



INFORMATION SHEET: SERIES ESU DESIGN 5 SLIDE

# IMPORTANT INFORMATION DO NOT DISCARD!

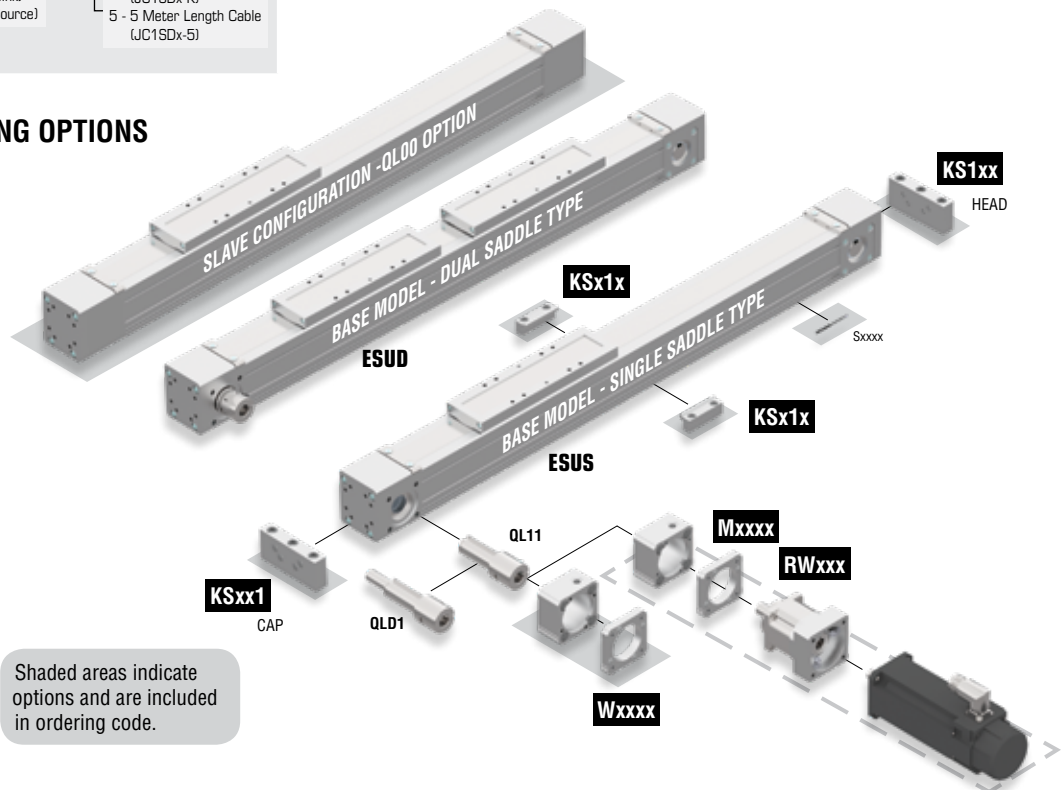
Use this information sheet to assist with product installation and setup.  
File with maintenance or machine documentation.

Example Ordering Data:

<b>ESU</b>	<b>S</b>	<b>5</b>	<b>x</b>	<b>300</b>	-	<b>RTxxx</b>	-	<b>QL11</b>	-	<b>Wxxxx</b>	-	<b>Mxxxx</b>	-	<b>RWxxx</b>	-	<b>Y5</b>
<b>Electromechanical Linear Actuator</b>	<b>Side</b>	<b>Type</b>	<b>Metric Design</b>	<b>Size</b>	<b>Travel</b>	<b>Drive Mode Belt</b>	<b>Motor Configuration</b>	<b>Motor Mount Code</b>	<b>Motor Code</b>	<b>Gear Reducer Code</b>	<b>Food Grade</b>	Options must be ordered together				
		S - Single Saddle D - Dual In-Line Saddle	5 6 8	50 mm = Minimum Stroke in 50 mm Increments Belt (-RT) Max Travel = 5500 mm	RT160 (55) RT192 (56) RT256 (58) RT000 = Slave Unit	QL11 - In-line with 1:1 Ratio (Standard) GLD1 - In-line Dual Shaft 1:1 Ratio QL00 - No Shaft (Slave Configuration)	Wxxxx - Open Architecture W0000 - Blank Motor Mount Blank - Slide Only (No Motor Mount)	Mxxxx - Cross Reference to Motor P/N  PHD provides motor installed as complete solution.	RW051 - 5:1 Reducer RW101 - 10:1 Reducer	Y5 - Food Grade Lube						

<b>KSxxx</b>	<b>Sxxxx</b>				
<b>End/Mid Supports</b> <b>Head Support Qty</b> KS0xx or KS1xx Qty Support (Max 1)  <b>Mid Support Qty</b> KS0xx to KS9x Qty Support (Max 9) See Options page for recommended spacing.  <b>Cap Support Qty</b> KSxx0 or KSxx1 Qty Support (Max 1)	<b>Switch Bundle (Optional)</b> <b>SCNK2</b> <table border="1"> <tr> <td><b>Switch Series</b> C - JC1SDx-x Series Single Position</td> <td><b>Quantity</b> 1 to 9 (JC1SDx-x)</td> </tr> <tr> <td><b>Switch Circuitry</b> N - NPN (Sink) P - PNP (Source)</td> <td><b>Cable Type</b> K - Quick Connect only (JC1SDx-K) 5 - 5 Meter Length Cable (JC1SDx-5)</td> </tr> </table>	<b>Switch Series</b> C - JC1SDx-x Series Single Position	<b>Quantity</b> 1 to 9 (JC1SDx-x)	<b>Switch Circuitry</b> N - NPN (Sink) P - PNP (Source)	<b>Cable Type</b> K - Quick Connect only (JC1SDx-K) 5 - 5 Meter Length Cable (JC1SDx-5)
<b>Switch Series</b> C - JC1SDx-x Series Single Position	<b>Quantity</b> 1 to 9 (JC1SDx-x)				
<b>Switch Circuitry</b> N - NPN (Sink) P - PNP (Source)	<b>Cable Type</b> K - Quick Connect only (JC1SDx-K) 5 - 5 Meter Length Cable (JC1SDx-5)				

**MOUNTING OPTIONS**



For additional technical assistance, call or visit our website:

**phd,inc.** P.O. Box 9070, Fort Wayne, IN 46899  
1-800-624-8511  
www.phdinc.com



## ENGINEERING DATA: SERIES ESU SLIDE - RT VERSION

SPECIFICATIONS				TIMING BELT SERIES ESU-RT		
REPEATABILITY				±0.05 mm [±0.002 in]		
TRAVEL TOLERANCE				+2.5/-0.0 mm [+0.100/-0.000 in]		
DUTY CYCLE				100%		
OPERATING TEMPERATURE				4 - 65°C [40 - 150°F]		
LUBRICATION INTERVAL				Factory lubricated for life		
ENCAPSULATION CLASS				IP54		

SPECIFICATIONS				SIZE		
				55	56	58
MECHANICS	DRIVE MECHANISM			Timing Belt		
	GUIDE			Recirculating Ball- Linear Motion Guide & Rail System		
	MAX TRAVEL <sup>1</sup> mm [in]			5500 [216.53]		
	BELT			HTD8		
	PITCH (LINEAR TRAVEL PER REVOLUTION) mm [in]			160 [6.3]	192 [7.56]	256 [10.08]
	PULLEY DIAMETER mm [in]			50.93 [2.005]	61.12 [2.406]	81.5 [3.208]
SPEED	MAXIMUM SPEED mm/s [in/sec]			5000 [197]		
	MAXIMUM ACCELERATION mm/s <sup>2</sup> [in/s <sup>2</sup> ]			50,000 [1970]		
THRUST	MAXIMUM THRUST <sup>2</sup> N [lbf]			1450 [326]	2610 [586]	5440 [1222]
TORQUE	MAX. PERMISSABLE DRIVE TORQUE <sup>3</sup> Nm [in-lb]			32 [283]	71 [628]	208 [1842]
	NO-LOAD TORQUE Nm [in-lb]			1.5 [13.3]	2.4 [22]	3.6 [32]
WEIGHT	TOTAL @ ZERO STROKE (W <sub>OT</sub> )	STANDARD	kg [lb]	6.38 [14.08]	13.69 [30.21]	25.66 [56.74]
		DUAL SADDLE	kg [lb]	9.46 [20.87]	20.43 [45.09]	37.47 [82.92]
	TOTAL TRAVEL ADDER (W <sub>LT</sub> )		kg/mm [lb/in]	6.50E-03 [0.366]	1.04E-02 [0.582]	1.54E-02 [0.881]
	MOVING @ ZERO TRAVEL (W <sub>OM</sub> )	STANDARD	kg [lb]	1.81 [3.99]	4.35 [9.59]	7.48 [16.52]
		DUAL SADDLE	kg [lb]	3.03 [6.69]	7.29 [16.09]	12.16 [26.87]
	MOVING TRAVEL ADDER (W <sub>LM</sub> )		kg/mm [lb/in]	3.00E-04 [1.57E-02]	4.00E-04 [2.35E-02]	7.00E-04 [3.92E-02]
INERTIA	ACTUATOR @ ZERO STROKE (J <sub>o</sub> )	STANDARD	kg-m <sup>2</sup> [lb-in <sup>2</sup> ]	1.17E-03 [4.00]	4.06E-03 [13.90]	1.24E-02 [42.50]
		DUAL SADDLE	kg-m <sup>2</sup> [lb-in <sup>2</sup> ]	1.97E-03 [6.70]	6.81E-03 [23.30]	2.02E-02 [69.10]
	TRAVEL ADDER (J <sub>L</sub> )		kg-m <sup>2</sup> /mm [lb-in <sup>2</sup> /in]	1.82E-07 [1.58E-02]	3.92E-07 [3.40E-02]	1.16E-06 [1.01E-01]
	EXTERNAL PAYLOAD ADDER (J <sub>M</sub> )		kg-m <sup>2</sup> /kg [lb-in <sup>2</sup> /lb]	6.84E-04 [1.01]	9.34E-04 [1.45]	1.66E-03 [2.57]

### NOTES:

- 1) STRONGLY RECOMMENDED: ORDERED TRAVEL = WORKING TRAVEL + SAFETY TRAVEL ON BOTH ENDS
- 2) REFER TO SPEED VS. THRUST CHART
- 3) REFER TO SPEED VS. TORQUE CHART

### WEIGHT AND INERTIAL CALCULATIONS:

TOTAL WEIGHT = W<sub>OT</sub> + (W<sub>LT</sub> X TRAVEL) + MOTOR MOUNT WEIGHT

TOTAL MOVING WEIGHT = W<sub>OM</sub> + (W<sub>LM</sub> X TRAVEL) + EXTERNAL PAYLOAD

INERTIA<sub>Reflected</sub> = J<sub>o</sub> + (J<sub>L</sub> X TRAVEL) + (J<sub>M</sub> X TOTAL MOVING WEIGHT)

## LOADS AND MOMENTS

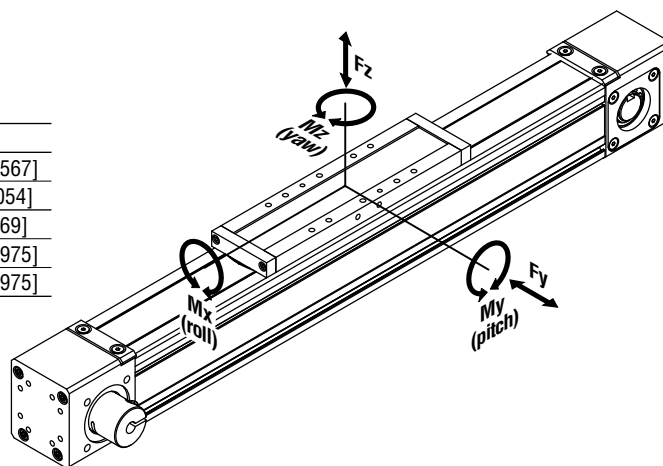
f<sub>c</sub> = Equivalent Load Factor

			55	56	58
Load (Max)	F <sub>z</sub>	N [lb]	4903 [1103]	7648 [1720]	11410 [2567]
	F <sub>y</sub>	N [lb]	3923 [883]	6120 [1377]	9129 [2054]
Bending Moments (Max)	M <sub>x</sub>	Nm [in-lb]	43 [381]	94 [832]	166 [1469]
	M <sub>y</sub>	Nm [in-lb]	380 [3363]	715 [6328]	1466 [12975]
	M <sub>z</sub>	Nm [in-lb]	380 [3363]	715 [6328]	1466 [12975]

$$f_c = \frac{F_z}{F_z \text{ max}} + \frac{F_y}{F_y \text{ max}} + \frac{M_x}{M_x \text{ max}} + \frac{M_y}{M_y \text{ max}} + \frac{M_z}{M_z \text{ max}} \leq 1$$

**NOTE:** Max Loads and Moments correspond to 5000 km of actuator life when applied individually.

To make the selection process quick and simple, refer to PHD's sizing software.



For additional technical assistance, call or visit our website:

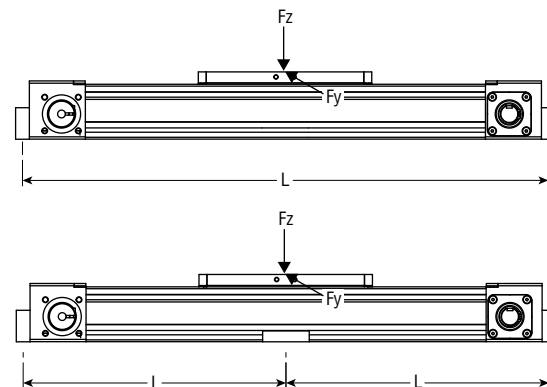
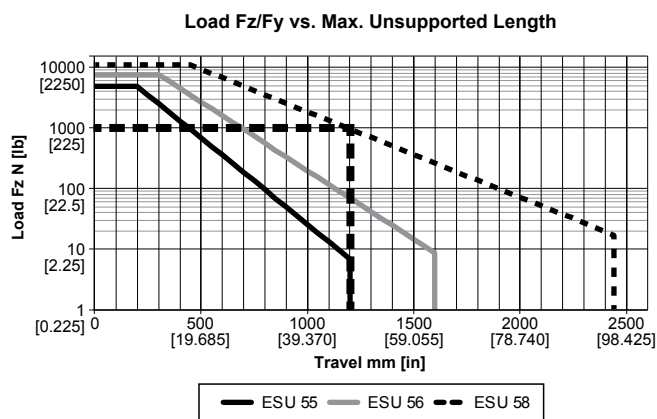
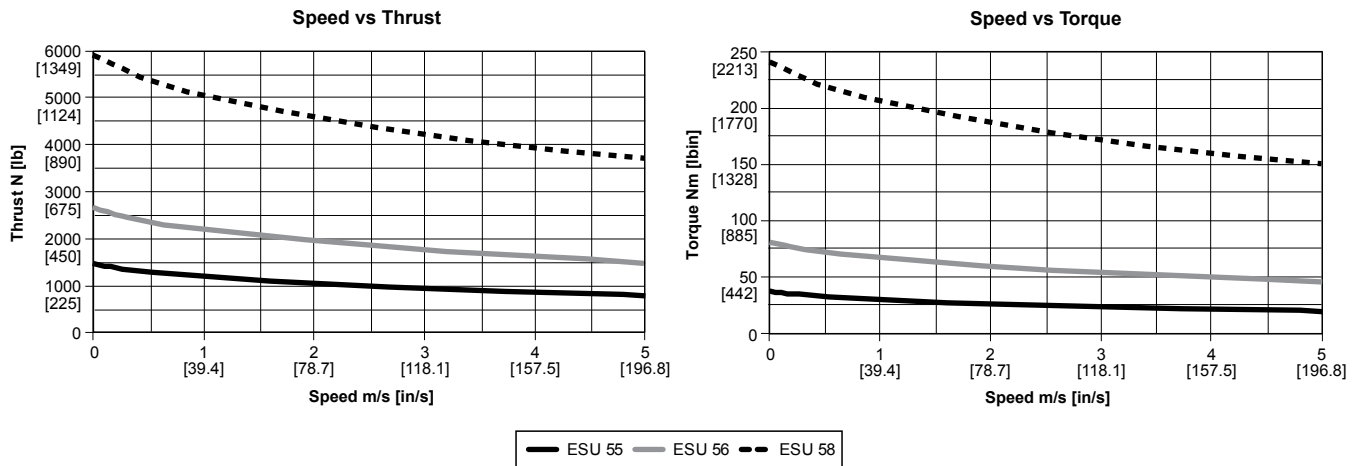
**phd,inc.** P.O. Box 9070, Fort Wayne, IN 46899  
**1-800-624-8511**  
[www.phdinc.com](http://www.phdinc.com)



## ENGINEERING DATA: SERIES ESU SLIDE - RT VERSION

This section contains information on the capabilities of the Series ESU -RT version. It is not intended to be a comprehensive selection guide. To make the selection process simple and quick, refer to PHD's sizing software. You may request application assistance from your distributor or PHD's Customer Service Department.

### PERFORMANCE CHARTS



### MID-SUPPORT CALCULATION

Example (Application Requirements)

Slide – ESUS size 58

Load Fz – 1000 N [225 lb]

Travel – 3000 mm

Use Load Fz/Fy vs Maximum Unsupported Length graph

- 1) Find **Maximum Unsupported Length** from the above graph [1000 N = 1200 mm]
- 2) Calculate **Total Slide Length** (refer to Dimensions page 6 or 7 in the ESU catalog)  
Total Travel + Dimension A = Total Slide Length  
 $3000 + 628.1 = 3628.1 \text{ mm}$
- 3) Determine **number of required mid-supports**  
(Total Slide Length/Maximum Unsupported Length) – 1 = Required mid-supports  
(3628.1 mm/1200 mm) – 1 = **2 mid-supports** (round to nearest whole number)

For additional technical assistance, call or visit our website:

**phd,inc.** P.O. Box 9070, Fort Wayne, IN 46899  
1-800-624-8511  
www.phdinc.com



## MOUNTING INFORMATION: SERIES ESU SLIDE - RT VERSION

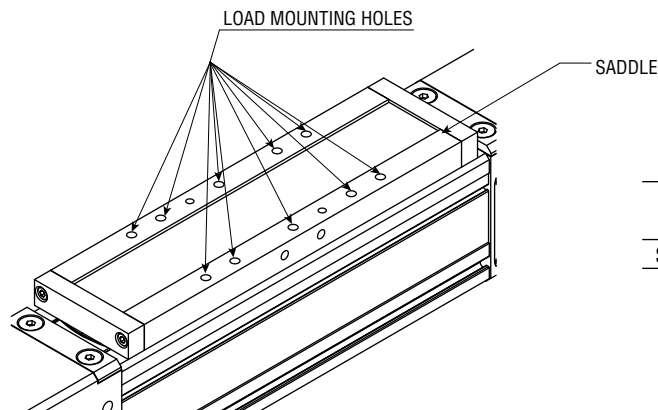
### START-UP PROCEDURE

- 1) The ESU Slide should be securely mounted before powering up the electric motor. When mounting the unit on your machine, apply the recommended fastener tightening torques as specified on page 5. For a list of available mounting options, refer to the End/Mid Supports options page in the product catalog.
- 2) Care should be taken to provide adequate space around the saddle and the attached load/tooling.
- 3) Make sure that the electric motor and the motor mount kit are securely mounted to the slide and fastened with recommended tightening torques.

### OPERATING CONDITIONS



- 1) It is strongly recommended that the Load/Tooling be fastened to the saddle using all ten threaded mounting holes as shown below. If the tooling is very long, a dual saddle should be used to prevent excessive overhang and corresponding bending moments.



PART DESCRIPTION	TORQUE in-lb [Nm]		
	55	56	58
SHCS for saddle to load	100 [11]	100 [11]	230 [26]



- 2) The mechanical stop for the saddle, on both ends of the slide, should **not** be used as the end of travel! Always add safe travel of about 25 to 50 mm on both ends to avoid accidental end of travel impact.



- 3) Use the "Load vs. Max Unsupported Length" chart on page 3 to calculate the need for mid supports. This is very important for proper functioning of the slide.
- 4) The maximum input torque and speed should not exceed the values specified in the engineering data on page 2.
- 5) Use ESU sizing software to select the right slide for your application. This will ensure that max moments and loads are not exceeded.
- 6) The slide is designed for use in a clean industrial environment. The design prevents any solid particles from entering the cylinder. Some indirect splashing of fluids is permitted. Consult factory for more details.

### MAINTENANCE

- 1) Under normal operating conditions, all the components of the ESU Slide are designed to last at least for 5000 km of life.
- 2) The linear guides and rail are factory lubricated for life.
- 3) If the stainless steel sealing band shows signs of excessive wear, it may require to be re-lubricated after 5000 km of life (see instructions on page 6). If required, replace the steel band.
- 4) Check the belt tension after 2500 km of life and re-tension the belt as per instructions on page 7.

For additional technical assistance, call or visit our website:

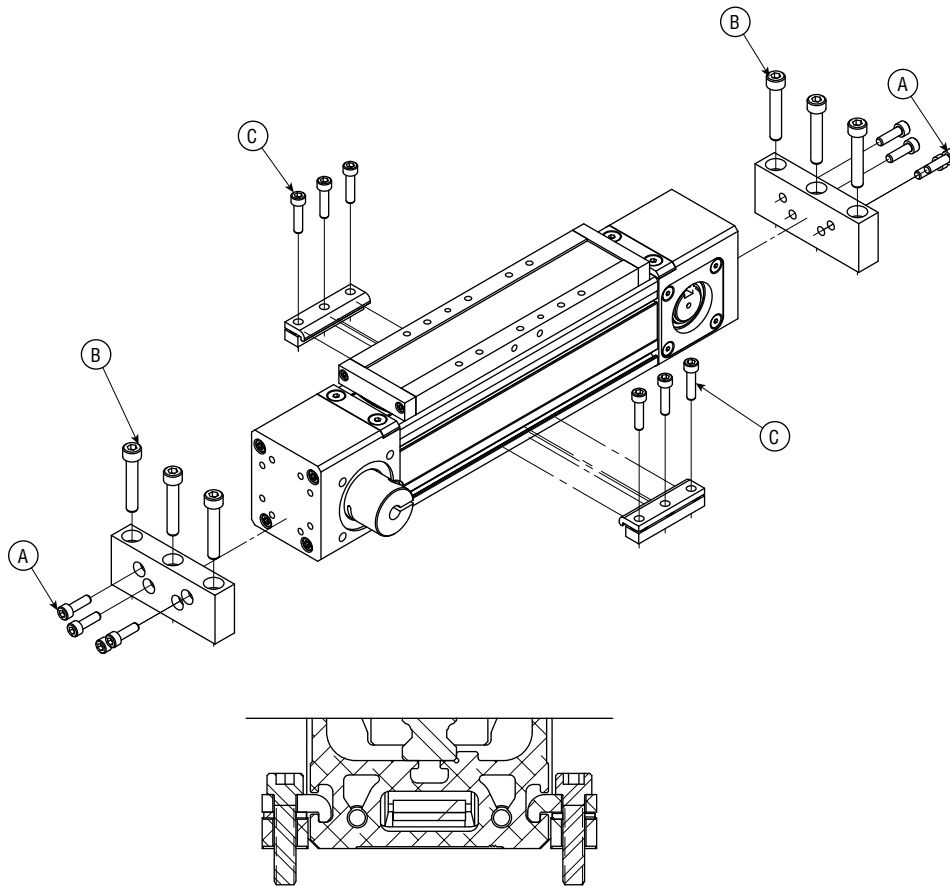
P.O. Box 9070, Fort Wayne, IN 46899  
**1-800-624-8511**  
**www.phdinc.com**

**phd,inc.**



# MOUNTING INSTRUCTIONS: SERIES ESU SLIDE - RT VERSION

## TIGHTENING TORQUES FOR KSxxx END/MID SUPPORTS



PART DESCRIPTION	FASTENER	TORQUE in-lb [Nm]		
		55	56	58
SHCS for KS1x1 End Supports	A (4 per side)	100 [11]	230 [26]	400 [45]
	B (3 per side)	230 [26]	400 [45]	400 [45]
SHCS for KSx1x Mid Supports	C (3 or 4 per side)	100 [11]	100 [11]	230 [26]

**NOTE:** PHD does not recommend only the use of mid supports for slide mounting. Utilize end supports when applicable.

### SUPPORT REPLACEMENT KITS

SUPPORT KITS	SIZE		
	55	56	58
Head or Cap	90036-01	90036-02	90036-03
Mid	90037-01	90037-02	90037-03

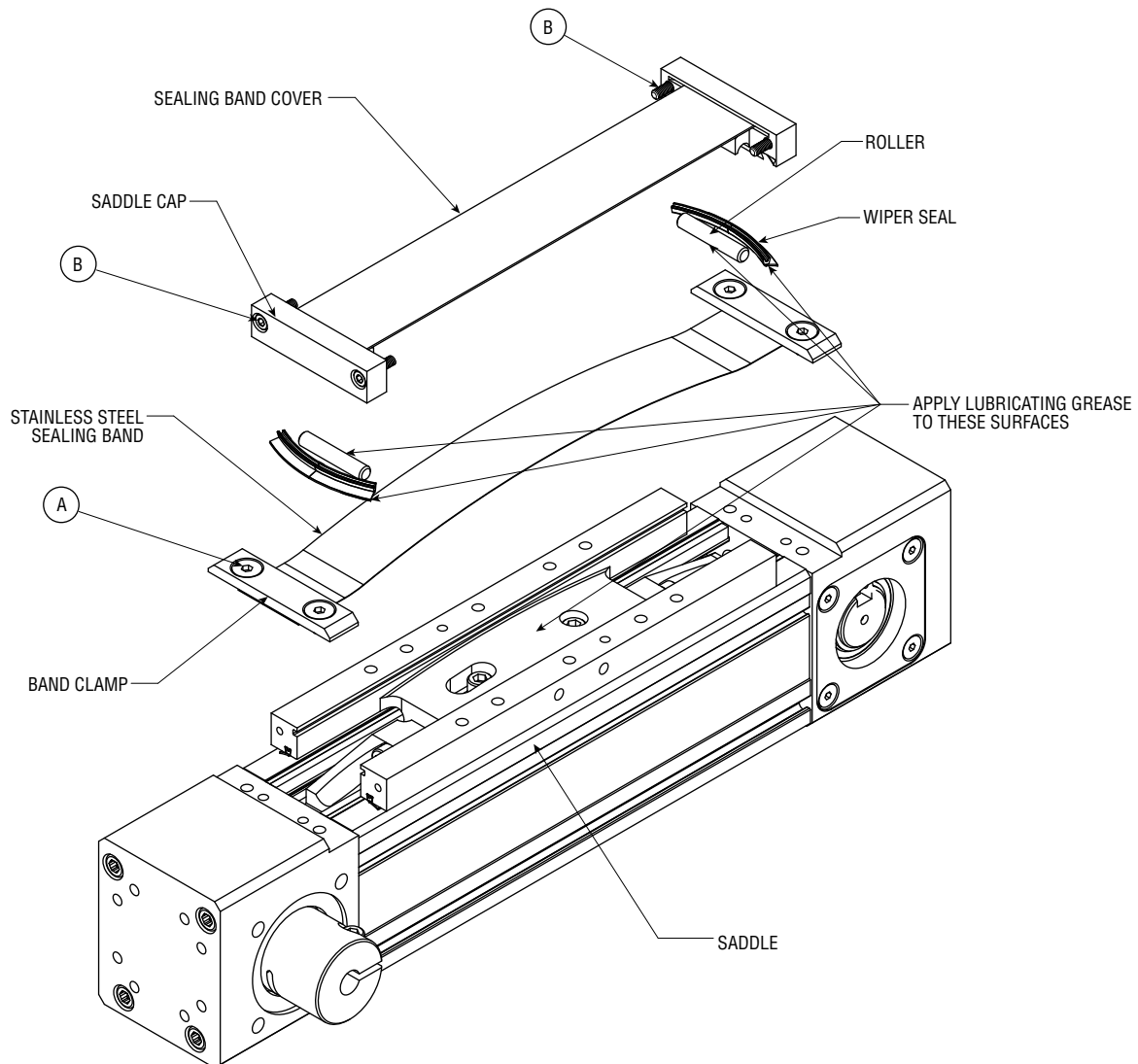
For additional technical assistance, call or visit our website:

P.O. Box 9070, Fort Wayne, IN 46899  
**1-800-624-8511**  
**www.phdinc.com**



## MAINTENANCE: SERIES ESU SLIDE - RT VERSION

### RELUBRICATING SADDLE/SEALING BAND



### RECOMMENDED GREASE: NYE RHEOLUBE 368 AX-1

- 1) Remove the four FHCS screws **A** and take off the band clamps.
- 2) Remove the four SHCS screws **B** to take off the saddle caps on both ends.
- 3) Pull the sealing band cover from the saddle and take off the sealing band.
- 4) Lubricate the convex surface of the saddle with recommended grease.
- 5) Also lubricate the wiper seals and plastic rollers in the saddle caps.
- 6) Reinstall one end of the sealing band using the band clamp and screws **A**, with a torque of 60 in-lb [6.7 Nm].
- 7) Place the sealing band over the saddle onto the other end of the slide. Install the saddle caps and the sealing band cover on the saddle. Tighten the four screws **B** to 40 [4.5], 80 [9], and 130 [15] in-lb [Nm] respectively for ESU sizes 55, 56, and 58.
- 8) Reinstall the other end of the sealing band using screws **A** with a torque of 60 in-lb [6.7 Nm].

For additional technical assistance, call or visit our website:

P.O. Box 9070, Fort Wayne, IN 46899  
**1-800-624-8511**  
**www.phdinc.com**



## MAINTENANCE: SERIES ESU SLIDE - RT VERSION

### TIMING BELT RETENSIONING

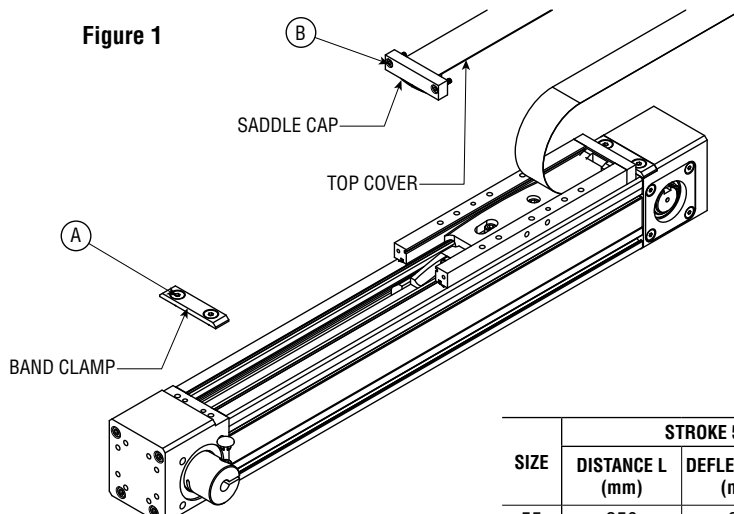
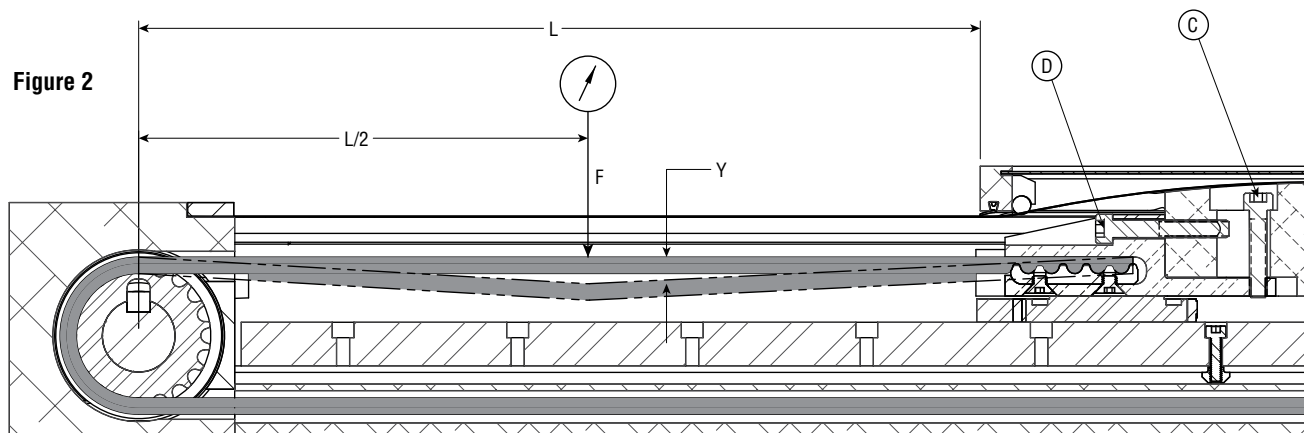


TABLE 1

SIZE	STROKE 50 TO 499 mm			STROKE 500 mm TO MAX		
	DISTANCE L (mm)	DEFLECTION Y (mm)	APPLIED FORCE lb [N]	DISTANCE L (mm)	DEFLECTION Y (mm)	APPLIED FORCE lb [N]
55	250	3.5	9 [40]	500	7	9 [40]
56	250	3.5	16 [70]	500	7	16 [70]
58	250	3.5	30 [130]	500	7	30 [130]



- 1) Move the saddle to 500 mm [19.6 in] from the motor end as shown above. If the total travel is less than 500 mm, move the saddle to 250 mm [9.8 in] from the motor end.
- 2) Remove the band clamp screws **A**, along with the saddle cap screws **B** as shown in Figure 1. Fold the sealing band over (as shown) to access the belt tensioning system.
- 3) On the belt, locate the distance  $L/2$  (halfway between saddle and motor end, see Figure 1).
- 4) Using a force gauge, measure the push force **F** required to deflect the belt by distance **Y** on the belt as shown in Figure 2 at the distance  $L/2$ .
- 5) If the applied force to move the belt distance **Y** is less than the force **F** in Table 1, belt tensioning is required.
- 6) To tension the belt, loosen screw **C**. Next, tighten screw(s) **D** to increase the belt tension as shown in Figure 2 until Force **F** equals the Applied Force value in Table 1 for the respective size.
- 7) Next, tighten the SHCS **C** to [130 in-lb] 15 Nm on ESU sizes 55 and 56. Size 58 does not have screw **C**.
- 8) Replace the saddle caps and sealing band cover, tighten the screws **B** to 40 [4.5], 80 [9], and 130 [15] in-lb [Nm] respectively for ESU sizes 55, 56, and 58.
- 9) Replace the sealing band using the screws **A** with a torque of 60 in-lb [6.7 Nm].

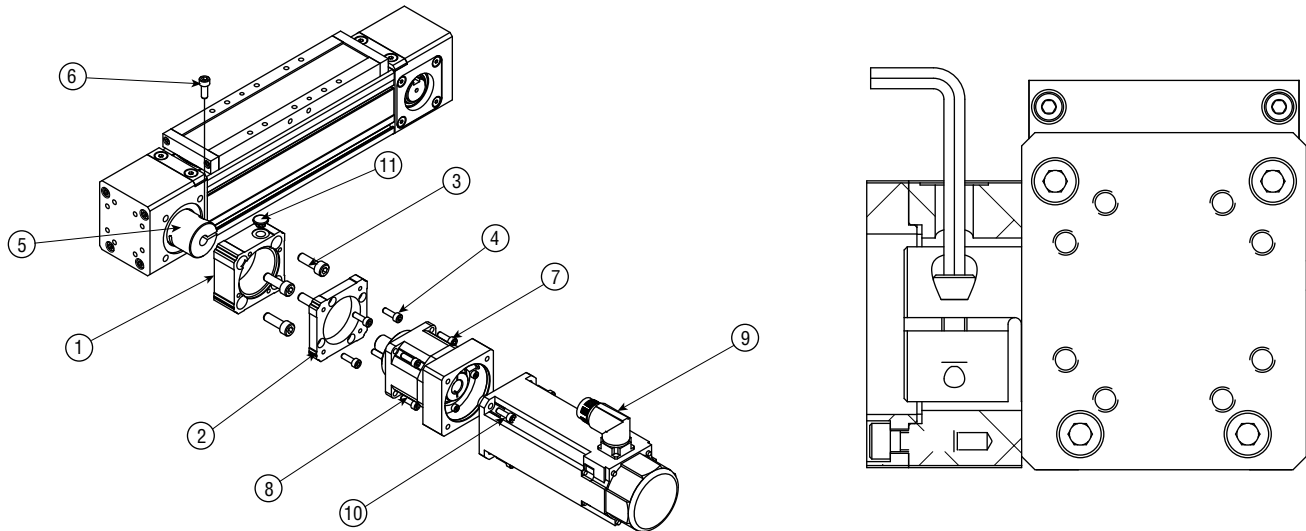
For additional technical assistance, call or visit our website:

P.O. Box 9070, Fort Wayne, IN 46899  
**1-800-624-8511**  
**www.phdinc.com**



## MOTOR MOUNTS: SERIES ESU SLIDE - RT VERSION

### QL11: INLINE MOTOR MOUNT OPTION



KEY	DESCRIPTION	QTY	TORQUE in-lb [Nm]		
			55	56	58
1	COUPLING HOUSING	1	-	-	-
2	GEAR REDUCER/MOTOR MOUNTING PLATE	1	-	-	-
3	BRITE ZINC PLATE (SHCS, LHCS) METRIC FASTENERS	4	28 [250]	28 [250]	45 [400]
4	BRITE ZINC PLATE (SHCS) METRIC FASTENERS	4	9 [80]	15 [130]	28 [250]
5	SHAFT COUPLING (INTEGRAL WITH DRIVE SHAFT)	1	-	-	-
6	BRITE ZINC PLATE (SHCS) METRIC FASTENERS	1	16 [140]	16 [140]	39 [345]
7	BRITE ZINC PLATE (SHCS) METRIC FASTENERS	4	see note below		
8	GEAR REDUCER (IF NEEDED)	2	-	-	-
9	ELECTRIC MOTOR		-	-	-
10	BRITE ZINC PLATE (SHCS) METRIC FASTENERS	4	see note below		
11	HOLE PLUG	1	-	-	-

**NOTE:** THE TORQUE FOR THESE SCREWS WILL DEPEND ON THE SCREW SIZES ON YOUR MOTOR/GEAR REDUCER.

- 1) Using the four screws **3**, fasten the housing **1** to the slide and tighten to the recommended torque.
- 2) Mount the mounting plate **2** to the housing **1** using the four fasteners **4** and tighten to the recommended torque.
- 3) **Important:** Rotate the slide 90 degrees, such that the shaft coupling **5** is facing upwards. This will ensure that the gear reducer/motor shaft is allowed to self-align with coupling **5**.
- 4) Insert the gear reducer/motor carefully through the gear reducer/motor mounting plate **2** to allow the shaft to be inserted in the coupling **5**. You may have to apply some force to fully insert the shaft in the coupling.
- 5) With the flange on the gear reducer/motor in contact with the mounting plate **2**, use the mounting screws **7** to fasten the motor to the mounting plate **2**.
- 6) To tighten coupling screw **6**, align the head of this screw with the hole in the coupling housing as shown in the view above by moving the saddle to the left or right, which rotates the coupling. Tighten the screw **6** to the recommended torque.
- 7) Plug the hole on the coupling housing using the plastic plug **11**.
- 8) Repeat steps 4 to 7 for the motor, if this is a gear reducer and motor combination.

For additional technical assistance, call or visit our website:

P.O. Box 9070, Fort Wayne, IN 46899  
**1-800-624-8511**  
**www.phdinc.com**

**phd,inc.**