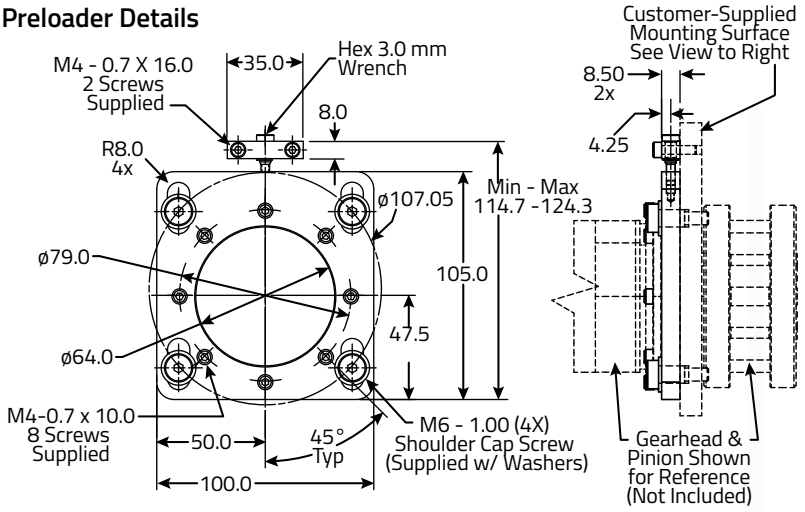
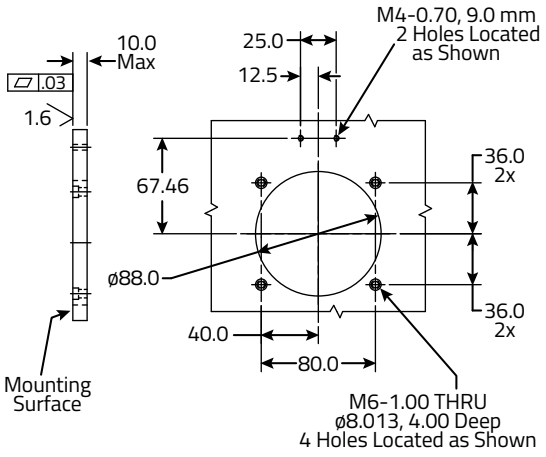
RPS-PRE-ISO-064-3 Product Number 960851

Preloader Details

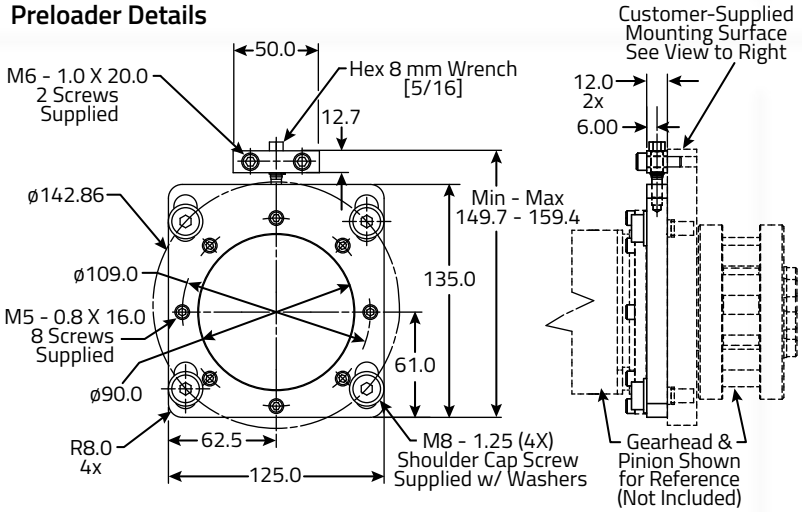


Customer Mounting Surface Details

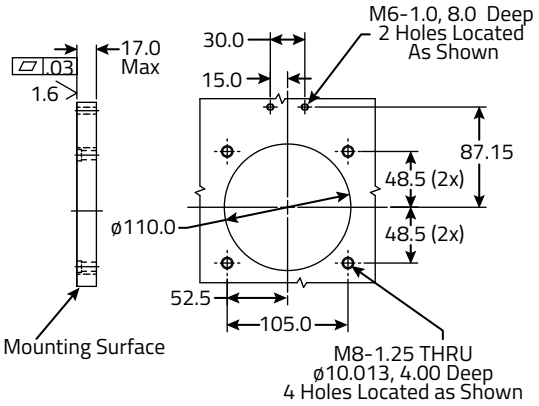


RPS-PRE-ISO-090-3 Product Number 960850

Preloader Details

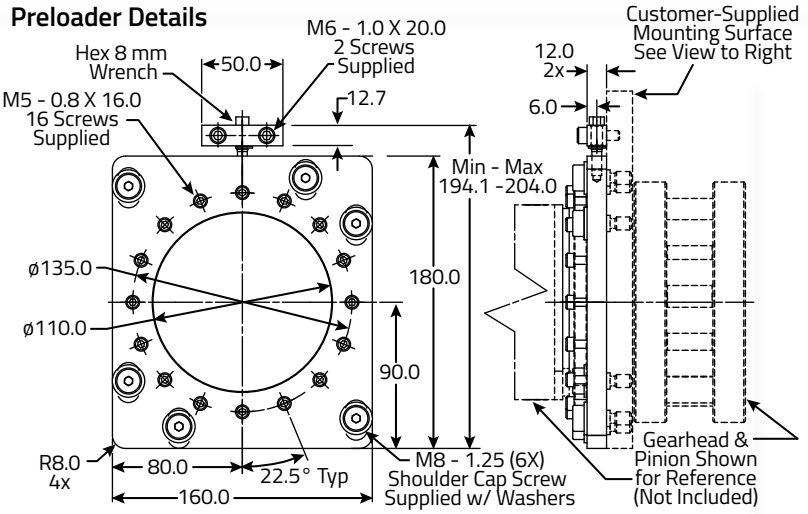


Customer Mounting Surface Details

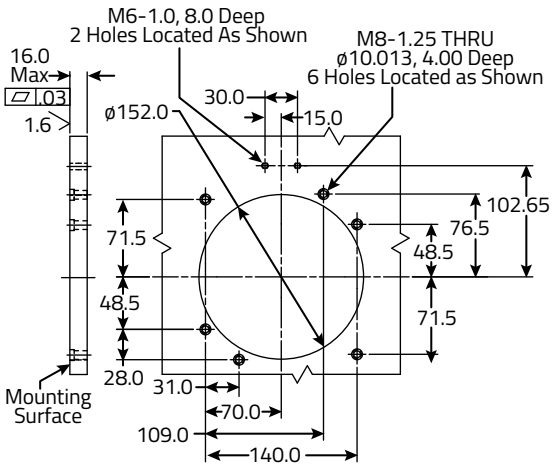


RPS-PRE-ISO-110-3 Product Number 960852

Preloader Details



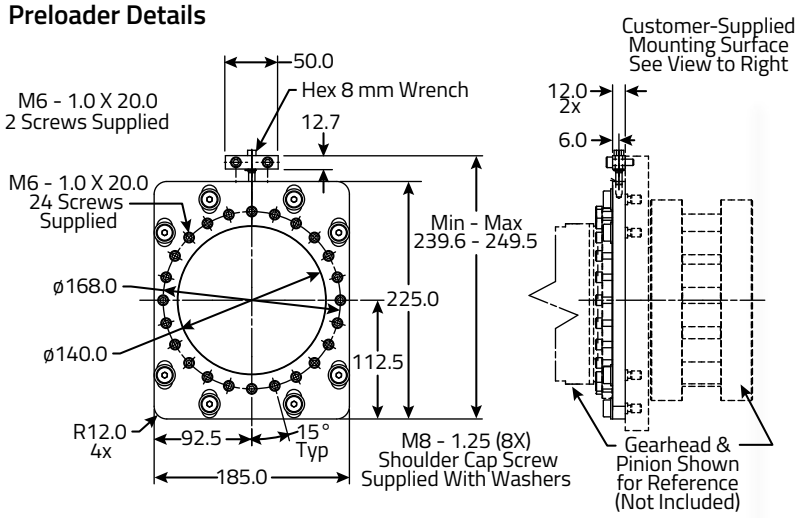
Customer Mounting Surface Details



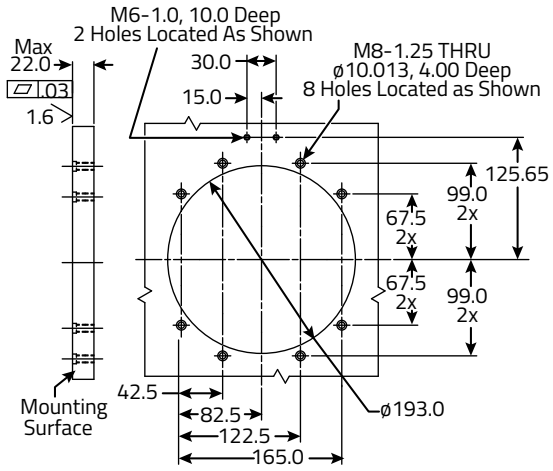
Preloader Dimensions

RPS-PRE-ISO-140-3 Product Number 960853

Preloader Details

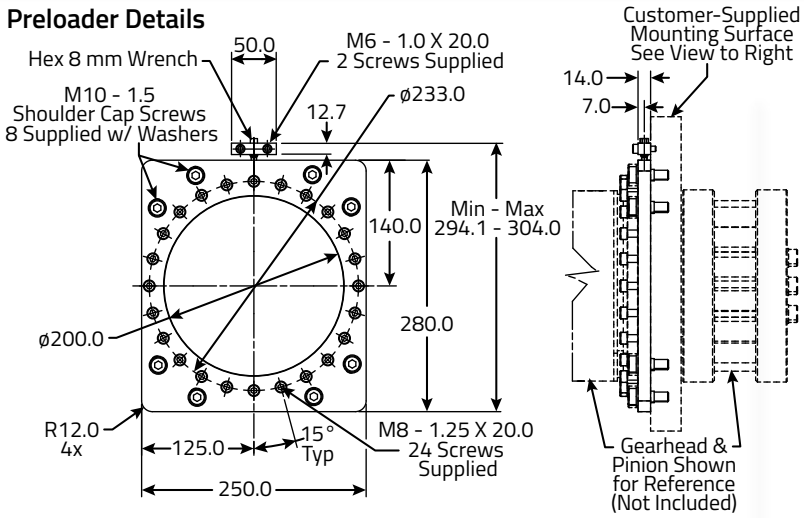


Customer Mounting Surface Details

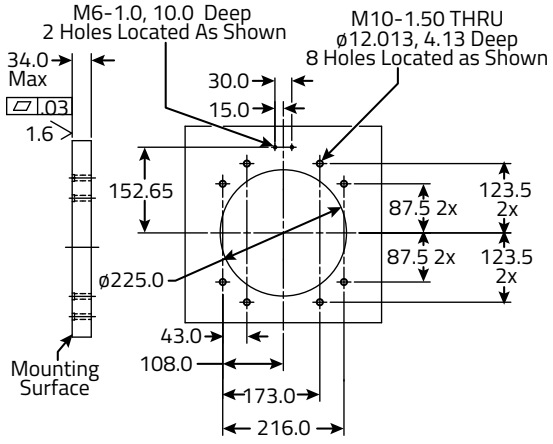


RPS-PRE-ISO-200-3 Product Number 960854

Preloader Details



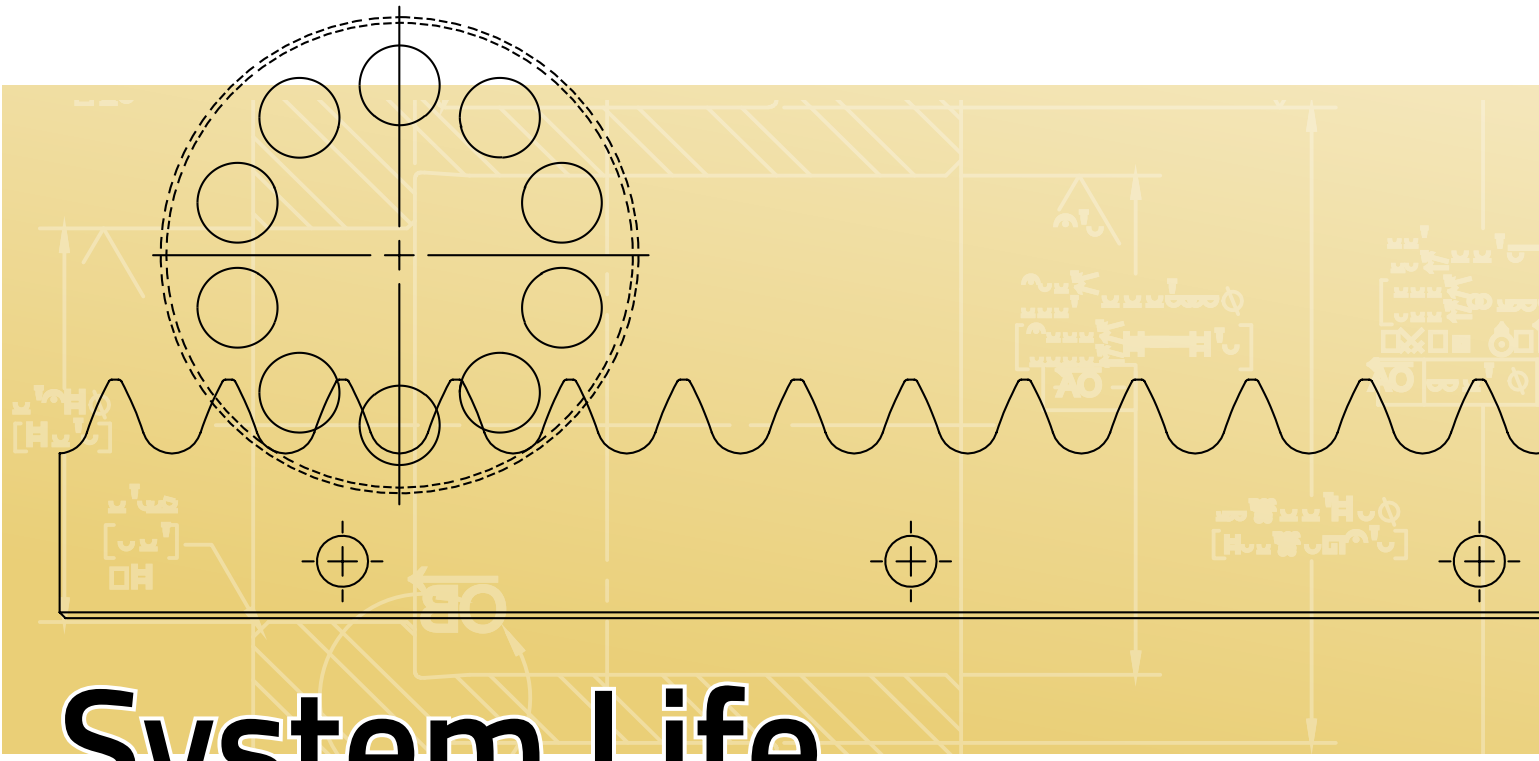
Customer Mounting Surface Details



nexen

Roller Pinion System Life

The RPS system offers an efficiency greater than 99% with a long life of up to 60,000,000 pinion revolutions (up to 36 million meters of travel). Typically the rack/gear lasts through several pinion changes.



System Life

Calculating RPS System Life

The calculations in the following section will allow you to calculate the expected rack and pinion life. These calculations will result in the same values as the charts on the following pages.

RPS Pinion Life Data & Calculations

Table 7 - RPS Pinion Life Values

		RPS10	RPS12	RPS16		RPS20		RPS25		RPS32	RPS40
				Premium	Value	Premium	Value	Premium	Value		
Max Torque (T_{max})	**Nm**	4.0	9.5	61.1	12.8	92.3	23.9	159.2	43.8	641.5	1375.2
Torque at Max Life (T_{final})	**Nm**	4.0	9.5	33.7	12.8	52.5	23.9	89.5	43.8	366.6	1146
Distance Per Revolution (L_{rev})	**m**	0.1	0.12	0.16	0.16	0.2	0.2	0.25	0.25	0.384	0.48
Transition Point (E_T)	**million contacts**	60	60	8	2	8.2	2	8.5	2	9.4	32
Max Life ($N_{max\ contacts}$)	**million contacts**	60	60	60	2	60	2	60	2	60	60
Constant (C)		NA	NA	115.30	NA	179.43	NA	305.91	NA	1255.14	3916.09

Step 1: Gather Application Data
Before you begin calculations, there are three key measurements that you will need from your application. Collect the data and record it in space provided to the right.

Measurements Required for Pinion Calculations	Customer Data (record your values below)	Sample Data
Average Torque (T_{avg})	Nm	85 Nm
Distance Per Cycle (L) (single direction move)	m	1.3 m
Average Speed (V_{avg})	m/s	2 m/s

Step 2: Calculate The Total Number of Pinion Contacts ($N_{contacts}$)
Perform the following calculations using the data collected from your application data in Step 1.

Pinion Roller Contacts ($N_{contacts}$)

The total number of roller contacts ($N_{contacts}$) that an RPS Pinion can sustain before needing replacement is based on the average torque of your application. Determine which equivalency or inequality statement below is true for the average torque (T_{avg}) of your application. Then complete the corresponding pinion roller contact equation and record your value below.

If T_{avg} is:	Then $N_{contacts}$:
$\leq T_{final}$	$= N_{max\ contacts}$
$> T_{final}$ and $< T_{max}$	$= (C \div T_{avg})^{3.333} = \left(\quad \div \quad \text{Nm} \right)^{3.333}$
$= T_{max}$	$= E_T$

Pinion Life in Roller Contacts	
$N_{contacts} =$	million contacts

Sample: (Evaluating RPS20 size) $N_{contacts} = (179.43 \div 85\ Nm)^{3.333} = 12$ million contacts

Step 3: Convert Roller Contacts To Hours, Meters Or Revolutions

There are two options for converting contacts to other units: exact and estimated. Exact should be used whenever possible. The estimation is available for customers who do not have a well-defined distance per cycle.

Exact option: Pinion Life in Hours (N_{hours})

Use Table 7 along with the data you collected above to calculate the total number of service hours your pinion can provide before needing replacement. First calculate E_1 to use in the N_{hours} equation.

$E_1 = L \div L_{rev}$ $\quad E_1 =$ round up (____ m ÷ ____ m) = ____

Must round E_1 up to the nearest whole integer

Sample: $E_1 = 1.3\text{ m} \div 0.2\text{ m} = 6.5\text{ m} \longrightarrow$ Round up to 7.

$N_{hours} = (N_{contacts} \bullet 10^6 \bullet L) \div (3600 \bullet E_1 \bullet V_{avg})$

$N_{hours} =$ (____ million contacts $\bullet\ 10^6 \bullet$ ____ m) ÷ (3600 $\bullet$ ____ $\bullet$ ____ m/s)

Pinion Life in Hours

$N_{hours} =$ ____ hrs

Sample: $N_{hours} = (12 \bullet 10^6 \bullet 1.3\text{ m}) \div (3600 \bullet 7 \bullet 2\text{ m/s}) = 309.5\text{ hrs}$

Estimation Options: Pinion Life in Meters and Life in Revolutions

These calculations assume the pinion travels nonstop in one direction throughout its whole life.

Pinion Life in Meters (N_{meters})

$N_{meters} = N_{contacts} \bullet L_{rev} \bullet 10^6$ $\quad N_{meters} =$ ____ $\bullet$ ____ m $\bullet 10^6$

Pinion Life in Meters

$N_{meters} =$ ____ m

Sample: $N_{meters} = 12 \bullet 0.2\text{ m} \bullet 10^6 = 2{,}400{,}000\text{ m}$

Pinion Life in Revolutions (N_{rev})

$N_{rev} = N_{contacts}$

Pinion Life in Revolutions

$N_{rev} =$ ____ million revolutions

Sample: $N_{rev} = 12$ million revolutions

Table 8 - RPS Rack Life Values

	RPS Rack Size	RPS10	RPS12	RPS16	RPS20	RPS25	RPS32	RPS40
	Pitch (P) meters	0.01	0.012	0.016	0.02	0.025	0.032	0.04
	Distance Per Revolution (L_{rev}) meters	0.1	0.12	0.16	0.2	0.25	0.384	0.48
Premium & Standard	Max Dynamic Thrust (F_{max}) N	250	500	2400	2900	4000	10500	18000
	Thrust at Max Life (F_{final}) N	250	500	1000	1500	2200	6000	15000
	Transition Point (E_T) million contacts	30	30	5	5	5	5	5
	Max Life ($N_{max\ contacts}$)	30 Million Contacts						
	Slope (m)	NA	NA	-56	-56	-72	-180	-120
	Intercept (b) N	NA	NA	2680	3180	4360	11400	18600
Endurance	Max Dynamic Thrust (F_{max}) N	NA	NA	1500	2250	3300	5 400	6000
	Thrust at Max Life (T_{final}) N	NA	NA	1000	1500	2200	3600	6000
	Transition Point (E_T) million contacts	NA	NA	5	5	5	5	30
	Max Life ($N_{max\ contacts}$)	NA	NA	30 Million Contacts				
	Slope (m)	NA	NA	-20	-30	-44	-72	NA
	Intercept (b) N	NA	NA	1600	2400	3520	5760	NA
Universal & Universal Stainless	Max Dynamic Thrust (F_{max}) N	NA	NA	750	1125	1650	2700	4500
	Thrust at Max Life (F_{final}) N	NA	NA	750	1125	1650	2700	4500
	Max Life ($N_{max\ contacts}$)	NA	NA	5 Million Contacts				2 Million Contacts

RPS Rack Life Calculations

Step 1: Gather Application Data

Before you begin calculations, there are three key measurements that you will need from your application. Collect the data and record it in space provided below.

Measurements Required for Rack Calculations	Customer Data (Record your values below)	Sample Data
Average Thrust Force (F_{avg})	N	2500 N
Distance Per Cycle (L) (single direction move)	m	1.3 m
Average Speed (V_{avg})	m/s	2 m/s

Step 2: Calculate The Total Number of Tooth Contacts

Perform the following calculations using the data collected from your application and the values from Table 8.

Rack Tooth Contacts ($N_{contacts}$)

The total number of tooth contacts ($N_{contacts}$) that an RPS Rack can sustain before needing replacement is based on the average thrust force of your application. Use Table 5 to determine which equivalency or inequality statement below is true for the average thrust force (F_{avg}) of your application. Then complete the corresponding rack tooth contact formula and record your value below.

If F_{avg} is:	Then $N_{contacts}$:
$\leq F_{final}$	$= N_{max\ contacts}$
$> F_{final}$ & $< F_{max}$	$= (F_{avg} - b) \div m =$ (N – N) ÷
$= F_{max}$	$= E_T$

Rack Life in Tooth Contacts	
$N_{contacts} =$	million contacts

Sample: (Evaluating RPS20 size) $N_{contacts} = (2500\ N - 3180) \div -56 = 12$ million contacts

Step 3: Convert Rack Tooth Contacts to Hours of Life

Perform the following calculations using the data collected from your application and the values from Table 5.

Rack Life in Hours (N_{hours})

$$N_{hours} = (N_{contacts} \div 3600) \bullet (L \div V_{avg}) \bullet 10^6$$

$$N_{hours} = (\quad \div 3600) \bullet (\quad m \div \quad m/s) \bullet 10^6$$

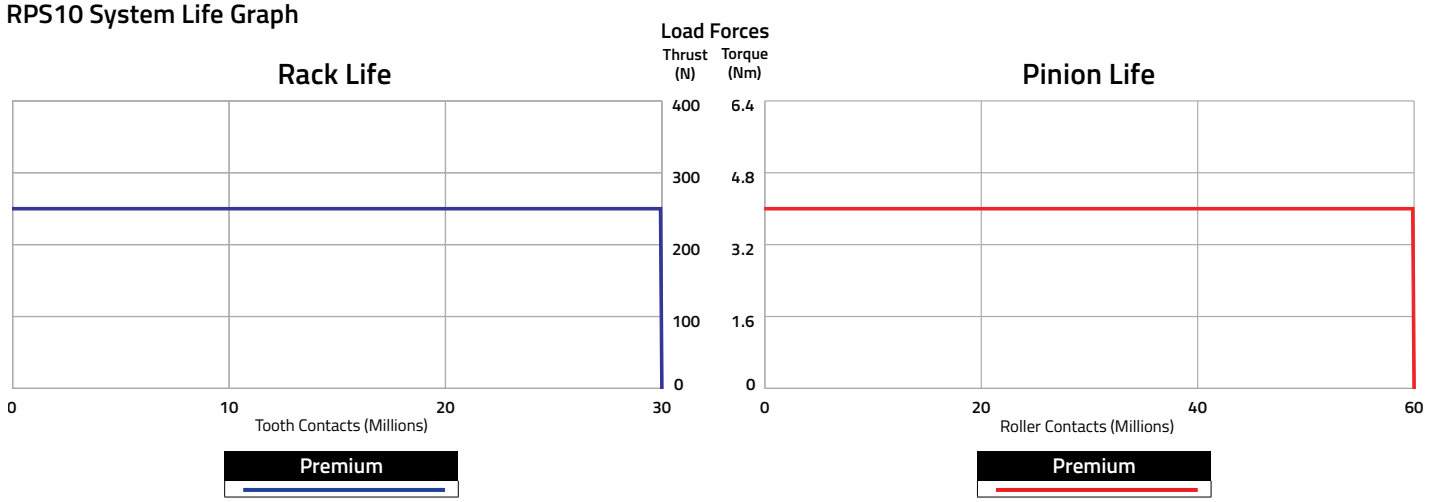
Rack Life in Hours	
$N_{hours} =$	hours

Sample: $N_{hours} = (12 \div 3600) \bullet (1.3\ m \div 2\ m/s) \bullet 10^6 = 2166$ hours

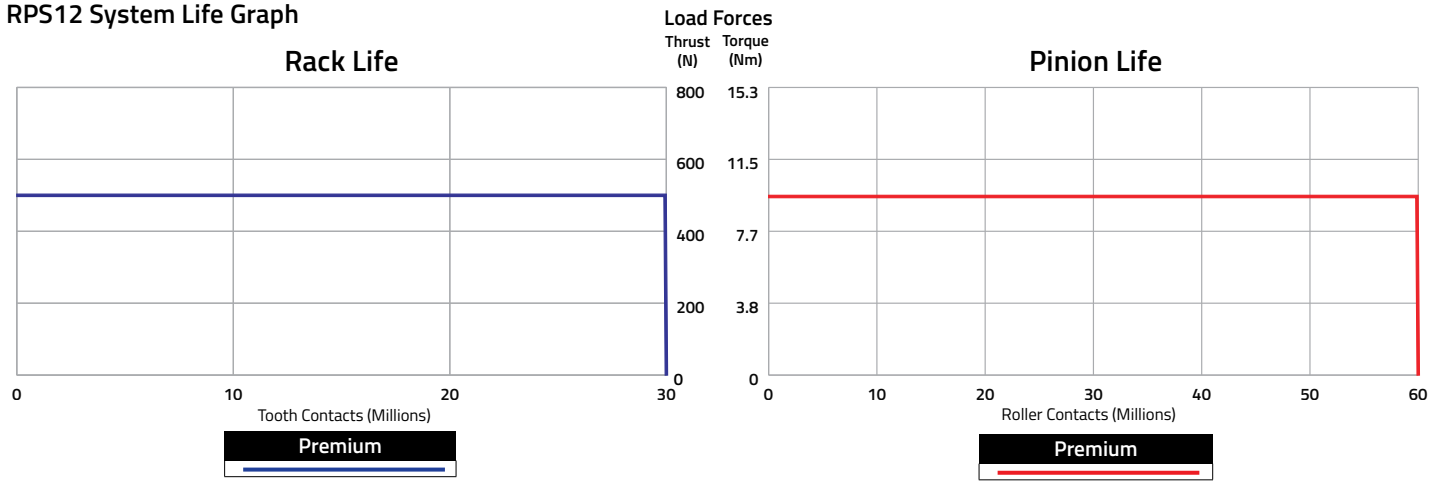
RPS System Life Graphs (RPS10, 12 and 16)

The RPS system life ratings are based on the force of the load. Refer to the following graphs to determine the pinion and rack life based on your application load forces. Graphs show the thrust along side the corresponding torque to more easily calculate your complete system life. Typically the pinion can be replaced numerous times before replacing the rack.

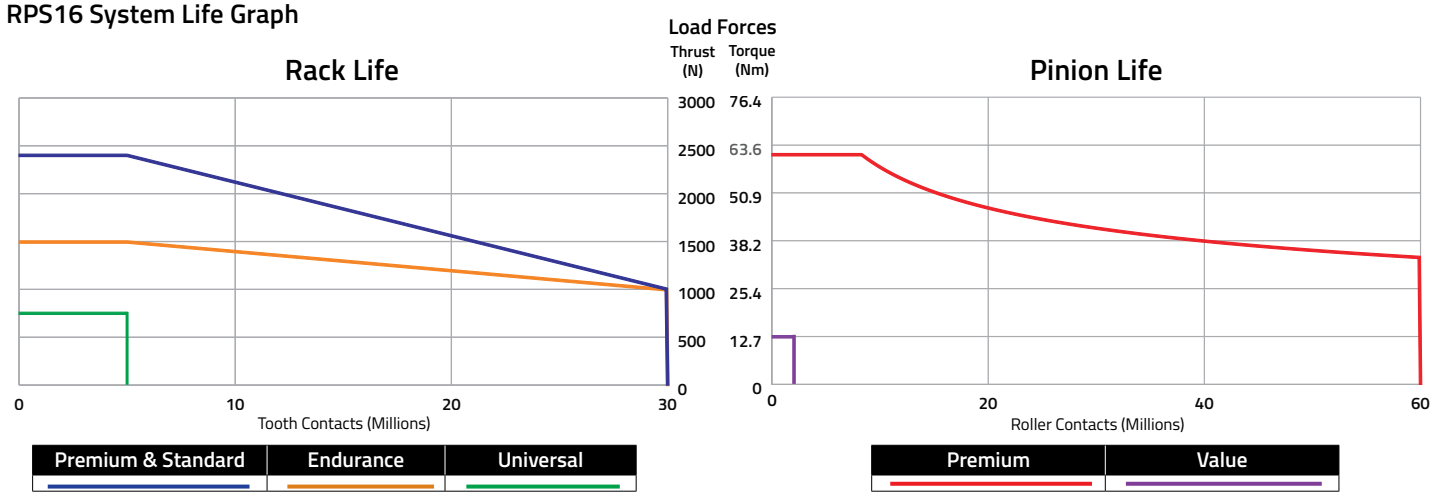
RPS10 System Life Graph



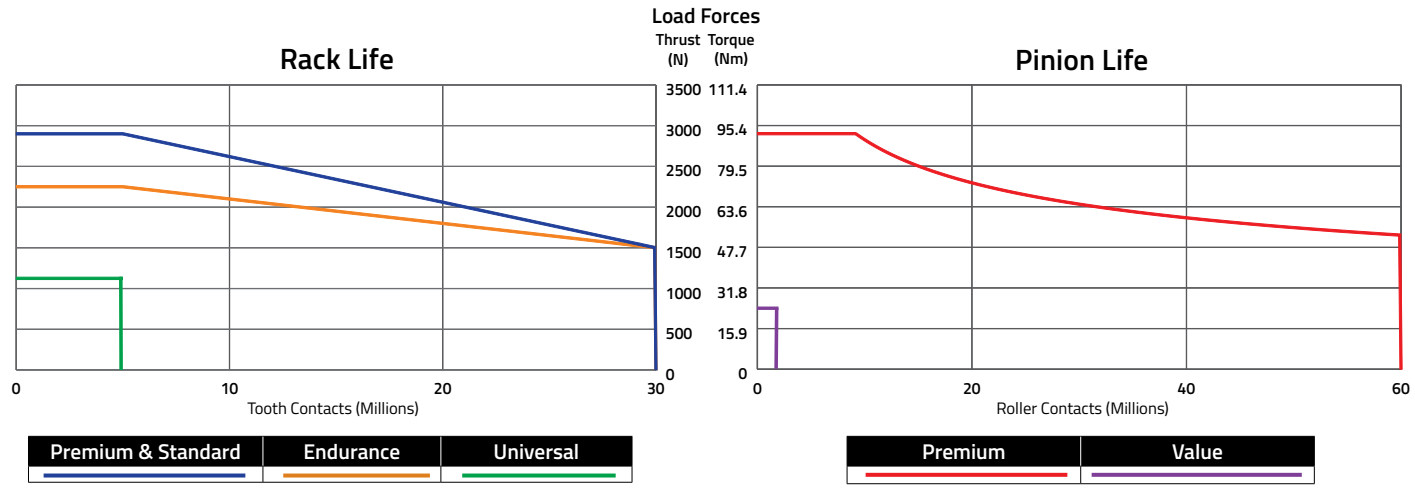
RPS12 System Life Graph



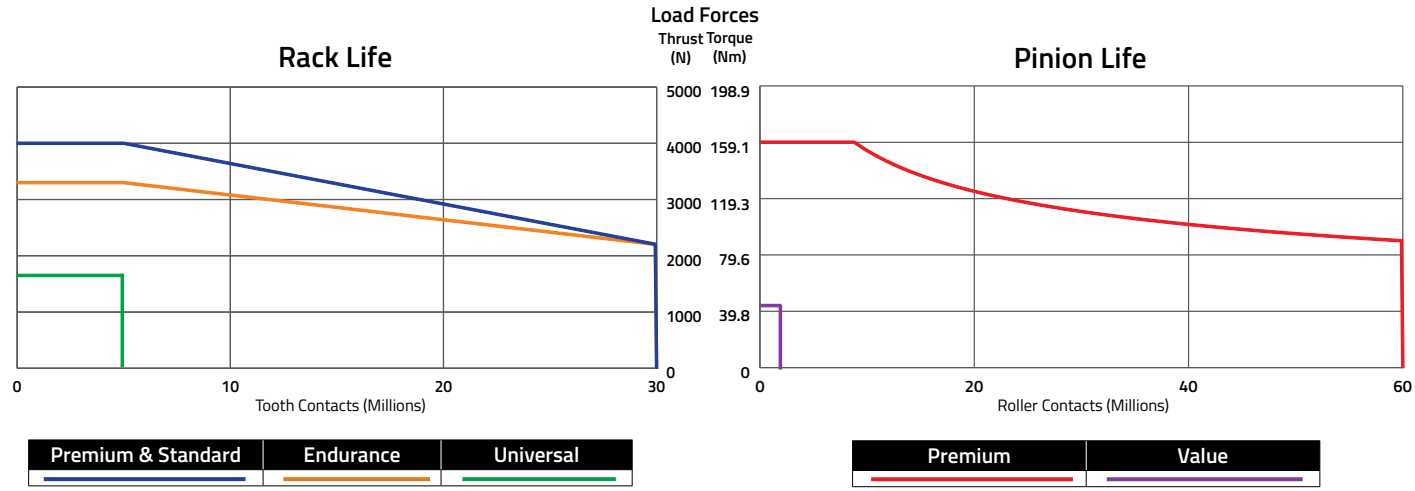
RPS16 System Life Graph



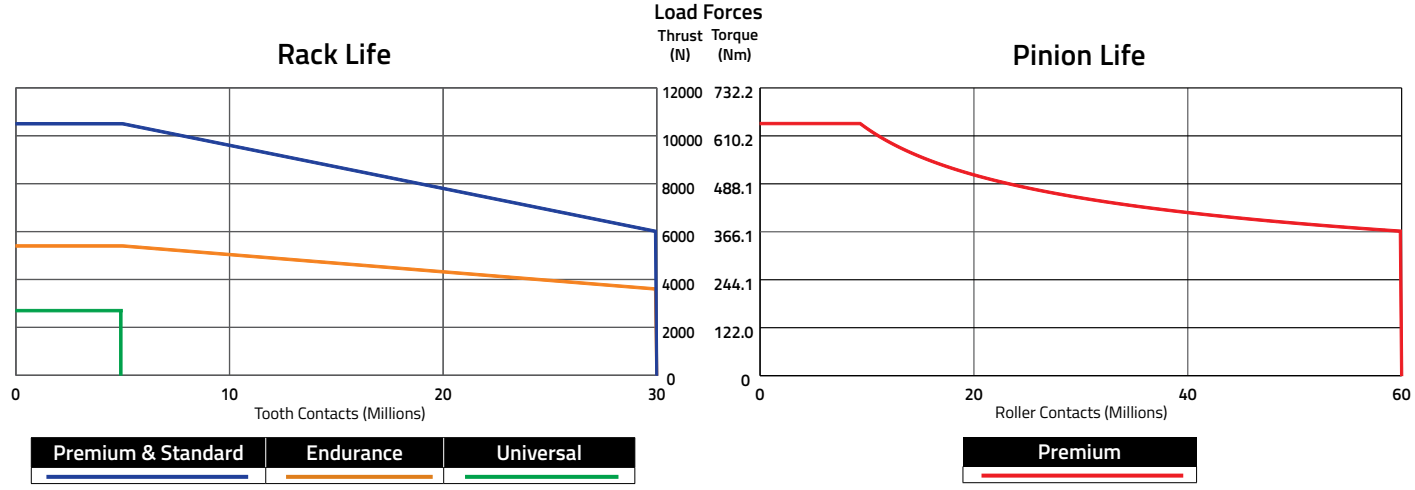
RPS20 System Life Graph



RPS25 System Life Graph

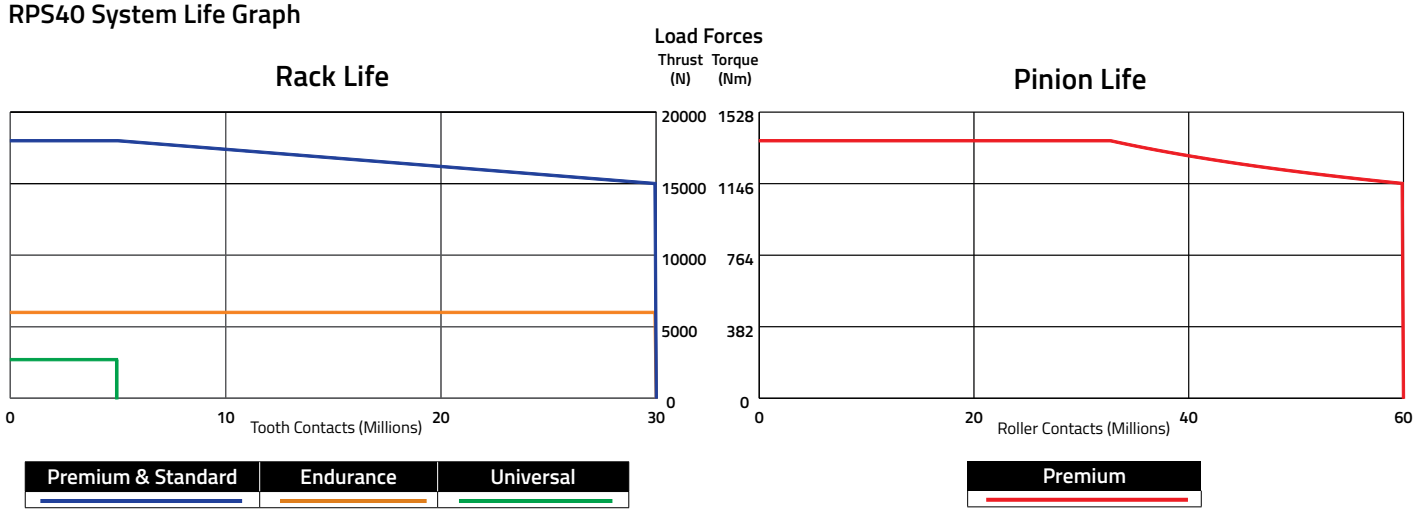


RPS32 System Life Graph



RPS System Life Graphs (RPS40)

RPS40 System Life Graph



Notes