

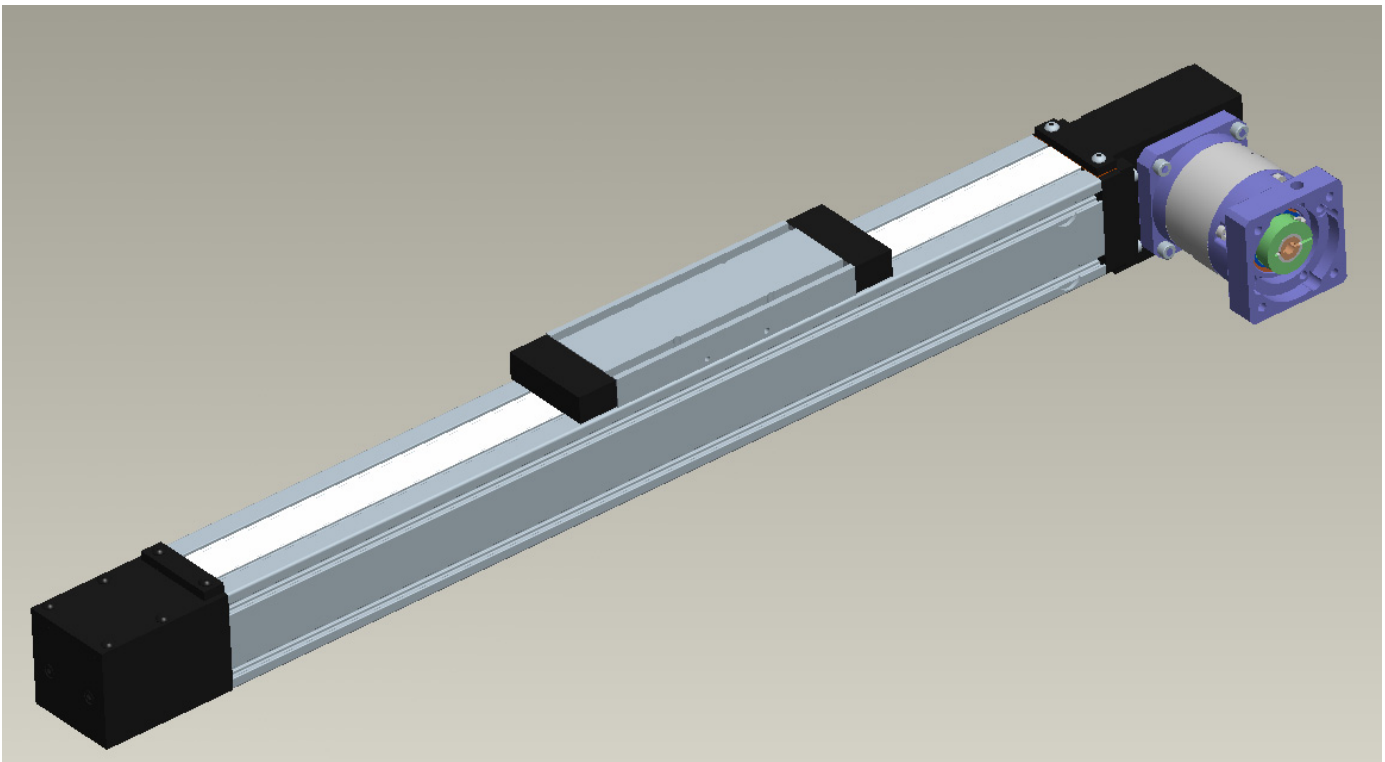
HLE60 SERIES LINEAR DRIVES

INSTALLATION , OPERATION , AND MAINTENANCE MANUAL

MANUAL NO. 100-5312-01 REV 5

HLE60 SR -SQUARE RAIL VERSION

HLE60 RB- ROLLER WHEEL BEARING VERSION



REVISION NOTES:

REV 4 1-20-2006

CHANGED REVISION CODE FROM NUMBERS TO LETTERS
UPDATED BELT TENSION PHOTO
PG 32 PART#'S AND DESCRIPTIONS

REV 5 3-12-2007

COMPLETE UPDATE OF MANUAL TO HLE60 GEN2



WARNING

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TABLE OF CONTENTS

1 SAFETY.....	4	5 HLE60 CONFIGURABLE.....	24-25
1.1 GENERAL.....	4		
1.2 IDENTIFICATION.....	4		
1.3 END USER SAFETY NOTICE.....	4		
1.4 SAFETY OPERATING.....	5		
1.5 ADVICE ON PARTICULAR DANGERS.....	5		
1.6 UNAUTHORISED MODIFICATION.....	5		
1.7 HANDLING TRANSPORTING.....	5		
2 TECHNICAL DATA.....	6	6 ASSEMBLIES HLE60RB.....	
2.1 PRODUCT CONSTRUCTION.....	6	HLE60RB.....	26
2.2 TECHNICAL DATA.....	7	HLE60RB-NL- CARRIAGE.....	27
2.3 CARRIAGE LOADING SR.....	8	HLE60RB-VL-CARRIAGE.....	28
2.4 CARRIAGE LOADING RB.....	9	ARO/ALO-HLE60RB.....	29
2.5 DIMENSIONS.....	10	ARW/ALW-HLE60RB.....	30
2.5.1 DIMENSIONS HLE60RB.....	10	MBR./MBL-HLE60RB.....	31
2.5.2 DIMENSIONS HLE60SR.....	11	MRW/MLW-HLE60RB.....	32
3 INSTALLATION.....	12	WBO-HLE60RB.....	33
3.1 GENERAL.....	12	WRO/WLO-HLE60RB.....	34
3.2 SUBSTRUCTURE PREPARATION.....	12	TESION STATION HLE60RB.....	35
3.3 INSTALLING.....	12		
3.3.1 INSTALLING SINGLE AXIS.....	12	7 ASSEMBLIES HLE60SR.....	
3.3.2 IINSTALLING DUAL AXIS.....	13	HLE60SR.....	36
3.4 LIMIT SWITCHES.....	13	HLE60SR-NL- CARRIAGE.....	37
3.4.1 GENERAL.....	13	HLE60SR-VL-CARRIAGE.....	38
3.4.2 SETTING UP END OF TRAVELS.....	14	ARO/ALO-HLE60SR.....	39
4 MAINTENANCE.....	15	ARW/ALW-HLE60SR.....	40
4.1 MAINTENANCE SCHEDULE.....	15	MBR./MBL-HLE60SR.....	41
4.2 REPLACEMENT INTERVAL STRIP SEAL/ WEARING PARTS.....	15	MRW/MLW-HLE60SR.....	42
4.3 ABNORMAL TIMING BELT WEAR.....	16	WBO-HLE60SR.....	43
4.4 MAINTENANCE & REPAIR.....	17	WRO/WLO-HLE60SR.....	44
4.4.1 SAFETY NOTICE.....	17	TESION STATION HLE60SR.....	45
4.5 REPLACING, TENSIONING, AND ALIGNING TIMINGBELTS.....	17		
4.5.1 GENERAL INFORMATION.....	17	8 GEARBOX INFORMATION.....	
4.5.2 REPLACING TIMING BELT.....	17	GEARBOX TECHNICAL INFO.....	46
4.5.2 TENSIONING TIMING BELT.....	17	GEARBOX MOMENT OF INERTIAS.....	47
4.5.2 CHECKING ADJUSTING BELT TENSION.....	17	GEARBOX DIMENSIONAL.....	48
4.5.3 MEASURING TIMING BELT.....	18	GEARBOX SHAFT LOADING.....	48
4.5.4 TIMING BELT TRACKING.....	18	MOTOR MOUNTING.....	49
4.6 CARRIAGE.....	19		
4.6.1 CHECKING CARRIAGE PLAYRB.....	19		
4.6.2 ADJUSTING CARRIAGE WHEELS.....	19		
4.6.3 CHECKING CARRIAGE PLAYSR.....	20		
4.6.4 CHANGING BEARING BLOCK SR.....	20		
4.6.5 LUBRICATION SR.....	21		
4.6.6 REPLACING SQUARE RAIL SR.....	21		

Safety

1.1 General

It is the responsibility of the end user to ensure that equipment is installed and operated in accordance with both local and federal safety codes and guidelines.

The user must ensure that the attachment of workpieces/tools or other devices on the moving carriage of the linear unit does not endanger persons and/or property.

1.2 Symbols and Definitions used within this document

Special attention with regard to the safety of personnel, equipment and property should be considered when one or more of the symbols listed below are shown in this document. During equipment installation and operation, any area/condition considered unsafe should be identified by posting appropriate signs or placards.

Safety notices used:

	Danger	Dangerous situation - can lead to death or serious physical injury if not otherwise prevented by corresponding safety measures.
	Warning	Possible dangerous situation - can lead to possible serious injury if not otherwise prevented by corresponding safety measures.
	Caution	Possible dangerous situation - can lead to minor physical injury or damage to property if not otherwise prevented by corresponding safety measures.
	Note	Important product information - special handling instructions or indicates a certain section of the handbook to which you should refer.

1.2.1 Operating personnel

The following work should only be carried out by trained and authorized personnel:

Installation and calibration of the linear drive.

Connection of safety limit switches.

Installation and start-up of motors and drives.

1.3 End User Safety notices

Supervisors, Technicians, and Installation personnel should familiarize themselves with chapters on "Safety" and "Installation" of this document prior to Installation/operation of equipment.

1.4 Safety notice for operating personnel

Operating personnel must inspect linear drive unit(s)/machine once per shift for any signs of visible damage or loose hardware. Do not operate equipment suspected of erratic behavior or unusual noise levels.

Parker has specially designed components and accessories. Use only genuine Parker replacement parts. Use of unauthorized parts can effect machine performance and safety.

We accept no liability for damages arising through the use of non-genuine parts and accessories.

We accept no liability for safety features removed or disabled.

Use Federal and local safety requirements/regulations during installing and operation.

1.5 Advice on particular dangers

HLE linear drives must be supported at the prescribed minimum distances (see Chapter 3.2).

Stand clear of moving parts

1.6 Unauthorized conversions and modifications

Linear drive units can not be altered in any manner that will affect safety. Any unauthorized alterations will exclude any liability on the part of Parker.

1.7 Handling and Transporting

	Danger	When lifting, stand clear of suspended load(s)! Ensure parts subject to movement do not move off-center or shift out of position.
	Caution	When transporting long axes, permanent deformation of the aluminum profile due to deflection can result if not supported properly. Changes in profile straightness can adversely affect the performance of the moving carriage.

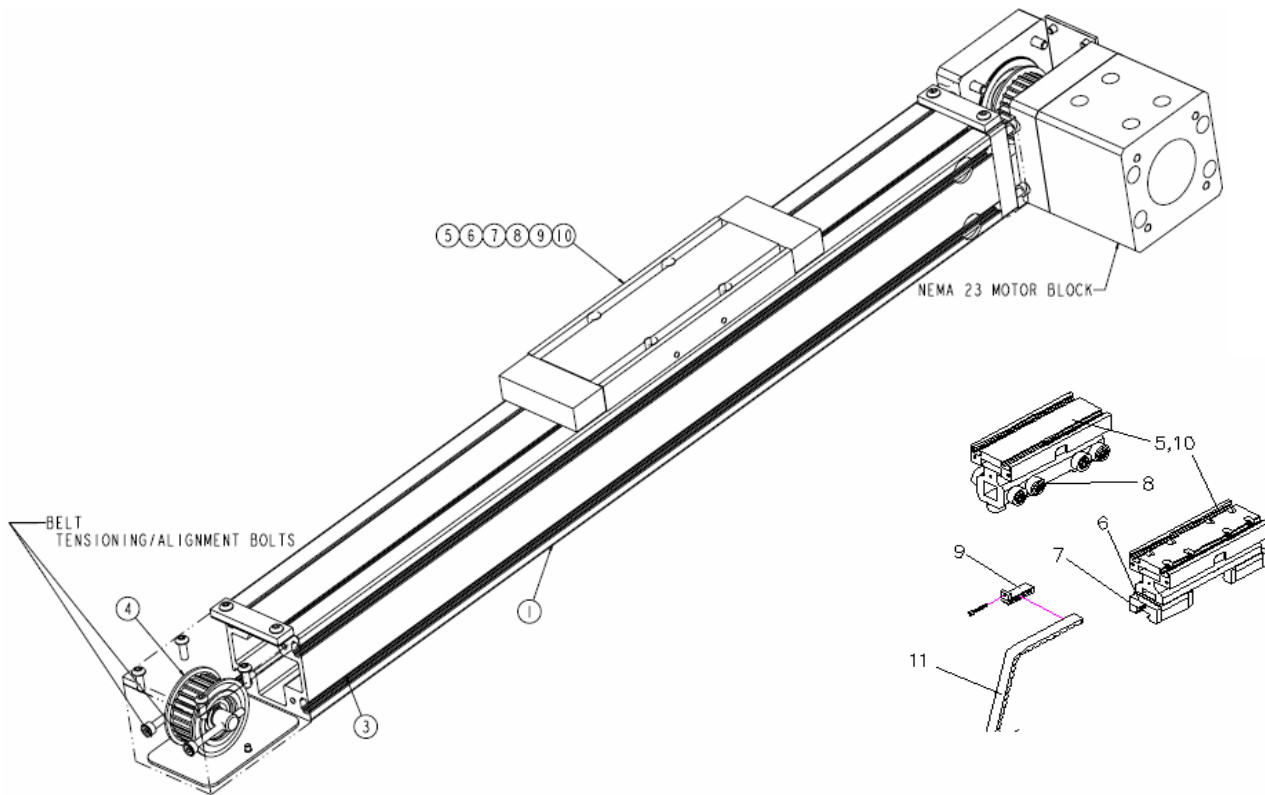
Always use transport equipment with adequate lifting capacity. Lifting straps or ropes must not be twisted, knotted, or frayed. If several ropes are used, all should be under equal tension.

An estimate of weight on the HLE 60 Series can be made as follows:

	<u>Weight</u>	
	HLE 60 SR	HLE 60 RB
Basic Unit (0 Travel)	20.3 kg	17 kg
Each additional Meter	5.5 Kg	3.62 kg

60 Series transportation weight (with motor and gearbox)

Figure 1: Reference value for HLE



Aluminum profile (1)

Main body of drive unit, with 4 External integrated "T" slots, running the entire length. Provides the support structure for drive unit. All profiles are anodized coated.

Running surfaces SR & RB

Steel square rail bolted within profile (1) for **Square Rail** version and extruded guidance system for wheels of **Roller Bearing** version.

Plastic "T" Slot cover (3)

Protects "T" slot from dirt. Contains wiring when "T" slots are used as conduit.

Flanged Drive Pulley (4)

Transfers drive torque to timing belt (11) and simultaneously guides the belt.

Carriage (5)

Positioned by the timing belt, the

Bearing Blocks SR (6)

Linear bearings specifically designed to transport heavy loads at high speeds make up the **SR** version. Rides on a precision square rail running the length of profile.

Lubrication system (7)

Lubrication fittings located on both ends of the carriage provide easy access for lubrication.

Carriage Wheels RB (8)

Totally enclosed, permanently lubricated ball bearings with polymer treads provide smooth and quiet high speed positioning on the **RB** version. Rides on extruded internal channels within the profile.

Timing belt holding bracket (9)

Secures timing belt within carriage. Makes changing timing belt possible without having to dismantle the load attachment plate (10). Provides method of adjusting timing belt tension. Note : The new tension bolts on idler end should be used for belt tensioning and alignment on GEN2 HLE60

Load attachment plate (10)

Aluminum profile with integrated "T" slots and cavity for passage of steel cover strip.

Timing belt (11)

Slip-free polyurethane timing belt re-inforced with inlaid steel-cord. Used to provide power transmission between drive pulley and carriage.

Drive station (12)

Provides flange mounting on both sides of housing and flexibility in the options available:

Motor block or PV60 Direct Mounting as standard options

Left shaft (WLO) / Right shaft (WRO) / Double shaft (WBO)

Fixed mounting of drive pulley through a keyed shaft positioned between ball-bearing sets.

2.2 Technical data

HLE60 Linear Drive	Unit	HLE 60	
		RB	SR

Dimensions, mass moments of inertia

Dimension of base unit, 1m stroke			
Carriage + load attachment plate NL	kg	0.8	1.8
Carriage + load attachment plate VL	kg	1.3	2.1
Mass of drive profile	kg/m	5.1	5.5
Mass moment of inertia related to the drive shaft			
Normal carriage NL	kgcm ²	3.07	3.52
Extended carriage VL	kgcm ²	4.81	5.2

Travel and speeds

Maximum travel speed ¹	m/s	5.0	3.0
Maximum acceleration ¹	m/s ²	10.0	
Maximum travel distance, normal carriage NL	mm	3,048	3,048
Maximum travel distance, extended carriage VL	mm	2,896	2,896

Geometrical data

Cross-section	mm x mm	57.2 x 57.2	
Moment of inertia I _x	cm ⁴	55.8	48.3
Moment of inertia I _y	cm ⁴	56.2	59.5
Modulus of elasticity	N/mm ²	0.72*10 ⁵	

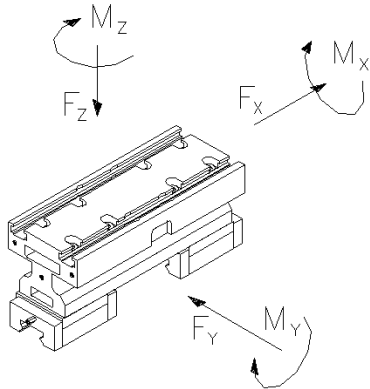
Pulley data, torque's and forces

Travel distance per revolution	mm/rev	125	
Pulley diameter	mm	39.8	
Belt weight	g/mm	00.107	
Peak drive torque ²	Nm	8.87	
Max. belt traction ² (effective load)	N	668	
Repeatability	mm	0.2	

¹ Higher speeds and accelerations are possible. Please consult factory.

² increased tension of timing belt necessary.

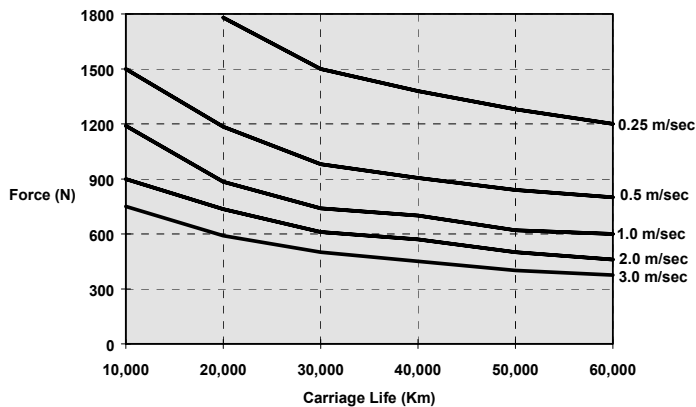
2.3 HLE 60 SR Carriage loads and timing belt



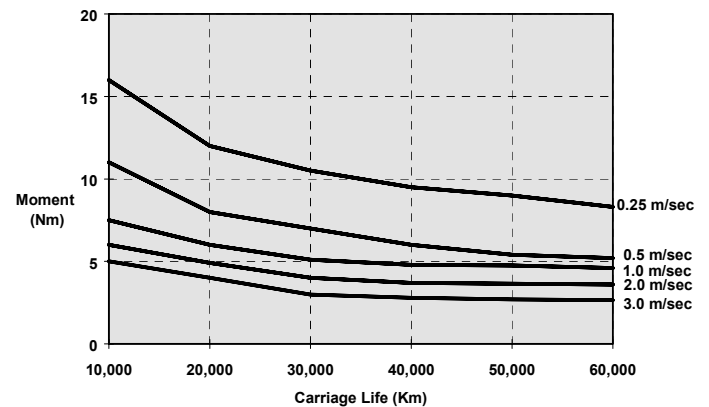
Forces transferred by the carriage and timing belt are speed dependent. Curves shown in graphs are valid for the normal carriage (NL).

Curves show the maximum load-bearing capacity of a carriage in one direction of force or torque. If several loads are applied from different directions, values stated in the curves **may not be fully exploited**, i.e. the load or speed should be reduced if necessary.

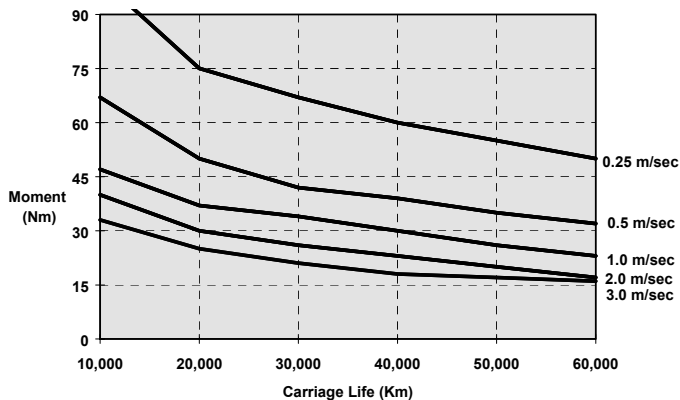
Life vs. Load
HLE60SR Fz & Fy Normal & Side Loads



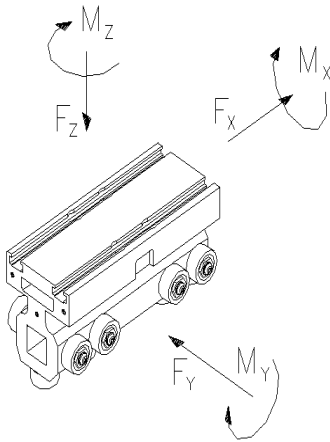
Life vs. Moment Load
HLE60SR Mx



Life vs. Moment Load
HLE60SR My & Mz

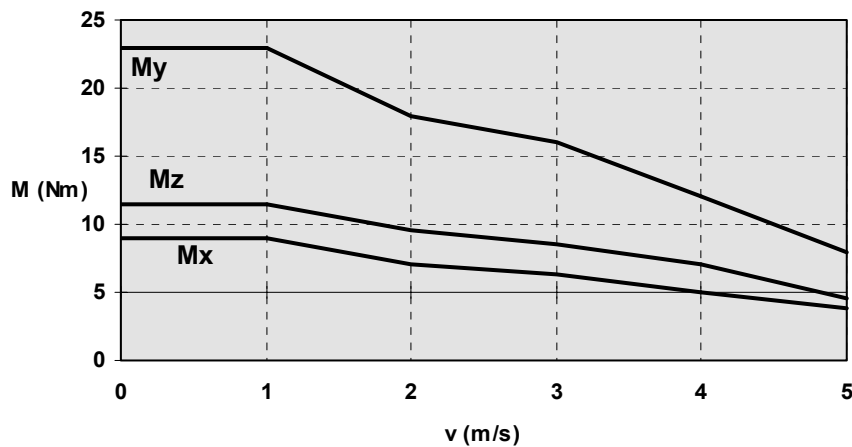
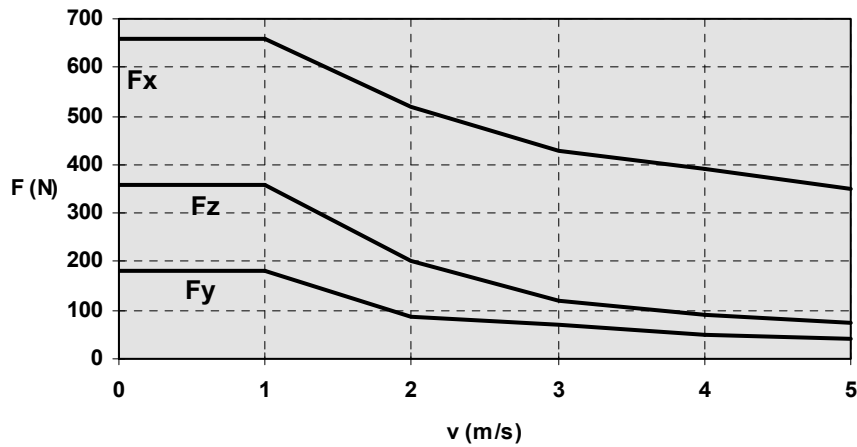


2.4 HLE 60 RB Carriage loads and timing belt strength



Forces transferred by the carriage and timing belt are speed dependent. Curves shown in graphs are valid for the normal carriage (NL). For extended carriages (VL), all values except for F_x (load-bearing capacity of timing belt) can be doubled if the load is applied in pairs or distributed uniformly along length of carriage.

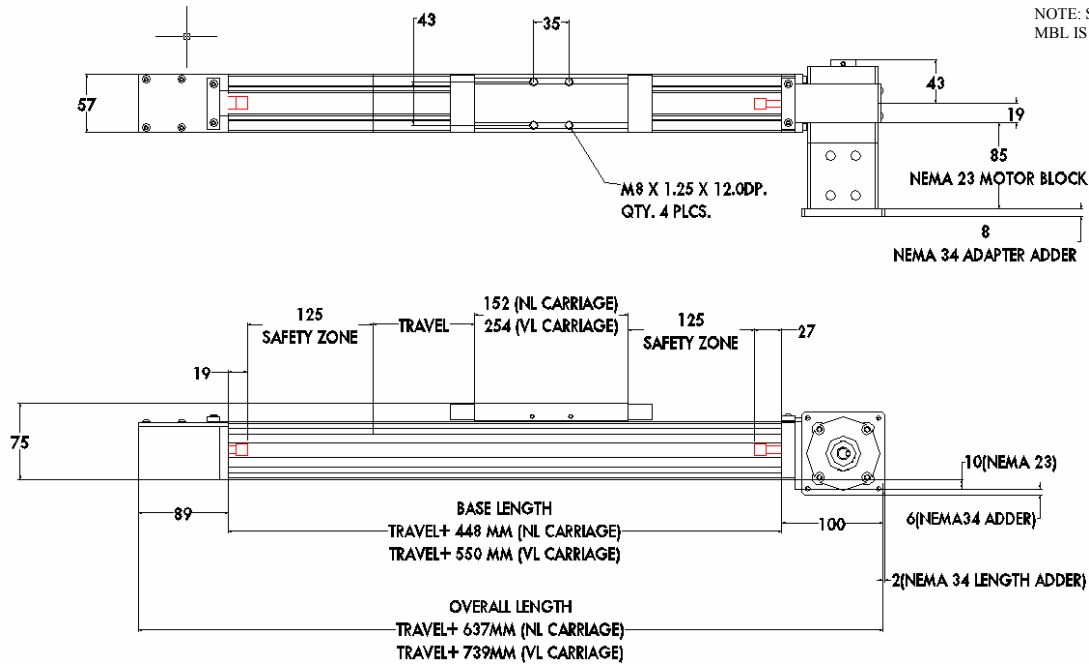
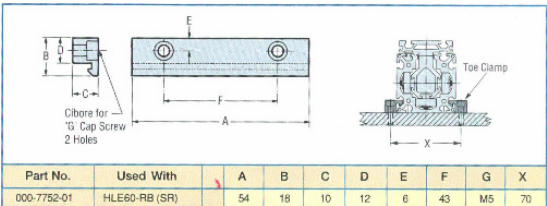
Curves show the maximum load-bearing capacity of a carriage in one direction of force or torque. If several loads are applied from different directions, values stated in the curves **may not be fully exploited**, i.e. the load or speed should be reduced if necessary.



2.5 Dimensions

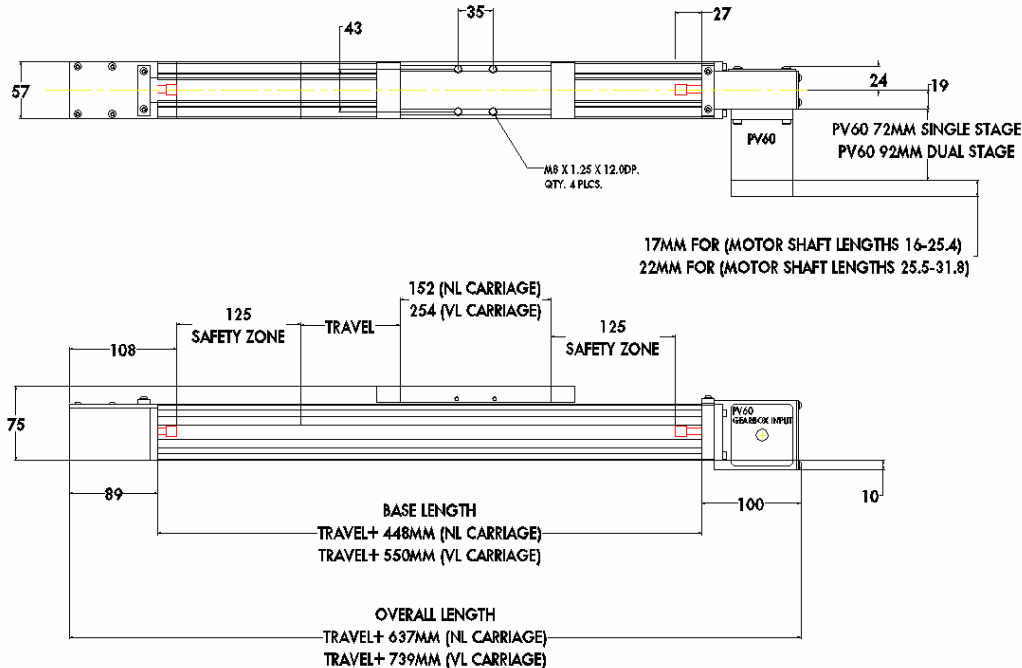
2.5.1 Dimensios HLE 60 SR Drive unit

HLE60SR WITH NEMA MTR BLOCK OPTION



HLE60SR WITH PV60 DIRECT DRIVE

NOTE: SHOWN AS ARO
ALO IS MIRROR IMAGE



3 Installation

3.1 General

Single HLE linear drive units ordered with limit switches will be supplied completely assembled and mechanically ready for operation.

HLE double axes will be supplied dismantled for delivery and safety reasons. (Assembly instructions can be found in chapters 4.10).

Unless otherwise noted, motors should always be mounted in accordance to the motor manufacturer's specifications.

Unless otherwise specified, the standard installation of the linear drive is horizontal, with open slot in profile facing up.

	Note	In vertically mounted applications, the drive station should be at the top of the unit, placing belt tension between drive pulley and load.
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3.2 Substructure preparation

- Each point of support must be level and plane parallel to 0.2 mm.
- All points of support must be aligned to one another with parallelism not to exceed 0.5 mm.
- For double drive units, a one axis parallelism of 0.2 mm must be guaranteed.
- Ideal distance between supports provides drive deflection of 1 mm per meter, see catalog for reference dimensions.
- To simplify leveling, points of HLE drive support can include a series of adapter plates that can be leveled using adjustment screws.

3.3 Installing

	Caution	Permanent deformation of long drive units can occur if handled improperly. Twisted and bent profile can affect the performance of the carriage.
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	Note	During installation, plastic film tape may be used to cover the slot opening to prevent contamination by dirt and debris (does not apply to units equipped with cover system).
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	Note	Always make provisions for easy access to the belt tension adjustment screws and carriage assembly for maintenance purposes!
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3.3.1 Installing a single axis

1. Remove drive unit from crate, strip off protective film and inspect for transportation damage.
2. Place protective tape over drive slot (does not apply to units equipped with cover system).
3. Place HLE on pre-leveled connection points (use leveling instrument).
4. Secure drive using clamping profiles within the "T"-slot grooves of profile. Do not drill into profile!
5. Attach equipment to load plate.
6. Remove dust cover (adhesive film).

3.3.2 Installing a double axis

1. Remove drive unit from crate, strip off protective film and inspect for transportation damage.
2. Place protective tape over drive slot (does not apply to units equipped with cover system).
3. Place HLE's on pre-leveled connection points (use leveling instrument).
4. Secure motor driven HLE using clamping profiles within the "T"-slot grooves of profile.
Do not drill into profile!
5. Install second drive (non-driven axis) same as in step #4, but do not tighten fasteners.
6. Measure for parallelism using tape measurer [Figure 2 left].
7. Check squareness with diagonal measurement (tape measurer) [Figure 2 right]. If adjustment is needed, correct by moving non-driven axis.
8. Check horizontal orientation of both axes to one another (use leveling instrument), and correct by moving non-driven axis.
9. Install connecting axle shaft (does not apply if second axis is an idler unit).
10. Remove the dust cover (adhesive film).
11. Tighten all hardware.

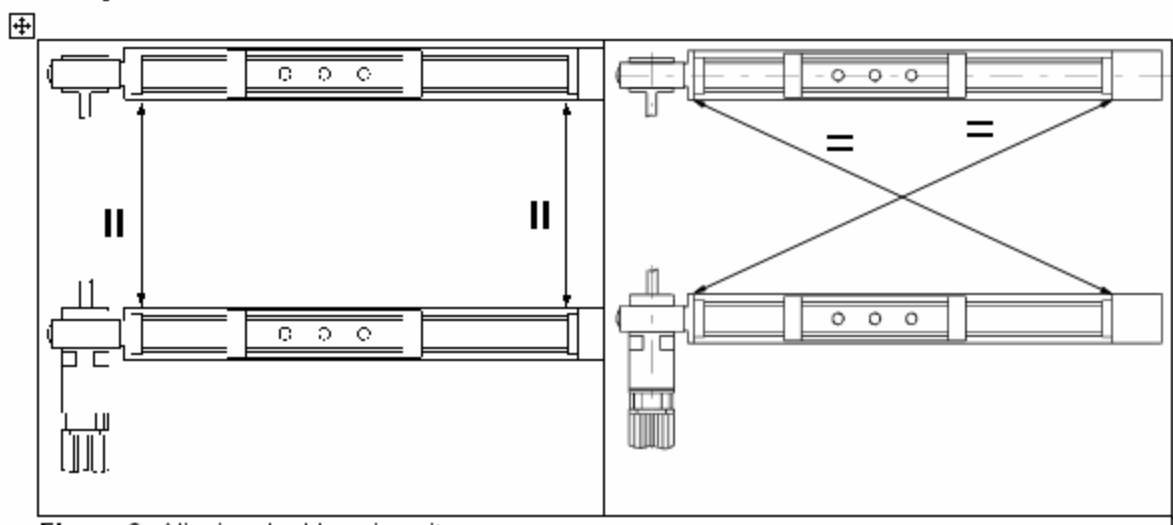


Figure 2: Aligning double axis unit

3.4 Limit Switches/Sensors

3.4.1 General

- HLE's supplied with limit switches are pre-mounted to the unit but must be properly adjusted to customer requirements.

	Note	Requirements for switches/sensors when connecting motors and drives vary depending on manufacturer. Consult driver/controller manual for switch configuration.
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	Note	Recommendation: A minimum end of travel safety distance of 125mm should be maintained.
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3.4.2 Setting up end of travel limits



Note

Unless otherwise specified, the tripping magnet and initiator switches are mounted on the motor/gearbox side of the unit.

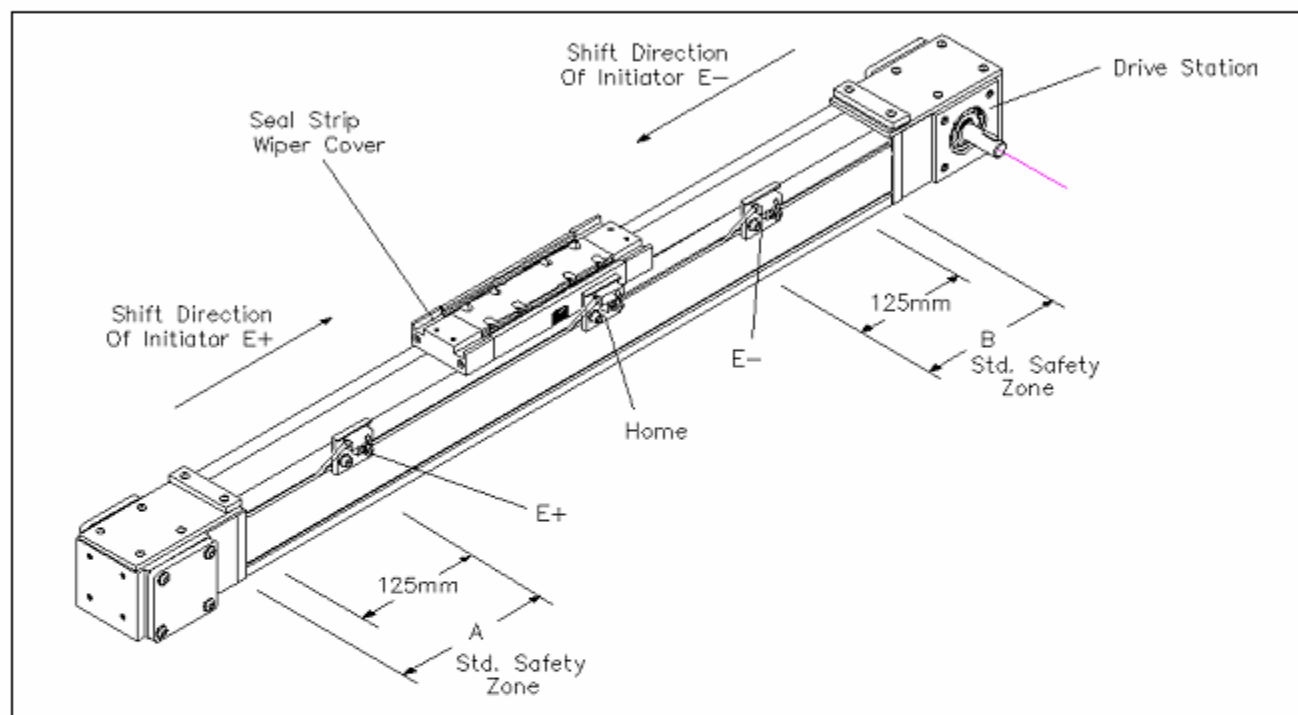


Figure 3: Limit Switches (initiators): setting up end of travel limits and safety zones.

Dimen- sions	Unit	HLE 60 SR/RB with cover seal	
		Std. Carriage	Ext. Carriage
A	mm	220	283
B	mm	220	283

Table 1: Distances for setting up the limit switches (initiators), based on 125 mm safety zone

4 Maintenance

4.1 Maintenance schedule

When	What	Action	Reference
After Start-up	Timing belt	Check belt tension, tracking and adjustment.	Chapter 4.5.4 & 4.5.5
One week,	Timing belt	Measure timing belt tension. If tension is less than 0.9 x the operating tension, increase timing belt tension to 1.1 x the operating tension.	Chapter 4.5.4
Daily	Entire drive	Depending on the application, clean all affected parts (internal, tensioning station, drive station).	
Every six months	Bearings	For HLE 60 SR, lubricate carriage bearing blocks (see Note below). For HLE 60 RB, check carriage side play.	Chapter 4.6.6 Chapter 4.6.2
	Timing belt	Check tension. Visually inspect timing belt for wear. Excessively worn belts should be replaced. For abnormal timing belt wear, see chapter 4.3, for possible cause(s) and cure(s).	Chapter 4.5.4 & 4.5.5

Table 2: HLE 60 maintenance schedule

Note:For HLE60SR Only. Use only LITHIUM HYDROXYSTEARATE SOAP BASE containing additives to enhance oxidation resistance and rust protection. (SHELL ALVANIA RL2)

CAUTION: Never mix petroleum base, with synthetic base lubricants. For special or severe service conditions, consult factory.

4.2 Replacement interval for steel strip cover wearing parts

Travel	What	Action	Reference
3750 km	Felt wiper bar	Replace	Chapter 4.11.4
22000 km	Steel cover strip	Replace	Chapter 4.11.1

Table 3: HLE 60 wearing parts with steel strip cover

4.3 Abnormal timing belt wear

Several factors can cause abnormal timing belt wear. Determination of the type of belt wear may allow for the specification of a particular cause. The following table shows possible causes for typical cases:

Observation	Probable Cause	Cure
Abnormal wear on belt tooth flank.	Tension too high.	Change timing belt, adjust tension (see 4.5.3).
	Drive torque too high.	Check drive characteristics.
Abnormal wear on belt sides.	Incorrect timing belt tracking.	Change timing belt, adjust tension (see 4.5.3).
	Edge of roller/pulley deformed.	Change belt pulleys.
Shearing of belt teeth.	Tension too low.	Change timing belt, adjust tension (see 4.5.3).
	Overload or system crash.	
Tears in belt teeth or abnormal wear on loaded tooth profiles.	Incorrect belt tension.	Change timing belt, adjust tension (see 4.5.3).
	Overload.	Change timing belt, adjust tension (see 4.5.3). Check if load is greater than drive units capability.
	Aging of belt material.	Change timing belt, adjust tension (see 4.5.3).
Broken timing belt.	Incorrect belt tension.	Change timing belt, adjust tension (see 4.5.3).
	Overload.	Change timing belt, adjust tension (see 4.5.3). Check if load is greater than drive units capability.
Softening of belt material.	Operating temperature too high.	Change timing belt, adjust tension (see 4.5.3). Lower operating temperature.
	Contact with solvents.	Change timing belt, adjust tension (see 4.5.3). Do not clean belt with solvents.
Belt skipping over pulley, loss of machine zero point.	Tension too low Incorrect motor position (bottom) in vertical application.	Adjust tension to correct value. If possible, have drive on top. Alternative: increase tension or reduce loads in longitudinal direction.

Table 2: Abnormal belt wear

4.4 Maintenance and repair

4.4.1 Safety notices

Before performing maintenance and/or repair, ensure the main electrical disconnect switch for the equipment being worked on is in the "OFF" position and secured with padlock(s). If additional automation equipment is in operation within the work area, barriers, fences or other means must be taken to ensure safety.

Where it is necessary to disconnect or remove safety devices during maintenance, such devices must be refitted and tested prior to placing equipment back in operation.

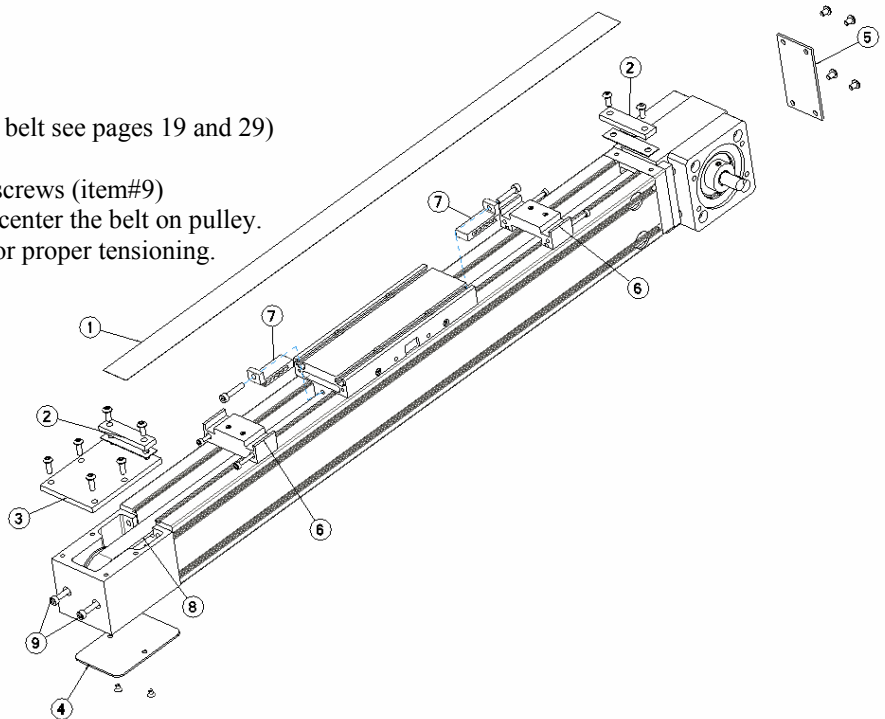
4.5 Replacing, tensioning and aligning timing belts

4.5.1 General information

- Unpack new timing belts immediately. Store flat on their side, in a coiled circular shape at room temperature in a dry place.
- Timing belts must not be kinked.
- The pitch of timing belt and mating pulley teeth must be the same.
- Long-term temperatures at a maximum of 178° F (80° C) are permitted.
- Store linear drives in a clean dry environment.

4.5.2 Replacing timing belt

1. Remove end caps (item#6)
2. Remove strip seal clamps(item#2)
3. Remove strip seal (item#1)
4. Remove cover plates (items#3,4,5)
5. Remove belt clamps (item#7)
6. Remove belt (item#8)
7. Measure existing belt (If you do not have old belt see pages 19 and 29)
8. Replace with belt of same length
9. Align/track and tension belt with tensioning screws (item#9)
Run carriage from end to end repeatedly and center the belt on pulley.
10. Use tension meter and values on next page for proper tensioning.



4.5.3 Measuring timing belt tension

Belt tension measuring device RSM

The RSM belt tension measuring device calculates the oscillation frequency of the free running belt length. This is a very fast and easy method of tensioning any type of timing belt.

The belt tension measuring device can be obtained through Parker (Part. No. 003-7112-01).

CARRIAGE AT FAR END OF TRAVEL FREQUENCY MEASURED AT MID TRAVEL			
MM TRAVEL	MM BELT SPAN	N NOMINAL PRELOAD	HZ NATURAL FREQUENCY
100	435	334.4	90.45
150	485	334.4	81.13
200	535	334.4	73.54
250	585	334.4	67.26
300	635	334.4	61.96
350	685	334.4	57.44
400	735	334.4	53.53
450	785	334.4	50.12
500	835	334.4	47.12
550	885	334.4	44.46
600	935	334.4	42.08
650	985	334.4	39.95
700	1035	334.4	38.02
750	1085	334.4	36.26
800	1135	334.4	34.67
850	1185	334.4	33.20
900	1235	334.4	31.86
950	1285	334.4	30.62
1000	1335	334.4	29.47
1050	1385	334.4	28.41
1100	1435	334.4	27.42
1150	1485	334.4	26.50
1200	1535	334.4	25.63
1250	1585	334.4	24.82
1300	1635	334.4	24.06
1350	1685	334.4	23.35
1400	1735	334.4	22.68
1450	1785	334.4	22.04
1500	1835	334.4	21.44
1550	1885	334.4	20.87
1600	1935	334.4	20.33
1650	1985	334.4	19.82
1700	2035	334.4	19.33
1750	2085	334.4	18.87
1800	2135	334.4	18.43
1850	2185	334.4	18.01
1900	2235	334.4	17.60
1950	2285	334.4	17.22
2000	2335	334.4	16.85
2050	2385	334.4	16.50
2100	2435	334.4	16.16
2150	2485	334.4	15.83
2200	2535	334.4	15.52
2250	2585	334.4	15.22
2300	2635	334.4	14.93
2350	2685	334.4	14.65
2400	2735	334.4	14.39
2450	2785	334.4	14.13
2500	2835	334.4	13.88
2550	2885	334.4	13.64
2600	2935	334.4	13.41
2650	2985	334.4	13.18
2700	3035	334.4	12.96
2750	3085	334.4	12.75
2800	3135	334.4	12.55
2850	3185	334.4	12.35
2900	3235	334.4	12.16
2950	3285	334.4	11.98
3000	3335	334.4	11.80



Move carriage to far end of travel. Measure tension/frequency at mid point of belt span.

4.5.4 Timing belt tracking

	Note	Adjustments to timing belt tension must be done prior to checking/adjusting belt tracking. Tracking can only be checked with the carriage in motion. Proper tracking is when timing belt oscillates between tension station pulley flanges, but does not attempt to ride up on the sides of the flanges.
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4.6.1 Checking carriage play on HLE 60 RB

	Note	Carriage play is when one can grab the load attachment plate and find movement (side to side or up and down) when applying moderate forces. Check for improper adjustment or worn carriage wheels.
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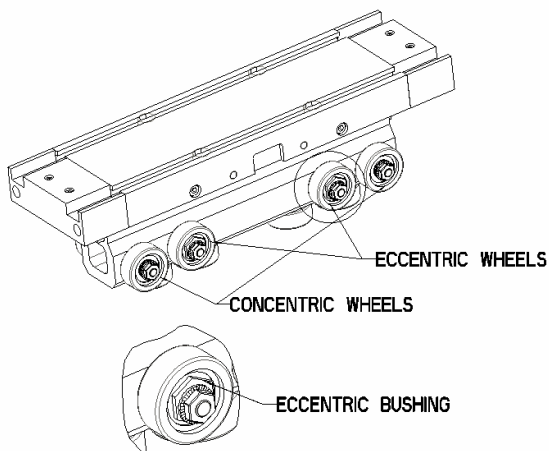
1. Remove the load from the load attachment plate.
2. If equipped with a steel strip cover - remove it
3. Remove timing belt from carriage:

	Danger	On vertical axis units, secure the carriage to prevent movement. When timing belt is disconnected from carriage, it will fall due to gravity if not supported. This can result in damage to people or property.
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4. Visually check to ensure all wheels are in contact with rail guides over the complete travel.
5. To check wheel pressure against profile guides; prevent wheels from turning using your index finger; wheels should stop rotating when applying minimal force against them. The carriage should feel smooth but tight throughout its travel.

4.6.2 Adjusting carriage wheels HLE 60 RB

Carriages are designed with both concentric and eccentric wheels located on three sides of carriage body. Fixed or concentric wheels require no adjustment. Eccentric wheels are equipped with an off-set bushing, and when adjusted properly, remove excess play between carriage and profile.



Remove steel strip seal
 Remove timing belt from carriage.
 Remove Tension end assembly
 Remove carriage
 Clean inside surfaces of profile.

Adjust eccentric bushing with a 10 mm socket wrench in small stages until the carriage can be pushed freely and without play through the HLE profile. Proper adjustment has been achieved when, with minimal pressure from your finger, the wheel can be stopped from rotating.

Note: Concentric wheels should be carry load in normal direction. Eccentric wheels are for preloading the carriage in profile.

Repeat step 5 as necessary, until carriage adjustment is correct. And all wheels are in contact with profile

Note: Extended carriage has 4 additional eccentric wheels per side and will alternate preload one up and one down against profile surfaces

4.6.3 Checking carriage play on HLE 60SR

	Note	Carriage play is when one can grab the load attachment plate and find movement (side to side or up and down) when applying moderate forces. Check for a worn out linear bearing block or wear on the steel rail.
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Remove the load from the load attachment plate.
 If equipped with a steel strip cover - remove it:
 Remove timing belt from carriage: (see 4.5.2).

	Danger	On vertical axis units, secure the carriage to prevent movement. When timing belt is disconnected from carriage, it will fall due to gravity if not supported. This can result in damage to people or property.
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Visually check for rust or corrosion of the steel rail system. If corrosion exists, completely changing out both steel rail and bearing block assembly
 Push the carriage over the complete travel while observing the area where the linear bearing block meets the steel rail.
 The carriage should feel smooth but tight throughout the travel.
 Lubricate the bearing block and check for excessive leakage at end seals.
 Excessive side to side movement indicates wear between linear bearing block and steel rail.
 Completely change out both steel rail and bearing block assembly .
There are no adjustments to linear bearing blocks to compensate for wear.

4.6.4 Changing bearing blocks HLE 60 SR

General

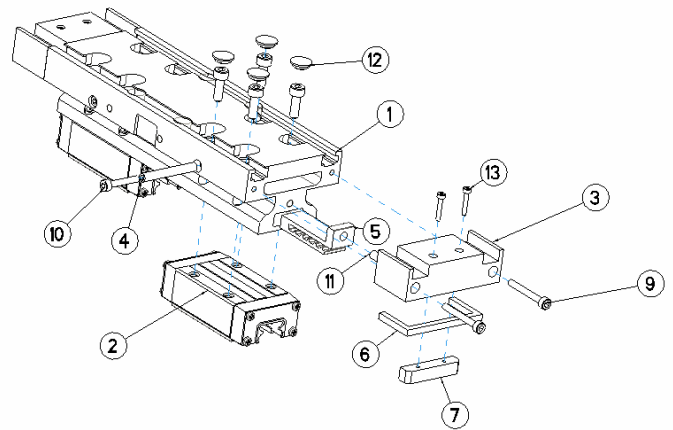
Linear bearing blocks consist of re-circulating (one string on each side) ball bearings captured within the block. Bearing blocks are sealed against the square steel rail and lubricated through a fitting located at the end of each block. Lubrication is required. Although linear bearing blocks are capable of operating at a maximum temperature of 248°F (120°C) and continuously at 212°F (100°C), the timing belt can only withstand environmental temperatures between 40°F (-40°C) to 178°F (+80°C).

	Warning	If checking for bearing block damage while carriage is in motion within profile, care should be taken to prevent injury. If possible, move the carriage manually (best done if motor and gearbox are removed and drive unit is horizontal). If using motor, operate drive unit with jog button at low speed (< 1m/min).
---	----------------	---

	Note	When removing bearing block from guide rail observe reference markings on both block and rail. Bearing blocks are ground on one side (its ref. mark) and rails have arrows embossed on the top of the rail indicating its ref. mark. During re-assembly it is important to match these reference marks (see below).
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4.6.4 Changing bearing blocks HLE 60 SR (cont.)

Remove carriage from steel rail guide
 Place on a clean surface.
 Remove socket head cap screws from top of carriage.
 Lift old bearing block(item#2) from carriage frame.
 Position replacement block on carriage (note reference mark on side of block (machined ground side).When re-inserting carriage this side should align with rail side that is banked against profile edge
 Thread in socket head screws with screw retention (Loc-tite) but do not tighten.
 Repeat steps 3 through 5 for second bearing block.
 Clean inside of linear drive profile and apply grease to steel rail
 Guide carriage assembly onto steel rail and insert into profile

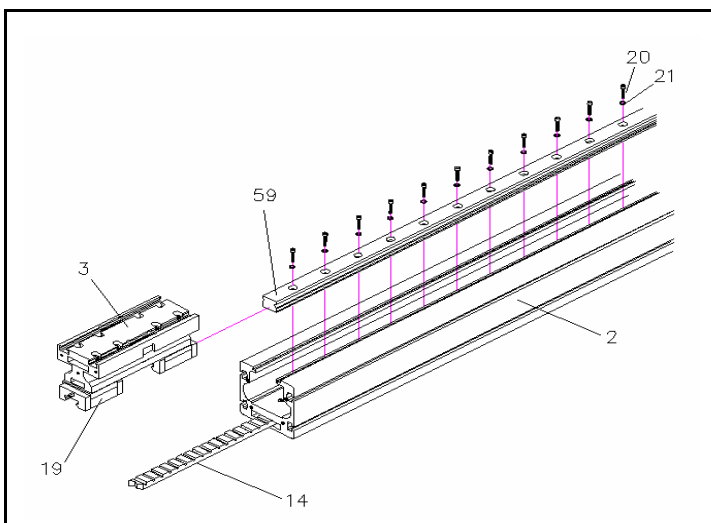


4.6.5 Lubrication of bearing block

Remove steel strip seal
 Center carriage in relation to travel.
 Remove timing belt (see 4.5.2) from carriage .
 Using a grease gun, pump 3 shots of grease into fitting.
 Repeat steps 3 & 4 on opposite side of carriage for second bearing block.
 Re-install timing belt (see 4.5.2).
 Replace steel strip seal

NOTE: Use only LITHIUM 12 HYDROXYSTEARATE SOAP BASE(SHELL ALVANIA RS2) containing additives to enhance oxidation resistance and rust protection. **CAUTION:** Never mix petroleum base, with synthetic base lubricants. For special or sever service conditions, consult factory.

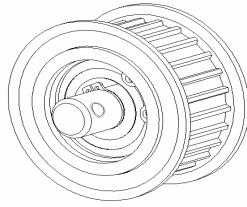
4.6.6 Changing steel square rail



Remove carriage
 Using a 4mm allen wrench remove all bolts washers located on top of square rail.
 Lift rail up and out through access slot in profile
 Clean inside of profile.
 Position new rail within profile (ref. arrow mark side of rail against ledge running the length of profile) and re-Install hardware from step #2 into new square rail (do not tighten).
 Push rail against ledge while tightening all bolts.

4.6.7 Replacing Tensioning Pulley Assembly 002-2754-03

1. Remove end caps (item#6)
2. Remove strip seal clamps(item#2)
3. Remove strip seal (item#1)
4. Remove cover plates (items#3,4)
5. Remove belt clamp (item#7)
6. Pull belt around existing pulley (item#8)
7. Remove tensioning screws(item#9)
8. Replace tensioning pulley assembly
9. Reassemble (7 thru 1)
10. Align/track and tension belt with tensioning screws (item#9)
Run carriage from end to end repeatedly and center the belt on pulley.
11. Use tension meter and values on page 18 for proper tensioning.

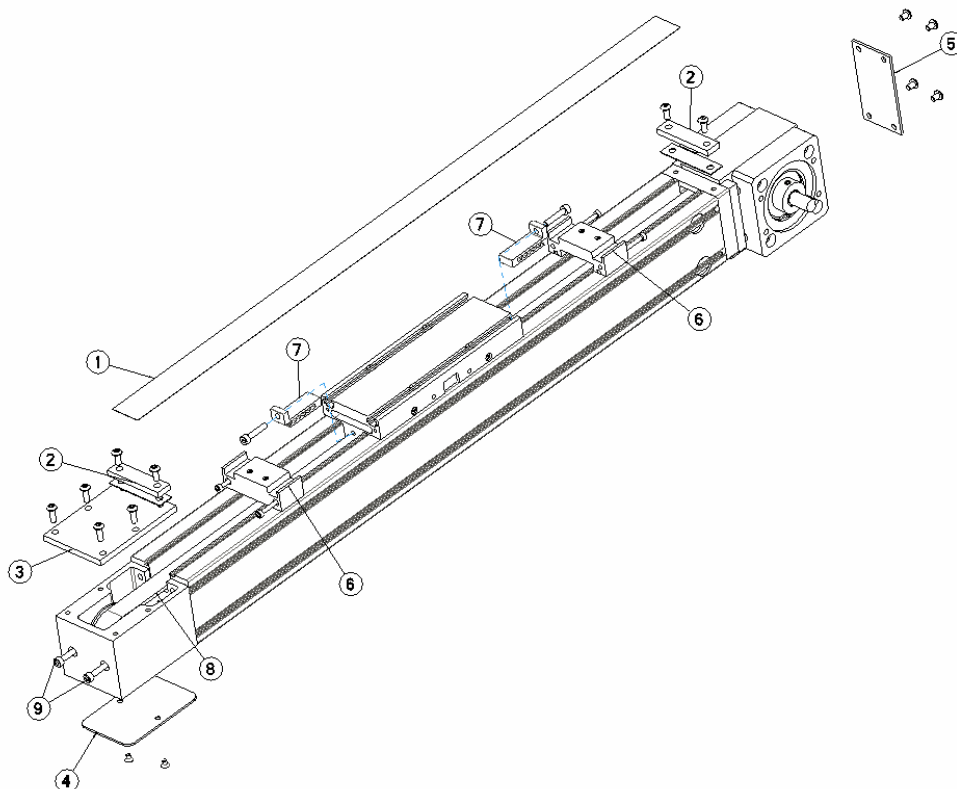


4.6.8 Replacing drive end stations

Please see assembly drawing exploded views to determine parts required

4.6.9 Replacing strip seal

1. Remove strip seal clamps(item#2)
2. Remove endcaps (item#6)
3. Remove strip seal (item#1)
4. Replace strip seal (Make sure the strip seal rides over rod guides inside carriage cavity)
5. Reassemble end caps



4.6.10 Double Axis General

Double axes are generally shipped as two single axis assemblies. Link shafts with coupling sets are dismantled for ease of shipping. The couplings only allow for minimal misalignment and offset angles between the two axis.(care must be taken when mounting dual axis to assure the axial alignment is maintained.

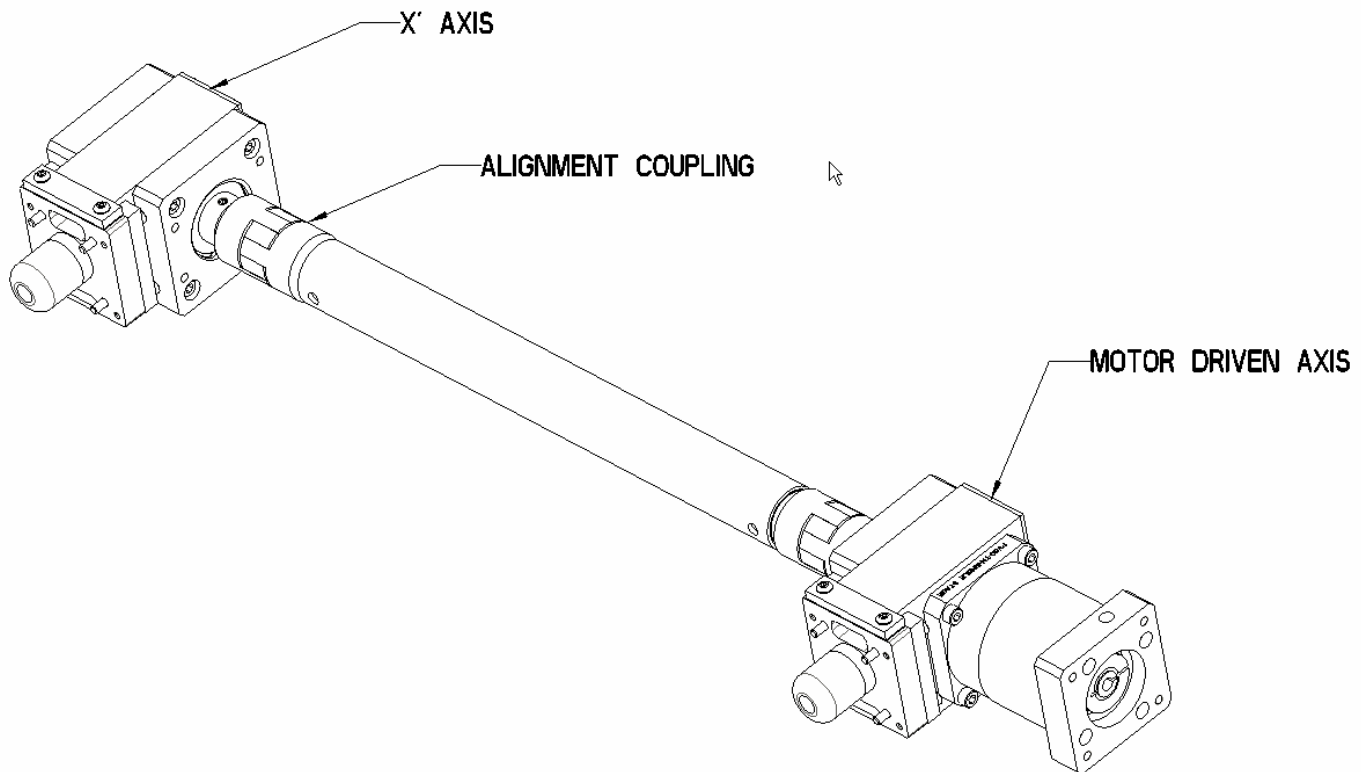
Clamping style couplings provide a method of adjusting carriage position that would otherwise not be possible with a fixed keyway design.

4.6.10 Aligning carriages OF DUAL AXIS UNIT

Refer to section 1 .5 for initial set up directions. of dual axis on page 13.

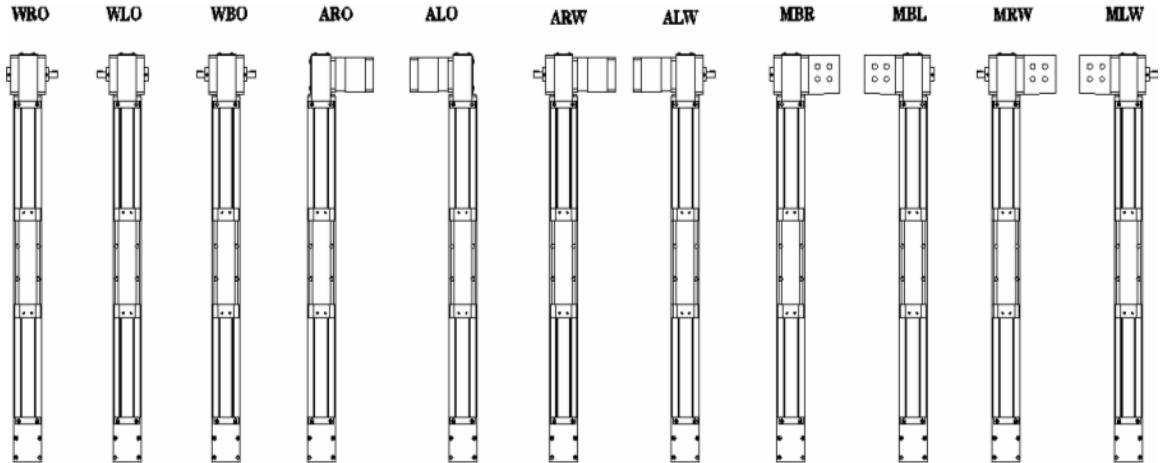
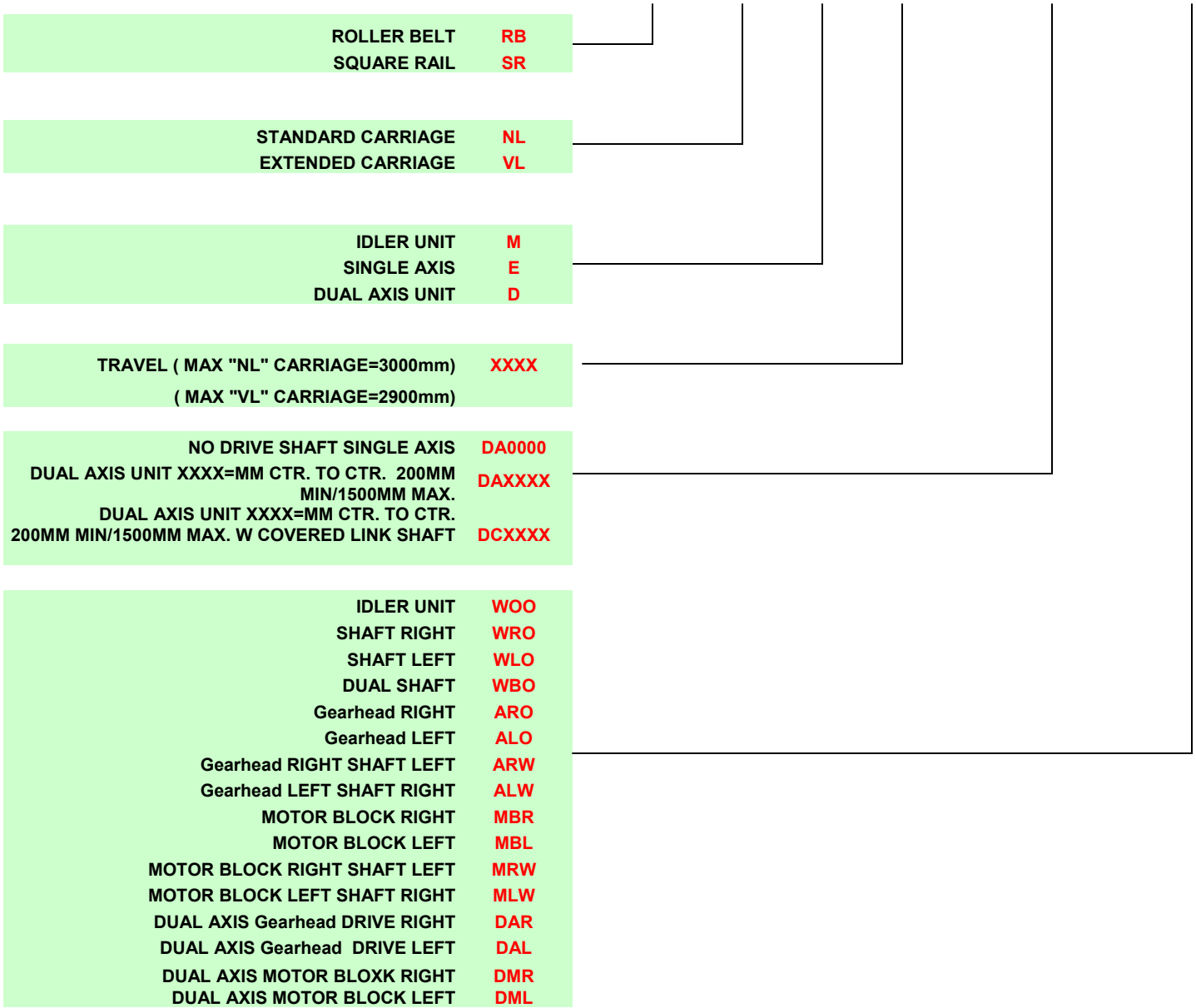
Once mounted and aligned loosen one coupling on the x' axis.(non motor mounted axis)

1. Move carriage of motor driven axis to end of travel and let rest against bumper.
2. Move carriage of x' axis to same relative location on its axis.
3. Tighten the coupling to the specified torque((2.2 N-M)



HLE60 GEN2 Configurable

HLE60 **RB** **NL** **E** **1000** **DA0000** **MBL**



HLE60 GEN2 Configurable

SP1 G12NN H1 K21 ZA LHO

LHO NO LIMIT SWITCHES
LH3 THREE NPN PROX SWITCHES 10V-30 VDC
LH4 THREE PNP PROX SWITCHES 10-30 VDC

ZA UNIT WITH STRIP SEAL
ZB UNIT WITHOUT STRIP SEAL

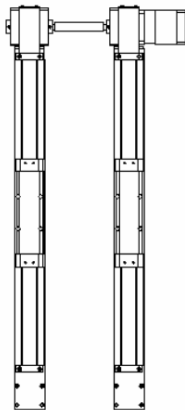
K00-HLE60 NO MOTOR KIT
K21-HLE60 MOTOR KIT LV23/HV23/OS23/ES23/VS23
K22-HLE60 MOTOR KIT BE23X
K23-HLE60 MOTOR KIT SM23/SE23
K24-HLE60 MOTOR KIT LV34/HV34
K25-HLE60 MOTOR KIT BE34/NO34X/JO34X/TS31/TS32
K26-HLE60 MOTOR KIT RS34/ES34
K27-HLE60 MOTOR KIT NO70/JO70
K28-HLE60 MOTOR KIT SMB60

H1 NORMAL ORIENTATION CARRIAGE UP
H2 INVERTED ORIENTATION CARRIAGE DOWN
H3 CARRIAGE ON SIDE DRIVE STATION UP
H4 CARRIAGE ON ITS SIDE DRIVE STATION DOWN

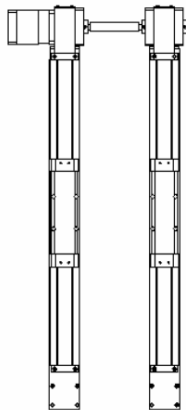
G0 NO GEARBOX REQUIRES MBR/MBL/MRW/MLW
G1 CUSTOMER SUPPLIED GEARHEAD
G1203 PV60 GEARHEAD 3:1 RATIO
G1205 PV60 GEARHEAD 5:1 RATIO
G1210 PV60 GEARHEAD 10:1 RATIO
G1215 PV60 GEARHEAD 15:1 RATIO
G1225 PV60 GEARHEAD 25:1 RATIO

SP19 DRIVE HOUSING FOR PV60-FN
SP20 IDLER UNIT
SP21 NO MOTOR BLOCK
SP22 MOTOR BLOCK NEMA23 W 0.375" BORE COUPLING
SP23 MOTOR BLOCK NEMA23 W 0.25" BORE COUPLING
SP24 MOTOR BLOCK NEMA34 W 0.375" BORE COUPLING
SP25 MOTOR BLOCK NEMA34 W 0.50" BORE COUPLING
SP28 MOTOR BLOCK NEMA23 NO COUPLING
SP29 MOTOR BLOCK NEMA34 NO COUPLING
SP30 MOTOR BLOCK NEO70 W 11.0MM BORE COUPLING

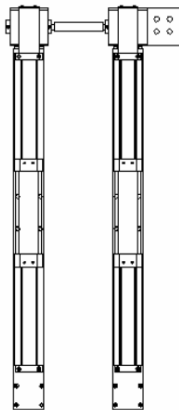
DAR



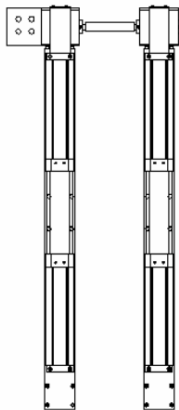
DAL



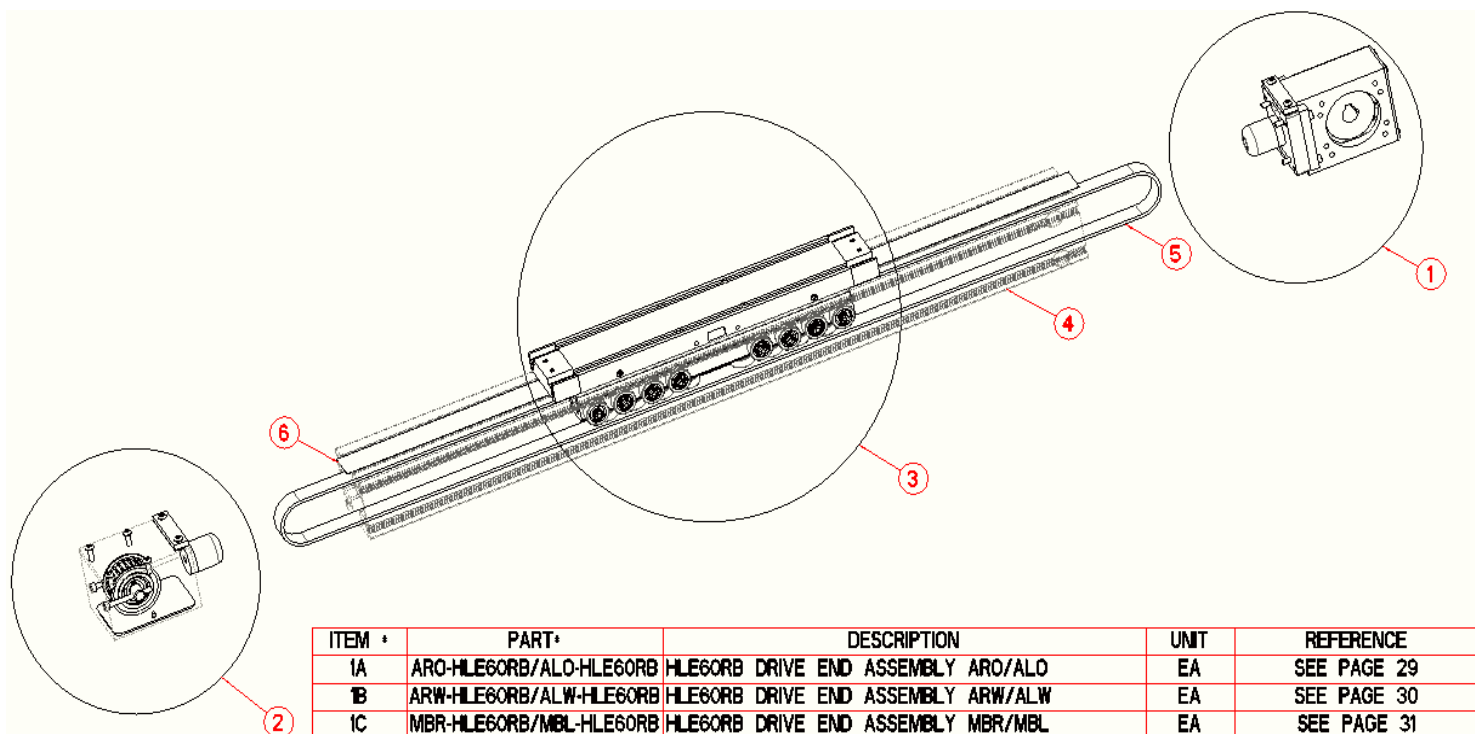
DMR



DML



HLE60RB ASSEMBLY COMPONENTS



ITEM #	PART#	DESCRIPTION	UNIT	REFERENCE
1A	ARO-HLE60RB/ALO-HLE60RB	HLE60RB DRIVE END ASSEMBLY ARO/ALO	EA	SEE PAGE 29
1B	ARW-HLE60RB/ALW-HLE60RB	HLE60RB DRIVE END ASSEMBLY ARW/ALW	EA	SEE PAGE 30
1C	MBR-HLE60RB/MBL-HLE60RB	HLE60RB DRIVE END ASSEMBLY MBR/MBL	EA	SEE PAGE 31
1D	MRW-HLE60RB/MLW-HLE60RB	HLE60RB DRIVE END ASSEMBLY MRW/MLW	EA	SEE PAGE 32
1E	WBO-HLE60RB	HLE60RB DRIVE END ASSEMBLY WBO	EA	SEE PAGE 33
1F	WRO-HLE60RB/WLO-HLE60RB	HLE60RB DRIVE END ASSEMBLY WRO/WLO	EA	SEE PAGE 34
2	002-2754-01	HLE60RB TENSION STATION ASSEMBLY	EA	SEE PAGE 35
3A	NL-HLE60RB	HLE60RB STANDARD "NL" CARRIAGE ASSEMBLY	EA	SEE PAGE 27
3B	VL-HLE60RB	HLE60RB EXTENDED "VL" CARRIAGE ASSEMBLY	EA	SEE PAGE 28
4	100-0340-01	HLE60RB MACHINED BASE	METERS	SEE PAGE 26
5	003-1860-01	HLE60RB TIMING BELT 16MM WIDE 5MM PITCH	METERS	SEE PAGE 26
6	003-1879-01	HLE60RB STRIP SEAL	METERS	SEE PAGE 26

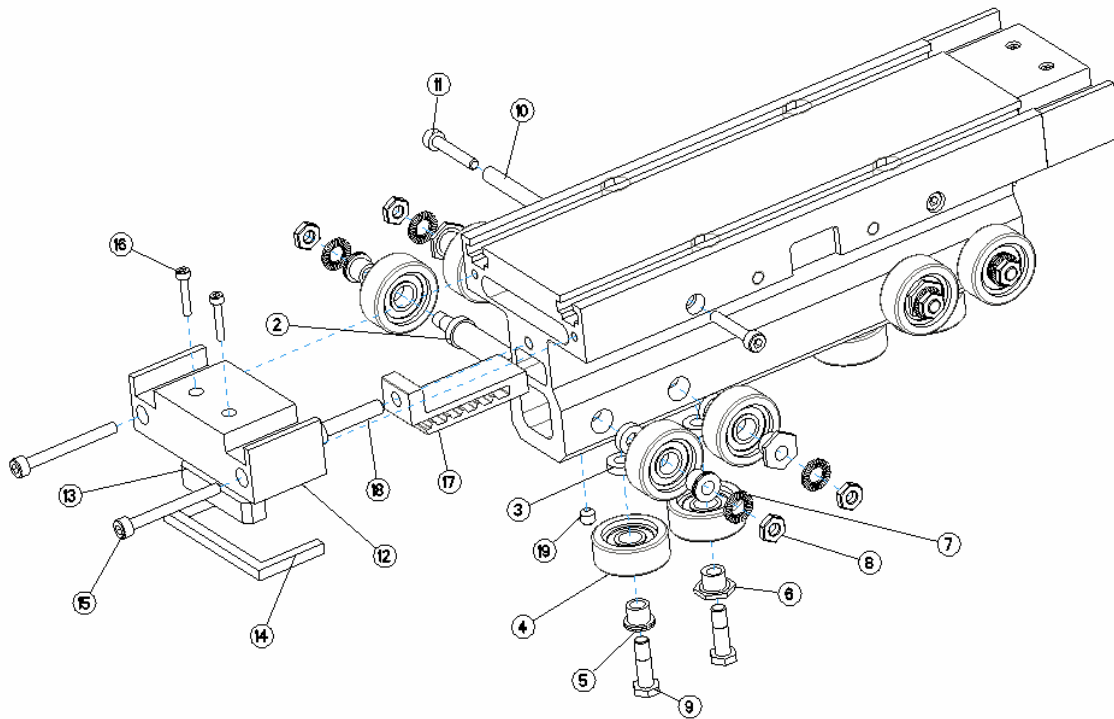
HLE 60RB

REQUIRED BELT LENGTH P/N 003-1860-01
NL/VL/SL CARRIAGE 1272MM + (2 X TRAVEL)

BASE LENGTH P/N 100-0340-01
NL CARRIAGE 466 MM +TRAVEL
VL CARRIAGE 568 MM +TRAVEL
SL CARRIAGE 314 MM+TRAVEL+ SPECIAL CARRIAGE LENGTH

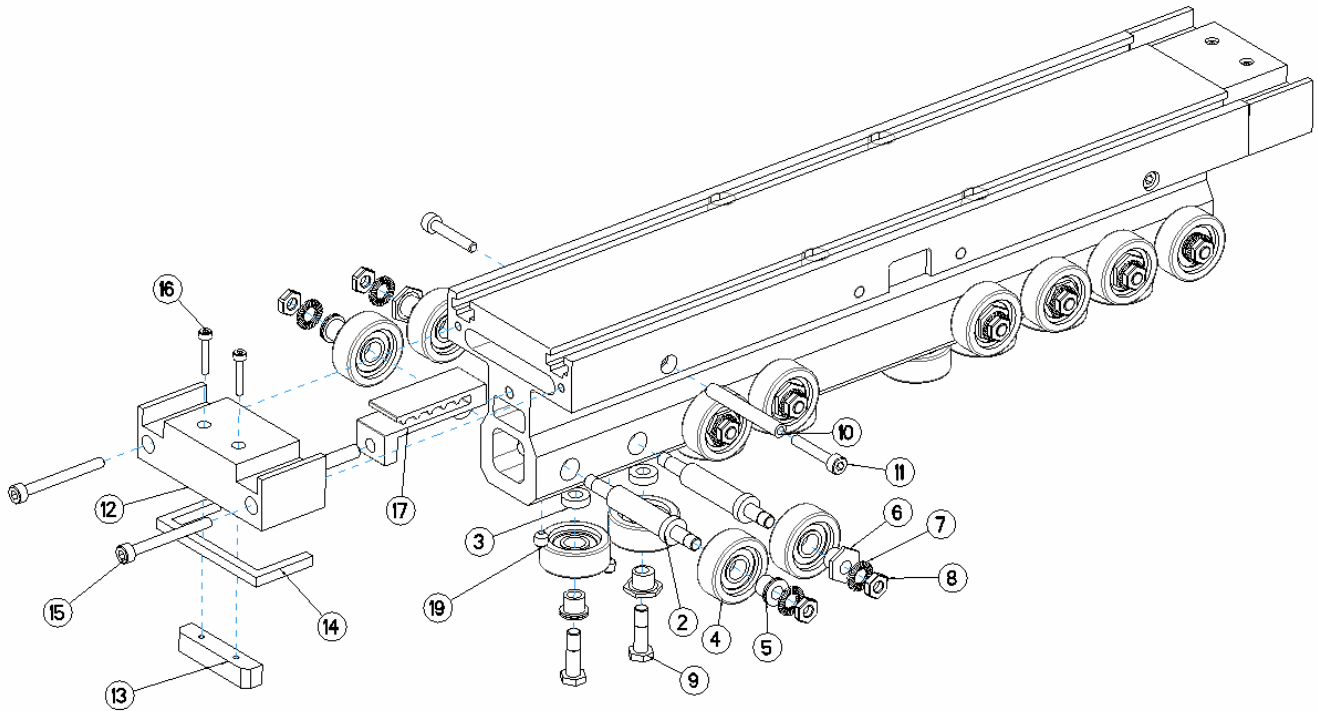
STRIP SEAL P/N 003-1879-01
NL CARRIAGE 480 MM +TRAVEL
VL CARRIAGE 582 MM +TRAVEL
SL CARRIAGE 328 MM+TRAVEL+ SPECIAL CARRIAGE LENGTH

HLE60RB NL CARRIAGE ASSEMBLY COMPONENTS



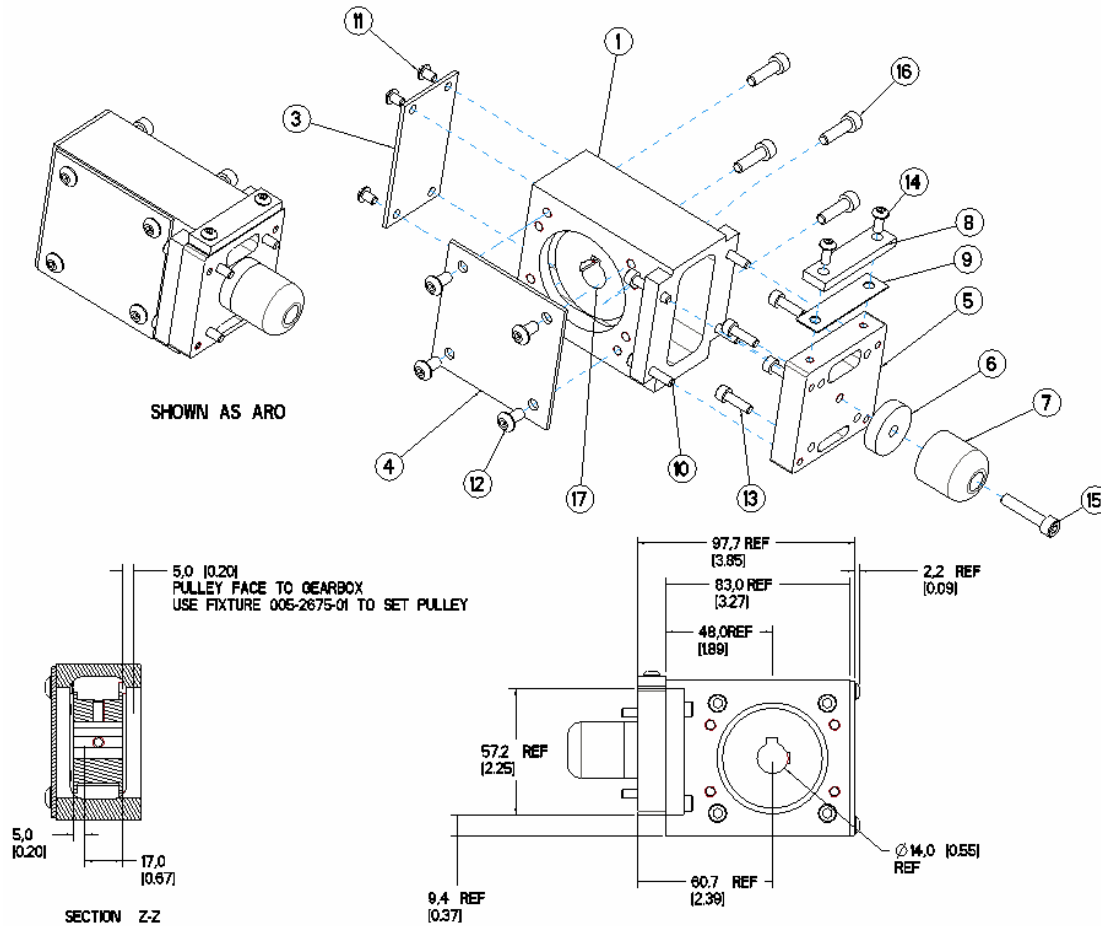
Part Number	ITEM	QTY.	DESCRIPTION
100-0226-01	1	1	CARRIAGE NL HLE60
100-6971-01	2	4	AXEL SIDE HLE60RB
000-7318-01	3	8	SPACER
416-201062	4	12	WHEEL HLE60
100-0800-02	5	6	SLEEVE CONCENTRIC WHHEL
100-0801-02	6	6	SLEEVE ECCENTRIC WHHEL
135-728705	7	8	RIBBED WASHER M4
NHJ-M004-0070	8	12	JAM NUT M4
100-6972-01	9	4	AXEL BOTTOM HLE60RB
100-7930-01	10	2	ROD WEAR GUIDE
SCH-M003-0016	11	2	SOCKET HEAD CAP SCREW M3 X 18 LG
100-0356-01	12	2	ENDCAP
100-0785-01	13	2	WEAR BAR ENDCAP
003-1986-01	14	2	FELT SEAL
SCH-M003-0030	15	4	SOCKET HEAD CAP SCREW M3 X 30 LG
SCH-M002-0012	16	4	SOCKET HEAD CAP SCREW M2 X 12 LG
100-0220-01	17	2	BELT CLAMP
SCH-M004-0016	18	2	SOCKET HEAD CAP SCREW M4 X 16 LG
SSH-M004-0004	19	4	SOCKET HEAD ST SCREW M4 X 4LG

HLE60RB VL CARRIAGE ASSEMBLY COMPONENTS



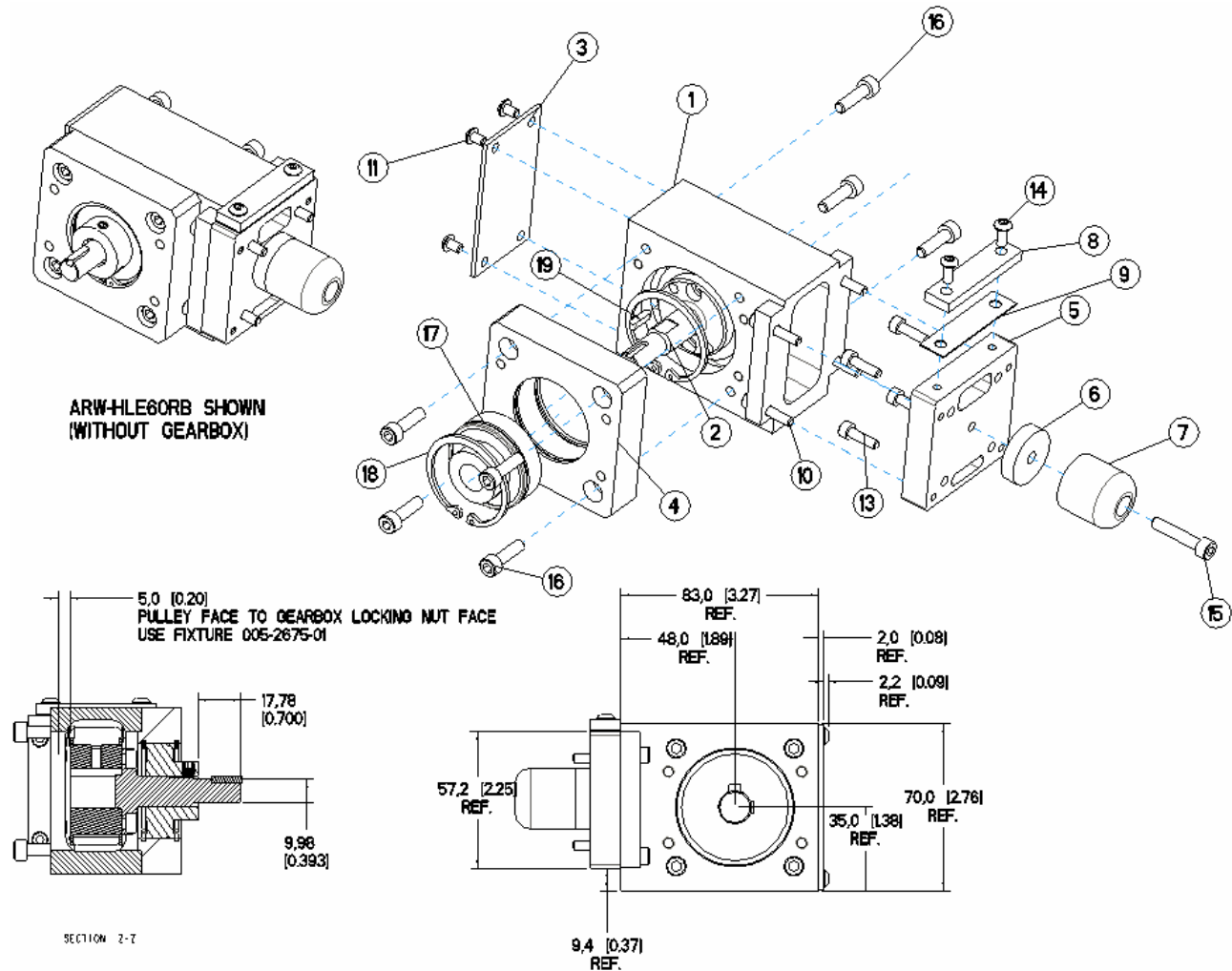
Part Number	ITEM	QTY.	DESCRIPTION
100-0239-01	1	1	CARRIAGE NL HLE60
100-6971-01	2	8	AXEL SIDE HLE60RB
000-7318-01	3	16	SPACER
416-201062	4	24	WHEEL HLE60
100-0800-02	5	6	SLEEVE CONCENTRIC WHHEL
100-0801-02	6	18	SLEEVE ECCENTRIC WHHEL
135-728705	7	16	RIBBED WASHER M4
NHJ-M004-0070	8	24	JAM NUT M4
100-6972-01	9	8	AXEL BOTTOM HLE60RB
100-7930-01	10	2	ROD WEAR GUIDE
SCH-M003-0016	11	2	SOCKET HEAD CAP SCREW M3 X 18 LG
100-0356-01	12	2	ENDCAP
100-0785-01	13	2	WEAR BAR ENDCAP
003-1986-01	14	2	FELT SEAL
SCH-M003-0030	15	4	SOCKET HEAD CAP SCREW M3 X 30 LG
SCH-M002-0012	16	4	SOCKET HEAD CAP SCREW M2 X 12 LG
100-0220-01	17	2	BELT CLAMP
SCH-M004-0016	18	2	SOCKET HEAD CAP SCREW M4 X 16 LG

ARO/ALO-HLE60RB DRIVE END ASSEMBLY



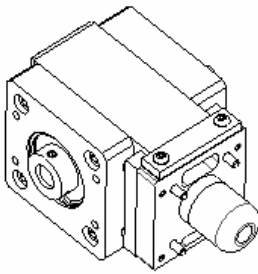
PART#	ITEM#	QTY	DESCRIPTION
102-1500-01	1	1	DRIVE HOUSING HLE60-PV60 DIRECT GEN2
102-0513-01	2	1	PULLEY DRIVE HLE60 PV60 DIRECT GEN2
102-1501-01	3	1	COVER PLATE 1 HLE60 DRIVE END GEN2
102-1502-01	4	1	COVER PLATE 2 HLE60 DRIVE END GEN2
102-0284-01	5	1	HLE60RB DRV HSG ADPTER PLT GEN2
000-6736-01	6	1	SPACER BUMPER
003-1801-01	7	1	BUMPER HEL60RB
000-7346-01	8	1	STRIP SEAL RETAINER CLAMP
003-2171-01	9	1	STRIP SEAL GASKET
SCH-M004-0020	10	4	
SBH-M004-0006	11	4	
SBH-M005-0010	12	4	
SCH-M004-0014	13	4	
SBH-M004-0010	14	2	
SCH-M005-0025	15	1	
SCH-M005-0018	16	4	
SSH-M005-0006	17	2	

ARW/ALW-HLE60RB DRIVE END ASSEMBLY

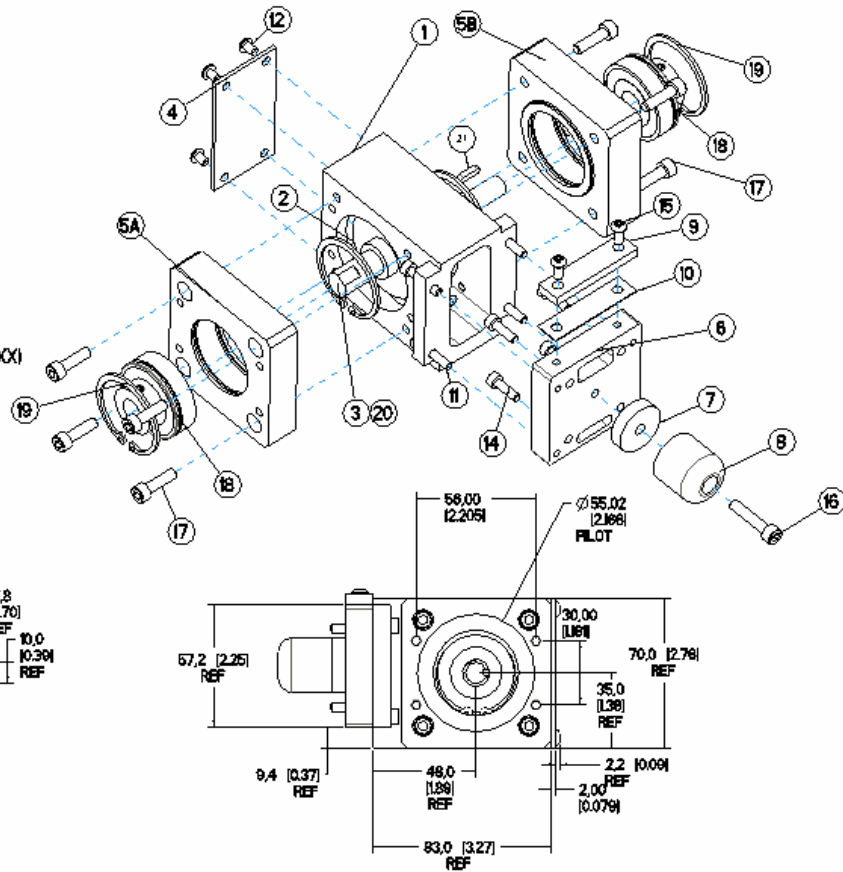


Part Number	ITEM	QTY.	
102-1500-01	1	1	DRIVE HOUSING HLE60-PV60 DIRECT GEN2
002-2834-03	2	1	STUB SHAFT PULLEY ASSY HLE60 PV60 GEN2
102-1501-01	3	1	COVER PLATE 1 HLE60 DRIVE END GEN2
102-1505-01	4	1	BEARING HOUSING HLE60 GEN2
102-0284-01	5	1	HLE60RB DRV HSG ADPTER PLT GEN2
000-6736-01	6	1	SPACER BUMPER
003-1803-01	7	1	BUMPER HEL60RB
000-7346-01	8	1	STRIP SEAL RETAINER CLAMP
003-2171-01	9	1	STRIP SEAL GASKET
SCH-M004-0020	10	4	
SBH-M004-0006	11	4	
SCH-M004-0014	13	4	
SBH-M004-0010	14	2	
SCH-M005-0025	15	2	
SCH-M005-0018	16	8	
003-4075-01	17	1	BRG W/LKNG SET SCRW
003-1507-33	18	2	
003-2226-04	19	1	

MBR/MBL-HLE60RB DRIVE END ASSEMBLY

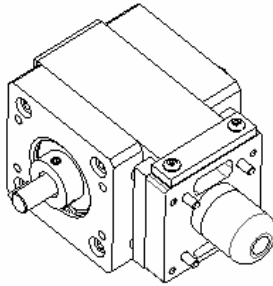


MBR SHOWN
 MBL ROTATE DRIVE SHAFT 180° RADially
 AND SWAP BEARING HOUSING PLATES(102-1505-XX)
 (ONE IS PILOTED FOR MTR BLOCK!)

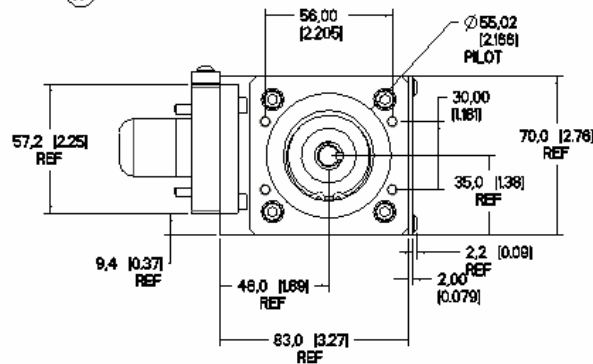
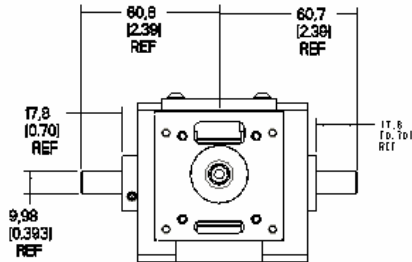
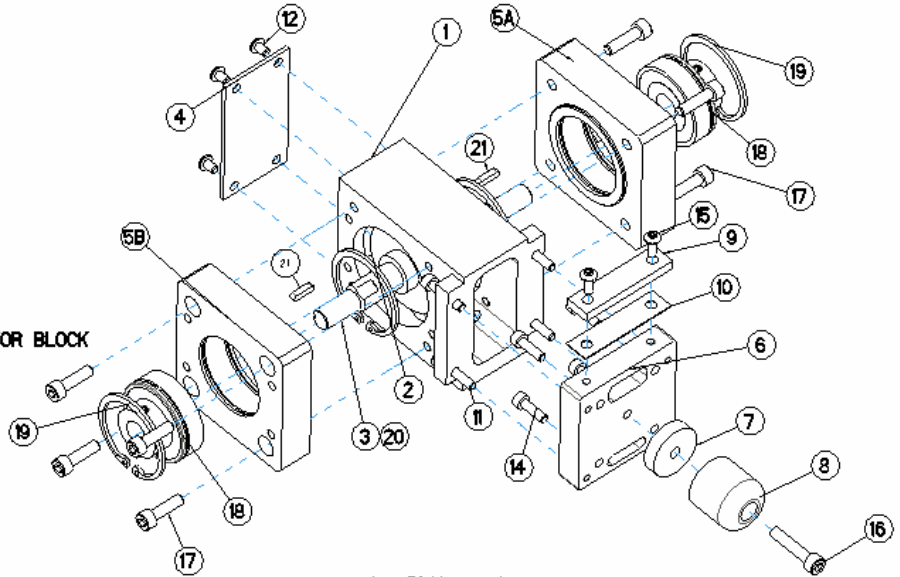


Part Number	ITEM	QTY.	Part Description
102-1500-01	1	1	DRIVE HOUSING HLE60-PV60 DIRECT GEN2
102-0513-01	2	1	PULLEY
102-1503-02	3	1	DRIVE SHAFT HLE60 WRO/WLO GEN2
102-1501-01	4	1	COVER PLATE 1 HLE60 DRIVE END GEN2
102-1505-01	5A	1	BEARING HSG MTR PILOT HLE60 GEN2
102-1505-02	5B	1	BEARING HOUSING HLE60 GEN2
102-0284-01	6	1	HLE60RB DRV HSG ADPTER PLT GEN2
000-6736-01	7	1	SPACER BUMPER
003-1801-01	8	1	BUMPER HEL60RB
000-7346-01	9	1	STRIP SEAL RETAINER CLAMP
003-2171-01	10	1	STRIP SEAL GASKET
SCH-M004-0020	11	4	
SBH-M004-0006	12	4	
SCH-M004-0014	14	4	
SBH-M004-0010	15	2	
SCH-M005-0025	16	1	
SCH-M005-0018	17	8	
003-4075-01	18	2	BRG W/LKNG SET SCRW
003-1507-33	19	4	
003-2226-29	20	1	
003-2226-04	21	1	

MRW/MLW-HLE60RB DRIVE END ASSEMBLY

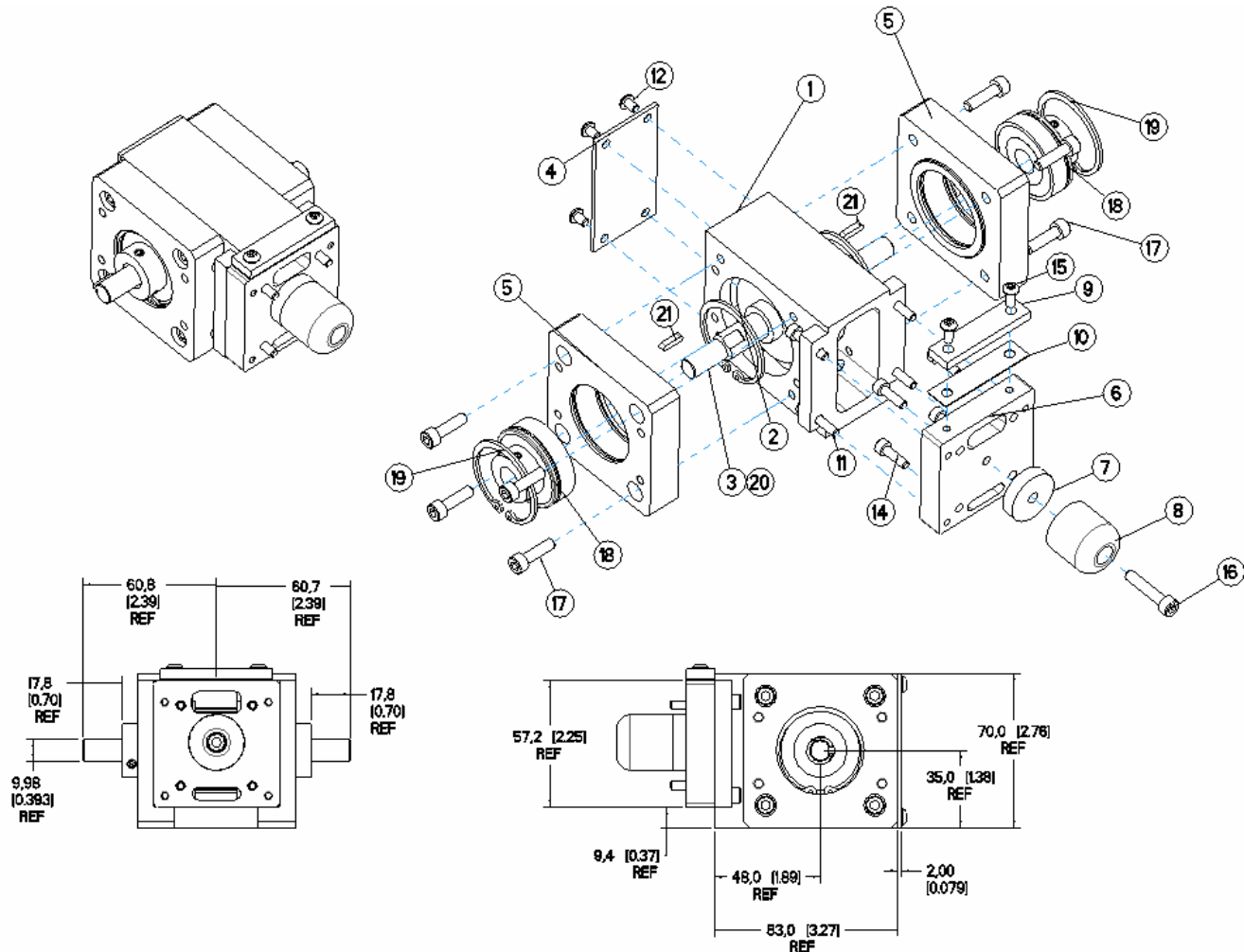


MRW SHOWN
MLW SWAP BEARING HOUSING 5A AND 5B
5A HAS TAPPED HOLES AND PILOT TO ACCEPT MOTOR BLOCK



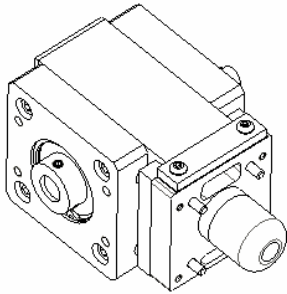
Part Number	ITEM	QTY.	DESCRIPTION
102-1500-01	1	1	DRIVE HOUSING HLE60-PV60 DIRECT GEN2
102-0513-01	2	1	PULLEY
102-1503-01	3	1	DRIVE SHAFT HLE60 WBO GEN2
102-1501-01	4	1	COVER PLATE 1 HLE60 DRIVE END GEN2
102-1505-01	5A	1	BEARING HOUSING MTR PILOT HLE60 GEN2
102-1505-02	5B	1	BEARING HOUSING HLE60 GEN2
102-0284-01	6	1	HLE60RB DRV HSG ADPTER PLT GEN2
000-6736-01	7	1	SPACER BUMPER
003-1801-01	8	1	BUMPER HEL60RB
000-7346-01	9	1	STRIP SEAL RETAINER CLAMP
003-2171-01	10	1	STRIP SEAL GASKET
SCH-M004-0020	11	4	
SBH-M004-0006	12	4	
SCH-M004-0014	14	4	
SBH-M004-0010	15	2	
SCH-M005-0025	16	1	
SCH-M005-0018	17	8	
003-4075-01	18	2	BRG W/LKNG SET SCRW
003-1507-33	19	4	
003-2226-29	20	1	
003-2226-04	21	2	

WBO-HLE60RB DRIVE END ASSEMBLY

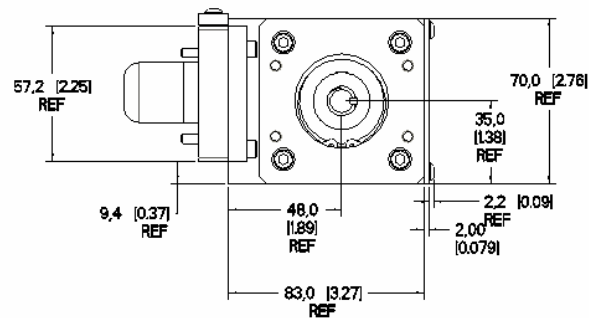
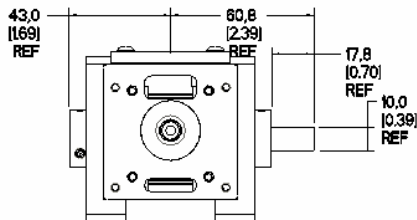
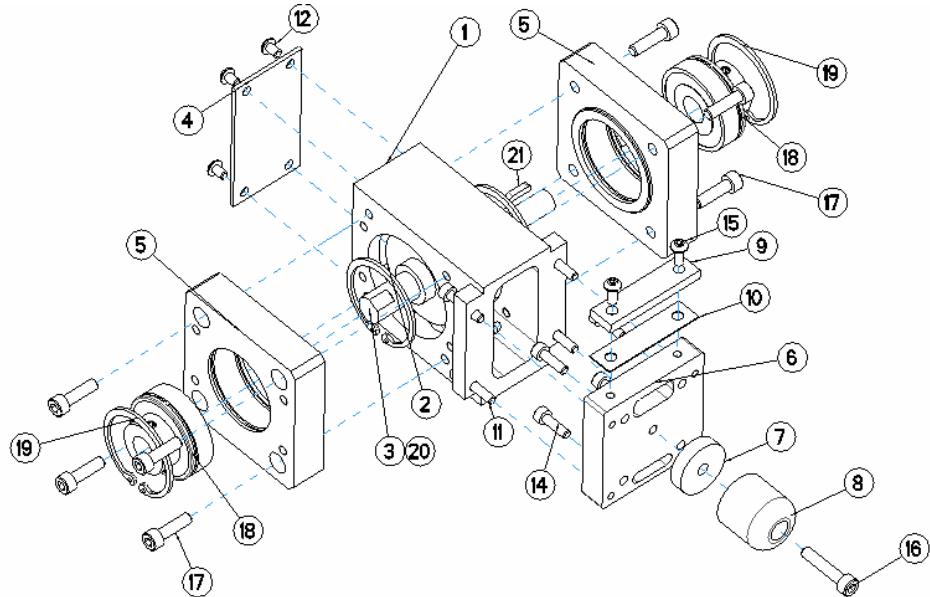


Part Number	ITEM	QTY.	DESCRIPTION
102-1500-01	1	1	DRIVE HOUSING HLE60-PV60 DIRECT GEN2
102-0513-01	2	1	PULLEY
102-1503-01	3	1	DRIVE SHAFT HLE60 WBO GEN2
102-1501-01	4	1	COVER PLATE 1 HLE60 DRIVE END GEN2
102-1505-02	5	2	BEARING HOUSING HLE60 GEN2
102-0284-01	6	1	HLE60RB DRV HSG ADPTER PLT GEN2
000-6736-01	7	1	SPACER BUMPER
003-1801-01	8	1	BUMPER HEL60RB
000-7346-01	9	1	STRIP SEAL RETAINER CLAMP
003-2171-01	10	1	STRIP SEAL GASKET
SCH-M004-0020	11	4	
SBH-M004-0006	12	4	
SCH-M004-0014	14	4	
SBH-M004-0010	15	2	
SCH-M005-0025	16	1	
SCH-M005-0018	17	8	
003-4075-01	18	2	BRG W/LKNG SET SCRW
003-1507-33	19	4	
003-2226-29	20	1	
003-2226-04	21	2	

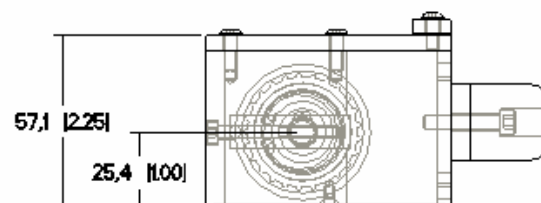
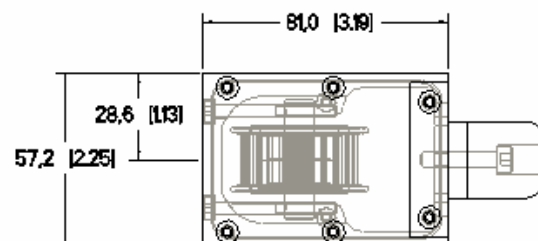
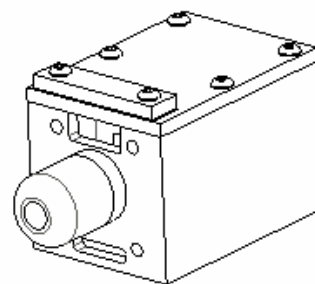
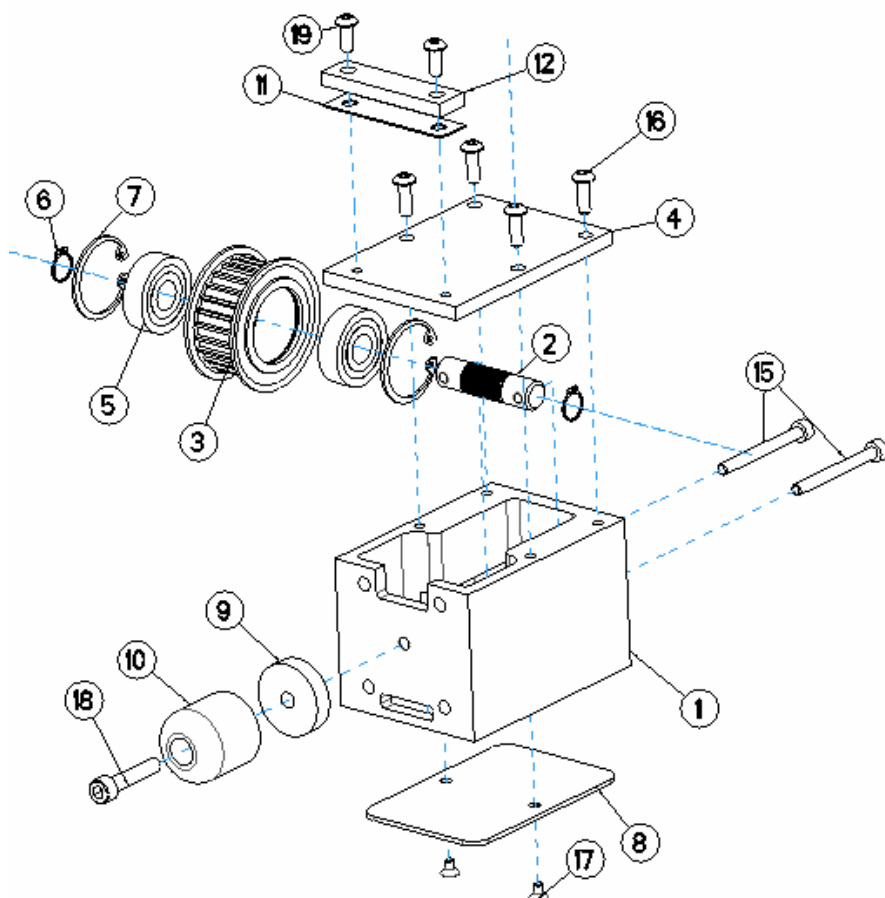
WRO/WLO-HLE60RB-DRIVE END ASSEMBLY



WRO SHOWN
WLO ROTATE DRIVE SHAFT 180° RADially

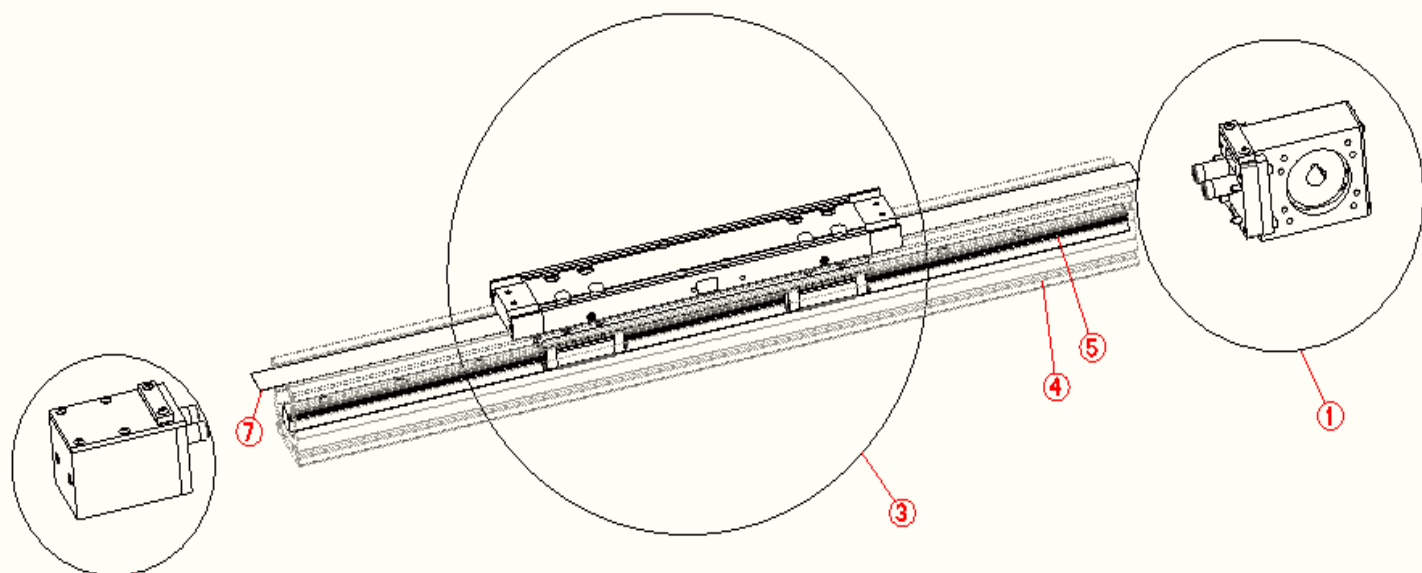


Part Number	ITEM	QTY.	PART DESCRIPTION
102-1500-01	1	1	DRIVE HOUSING HLE60-PV60 DIRECT GEN2
102-0513-01	2	1	PULLEY
102-1503-02	3	1	DRIVE SHAFT HLE60 WRO/WLO GEN2
102-1501-01	4	1	COVER PLATE 1 HLE60 DRIVE END GEN2
102-1505-02	5	2	BEARING HOUSING HLE60 GEN2
102-0284-01	6	1	HLE60RB DRV HSG ADPTER PLT GEN2
000-6736-01	7	1	SPACER BUMPER
003-1801-01	8	1	BUMPER HEL60RB
000-7346-01	9	1	STRIP SEAL RETAINER CLAMP
003-2171-01	10	1	STRIP SEAL GASKET
SCH-M004-0020	11	4	
SBH-M004-0006	12	4	
SCH-M004-0014	14	4	
SBH-M004-0010	15	2	
SCH-M005-0025	16	1	
SCH-M005-0018	17	8	
003-4075-01	18	2	BRG W/LKING SET SCRW INNER RACE
003-1507-33	19	4	
003-2226-29	20	1	
003-2226-04	21	1	

002-2754-01 **HLE60RB** TENSION END ASSEMBLY

Part Number	ITEM	QTY.	DESCRIPTION
102-0280-01	1	1	HSG,TENSION,HLE60
102-0282-01	2	1	SHAFT,HLE60 TENSION
101-2953-01	3	1	PULLEY,IDLER HLE60
102-0281-01	4	1	COVER, TOP HLE60RB TEN HSG
003-1087-31	5	2	BRG,RAD,10MM X 26MM X 8MM
003-1759-08	6	2	RETAINER RING,5100-39
003-1807-15	7	2	RET RING 5008-100
100-1990-01	8	1	COV BOTTOM HLE-60
000-6746	9	1	SPACER BUMPER HLE-60RB
003-1801-01	10	1	BUMPER RUBBER
003-2171-01	11	1	GASKET STRIP SEAL,HLE60
000-7346-01	12	1	RET SEAL SIZE 1
SCH-M004-0040	15	2	SCR CAP HD HEX M4 X 40MM
SBH-M004-0012	16	4	SCR BUT HD HEX M4 X 12MM
SFH-M003-0006	17	2	SCR FLAT HD HEX M3 X 6MM
SCH-M005-0025	18	2	SCR CAP HD HEX M5 X 25MM
SBH-M004-0010	19	2	SCR BUT HD HEX M4 X 10MM

HLE60SR ASSEMBLY COMPONENTS



ITEM #	PART#	DESCRIPTION	UNIT	REFERENCE
1A	ARO/ALO-HLE60SR	HLE60SR DRIVE END ASSEMBLY ARO/ALO	EA	SEE PAGE 39
1B	ARW/ALW-HLE60SR	HLE60SR DRIVE END ASSEMBLY ARW/ALW	EA	SEE PAGE 40
1C	MBR/MBL-HLE60SR	HLE60SR DRIVE END ASSEMBLY MBR/MBL	EA	SEE PAGE 41
1D	MRW/MLW-HLE60SR	HLE60SR DRIVE END ASSEMBLY MRW/MLW	EA	SEE PAGE 42
1E	WBO-HLE60SR	HLE60SR DRIVE END ASSEMBLY WBO	EA	SEE PAGE 43
1F	WRO/WLO-HLE60SR	HLE60SR DRIVE END ASSEMBLY WRO/WLO	EA	SEE PAGE 44
2	002-2754-02	HLE60SR TENSION STATION ASSEMBLY	EA	SEE PAGE 45
3A	NL-HLE60SR	HLE60SR STANDARD "NL" CARRIAGE ASSEMBLY	EA	SEE PAGE 37
3B	VL-HLE60SR	HLE60SR EXTENDED "VL" CARRIAGE ASSEMBLY	EA	SEE PAGE 38
4	100-1778-01	HLE60SR MACHINED BASE	METERS	SEE PAGE 36
5	100-1777-01	HLE60SR SQUARE RAIL	METERS	SEE PAGE 36
6	003-1860-01	HLE60SR TIMING BELT 16MM WIDE 5MM PITCH	METERS	SEE PAGE 36
7	003-1879-01	HLE60SR STRIP SEAL	METERS	SEE PAGE 36

HLE 60SR

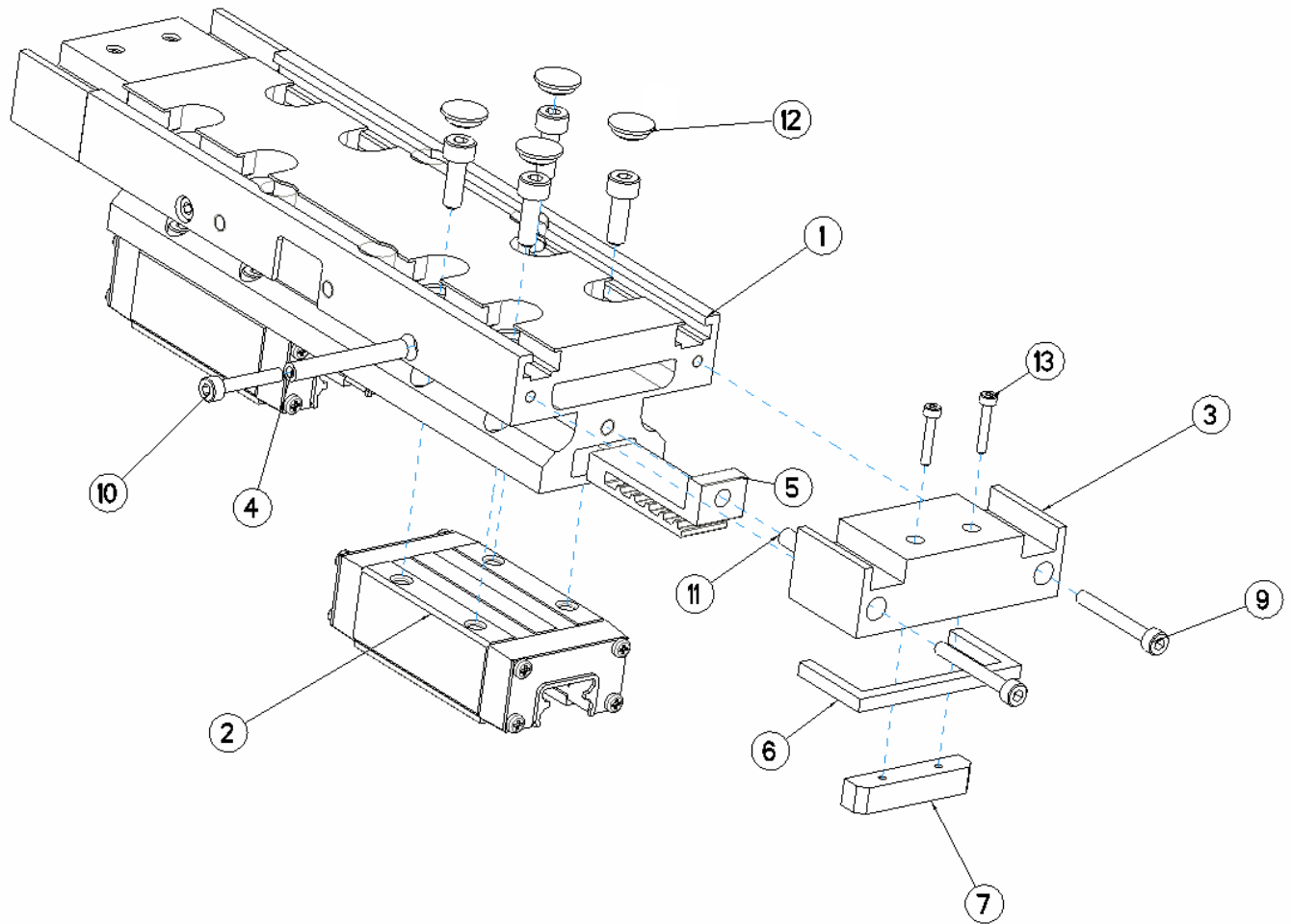
REQUIRED BELT LENGTH P/N 003-1860-01
NL/VL/SL CARRIAGE 1256MM + (2 X TRAVEL)

BASE LENGTH P/N 100-1778-01
NL CARRIAGE 448 MM +TRAVEL
VL CARRIAGE 550 MM +TRAVEL
SL CARRIAGE 297 MM+TRAVEL+ SPECIAL CARRIAGE LENGTH

RAIL LENGTH P/N 100-1777-01
NL CARRIAGE 444 MM +TRAVEL
VL CARRIAGE 546 MM +TRAVEL
SL CARRIAGE 291 MM+TRAVEL+ SPECIAL CARRIAGE LENGTH

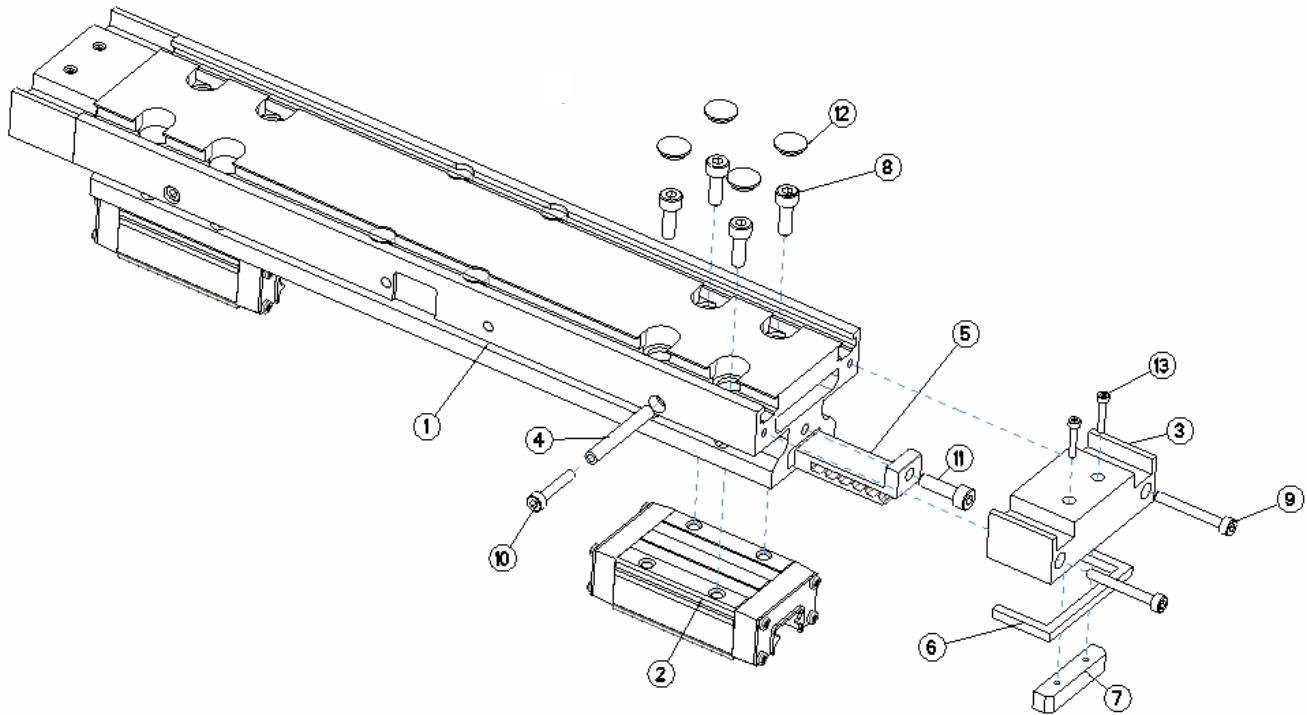
STRIP SEAL P/N 003-1879-01
NL CARRIAGE 464 MM +TRAVEL
VL CARRIAGE 566 MM +TRAVEL
SL CARRIAGE 313 MM+TRAVEL+ SPECIAL CARRIAGE LENGTH

HLE60SR NL CARRIAGE ASSEMBLY COMPONENTS



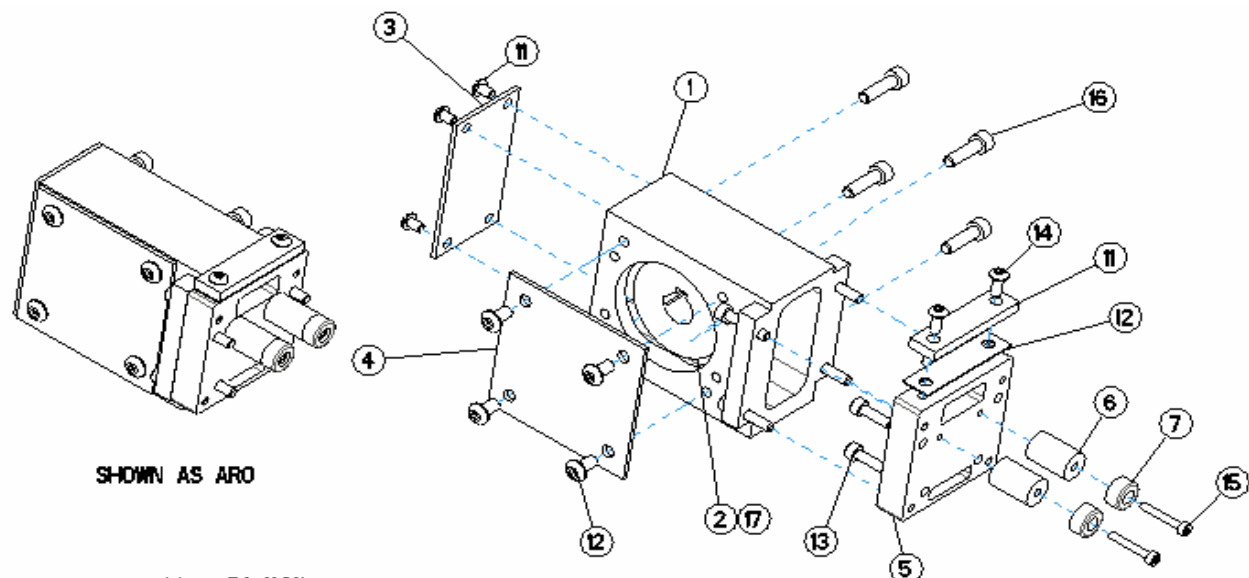
Part Number	ITEM	QTY.	DESCRIPTION
100-1598-01	1	1	CARRIAGE HLE-60SR HL (MACH)
002-1898-01	2	2	BRG, LIN, GREASED, LWHS15C1BT1
100-0356-01	3	2	END CAP SIZE 1
100-7930-01	4	2	ROD GUIDE HLE60
100-0220-01	5	2	CLAMP BELT HLE60
003-1986-01	6	2	SEAL FELT PHC-8272
100-0785-01	7	2	RETAINER STRIP HLE-60
SCH-M004-0025	8	2	SCR CAP HD HEX M4 X 25MM
SCH-M003-0030	9	4	SCR CAP HD HEX M3 X 30MM
SCH-M003-0018	10	4	SCR CAP HD HEX M3 X 18MM
SCH-M004-0012	11	8	SCR CAP HD HEX M4 X 12MM
100-0976-01	12	8	PLUG MTG HOLE HLE60SR
SCH-M002-0012	13	4	SCR CAP HD HEX M2 X 12MM

HLE60SR VL CARRIAGE ASSEMBLY COMPONENTS

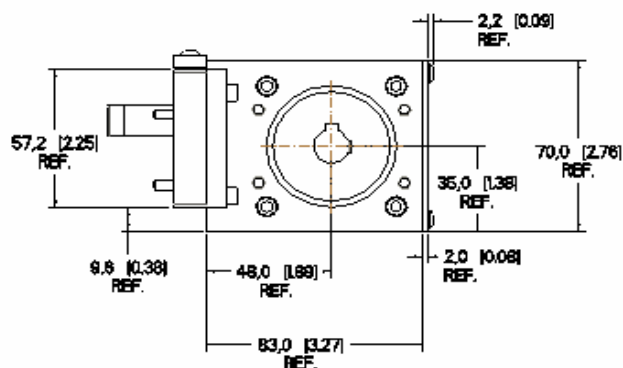
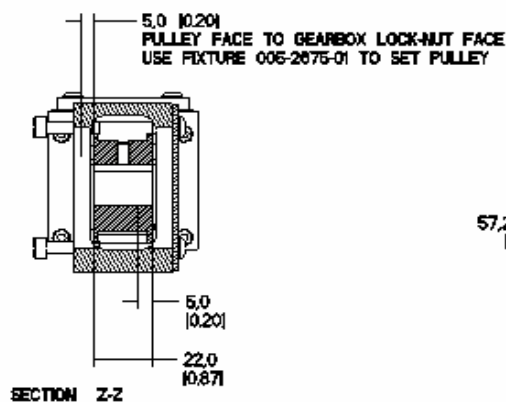


Part Number	ITEM	QTY.	DESCRIPTION
100-4962-01	1	1	CARRIAGE HLE-60SR VL (MACH)
002-1898-01	2	2	BRG,LIN,GREASED,LWHS15C1BT1
100-0356-01	3	2	END CAP SIZE 1
100-7930-01	4	2	ROD GUIDE HLE60
100-0220-01	5	2	CLAMP BELT HLE60
003-1986-01	6	2	SEAL FELT PHC-8272
100-0785-01	7	2	RETAINER STRIP HLE-60
SCH-M004-0016	8	2	SCR CAP HD HEX M4 X 16MM
SCH-M003-0030	9	4	SCR CAP HD HEX M3 X 30MM
SCH-M003-0018	10	4	SCR CAP HD HEX M3 X 18MM
SCH-M004-0012	11	8	SCR CAP HD HEX M4 X 12MM
100-0976-01	12	8	PLUG MTG HOLE HLE60SR
SCH-M002-0012	13	4	SCR CAP HD HEX M2 X 12MM

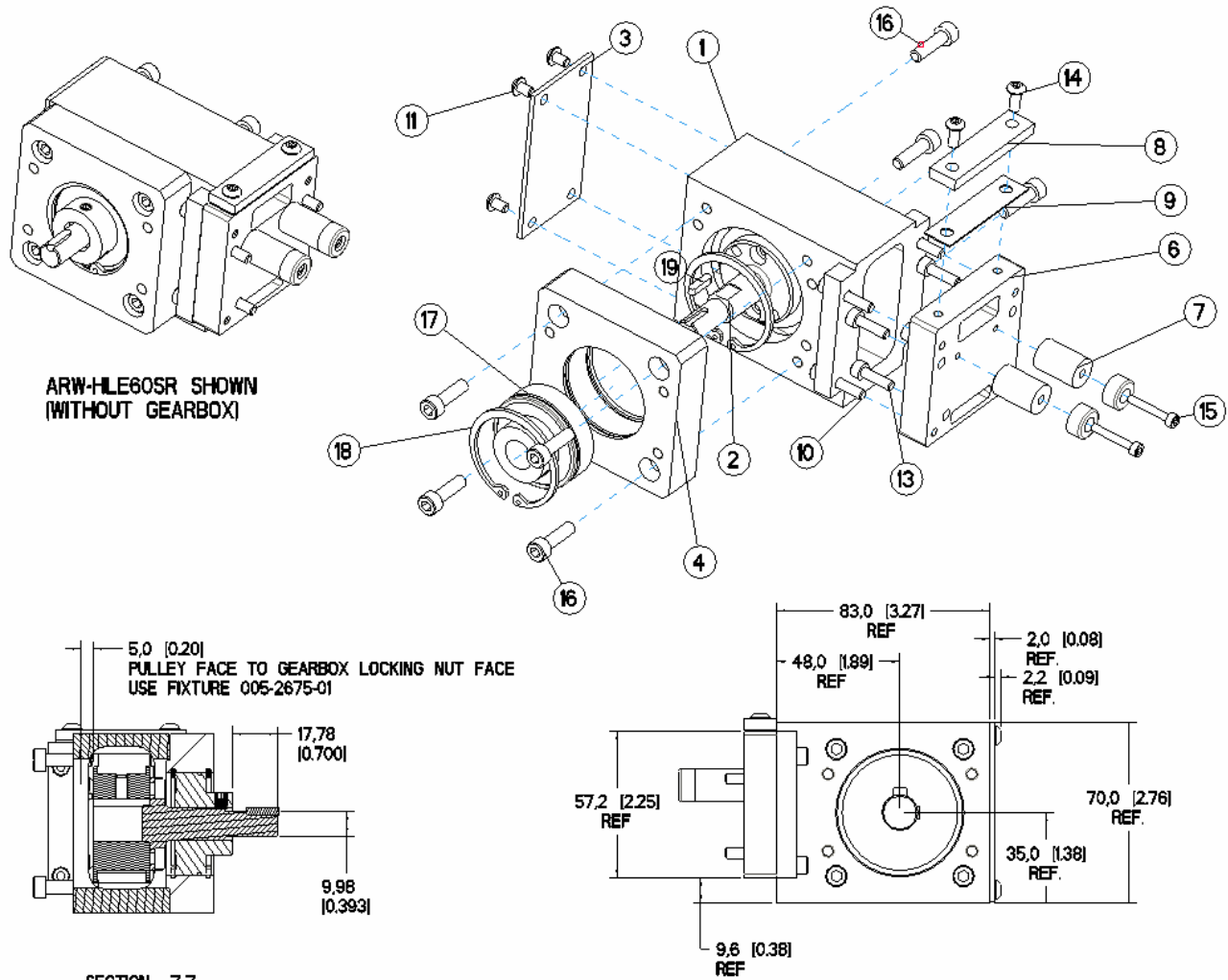
ARO/ALO-HLE60SR-DRIVE END ASSEMBLY



SHOWN AS ARO

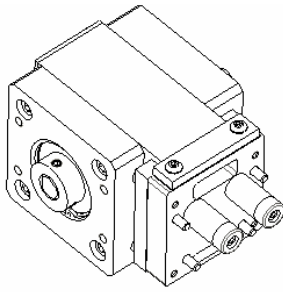


Part Number	ITEM	QTY.	DESCRIPTION
102-1500-01	1	1	DRIVE HOUSING HLE60-PV60 DIRECT GEN2
102-0513-01	2	1	PULLEY DRIVE HLE60 PV60 DIRECT GEN2
102-1501-01	3	1	COVER PLATE 1 HLE60 DRIVE END GEN2
102-1502-01	4	1	COVER PLATE 2 HLE60 DRIVE END GEN2
102-0285-01	5	1	HLE60SR DRV HSG ADPTER PLT GEN2
100-1196-02	6	2	SPACER BUMPER
003-1588-01	7	2	BUMPER HEL60SR
000-7346-01	8	1	STRIP SEAL RETAINER CLAMP
003-2171-01	9	1	STRIP SEAL GASKET
SCH-M004-0020	10	4	
SBH-M004-0006	11	4	
SBH-M005-0010	12	4	
SCH-M004-0014	13	4	
SBH-M004-0010	14	2	
SCH-M003-0020	15	2	
SCH-M005-0018	16	4	
SSH-M005-0006	17	2	

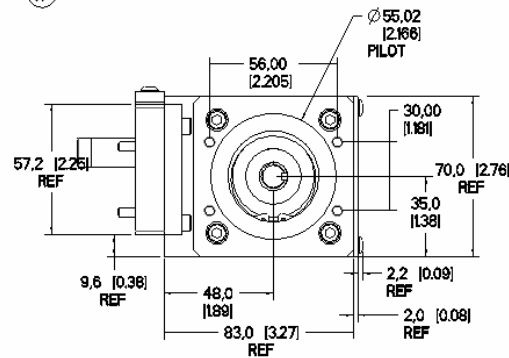
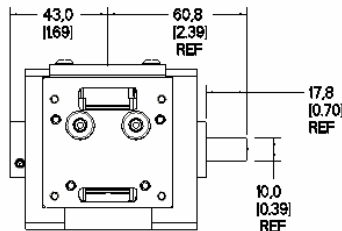
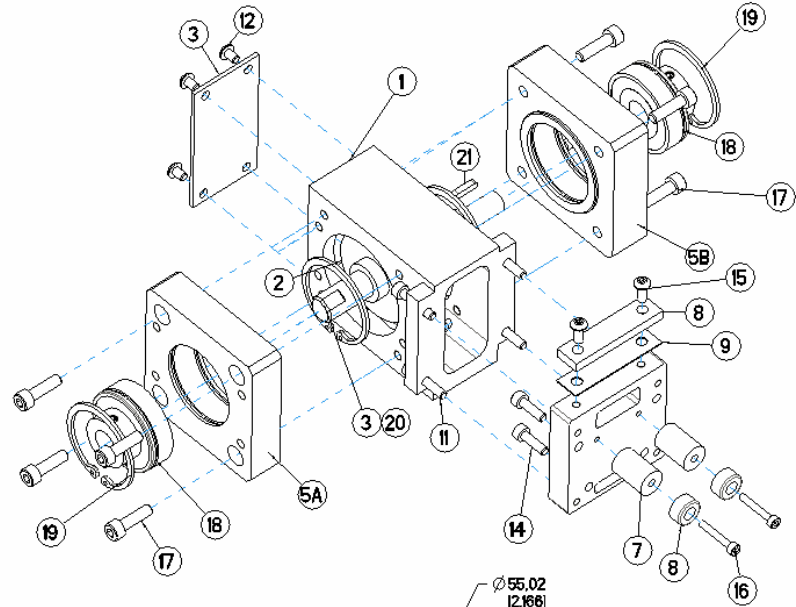
ARW/ALW -HLE60SR DRIVE END ASSEMBLY

Part Number	ITEM	QTY.	
102-1500-01	1	1	DRIVE HOUSING HLE60-PV60 DIRECT GEN2
002-2834-03	2	1	STUB SHAFT PULLEY ASSY HLE60 PV60 GEN2
102-1501-01	3	1	COVER PLATE 1 HLE60 DRIVE END GEN2
102-1505-01	4	1	BEARING HOUSING HLE60 GEN2
102-0285-01	5	1	HLE60SR DRV HSG ADPTER PLT GEN2
100-1196-02	6	2	SPACER BUMPER
003-1588-01	7	2	BUMPER HEL60SR
000-7346-01	8	1	STRIP SEAL RETAINER CLAMP
003-2171-01	9	1	STRIP SEAL GASKET
SCH-M004-0020	10	4	
SBH-M004-0006	11	4	
SCH-M004-0014	13	4	
SBH-M004-0010	14	2	
SCH-M003-0020	15	2	
SCH-M005-0018	16	8	
003-4075-01	17	1	BRG W/LKNG SET SCRW
003-1507-33	18	2	
003-2226-04	19	1	

MBR/MBL -HLE60SR-DRIVE END ASSEMBLY

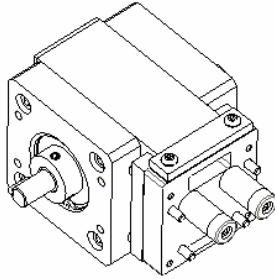


MBR SHOWN
MBL ROTATE DRIVE SHAFT 180° RADIALLY
AND SWAP BEARING HOUSING PLATES(102-1505-XX)
(ONE IS PILOTED FOR MTR BLOCK)

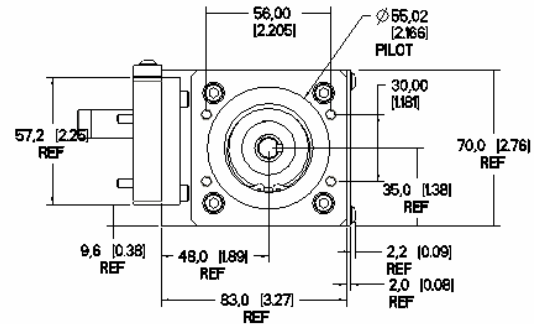
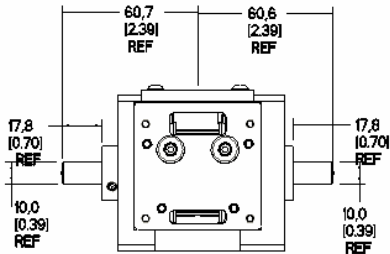
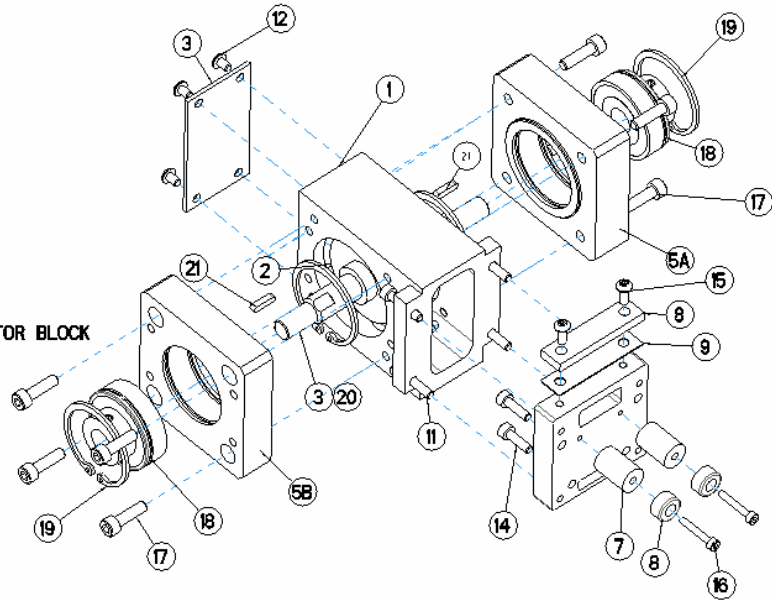


Part Number	ITEM	QTY.	DESCRIPTION
102-1500-01	+	1	DRIVE HOUSING HLE60-PV60 DIRECT GEN2
102-0513-01	2	1	PULLEY
102-1503-02	3	1	DRIVE SHAFT HLE60 WRO/WLO GEN2
102-1501-01	4	1	COVER PLATE 1 HLE60 DRIVE END GEN2
102-1505-01	5A	1	BEARING HSG MTR PILOT HLE60 GEN2
102-1505-02	5B	1	BEARING HOUSING HLE60 GEN2
102-0285-01	6	1	HLE60SR DRV HSG ADPTER PLT GEN2
100-1196-02	7	2	SPACER BUMPER
003-1588-01	8	2	BUMPER HEL60SR
000-7346-01	9	1	STRIP SEAL RETAINER CLAMP
003-2171-01	10	1	STRIP SEAL GASKET
SCH-M004-0020	11	4	
SBH-M004-0006	12	4	
SCH-M004-0014	14	4	
SBH-M004-0010	15	2	
SCH-M003-0020	16	2	
SCH-M005-0018	17	8	
003-4075-01	18	2	BRG W/LKNG SET SCRW ASS201-008H
003-1507-33	19	4	
003-2226-29	20	1	
003-2226-04	21	1	

MRW/MLW-HLE60SR DRIVE END ASSEMBLY

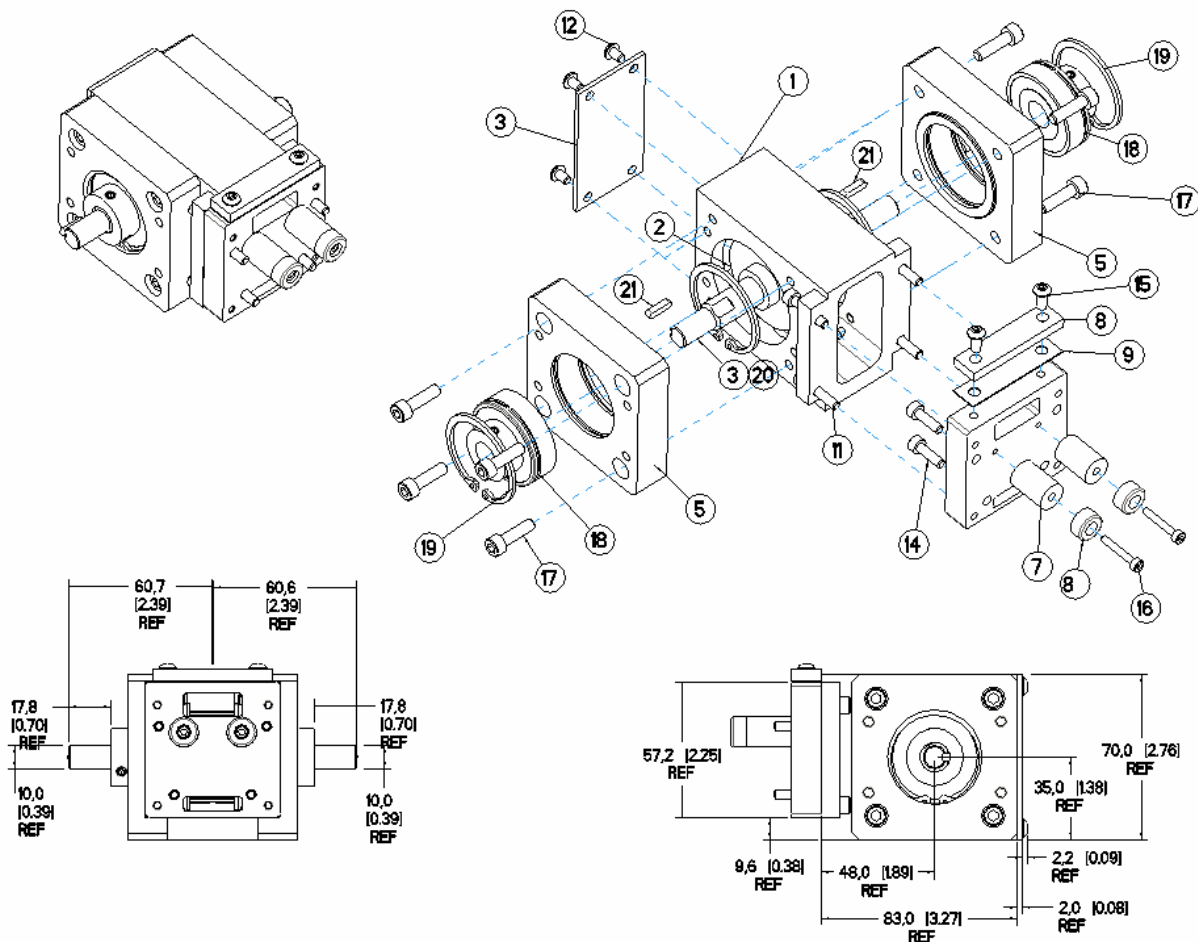


MRW SHOWN
MLW SWAP BEARING HOUSING 5A AND 5B
5A HAS TAPPED HOLES AND PILOT TO ACCEPT MOTOR BLOCK



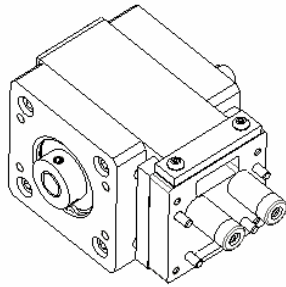
Part Number	ITEM	QTY.	DESCRIPTION
102-1500-01	1	1	DRIVE HOUSING HLE60-PV60 DIRECT GEN2
102-0513-01	2	1	PULLEY
102-1503-01	3	1	DRIVE SHAFT HLE60 WBO GEN2
102-1501-01	4	1	COVER PLATE 1 HLE60 DRIVE END GEN2
102-1505-01	5A	1	BEARING HOUSING MTR PILOT HLE60 GEN2
102-1505-02	5B	1	BEARING HOUSING HLE60 GEN2
102-0285-01	6	1	HLE60SR DRV HSG ADPTER PLT GEN2
100-1196-02	7	2	SPACER BUMPER
003-1588-01	8	2	BUMPER HEL60SR
000-7346-01	9	1	STRIP SEAL RETAINER CLAMP
003-2171-01	10	1	STRIP SEAL GASKET
SCH-M004-0020	11	4	
SBH-M004-0006	12	4	
SCH-M004-0014	14	4	
SBH-M004-0010	15	2	
SCH-M003-0020	16	2	
SCH-M005-0018	17	8	
003-4075-01	18	2	BRG W/LKNG SET SCRW
003-1507-33	19	4	
003-2226-29	20	1	
003-2226-04	21	2	

WBO-HLE60SR DRIVE END ASSEMBLY

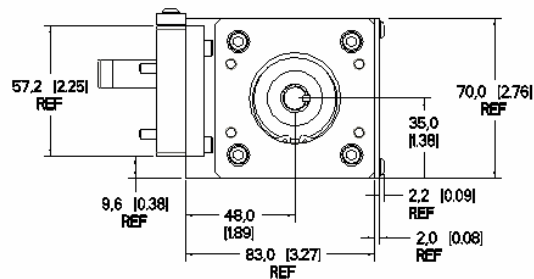
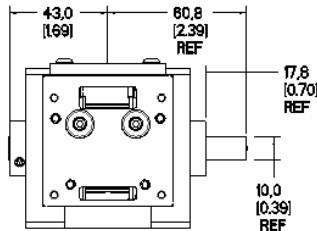
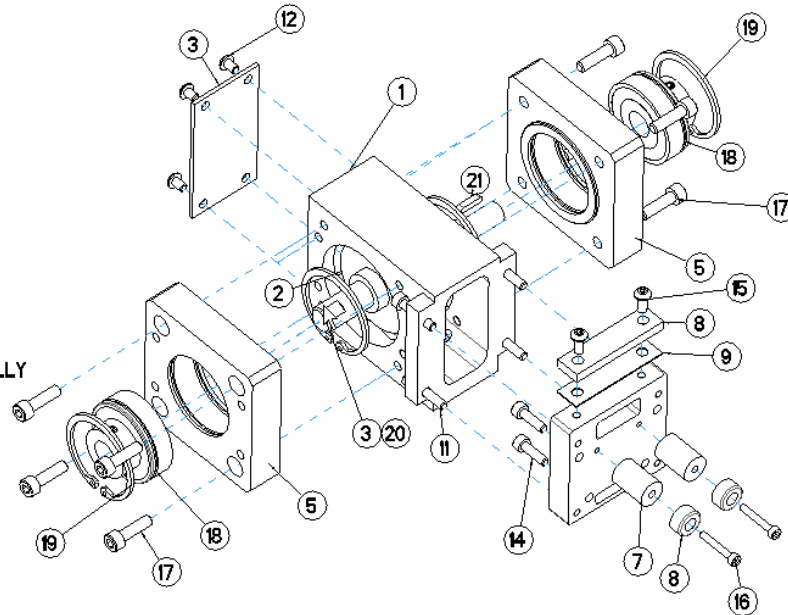


Part Number	ITEM	QTY.	PART DESCRIPTION
102-1500-01	1	1	DRIVE HOUSING HLE60-PV60 DIRECT GEN2
102-0513-01	2	1	PULLEY
102-1503-01	3	1	DRIVE SHAFT HLE60 WBO GEN2
102-1501-01	4	1	COVER PLATE 1 HLE60 DRIVE END GEN2
102-1505-02	5	2	BEARING HOUSING HLE60 GEN2
102-0285-01	6	1	HLE60SR DRV HSG ADPTER PLT GEN2
100-1196-02	7	2	SPACER BUMPER
003-1588-01	8	2	BUMPER HEL60SR
000-7346-01	9	1	STRIP SEAL RETAINER CLAMP
003-2171-01	10	1	STRIP SEAL GASKET
SCH-M004-0020	11	4	
SBH-M004-0006	12	4	
SCH-M004-0014	14	4	
SBH-M004-0010	15	2	
SCH-M003-0020	16	2	
SCH-M005-0018	17	8	
003-4075-01	18	2	BRG W/LKING SET SCRW
003-1507-33	19	4	
003-2226-29	20	1	
003-2226-04	21	2	

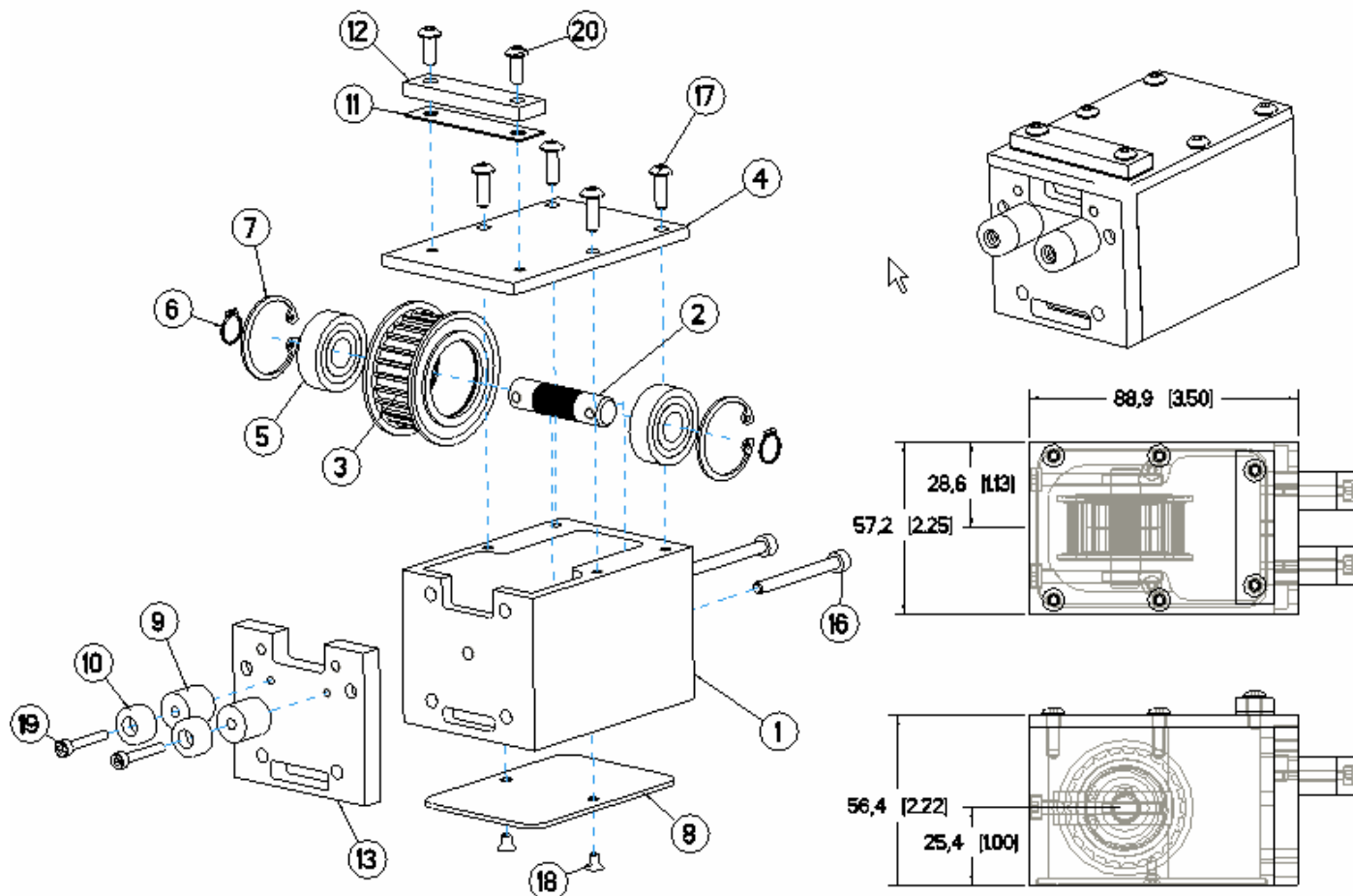
WRO/WLO-HLE60SR DRIVE END ASSEMBLY



WRO SHOWN
WLO ROTATE DRIVE SHAFT 180° RADIALLY



Part Number	ITEM	QTY.	DESCRIPTION
102-1500-01	1	1	DRIVE HOUSING HLE60-PV60 DIRECT GEN2
102-0513-01	2	1	PULLEY
102-1503-02	3	1	DRIVE SHAFT HLE60 WRO/WLO GEN2
102-1501-01	4	1	COVER PLATE 1 HLE60 DRIVE END GEN2
102-1505-02	5	2	BEARING HOUSING HLE60 GEN2
102-0285-01	6	1	HLE60SR DRV HSG ADPTER PLT GEN2
100-1196-02	7	2	SPACER BUMPER
003-1588-01	8	2	BUMPER HEL60SR
000-7346-01	9	1	STRIP SEAL RETAINER CLAMP
003-2171-01	10	1	STRIP SEAL GASKET
SCH-M004-0020	11	4	
SBH-M004-0006	12	4	
SCH-M004-0014	14	4	
SBH-M004-0010	15	2	
SCH-M003-0020	16	2	
SCH-M005-0018	17	8	
003-4075-01	18	2	BRG W/LKNG SET SCRW INNER RACE
003-1507-33	19	4	
003-2226-29	20	1	
003-2226-04	21	1	

002-2754-02 **HLE60SR** TENSION END ASSEMBLY

Part Number	ITEM	QTY.	DESCRIPTION
102-0280-01	1	1	HSG,TENSION,HLE60
102-0282-01	2	1	SHAFT,HLE60 TENSION
101-2953-01	3	1	PULLEY,IDLER HLE60
102-0281-02	4	1	COVER,TOP HLE60SR TEN HSG
003-1087-31	5	2	BRG,RAD,10MM X 26MM X 8MM
003-1759-08	6	2	RETAINER RING,5100-39
003-1807-15	7	2	RET RING 5008-100
100-1990-01	8	1	COV BOTTOM HLE-60
100-1196-01	9	2	SPACER BUMPER HLE-60SR
003-1588-01	10	2	BUMPER BUNA-5
003-2171-01	11	1	GASKET STRIP SEAL,HLE60
000-7346-01	12	1	RET SEAL SIZE 1
100-1783-01	13	1	ADPT ENDBLK HLE-60SR
SCH-M004-0040	16	2	SCR CAP HD HEX M4 X 40MM
SBH-M004-0012	17	4	SCR BUT HD HEX M4 X 12MM
SFH-M003-0006	18	2	SCR FLAT HD HEX M3 X 6MM
SCH-M003-0020	19	2	SCR CAP HD HEX M3 X 20MM
SBH-M004-0010	20	2	SCR BUT HD HEX M4 X 10MM

PV60 Gearbox Technical Information

PV Series, Specifications

Parameter	Units	Ratio	
Nominal Output Torque, T_{nom} ^r	Nm (in-lb)	3	12 (106.2)
		4	18.9 (167.265)
		5	19.6 (173.46)
		7	16.7 (147.795)
		10	10.6 (93.81)
		12	18.2 (161.07)
		15	19.4 (171.69)
		16	
		20	21.5 (190.255)
		25	20.0 (177)
		30	22.5 (199.125)
		35	
		40	21.5 (190.275)
		50	20 (177)
		70	16.7 (147.795)
		100	10.6 (93.81)
Max. Acceleration Output Torque, T_{acc} ^{r 1}	Nm (in-lb)	3	24 (212.4)
		4,5,12,15	36.4 (322.14)
		7,70	33.4 (295.59)
		10,100	21.2 (187.62)
		16,20,25,28,30,35,40,50	40 (354)
Emergency Stop Output Torque, T_{em} ^{r 2}	Nm (in-lb)	3,4,5,12,15,16,20,25,30,35,40,50	55 (486.75)
		7,70	44 (389.4)
		10,100	39 (345.15)
Nominal Input Speed, N_{nom} ^r	RPM	All Ratios	4000
Maximum Input Speed, N_{max} ^r	RPM	All Ratios	6000
Lifetime	h	All Ratios	20,000
Standard Backlash ³	arc-min	$\leq 10:1$	< 12
		$> 10:1$	< 16
Efficiency at Nominal Torque	%	$\leq 10:1$	96
		$> 10:1$	94
Noise Level at 3000 RPM ⁴	dB(A)	All Ratios	65
Maximum Allowable Case Temperature	Degree C	All Ratios	-20 to 100
Lubrication		All Ratios	Lifetime lubrication
Mounting Position		All Ratios	Any
Direction of Rotation		All Ratios	Same as input
Degree of Protection		All Ratios	IP 64

1) $t_{acc} + t_{dec} = 2(t_{acc} + t_{cont} + t_{dec})$

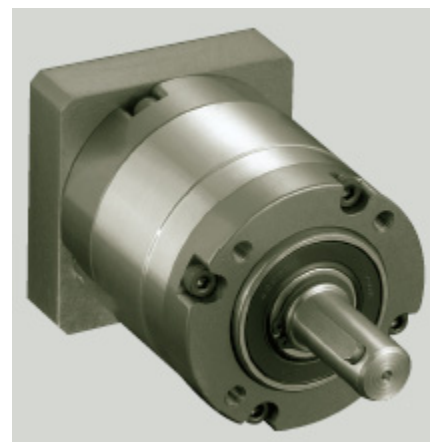
$T_{cont} = .25T_{acc}$

2) Maximum of 1000 stops.

3) Measured at 2% of rated torque.

4) Measure at 1m.

r = rated values



PV60 Gearbox Technical Information

PV Series, Inertia Table¹

Units	Ratio	PV80/PV23
kg cm ² in lb sec ²	3	0.1400 0.000124
kg cm ² in lb sec ²	4	0.1000 0.000089
kg cm ² in lb sec ²	5	0.0840 0.000074
kg cm ² in lb sec ²	7	0.0750 0.000066
kg cm ² in lb sec ²	10	0.0070 0.000006
kg cm ² in lb sec ²	12	0.0970 0.000086
kg cm ² in lb sec ²	15	0.0830 0.000073
kg cm ² in lb sec ²	16	---- ----
kg cm ² in lb sec ²	20	0.0830 0.000073
kg cm ² in lb sec ²	25	0.0830 0.000073
kg cm ² in lb sec ²	28	---- ----
kg cm ² in lb sec ²	30	0.0700 0.000062
kg cm ² in lb sec ²	35	---- ----
kg cm ² in lb sec ²	40	0.0700 0.000062
kg cm ² in lb sec ²	50	0.0700 0.000062
kg cm ² in lb sec ²	70	0.0700 0.000062
kg cm ² in lb sec ²	100	0.0700 0.000062



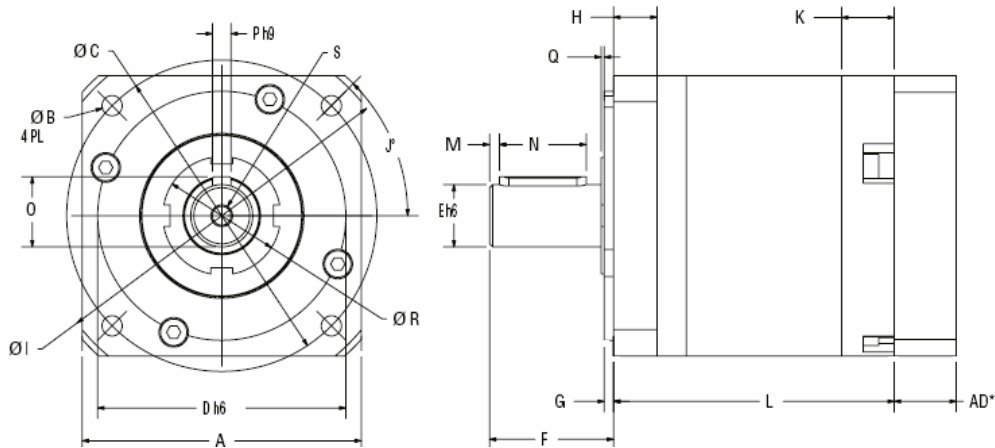
(1) Note: All moments of inertia values are as reflected at the input shaft of the gearhead.

PV60 Gearbox Technical Information

PV Flange Face Dimensions Units: mm (In)

		A		B		C		D		E		F		G		H		I		J	
		Square Flange		Bolt Hole		Bolt Circle		Pilot Diameter		Output Shaft Diameter		Output Shaft Length		Pilot Thickness		Flange Thickness		Housing Diameter		Lead Angle	
PV60-FN		62	2.441	5.5	0.217	70	2.756	50	1.969	14	0.551	25	0.984	2.5	0.098	10.3	0.406	80	3.150	45	

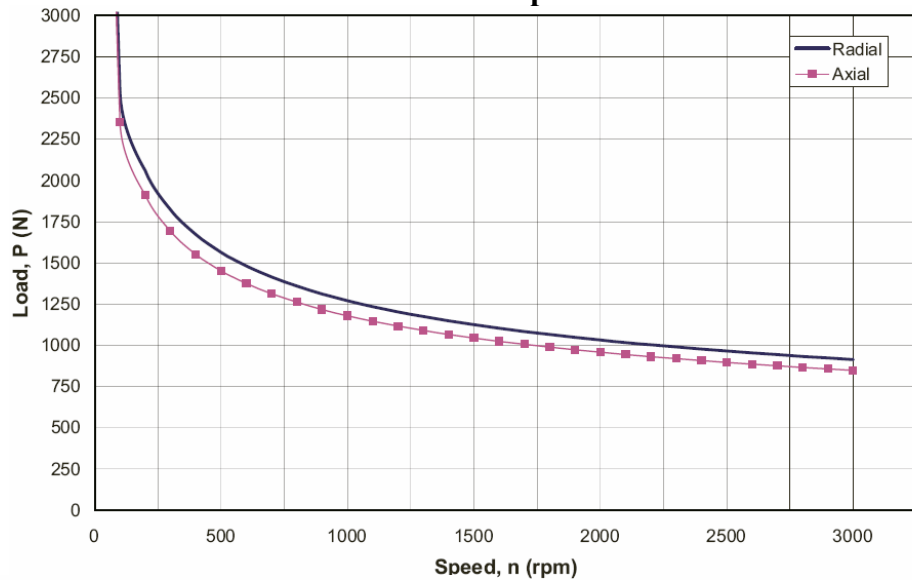
		K		L1		L2		M		N		O		P		Q		R		S	
		Rear Thickness		Length (Ratio < 10:1)		Length (Ratio > 10:1)		Dist. From Shaft End		Keyway Length		Key Height		Keyway Width		Shoulder Height		Shoulder Diameter		Tap x Depth	
PV60-FN		16	0.630	71.5	2.815	91.5	3.602	3.2	0.126	16	0.630	16	0.630	5	0.197	1	0.039	28	1.102	M5x12	



PV Series, Output shaft load rating

PV60-FN

Load vs. Speed



- 1) Maximum axial load, F_a .
- 2) Maximum radial load applied to the center of the shaft, F_r .
- 3) Radial load curves can be used to combine (radial + axial) load if $F_a/F_r < .22$.
- 4) If $F_a/F_r > .22$ consult factory.

PV60 Gearbox Technical Information

Gearbox Installation

Parts supplied:

- PV Series gearhead with input section.
- 4 Socket head cap screws with lock washers.
- Allen wrench.

Mounting Instructions

Step 1. Remove the plastic plug from the pinion screw hole access in the rear adapter plate of the gearhead. **Fig. 1**

Step 2. Rotate the pinion until the head of the pinion screw is aligned with the pinion screw access hole.

Step 3. Insert the supplied allen wrench through the pinion bolt access hole into the head of the pinion bolt and loosen the pinion bolt.

Step 4. Position the motor vertically with the shaft pointing upward. Make sure motor shaft is clean and dry for best installation. Insert the motor shaft into the gearhead pinion. If the motor shaft has a flat, rotate the shaft so that the flat is opposite the pinion bolt. Align the motor flange mounting holes to the holes on the gearhead. **Fig. 2** Align split in bushing sleeve with split in pinion. Tighten pinion screw using supplied wrench to torque value in table below.

Step 5. Check that the gearhead is fully seated onto the motor flange. Secure the gearhead to the motor using the 4 socket cap screws and 4 lock washers supplied. Refer to the torque specification table below. Reinsert plastic cap into pinion bolt access hole.



Fig.1

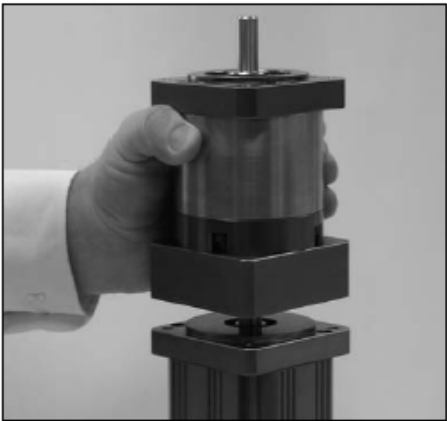


Fig.2

Screw Tightening Torques

Frame Size (mm)	Motor Shaft Diameter		Screw Size	Tightening Torque	
	mm	(inches)		Nm	(in-lbs)
60	5.8 - 16	(.230 - .630)	M4	4.6	[41]

Note: Torques shown are minimum tightening values. Bolts can be safely tightened up to 25% higher for increased holding torques. Optionally, Loctite 242 can be applied to the threads of the pinion bolts.





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