PLA SERIES

LINEAR SERVO MOTOR ACTUATOR

PBA SYSTEMS

www.pbasystems.com.sg

PLA SERIES

LINEAR SERVO MOTOR ACTUATOR

Faster Settling, Accuracy and Highly Repeatable Positioning

PBA's PLA series linear servo motor actuators are "plug and play" center driven linear solutions that combine ironless and iron core linear motor technology to offer a modular actuator inclusive of precision linear encoders and linear guideways.

These modules offer optimal acceleration/velocity possibilities and rigidity that allows for faster settling, accuracy and highly repeatable positioning.

PLA actuators is configurable as open frame systems for basic applications as well as partially enclosed and fully sealed bellow covers.

- Velocity to 3 m/sec
- Acceleration up to 5Gs
- Encoder Resolution to 0.8nm (Depends on drive)
- Effective stroke up to 2m

* Technical specifications subject to change without prior notice

PART NUMBERING SYSTEM

Coil Assembly

PLA - D2 - C2 - S - TC - 1.0 - FC - HC - E1.0 - O - 740 - 00

MOTOR MODEL

D2	DX20B

MOTOR SIZE

C2
C3
C4
C5

CONNECTION TYPE

S	Series
P	Parallel

THERMAL PROTECTION

TC*	PT 100 Sensor

CABLE LENGTH**

0.5	0.5m
1.0	1.0m
2.0	2.0m
3.0	3.0m
4.0	4.0m
5.0	5.0m

POWER CABLE OPTIONS

NF	No Ferrite Core (Flying Leads)
FC	Ferrite Core (Recommended)
9NF	No Ferrite Core, D Sub 9 pins Female Connector
CNF	No Ferrite Core, Circular Quick Lock 6 pins Male Connector

DESIGN VERSIONS

00	Standard
01	Customized Version
	:

EFFECTIVE STROKE (mm)

140
200
260
320
380
440
500
560
620
680
740

COVER

O	Open
C	Covered

ENCODER RESOLUTION

EA	Analog
E0.5	0.5um
E1.0	1.0um

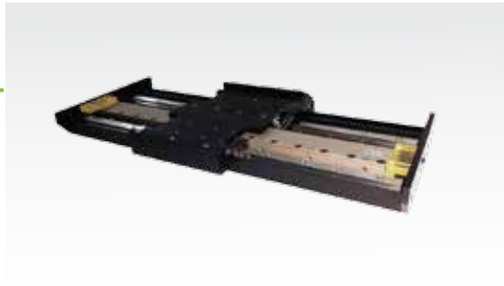
HALL SENSOR CONNECTOR OPTIONS

H	Flying Leads (No Connector)
HC	9 pins D Sub Male Connector
CHC	5 pins Circular Quick Lock Male Connector

* TC - Sensor output to temperature controller
** Encoder, power & hall cable

PLA-D2

- Linear Actuator
- Peak force to 137N, Continuous force to 27N

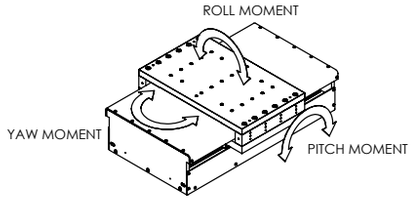


PLA SERIES
MULTI-AXIS ACTUATOR

SPECIFICATION		MODEL			
		PLA-D2-C2		PLA-D2-C3	
Motor Parameters	**Unit**	S	P	S	P
Peak Force	N	92		137	
Continuous Force @ 120ºC*	N	18		27	
Peak Power @ 120ºC	W	24		36	
Continuous Power @ 120ºC*	W	744		1116	
Peak Current	A^{pk}	10.5	21	10.5	21
Continuous Current @ 120ºC*	A^{pk}	2.1	4.2	2.1	4.2
Continuous Stall Current @ 120ºC*	Arms	1.40	2.80	1.40	2.80
Force Constant	N/A^{pk}	8.7	4.4	13.1	6.5
Back EMF Constant	V^{pk}/m/s	10	5	15	7.5
Coil Resistance L-L @ 25ºC	Ohm	6.5	1.6	9.8	2.4
Coil Resistance L-L @ 120ºC*	Ohm	9.0	2.2	13.5	3.4
Inductance L-L @ 1kHz	mH	1.53	0.38	2.3	0.57
Motor Constant @ 25ºC*	N/√W	3.95		4.84	
Motor Constant @ 120ºC*	N/√W	3.36		4.11	
Max. Terminal Voltage	Vdc	400			
Thermal Resistance @ 120ºC*	ºC/W	3.19		2.13	
Max. Coil Temperature	ºC	120			
Electrical Cycle Length	mm	30			
Specifications					
Repeatability**	um	±2.0			
Accuracy***	um	±30um/300mm			
Straightness***	um	±10um/300mm			
Flatness***	um	±20um/300mm			
Linear Guide Rated Load and Static Moment					
Model Code		LM Guide			
Block Quantity		4			
Maximum bearing load	N	3125			
Pitch moment	Nm	191		287	
Yaw moment	Nm	191		287	
Roll moment	Nm	218			

Notes:

1. A^{pk} = 1.414 * Arms; V^{pk} = 1.414 * Vrms.
2. * Ambient temperature 25ºC, heat dissipation by natural convection, without heat sink attached.
3. Specifications tolerance – inductance +/-30%, all others +/-10% (for motor parameters).
4. Peak force and current - 1 second duration.
5. ** Depend on encoder resolution.
6. *** Specific accuracy, straightness and flatness requirement, contact PBA for more information.
7. For customized stroke length, contact PBA.
8. For different motor models, contact PBA.



PLA-D2

- Linear Actuator
- Peak force to 137N, Continuous force to 27N

PLA SERIES
MULTI-AXIS ACTUATOR

SPECIFICATION		MODEL			
		PLA-D2-C4		PLA-D2-C5	
Motor Parameters	**Unit**	S	P	S	P
Peak Force	N	183		229	
Continuous Force @ 120ºC*	N	37		46	
Peak Power @ 120ºC	W	48		60	
Continuous Power @ 120ºC*	W	1488		1860	
Peak Current	A^{pk}	10.5	21	10.5	21
Continuous Current @ 120ºC*	A^{pk}	2.1	4.2	2.1	4.2
Continuous Stall Current @ 120ºC*	Arms	1.40	2.80	1.40	2.80
Force Constant	N/A^{pk}	17.4	8.7	21.8	10.9
Back EMF Constant	V^{pk}/m/s	20.1	10	25.1	12.5
Coil Resistance L-L @ 25ºC	Ohm	13	1.6	16.3	4.1
Coil Resistance L-L @ 120ºC*	Ohm	18.0	4.5	22.5	5.6
Inductance L-L @ 1kHz	mH	3.06	0.77	3.83	0.96
Motor Constant @ 25ºC*	N/√W	5.59		6.24	
Motor Constant @ 120ºC*	N/√W	4.75		5.31	
Max. Terminal Voltage	Vdc	400			
Thermal Resistance @ 120ºC*	ºC/W	1.60		1.28	
Max. Coil Temperature	ºC	120			
Electrical Cycle Length	mm	30			
Specifications					
Repeatability**	um	±2.0			
Accuracy***	um	±30um/300mm			
Straightness***	um	±10um/300mm			
Flatness***	um	±20um/300mm			
Linear Guide Rated Load and Static Moment					
Model Code		LM Guide			
Block Quantity		4			
Maximum bearing load	N	3125			
Pitch moment	Nm	287			
Yaw moment	Nm	287			
Roll moment	Nm	218			

Notes:

1. A^{pk} = 1.414 * Arms; V^{pk} = 1.414 * Vrms.
2. * Ambient temperature 25ºC, heat dissipation by natural convection, without heat sink attached.
3. Specifications tolerance – inductance +/-30%, all others +/-10% (for motor parameters).
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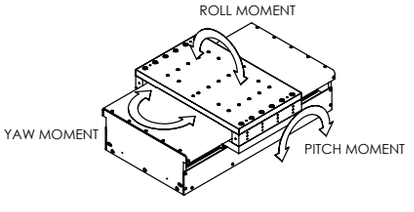
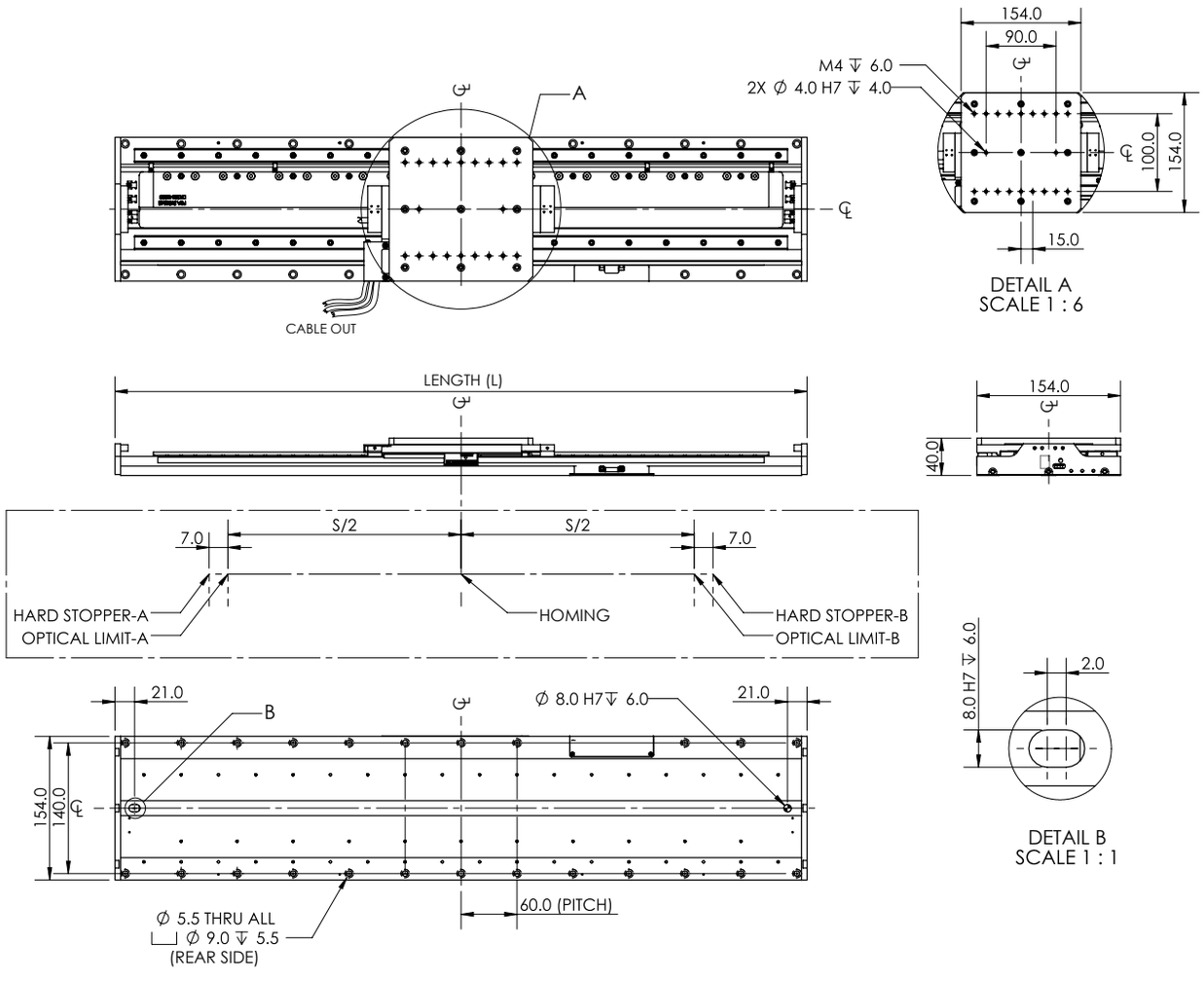


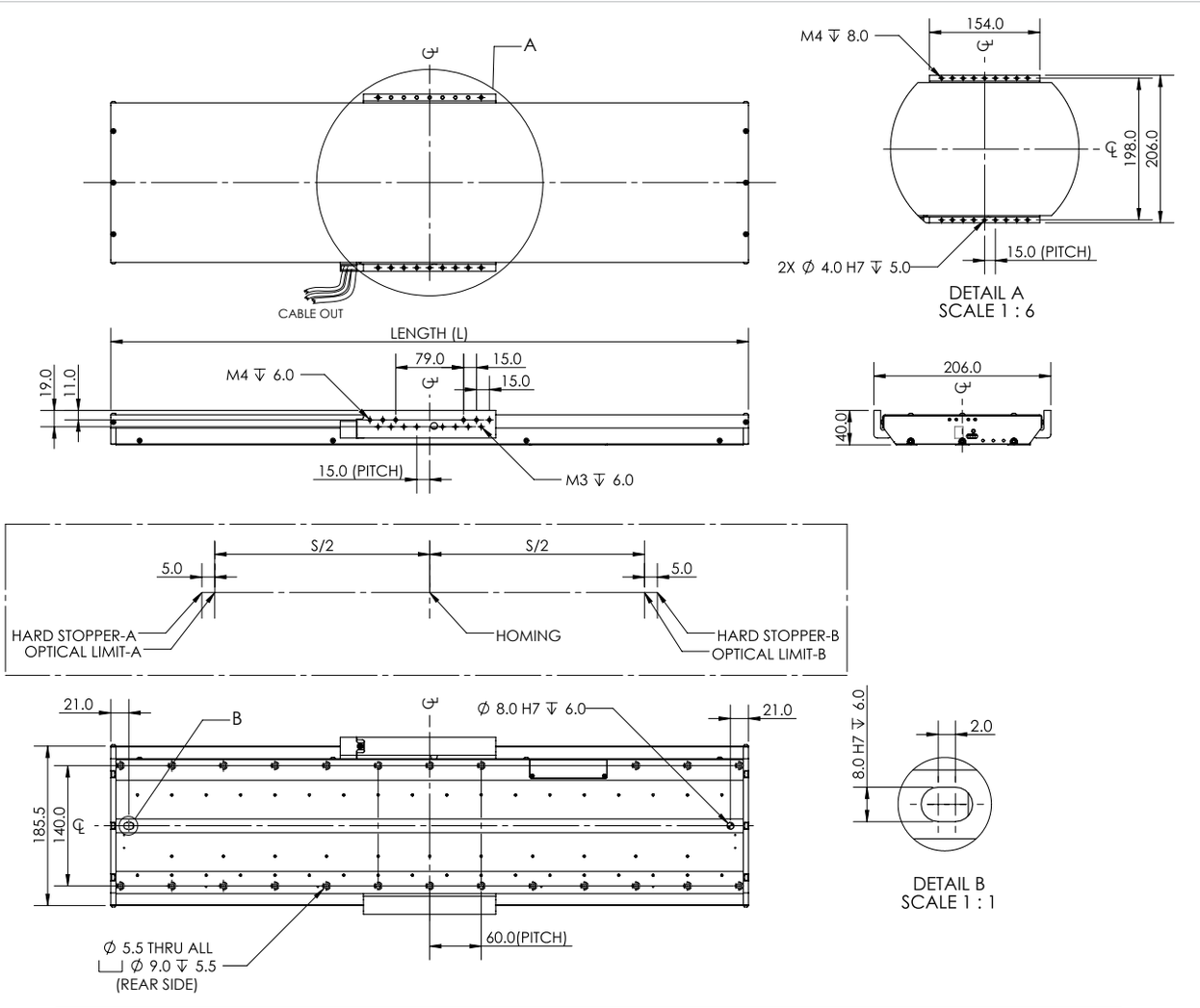
PLA - OPEN TYPE



MOTOR MODEL	STROKE (S) mm	ACTUATOR LENGTH (L) mm	CARRIAGE LENGTH (A) mm	SLIDER MASS kg	MODULE MASS kg
C2 & C3	140	352	124	1.6	4.6
	200	412			5.2
	260	472			5.8
	320	532			6.4
	380	592			7.0
	440	652			7.6
	500	712			8.2
	560	772			8.8
	620	832			9.4
	680	892			10.0
	740	952			10.6
C4 & C5	140	382	154	1.9	5.1
	200	442			5.7
	260	502			6.3
	320	562			6.9
	380	622			7.5
	440	682			8.1
	500	742			8.7
	560	802			9.3
	620	862			9.9
	680	922			10.5
	740	982			11.1

Notes: 1. Slider Mass = Coil Mass + Carriage Mass

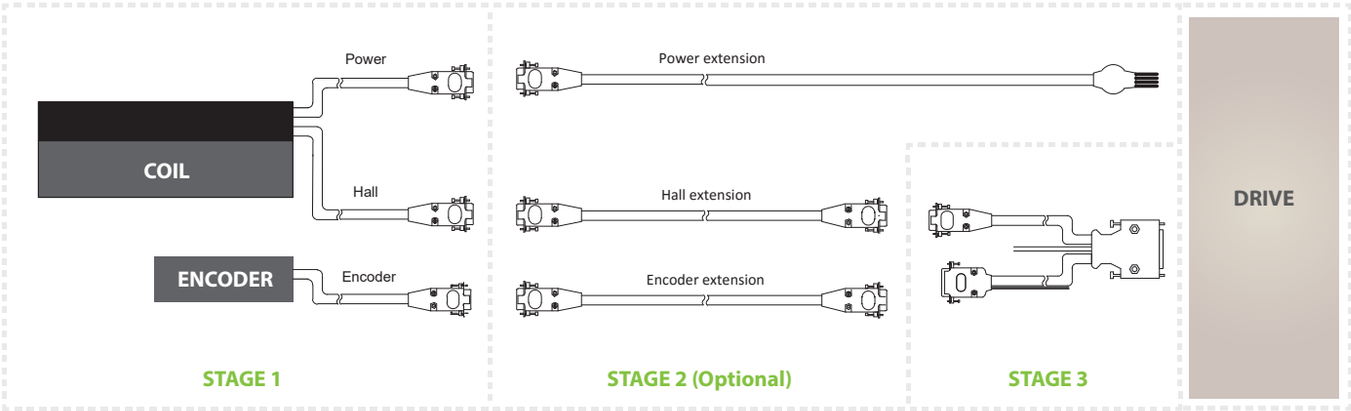
PLA - COVERED TYPE



MOTOR MODEL	STROKE (S) mm	ACTUATOR LENGTH (L) mm	CARRIAGE LENGTH (A) mm	SLIDER MASS kg	MODULE MASS kg
C2 & C3	140	352	124	1.7	5.1
	200	412			5.9
	260	472			6.7
	320	532			7.5
	380	592			8.3
	440	652			9.1
	500	712			9.9
	560	772			10.7
	620	832			11.5
	680	892			12.3
	740	952			13.1
C4 & C5	140	382	154	2.0	5.6
	200	442			6.4
	260	502			7.2
	320	562			8.0
	380	622			8.8
	440	682			9.6
	500	742			10.4
	560	802			11.2
	620	862			12.0
	680	922			12.8
	740	982			13.6

Notes: 1. Slider Mass = Coil Mass + Carriage Mass

CABLE OPTION

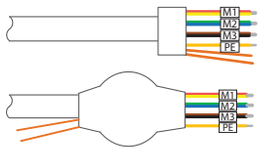


STAGE 1 — POWER AND HALL CABLE OPTION

PLA-D2-C1-S-TC-1.0-FC-HC-E1.0-O-740-00

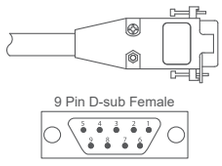
POWER CABLE OPTIONS

NF / FC



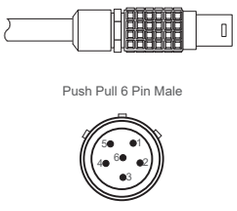
M1	Pink & Yellow
M2	Green & Blue
M3	Brown & Black
PE	Yellow
Temp sensor 1	Orange / Black
Temp sensor 2	Orange

9NF



P1	M1	Pink
P2	M1	Yellow
P3	M3	Black
P4	M3	Brown
P5	M2	Blue
P6	M2	Green
P7	Temp sensor 1	Orange/Black
P8	Temp sensor 2	Orange
P9	PE	White

CNF



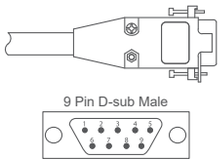
P1	M1	Pink & Yellow
P2	M2	Green & Blue
P3	M3	Brown & Black
P4	Temp sensor 1	Orange / Black
P5	Temp sensor 2	Orange
P6	PE	White

HALL SENSOR OPTIONS

H

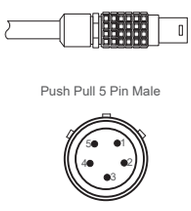
Hall A	White
Hall B	Green
Hall C	Blue
5V	Red
0V	Black

HC



P1	Hall A	White
P2	Hall B	Green
P3	Hall C	Blue
P4	5V	Red
P5	0V	Black

CHC



P1	Hall A	White
P2	Hall B	Green
P3	Hall C	Blue
P4	5V	Red
P5	0V	Black

The temperature in which the thermostat is active is shown as below:

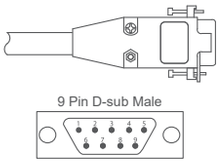
MODEL	THERMAL DEVICE TYPE	THERMOSTAT (NC) OPENS AT
DX 20B	PT100	See Note 1

Note 1

- Programmable on temperature controller or analog inputs on motion controller.
- Recommended to set cut-off temperature to 100°C (max) to prevent coil damage.
- User has to ensure that the thermal protection devices are wired to appropriate electronics to ensure that the motor power cutoff is active when temperature reaches its allowable limit.

PLA CABLE PIN OUT

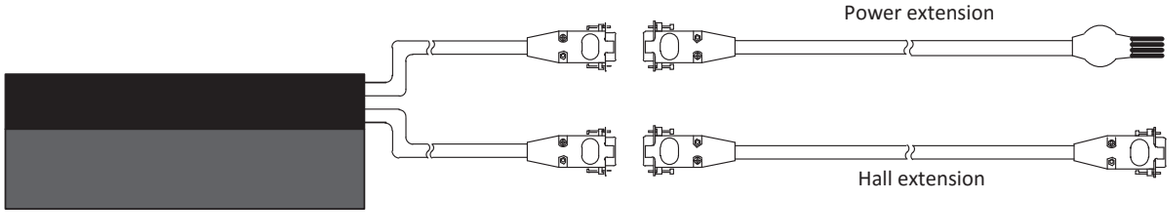
ENCODER CONNECTOR - 9 PIN D-SUB MALE

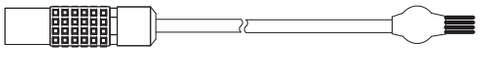
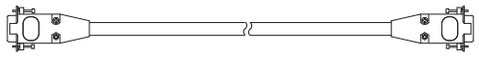
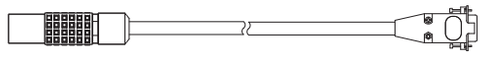
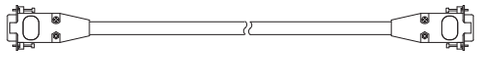


	RH200X / RH200Z	RH200B
P1	0V DC	0V DC
P2	A+	Sine+
P3	Z+	Z+
P4	B+	Cosine+
P5	+5V DC	+5V DC
P6	A-	Sine-
P7	Z-	Z-
P8	B-	Cosine-
P9	Inner	Inner
Casing	Outer	Outer

STAGE 2 PLA EXTENSION CABLE

Connection example: PLA-D2-C2-S-TC-1.0-FC-HC-E1.0-O-740-00



Extension Cable		Part Number
Power Extension Cable		CBL_EXT_PWR_DX_X.X
		CBL_EXT_PWR_DX_CC_X.X
Hall Sensor Extension Cable		CBL_EXT_HALL_DX_X.X
		CBL_EXT_HALL_DX_CC_X.X
Encoder Extension Cable		CBL_EXT_REN01_X.X
		CBL_EXT_REN01B_X.X

CABLE	
01	RH200 Digital
01B	RH200 Analog

CABLE LENGTH (X.X)	
0.5	0.5 meter
1.0	1.0 meter
2.0	2.0 meter
3.0	3.0 meter
4.0	4.0 meter
5.0	5.0 meter

Notes: **1.** X.X is the length of the cable in meters 2. For customized cable length, contact PBA