



## 42 mm sq.

0.9° - 1.8° /step RoHS

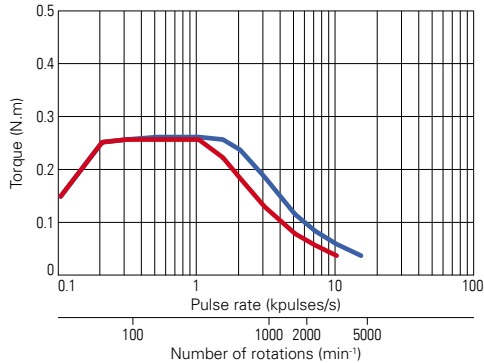
Unipolar and Bipolar winding  
Lead wire and Connector type

Based motor	Holding torque at 2-phase energization	Step angle °	Winding type	Rated current A/phase	Wiring resistance Ω /phase	Winding inductance mH/phase	Rotor Inertia [x 10 <sup>-4</sup> kg.m <sup>2</sup> ]	Weight kg	Optional motor cable
	[N.m min.]								
<b>2P4233B10</b>	0.23	0.9	Bipolar	1	3.3	8.0	0.044	0.24	-
<b>2H4233B05</b>	0.26	1.8	Bipolar	0.48	14	27	0.036	0.23	4835728-1
<b>2H4238B17</b>	0.39	1.8	Bipolar	1.7	1.3	3.4	0.056	0.29	4835728-1
<b>2H4241B05</b>	0.42	1.8	Bipolar	0.5	18	42	0.062	0.31	4835728-1
<b>2H4241U12</b>	0.32	1.8	Unipolar	1.2	3	3.9	0.062	0.31	4835710-1
<b>2H4248U12</b>	0.37	1.8	Unipolar	1.2	3.3	3.4	0.074	0.37	4835710-1

### Dynamic performances

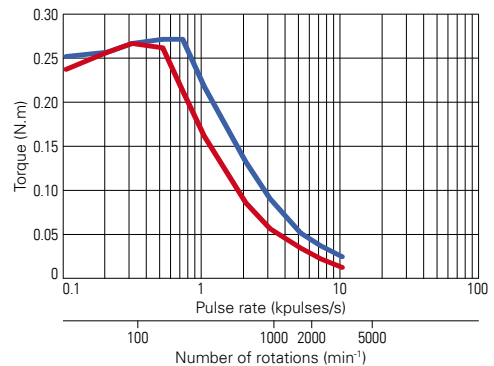
#### 2P4233B10

Driver: Internal circuit  
Power supply: — 36V — 24V  
Current: 1A/phase bipolar  
Excitation mode: Full-step  
Load inertia JL = 0.94x10<sup>-4</sup>kg.m<sup>2</sup> (rubber coupling)



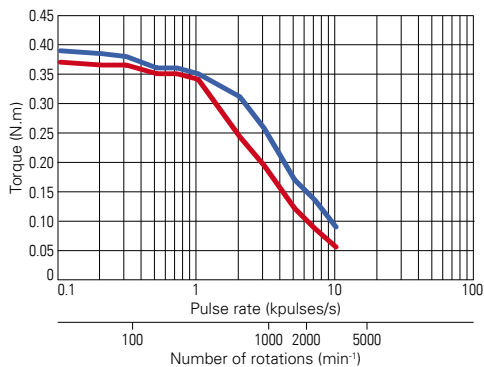
#### 2H4233B05

Driver: Internal circuit  
Power supply: — 36V — 24V  
Current: 0.48A/phase bipolar  
Excitation mode: Full-step  
Load inertia JL = 0.94x10<sup>-4</sup>kg.m<sup>2</sup> (rubber coupling)



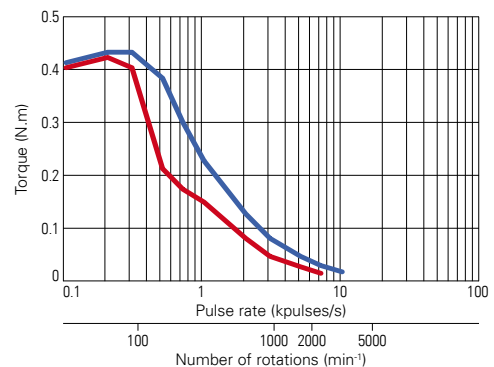
#### 2H4238B17

Driver: BS1D200P10  
Power supply: — 36VDC — 24VDC  
Current: 1.7A/phase bipolar  
Excitation mode: Full-step  
Load inertia JL = 0.94x10<sup>-4</sup>kg.m<sup>2</sup> (rubber coupling)



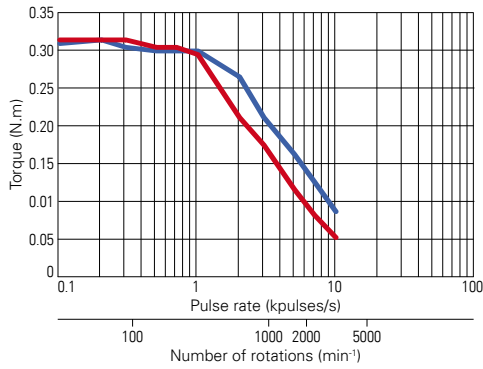
#### 2H4241B05

Driver: Internal circuit  
Power supply: — 36V — 24V  
Current: 0.5A/phase bipolar  
Excitation mode: Full-step  
Load inertia JL = 0.94x10<sup>-4</sup>kg.m<sup>2</sup> (rubber coupling)



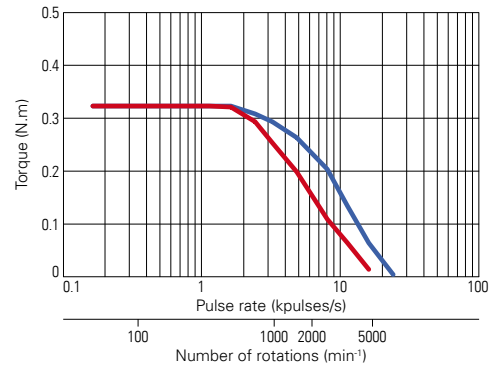
### 2H4241U12

Driver: US1D200P10  
 Power supply: — 36V — 24V  
 Current: 1.2A/phase unipolar  
 Excitation mode: Full-step  
 Load inertia JL = 0.94x10<sup>-4</sup>kg.m<sup>2</sup> (rubber coupling)



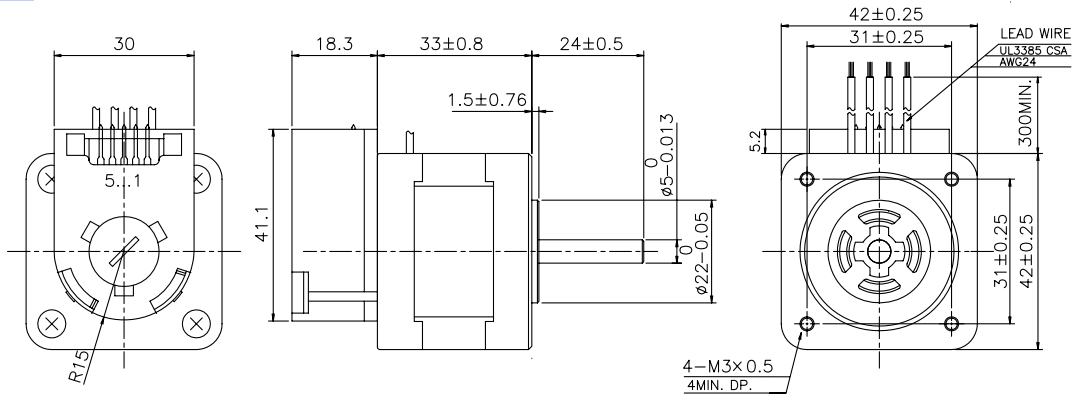
### 2H4248U12

Driver: US1D200P10  
 Power supply: — 36V — 24V  
 Current: 1.2A/phase unipolar  
 Excitation mode: Full-step  
 Load inertia JL = 0.94x10<sup>-4</sup>kg.m<sup>2</sup> (rubber coupling)

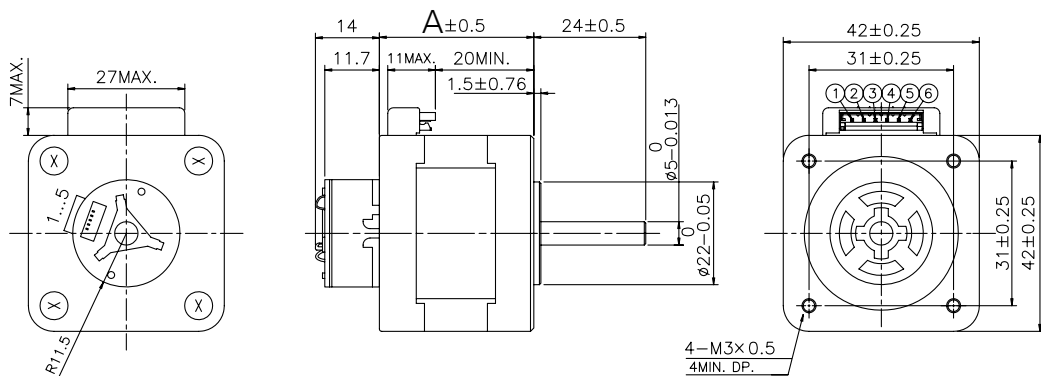


## Dimensions [Unit: mm]

2P4233B10Sx40  
 2P4233B10Mx1x



2H42xxxxR220



Motor Length	A [mm]
2H4233	33
2H4238	39
2H4248	48

35mm sq.

42mm sq.

56mm sq.

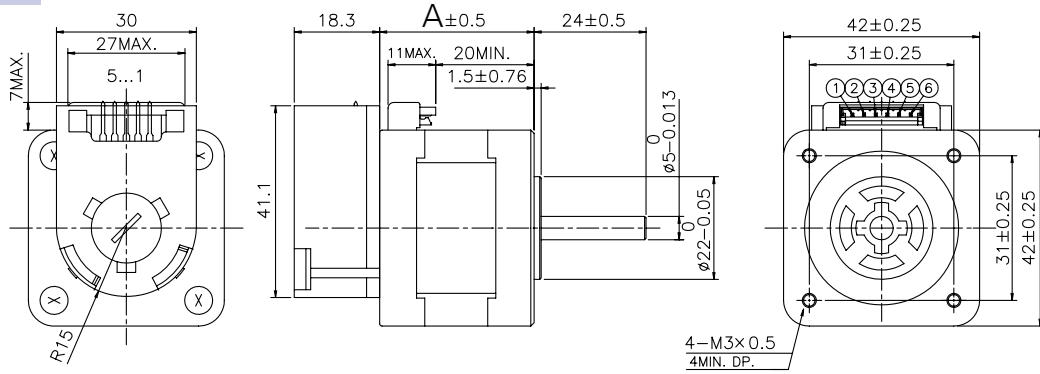
60mm sq.

86mm sq.

Encoder Specifications

Customization Service

**2H42xxxxSx40**  
**2H42xxxxMx1x**

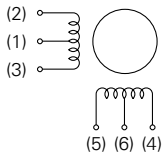


Motor Length	A [mm]
2H4233	33
2H4238	39
2H4241	41
2H4248	48

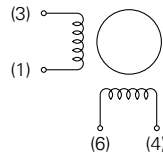
**Internal wiring**

( ) connector pin number

Unipolar winding



Bipolar winding



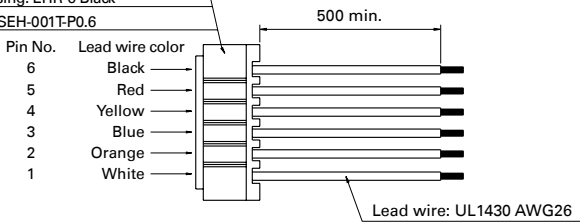
General Specification ▶ p. 24

Rotation Direction ▶ p. 25

**Motor cables**

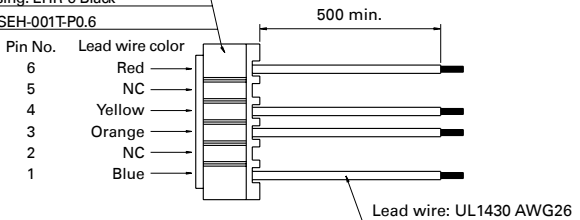
Unipolar winding, Cable P/N: 4835710-1

Manufacturer: J.S.T. Mfg. Co., Ltd.  
 Housing: EHR-6 Black  
 Pin: SEH-001T-P0.6



Bipolar winding, Cable P/N: 4835728-1

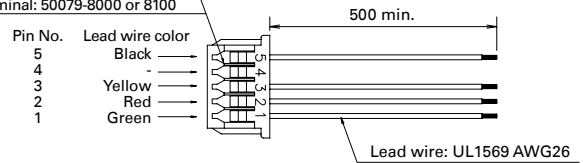
Manufacturer: J.S.T. Mfg. Co., Ltd.  
 Housing: EHR-6 Black  
 Pin: SEH-001T-P0.6



**Encoder cables**

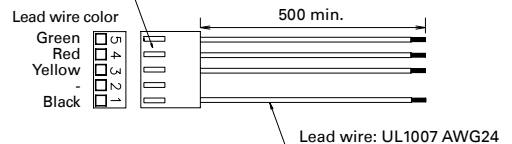
R220 Encoder, Cable P/N: CRP12500

Manufacturer: MOLEX  
 Housing: 51021-0500  
 Terminal: 50079-8000 or 8100



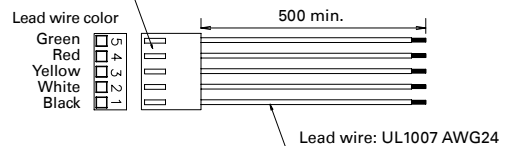
S2xx, M2xx Encoder, Cable P/N: CS2500

Manufacturer: MOLEX  
 Housing: 22-01-2055  
 (locking ramp cut)



S3xx, M3xx Encoder, Cable P/N: CS3500

Manufacturer: MOLEX  
 Housing: 22-01-2055  
 (locking ramp cut)





# S type Encoder

RoHS

- Two channel quadrature outputs with optional index pulse
- Resolution 400 or 500 counts per revolution
- Single ended output signals, TTL compatible
- Single 5VDC supply
- HEDS serie encoders from Broadcom Limited

## Encoder features

Parameter	S240	S340
Supply voltage [VDC]	5 ± 0.5	
Max. Supply current [mA]	40	85
Output voltage [VDC]	VOH = 2.4 min, VOL = 0.4 max	
Output channels	2 (A, B)	3 (A, B, I)
Maximum frequency [kHz]	100	

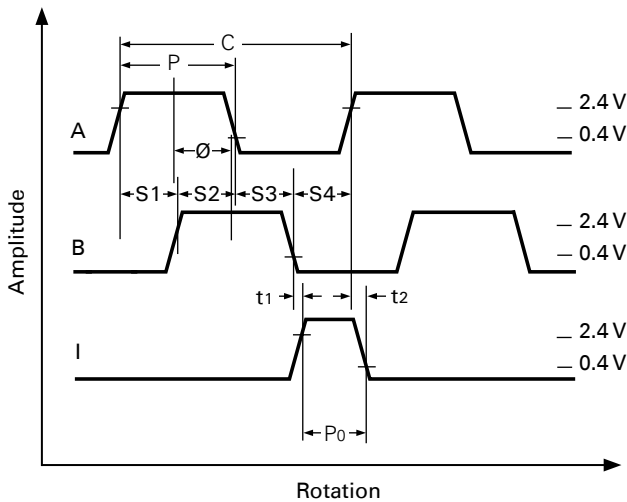
## Encoder pin-outs

Pins	S240	S340
Pin 1	GND	
Pin 2	NC	Channel I
Pin 3	Channel A	
Pin 4	5 VDC	
Pin 5	Channel B	

## Encoder P/N

**S240:** 2 channels, 400CPR  
**S340:** 3 channels, 400CPR

## Output waveforms

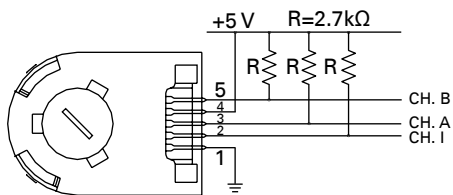


## Encoding characteristics

Parameter	Symbol	S240			S340		
		Min.	Typ.*	Max.	Min.	Typ.*	Max.
Pulse width error [°e]	$\Delta P$	7	45		5	45	
Logic width error [°e]	$\Delta S$	5	45		5	35	
Phase error [°e]	$\Delta \emptyset$	2	20		2	15	
Position error [arcmin.]	$\Delta \Theta$	10	40		10	40	
Cycle error [°e]	$\Delta C$	3	5.5		3	5.5	
Index pulse width [°e]	$P_0$				55	90	
CH.I rise after CH.A or CH.B fall [ns]	$t_1$				-300	100	
CH.I fall after CH.A or CH.B rise [ns]	$t_2$				70	150	

\*Typical values specified at supply voltage = 5.0 VDC and 25°C

## Electrical interface



S340 encoders require 2.7kΩ (±10%) pull-up resistors on output pins 2,3 and 5 (Channels I, A and B). These pull-up resistors should be located as close to the encoder as possible.

S240 encoders do not normally require pull-up resistors. However, 3.2kΩ pull-up resistors on output pins 3 and 5 (Channels A and B) are recommended.

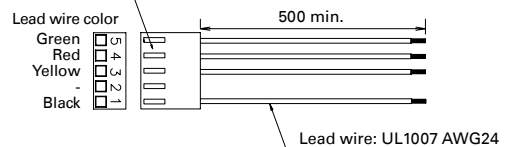
## Suitable connectors

Manufacturer	Part number	
	Housing	Contact
AMP	103686-4	640442-5
Molex	2695 series	2759 series
FCI	65039-032	4825X-000

## Encoder cables

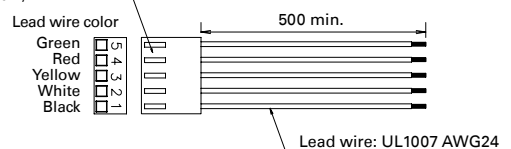
S240 Encoder, Cable P/N: CS2500

Manufacturer: MOLEX  
 Housing: 22-01-2055  
 (locking ramp cut)



S340 Encoder, Cable P/N: CS3500

Manufacturer: MOLEX  
 Housing: 22-01-2055  
 (locking ramp cut)



35mm sq.

42mm sq.

56mm sq.

60mm sq.

86mm sq.

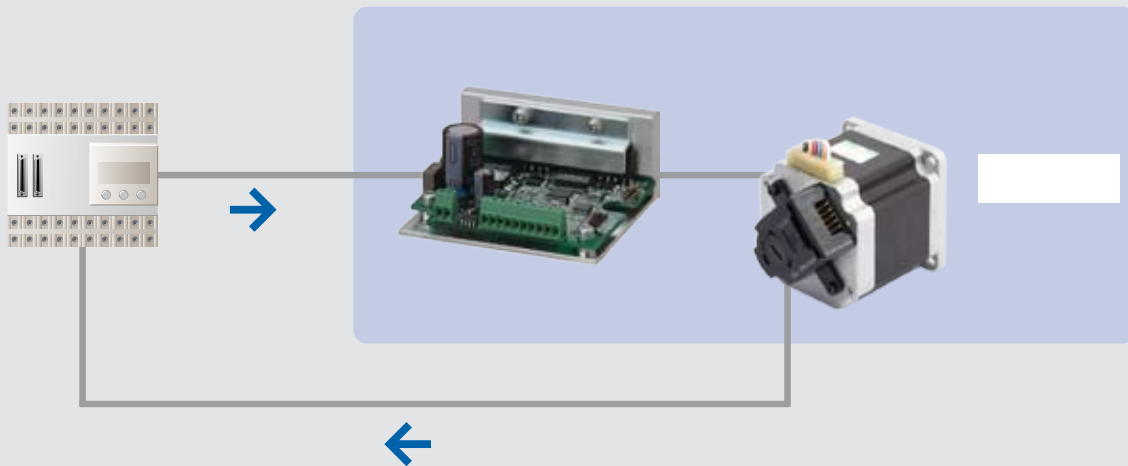
Encoder Specifications

Customization Service

# STEPPING MOTOR WITH ENCODER

## When open-loop control is not enough

Stepping systems provide precise positioning with easy control. By adding an encoder to a stepping motor, the controller can monitor the actual position directly, closing the feedback loop and improving the safety and reliability.



## Stepping Motor with Encoder: Features

### Safety: Position verification

Adding an encoder is an ideal and easy solution for safety-sensitive applications, requiring position verification and position maintenance, such as medical instrumentation.

### Close-loop control with stepper benefit

High-end close loop control can be achieved while keeping the advantages of stepping motors: stable stop without hunting, higher torque than DC servo motor at low speed over the same size, eliminating the need of gearboxes.

### Reliability: Stall Detection

Device reliability is improved with possible detection and reporting of stalls.

### Accurate Homing

Encoder with index pulse option can be used to achieve precise homing.

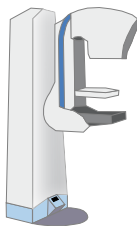


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# Application Examples



Blood Analyser



Mammograph









3D Printing







Industrial machine

## Stepping Motors: Lineup RoHS

Basic step angle	Motor size		Holding torque [Nm min.] Model number	Page
1.8°	35 mm sq.		0.195 to 0.23 2H35□	p. 8
0.9°	42 mm sq.		0.23 2P42□	p. 10
1.8°	42 mm sq.		0.26 to 0.42 2H42□	p. 10
1.8°	56 mm sq.		0.83 to 2 2H56□	p. 13
1.8°	60 mm sq.		0.88 to 2.7 2H60□	p. 16
1.8°	86 mm sq.		3.3 to 9 2H86□	p. 18

## Encoder Selection Guide RoHS

4 types of encoder can be selected. They are two and three channels optical incremental encoders and emphasize high reliability and high resolution.

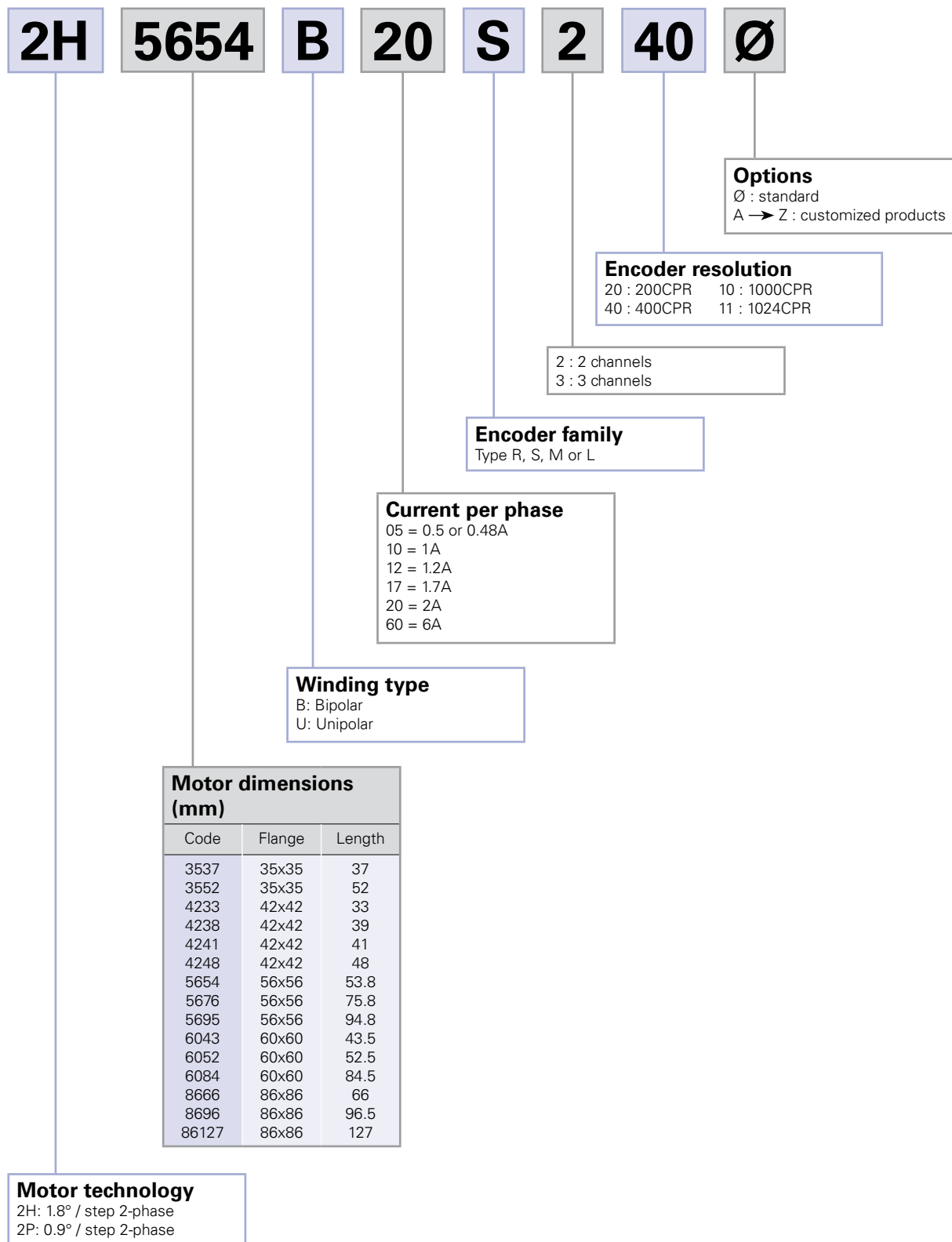
Encoder type	Counts Per Revolution [CPR]					Pulse index option	Single ended	Differential line driver	Key points
		200	400	1000	1024				
<b>R</b> <sub>type</sub> 		■					■	Compact size Simple interface Cost effective	
<b>S</b> <sub>type</sub> 			■		■		■	Medium resolution Pulse index option Simple interface	
<b>M</b> <sub>type</sub> 				■	■	■	■	High resolution Pulse index option Simple interface	
<b>L</b> <sub>type</sub> 			■					Noise immunity Transmitting encoder signal over a long distance	

Encoder specifications ▶ p. 20 to 23  
Please consult us for higher resolution encoder

# How to Read Part Numbers

Note that not every combination of the following codes or characters is available. Check the part numbers available on the following or contact us.

Example: This is a standard model number for a stepping motor and encoder. The motor specifications are 2-phase stepping motor, motor size: 56mm sq., motor length: 54mm, bipolar winding, 2A/phase, S type encoder, 2 channels, 400 CPR.



# Part Numbers Available

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

■ : Valid combinations, available from stock

Motor size	Based motor	Encoder type							
		R type	S type			M type			L type
		2 channels	2 channels	3 channels	2 channels		3 channels	2 channels	
		200CPR	400CPR	400CPR	1000CPR	1024CPR	1000CPR	400CPR	
		R220	S240	S340	M210	M211	M310	L240	
35 mm sq.	2H3537B12	■	■	■	■	■	■		
	2H3552U12	■	■	■	■	■	■		
42 mm sq.	2P4233B10		■	■	■	■	■		
	2H4233B05	■	■	■	■	■	■		
	2H4238B17	■	■	■	■	■	■		
	2H4241B05		■	■	■	■	■		
	2H4241U12		■	■	■	■	■		
	2H4248U12	■	■	■	■	■	■		
56 mm sq.	2H5654U10	■	■	■	■	■		■	
	2H5654U20	■	■	■	■	■		■	
	2H5654B20		■	■	■	■		■	
	2H5676B20		■	■	■	■		■	
	2H5695B20	■	■	■	■	■		■	
60 mm sq.	2H6043B20	■	■	■	■	■		■	
	2H6052B20	■	■	■	■	■		■	
	2H6084B20	■	■	■	■	■		■	
86 mm sq.	2H8666B60	■	■	■	■	■		■	
	2H8696B60	■	■	■	■	■		■	
	2H86127B60	■	■	■	■	■		■	

## Optional Cables

### Motor cables

Motor size	Based motor	Cable P/N
42 mm sq.	2H4233B05	4835728-1
	2H4238B17	4835728-1
	2H4241B05	4835728-1
	2H4241U12	4835710-1
	2H4248U12	4835710-1

### Encoder cables

Encoder	Motor type	Cable P/N
R220	2H35, 2H42	CRP12500
	2H56, 2H60, 2H86	CRS22500
S240 M21x	all	CS2500
S340 M310	all	CS3500



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[9GV1248P1J01](#) [9HV0412P3K001](#) [9WE1724K501](#) [9WG1212E101](#) [103H5208-5240](#) [103H7126-5840](#) [103H7822-5740](#) [109-1001F13](#) [109-](#)  
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[109R0824S4D01](#) [109-1069](#) [109-604](#) [109BF24HD2](#) [109P0424H302](#) [9L0412H301](#) [103H8223-6340](#) [103H8222-5141](#) [9S1212L4011](#)  
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[109P0624W602](#) [9WF0924S201](#) [9A0812S402](#) [109E1724M501](#) [9GV1248P4J011](#) [9G1224F102](#) [109R0648S402](#)