

# SM SERIES

SHAFT LINEAR MOTOR

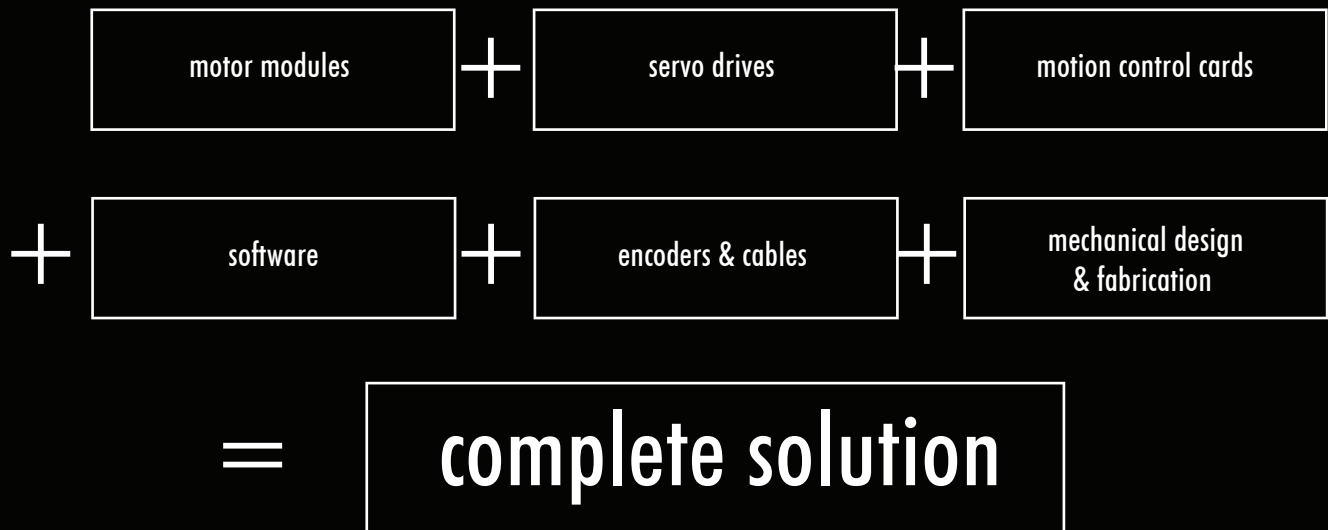


**BUILT-IN ENCODER**  
*turn key linear motion systems*

[www.pbasystems.com.sg](http://www.pbasystems.com.sg)

PBA Systems is an ISO certified company that designs and manufactures motion control products, including linear motor modules, voice coil modules, piezo stages, large XYZ Theta stages and other special customized solutions.

Founded in 1999, PBA Systems continuously aims for technological breakthroughs and innovations, working to deliver the best products to our customers while providing excellent service and uncompromising quality standards. For enquiries on any of our products, email us at [sales@pbasystems.com.sg](mailto:sales@pbasystems.com.sg) or call us at +65 6576 6767



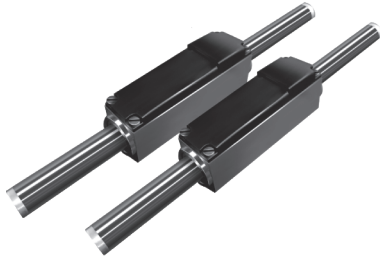
ISO 9001:2008 Cert.No.: 601191





**SM Series Shaft Linear Motors** *With Built-in Encoder for Turn Key Linear Motion Systems*

PART NUMBERING



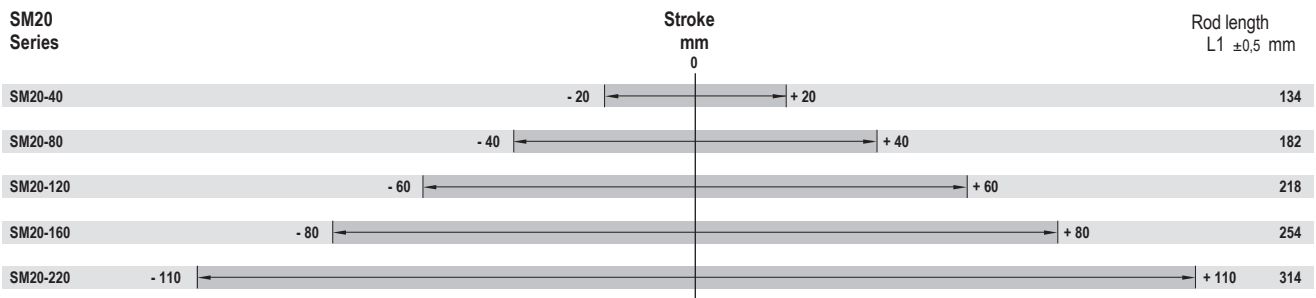
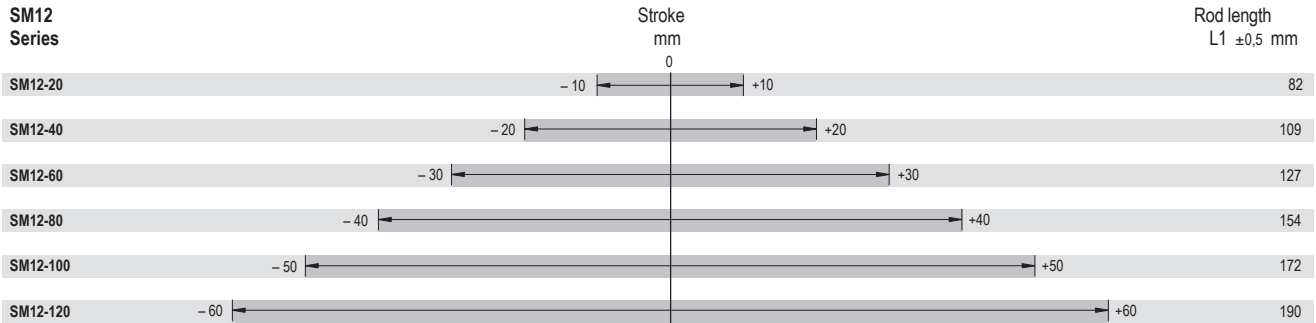
Coil Assembly

# SM Series Part Numbering System

**SM12 - 20**

Motor Model	Stroke (mm)
SM12	20
	40
	60
	80
	100
SM20	120
	.
	.

## Overview



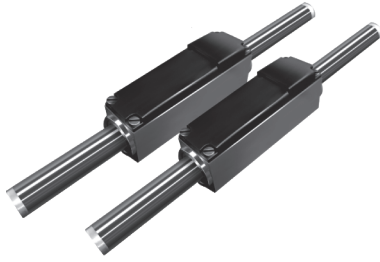
Note: Single rod available on request.

We reserve the right to make technical changes at any time without prior notice



**SM Series**  
**Shaft Linear Motors** *With Built-in Encoder for Turn Key Linear Motion Systems*

SPECIFICATIONS



**SM 12**

- Built-in encoder
- Ideal for Z-axis
- Small cross-section
- Control mode switching function available

**Performance**

	Unit	SM12-020	SM12-040	SM12-060	SM12-080	SM12-100	SM12-120
Peak Force	N				10.7		
Continuous Force @ 125°C*	N				3.5		
Peak Power @ 125°C	W				77.1		
Continuous Power @ 125°C*	W				8.5		

**Electrical**

	Unit	SM12-020	SM12-040	SM12-060	SM12-080	SM12-100	SM12-120
Peak Current	Apk				2.35		
Continuous Current @ 125°C*	Apk				0.78		
Continuous Stall Current @ 125°C*	Arms				0.55		
Force Constant	N/Apk				4.55		
Back EMF Constant L-L	Vpk/m/s				5.23		
Resistance L-L @ 22°C	Ohm				13.2		
Resistance L-L @ 125°C	Ohm				18.7		
Inductance L-L @ 1kHz	mH				0.82		
Motor Constant @ 125°C	N/√W				1.22		
Electrical Cycle Length	mm				18		
Max. Terminal Voltage	VDC				75		

**Thermal**

	Unit	SM12-020	SM12-040	SM12-060	SM12-080	SM12-100	SM12-120
Thermal Resistance @ 125°C	°C/W				12.2		
Max. Winding Temperature	°C				125		

**Mechanical**

	Unit	SM12-020	SM12-040	SM12-060	SM12-080	SM12-100	SM12-120
Coil Weight	gram				39		
Shaft Weight	gram	18	24	28	35	39	43
Repeatability**	um				+/-15		
Accuracy**	um	+/-200	+/-220	+/-240	+/-260	+/-280	+/-300

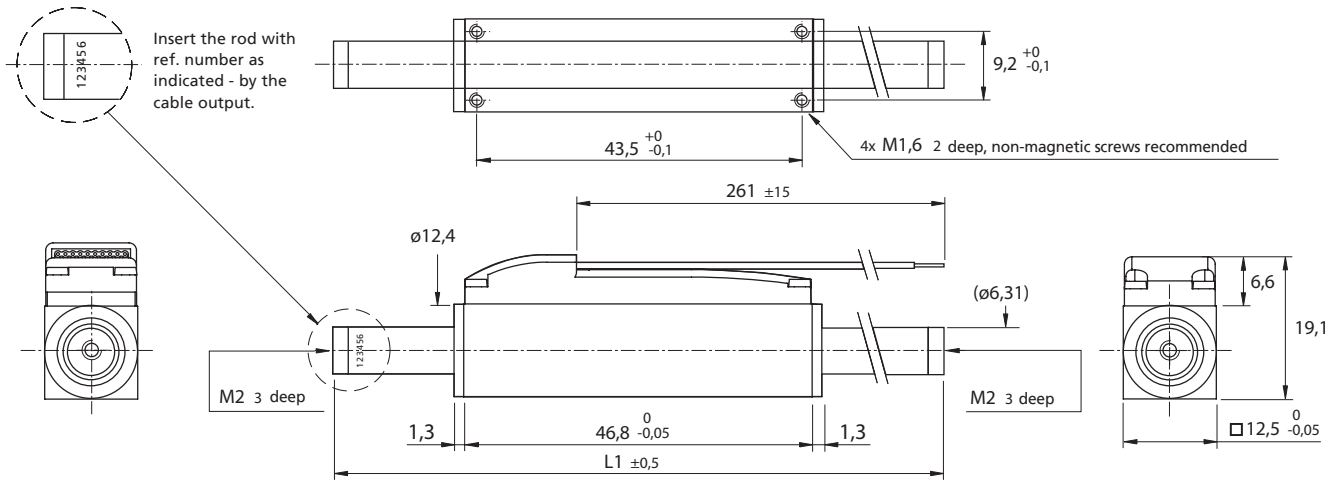
**Notes:**

1. Apk = 1.414 \* Arms; Vpk = 1.414 \* Vrms
2. \* Ambient temperature 22°C, natural convection, no heat sink.
3. \*\* Typical values with integrated Sin/Cos Hall sensors and Elmo SOL-WHI2.5/60I01.  
Values may vary depending on conditions of use.
4. Specifications tolerance – inductance +/-30%, all others +/-10%.

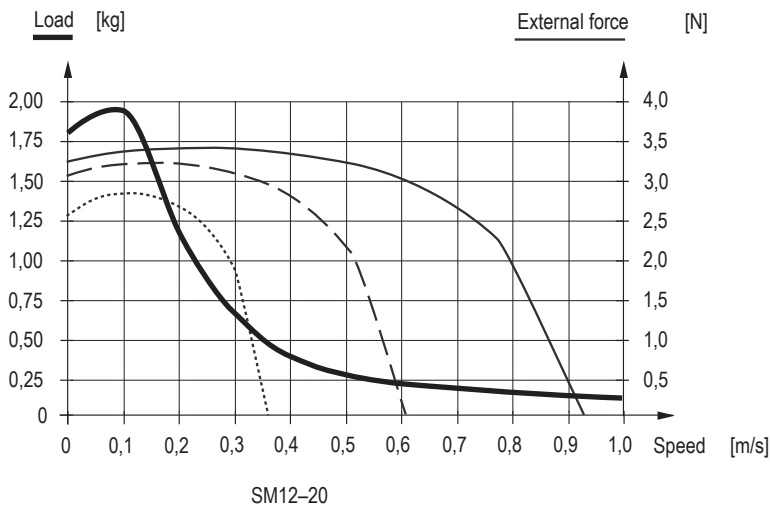
**SM Series**  
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SPECIFICATIONS

**SM 12**



SM 12 SPEED VS FORCE PLOT



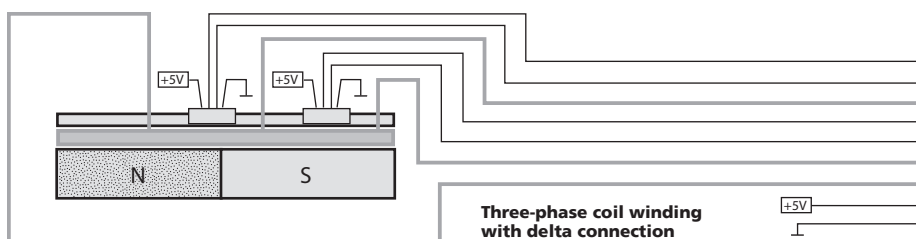
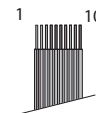
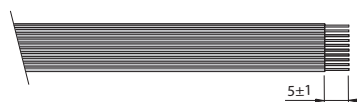
Trapezoidal motion profile	(t1 = t2 = t3)
Displacement distance:	20 mm
Friction coefficient:	0,2
Slope angle:	0°
Rest time:	0,1 s

<b>Load:</b>	The max. permissible load at a given speed with an external force of 0 N
<b>External force:</b>	The max. permissible external force at a given speed with a load of:
- 0,1 Kg	_____
- 0,2 Kg	_____
- 0,5 Kg	_____

CABLE CONNECTION

**Cable**  
Material PVC, 10 conductors, AWG 28, grid 1mm, wires tinned



**Connection**

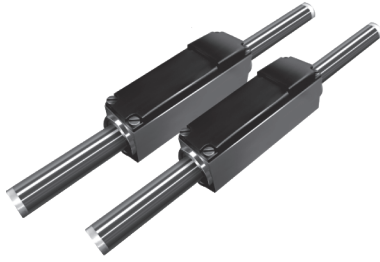
PIN	Function
10	N.C.
6	Sin +
7	Sin -
3	Phase A
8	Cos +
9	Cos -
2	Phase B
1	Phase C
5	Logic supply +5V
4	Logic GND

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SPECIFICATIONS



**SM 20**

- Built-in encoder
- Ideal for Z-axis
- Small cross-section
- Control mode switching function available

**Performance**

	Unit	SM20-040	SM20-080	SM20-120	SM20-160	SM20-220
Peak Force	N			27.6		
Continuous Force @ 125°C*	N			9.2		
Peak Power @ 125°C	W			129.2		
Continuous Power @ 125°C*	W			14.4		

**Electrical**

	Unit	SM20-040	SM20-080	SM20-120	SM20-160	SM20-220
Peak Current	Apk			3.35		
Continuous Current @ 125°C*	Apk			1.12		
Continuous Stall Current @ 125°C*	Arms			0.79		
Force Constant	N/Apk			8.23		
Back EMF Constant L-L	Vpk/m/s			9.47		
Resistance L-L @ 22°C	Ohm			10.8		
Resistance L-L @ 125°C	Ohm			15.3		
Inductance L-L @ 1kHz	mH			1.13		
Motor Constant @ 125°C	N/√W			2.43		
Electrical Cycle Length	mm			24		
Max. Terminal Voltage	VDC			75		

**Thermal**

	Unit	SM20-040	SM20-080	SM20-120	SM20-160	SM20-220
Thermal Resistance @ 125°C	°C/W			7.2		
Max. Winding Temperature	°C			125		

**Mechanical**

	Unit	SM20-040	SM20-080	SM20-120	SM20-160	SM20-220
Coil Weight	gram			138		
Shaft Weight	gram	98	140	168	200	250
Repeatability**	um			+/-20		
Accuracy**	um	+/-500	+/-600	+/-700	+/-800	+/-900

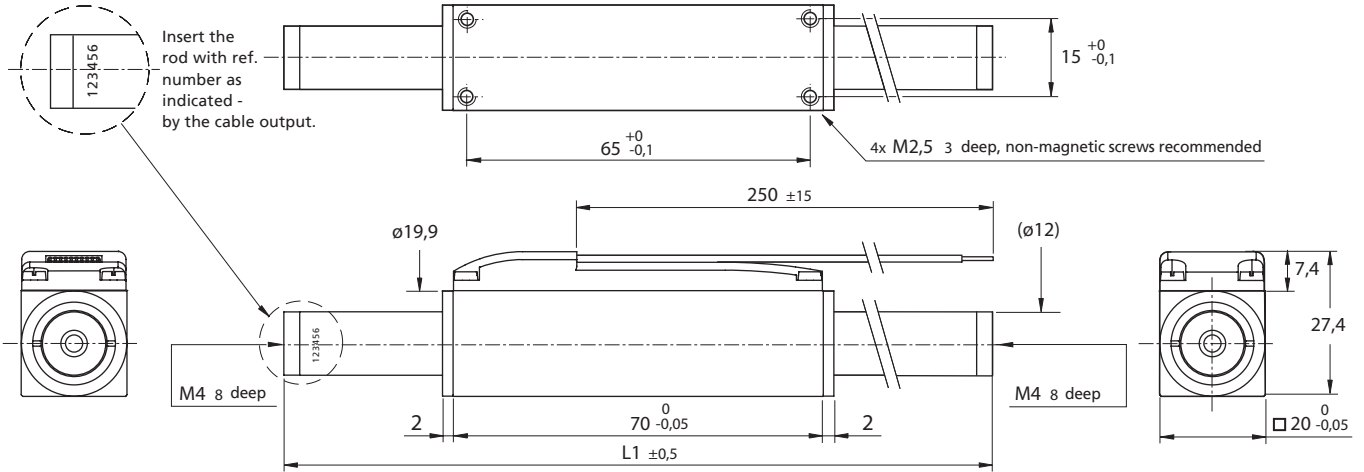
**Notes:**

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2. \* Ambient temperature 22°C, natural convection, no heat sink.
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Values may vary depending on conditions of use.
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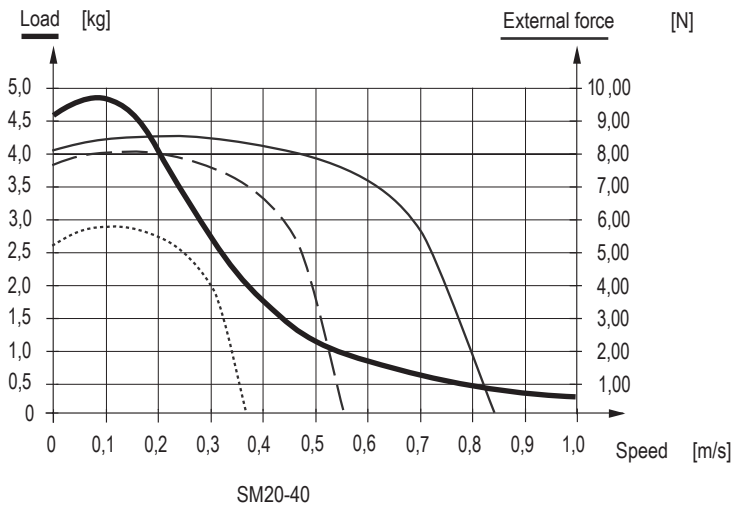
**SM Series**  
**Shaft Linear Motors** With Built-in Encoder for Turn Key Linear Motion Systems

SPECIFICATIONS

**SM 20**



SM 20 SPEED VS FORCE PLOT



Trapezoidal motion profile (t1 = t2 = t3)

Displacement distance:	40 mm
Friction coefficient:	0,2
Slope angle:	0°
Rest time:	0,1 s

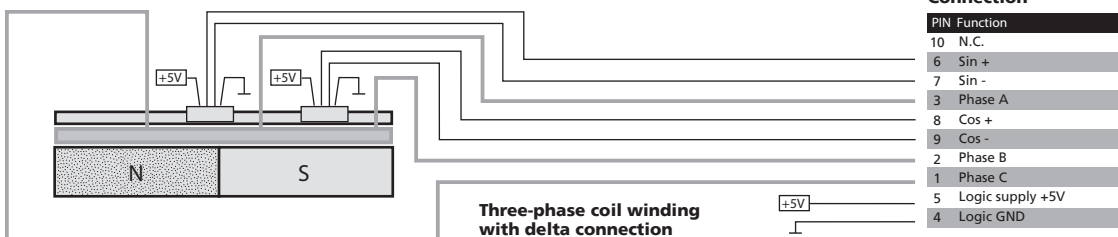
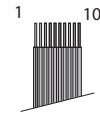
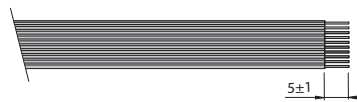
**Load:** The max. permissible load at a given speed with an external force of 0 N

**External force:** The max. permissible external force at a given speed with a load of:

- 0,5 Kg \_\_\_\_\_
- 1,0 Kg - - - - -
- 2,0 Kg ··········

CABLE CONNECTION

**Cable**  
Material PVC, 10 conductors, AWG 28, grid 1mm, wires tinned



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# PBA GROUP

## SINGAPORE

### PBA (S) Pte Ltd Headquarters

Address: PBA Building, 505 Yishun Industrial Park A, Singapore 768733  
Tel: +(65) 6576-6766  
Fax: +(65) 6576-6765  
Email: enquiries@pba.com.sg  
Website: www.pba.com.sg

### PBA Solutions Pte Ltd

Address: PBA Building, 505 Yishun Industrial Park A, Singapore 768733  
Tel: +(65) 6576-6776  
Fax: +(65) 6576-6765  
Email: enquiry@pbasolutions.com  
Website: www.pbasolutions.com

### PBA Systems Pte Ltd (601191)

Address: PBA Building, 505 Yishun Industrial Park A, Singapore 768733  
Tel: +(65) 6576-6767  
Fax: +(65) 6484-6768  
Email: sales@pbasystems.com.sg  
Website: www.pbasystems.com.sg

### PBA Technology Pte Ltd (QA251)

Address: PBA Building, 505 Yishun Industrial Park A, Singapore 768733  
Tel: +(65) 6576-6760  
Fax: +(65) 6576-6761  
Email: enquiry@pbatechnology.com  
Website: www.pbatechnology.com

### PBA Spindles Pte Ltd

Address: PBA Building, 505 Yishun Industrial Park A, Singapore 768733  
Tel: +(65) 6576-6766  
Fax: +(65) 6576-6765  
Email: edwin.kang@pba.com.sg  
Website: www.pba-spindles.com

## INDIA

### PBA (India) Engineering Services and Supplies Private Limited

Address: 503, 5th Floor Shivai Plaza, Marol, Andheri East, Mumbai, India 400 059  
Tel: +(91) 22-412-01278  
Fax: +(91) 22-401-58389  
Email: pbain@pbatechnology.com

## INDONESIA

Indonesia Rep: Mr. Raya Tjendrawasi  
H/P: +(62) 816-4846-547  
Email: rayac@cbn.net.id

## MALAYSIA

### PBA Industries (M) Sdn Bhd

Address: No 12A, Ground Floor Aked Esplanad, Jalan 14/155B Bukit Jalil Kuala Lumpur, Malaysia 57000  
Tel: +(60) 03-8993-9101 / 9102 / 9103  
Fax: +(60) 03-8993-9106  
Email: malaysia@pbagroup.net

### PBA System (M) Sdn Bhd

Address: No 12A, Ground Floor Aked Esplanad, Jalan 14/155B Bukit Jalil Kuala Lumpur, Malaysia 57000  
Tel: +(60) 03-8993-9105  
Fax: +(60) 03-8993-9106  
Email: malaysia@pbagroup.net

### PBA Industries (PG) Sdn Bhd

Address: 17-2-5, Bayan Point, Medan Kampung Relau, Penang, Malaysia 11900  
Tel: +(60) 04-6427915 / 6452916  
Fax: +(60) 04-6447434  
Email: inquiries@pbaindustries.com.my

### PBA Advantech (M) Sdn Bhd

Address: No 26 & 28, Jalan PTP 1/4, Taman Perindustrian Tasik Perdana, Puchong, Selangor 47120  
Tel: +(60) 03-8993-9101 / 9102 / 9103  
Email: malaysia@pbagroup.net

## PHILIPPINES

### PBA (S) Pte Ltd

Philippines Rep Office:  
Address: PBA Building, 505 Yishun Industrial Park A, Singapore 768733  
Tel: +(65) 6576-6766  
Fax: +(65) 6576-6765  
Email: info@pbagroup.net  
Website: www.pbagroup.net

## THAILAND

### PBA Systems (Thailand) Co., Ltd.

Address: 234/118, Asok-Dindaeng Road, Huakwang, Bangkok, Bangkok, Thailand 10310  
Tel: +(66) 2-641-4522 / 641-4523  
Fax: +(66) 2-614-4400  
E-mail: support@pbathailand.com

### International Magnetics Technology Co., Ltd

Address: Nongkhae Industrial Estate 10/19 Soi SRDI Moo4, Tambon Kokyae, Amphur Nongkhae, Saraburi, Thailand 18230  
Tel: +(66) 3-637-4024

## CHINA

### Sales Office 销售办事处:

#### 立狄线性马达 (深圳) 有限公司

#### PBA Linear Motor Co. Ltd.

宝安42区兴华一路华创达中心商务大厦A栋407-A  
42 Xinghua Road, HuaChuangDa Central Business Building, Block A, 407-A Baoan District, Shenzhen, China 518000  
Tel: +(86) 755-216-77507  
Fax: +(86) 755-216-77506

### Representative Office 代表机构:

#### 新加坡碧绿威私人有限公司深圳代表处

#### 宝安42区兴华一路华创达中心商务大厦A栋407-B

42 Xinghua Road, HuaChuangDa Central Business Building, Block A, 407-B Baoan District, Shenzhen, China 518000  
Tel: +(86) 755-216-77507  
Fax: +(86) 755-216-77506

## TAIWAN

### 新加坡商立狄线性马达有限公司

地址: 臺北市民權西路35號6樓之2

Address: 6-2 FL No. 35, Min Chuan West Road, Taipei, Taiwan 104  
Tel: +(886) 2-2599-3558  
Fax: +(886) 2-2599-3042

HP: +(886) 982-090-501 / +(886)

938-030-774

Email: pba.taiwan@pbagroup.net

## KOREA

### PBA Systems (Korea)

Address: 12 Block- 5 Lot, #622-4, NamChon-Dong, Gyeongin-Ro, Namdong-Gu, Incheon, Korea 405846  
Tel: +(82) 32-815-3428  
Fax: +(82) 32-815-3429  
Contact Person: Dr. Sanguk Kim  
Email: sales@pbasystems.com.sg

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