HPLA Series Belt Driven Linear Modules

Features

- Strong – steel roller bearing option for highest load capacity – 1530 kg
- Rugged construction for heavy duty applications
- Thrust force capacity to 5455 N
- Standard travel up to 9 meters
- Velocity up to 5 meters/sec.
- Positional repeatability of ±0.2 mm
- Timing belt and pulley drive mechanism for fast, accurate positioning

The Modular Concept

Provides the ideal solution for applications:

Modular drive system:

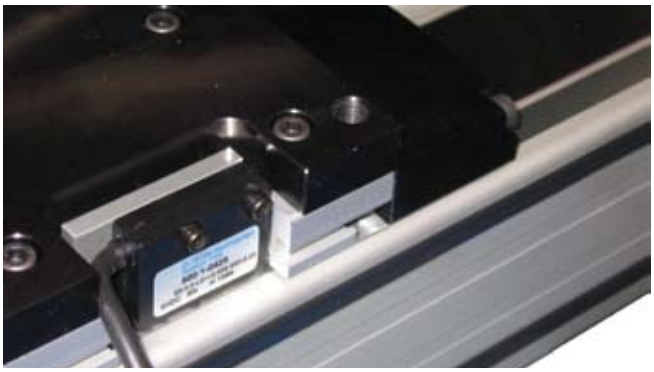
- Increased system stiffness due to larger belt width
- Low maintenance
- High performance due to hollow shaft input

Modular guide system:

- Provides an alternative to composite wheel material
- Quiet operation
- Low maintenance
- Steel wheel option on an integrated steel rolling surface for increased load capacity
- High load-bearing capacity
- High levels of rigidity

Various options for adaptation to wide ranging applications:

- Steel cover strip
- Corrosion-resistant stainless steel version for application in clean rooms or in the food industry
- Integrated position feedback system for maximum precision
- Optional IP30 rated strip seal



HPLA Encoder Option

See pages 272-276 for available options and accessories.

Proven Technology

- Direct mounting for planetary gear reducers – eliminating complexity of additional machined parts or couplings
- Adjustable “end of travel” limit switches and “Home” position sensor
- Cable carrier systems
- Performance matched Parker servo systems
- Structural components for vertical and multi-axis mounting
- Toe clamps and hardware for fast/easy mounting
- External bumper option
- Link shafts and support bearing for dual unit axes
- Splice plates for extending travels beyond length available in a single profile

Typical Fields of Application

As part of advanced, cost-effective construction of machines and handling systems:

- Materials handling: palletizing, depalletizing, feeding, part removal
- Cleanroom technology: wafer transport, wafer coating
- Warehouse technology: parts picking, storage and retrieval
- Machine tool automation: workpiece loading and unloading, tool changing
- Construction: formwork, placing reinforcing steel bars in concrete
- Process engineering: painting, coating, bonding
- Testing technology: guiding ultrasonic sensors, laboratory equipment
- Textile machinery building: cross-cutting, slitting and stacking, quilting, seam stitching

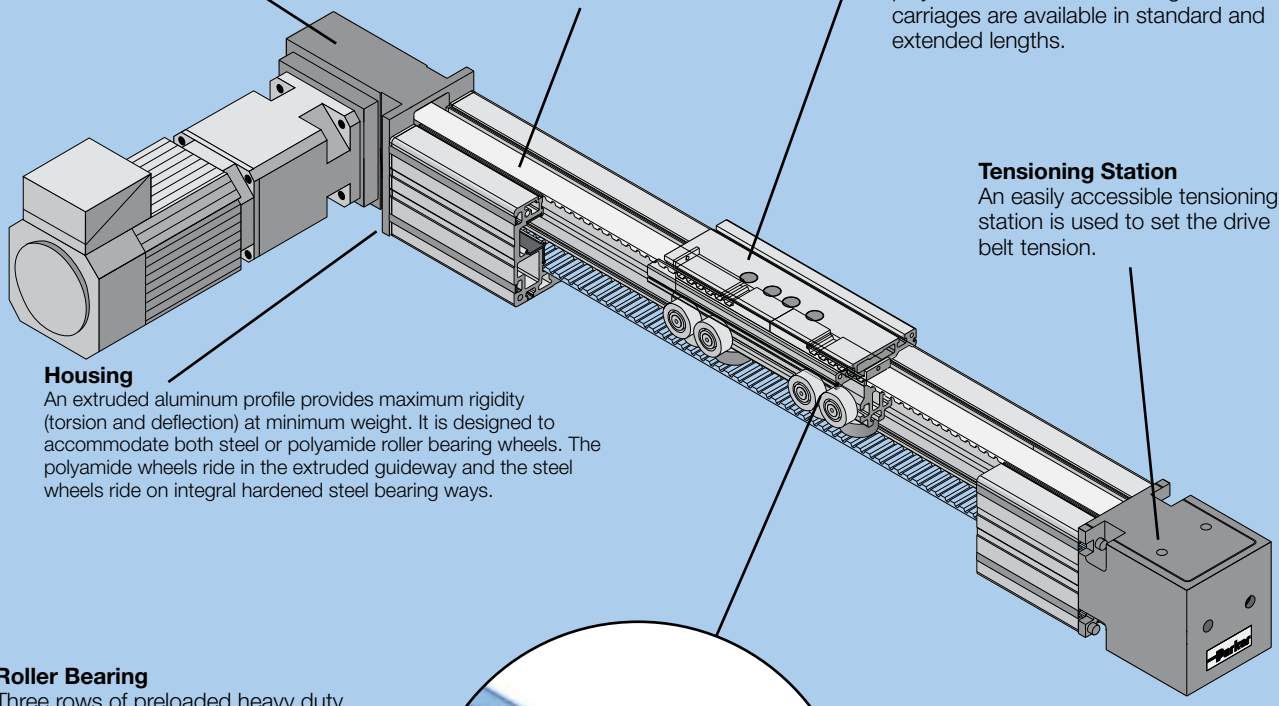
The HPLA is a rugged “next generation” linear module that offers high speed, high acceleration, and long travel, combined with stiff, rigid construction characteristics. It is ideally suited as a single axis product or as a component for high speed multi-axis gantries. The HPLA carriage is rigidly supported on three sides by heavy duty roller bearings, housed in a rugged aluminum housing. The bearing wheels are pre-loaded via eccentric bushings to eliminate play in the system, and are strategically located to evenly distribute the load across the length of the carriage.

A high strength steel reinforced drive belt and pulley system provides fast and highly repeatable positioning of the carriage. This high thrust drive belt is securely connected to the carriage by a unique clamping system. This system provides a secure connection and enables easy belt replacement without the need to remove the payload. Having a low coefficient of friction, the carriage design provides a high mechanical efficiency and long service life. Special carriage lengths and linear units with multiple carriages are available for custom applications.

Drive Station
The drive stations are designed to accept planetary gear reducers or provide different shaft outputs for driving the HPLA.

Drive Belt
A zero backlash, steel reinforced timing belt provides high speed, high force, and high acceleration. A serrated clamp mechanism between belt and carriage guarantees a safe, strong connection and allows belt replacement without removing the load.

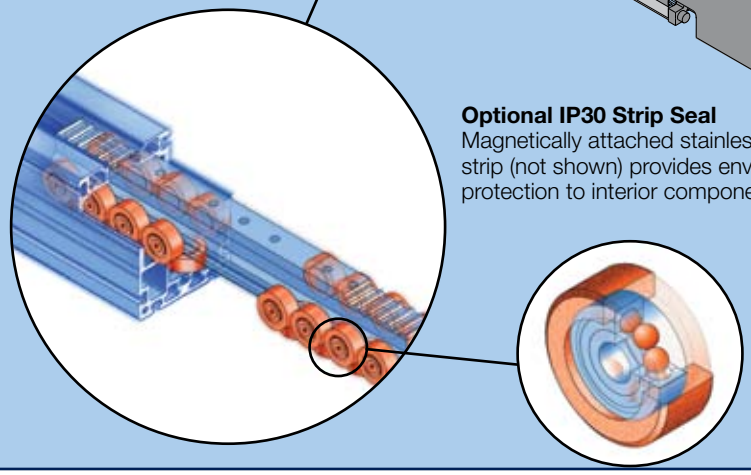
Carriage
Roller bearing wheels are installed on three sides of the carriage to provide smooth linear motion and support. The wheels are positioned to evenly distribute the load across the length of the carriage. Eccentric bearing wheel bushings are adjusted to eliminate play on all sides of the carriage. The carriages are available in standard and extended lengths.



Tensioning Station
An easily accessible tensioning station is used to set the drive belt tension.

Housing
An extruded aluminum profile provides maximum rigidity (torsion and deflection) at minimum weight. It is designed to accommodate both steel or polyamide roller bearing wheels. The polyamide wheels ride in the extruded guideway and the steel wheels ride on integral hardened steel bearing ways.

Roller Bearing
Three rows of preloaded heavy duty steel roller bearings provide the highest load carrying capacity available. Each roller bearing incorporates a low friction, lubricated and sealed radial ball bearing enclosed in a hardened steel outer ring (or raceway). A polyamide tread can be substituted for the steel ring whenever whisper quiet motion is desired.



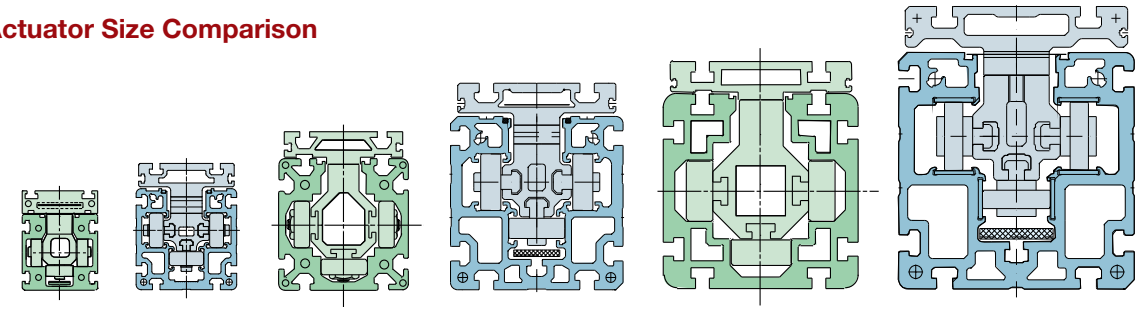
Optional IP30 Strip Seal
Magnetically attached stainless steel seal strip (not shown) provides environmental protection to interior components.

HPLA Series Specifications

Characteristic	Units	HPLA80 Polyamide Wheel	HPLA80 Steel Wheel	HPLA120 Polyamide Wheel	HPLA120 Steel Wheel	HPLA180 Polyamide Wheel	HPLA180 Steel Wheel	HPLA180 (Rack Drive) Polyamide Wheel
Unit Weight (basic unit without stroke)								
Standard Carriage, NL	kg (lb)	6.8 (15.0)	7.5 (16.5)	20.2 (44.4)	21.6 (47.5)	57.2 (125.8)	61.6 (135.3)	78.4 (172.5)
Extended Carriage, VL	kg (lb)	8.6 (18.9)	9.5 (20.9)	25.2 (55.4)	27.1 (59.6)	74.8 (164.6)	80.9 (178.0)	95.2 (209.4)
Carriage Weight								
Standard Carriage, NL	kg (lb)	1.7 (3.7)	1.8 (4.0)	5.8 (12.8)	6.0 (13.2)	12.3 (27.1)	12.6 (27.7)	32.5 (71.5) (1)
Extended Carriage, VL	kg (lb)	2.6 (5.7)	2.8 (6.2)	8.8 (19.4)	9.2 (20.2)	21.1 (46.4)	21.8 (48.0)	39.8 (87.6) (1)
Weight/Meter of Additional Travel	kg/m (lb/ft)	6.1 (4.1)	7.3 (4.9)	13.7 (9.2)	15.5 (10.4)	29.4 (19.8)	33.6 (22.6)	31.5 (21.2)
Moment of Inertia (related to the drive shaft)								
Standard Carriage, NL	kg-cm^2 (lb-in^2)	17.8 (6.1)	18.4 (6.3)	142 (48)	146 (50)	725 (247)	743 (253)	698 (238)
Extended Carriage, VL	kg-cm^2 (lb-in^2)	25.4 (8.7)	26.5 (9.0)	197 (67)	204 (70)	1121 (382)	1154 (393)	845 (288)
Travel and Speed								
Maximum Speed(2)	m/s (in/s)	5 (200)		5 (200)		5 (200)		5 (200)
Maximum Acceleration(2)	m/s^2 (in/s^2)	10 (393)		10 (393)		10 (393)		10 (393)
Max. Travel, Standard Carriage NL(3)	mm (in)	5540 (218)	5520 (217)	9470 (372)	9440 (371)	9240 (363)	9200 (362)	8680 (341)
Max. Travel, Extended Carriage VL(3)	mm (in)	5390 (212)	5370 (211)	9270 (365)	9240 (363)	8940 (352)	8900 (350)	8380 (330)
Geometric Data								
Cross Section, Square	mm (in)	80 (3.15)		120 (4.72)		180 (7.09)		180 (7.09)
Moment of Inertia Ix	cm^4 (in^4)	139 (3.34)		724 (17.39)		3610 (86.73)		3610 (86.73)
Moment of Inertia Iy	cm^4 (in^4)	165 (3.96)		830 (19.94)		4077 (97.95)		4077 (97.95)
Moment of Elasticity	N/mm^2 (lb/in^2)	0.72 x 10^5 (0.1044 x 10^8)		0.72 x 10^5 (0.1044 x 10^8)		0.72 x 10^5 (0.1044 x 10^8)		0.72 x 10^5 (0.1044 x 10^8)
Pulley Data, Torques, Forces								
Travel Distance per Revolution	mm/rev (in/rev)	180 (709)		270 (10.63)		420 (16.54)		280 (11.02)
Response Radius of Drive Pulley	mm (in)	28.7 (1.13)		43.0 (1.69)		66.8 (2.63)		44.6 (1.75)
Maximum Drive Torque	Nm (lb-in)	47.4 (420)		131.4 (1165)		368 (3264)		58 (514)
Maximum Belt Traction (effective load)				Refer to charts on following pages				
Repeatability(3)(4)	mm (in)	± 0.2 (± 0.008)		± 0.2 (± 0.008)		± 0.2 (± 0.008)		± 0.05 (± 0.002)

(1) Includes weight of drive module.
(2) Greater speeds and accelerations may be achieved.
(3) Bumper to bumper maximum stroke - splicing possible for longer travel distances including safety zone.
(4) Nominal value - component dependent. For improved repeatability consult factory.

Linear Actuator Size Comparison

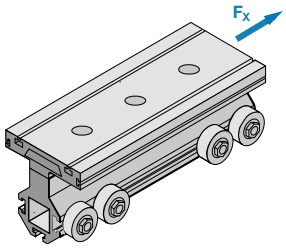


HLE60 HPLA080 HLE100 HPLA120 HLE150 HPLA180

HPLA080 Series – Load-Bearing Capacity of Carriage and Timing Belt

Load-Bearing Capacity of HPLA080 Timing Belt (Fx)

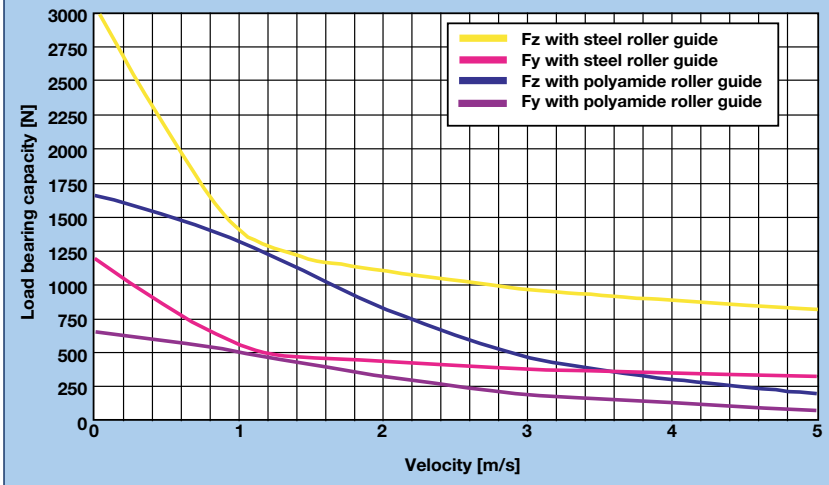
Drive Option	Transferable Thrust Force (n) Nominal Belt Tension (81,000 km life)	Maximum Belt Tension (46,000 km life)
Supported Pulley (S03, S04, S08, S09)	925	1115
Unsupported Pulley (S01, S02)		
W/GTN090	675	900
PEN115	675	900
PEN090	500	665



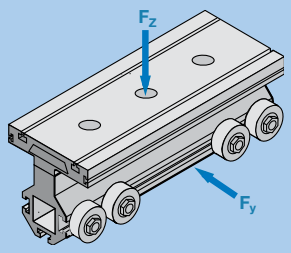
The forces and moments that the carriage is capable of transferring are speed-dependent. The curves shown in the graphs apply to a standard carriage (S). With the extended carriage (E), all the values apart from Fx (load-bearing capacity of timing belt) can be doubled if the load is applied equally to both halves of the carriage or distributed uniformly along its entire length.

HPLA080 Load-Bearing Capacity (Fy and Fz)

(Values double for extended carriage)



The curves show the maximum load-bearing capacity of a carriage in one direction of force or torque. If several loads are applied in different directions, the values given by the curves must be derated, i.e. the load or speed should be reduced if necessary.

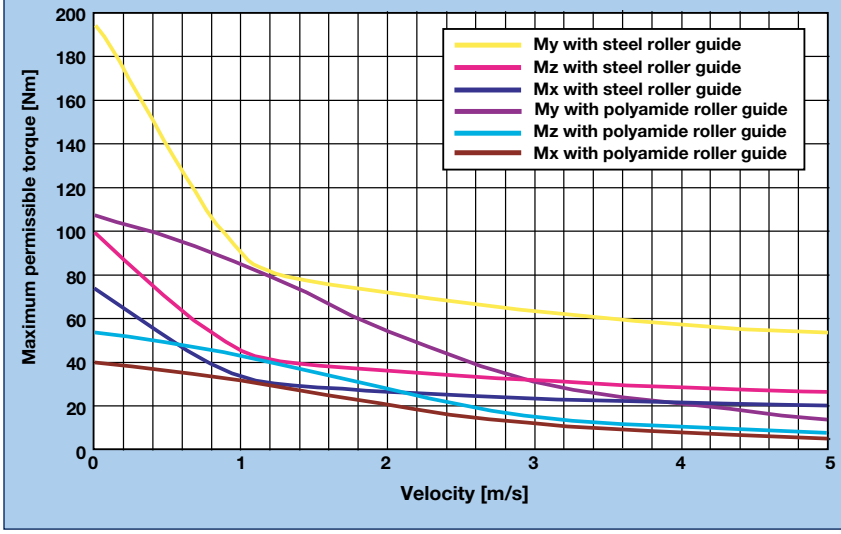


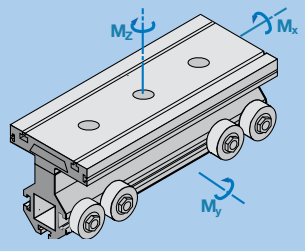
"DimAxes" software is available for determination of precise carriage loading.

Visit www.parkermotion.com to request a Gantry Robot CD.

HPLA080 Maximum Permissable Moment Load (Mx, My and Mz)

(Values double for extended carriage)

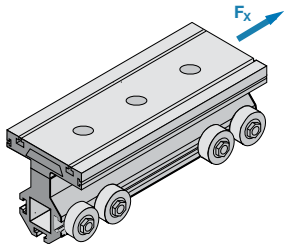




HPLA120 Series – Load-Bearing Capacity of Carriage and Timing Belt

Load-Bearing Capacity of HPLA120 Timing Belt (Fx)

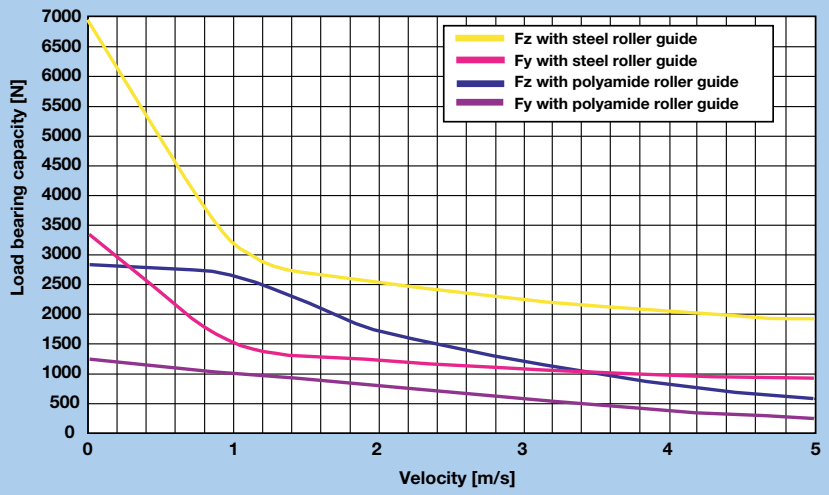
Drive Option	Transferable Thrust Force (n) Nominal Belt Tension (85,000 km life)	Maximum Belt Tension (37,000 km life)
Supported Pulley (S03, S04, S08, S09)	1700	2235
Unsupported Pulley (S01, S02)		
W/GTN115	1515	2015
W/GTN090	675	900
PEN115	675	900



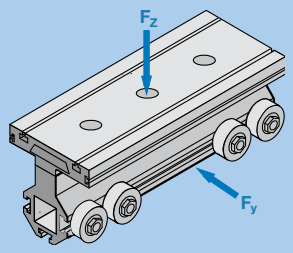
The forces and moments that the carriage is capable of transferring are speed-dependent. The curves shown in the graphs apply to a standard carriage (S). With the extended carriage (E), all the values apart from Fx (load-bearing capacity of timing belt) can be doubled if the load is applied equally to both halves of the carriage or distributed uniformly along its entire length.

HPLA120 Load-Bearing Capacity (Fy and Fz)

(Values double for extended carriage)



The curves show the maximum load-bearing capacity of a carriage in one direction of force or torque. If several loads are applied in different directions, the values given by the curves must be derated, i.e. the load or speed should be reduced if necessary.

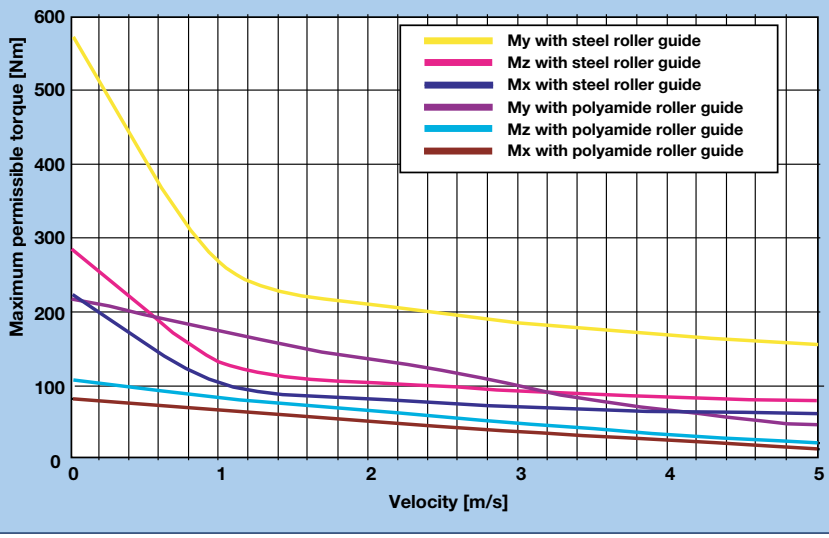


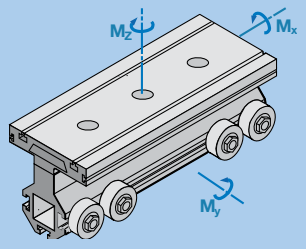
"DimAxes" software is available for determination of precise carriage loading.

Visit www.parkermotion.com to request a Gantry Robot CD.

HPLA120 Maximum Permissable Moment Load (Mx, My and Mz)

(Values double for extended carriage)

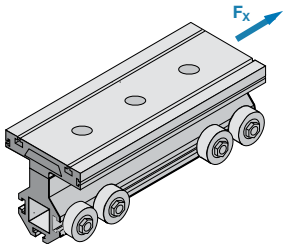




HPLA180 Series – Load-Bearing Capacity of Carriage and Timing Belt

Load-Bearing Capacity of HPLA180 Timing Belt (Fx)

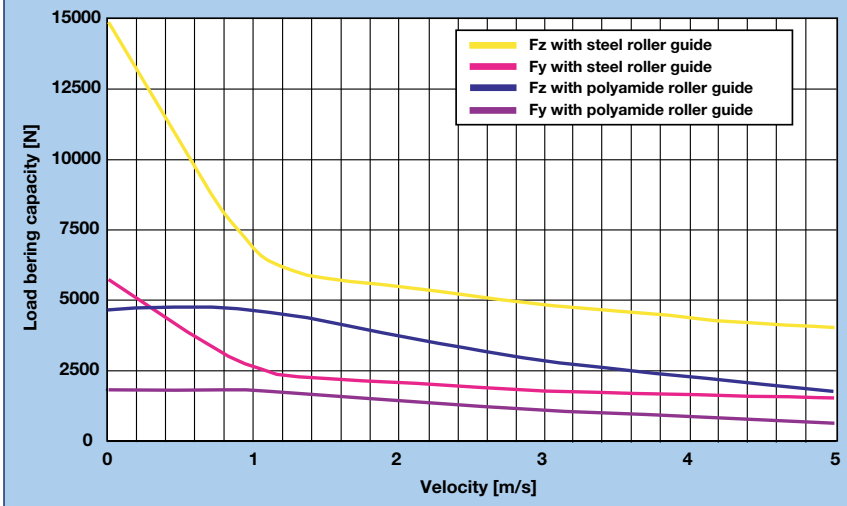
Drive Option	Transferable Thrust Force (n) Nominal Belt Tension (100,000 km life)	Maximum Belt Tension (45,000 km life)
Supported Pulley (S03, S04, S08, S09)	4170	5455
Unsupported Pulley (S01, S02)		
W/GTN142	1405	1804
W/GTN115	1065	1400



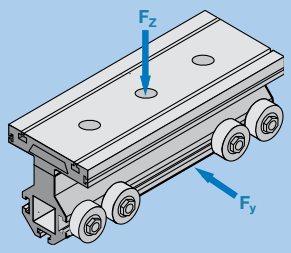
The forces and moments that the carriage is capable of transferring are speed-dependent. The curves shown in the graphs apply to a standard carriage (S). With the extended carriage (E), all the values apart from Fx (load-bearing capacity of timing belt) can be doubled if the load is applied equally to both halves of the carriage or distributed uniformly along its entire length.

HPLA180 Load-Bearing Capacity (Fy and Fz)

(Values double for extended carriage)



The curves show the maximum load-bearing capacity of a carriage in one direction of force or torque. If several loads are applied in different directions, the values given by the curves must be derated, i.e. the load or speed should be reduced if necessary.



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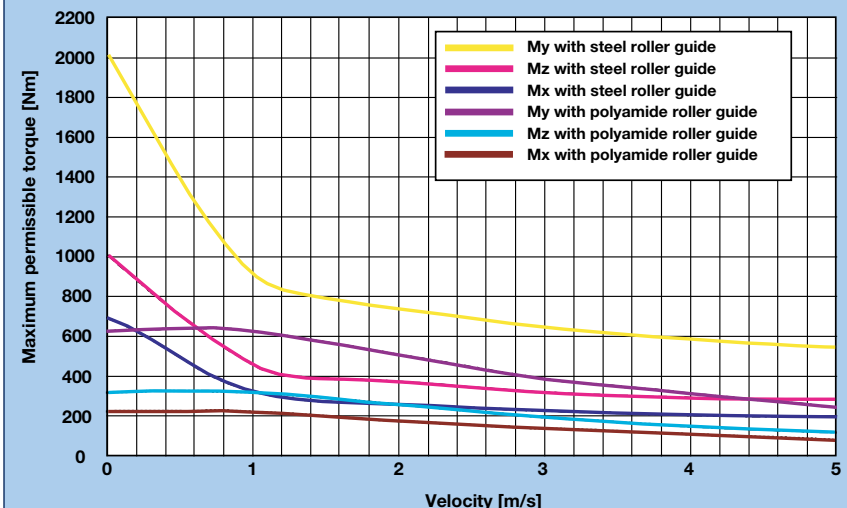
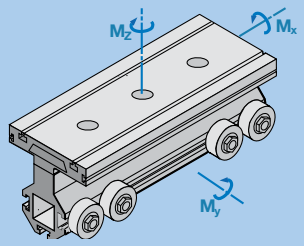
HPLA180 Maximum Permissable Moment Load (Mx, My and Mz)

(Values double for extended carriage)

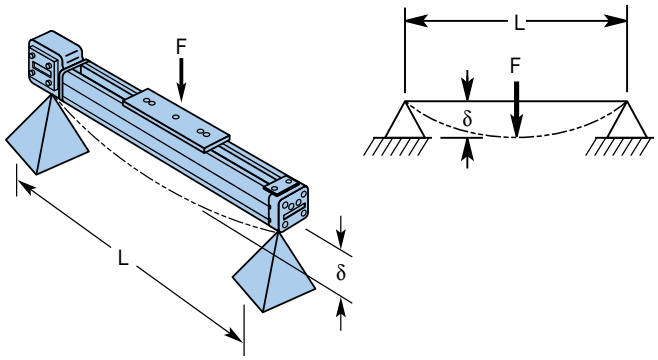




HPLA Characteristics

The HPLA deflection curves can be used for determining the deflection based on the profile length and the application load weight. Applications requiring high acceleration forces can place a severe strain on the system stability. In these cases, a solid substructure may be required with the HPLA product being supported at frequent intervals.

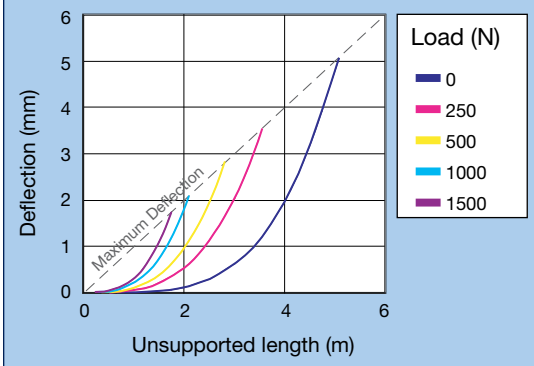
These deflection curves illustrate the deflection δ, based on the HPLA profile being simply supported at both ends. The graphs take into consideration the self deflection due to the weight of the profile, along with the load to be transported. The maximum deflection cannot be exceeded. If the maximum deflection is exceeded based on your application parameters, then additional supports are required. Alternatively, the next larger profile size may be considered. For deflection formulas and calculations, please refer to the Technical Information Library found on our web site: www.parkermotion.com



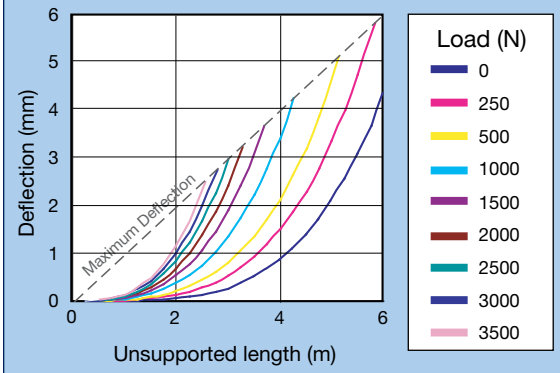
F = Force N
L = Unsupported length mm
δ = Deflection mm

Deflection Curves

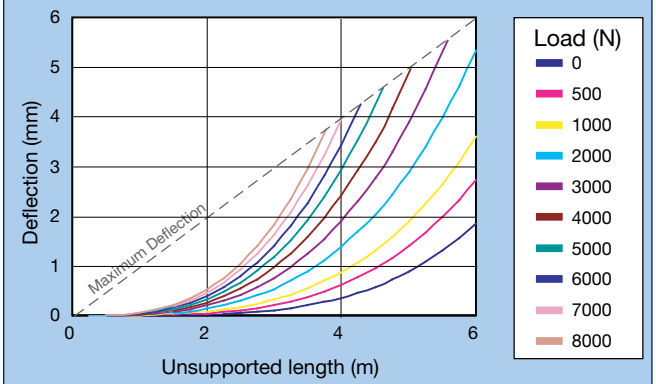
HPLA080



HPLA120



HPLA180

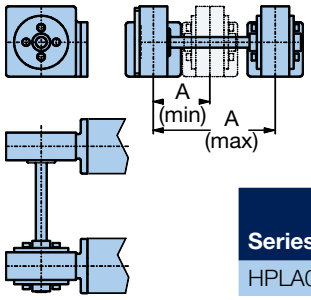


Dual Axis Considerations

When two parallel linear modules are required to form a single axis, the span or distance between each unit determines which type of shaft connection is required. In some cases, a link shaft support bearing might also be required.

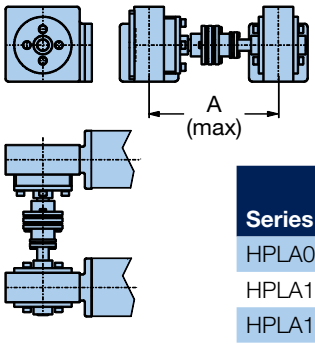
The link shaft bearing is used to support the linking shaft of an HPLA dual axis when there is a large center to center distance. This bearing must be used if the critical speed is exceeded with the dual-axis link shaft.

Figure A



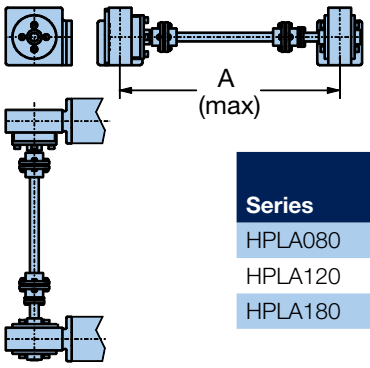
Series	"A" Span (mm) (min.)	(max.)
HPLA080	120	350
HPLA120	150	350
HPLA180	185	350

Figure B



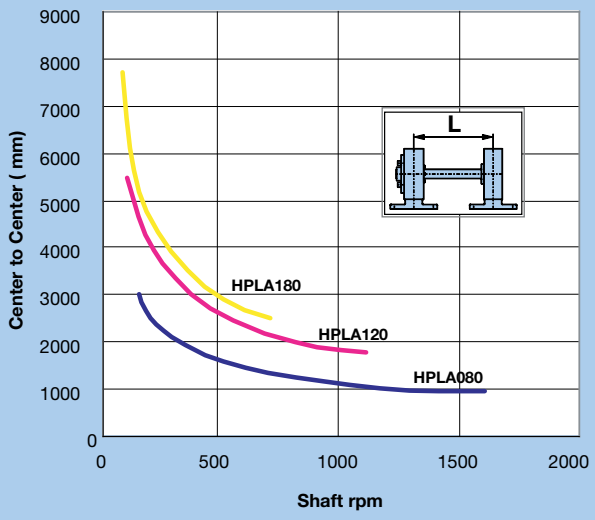
Series	"A" Span (mm) (min.)	(max.)
HPLA080	351	600
HPLA120	351	600
HPLA180	351	600

Figure C

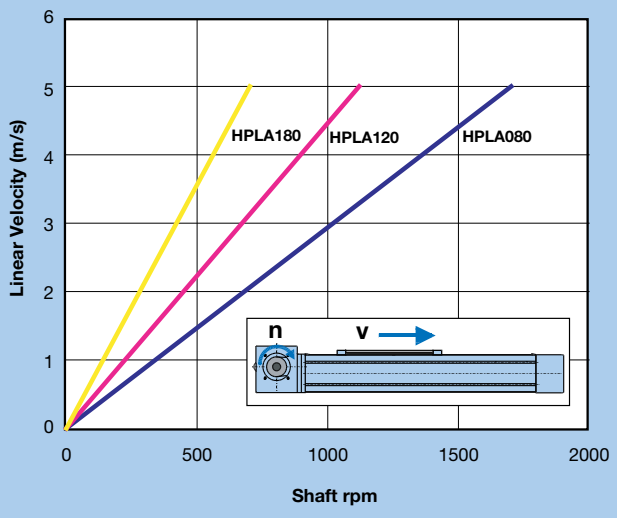


Series	"A" Span (mm) (min.)	(max.)
HPLA080	601	3000
HPLA120	601	3000
HPLA180	601	3000

Critical Speed



Linear Velocity



HPLA080 Dimensions

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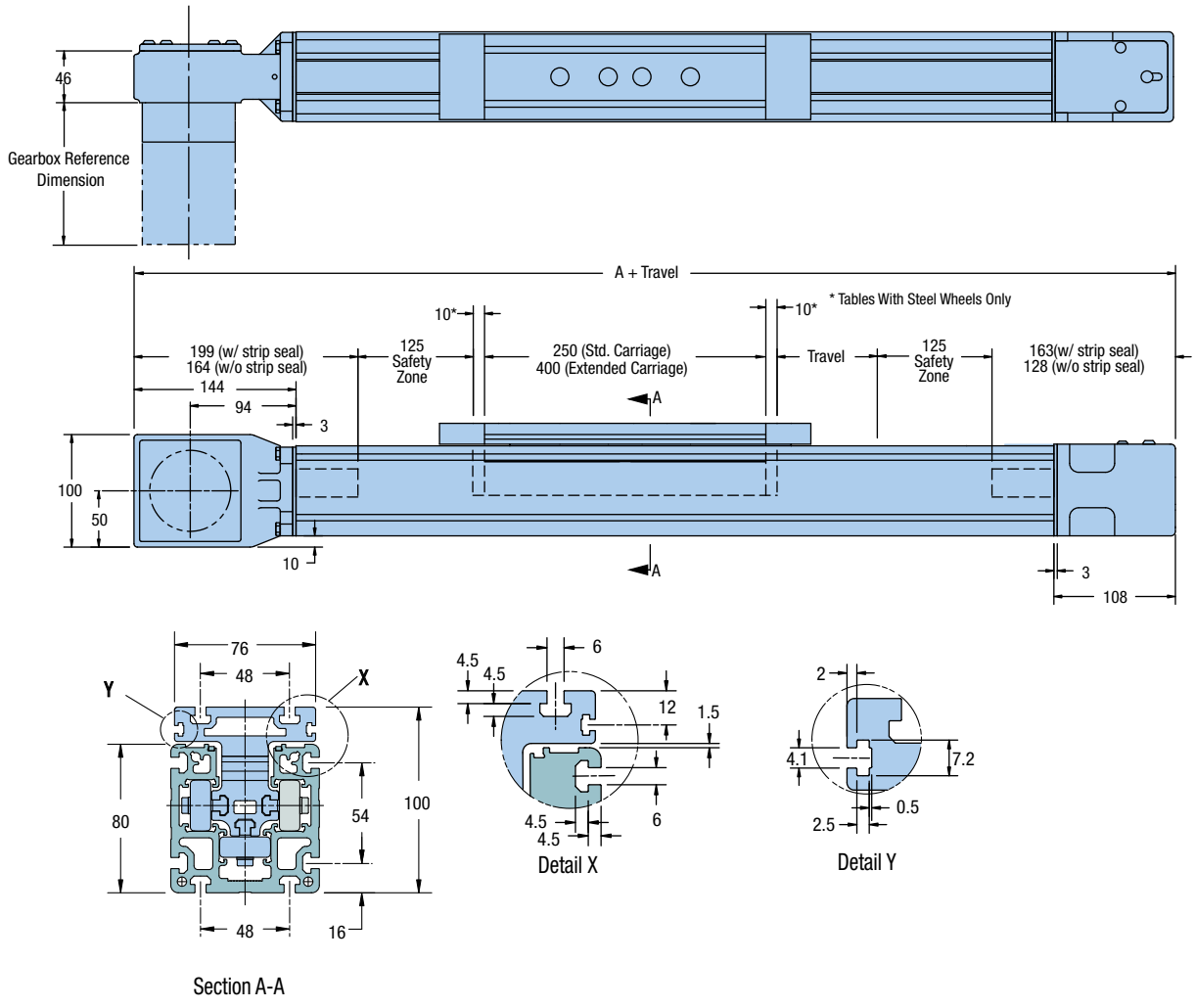
HPLA080 Drive Unit

Dimensions (mm)



Section A-A

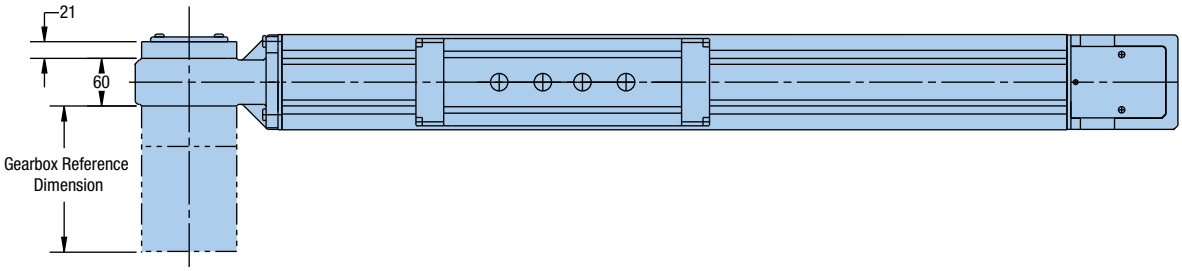
Detail X

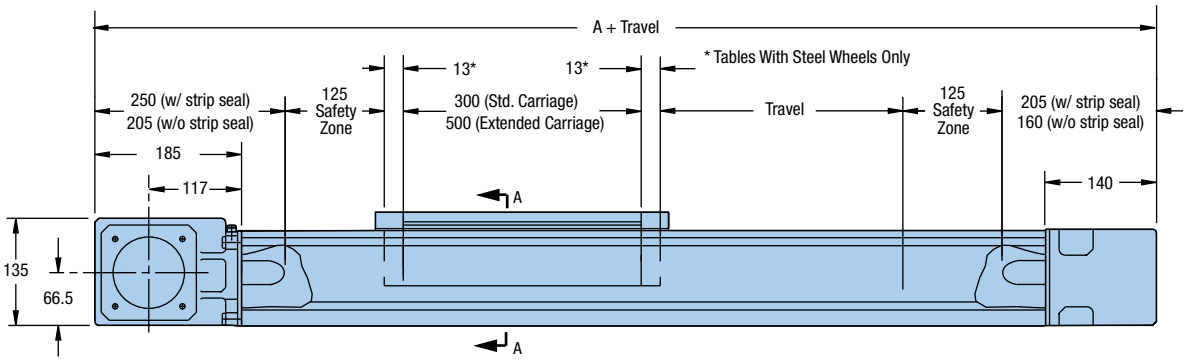
Detail Y

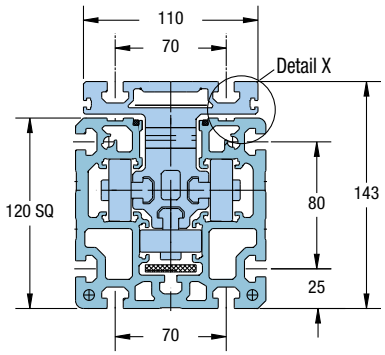
Description	Dimension A (mm) With Strip Seal	Without Strip Seal
Standard Carriage - Polyamide Wheels	862	792
Standard Carriage - Steel Wheels	882	812
Extended Carriage - Polyamide Wheels	1012	942
Extended Carriage - Steel Wheels	1032	962

HPLA120 Drive Unit

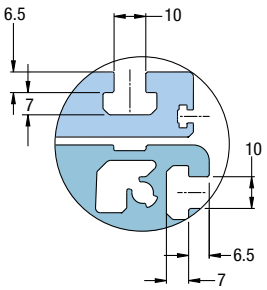
Dimensions (mm)







Section A-A



Detail X

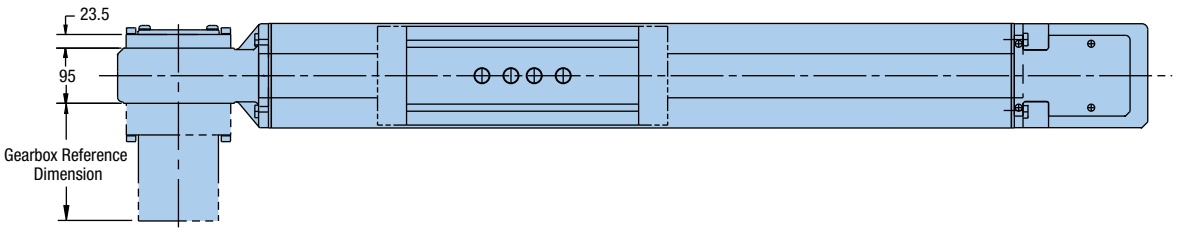
Description	Dimension A (mm) With Strip Seal	Without Strip Seal
Standard Carriage - Polyamide Wheels	1005	915
Standard Carriage - Steel Wheels	1031	941
Extended Carriage - Polyamide Wheels	1205	1115
Extended Carriage - Steel Wheels	1231	1141

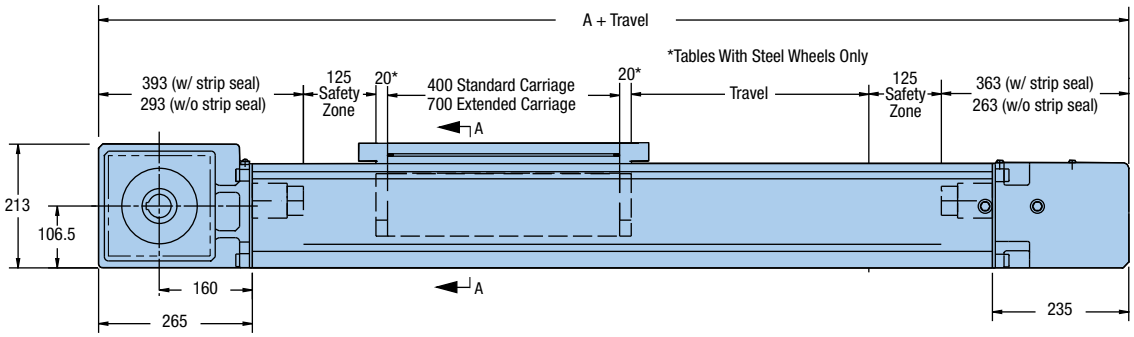
HPLA180 Dimensions

2D & 3D CAD files — Download from parkermotion.com

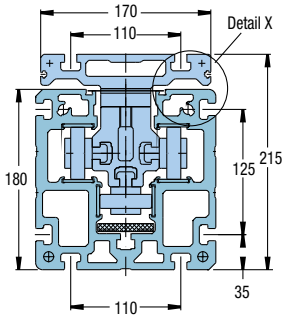
HPLA180 Drive Unit

Dimensions (mm)

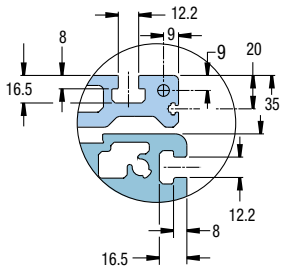




Description	Dimension A (mm) With Strip Seal	Dimension A (mm) Without Strip Seal
Standard Carriage - Polyamide Wheels	1408	1206
Standard Carriage - Steel Wheels	1446	1246
Extended Carriage - Polyamide Wheels	1706	1506
Extended Carriage - Steel Wheels	1746	1546

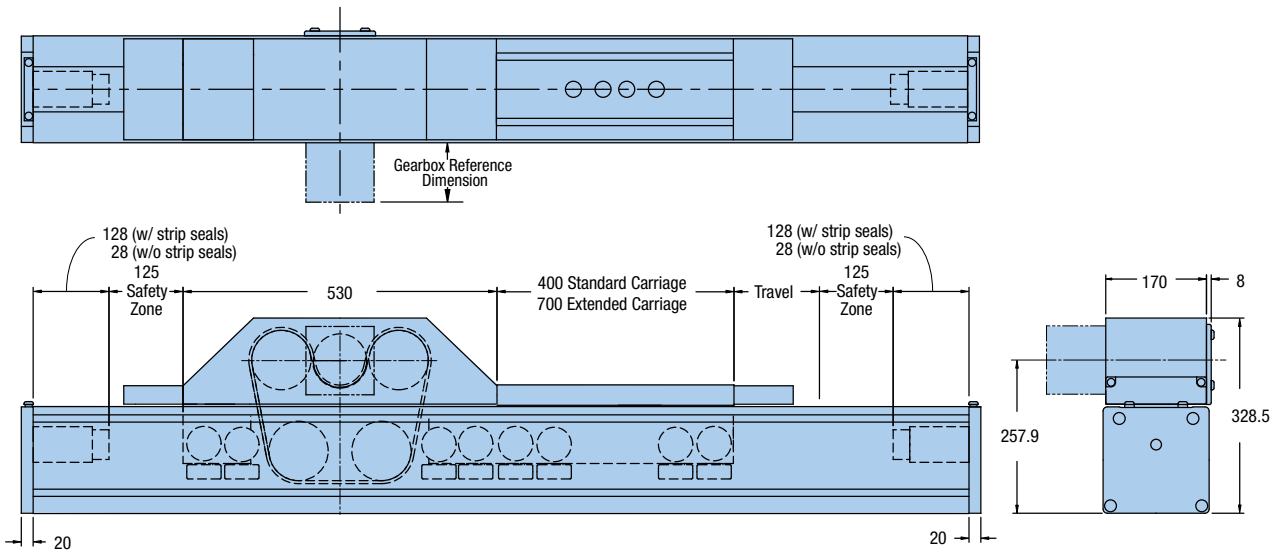


Section A-A



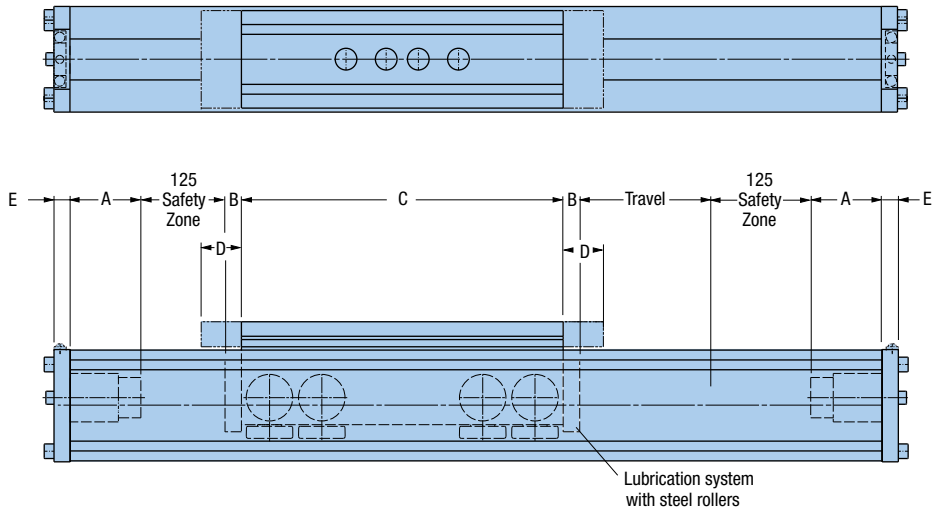
Detail X

HPLA180 Rack Drive Unit



Idler Unit Dimensions

Dimensions (mm)



Series	Carriage Length	Wheel Type	Dimensions (mm)									
			With Strip Seal					Without Strip Seal				
			A	B	C	D	E	A	B	C	D	E
HPLA080	Standard	Polyamide	55	-	250	40	10	20	-	250	-	10
HPLA080	Extended	Polyamide	55	-	400	40	10	20	-	400	-	10
HPLA080	Standard	Steel	55	10	250	40	10	20	10	250	-	10
HPLA080	Extended	Steel	55	10	400	40	10	20	10	400	-	10
HPLA120	Standard	Polyamide	65	-	300	50	15	20	-	300	-	15
HPLA120	Extended	Polyamide	65	-	500	50	15	20	-	500	-	15
HPLA120	Standard	Steel	65	13	300	50	15	20	13	300	-	15
HPLA120	Extended	Steel	65	13	500	50	15	20	13	500	-	15
HPLA180	Standard	Polyamide	128	-	400	100	20	28	-	400	-	20
HPLA180	Extended	Polyamide	128	-	700	100	20	28	-	700	-	20
HPLA180	Standard	Steel	128	20	400	100	20	28	20	400	-	20
HPLA180	Extended	Steel	128	20	700	100	20	28	20	700	-	20

HPLA Series Ordering Information

Fill in an order code from each of the numbered fields to create a complete model order code.

①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮
Order Example:	HPLA080	D1	B1	T2000	C1	DA1000	S08	F02	G2-05	K24	M98	R1	H1	LH1	E1

① Series

HPLA080
HPLA120
HPLA180

② Drive System

D0	Idler Unit
D1	Timing Belt Drive, Nominal Thrust, Maximum Life
D2	Timing Belt Drive, Maximum Thrust, Nominal Life
D9	Internal Rack and Pinion (HPLA180 only)

③ Bearing Option

B1	Polyamide Rollers
B2	Steel Rollers

④ Travel

Tnnnn	Specified travel in mm (nnnn = mm)

⑤ Carriage

C1	Standard Length Carriage with Load Plate*
C2	Extended Length Carriage with Load Plate*
C3	Standard Length Carriage with Clamping Bar*
C4	Extended Length Carriage with Clamping Bar*

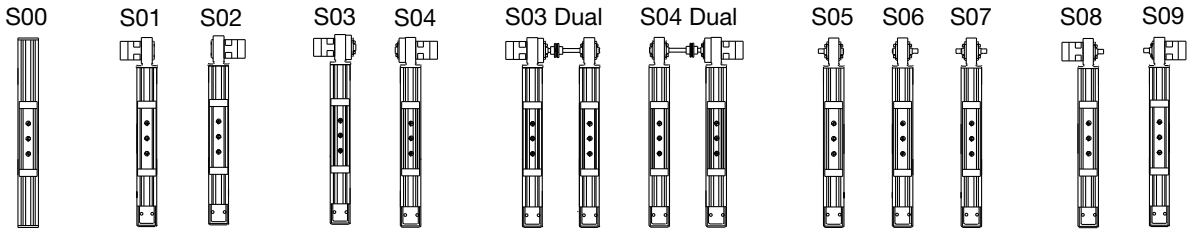
* See photos below.

⑥ Link Shaft Option

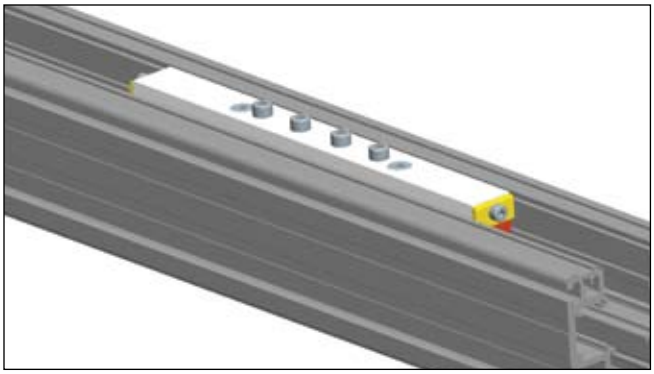
DA0000	No Link Shaft - Single Axis or Idler Unit
DAnnnn	Double Unit, Specify Center to Center Distance (mm)

⑦ Drive Shaft Configuration

S00	No Shaft, Idler Unit
S01	Unsupported Pulley, Flange Left
S02	Unsupported Pulley, Flange Right
S03	Supported Pulley, Flange Left
S04	Supported Pulley, Flange Right
S05	Supported Pulley, Shaft Option, Left
S06	Supported Pulley, Shaft Option, Right
S07	Supported Pulley, Shaft Option, Both
S08	Supported Pulley, Flange Left, Shaft Right
S09	Supported Pulley, Flange Right, Shaft Left



Load Plate carriage option



Clamping Bar carriage option

⑧ Drive Housing Flange

F00	No Flange
F01	GTN070 Flange (HPLA080 only)
F02	GTN090 Flange (HPLA080 and HPLA120 only)
F03	GTN115 Flange (HPLA120 & HPLA180 only)
F04	GTN142 Flange (HPLA180 only)
F06	PEN090 Flange (HPLA080 only)
F07	PEN115 Flange (HPLA080 and HPLA120 only)

⑨ Gearbox Option

G0-00	No Gearbox
G01-nn	GTN070*
G02-nn	GTN090*
G03-nn	GTN115*
G04-nn	GTN142*
G06-nn	PEN090**
G07-nn	PEN115**

*Single stage ratios: 3, 4, 5, 8, 10; Dual stage ratios: 12, 15, 16, 20, 25
**Single stage ratios: 3, 4, 5, 8; Dual stage ratios: 9, 12, 15, 16, 20, 25

⑩ Motor Kit Option

K00	No Flange
K20	NEMA23 stepper, 1/4” shaft
K21	BE23
K22	MPM66 (metric)
K23	SMN60, MPM72 (metric), N070, J070
K24	SMN82, MPM89 (metric), N092, J092
K25	NEMA34 stepper, 3/8” shaft
K26	BE34
K27	SMN100
K28	NEMA42 stepper, 5/8” shaft
K29	MPM114x (x =0, 1 metric)
K30	SMN115, MPM114x (x = 2, 3 metric)
K31	SMN152, MPM142 (x = 0, 1, 2 metric)
K32	MPM142x (x = 3, 4 metric)
K33	MPM190x (x = 0, 1, 2 metric)
K34	MPP092x motor kit

⑪ Motor Mount Option

M00	No Motor
M98	Mount Parker Motor
M99	Mount Customer Motor (Consult Factory)

⑫ Environmental Option

R1	Standard preparation with strip seal [1]
R2	Standard preparation with no strip seal
R3	Corrosion resistant preparation with strip seal [1, 2]
R4	Corrosion resistant preparation with no strip seal [2]

[1] C1, C2 Carriage Load Plate Only
[2] B1 Bearing Option Polyamide Rollers Only)

⑬ Mounting Orientation

H1	Carriage Up
H2	Carriage Down
H3	Carriage on Side, Drive Station Up
H4	Carriage on Side, Drive Station Down

⑭ Limit/Home Switch Option*

LH0	No Limit Switch Assembly
LH1	Three Mechanical Switches
LH2	Two Mechanical Switches, One Proximity (NPN)
LH3	Three NPN Prox Switches,10-30 VDC
LH4	Three PNP Prox Switches, 10-30 VDC

*C1, C2 Carriage Load Plate Only

⑮ Linear Encoder

E1	Without Linear Encoder
E5	5.0 Micron Resolution, Magnetic Type
E7	Sine Cosine Output, Magnetic Type

*C1, C2 Carriage Load Plate Only