APG

The **DODGE APG** Speed Reducer shall be suitable for C-face, separate, or integral gearmotor construction in either base or output flange mountings, and available in single, double, or triple reduction ratios.

The reducer housing and covers shall be constructed of corrosion resistant, class 30 gray iron with cast internal ribbing for added strength. All housings and end covers shall be either doweled or tenoned, and precision machined to assure accurate alignment for all gear sets.

Gearing shall be of single helical design, and crown shaved or ground to provide an ellipsoid tooth form to eliminate tooth end wearing and assure meshing in the strongest tooth area. All gears shall be case carburized to insure a high surface durability and resilient tooth core for greater impact resistance and longer service life.

The input pinion shall be of the shank pinion design that is assembled by being pressed and cross pinned into place.

Reducer bearings shall be the taper roller or ball type and provide a minimum 25,000 hour average life. All seals shall be of the spring loaded type, made of viton (input seals) and nitrile rubber (output seals.)

Reducer gears and bearings shall be splash lubricated using an extended life synthesized hydrocarbon lubricant containing additives that enhance oxidation stability and provides protection against rust. The lubricant allows a wide operating temperature range of -105 to 165˚ ambient and meets USDA class H-2 standards.

C-face reducers shall be of the cross split hollow bore and clamp collar design so as to eliminate backlash at the motor connection, and eliminate, or minimize, fretting corrosion between the motor shaft and the reducer stub shaft.

HOW TO ORDER

APG Reducers and Gearmotors have part numbers assigned that can be found on the selection pages. Refer to the part number when ordering. Always specify mounting position if other than standard, and specify flange mounting and accessories/ modifications, if required.

Refer to the following procedure for selection assistance.

Step 1: For applications with one start/hr. or less and nonpulsating load (starting factor = 1.0) skip Steps 2 and 3 and proceed to Step 4. For applications with more than one start/hr. proceed to Step 2.

Step 2: Determine inertia ratio.

$$\text{Inertia Ratio} = \frac{\text{Driven Inertia}}{\text{Driving Inertia}}$$

Where: **Driving Inertia** is defined as the motor inertia. This value must be provided by the motor manufacturer. On APG Gearmotors, driving inertia data is available from your DODGE Sales Engineer or Application Engineering.

Driven Inertia is defined as the "load inertia" referred to the motor speed. The "load inertia" must be provided by the driven machine manufacturer. For assistance contact application engineering or see the following formulas.

$$\text{Rotating Driven Inertia} = \text{Load Inertia} \times \left(\frac{\text{Load RPM}}{\text{Motor RPM}} \right)^2$$

$$\text{Linear Driven Inertia} = W \times \left(\frac{V}{6.28\ N} \right)^2$$

Where: W = Weight (Lbs.)
V = Linear Velocity (Ft./Min.)
N = Motor RPM

If these values are unobtainable proceed to Step 3.

NOTE: **Gearbox Inertias,** not addressed above, are typically negligible. If required, inertia values for the APG unit may be obtained from your DODGE Sales Engineer or Application Engineering.

APG

Step 3: With inertia ratio determined, use Chart 1 to select starting factor.

Chart 1: Starting Factors

Starts	Inertia Ratios				Unknown Inertia
HR	0.0-0.5	>0.5-1.0	>1.0-2.0	>2.0-4.0	Ratio
1	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.15	1.15
5	1.00	1.00	1.13	1.33	1.33
10	1.00	1.01	1.21	1.45	1.45
15	1.00	1.03	1.26	1.51	1.51
20	1.00	1.05	1.29	1.56	1.56
25	1.00	1.05	1.31	1.59	1.59

If starting frequency is greater than 25 starts/hr., contact application engineering at 812-376-1100.

Step 4: Determine "Driven Machine Factor" from Chart 2 below.

Chart 2: Driven Machine Factor

Prime Mover	Duration of Service Per Day	Driven Load Classification		
		Uniform	Medium Shock	Heavy Shock
	Intermittent 2 hrs.	0.90	1.00	1.50
Electric	Up to 10 hours	1.00	1.25	1.75
Motor	10-24 hours	1.25	1.50	2.00
Multi-cylinder				
Internal	Intermittent 2 hrs.	1.00	1.25	1.75
Combustion	Up to 10 hours	1.25	1.50	2.00
Engine	10-24 hours	1.50	1.75	2.25
Single Cylinder				
Internal	Intermittent 2 hrs.	1.25	1.50	2.00
Combustion	Up to 10 hours	1.50	1.75	2.25
Engine	10-24 hours	1.75	2.00	2.50

Step 5: Determine service factor.

Service Factor = Starting Factor x Driven Machine Factor

Step 6:

Reducer Selection-

Using the service factor obtained in Step 5, calculate the equivalent HP by multiplying the demand HP to be transmitted by the service factor.

$$\text{Equivalent HP} = \frac{\text{Demand HP x Service Factor}}{\text{Nominal Efficiency}}$$

Where: Single Reduction Nominal Eff. = 0.98
Double Reduction Nominal Eff. = 0.96
Triple Reduction Nominal Eff. = 0.94

Gearmotor Selection -

Determine class of service from Chart 3.

Chart 3: Class of Service

Service Factor	Class of Service
0.9-1.0	I
>1.0-1.4	II
>1.4-2.0	III

For service factors greater than 2.0, a DODGE APG reducer must be selected.

Step 7:

Reducer Selection -

From rating tables pages D1-7 through D1-48, make reducer selection based on input RPM, ratio, and equivalent HP.

Gearmotor Selection -

Go to the desired HP Gearmotor Selection Table for the appropriate class of service and output RPM (or reduction ratio). This will indicate gearcase size, motor frame size, output torque, and output OHL capacity.

Step 8: Check overhung loads by using the following formula:

$$\text{OHL} = \frac{126{,}000 \times \text{HP} \times \text{Fc} \times \text{Lf}}{\text{PD} \times \text{RPM}}$$

Where: OHL = Overhung Load (lbs.)
HP = Demand Horsepower
Fc = Load Connection Factor
Chain Drive: Fc = 1.00
Synchronous Belt Drive Fc = 1.10
Spur or Helical Gear Fc = 1.25
V-Belt Drive Fc = 1.50
Flat Belt Drive Fc = 2.50
Lf = Load Location Factor. For Lf of low speed shaft see page D1-85.
PD = Pitch Diameter (inches)
RPM = Revolutions per Minute (output)

To minimize overhung load and increase bearing life, load centerline should be located as close to the shaft shoulder as possible. For applications where OHL exceeds catalogued values contact Application Engineering at 812-376-1100 or use the reducer selection tables to select the next largest size gearcase.

APG Reducers And Gearmotors

XXX - XXX - X X X X - X - XXX.XX - XXX

- MOTOR HP-IF G CONSTRUCTION
  MOTOR HP-IF M CONSTRUCTION
  BLANK-IF R CONSTRUCTION OR IF NO MOTOR ATTACHED
- MOTOR FRAME-IF G CONSTRUCTION
  MOTOR FRAME-IF M CONSTRUCTION
  BLANK-IF R CONSTRUCTION
- STAGES OF REDUCTION
  S = SINGLE
  D = DOUBLE
  T = TRIPLE
- GEARCASE CONSTRUCTION
  G = INTEGRAL GEARMOTOR
  M = C-FACE MOTORIZED
  R = SEPARATE REDUCER
- GEARCASE SIZE-1 THROUGH 8
- FOOTMOUNT (A) OR FLANGE MOUNT (F)
- CLASS OF SERVICE
  1, 2 OR 3-IF G CONSTRUCTION
  BLANK-IF M CONSTRUCTION
  BLANK-IF R CONSTRUCTION
- RATIO-1.22 THROUGH 129.7
- MOUNTING POSITION - SEE PAGE D1-77 FOR GEARMOTORS
  D1-81 FOR REDUCERS

NOMENCLATURE EXAMPLES

15 - 215TY - D G 5 A - 2 - 11.4 - A1

- MOTOR HP - 15 HP
- MOTOR FRAME - 215 TY
- DOUBLE REDUCTION
- INTEGRAL GEARMOTOR CONSTRUCTION
- APG SIZE 5
- FOOT MOUNT
- CLASS 2 SERVICE
- 11.4:1 NOMINAL RATIO
- A1 MOUNTING POSITION

S R 3 A - 2.25 - C2

- SINGLE REDUCTION
- SEPARATE REDUCER CONSTRUCTION
- APG SIZE 3
- FOOT MOUNT
- 2.25:1 NOMINAL RATIO
- C2 MOUNTING POSITION

184TC - T M 6 F - 86.5 - AF5

- MOTOR FRAME - 184TC
- TRIPLE REDUCTION
- C-FACE REDUCER CONSTRUCTION
- APG SIZE 6
- FLANGE MOUNT
- 86.5:1 NOMINAL RATIO
- AF5 MOUNTING POSITION