Nabtesco Reducers Introduction

Nabtesco gear reducers are cycloidal drives, designed for use in high load, precision, extreme bending moment, and any other application where positioning is required.

The evolution from a hydraulic reducer used in the construction industry lead to an innovative design for servo driven applications. Nabtesco Reducer’s success has led to 4 million units sold in more than 26 years of manufacturing while serving many industries worldwide. Since the inception of Nabtesco reducers we have gone through numerous improvements, innovations, and designs giving the widest range available for most customer needs.
Nabtesco Reducers Introduction

Nabtesco reducers are ...

- **Precise**
  - Very low backlash
  - Low inertia
  - High torsional stiffness

- **Durable**
  - High shock load capability
  - Low wear and long life
  - High reliability
  - High moment rigidity

- **Efficient**
  - Excellent starting and running efficiency
  - Able to reduce the motor size

- **Compact**
  - Very compact for its reduction ratio and power density
Reduction Ratio

Reduction Ratio: The ratio of input speed to output speed, and how much torque is gained. A 1:100 reduction ratio leads to an output spinning at 1/100th the speed of the input, with 100 times more torque. The higher the reduction ratio, the more load a given motor can carry.

- Requires more power
- Requires large motor for large torque

- Requires less power
- Can use small motor with little torque

Nabtesco Advantage: Nabtesco reducers have high reduction ratios, so you can use smaller motors.
Torque and Bending Moment

Torque and Moment are two ways of saying the same thing. However, Nabtesco makes a distinction. In our case, torque is the rotational torque and moment is in any other direction.

The weight of the payload induces a torque and bending moment on the reducer.

Rotational Torque = Force x Radius
Bending Moment = Force x Length
**Torsional Rigidity and Moment Rigidity**

Torque and Moment are two ways of saying the same thing. In our case, torque is the rotational torque and moment is in any other direction.

*Torsional Rigidity*: The ability of a part to resist deformation under torque loads.

High Torsional Rigidity ⇔ Small Deflection ⇔ High Positioning Accuracy

*Low Torsional Rigidity*:

*Bending Moment Rigidity*: The ability of a part to resist deformation under moment loads.

High Moment Rigidity ⇔ Small Deflection ⇔ High Positioning Accuracy

**Nabtesco Advantage**: Nabtesco reducers have high spring constants and rigidities, making its output more precise.
Backlash and Lost Motion

Backlash
Backlash is defined differently for each company. In Nabtesco terms it is the hysteric displacement that occurs after a large torque is induced and then relieved. The teeth engage in such a way as to allow minimal gaps, making backlash a result of internal friction.

Lost Motion
Lost Motion refers to the output variation near zero torque, and comes from the minute gaps between components.

Nabtesco Advantage: Nabtesco reducers have low backlash and lost motion which guarantee high output accuracy.
Angular Transmission Accuracy

The angular transmission accuracy refers to a difference between the theoretical output revolution angle and the actual revolution angle \((\theta_{\text{out}})\) when any revolution angle \((\theta_{\text{in}})\) is the input, and is expressed as an angular transmission error \((\theta_{\text{er}})\). The angular transmission error is found in the following equation:

\[
\theta_{\text{er}} = \frac{\theta_{\text{in}}}{\text{Reduction Ratio}} - \theta_{\text{out}}
\]

Angular transmission accuracy is accuracy in the rotational direction, not vertical:

Low \(\theta_{\text{er}}\) translates to smoother indexing

High \(\theta_{\text{er}}\) translates to rough, jittery indexing

Nabtesco Advantage: Nabtesco reducers have high angular transmission accuracy, allowing for very smooth indexing.
Nabtesco Reducers Product Family

RV Series
- RV-E (Solid)
- RV-C (Hollow)

RD Series
- RD-E (Solid)
- RD-C (Hollow)

RV-N Series
- New Generation

RD2 Series
- RD-E (Solid)
- RD-C (Hollow)

RDS (In Line)
RDR (Right Angle)
RDP (Pulley)

RS Series

GH Series

For Large Positioners

High Speed

Improved Power Density

Gearhead

General Purpose
Basic Component Type

- 3 Types: RV-E (Solid Shaft), RV-C (Hollow Shaft), RV-N (High Torque Density)
- Basic RV mechanism with load bearings
- Extreme precision (≤ 1arcmin backlash)
- Motor flange, grease and seals (O-rings, etc.) not included
- Offers great flexibility for demanding applications

Basic specifications:
Reduction Ratio: 31 - 242:1
Rated Torque: 58 - 14715N-m
Rated Moment: 196 - 44145N-m
Backlash: ≤ 1arcmin

Please refer to catalog for detailed specifications.
RV SERIES Product Code

**RV-E**

**RV-C**

**RV-N**
Gearhead Type

- 3 Types: RDS (In Line Input), RDR (Right Angle Input), RDP (Pulley Input)
- Hollow or solid shaft available
- Pre-greased
- Easy to use out of the box solution

Basic specifications:
Reduction Ratio: 31 - 258:1
Rated Torque: 58 - 3136N-m
Rated Moment: 196 - 20580N-m
Backlash: ≤ 1arcmin

Please refer to catalog for detailed specifications.
High Speed Gearhead Type

- The high speed RV mechanism (Max Output 250rpm)
- Low reduction ratio (11 - 31:1)
- Pre-greased
- Easy to use out of the box solution
- Shaft or flange output available
- Examples: Rack & pinion

Basic specifications:
Reduction Ratio: 11 - 31:1
Rated Torque: 69 - 980N-m
Rated Moment: 460 - 4900N-m
Backlash: ≤ 6arcmin

Please refer to catalog for detailed specifications.
GH Series
GH SERIES Product Code

GH

7
(1) Model code
7
17
24
40
100

21
(2) Ratio code
11
21
31

A
(3) Input spline code
Standard
A to ZZ
Blank
Y1
Y2
None
Z

B
(4) Motor flange code
Standard
A to ZZ
Blank
Y1
None
Z

P
Output shaft type code
Flange
P
Shaft
S
Turntable Gearhead Type

- Reinforced thrust bearings (Max thrust rating 88290N)
- The RV mechanism coupled with an input gear frame and motor flange
- Floor mounted design, right angle input
- Pre-greased
- Easy to use out of the box solution
- Low profile
- Examples: Large turntables

Basic specifications:
- Reduction Ratio: 170 - 240:1
- Rated Torque: 3136 - 8820N-m
- Rated Moment: 20580 - 44100N-m
- Backlash: ≤ 1arcmin

*Motor not included

Please refer to catalog for detailed specifications.

RS Series

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