

## 42 mm sq.

0.9° - 1.8° /step RoHS

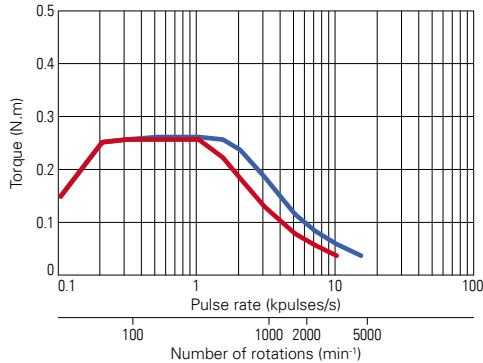
Unipolar and Bipolar winding  
Lead wire and Connector type

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

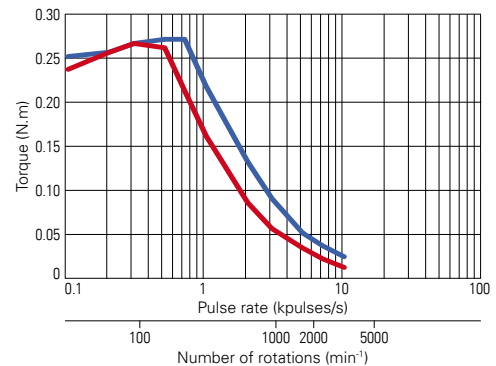
#### 2P4233B10

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)



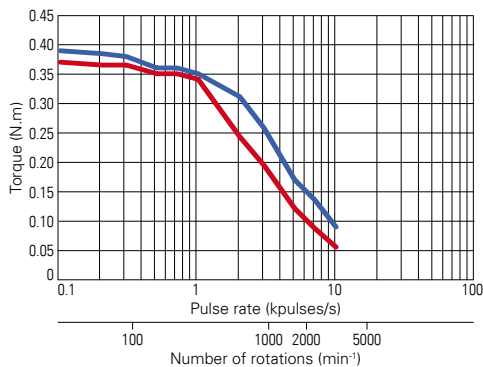
#### 2H4233B05

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)



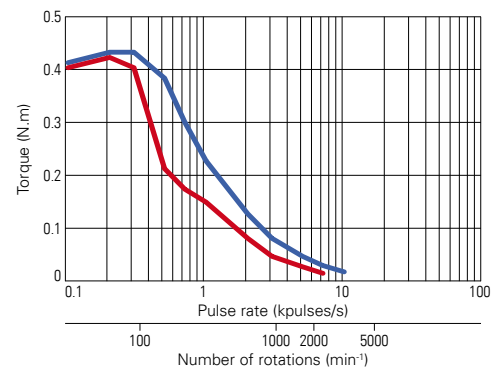
#### 2H4238B17

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)



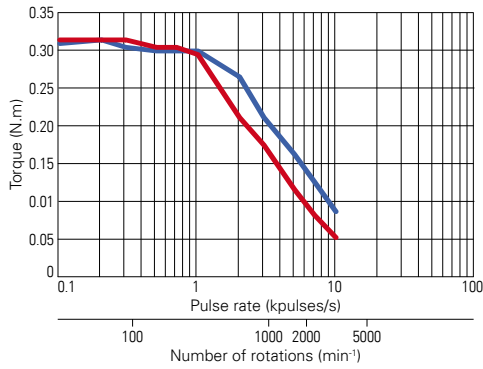
#### 2H4241B05

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)



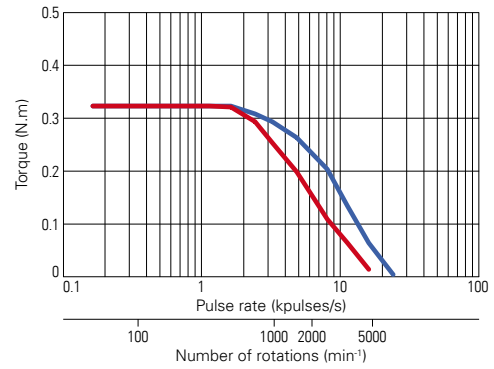
### 2H4241U12

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)



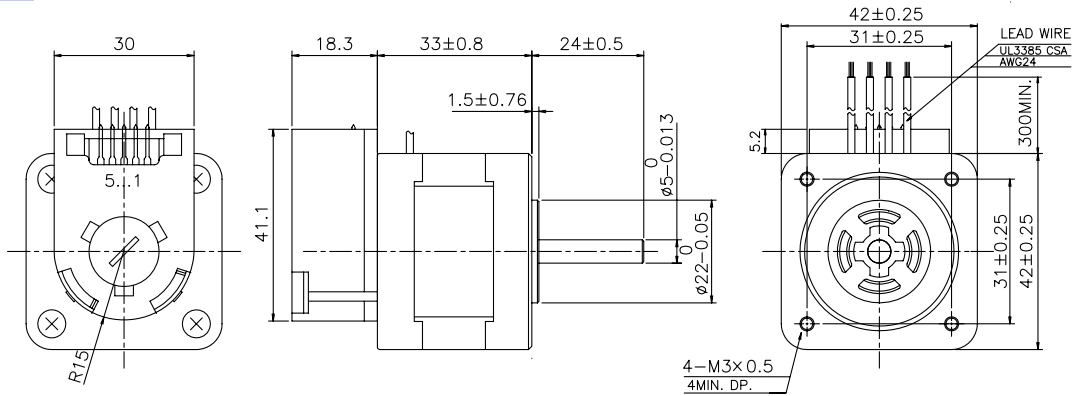
### 2H4248U12

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)

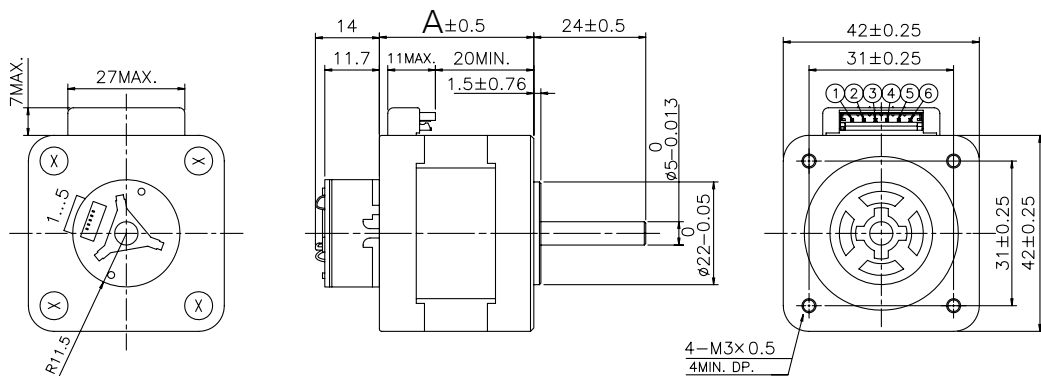


## Dimensions [Unit: mm]

2P4233B10Sx40  
 2P4233B10Mx1x



2H42xxxxR220



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

35mm sq.

42mm sq.

56mm sq.

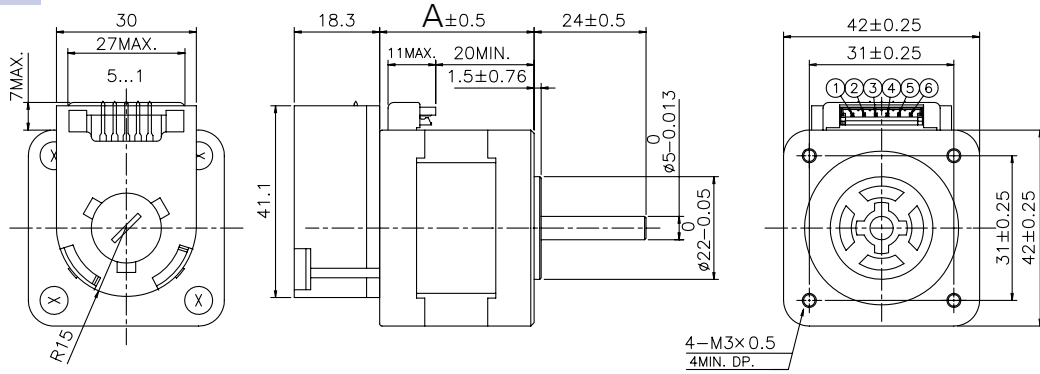
60mm sq.

86mm sq.

Encoder Specifications

Customization Service

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

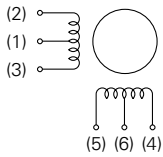


Motor Length	A [mm]
2H4233	33
2H4238	39
2H4241	41
2H4248	48

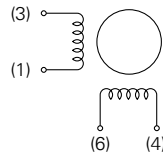
**Internal wiring**

( ) connector pin number

Unipolar winding



Bipolar winding



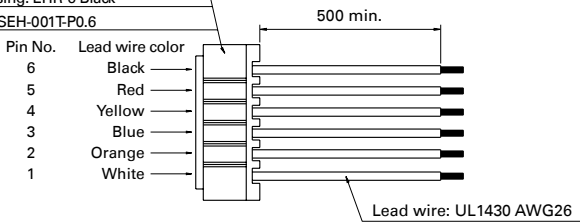
General Specification ▶ p. 24

Rotation Direction ▶ p. 25

**Motor cables**

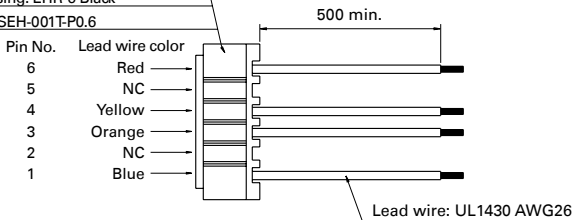
Unipolar winding, Cable P/N: 4835710-1

Manufacturer: J.S.T. Mfg. Co., Ltd.  
 Housing: EHR-6 Black  
 Pin: SEH-001TP0.6



Bipolar winding, Cable P/N: 4835728-1

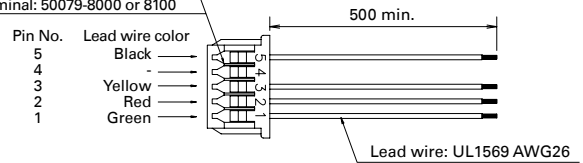
Manufacturer: J.S.T. Mfg. Co., Ltd.  
 Housing: EHR-6 Black  
 Pin: SEH-001TP0.6



**Encoder cables**

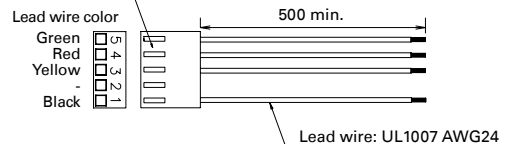
R220 Encoder, Cable P/N: CRP12500

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



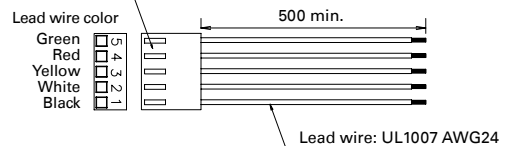
S2xx, M2xx Encoder, Cable P/N: CS2500

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)





# R type Encoder

RoHS

- Two channel quadrature outputs
- Resolution 200 counts per revolution
- TTL compatible
- Single 5VDC supply
- HEDR serie encoders from Broadcom Limited

## Encoder features

Parameter	R220
Supply voltage [VDC]	5 ± 0.5
Max. Supply current [mA]	33
Output voltage [VDC]	VOH = 2.4 min, VOL = 0.4 max
Output channels	2 (A, B)
Maximum frequency [kHz]	16

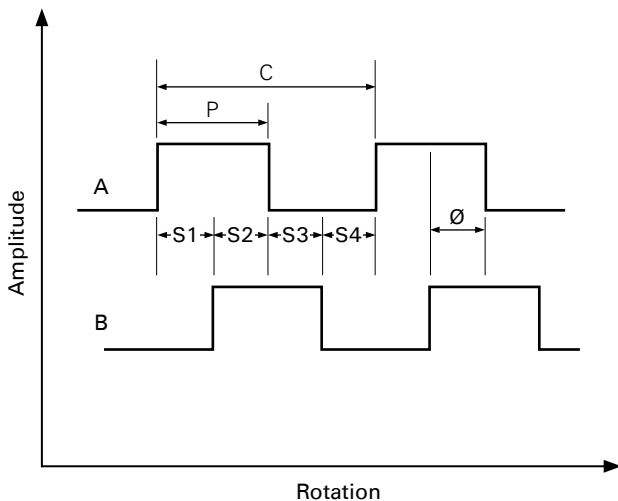
## Encoder pin-outs

Pins	R220	R220
	35, 42mm sq.	56, 86mm sq.
Pin 1	Channel B	GND
Pin 2	5 VDC	NC
Pin 3	Channel A	Channel A
Pin 4	NC	5 VDC
Pin 5	GND	Channel B

## Encoder P/N

R220: 2 channels, 200CPR

## Output waveforms

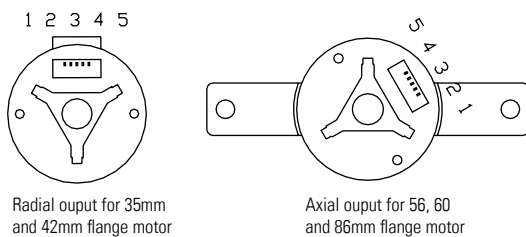


## Encoding characteristics

Parameter	Symbol	R220	
		Typ.*	Max.
Pulse width error [°e]	$\Delta P$	7	75
Logic width error [°e]	$\Delta S$	15	60
Phase error [°e]	$\Delta \emptyset$	15	60
Position error [arcmin.]	$\Delta \emptyset$	50	120
Cycle error [°e]	$\Delta C$	10	45

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

## Electrical interface



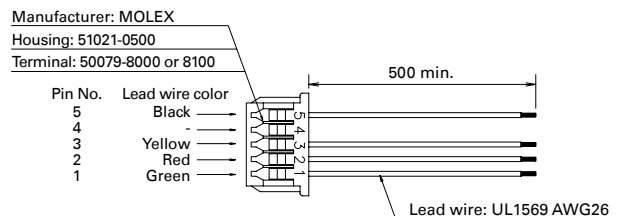
Pull-up resistors on output pins have already been integrated. Each of the three encoder outputs can drive a single TTL load in this configuration.

## Suitable connectors

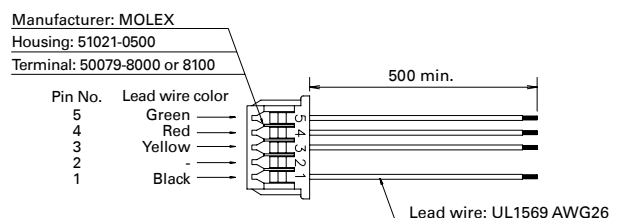
Manufacturer	Part number	
	Housing	Contact
Molex	51021-0500	50079-8000

## Encoder cables

R220 Encoder, 35 & 42mm flange Motor, Cable P/N: CRP12500



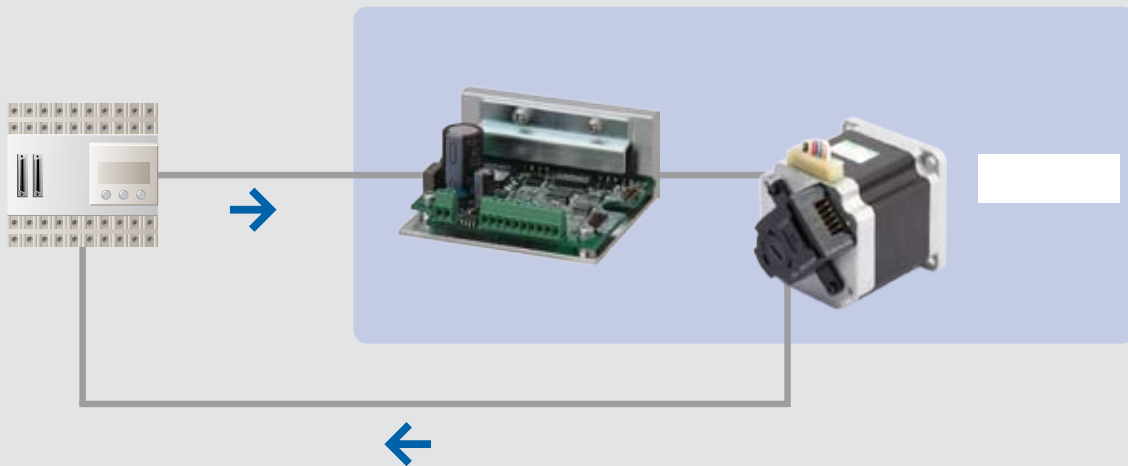
R220 Encoder, 56, 60 & 86mm flange Motor, Cable P/N: CRS22500



# 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.

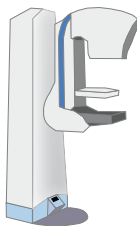


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# Application Examples



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.

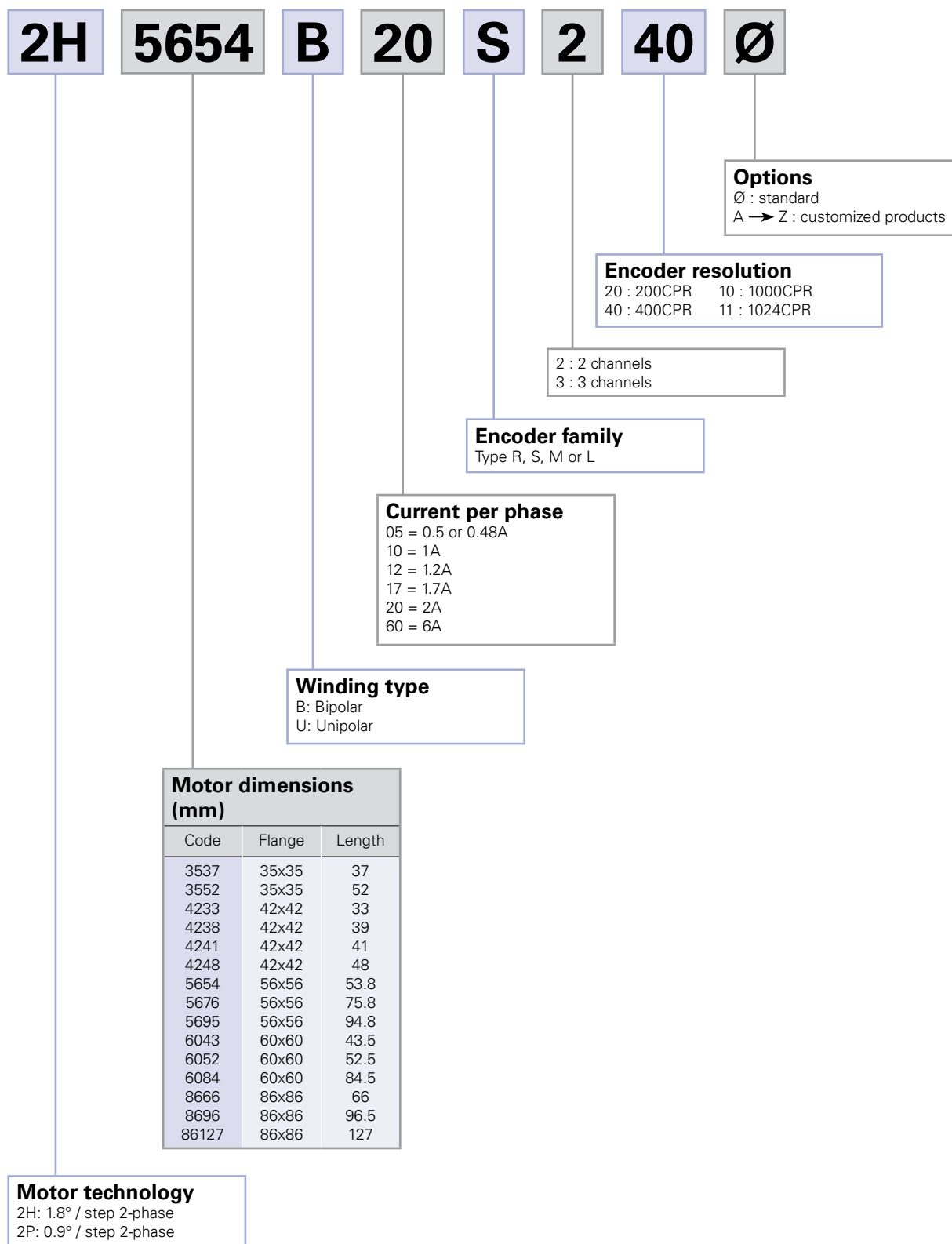
Encoder type		Counts Per Revolution [CPR]				Pulse index option	Single ended	Differential line driver	Key points
		200	400	1000	1024				
<b>R</b> <sub>type</sub>		■					■		Compact size Simple interface Cost effective
<b>S</b> <sub>type</sub>			■			■	■		Medium resolution Pulse index option Simple interface
<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](#) [109-1002F40](#) [109-1003M30](#) [109-313](#) [109-601](#) [109L1748H501](#) [109L5712H501](#) [109P0412D602](#) [109P0424G302](#) [109P1412M101](#)  
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