

## HLE-RB Series Belt Driven Linear Modules

### Features

- Standard travel up to 7.9 meters\*
- Load Capacities up to 600 kg
- $\pm 0.2$  mm positional repeatability
- Timing belt and pulley drive mechanism for fast, accurate positioning
- Roller wheel bearings for smooth high speed linear motion
- IP30 strip seal

\*Longer travels available with splice kits.

The HLE-RB linear modules are ideal as single axis products or as components for high speed multi-axis gantries. With thousands of units in operation worldwide the HLEs are proven performers offering long life and trouble-free operation.

### Construction

The HLE Linear Module consists of a lightweight carriage which can be precisely positioned within an extruded aluminum housing by a timing belt and pulley drive system. The housing, constructed from extruded aluminum with a square cross sectional geometry, demonstrates excellent deflection characteristics.

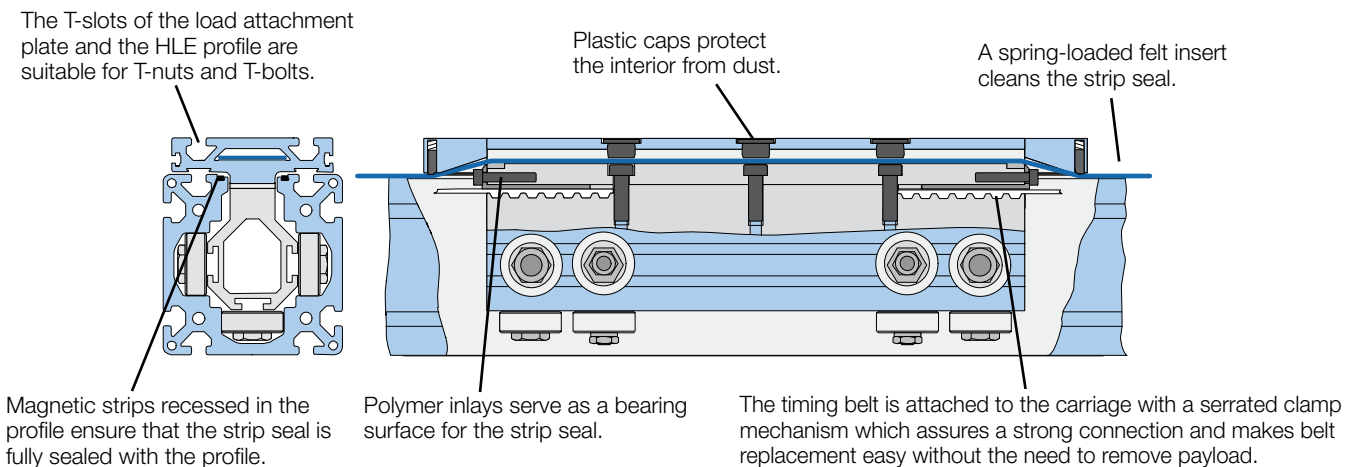
The protective anolite coating provides durability as well as an attractive silver appearance. It includes T-slots along its entire length for flexible mounting. The drive mechanism is a zero backlash steel reinforced timing belt. The tension station, conveniently located at the end of the unit provides for quick and easy belt adjustment. The drive station is designed to accept planetary gear reducers as well as a wide variety of servo and stepper motors. The bearing system for the RB models is comprised of three rows of roller wheels integral to the carriage which are guided by extruded tracks within the housing.



### Proven Technology

Proven in numerous applications, the HLE-RB series offers the following advantages:

- Low running friction
- Low particle generation (clean room suitability to class 100)
- Low wear
- Low maintenance
- Quiet operation
- High efficiency
- Long service life
- High dynamic performance due to low-mass, play-free wheels
- Minimal preventative maintenance required
- T-slots integrated on all sides of the profile for mounting attachments or for use as a cable duct
- Timing belts can be replaced without removing load attachment plate
- Multiple configuration options due to T-slots available on both the profile and load plate





## 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: crosscutting, slitting and stacking, quilting, seam stitching

## Optional Features

- Direct mounting for planetary gear reducers
- Adjustable “end of travel” limit switches and “home” position sensor
- Clean room preparation option
- Cable carrier systems
- Performance matched Parker servo systems
- Structural components for vertical and multi-axis mounting
- Toe clamps and hardware for fast and easy mounting
- External bumpers
- Link shafts and support bearings for dual axis units
- Splice plates for extending travels beyond length available in a single profile

See pages 272-276 for available options and accessories.

**Housing**  
Lightweight and self-supporting aluminum profiles are offered in three sizes:  
**HLE60: 60 x 60 mm**  
**HLE100: 100 x 100 mm**  
**HLE150: 150 x 150 mm**  
T-slots are provided for mounting the linear unit itself, applying additional components and accessories, or combining multiple HLEs. T-slots with plastic covers provide a simple cable conduit.

**Load Attachment Plate**  
Load attachment plates are available for every type of carriage. With integral T-slots or tapped with holes in a standard mounting pattern, they allow easy mounting of your load to the carriage of the HLE. Multiple HLEs can easily be mounted together by using standard clamping profiles. Tripping plates are mounted to the side of the load attachment plate to activate home or end of travel switches mounted to the side of the HLE. For special applications, the load plates can be designed to customer specified requirements.

**Drive Station**  
Rigid cast housing with standard flanges for a variety of gearboxes. The drive stations are designed to accept planetary and worm gear reducers or provide different shaft outputs for driving the HLE.

**Drive Belt**  
A zero backlash, steel reinforced timing belt provides high speed, high acceleration and good bidirectional repeatability.

**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. Due to a low coefficient of friction, the carriage design provides a high mechanical efficiency and long service life. The carriages are available in standard and extended lengths. Special carriage lengths and linear units with multiple carriages are available for custom applications.

**Roller Bearing**  
Each wheel consists of a lubricated and sealed radial ball bearing to reduce friction and maintenance. The bearing is enclosed within a tough polyamide tread to reduce noise and provide long service life.

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

**Tensioning Station**  
“Easy access” tensioning bolts allow external adjustment of belt tension.

Belt Driven Tables

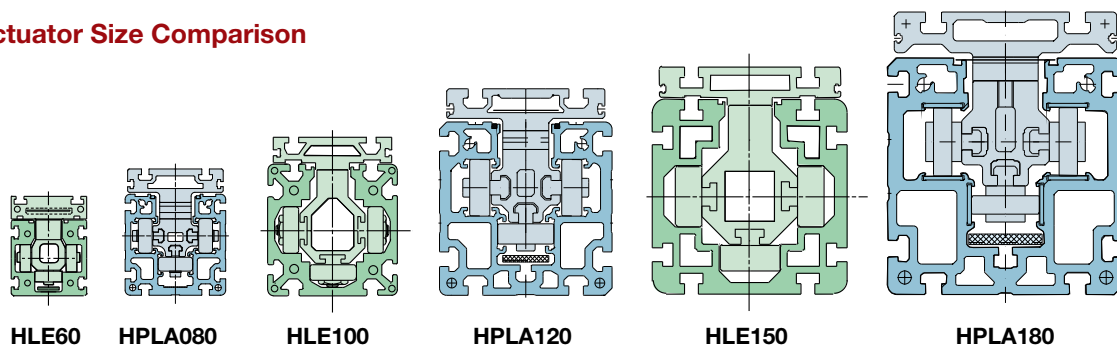
**HLE-RB Series Specifications**

Characteristic	Units	HLE60-RB		HLE100-RB		HLE150-RB	
<b>Unit Weight (basic unit without stroke)</b>							
Standard Carriage, NL	kg (lb.)	2.28	(5.03)	12.70	(28.00)	31.20	(68.80)
Extended Carriage, VL	kg (lb.)	3.98	(8.77)	15.80	(34.84)	38.50	(84.89)
<b>Carriage Weight</b>							
Standard Carriage, NL	kg. (lb)	0.8	(1.76)	2.80	(6.17)	7.30	(16.10)
Extended Carriage, VL	kg. (lb)	1.3	(2.87)	4.40	(9.70)	11.50	(25.36)
Weight per meter of additional length	kg/m (lb/ft)	3.62	(2.43)	10.00	(6.72)	21.10	(14.18)
<b>Moment of Inertia (related to the drive shaft)</b>							
Standard Carriage, NL	kg-cm <sup>2</sup> (lb-in <sup>2</sup> )	3.07	(1.05)	24.60	(8.41)	123.30	(42.17)
Extended Carriage, VL	kg-cm <sup>2</sup> (lb-in <sup>2</sup> )	4.81	(1.64)	36.40	(12.45)	183.60	(62.79)
<b>Travel and Speed</b>							
Maximum Speed <sup>(1)</sup>	m/s (in/s)	5	(120)	5	(200)	5	(200)
Maximum Acceleration <sup>(1)</sup>	m/s <sup>2</sup> (in/s <sup>2</sup> )	10	(393)	10	(393)	10	(393)
Maximum Travel <sup>(2)</sup> —standard carriage, NL	m (in)	4.0	(160)	6.2	(244)	7.9	(311)
Maximum Travel <sup>(2)</sup> —extended carriage, VL	m (in)	3.8	(149)	6.0	(238)	7.7	(305)
<b>Geometric Data</b>							
	mm (in)	57.1	(2.25)	100.0	(3.94)	150.0	(5.91)
Cross Section, Square	cm <sup>4</sup> (in <sup>4</sup> )	55.8	(1.34)	383.0	(9.20)	1940.0	(46.61)
Moment of Inertia Ix	cm <sup>4</sup> (in <sup>4</sup> )	56.2	(1.35)	431.0	(10.35)	2147.0	(51.58)
Moment of Inertia Iy	N/mm <sup>2</sup>	0.72 x	(0.1044 x	0.72 x	(0.1044 x	0.72 x	(0.1044 x
Moment of Elasticity	(lb/in <sup>2</sup> )	10 <sup>5</sup>	10 <sup>8</sup> )	10 <sup>5</sup>	10 <sup>8</sup> )	10 <sup>5</sup>	10 <sup>8</sup> )
<b>Pulley Data, Torques, Forces</b>							
Travel Distance per Revolution	mm/rev (in/rev)	125	(4.92)	170	(6.69)	240	(9.45)
Pulley Diameter	mm (in)	39.8	(1.57)	54.1	(2.13)	76.4	(3.01)
Maximum Drive Torque <sup>(3)</sup>	Nm (lb-in)	8.87	(78.5)	40.0	(354.0)	108.0	(955.9)
Maximum Belt Traction <sup>(3)</sup> (effective load)	N (lb)						
Repeatability <sup>(4)</sup>	mm (in)	±0.2	(±0.008)	±0.2	(±0.008)	±0.2	(±0.008)

For the following deviations from the above standards, please contact Parker engineering:

- (1) Greater speeds and accelerations may be achieved.
- (2) Splicing possible for longer travel distances. This may cause reductions in effective load, drive torque, speed, acceleration, and repeatability. Consult factory for strip seal availability on spliced units.
- (3) Increased timing belt tension required.
- (4) Nominal value - component dependent. For improved repeatability consult factory.

**Linear Actuator Size Comparison**



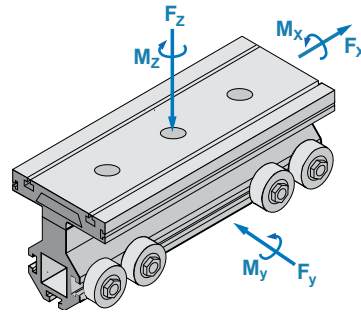


## Load-Bearing Capacity of Carriage and Timing Belt

### Forces and Moment Loads

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  $F_x$  (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.

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](http://www.parkermotion.com) to request a Gantry Robot CD.

### Load-Bearing Capacity Timing Belt ( $F_x$ )

#### HLE60-RB

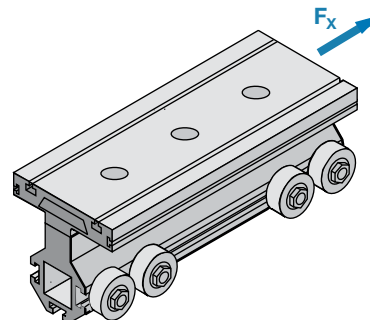
Drive Option	Transferrable Thrust Force (n)	
	Nominal Belt Tension (81,000 km life)	Maximum Belt Tension (46,000 km life)
Supported Pulley (SP19 - SP30)	500	–

#### HLE100-RB

Drive Option	Transferrable Thrust Force (n)	
	Nominal Belt Tension (81,000 km life)	Maximum Belt Tension (46,000 km life)
GTN115	925	1115
GTN090, PEN115	675	900
PEN090	500	665

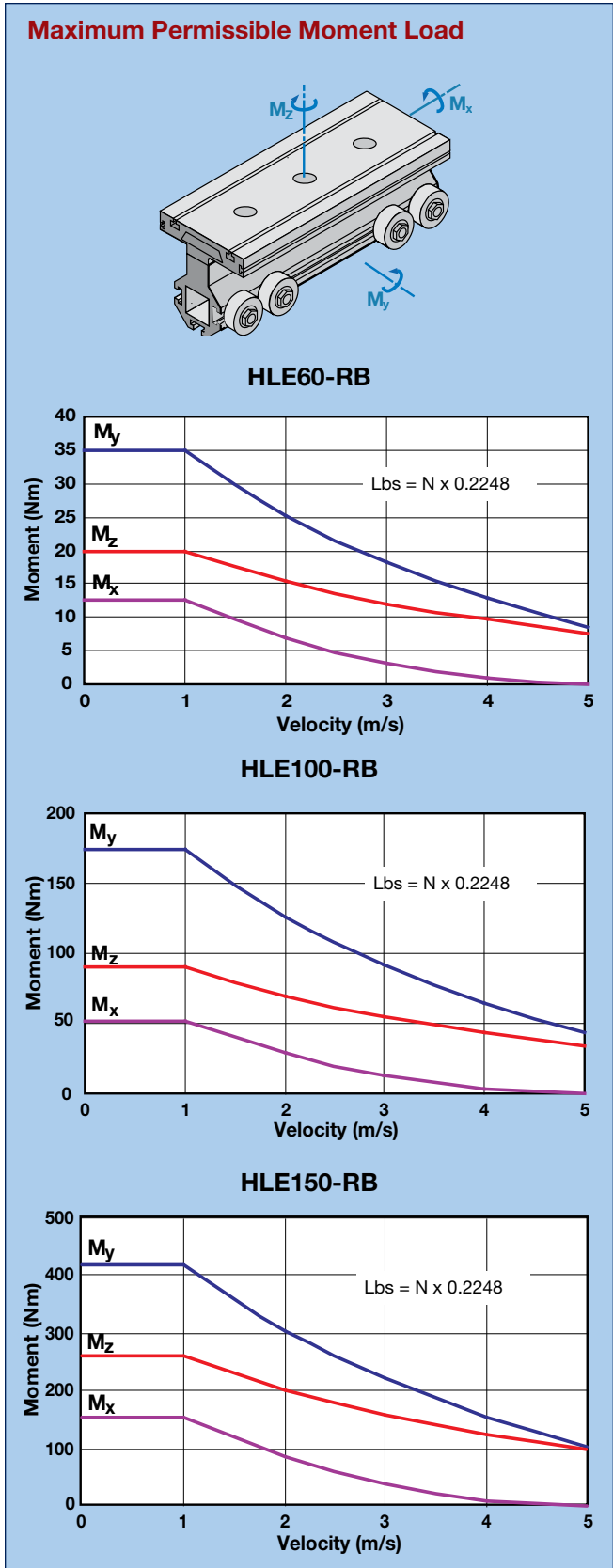
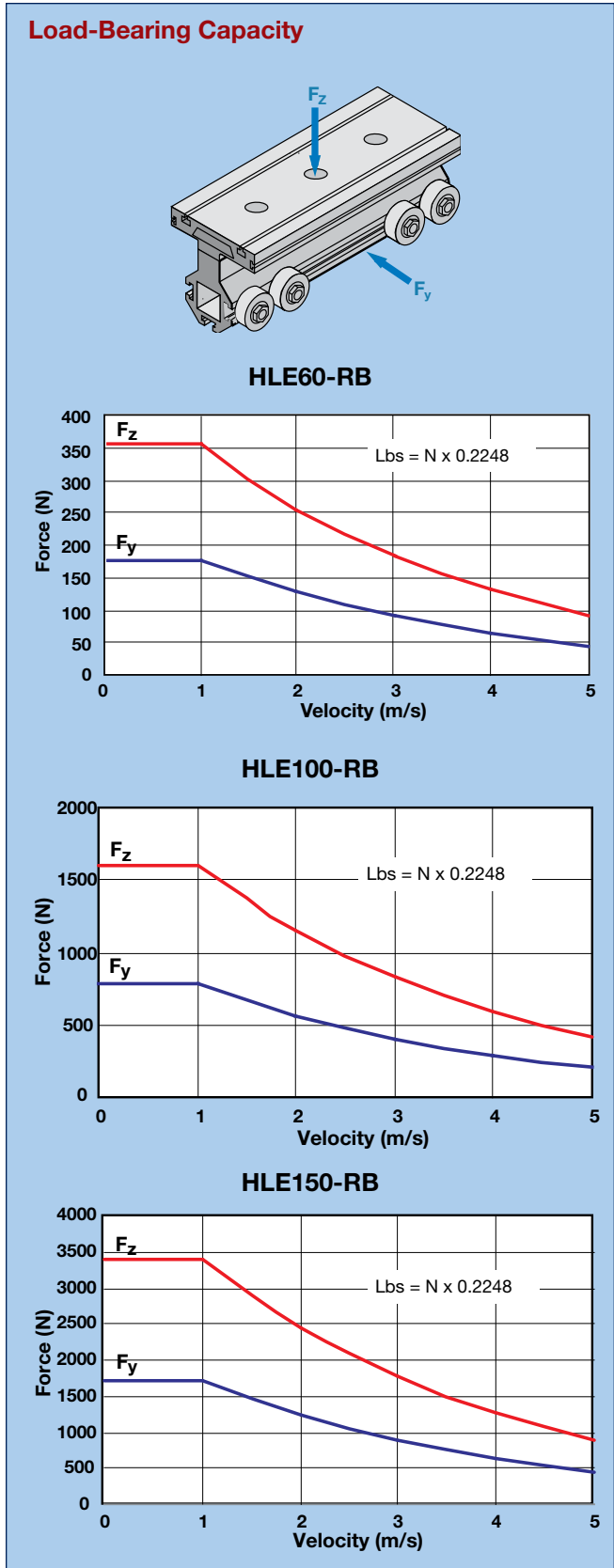
#### HLE150-RB

Drive Option	Transferrable Thrust Force (n)	
	Nominal Belt Tension (85,000 km life)	Maximum Belt Tension (37,000 km life)
GTN142	1700	2235
GTN115	1515	2015
PEN115	675	900



Belt Driven Tables

HLE-RB Series – Force and Moment Loads

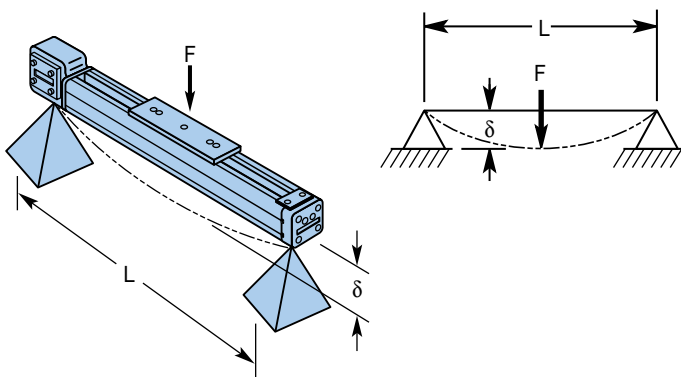




### HLE-RB Deflection Characteristics

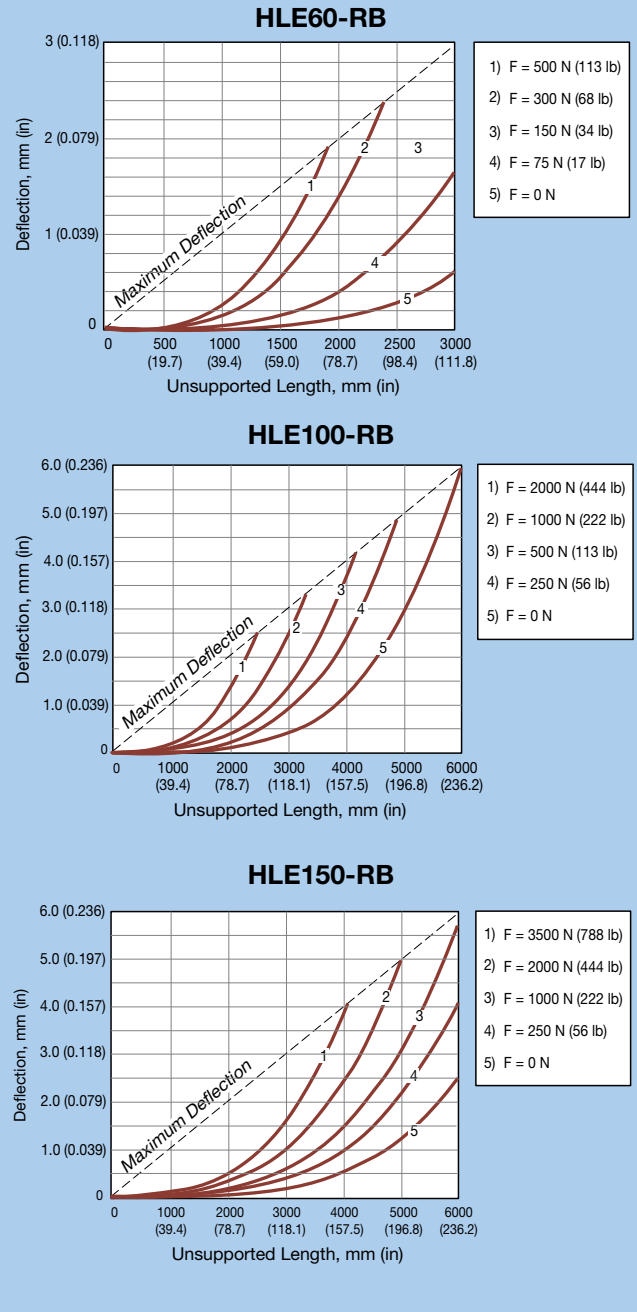
The HLE deflection curves can be used for determining the deflection based on the profile length and the application load weight. Applications requiring high acceleration forces can place a severe strain on the system stability. In these cases, a solid substructure may be required with the HLE product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

These deflection curves illustrate the deflection  $\delta$ , based on the HLE 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](http://www.parkermotion.com)



- F = Force N
- L = Unsupported length mm
- $\delta$  = Deflection mm

#### Deflection Curves



Belt Driven Tables

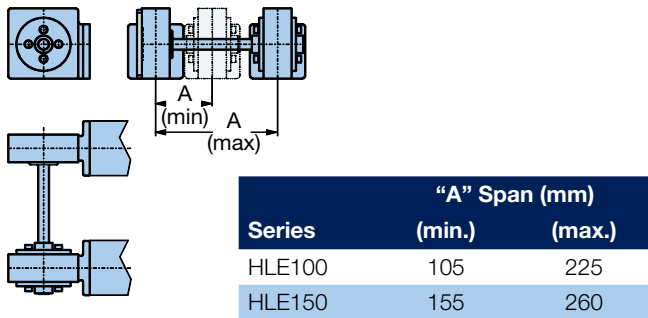


**Dual Unit Axis Considerations**

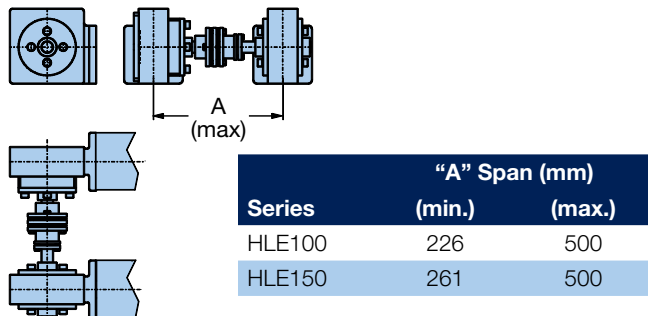
When two parallel linear modules are required to form a single axis, the span or distance between each unit determines which type of shaft connection is required. In some cases, a link shaft support bearing might also be required.

The link shaft bearing is used to support the linking shaft of an HLE 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.

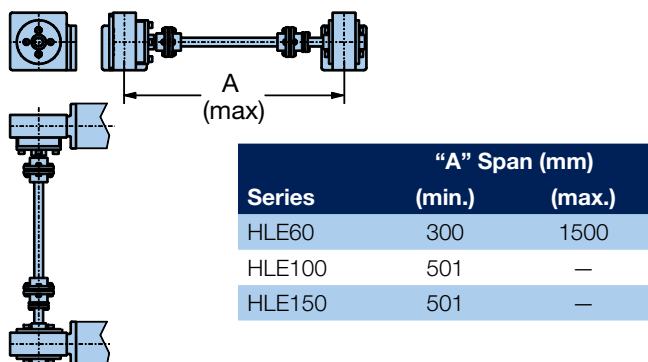
**Figure A**



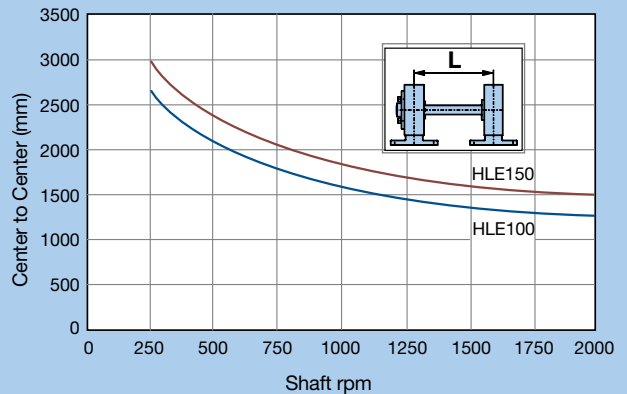
**Figure B**



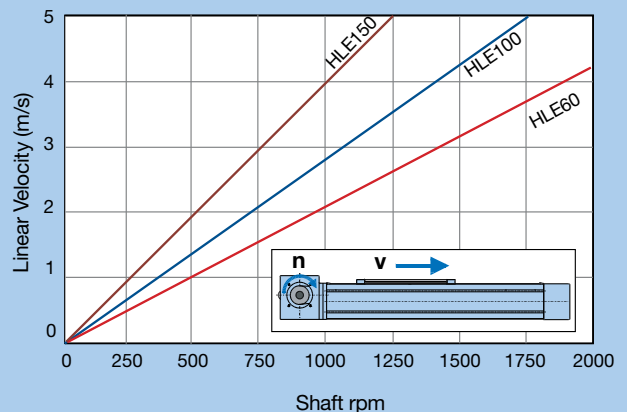
**Figure C**



**Critical Speed\***



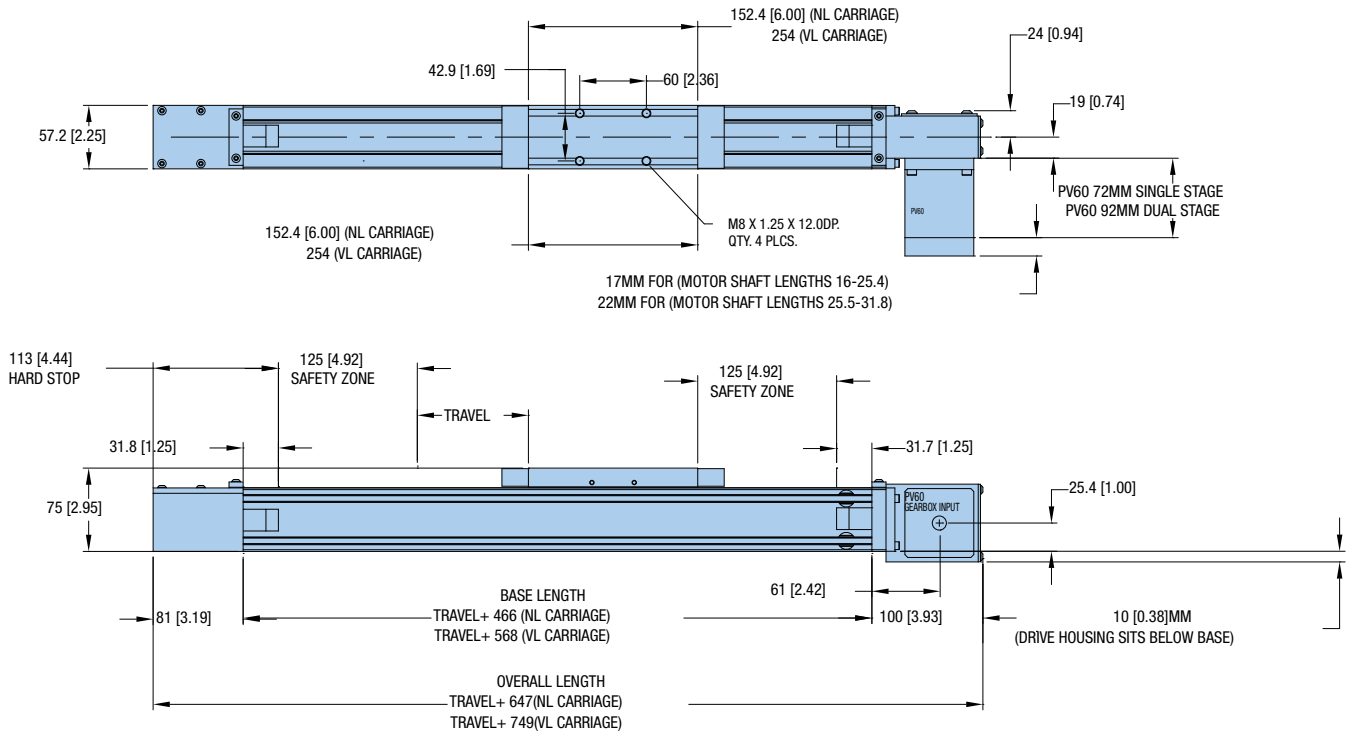
**Linear Velocity**



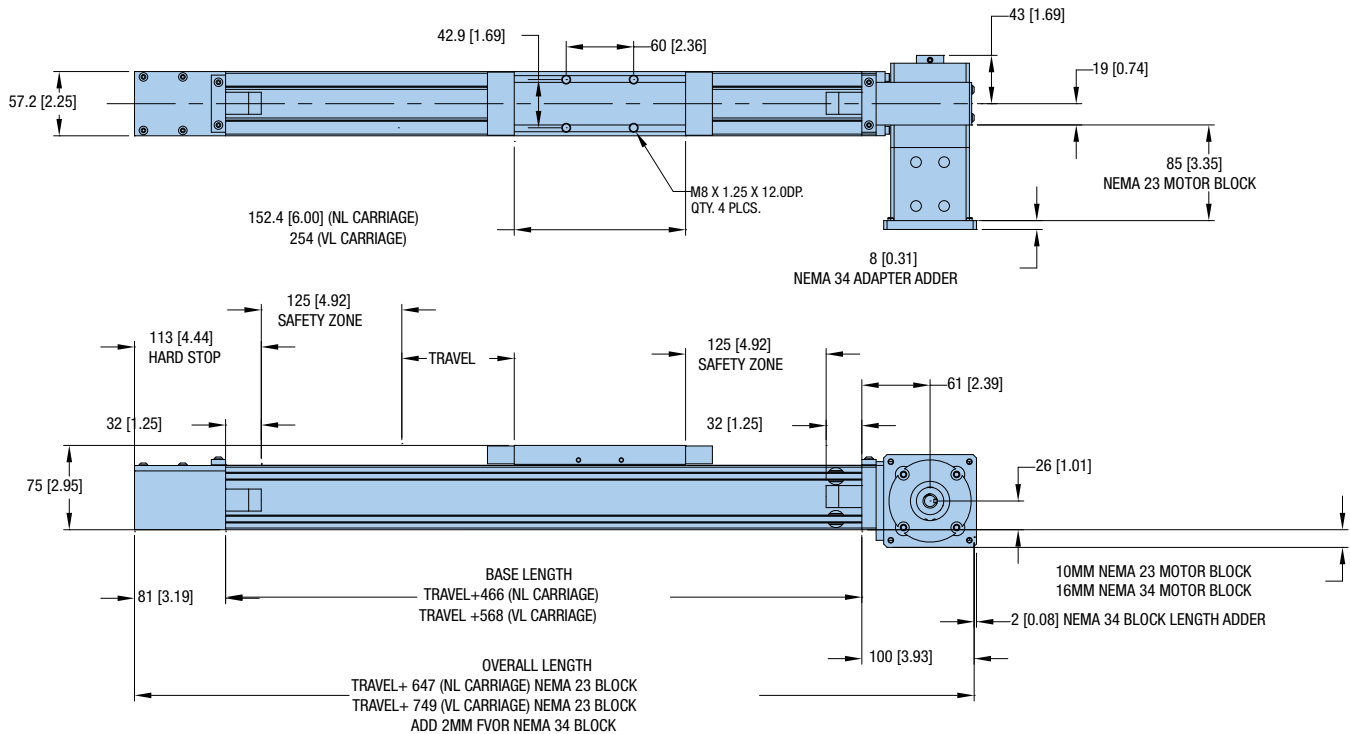
\*HLE60 Critical speed is above charted 2000 RPM.



## HLE60-RB with PV60 Direct Drive



## HLE60-RB Drive with Motor Block

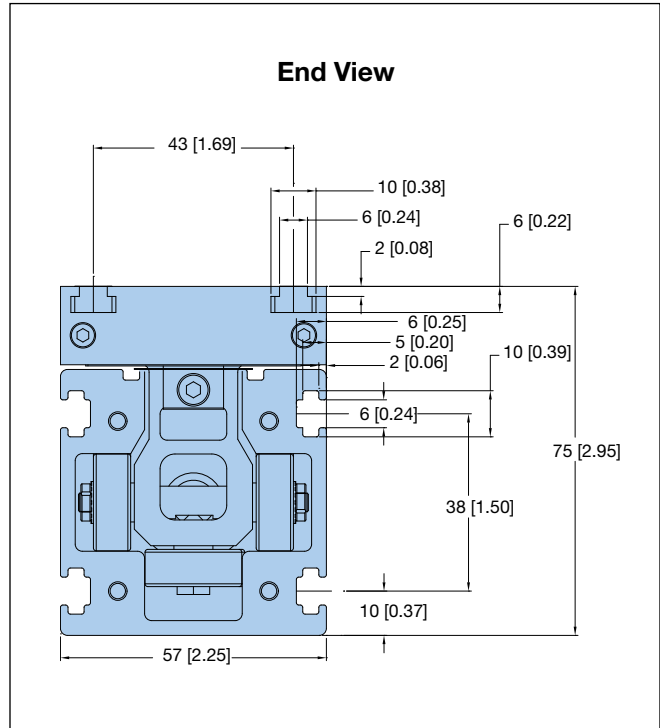
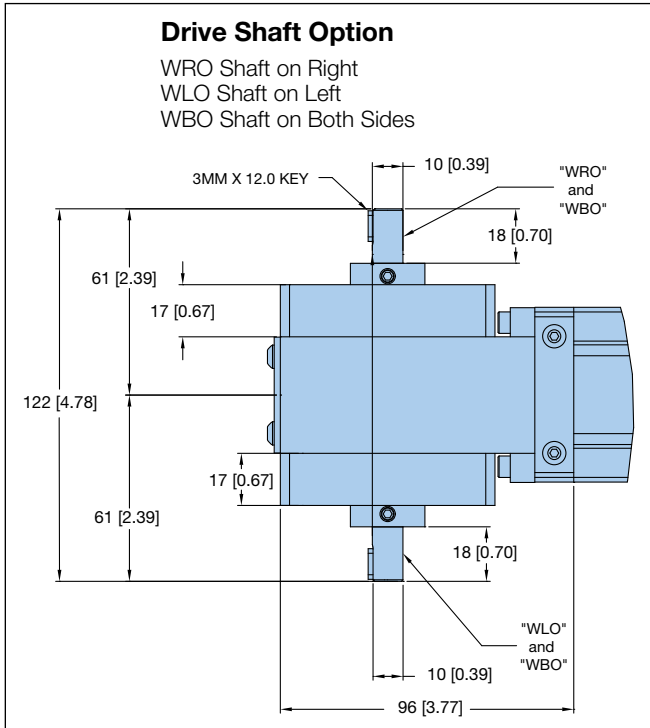
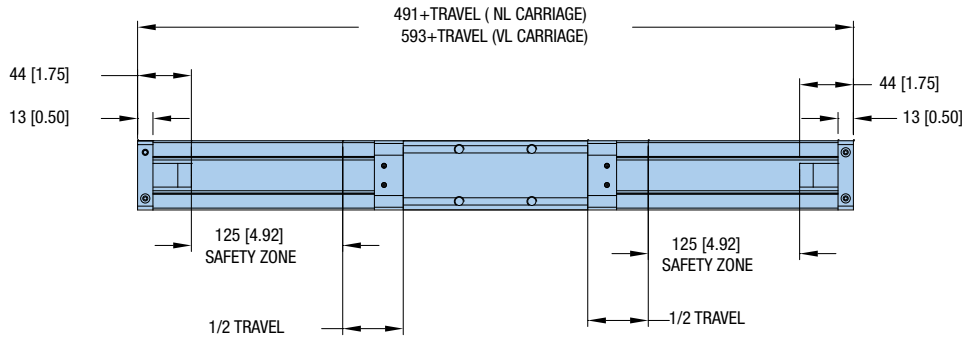


Belt Driven Tables



**HLE60-RB Idler**

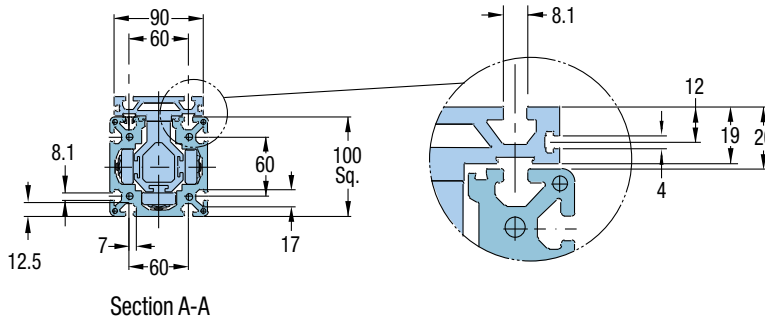
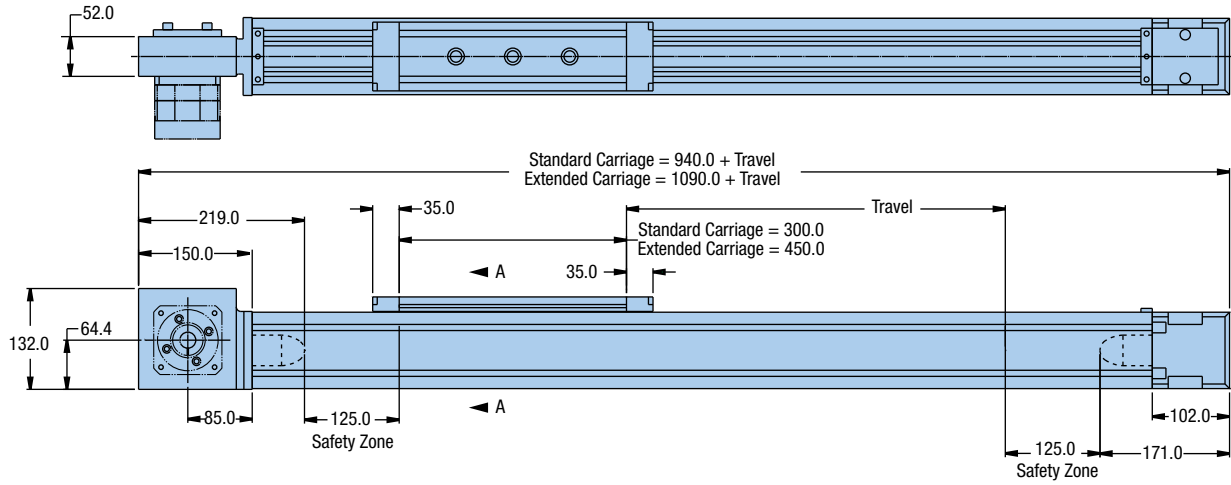
Dimensions (mm)





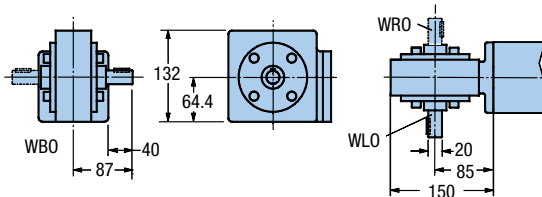
## HLE100-RB Drive

Dimensions (mm)

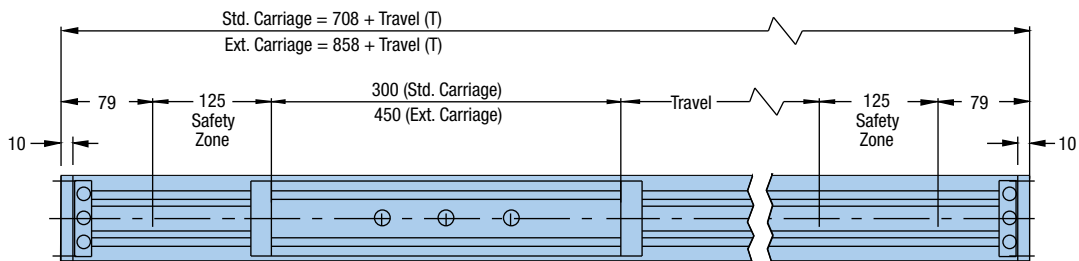


### Drive Shaft Option

- WRO Shaft on Right
- WLO Shaft on Left
- WBO Shaft on Both Sides

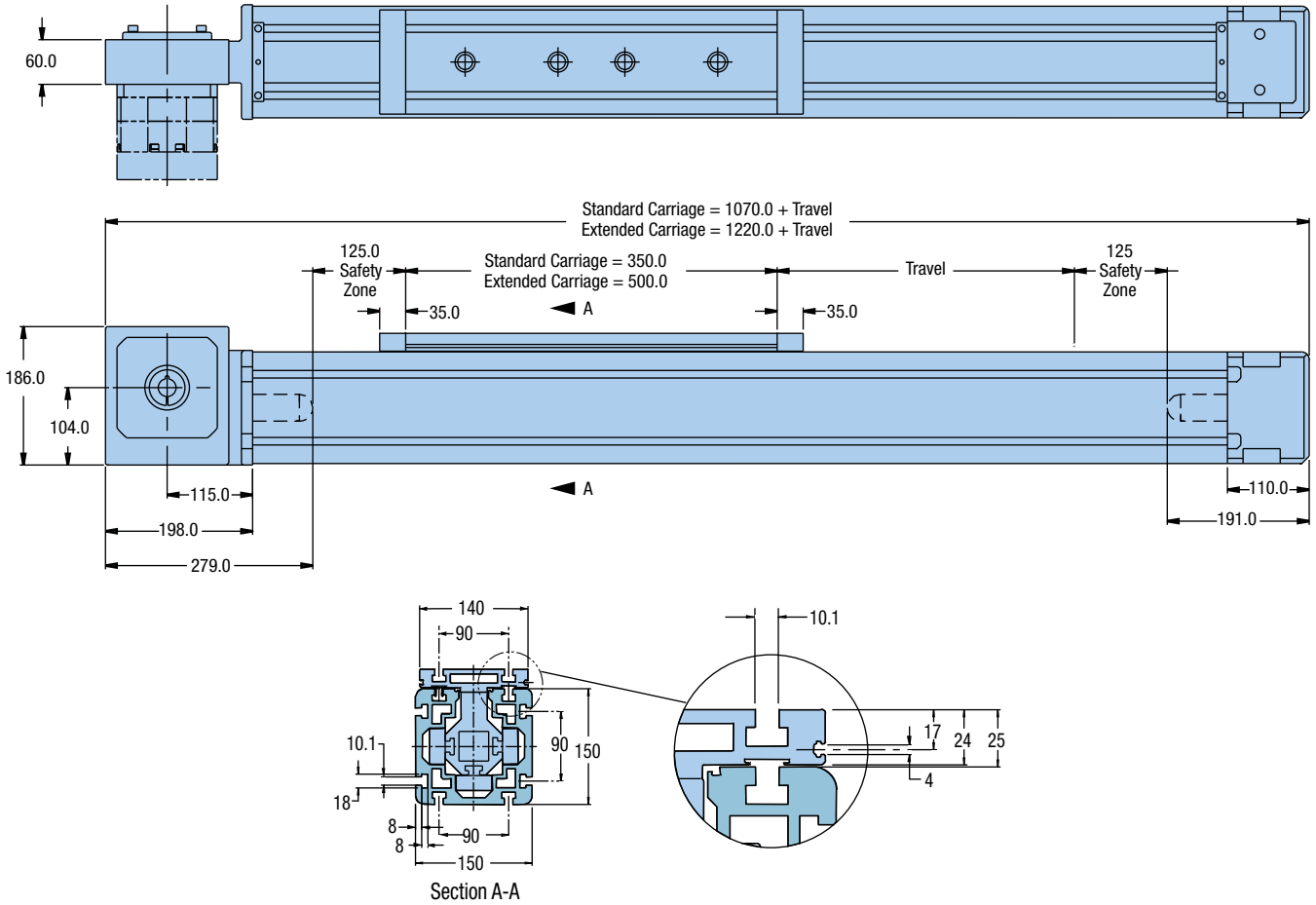


## HLE100-RB Idler



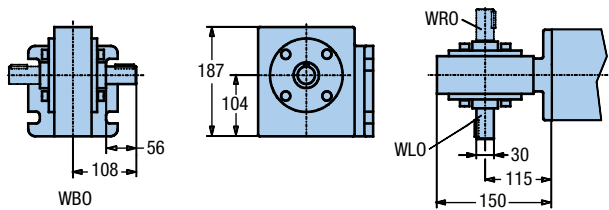
**HLE150-RB Drive**

Dimensions (mm)

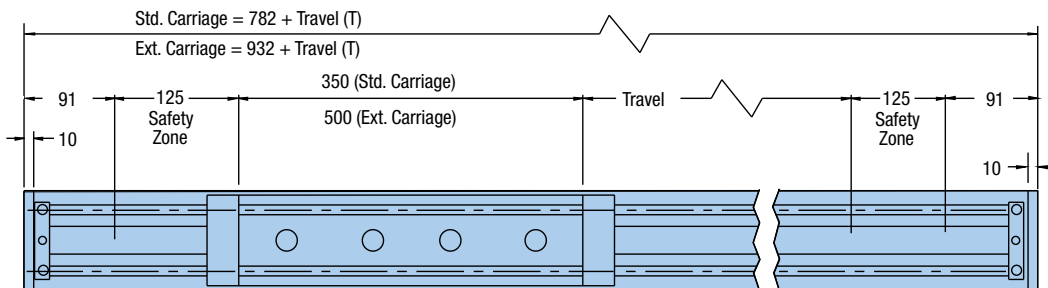


**Drive Shaft Option**

- WRO Shaft on Right
- WLO Shaft on Left
- WBO Shaft on Both Sides



**HLE150-RB Idler**





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

**Order Example:**

**HLE060 RB NL E 1000 DA0000 MBL SP5 G1205 H1 K24 ZA LH0**

① **Series**  
HLE060

② **Bearing Type**  
RB

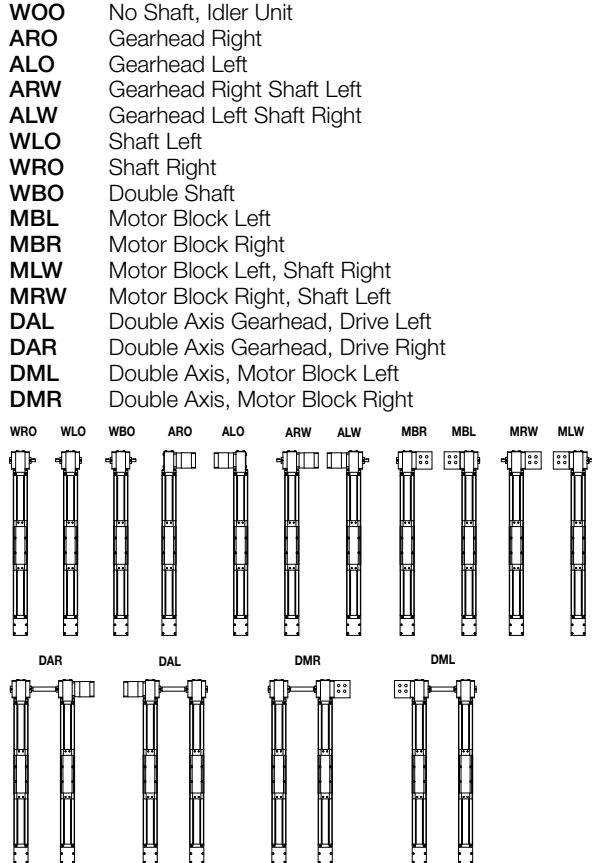
③ **Carriage Type**  
NL Standard Carriage  
VL Extended Carriage

④ **Unit Type**  
M Idler  
D Dual Axis Unit  
E Single Axis Unit

⑤ **Travel Length**  
nnnn nnnn=mm (3000 mm max for NL carriage;  
2900 mm max for VL carriage)

⑥ **Drive Shaft Option - Center to Center**  
DA0000 No Drive Shaft - Single Axis or Idler Unit  
DAnnnn (nnnn=mm) Dual Axis Center to Center  
(200 mm min; 1500 mm max)  
DCnnnn (nnnn=mm) Dual Axis with Covered Link Shaft Center  
to Center (200 mm min; 1500 mm max )

⑦ **Shaft Configuration Options**



⑧ **Drive Station Interface**

SP19 Drive Housing For PV60-FN  
SP20 Idler Unit  
SP21 No Motor Block  
SP22 Motor Block NEMA 23 with 0.375" Bore Coupling  
SP23 Motor Block NEMA 34 with 0.25" Bore Coupling  
SP24 Motor Block NEMA 34 with 0.375" Bore Coupling  
SP25 Motor Block NEMA 34 with 0.50" Bore Coupling  
SP28 Motor Block NEMA 23 without Coupling  
SP29 Motor Block NEMA 34 without Coupling  
SP30 Motor Block Neo 70 with 11.0 mm Bore Coupling

⑨ **Gearbox Option\***

G0 No Gearbox (Requires MBR, MBL, MRW, MLW)  
G1 Customer Supplied Gearhead\*  
G1203 PV60 Gearhead 3:1 Ratio  
G1205 PV60 Gearhead 5:1 Ratio  
G1210 PV60 Gearhead 10:1 Ratio  
G1215 PV60 Gearhead 15:1 Ratio  
G1225 PV60 Gearhead 25:1 Ratio

\*Contact factory for approval of any alternative gearbox information.

⑩ **Mounting Orientation**

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

⑪ **Motor Kit Option**

K00 No Motor Kit  
K21 Motor Kit LV23, HV23, OS23, ES23, VS23 to PV60  
K22 Motor Kit BE23X to PV60  
K23 Motor Kit SM23, SE23 to PV60  
K24 Motor Kit LV34, HV34  
K25 Motor Kit BE34, NO34X, JO34X, TS31, TS32 to PV60  
K26 Motor Kit RS34, ES34 to PV60  
K27 Motor Kit NO70, JO70 to PV60  
K28 Motor Kit SMB60 to PV60

⑫ **Strip Seal Option**

ZA Unit with Strip Seal (IP30)  
ZB Unit without Strip Seal

⑬ **Limit/Home Switch Option**

LH0 No Limit Switch Assembly  
LH1 Three Mechanical Switches (1 NO & 1 NC Contact Per Switch)  
LH2 Two Mechanical Switches (1 NO & 1 NC Contact Per Switch)  
LH3 Three NPN Prox Switches, 10-30 VDC  
LH4 Three PNP Prox Switches, 10-30 VDC

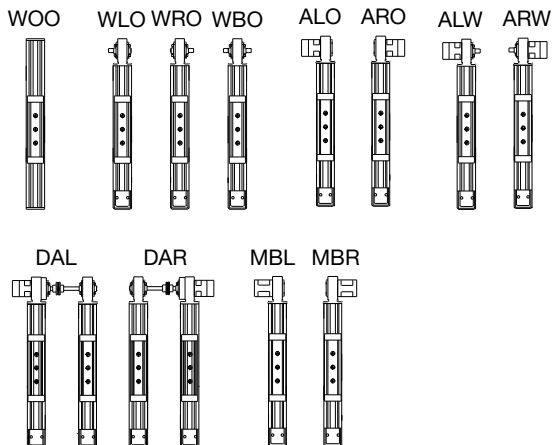
Belt Driven  
Tables



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
<b>Order Example:</b>	HLE100	RB	NL	E	1000	DA0000	ARO	SP7	G2-05	H2	ZB	K6	LH0

- ① **Series**  
HLE100
- ② **Bearing Type**  
RB
- ③ **Carriage Type**  
NL Standard Carriage  
VL Extended Carriage
- ④ **Unit Type**  
M Idler  
D Dual Axis Unit  
E Timing Belt Drive, Nominal Thrust, Maximum Life
- ⑤ **Travel Length**  
nnnn Specified travel in mm (nnnn = mm)
- ⑥ **Drive Shaft Option - Center to Center**  
DA0000 No Drive Shaft - Single Axis or Idler Unit  
DAnnnn (nnnn=mm)
- ⑦ **Shaft Configuration Options**  
WOO No Shaft, Idler Unit  
WLO Shaft Left  
WRO Shaft Right  
WBO Double Shaft  
ALO Reducer Left  
ARO Reducer Right  
ALW Reducer Left, Shaft Right  
ARW Reducer Right, Shaft Left  
DAL Double Axis, Drive Left  
DAR Double Axis, Drive Right  
MBL Motor Block Left  
MBR Motor Block Right



- ⑧ **Drive Station Interface**  
SP0 Idler or Shaft Option  
SP1 Drive Housing for GTN /GTR-090  
SP2 Drive Housing for GTN / GTR / PEN / PER-115  
SP3 Motor Block - NEMA 34 with 0.500 in. coupling  
SP4 Motor Block - NEMA 34 with 0.375 in. coupling  
SP5 Motor Block - NEMA 34 without coupling  
SP6 Motor Block - with coupling for JO923 direct drive  
SP7 Motor Block - NEMA 42 with 0.625 in. coupling  
SP8 Motor Block - NEMA 42 without coupling  
SP9 Drive Housing for PEN / PER-090
- ⑨ **Gearbox Option**  
G0-00 No Gearbox  
G2-nn PEN-090\*\*  
G3-nn PER-090\*\*  
G4-nn PEN-115\*\*  
G5-nn PER-115\*\*  
G6-nn GTN-090\*  
G7-nn GTR-090\*  
G8-nn GTN-115\*  
G9-nn GTR-115\*  
\*Single stage ratios: 3, 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 **Mounting Orientation**  
H1 Carriage Up  
H2 Carriage Down  
H3 Carriage on Side, Drive Station Up  
H4 Carriage on Side, Drive Station Down
- ⑪ **Strip Seal Option**  
ZA Unit with Strip Seal (IP30)  
ZB Unit without Strip Seal
- ⑫ **Motor Kit Option**  
K0 No motor kit  
K1 J034\*, N034\*, BE34\*, TS31, TS32 to GT-090, PE-090  
K2 J070\*, N070\* to GT-090, PE-090  
K3 J090\*, N090\* to GT-090, PE-090  
K4 M105\* to GT-090, PE-090  
K5 ES3\*, OEM83-\*, ZETA83-\*, S83-\*, RS3\* to GT-090, PE-090  
K6 J034\*, N034\*, BE34\*, TS3  
K7 J090\*, N090\*  
K8 M105\*  
K9 ES3\*, OEM83-\*, ZETA83-\*, S83-\*, RS3\*  
K10 RS42, RE42, S106-205  
K11 S106-178, S106-250  
K12 M145  
K35 MPP092  
K37 MPP100  
K39 MPP115  
\*Single stage ratios: 3, 5, 8, 10; Dual stage ratios: 12, 15, 16, 20, 25
- ⑬ **Limit/Home Switch Option**  
LH0 No Limit Switch Assembly  
LH1 Three Mechanical Switches, 1 NO and 1 NC contact per switch  
LH2 Two Mechanical Switches, 1 NPN Prox Switch  
LH3 Three NPN Prox Switches, 10-30 VDC  
LH4 Three PNP Prox Switches, 10-30 VDC



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
<b>Order Example:</b>	HLE150	RB	NL	E	1000	DA0000	ARO	SP1	G2-05	H2	ZA	K7	LH2

① **Series**  
HLE150

② **Bearing Type**  
RB

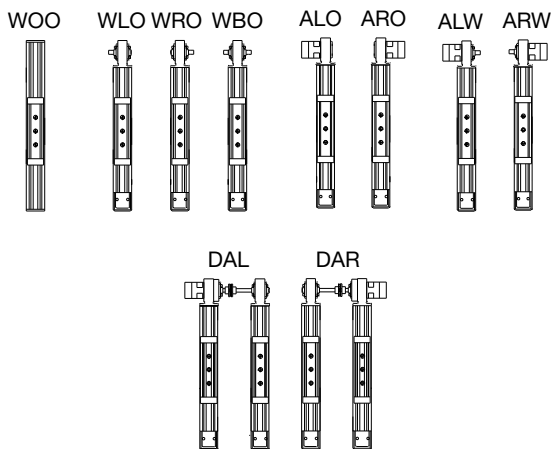
③ **Carriage Type**  
NL Standard Carriage  
VL Extended Carriage

④ **Unit Type**  
M Idler  
E Timing Belt Drive, Nominal Thrust, Maximum Life  
F Timing Belt Drive, Maximum Thrust, Nominal Life

⑤ **Travel Length**  
nnnn Specified travel in mm (nnnn = mm)

⑥ **Drive Shaft Option - Center to Center**  
DA0000 No Drive Shaft - Single Axis or Idler Unit  
DAnnnn (nnnn=mm)

⑦ **Shaft Configuration Options**  
WOO No Shaft, Idler Unit  
WLO Shaft Left  
WRO Shaft Right  
WBO Double Shaft  
ALO Reducer Left  
ARO Reducer Right  
ALW Reducer Left, Shaft Right  
ARW Reducer Right, Shaft Left  
DAL Double Axis, Drive Left  
DAR Double Axis, Drive Right



⑧ **Drive Station Interface**  
SP0 Idler or Shaft Option  
SP1 Drive Housing for GTN115  
SP2 Drive Housing for GTN142  
SP9 Drive Housing for PEN115

⑨ **Gearbox Option**  
G0-00 No Gearbox  
G2-*nn* PEN-115\*\*  
G3-*nn* PER-115\*\*  
G4-*nn* GTN-115\*  
G5-*nn* GTR-115\*  
G6-*nn* GTN-142\*  
G7-*nn* GTR-142\*

\*Single stage ratios: 3, 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 **Mounting Orientation**  
H1 Carriage Up  
H2 Carriage Down  
H3 Carriage on Side, Drive Station Up  
H4 Carriage on Side, Drive Station Down

⑪ **Strip Seal Option**  
ZA Unit with Strip Seal (IP30)  
ZB Unit without Strip Seal

⑫ **Motor Kit Option**  
K0 No motor kit  
K6 J034\*, N034\*, BE34\*, TS31, TS32 to GT-115, PE-115  
K7 J090\*, N090\* to GT-115, PE-115  
K8 M105\* to GT-115, PE-115  
K9 ES3\*, OEM83-\*, ZETA83-\*, S83-\*, RS3\* to GT-115, PE-115  
K10 RS42, RE42, S106-205 to GT-115, PE-115  
K11 S106-178, S106-250 to GT-115, PE-115  
K12 M145 to GT-115, PE-115  
K13 M145 to GT-142, PE-142

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

⑬ **Limit/Home Switch Option**  
LH0 No Limit Switch Assembly  
LH1 Three Mechanical Switches, 1 NO and 1 NC contact per switch  
LH2 Two Mechanical Switches, 1 NPN Prox Switch  
LH3 Three NPN Prox Switches, 10-30 VDC  
LH4 Three PNP Prox Switches, 10-30 VDC