HLE-SR Series Belt Driven Linear Modules

Features

- Heavy duty steel square rail bearing system for greater load capacity
- Standard travel to 6 meters*
- Load capacities up to 600 kg
- Velocity up to 3 meters/sec.
- ±0.2 mm positional repeatability
- Timing belt and pulley drive mechanism
- IP30 strip seal

*Longer travels available with splice kits.

HLE-SR Bearing System

The bearing system is the principal distinction between the RB (Roller Bearing) type modules and the SR (Square Rail) type. The SR employs a square rail bearing system, which permits greater load carrying capability without increasing overall size. Square rail bearings are recirculating ball bearings designed to move heavy loads on a precise linear path. Linear guides, which house several rows of re-circulating ball bearings, ride on a high strength, steel square rail. The steel square rail cross section enables bearing ways to be ground into the sides of the rail. These bearing ways are shaped in an arch which approximates the same radius as the ball bearing. This increases the contact surface between the ball and the rail, thereby increasing the load capacity of the linear bearing.

HLE-SR Drive Principle

The HLE-SR employs the same high performance belt and pulley drive mechanism as the HLE-RB. It features a zero backlash steel reinforced timing belt drive, which provides high speeds, high acceleration, and good bidirectional repeatability. A belt 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.

Proven Technology

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

- Low running friction
- Low wear
- Low maintenance
- Quiet operation
- High efficiency
- Long service life
- High dynamic performance due to high load capacity square rail systems
- Easily accessible lubrication points
- Minimal preventive maintenance required
- T-slots integrated on 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
- Clean room technology: water transport, water 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

Optional Features

- Direct mounting for planetary gear reducers
- 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 bumpers
- Link shafts and support bearing for dual unit axes
- Splice plates for extending travels beyond length available in a single profile

See pages 272-276 for available options and accessories.

Housing

The HLE-SR housing is a light-weight, compact and self-supporting extruded aluminum section. It is available in two cross-sections: 60 x 60 mm (HLE60) and 100 x 100 mm (HLE100). T-slots along the length are utilized for clamping mechanical components, joining units, and attaching sensors or mechanical switches.

Carriage

A rigid carriage assembly is built upon two bearing housings which contain several rows of recirculating ball bearings designed to ride in grooves ground into a steel square rail linear raceway. Longer or custom carriages are also available.

Load Attachment Plate

Longitudinal T-Slots integrated on the top of this plate facilitate the assembly of attachments to the HLE-SR. Utilization of these T-Slots together with standard clamping profiles enables easy straight-forward construction of multi-axis systems.

Bearing Raceway

A high strength steel alloy bearing rail features precision ground “gothic arch” raceways to provide precise translation and high strength support of the recirculating ball bearings.

Optional IP30 Strip Seal

Magnetically attached stainless steel seal strip provides environmental protection to interior components.

Drive Belt

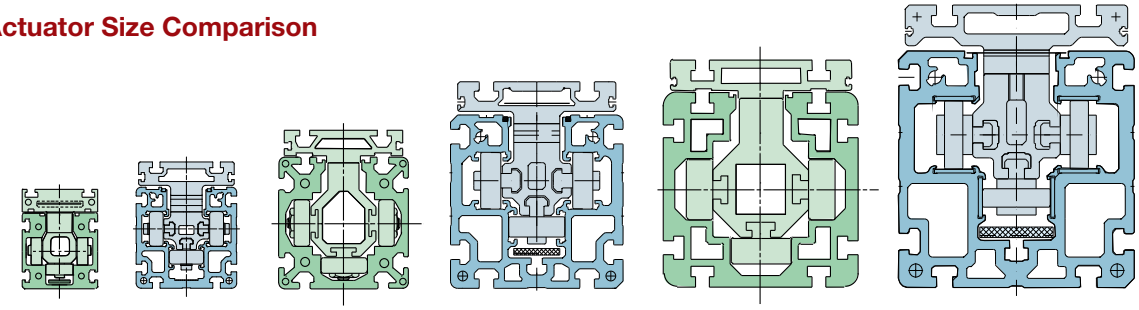
A zero backlash, steel reinforced timing belt provides high speed, high acceleration and high bidirectional repeatability. A serrated clamp mechanism between belt and carriage guarantees a safe and strong connection.

HLE-SR Series Specifications

Characteristic	Units	HLE60-SR		HLE100-SR	
Unit Weight (basic unit without stroke)					
Standard Carriage, NL	kg (lb.)	3.5	(7.7)	16.2	(35.7)
Extended Carriage, VL	kg (lb.)	5.91	(13)	20.0	(44.1)
Carriage Weight					
Standard Carriage, NL	kg. (lb)	1.8	(4.0)	2.2	(4.9)
Extended Carriage, VL	kg. (lb)	2.1	(4.6)	3.8	(8.4)
Weight per meter of additional length	kg/m (lb/ft)	5.5	(3.7)	13.3	(8.9)
Moment of Inertia (related to the drive shaft)					
Standard Carriage, NL	kg-cm^2 (lb-in^2)	3.52	(1.20)	34.8	(11.9)
Extended Carriage, VL	kg-cm^2 (lb-in^2)	5.20	(1.83)	52.2	(17.9)
Travel and Speed					
Maximum Speed[1]	m/s (in/s)	3	(120)	3	(120)
Maximum Acceleration[1]	m/s^2 (in/s^2)	10	(393)	10	(393)
Maximum Travel[2], NL	m (in)	3.05	(120)	6.15	(242)
Maximum Travel[2], VL	m (in)	2.8	(114)	6.0	(236)
Geometric Data					
Cross Section, Square	mm (in)	57.2	(2.25)	100	(3.94)
Moment of Inertia Ix	cm^4 (in^4)	48.3	(1.16)	377	(9.06)
Moment of Inertia Iy	cm^4 (in^4)	59.5	(1.43)	432	(10.38)
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)
Pulley Data, Torques, Forces					
Travel Distance per Revolution	mm/rev (in/rev)	125	(4.92)	240.0	(9.45)
Pulley Diameter	mm (in)	39.8	(1.57)	74.5	(2.93)
Maximum Drive Torque[3]	Nm (lb-in)	8.87	(79)	61.5	(544)
Maximum Belt Traction[3] (effective load)	N (lb)	668	(150)	1650	(371)
Repeatability[4]	mm (in)	±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.
(3) Increased timing belt tension required. (4) Nominal value - component dependant. For improved repeatability consult factory.

Linear Actuator Size Comparison



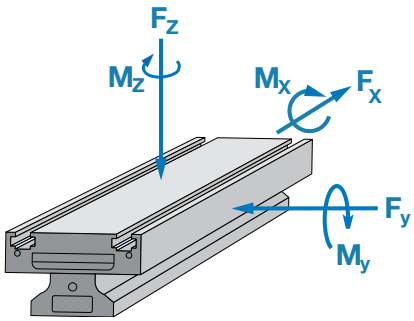
HLE60 HPLA080 HLE100 HPLA120 HLE150 (RB & Z only) HPLA180

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 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.

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.

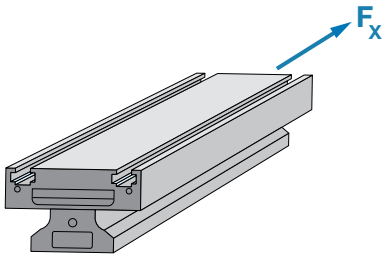
Load-Bearing Capacity Timing Belt (Fx)

HLE60-SR

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	–

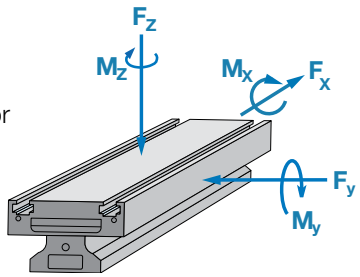
HLE100-SR

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



HLE-SR Performance Curves

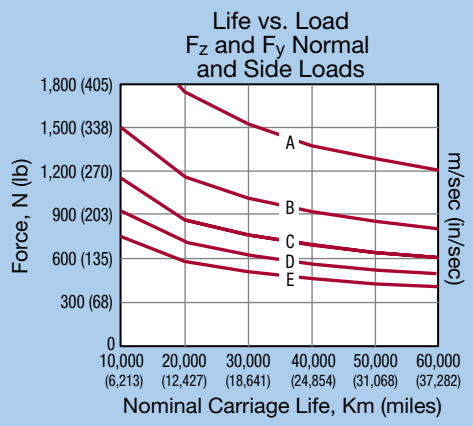
The force and moment capabilities of the carriage and the timing belt are speed dependent. The load curves shown in the graphs are valid for a standard (NL order code) carriage. These curves show the allowable force or moment versus the nominal carriage life.

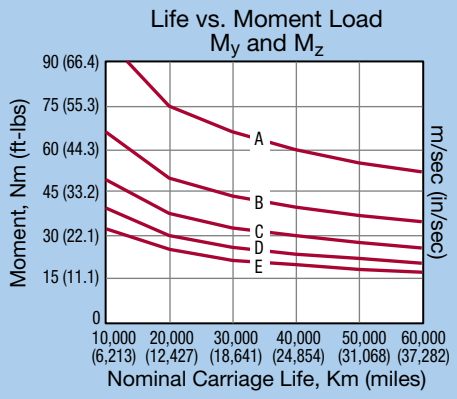


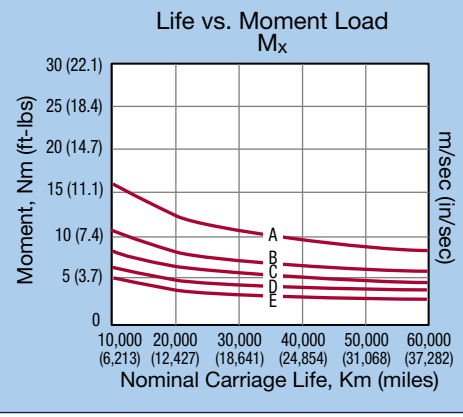
Legend

Curve	Velocity m/sec.	Velocity (in/sec.)
A	0.25	(10)
B	0.50	(20)
C	1.00	(40)
D	2.00	(80)
E	3.00	(120)

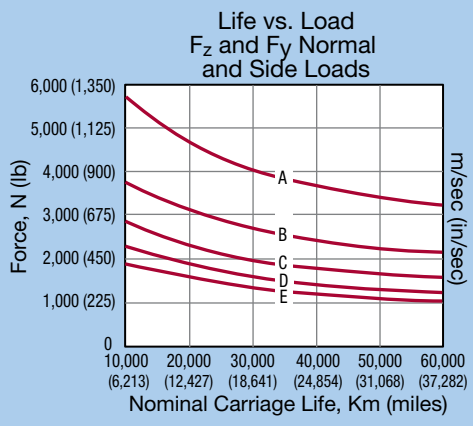
HLE-60SR

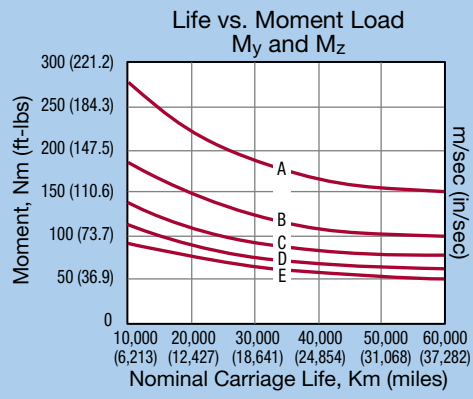


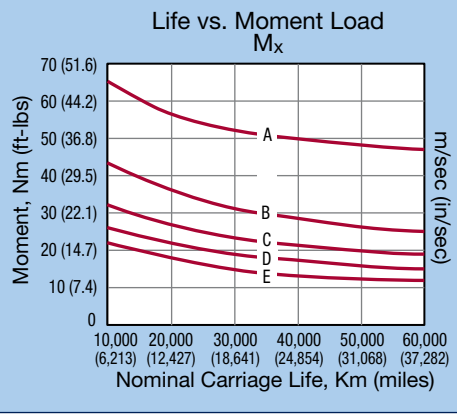




HLE-100SR



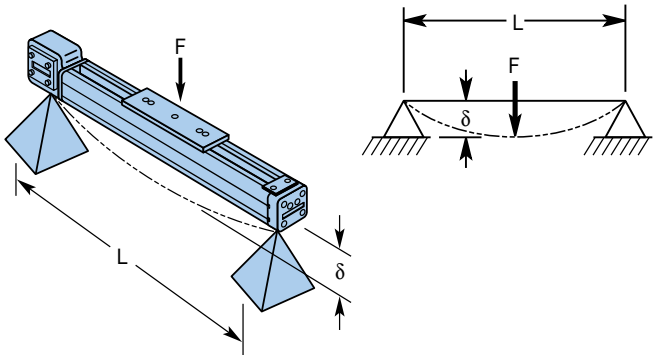




HLE-SR Deflection Characteristics

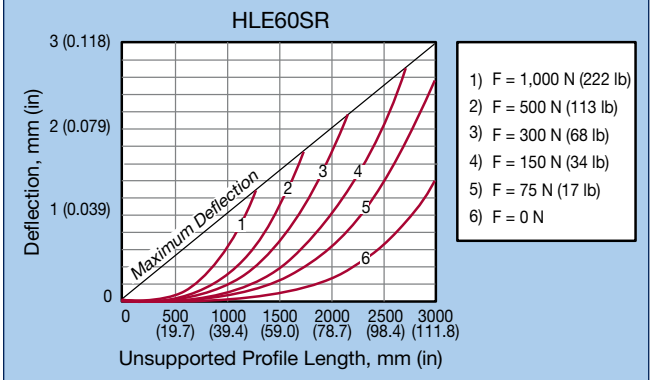
The HLE deflection curves can be used for determining the deflection based on the profile length and the application load weight. Applications requiring high acceleration forces can place a severe strain on the system stability. In these cases, a solid substructure may be required with the HLE product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

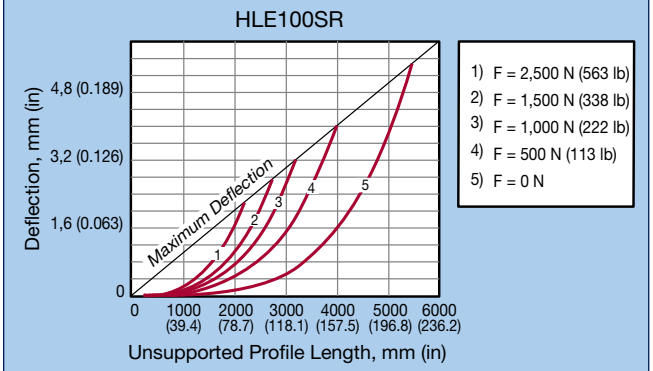
These deflection curves illustrate the deflection δ, based on the HLE profile being simply supported at both ends. The graphs take into consideration the self deflection due to the weight of the profile, along with the load to be transported. The maximum deflection cannot be exceeded unless additional supports are implemented. 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



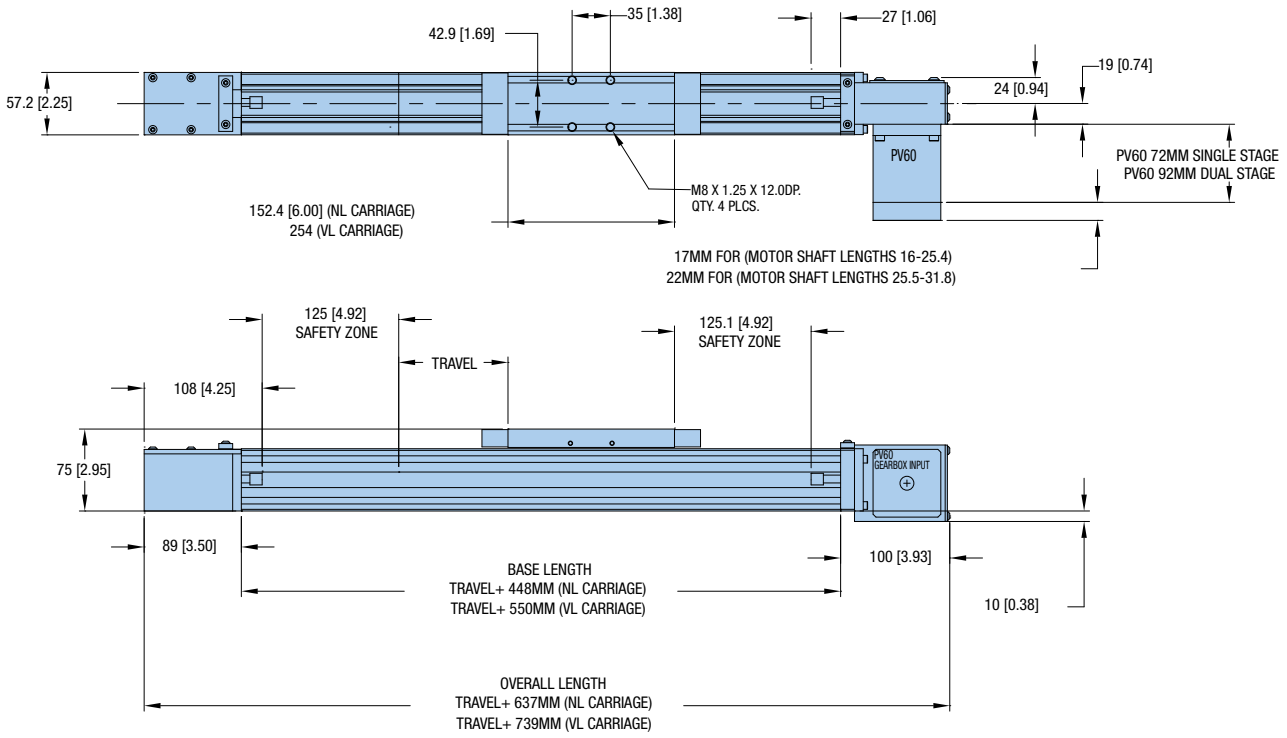


HLE60-SR Dimensions

Download from parkermotion.com

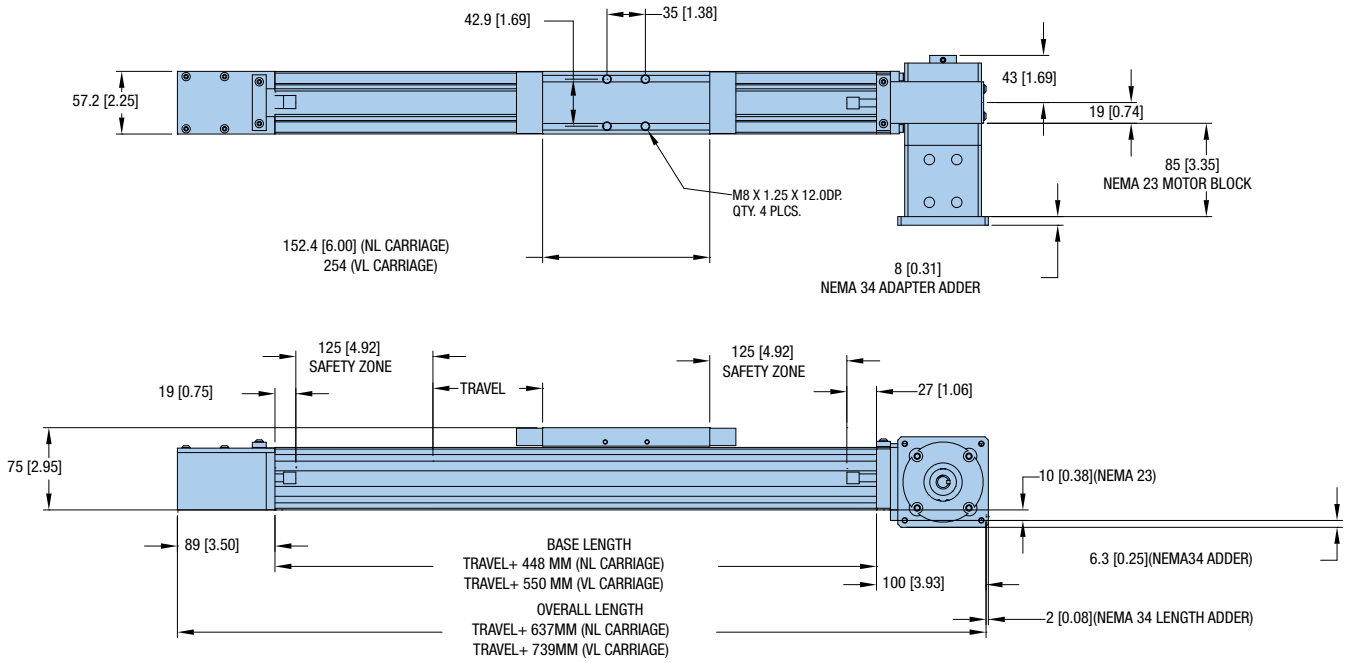
HLE60-SR with PV60 Direct Drive

Dimensions (mm)



HLE60-SR Drive with Motor Block

Dimensions (mm)

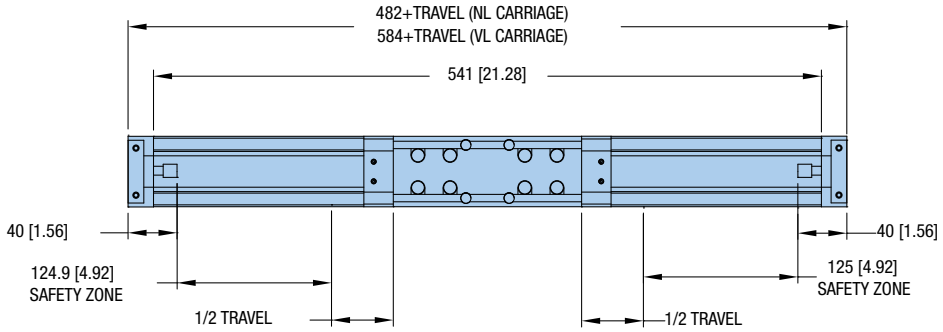


HLE60-SR Dimensions

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

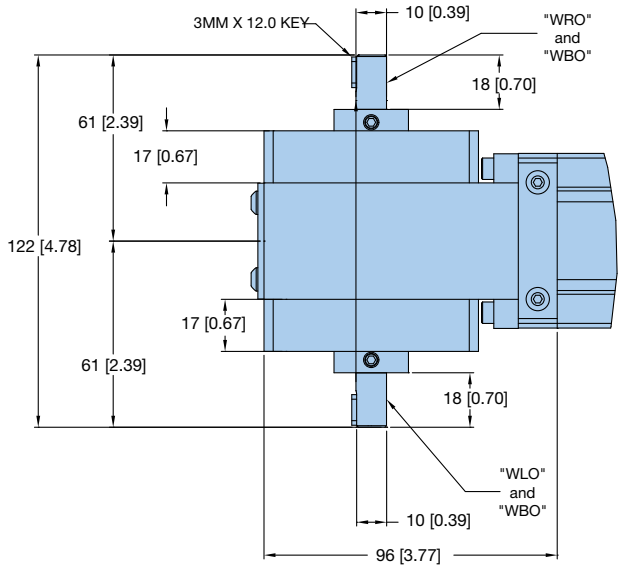
HLE60-SR Idler

Dimensions (mm)

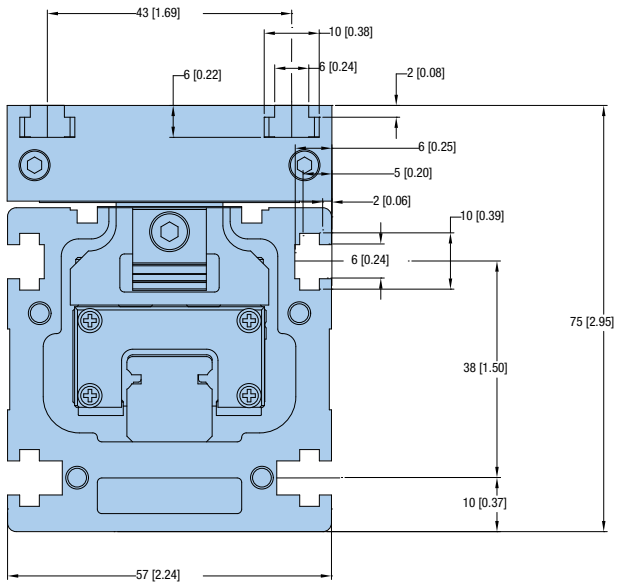


Drive Shaft Option

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

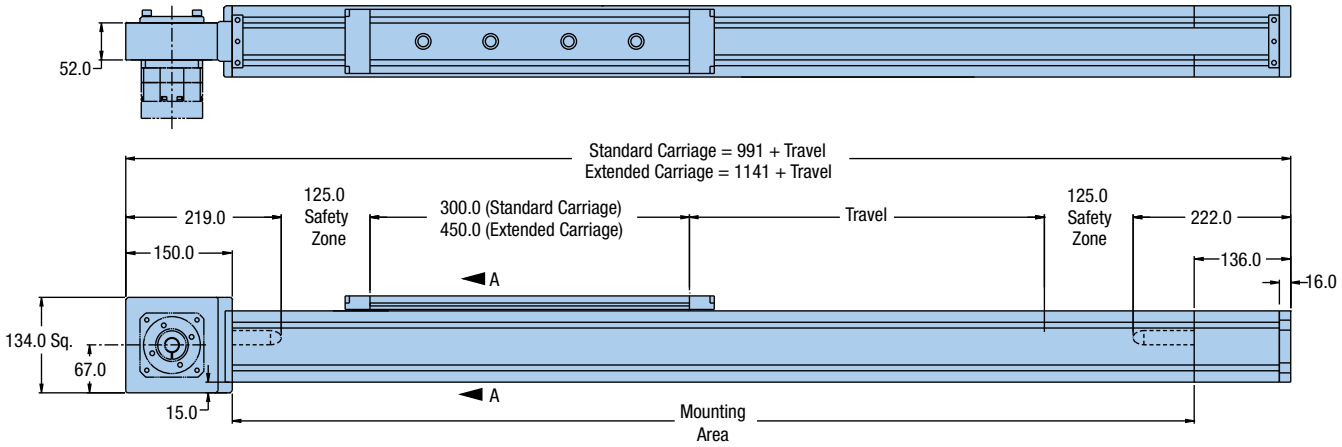


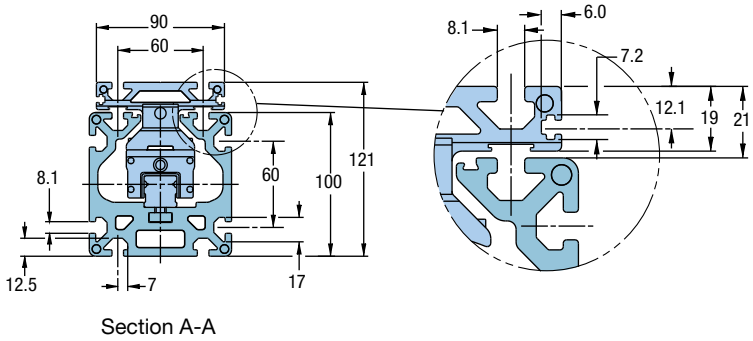
End View



HLE100-SR Drive

Dimensions (mm)

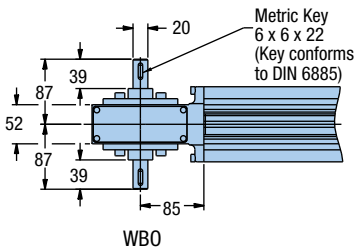




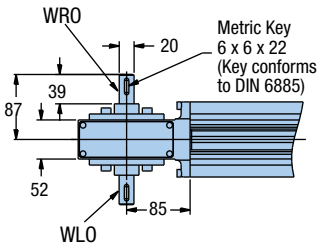
Section A-A

Drive Shaft Option

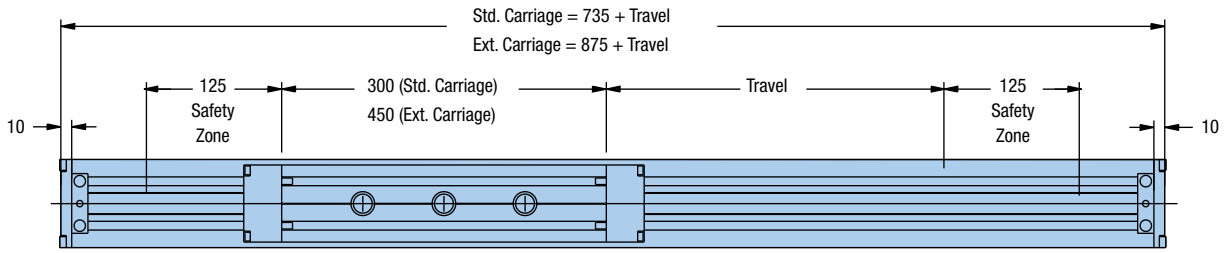
WRO Shaft on Right
WLO Shaft on Left
WBO Shaft on Both Sides



WBO



HLE100-SR Idler



HLE60-SR 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
Order Example:	HLE060	SR	NL	E	2000	DA000	MBR	SP5	G1205	H1	K24	ZA	LH0

① Series
HLE060

② Bearing Type
SR

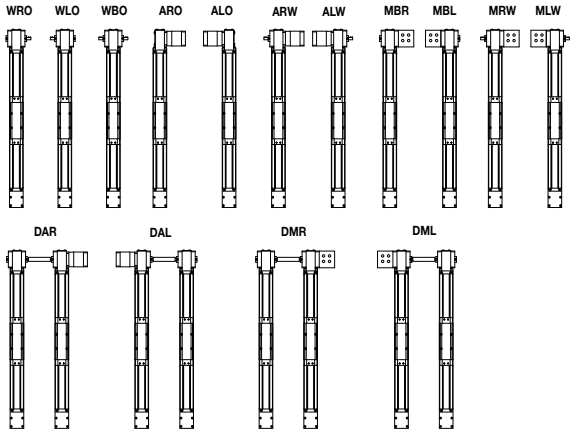
③ Carriage Type
NL Standard Carriage
VL Extended Carriage

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
WOO No Shaft, Idler Unit
ARO Gearhead Right
ALO Gearhead Left
ARW Gearhead Right Shaft Left
ALW Gearhead Left Shaft Right
WLO Shaft Left
WRO Shaft Right
WBO Double Shaft
MBL Motor Block Left
MBR Motor Block Right
MLW Motor Block Left, Shaft Right
MRW Motor Block Right, Shaft Left
DAL Double Axis Gearhead, Drive Left
DAR Double Axis Gearhead, Drive Right
DML Double Axis, Motor Block Left
DMR Double Axis, Motor Block Right



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 to PV60
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

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:	HLE100	SR	NL	E	2000	DA000	ARO	SP2	G2-03	H1	ZB	K2	LH0

① Series
HLE100

② Bearing Type
SR

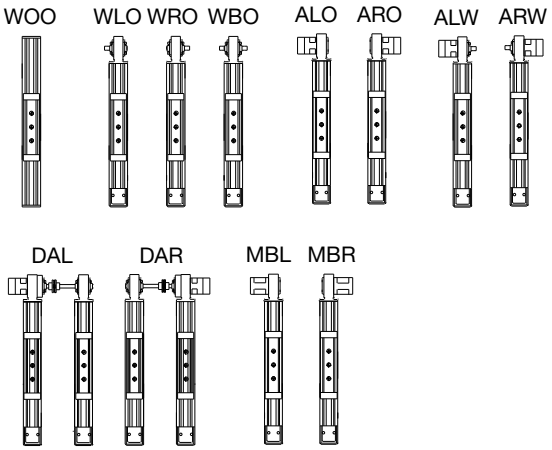
③ Carriage Type
NL Standard Carriage
VL Extended Carriage

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

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, 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 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*, TS3* to GTN, PEN-090
K2 J070*, N070* to GTN, PEN-090
K3 J090*, N090* to GTN, PEN-090
K4 M105* to GTN, PEN-090
K5 ES3*, OEM83-*, ZETA83-*, S83-*, RS3* to GTN, PEN-0-90
K6 J034*, N034*, BE34*, TS3* to GTN, PEN-115
K7 J090*, N090* to PE-115 or GTN, PEN-115
K8 M105* to PE-115 or GTN, PEN-115
K9 ES3*, OEM83-*, ZETA83-*, S83-*, RS3* to GTN, PEN-115
K10 RS42, RE42, S106-205 to GTN, PEN-115
K11 S106-178, S106-250 to GTN, PEN-115
K12 M145 to GTN, PEN-115ZETA57-83-MO-S
K35 MPP092
K37 MPP100
K39 MPP115
*Single stage ratios: 3, 4, 5, 8, 10; Dual stage ratios: 12, 15, 16, 20, 25

⑬ Limit/Home Switch Option
LH0 No Limit Switch Assembly
LH3 Three NPN Prox Switches, 10-30 VDC
LH4 Three PNP Prox Switches, 10-30 VDC