Ch A
Pin 4	5VDC
Pin 5	Ch B

Unit : mm

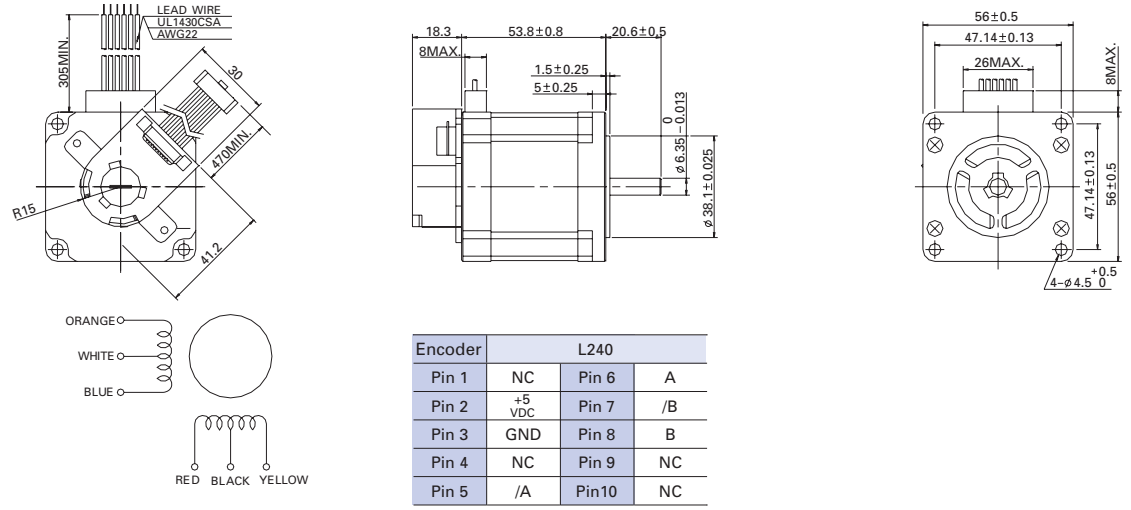
DIAGRAM B2 – MOTOR 2H5654U10 – 2H5654U20



Encoder	S240	S340
Pin 1	GND	
Pin 2	NC	Ch I
Pin 3	Ch A	
Pin 4	5 VDC	
Pin 5	Ch B	

Unit : mm

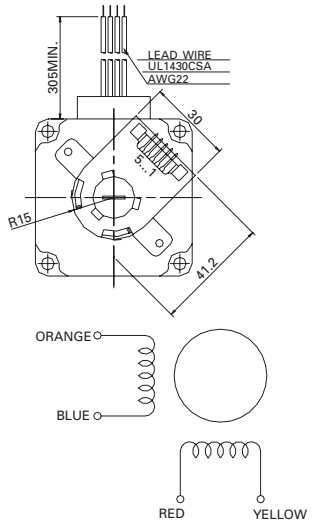
DIAGRAM B3 – MOTOR 2H5654U10 – 2H5654U20

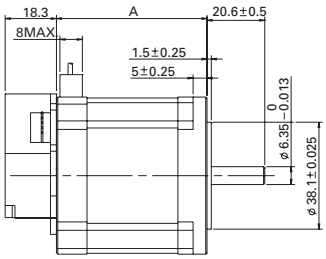


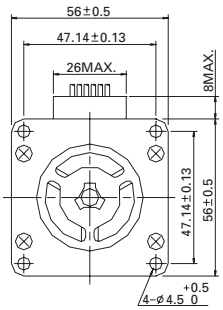
Encoder	L240		
Pin 1	NC	Pin 6	A
Pin 2	+5 VDC	Pin 7	/B
Pin 3	GND	Pin 8	B
Pin 4	NC	Pin 9	NC
Pin 5	/A	Pin10	NC

Unit : mm

DIAGRAM B4





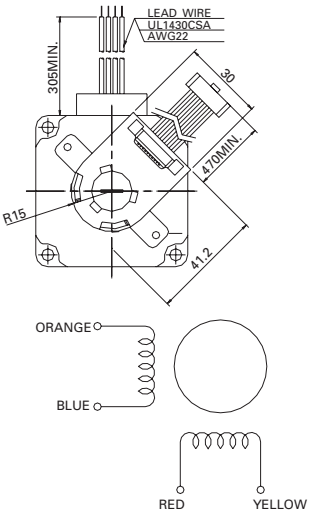


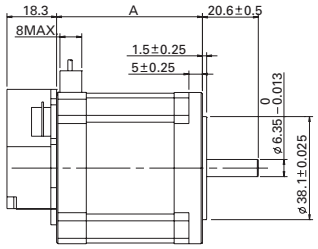
Encoder	S240	S340
Pin 1	GND	
Pin 2		Ch I
Pin 3	Ch A	
Pin 4	5 VDC	
Pin 5	Ch B	

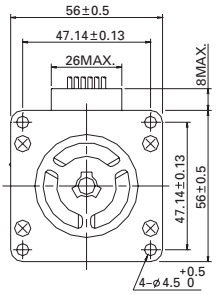
Motor length	A (mm)
2H5654B20-	53.8
2H5676B20-	76

Unit : mm

DIAGRAM B5







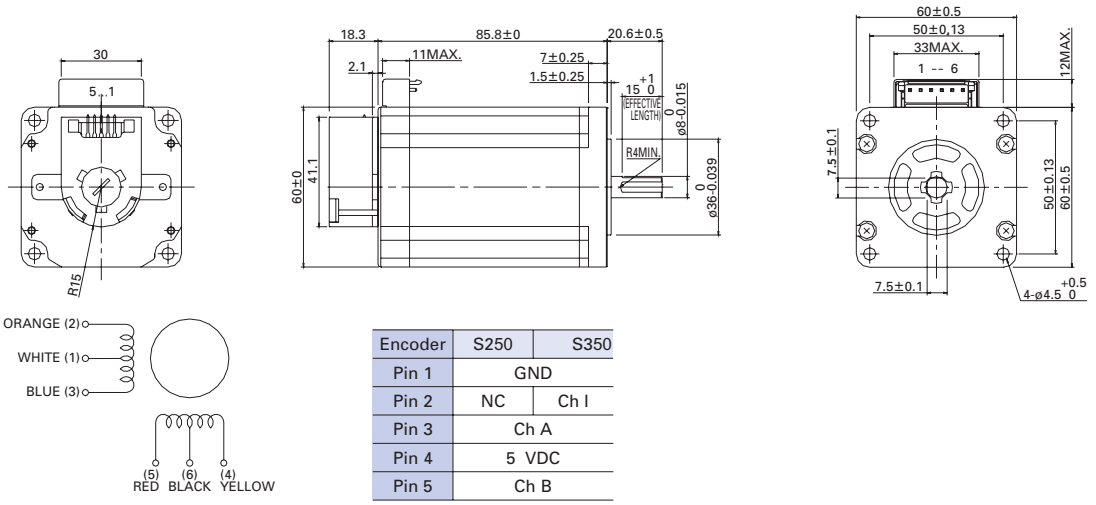
Encoder	L240		
Pin 1	NC	Pin 6	A
Pin 2	+5 VDC	Pin 7	/B
Pin 3	GND	Pin 8	B
Pin 4	NC	Pin 9	NC
Pin 5	/A	Pin 10	NC

Motor length	A (mm)
2H5654B20-	53.8
2H5676B20-	76

Unit : mm

Dimensions and Connection Diagram

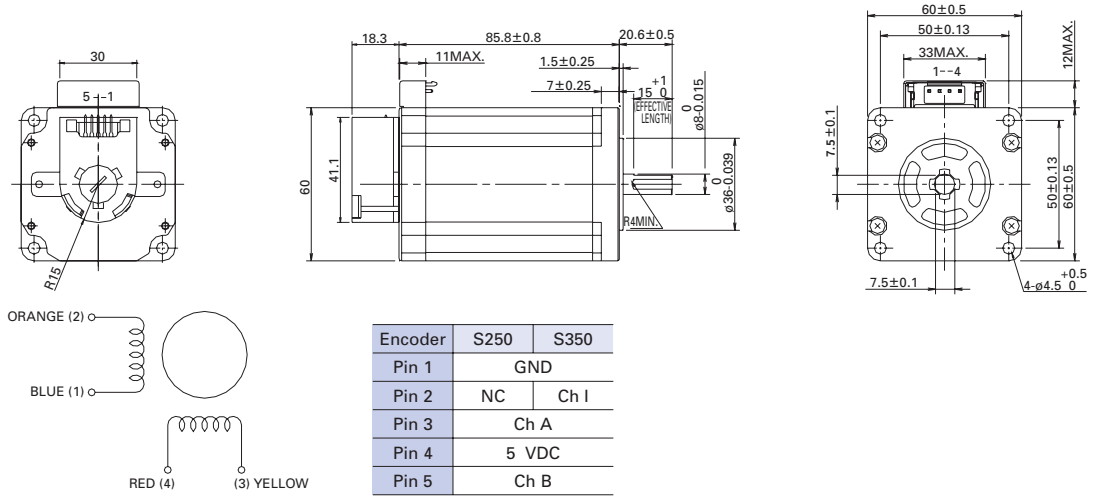
DIAGRAM C1 - MOTOR 2H6086U20



Encoder	S250	S350
Pin 1	GND	
Pin 2	NC	Ch I
Pin 3	Ch A	
Pin 4	5 VDC	
Pin 5	Ch B	

Unit : mm

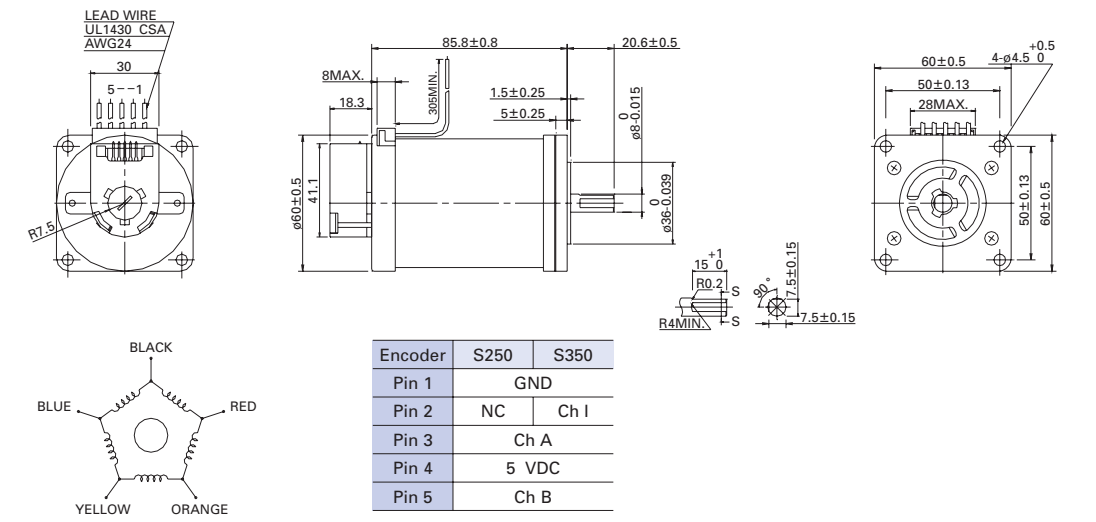
DIAGRAM C2 - MOTOR 2H6086B40



Encoder	S250	S350
Pin 1	GND	
Pin 2	NC	Ch I
Pin 3	Ch A	
Pin 4	5 VDC	
Pin 5	Ch B	

Unit : mm

DIAGRAM D1 - MOTOR 5H6086P15

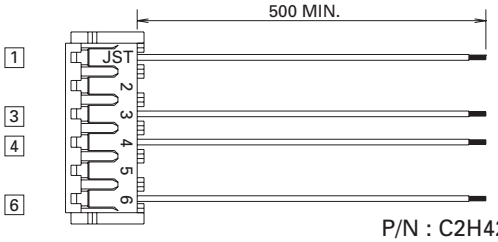


Encoder	S250	S350
Pin 1	GND	
Pin 2	NC	Ch I
Pin 3	Ch A	
Pin 4	5 VDC	
Pin 5	Ch B	

Unit : mm

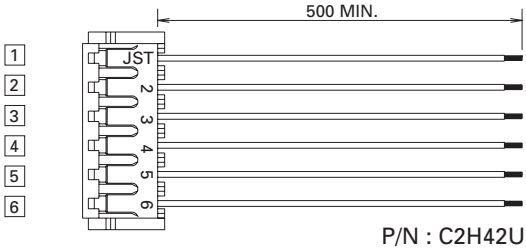
Accessories

Motor flange 42mm cable



P/N : C2H42B500

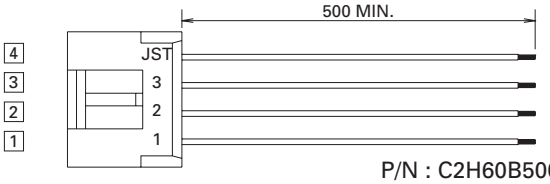
	Lead Color
Pin 1	BLUE
Pin 2	NC
Pin 3	ORANGE
Pin 4	YELLOW
Pin 5	NC
Pin 6	RED



P/N : C2H42U500

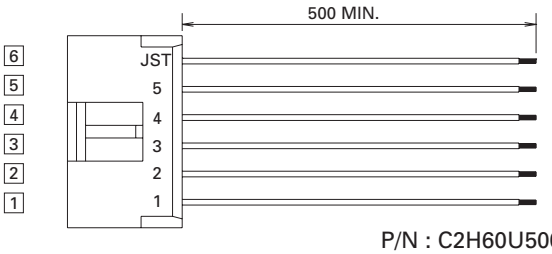
	Lead Color
Pin 1	WHITE
Pin 2	ORANGE
Pin 3	BLUE
Pin 4	YELLOW
Pin 5	RED
Pin 6	BLACK

Motor flange 60mm cable



P/N : C2H60B500

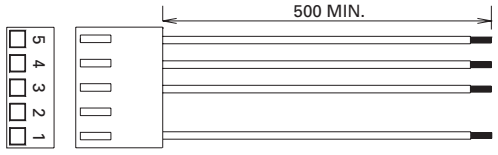
	Lead Color
Pin 1	BLUE
Pin 2	ORANGE
Pin 3	YELLOW
Pin 4	RED



P/N : C2H60U500

	Lead Color
Pin 1	WHITE
Pin 2	ORANGE
Pin 3	BLUE
Pin 4	YELLOW
Pin 5	RED
Pin 6	BLACK

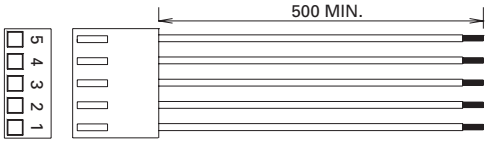
2 Channel Type S encoder cable



P/N : CS2500

	Lead Color
Pin 1	BLACK
Pin 2	NC
Pin 3	YELLOW
Pin 4	RED
Pin 5	GREEN

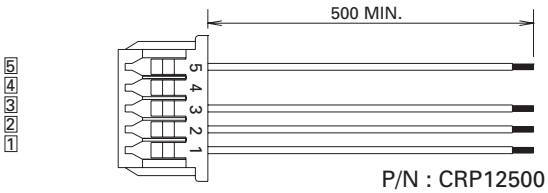
3 Channel Type S encoder cable



P/N : CS3500

	Lead Color
Pin 1	BLACK
Pin 2	WHITE
Pin 3	YELLOW
Pin 4	RED
Pin 5	GREEN

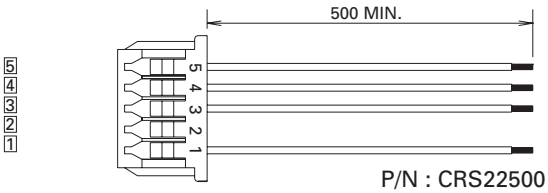
R220 encoder Cable for 2H42 motors



P/N : CRP12500

	Lead Color
Pin 1	GREEN
Pin 2	RED
Pin 3	YELLOW
Pin 4	NC
Pin 5	BLACK

R220 encoder Cable for 2H56 motors



P/N : CRS22500

	Lead Color
Pin 1	BLACK
Pin 2	NC
Pin 3	YELLOW
Pin 4	RED
Pin 5	GREEN

■ Precautions For Adoption

⚠ Cautions

Failure to follow the precautions on theright may cause moderate injury and property damage, or in some circumstances, could lead to a serious accident. Always follow all listed precautions.

⚠ Cautions

- Read the accompanying Instruction Manual carefully prior to using the product.
- If applying to medical devices and other equipment affecting people's lives, please contact us beforehand and take appropriate safety measures.
- If applying to equipment that can have significant effects on society and the general public, please contact us beforehand.
- Do not use this product in an environment where vibration is present, such as in a moving vehicle or shipping vessel.
- Do not perform any retrofitting, re-engineering, or modification to this equipment.
- The amplifiers presented in this catalog are meant to be used for general industrial applications. If using for special applications related to aviation and space, nuclear power, electric power, submarine repeaters, etc., please contact us beforehand.

＊For any question or inquiry regarding the above, contact our Sales Department.

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*Remarks:Specifications Are Subject To Change Without Notice.

06.12.N