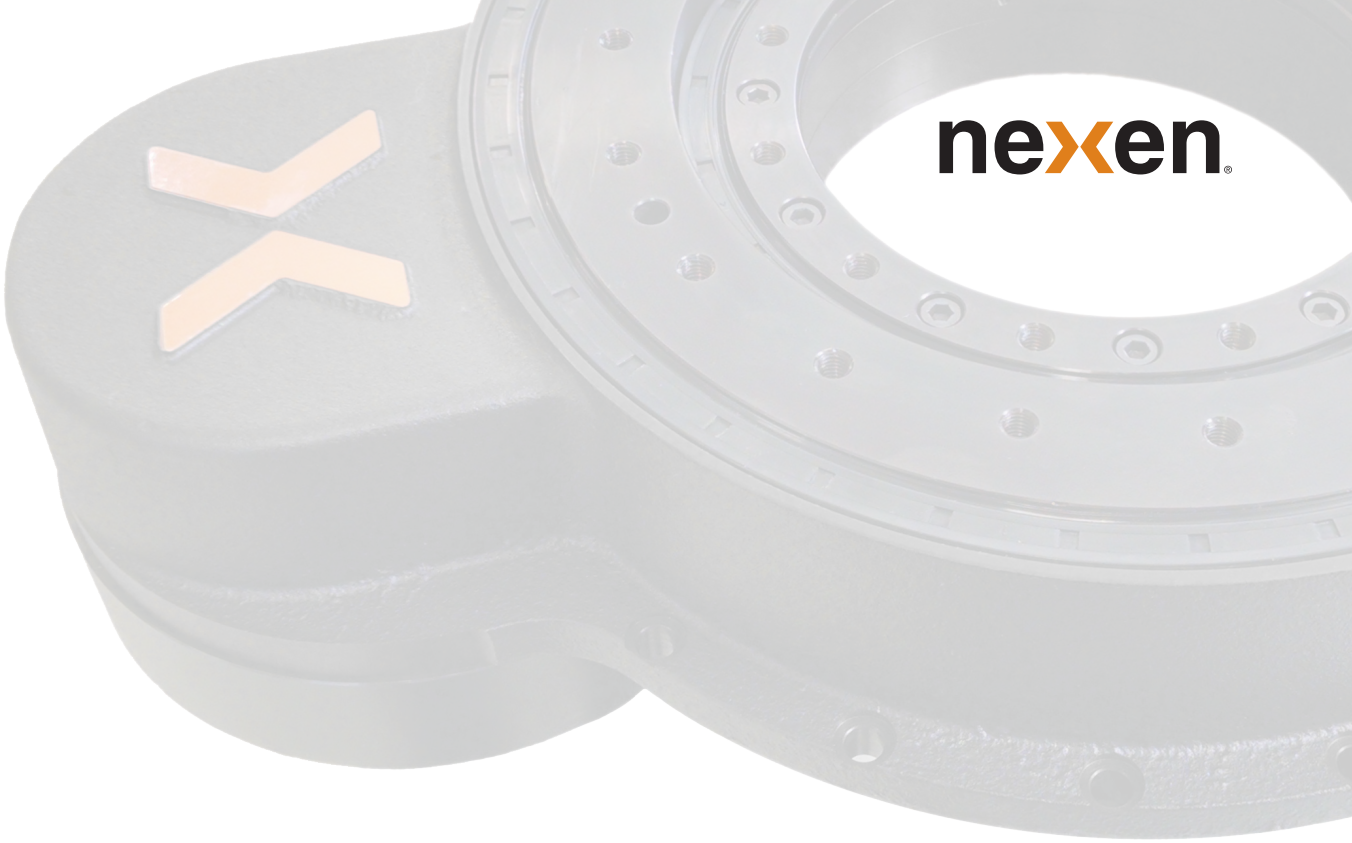


PRECISION RING DRIVE SYSTEMS

Based on Nexen's innovative Roller Pinion technology, Nexen Ring Drive Systems come complete with a precision grade, high capacity bearing and drive mechanism in a rigid housing. With options for high speed, high torque and zero backlash, Nexen Ring Drives can be optimized for every application. With accelerations up to twice as high as other indexing technologies, Nexen Ring Drive systems provide more productivity while boasting low maintenance, high efficiency and long life.

CE RoHS compliant

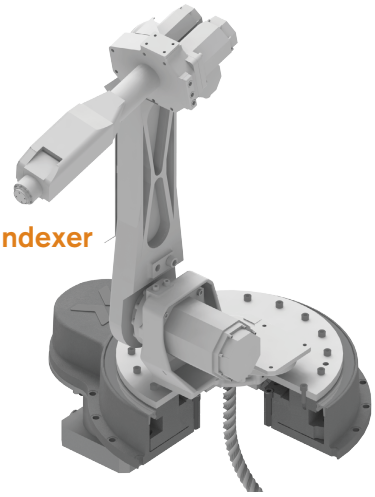
PATENTED

The Nexen Ring Drive Advantage

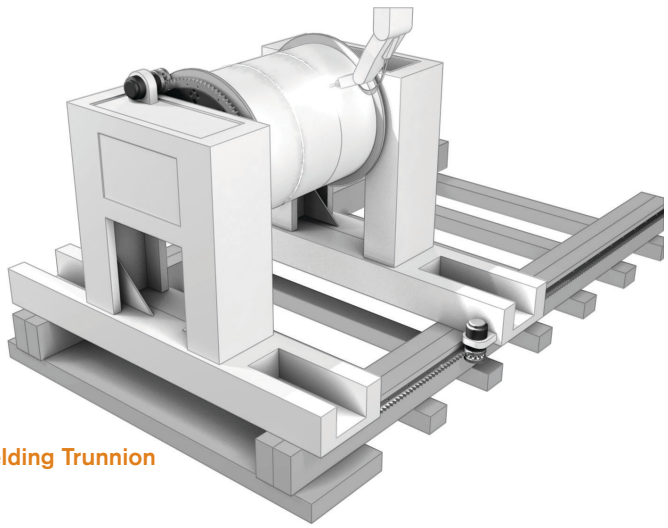
Based on Nexen's innovative Roller Pinion technology, Nexen Ring Drive (CRD & PRD) systems come complete with a precision grade bearing and drive mechanism in a rigid housing to simplify the selection process.
With all the great features of our other advanced RPS technology, the Ring Drives open up new design possibilities to next generation machines.

- **High Indexing Precision**
  With an indexing precision up to ± 11 ArcSec and repeatability up to ± 1.2 ArcSec, Nexen's Ring Drives offer unmatched mechanical system capabilities.
- **Zero Backlash**
  Unlike other mechanical drive systems, the CRD offers zero backlash options from the motor through the driven load.
- **High Load Capacity**
  With the precision grade, high load capacity cross-roller bearing, Nexen Ring Drives can handle loads up to 1575 kN.
- **High Speed**
  Nexen Ring Drives can handle speeds up to 225 RPM. Unlike traditional cam driven systems, Nexen Ring Drives can handle peak torque inputs at any time. This allows for indexing times up to 2x faster than the competition.
- **Smooth in Motion**
  Combining Nexen's RPS technology with a preloaded cross-roller bearing and an integrated motor/precision gearhead gives a rigid, smooth system.
- **High Torque Holding**
  With the optional zero backlash holding brake, the CRD can hold loads up to 800 Nm (available on CRD250, larger sizes pending) while still maintaining an open center.

DEPENDABLE. VERSATILE.
OPTIONS THAT DELIVER.



Robot Indexer



Welding Trunnion

Positioning • Semiconductors • Medical Products • Robotics

CRD: A DRIVE STATION FOR EVERY APPLICATION

High Precision Planetary (PL) ›››

HIGH TORQUE • HIGH SPEED
LOW BACKLASH
FLEXIBLE GEARHEAD RATIO

‹‹‹ Harmonic Gearhead (HG)

HIGH TORQUE • LOW SPEED
ZERO BACKLASH
HIGH RATIO GEARHEAD

Direct Drive Pinion (DD) ›››

HIGH SPEED • MID TORQUE
ZERO BACKLASH
INTEGRATED MOTOR
NO GEARHEAD

Output (Dial) Plate Bolt Circle Diameters: ›››
250 mm, 350 mm, 550 mm

Peak Output Torque: ›››
250 Nm, 350 Nm, 550 Nm

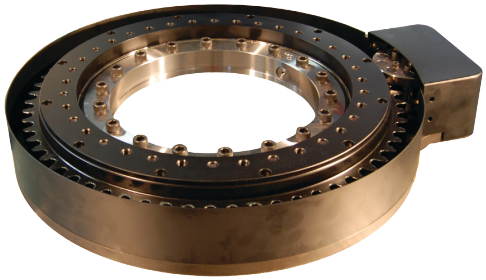
Positional Accuracy: ›››
± 20 to 59 ArcSec

Max Backlash: ›››
± 0 to 20.3 ArcSec

Input to Output Speed Ratio: ›››
6.2:1 to 2460:1

IP 65 Rated Sealed Housing ›››

PRD: CAPACITY EVEN FOR THE MOST DEMANDING



High Precision Planetary

HIGH TORQUE • HIGH SPEED
LOW BACKLASH
FLEXIBLE GEARHEAD RATIO

‹‹‹ Output (Dial) Plate Bolt Circle Diameters:
400 mm, 750 mm, 1100 mm, 1500 mm

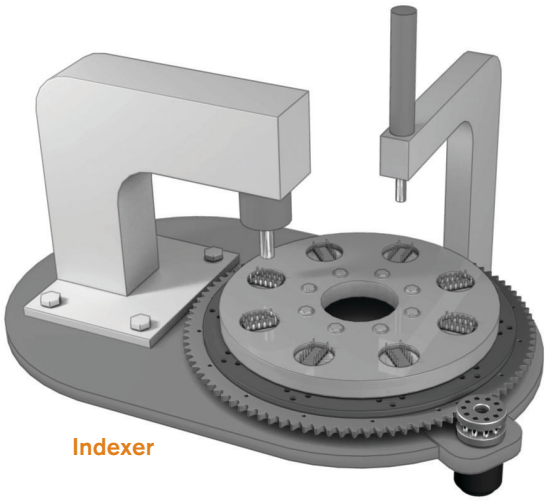
‹‹‹ Peak Output Torque:
563 Nm, 968 Nm, 1496 Nm, 1936 Nm

‹‹‹ Positional Accuracy:
± 11 to 35 ArcSec

‹‹‹ Max Backlash:
± 3 to 12 ArcSec

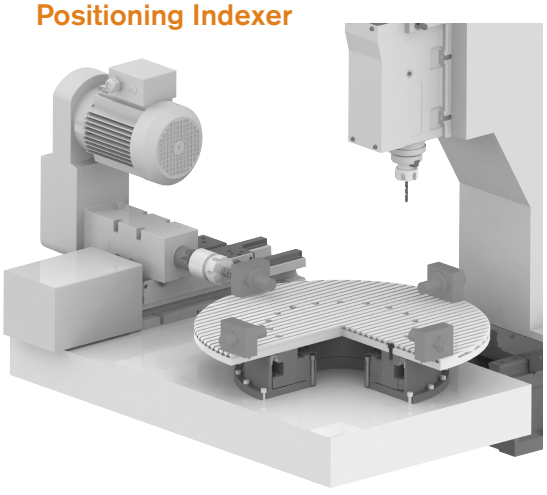
‹‹‹ Input to Output Speed Ratio:
25.6:1 to 6600:1

‹‹‹ Shrouded/Guarded Housing



Indexer

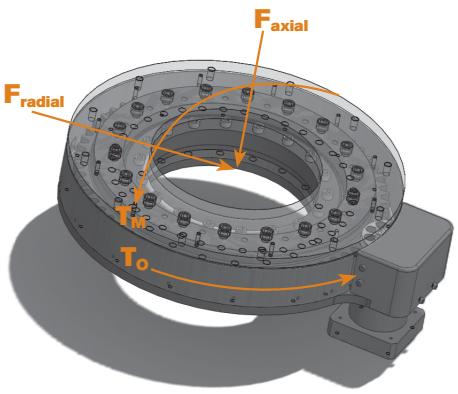
Positioning Indexer



DEPENDABLE. RELIABLE. **PERFORMANCE**

Ring Drive Selection Process

Nexen will work with you to select the perfect Ring Drive for your application needs. Please fill in the application data below and perform the calculations on the following page. With this information, Nexen will select a Ring Drive system to meet all your application requirements.



STEP 1: GATHER APPLICATION DATA

Before you begin calculations, there are key measurements that you will need from your application. Collect the data and record it in the chart below. With this data available you can proceed on to the calculations on the following page. (Refer to the diagram to the right when completing the table below.)

Measurements Required for Selection	Customer Data (record your values below)	Sample Data
Load Inertia (**I**)	kgm^2	*70 kgm^2*
Index Time (t_I)	seconds	*0.9 seconds*
Move Distance (θ)	°	*45°*
Maximum Axial Load (F_{axial})	kN	*50 kN*
Maximum Radial Load (F_{radial})	kN	*0 kN*
Maximum Moment Load (T_M)	kNm	*1 kNm*
Drag Torque & Other Applied Torque Loads (T_O) May include table support friction, cutting or clamping forces, etc.	Nm	*10 Nm*
Shock Factor (**K**) Circle the value that best reflects the smoothness of your application.	Shockless Operation 1.0 Normal Operation 1.2 Operation with Impact 1.5 Operation with High Impact 3.0	*1.2*

Other Key Application Information

Application Description:				
Environmental Conditions:	☐ Typical Industrial	☐ High Humidity	☐ High Temperature	☐ High Dust
Positional Accuracy Requirements:				
Mounting Orientation:	☐ Vertical (Radial Load)	☐ Horizontal (Applied Load)	☐ Horizontal (Suspended Load)	

STEP 2: CALCULATING RING DRIVE REQUIREMENTS FOR SIMPLE INDEXING APPLICATIONS

Ring Drive selection is based on the torque requirements of your application. Using the information gathered on the preceding page, perform the following calculations. If your application movement is more complex than basic indexing, evaluate each stage of movement independently and perform separate calculations for each stage.

Acceleration Time: $t_A = t_I \div 2$

$t_A =$ _____ sec $\div 2$

Acceleration Time

$t_A =$ _____ sec

Sample: $t_A = 0.9 \text{ seconds} \div 2 = 0.45 \text{ seconds}$

Max Angular Speed:
$\omega = (\theta \div t_I) \bullet (\pi \div 90)$

$\omega =$ (_____ ° • _____ sec) • ($\pi \div 90$)

Max Angular Speed

$\omega =$ _____ rad/sec

Sample: $\omega = (45° \div 0.9 \text{ seconds}) \bullet (\pi \div 90) = 1.75 \text{ rad/sec}$

Angular Acceleration: $\alpha = \omega \div t_A$

$\alpha =$ _____ rad/sec $\div$ _____ sec

Angular Acceleration

$\alpha =$ _____ rad/s²

Sample: $\alpha = 1.75 \text{ rad/sec} \div 0.45 \text{ sec} = 3.89 \text{ rad/s}^2$

Application Torque:
$T_{gear} = (I \bullet \alpha) + T_O$

$T_{gear} =$ (_____ kgm² • _____ rad/s²) + _____ Nm

Ring Gear Torque

$T_{gear} =$ _____ Nm

Sample: $T_{gear} = (70 \text{ kgm}^2 \bullet 3.89 \text{ rad/s}^2) + 10 \text{ Nm} = 282.3 \text{ Nm}$

Application Torque with Shock Factor:
$T_T = T_{gear} \bullet K$

$T_T =$ _____ Nm • _____

Ring Gear Torque w/ Shock Factor

$T_T =$ _____ Nm

Sample: $T_T = 282.3 \text{ Nm} \bullet 1.2 = 339 \text{ Nm}$

STEP 3: EVALUATE LOAD CARRYING CAPACITY

Use the data for Maximum Axial Load, Maximum Radial Load, Maximum Moment Load, and Mounting Orientation to evaluate your load carrying needs against the load diagrams on the following pages.

To do this, find the set of charts that represents your mounting orientation, then graph your data in the appropriate charts(s) to ensure that your requirements fall into the shaded area representing load capacity available in that CRD or PRD size and orientation.

(NOTE: The weight of the CRD or PRD is already factored into the load charts.)

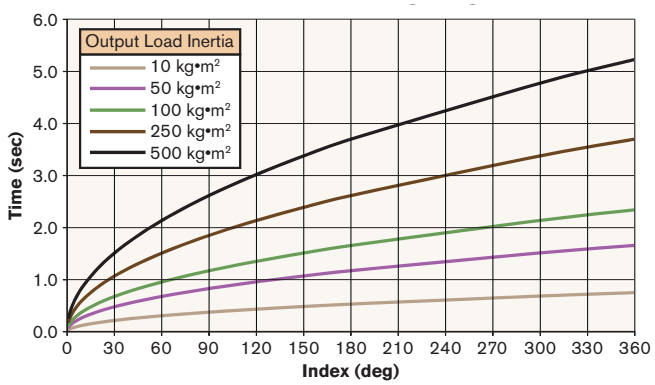
STEP 4: CHOOSE YOUR CRD SIZE

Use the Application Torque with Shock Factor requirement calculated in Step 2 and the load evaluation from Step 3 to select the Ring Drive size that best fits your application. Review CRD and PRD Specifications to ensure the selected size meets all of your application requirements.

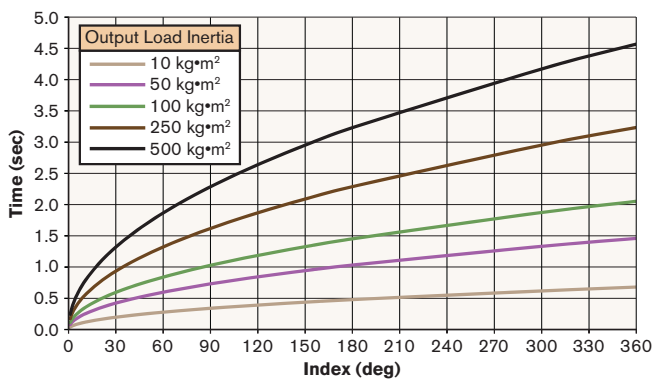
Selected CRD or PRD Size

CRD Timing Diagrams

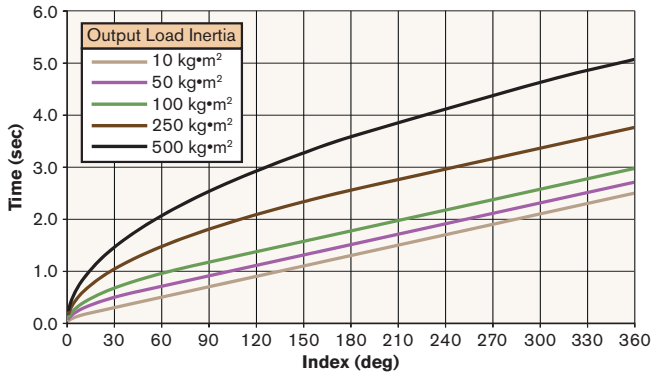
CRD250-PL Timing Diagram



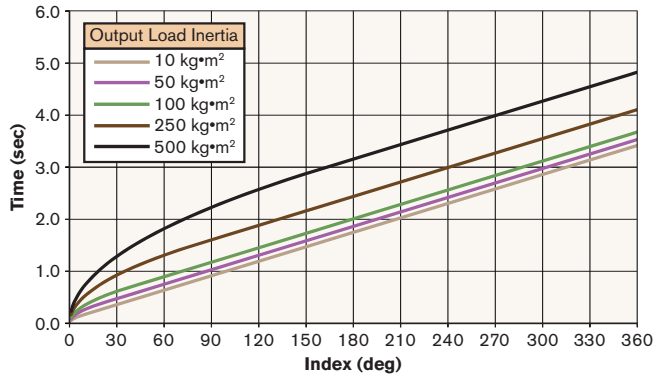
CRD350-PL Timing Diagram



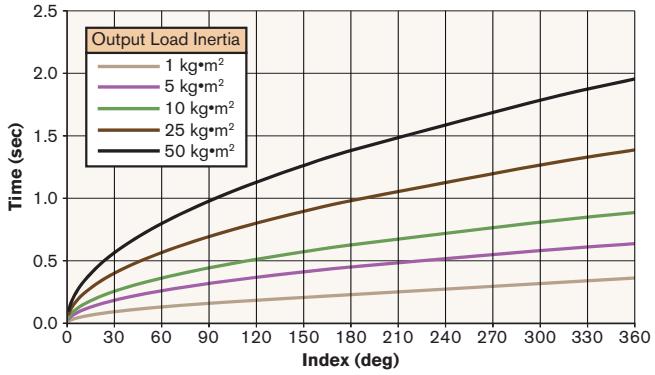
CRD250-HG Timing Diagram



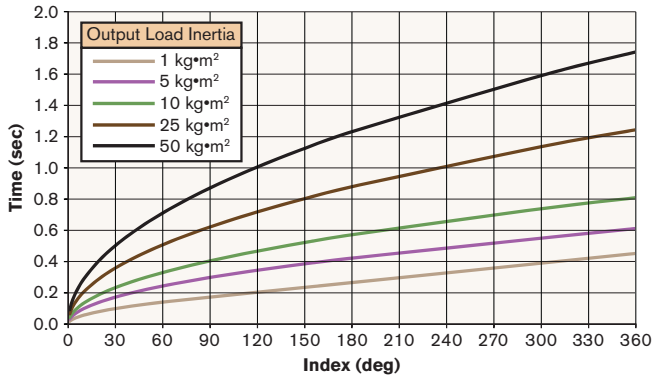
CRD350-HG Timing Diagram



CRD250-DD Timing Diagram



CRD350-DD Timing Diagram

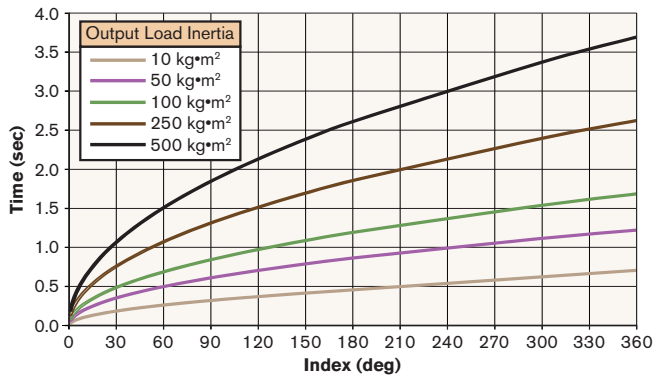


NOTES: Curves assume no external forces such as additional table support friction, cutting forces, etc.
Timing diagrams are developed assuming minimum drag torque, use for reference only.

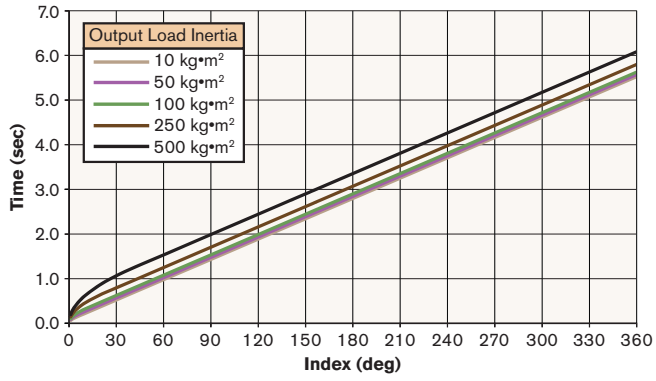
*Assumes Planetary Gearbox Ratio of 4:1 and Harmonic Gearhead Ratio of 50:1 (other ratio options available)

CRD Timing Diagrams

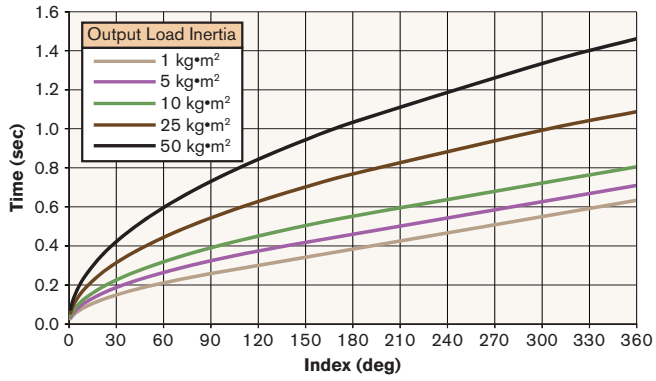
CRD550-PL Timing Diagram



CRD550-HG Timing Diagram



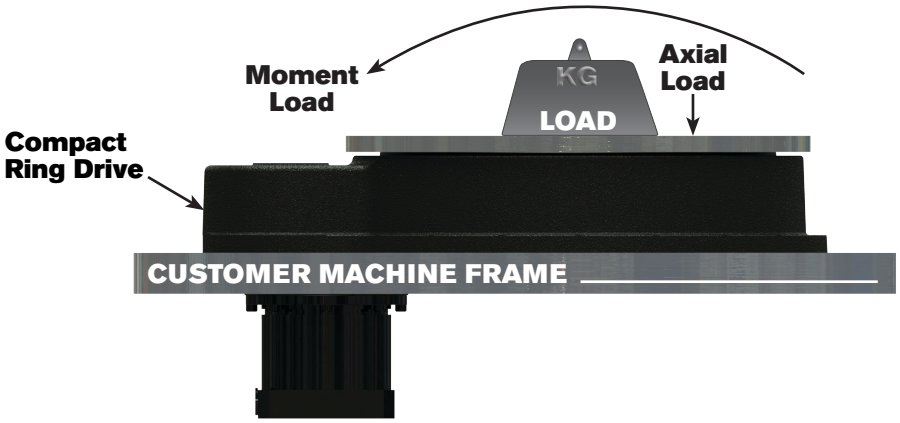
CRD550-DD Timing Diagram

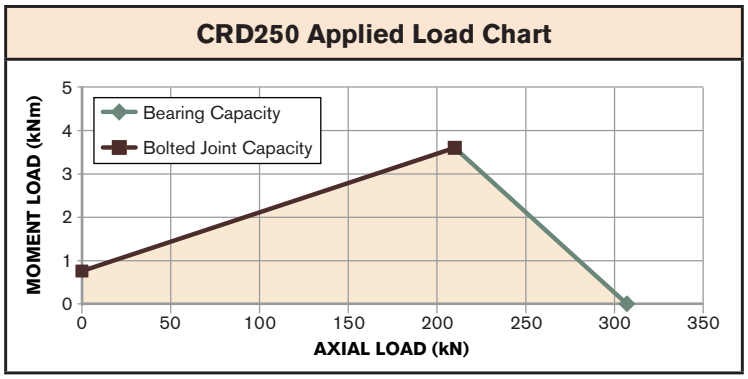


NOTES: Curves assume no external forces such as additional table support friction, cutting forces, etc.
Timing diagrams are developed assuming minimum drag torque, use for reference only.

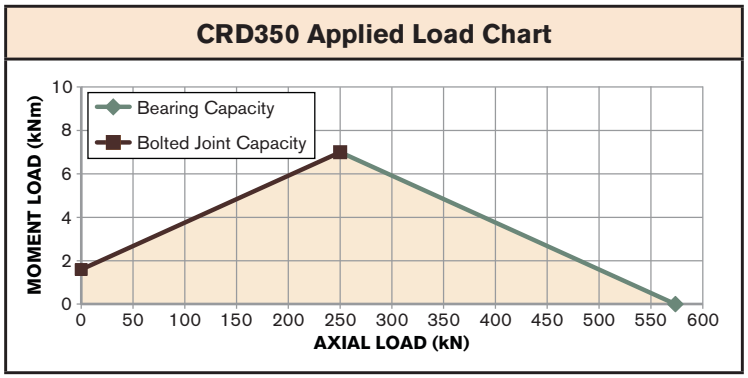
*Assumes Planetary Gearbox Ratio of 4:1 and Harmonic Gearhead Ratio of 50:1 (other ratio options available)

CRD Load Diagrams (Applied Load)

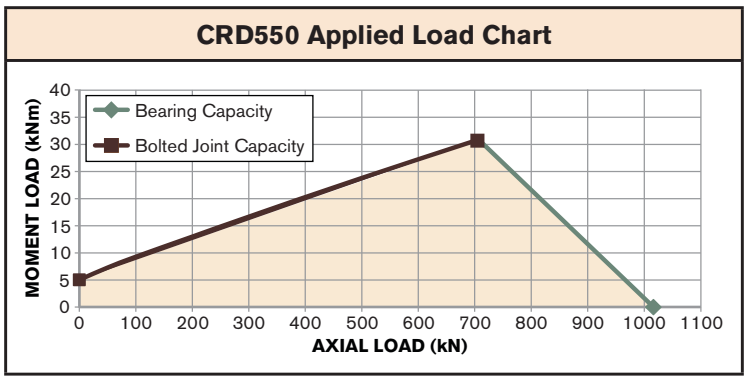




Contact Nexen for bearing life in this orientation

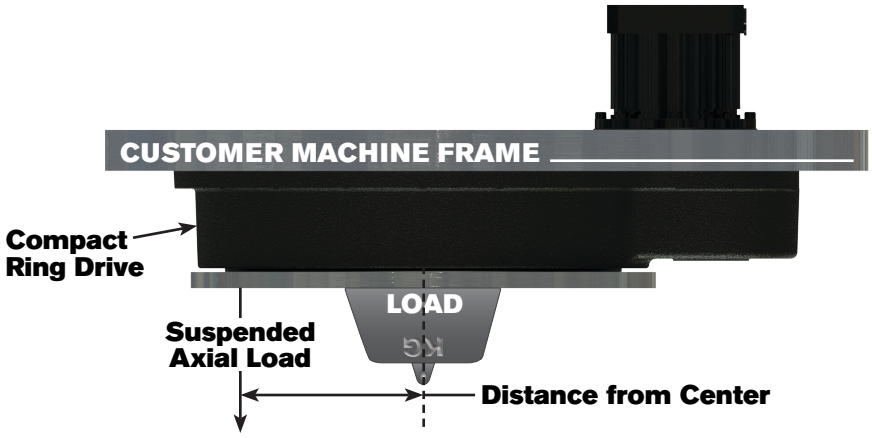


Contact Nexen for bearing life in this orientation

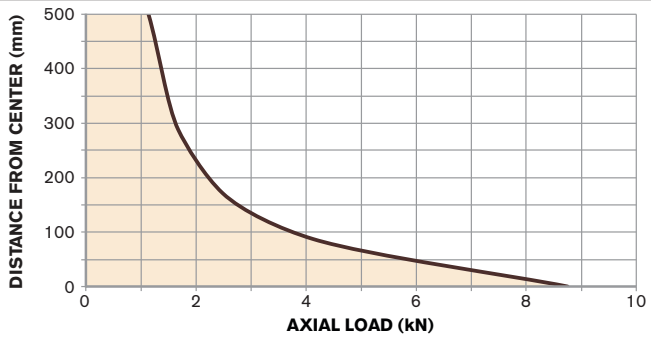


Contact Nexen for bearing life in this orientation

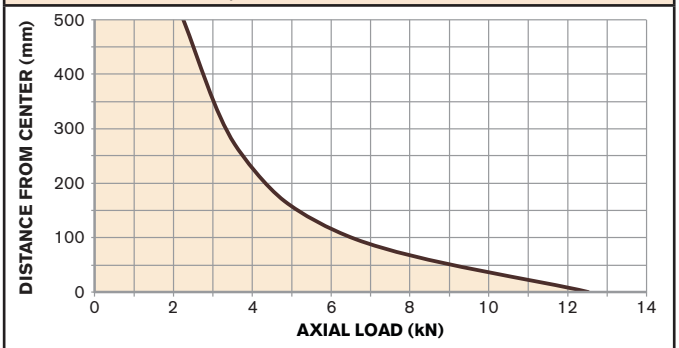
CRD Load Diagrams (Suspended Load)



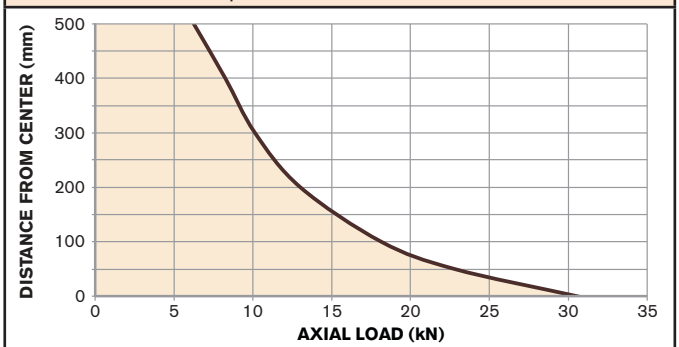
CRD250 Suspended Load Chart
(upside-down orientation)



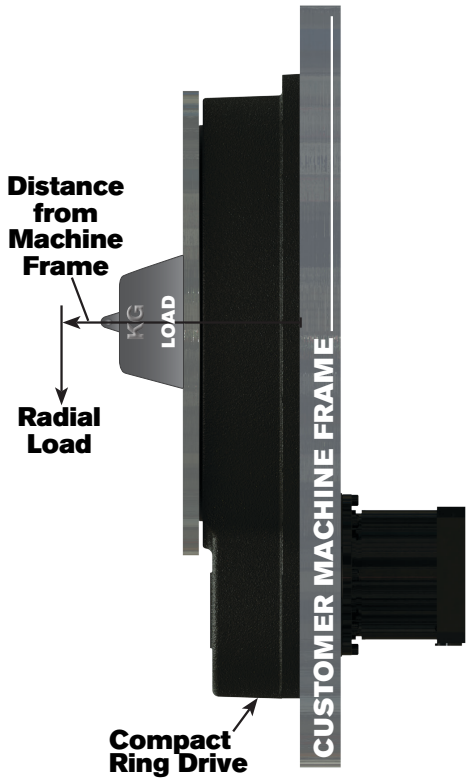
CRD350 Suspended Load Chart
(upside-down orientation)

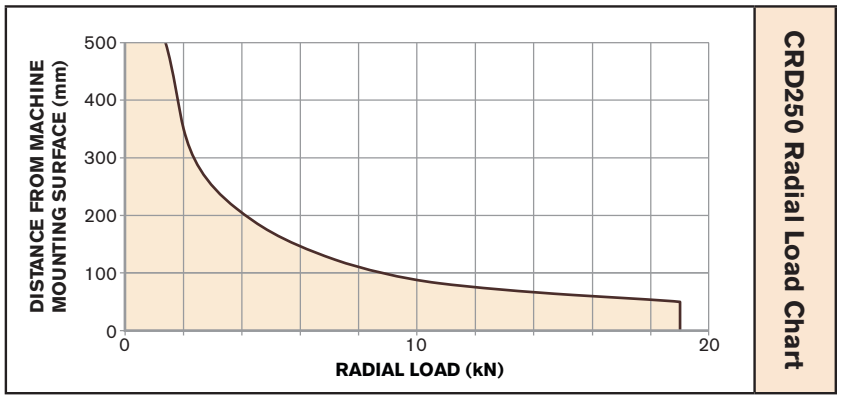


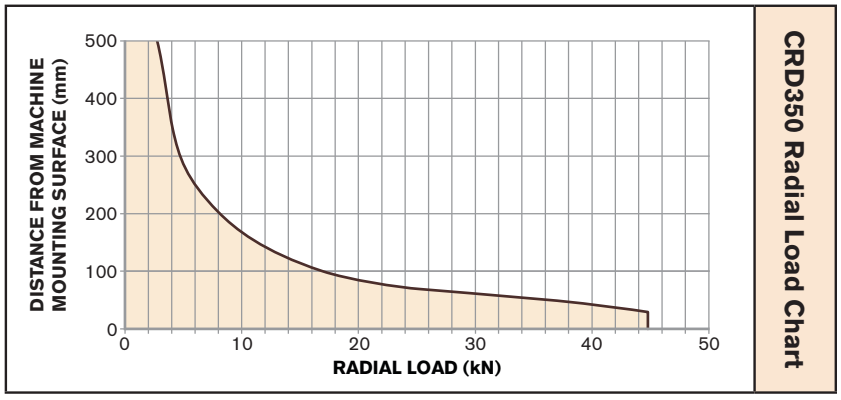
CRD550 Suspended Load Chart
(upside-down orientation)

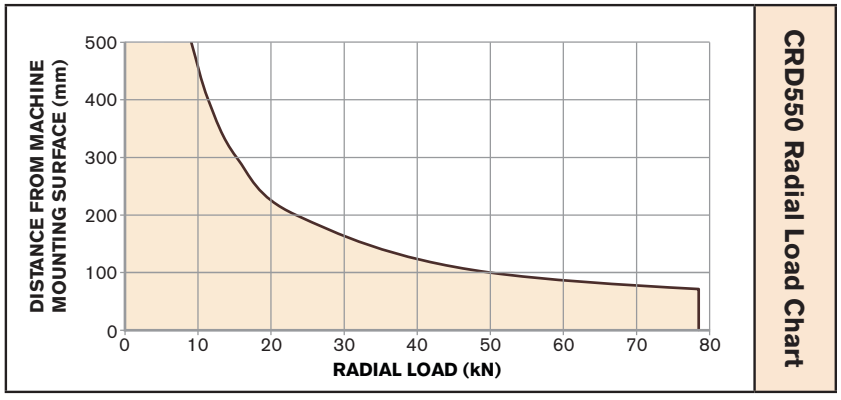


CRD Load Diagrams (Radial Load)



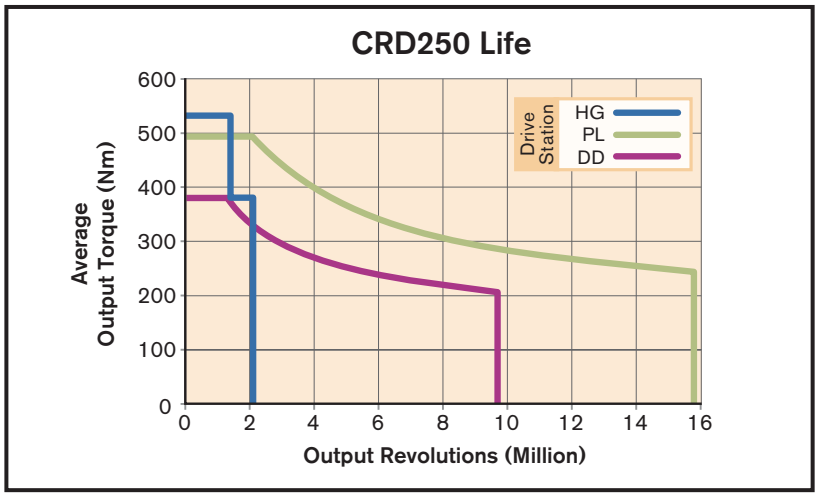




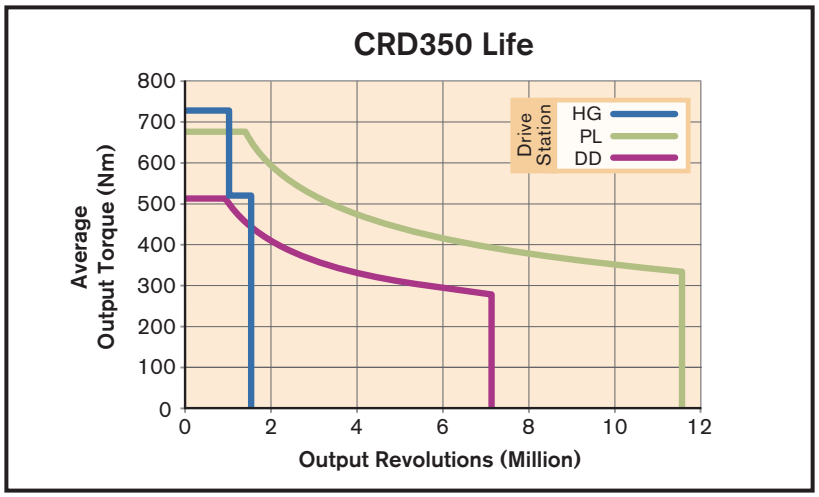


CRD System Life

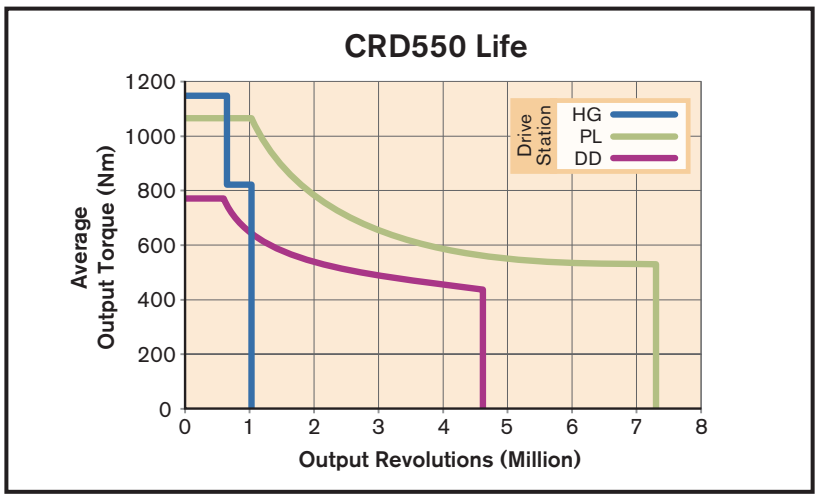
CRD life is based on average output torque and drive station options.



Assumes Planetary Gearbox Ratio of 4:1 and Harmonic Gearhead Ratio of 50:1 (other ratio options available)



Assumes Planetary Gearbox Ratio of 4:1 and Harmonic Gearhead Ratio of 50:1 (other ratio options available)

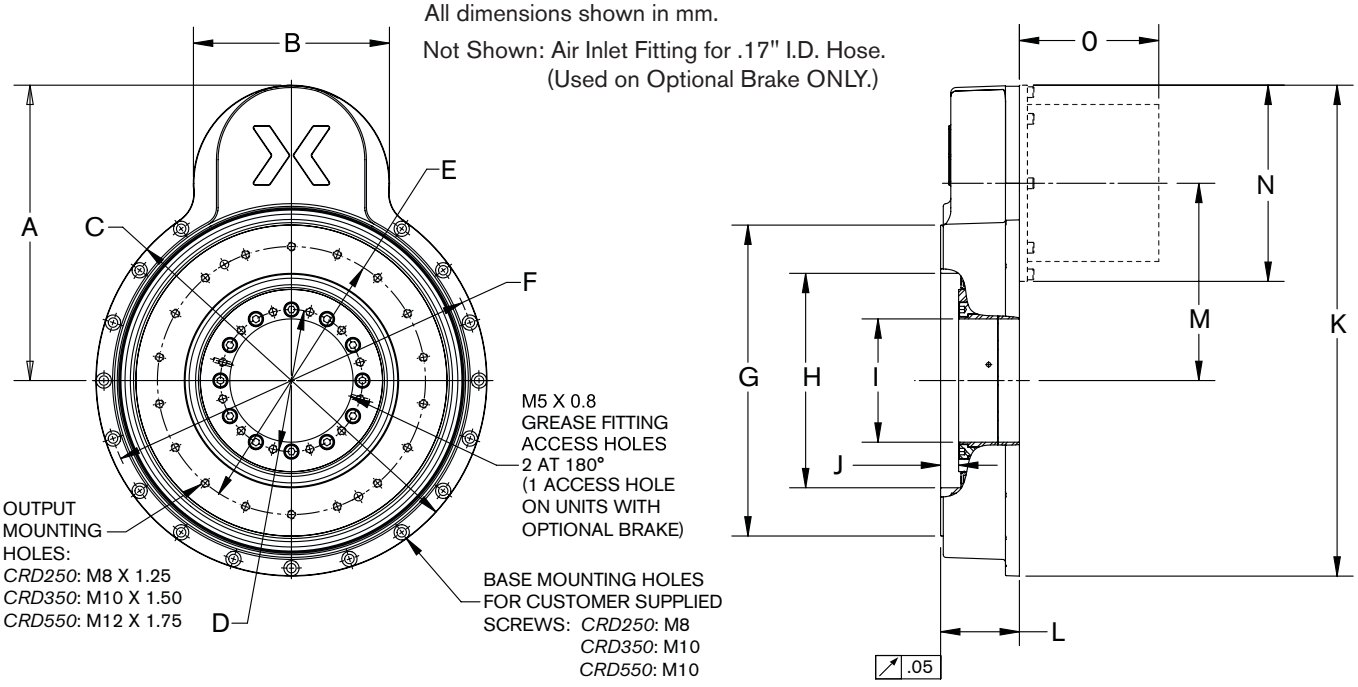


Assumes Planetary Gearbox Ratio of 4:1 and Harmonic Gearhead Ratio of 50:1 (other ratio options available)

CRD Dimensions

All dimensions shown in mm.

Not Shown: Air Inlet Fitting for .17" I.D. Hose.
(Used on Optional Brake ONLY.)



NOTE: Basic dimensions shown for selection purposes only and subject to change. Visit www.nexengroup.com for detailed drawings and CAD models before designing into your system.

			CRD250	CRD350	CRD550
A	Drive Station Envelope to Center Distance		275.5	329.5	441.5
B	Drive Station Envelope Width		182.8	184.3	179.8
C	Outer Diameter		363.3	487.8	721.6
D	Stationary Bolt Circle Diameter*		132.5	180	375
E	Output Bolt Circle Diameter		250	350	550
F	Base Mounting Hole Circle Diameter		350	465	698
G	Output Outer Diameter		290	385	600
H	Output Inner Diameter (H7)		200	280	470
I	Inner Diameter	without Brake	115	155	350
		with Brake	31.7	N/A	N/A
J	Depth to Stationary Ring		16.8	10	7.5
K	Overall Length		457.2	573.4	800.5
L	Unit Height		73.5	73.5	84.5
M	Drive Station Center to CRD Center	PL, HG	184	238	350
		DD	174	228	340
N	Drive Station & Adapter Width	PL, HG	183	183	183
		DD	193	193	193
O	Drive Station Depth	PL	130	130	130
		HG	58.5	58.5	58.5
		DD	191	191	191

* Not present on units with optional brake.

CRD Specifications

Performance Specifications		High Torque & High Speed			High Torque & Low Speed			High Speed & Mid Torque		
		CRD250-PL	CRD350-PL	CRD550-PL	CRD250-HG	CRD350-HG	CRD550-HG	CRD250-DD	CRD350-DD	CRD550-DD
Maximum Velocity	RPM	225	161	120	25 (2)	18 (2)	11 (2)	See Charts	See Charts	See Charts
Max Continuous Velocity	RPM	151 (2)	111 (2)	70 (2)	18 (2)	13 (2)	8 (2)	See Charts	See Charts	See Charts
Positional Accuracy (3)	±ArcSec	59 (1)	43 (1)	27 (1)	43	31	20	41	30	20
One Way Repeatability (3)	±ArcSec	7.1	5.2	3.3	7.1	5.2	3.3	6.9	5.1	3.2
Max Backlash	ArcSec	20.3 (1)	14.8 (1)	9.4 (1)	0	0	0	0	0	0
Max Acceleration Torque	Nm	494	676	1066	532	728	1148	367	497	770
Continuous Stall Torque	Nm	N/A	N/A	N/A	N/A	N/A	N/A	100	136	210
Nominal Torque	Nm	323	442	697	380	520	820	N/A	N/A	N/A
Gear/Pinion Ratio		3.8:1	5.2:1	8.2:1	3.8:1	5.2:1	8.2:1	6.2:1	8.4:1	13:1
Input to Output Ratio		15.2:1 (2)	20.8:1 (2)	32.8:1 (2)	190:1 (2)	260:1 (2)	410:1 (2)	6.2:1	8.4:1	13:1
Min Drag Torque (no load)	Nm	30	80	135	30	80	135	30	80	135
Max Load Inertia	kgm²	N/A	N/A	N/A	N/A	N/A	N/A	50	50	50
Output Inertia	kgm²	0.227	0.782	4.600	0.227	0.782	4.600	0.219	0.761	4.480
Total Reflected Inertia to Gearbox Output	kgm²	0.0182	0.0314	0.0709	0.0157	0.0289	0.0684	0.00864 (4)	0.0138 (4)	0.0294 (4)

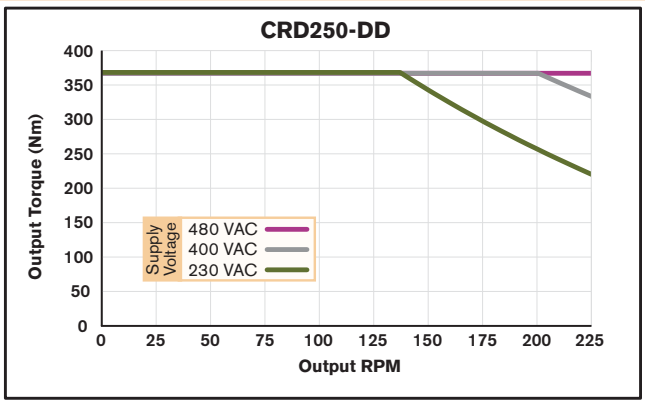
(*1*) Includes Gearbox Backlash (*2*) Assumes Planetary Gearbox Ratio of 4:1 and Harmonic Gearhead Ratio of 50:1 (other ratio options available)
(*3*) Contact Nexen for higher precision options (*4*) Total Reflected Rotary Inertia, including Motor Inertia

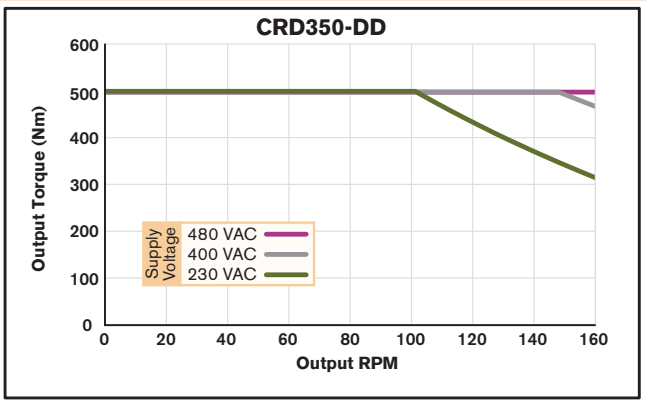
CRD Output Drag Torque

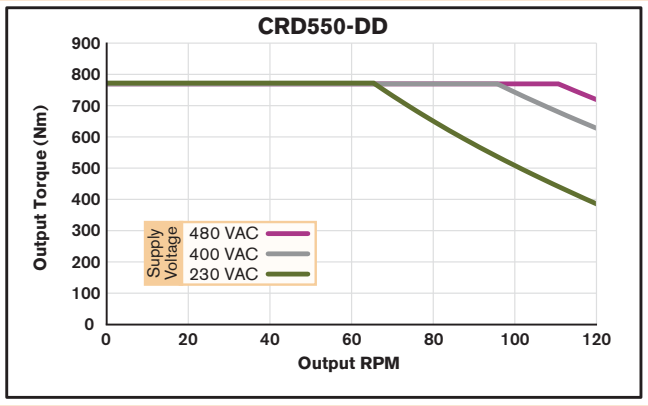
The CRD's output drag torque consists of seal drag and bearing drag. Bearing drag is directly affected by any axial, radial, and moment loading applied to the output of the CRD. Depending on the application, bearing drag torque can be a significant factor and difficult to calculate. For this reason, please contact Nexen for assistance with estimating bearing drag torque when applying load to the output of the CRD.

CRD Direct Drive Motor Specifications

Peak Speed Torque Curves at Output







* For non-cyclic continuous operation, contact Nexen.

Direct Drive Motor Specifications

Specifications		CRD250-DD			CRD350-DD			CRD550-DD		
Voltage Req'd at Rated Output **(Vac Input)**	Vac	230	400	480	230	400	480	230	400	480
Peak Current **(Ip)** (1)	Arms	49.5	49.5	39.2	49.5	49.5	39.2	49.5	49.5	39.2
Continuous Stall Current **(Ic)** (2)	Arms	9.8	9.8	7.9	9.8	9.8	7.9	9.8	9.8	7.9
Torque Sensitivity **(Kt)** (3)	Nm/Arms	10.2	10.2	12.7	13.7	13.7	17.2	21.3	21.3	26.65
Back EMF Constant **(Kb)** (3)	Vrms/kRPM	613	613	769	830	830	1040	1286	1286	1612
Resistance (Line to Line) **(Rm)**	Ohms	1.14	1.14	1.80	1.14	1.14	1.80	1.14	1.14	1.80
Inductance **(Lm)**	mH	9.3	9.3	15	9.3	9.3	15	9.3	9.3	15
Motor Poles		10	10	10	10	10	10	10	10	10

(*1*) @ 25°C winding temperature (*2*) Winding temperature = 145°C @ continuous stall, 25°C ambient
(*3*) System Equivalent Values

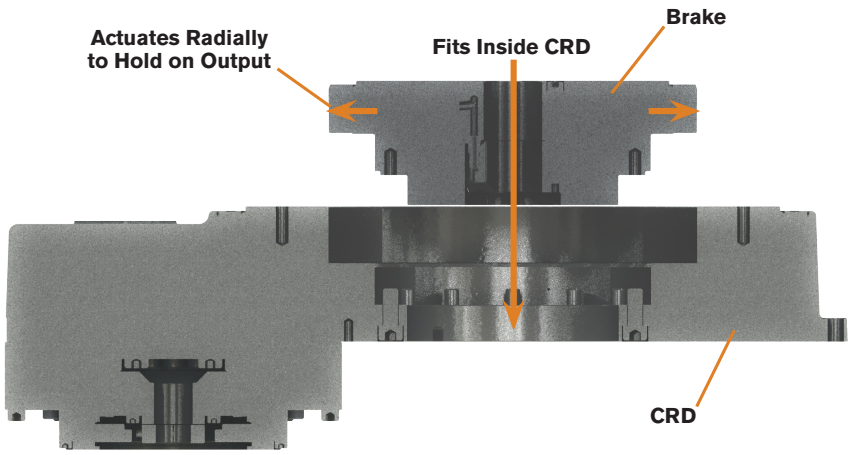
Motor Feedback

CRD Feedback Specifications		ENDAT01
Output Interface		Endat 2.1 Multi-turn
Device Resolution	Cycles or Lines/Rev	2048
Resolution after AKD Interpolation	Counts	134, 217, 728
Input Voltage	VDC ±5%	5
Current Consumption	mA Max	250
Plug and Play Motor ID *		Yes

*These feedback devices include electronic motor nameplate data allowing plug-and-play commissioning, eliminating the need for drive parameter set-up and servo loop tuning in most applications.

Optional Holding Brake

Nexen offers an optional holding brake that acts directly on the CRD driven output. (Available on CRD250, larger sizes pending.) With spring engaged / air released braking action, the brake's compact design does not increase the CRD footprint and maintains an open center. For brake E-Stop capabilities, contact Nexen.

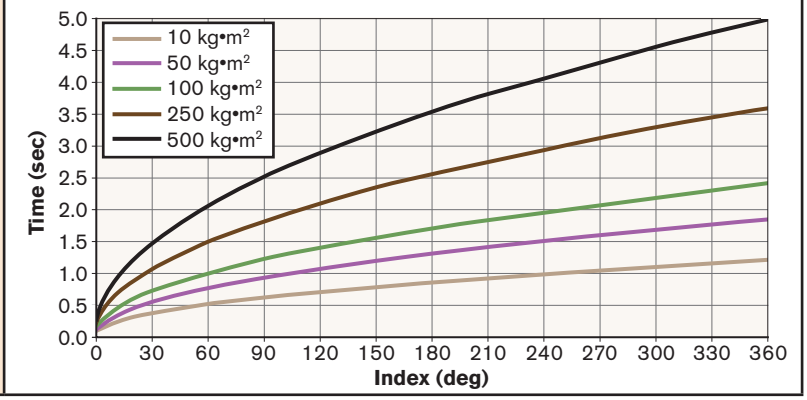


Brake Specifications		CRD250B
Holding Torque	Nm	800
Release Pressure	psi	60
Brake Life	Cycles	1 million
Brake Torsional Rigidity	Nm / Radian	8.65 million

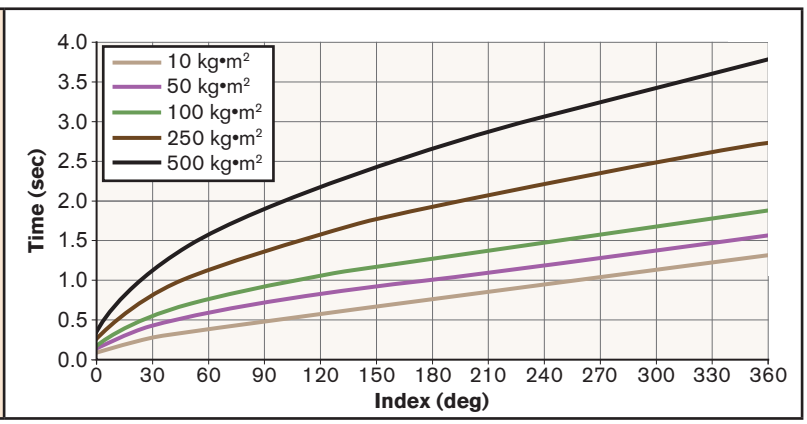
Note: Brake can be manually released by inserting screws into holes on its bottom side.
Note: Brake is fully sealed and IP 65 rated.

PRD Timing Diagrams

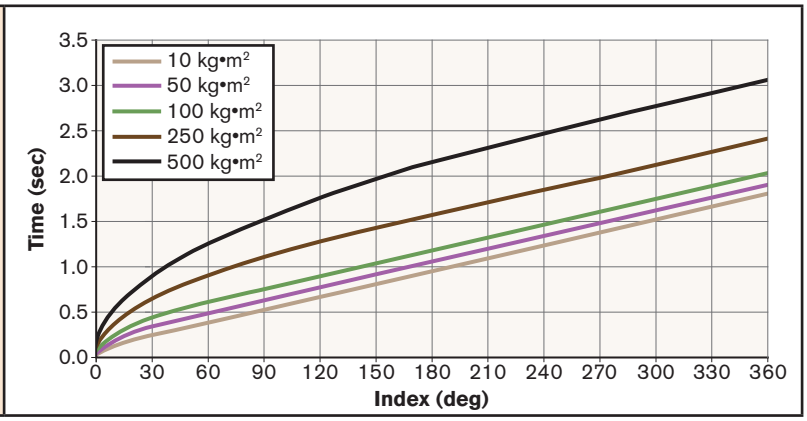
PRD400 Timing Diagram



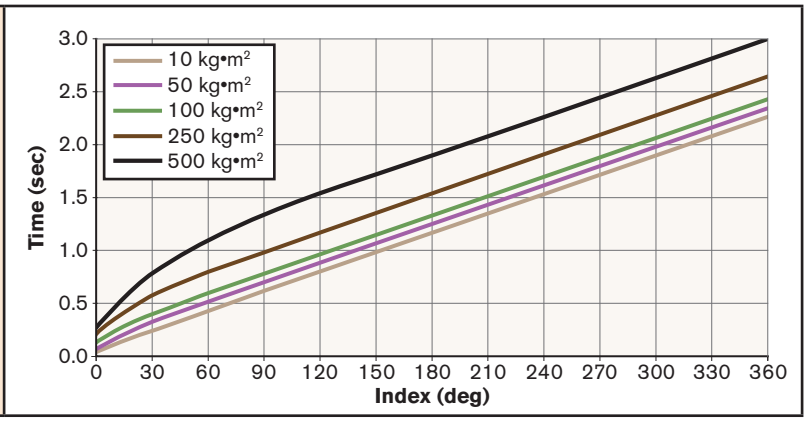
PRD750 Timing Diagram



PRD1100 Timing Diagram

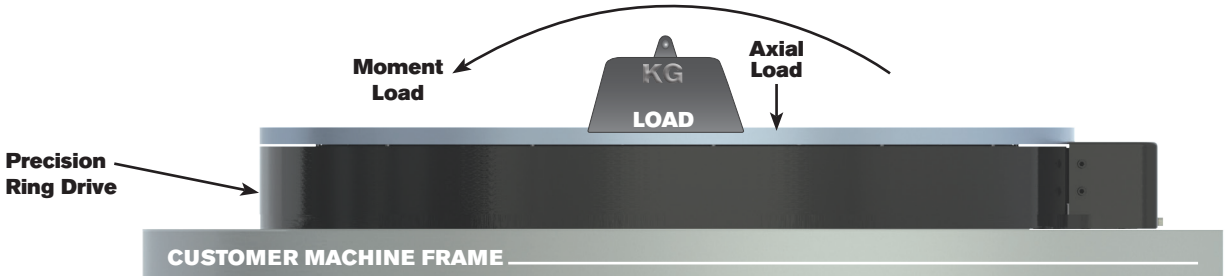


PRD1500 Timing Diagram

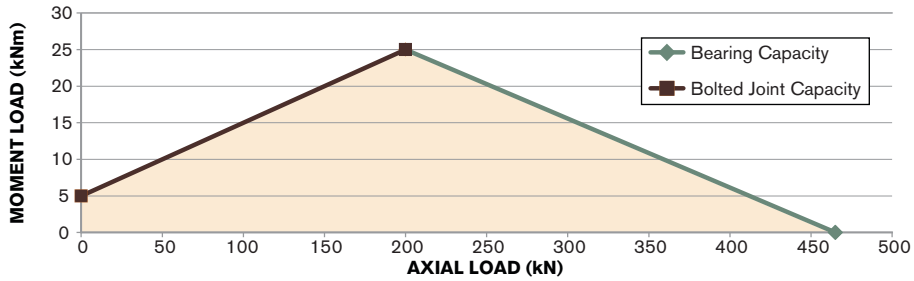


NOTE: Curves assume no external forces such as additional table support friction, cutting forces, etc.

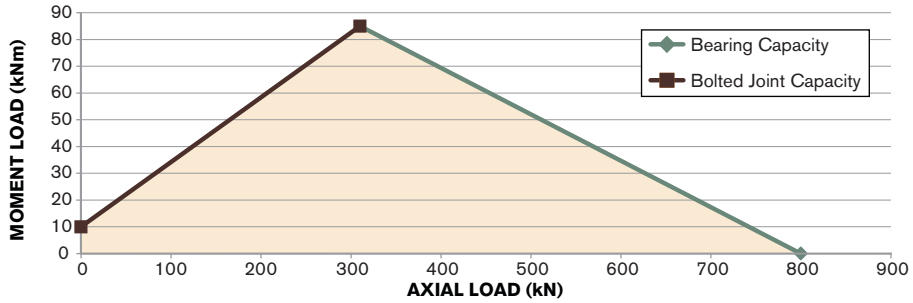
PRD Load Diagrams (Applied Load)



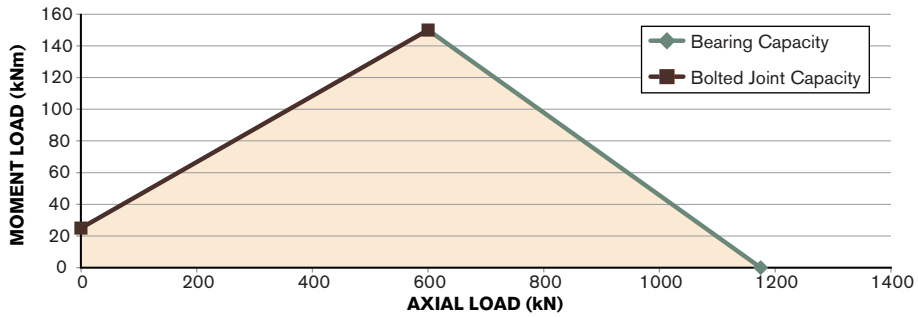
PRD400 Applied Load Chart



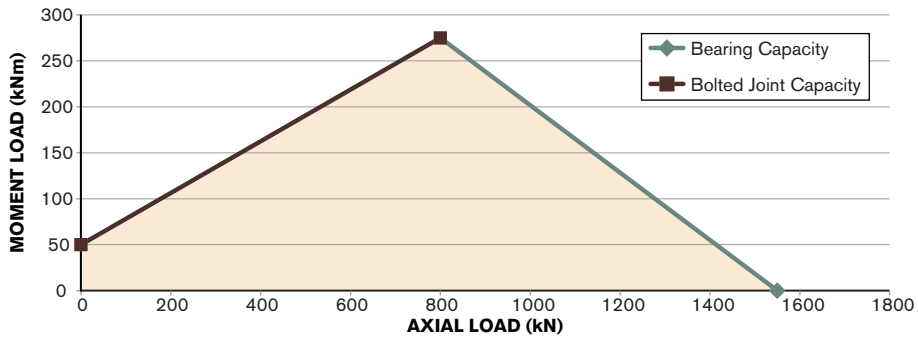
PRD750 Applied Load Chart



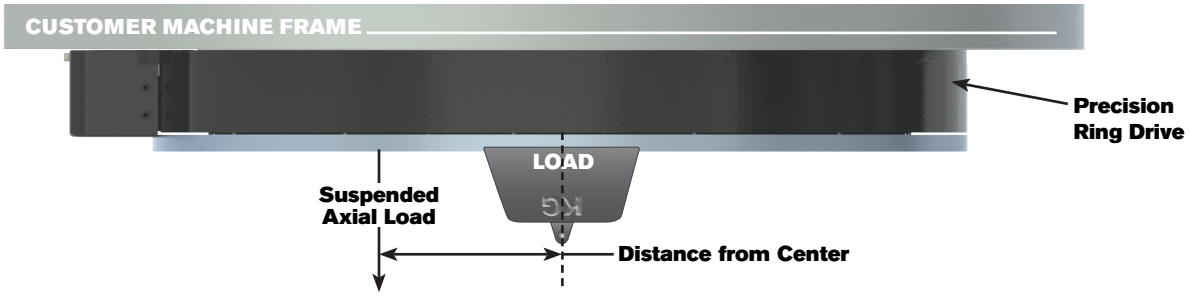
PRD1100 Applied Load Chart



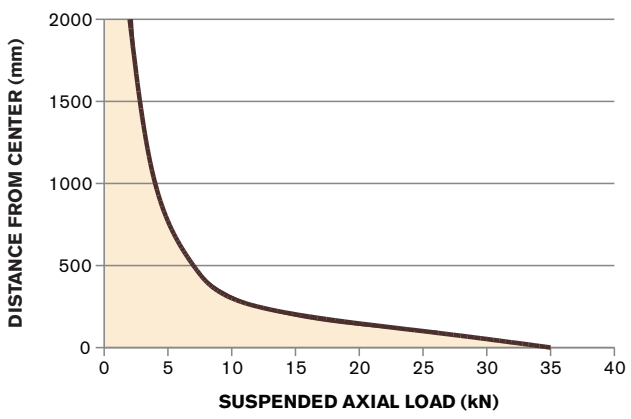
PRD1500 Applied Load Chart



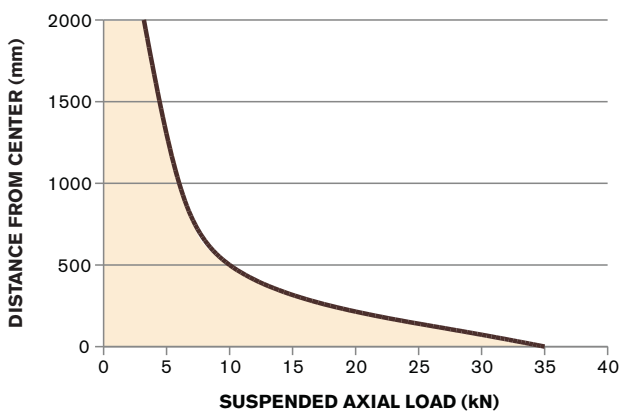
PRD Load Diagrams (Suspended Load)



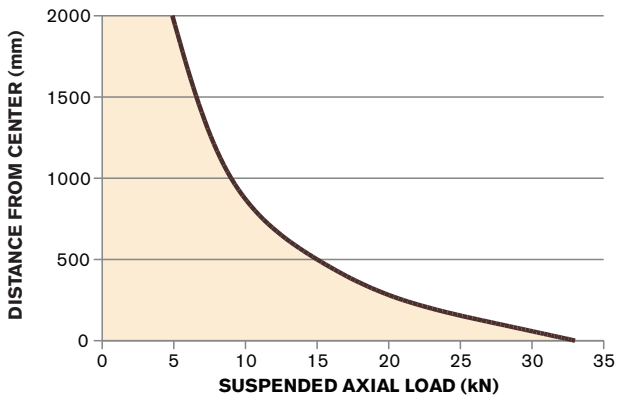
PRD400 Suspended Load Chart
(upside-down orientation)



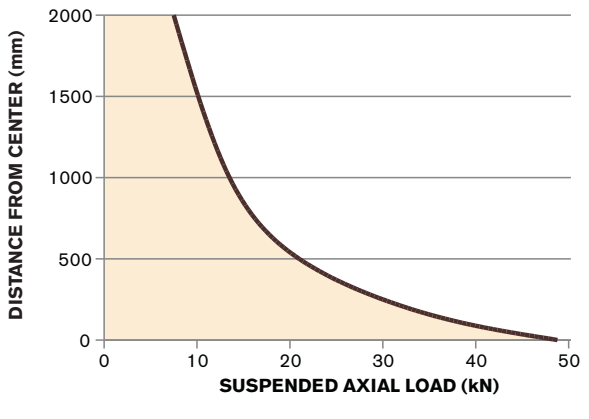
PRD750 Suspended Load Chart
(upside-down orientation)



PRD1100 Suspended Load Chart
(upside-down orientation)

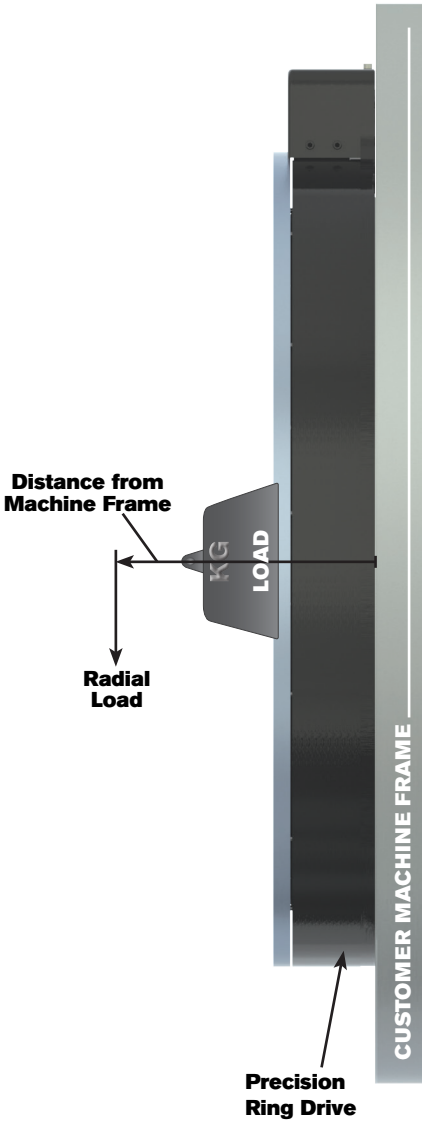


PRD1500 Suspended Load Chart
(upside-down orientation)

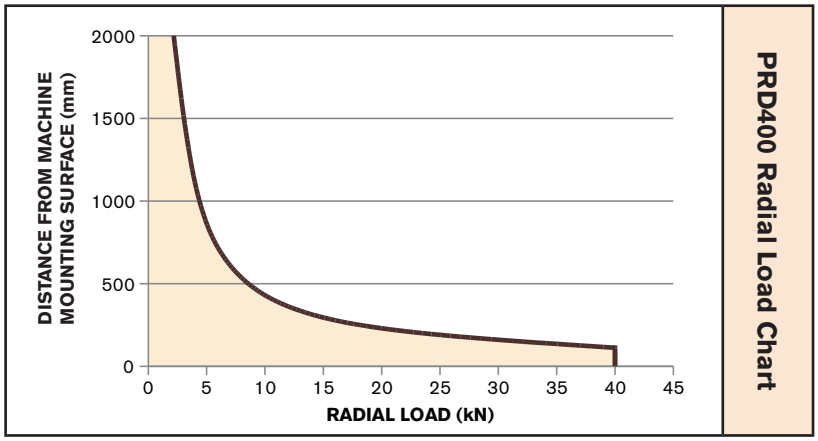


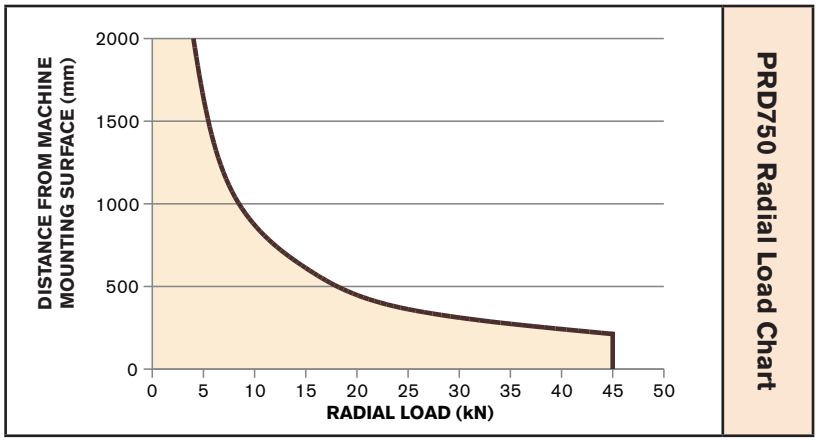
NOTE: The weight of the PRD is already factored into these charts.

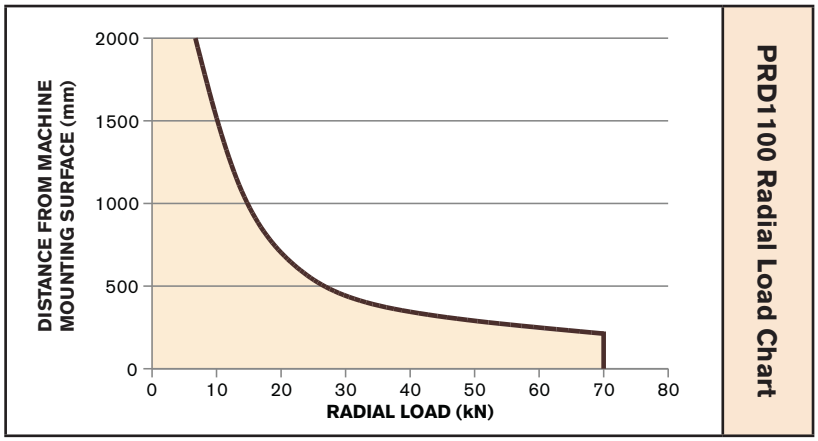
PRD Load Diagrams (Radial Load)

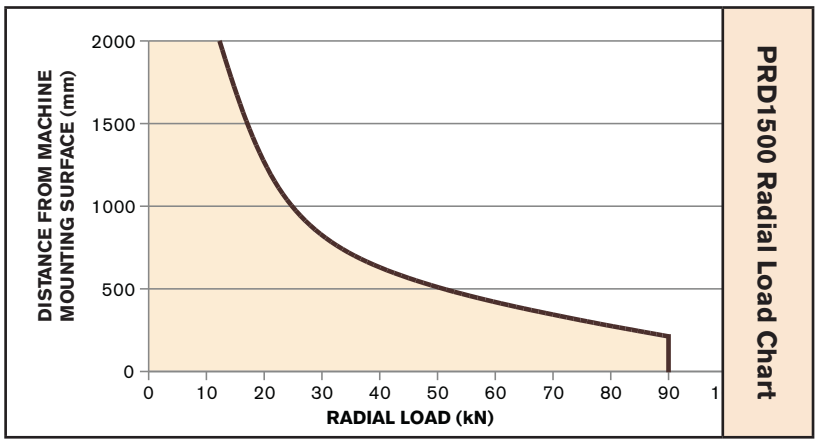


NOTE: The weight of the PRD is already factored into charts.

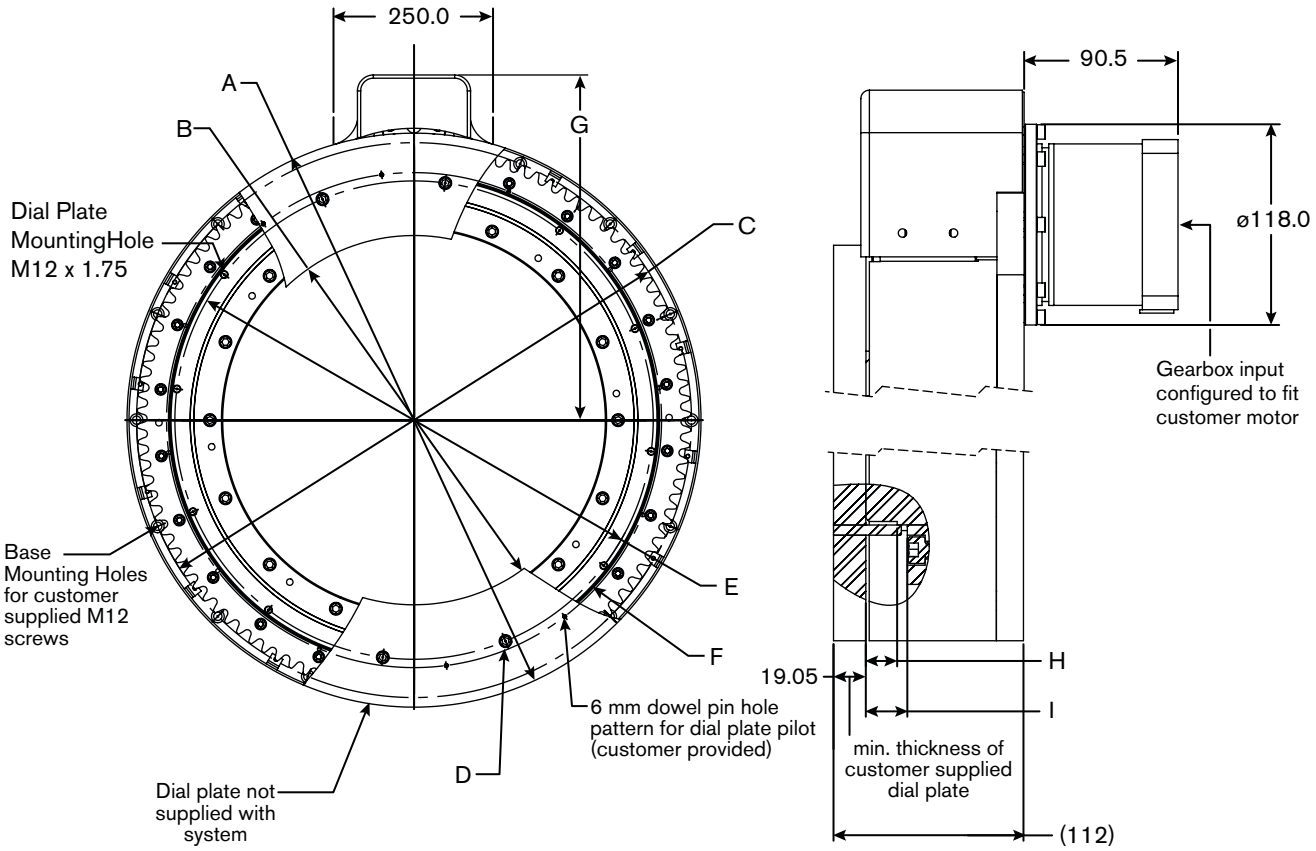








PRD Dimensions



NOTE: Basic dimensions shown for selection purposes only and subject to change. Visit www.nexengroup.com for detailed drawings and CAD models before designing into your system. (All dimensions shown in mm.)

		PRD400	PRD750	PRD1100	PRD1500
A	Minimum Outer Diameter	550	900	1350	1750
B	Maximum Inner Diameter	280	579	966	1330
C	Base Mounting Hole Circle Diameter	500	870	1325	1715
D	Dial Plate Bolt Pattern Circle Diameter	396	750	1100	1500
E	Ring Drive Pilot Diameter	460	770	1150	1525
F	Dowel Pin Hole Circle For 6mm Pins	466	776	1156	1531
G	Drive Enclosure Envelope to Center Distance	363	543	770	970
H	Minimum Depth to Dial Plate Pilot	0	18.5	18.5	18.5
I	Maximum Depth to Dial Plate Pilot	7	24.5	24.5	24.5

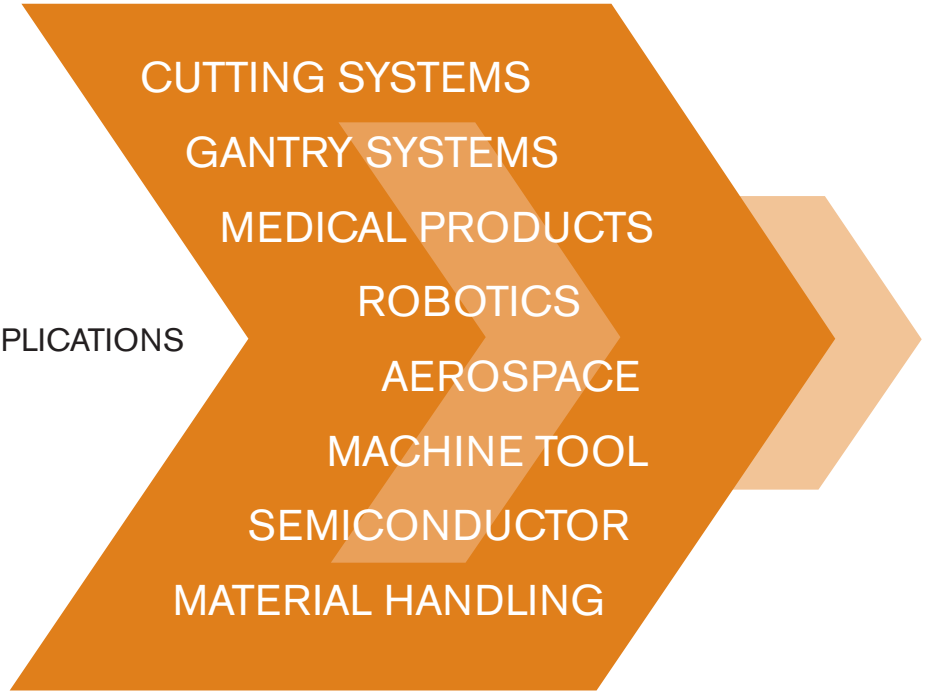
PRD Specifications

Performance Specifications		PRD400	PRD750	PRD1100	PRD1500
Positional Accuracy*	±ArcSec	35	21	13	11
One Way Repeatability*	±ArcSec	4.2	2.4	1.6	1.2
Maximum Backlash*	±ArcSec	12	7	4	3
Peak Torque at Output	Nm	563	968	1496	1936
Maximum Velocity Output	RPM	94	54	35	27
Maximum Acceleration	rad/sec^2	414	110	30	17
Input to Output Ratio (assuming 10:1 gearhead)		64:1	110:1	170:1	220:1
Gear/Pinion Ratio		6.4:1	11:1	17:1	22:1
Estimated Pinion & Ring Gear Life**		60 Million Contacts per Pinion Roller or 30 Million per Gear Tooth			
Output Inertia	kgm^2	1.39	8.83	48.97	112.95
Pinion Inertia	kgm^2	0.0025			
Total reflected inertia to gearbox output	kgm^2	0.036	0.075	0.172	0.236
Maximum Bearing Drag Torque	Nm	40	100	150	200

* All performance specifications assume using Nexen's standard 10:1 high precision reducer. Other customer specified reducers can be requested but will have an impact on the above specifications.

** Life rating is an estimate based on maintaining published accuracy specifications while operating with allowable dynamic loading. Nexen does not guarantee life since it can be impacted by environmental conditions, and lubrication intervals.

INDUSTRIES & APPLICATIONS



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