Cone Drive

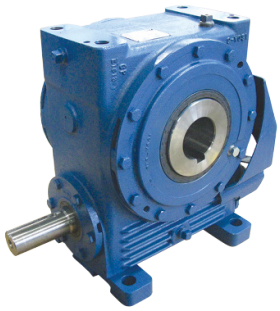
SERIES HP-A

POWER TRANSMISSION SOLUTIONS

PRODUCTS IN THE RANGE

Serving an entire spectrum of mechanical drive applications from food, energy, mining and metal; to automotive, aerospace and marine propulsion, we are here to make a positive difference to the supply of drive solutions.

Model HP
Worm Gear units with double enveloping worm gearing. Available in single, double and triple reductions.

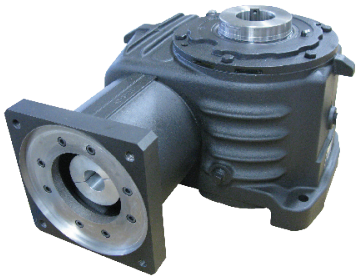


Model HP-A
Universal metric housing featuring double enveloping gearing & drywell feature

Series B
Industrial Duty worm gear unit featuring Conex gearing

DuoDrive
Dual gears on parallel output shafts

Extruder Drive
Rugged duty reducer takes high screw pressure

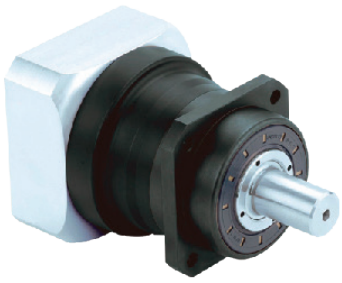


Model HP Servo
Model HP servo fits servo motor frame sizes up to 230mm in single reduction sizes.

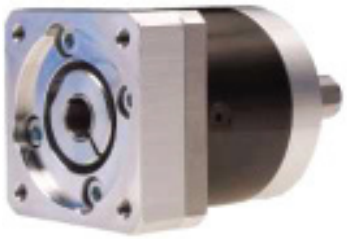
Series W
Precision right angle servo gearboxes

Model RG
Moderate precision right angle servo gearboxes

Series S
Value Engineered right angle servo gearboxes



Series P
Precision planetary servo gearboxes



Series E
Economical planetary servo gearboxes

Series LE
Economical planetary servo gearboxes

We can create custom engineered transmission solutions of any size and configuration.

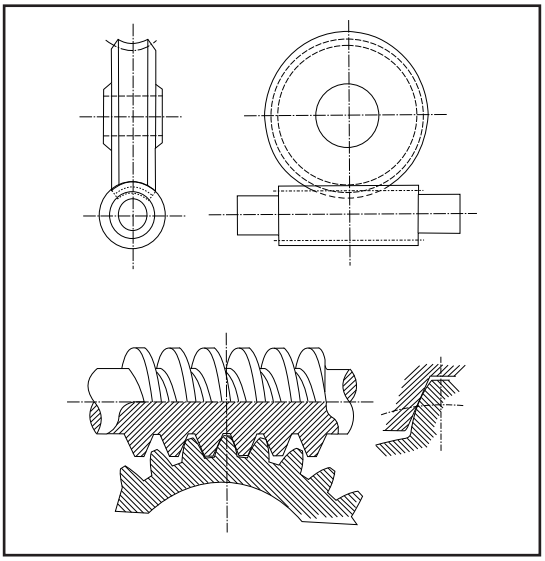
The Cone Drive Advantage

The element that distinguishes Cone Drive products from all the others is the double enveloping design. The term "double-enveloping" is an apt description, as the worm and gear wrap around each other. This greatly increases load carrying capacity by providing more tooth area contact and more teeth in mesh than other worm gear designs.

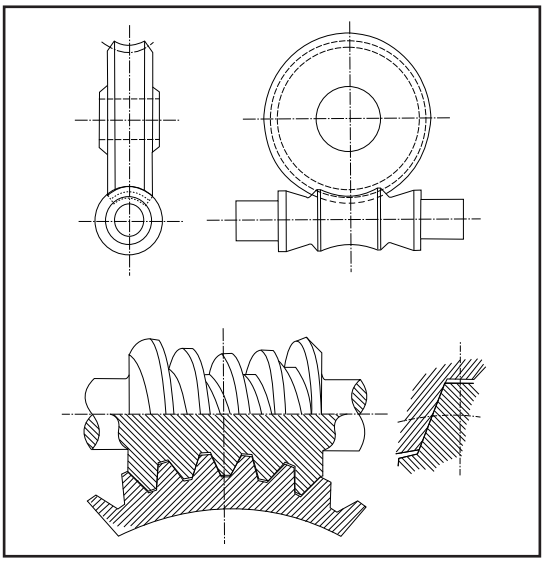
This design difference leads to many advantages, among them:

- Extra torque with no increase in size, or conversely, smaller, more reliable speed reducers
- High shock resistance, and the ability to withstand heavy starting and stopping loads
- Low backlash due to the inherent precision of the double-enveloping design
- Increased durability and longer gear life
- Design flexibility resulting from smaller and lighter envelopes

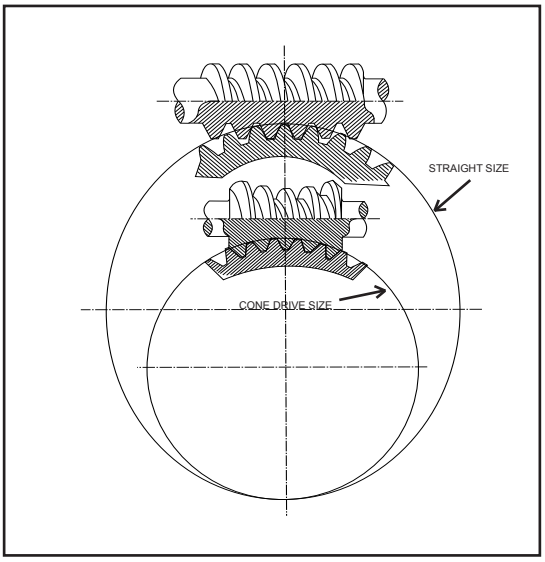
Simply stated, a Cone Drive speed reducer is a small machine doing the work of a big one.



The mesh of common Cylindrical worm gearing provides one to one and one-half gear teeth in contact with the worm.



The Cone Drive double-enveloping design typically provides contact between one-eighth of the total number of teeth on the gear and the worm.



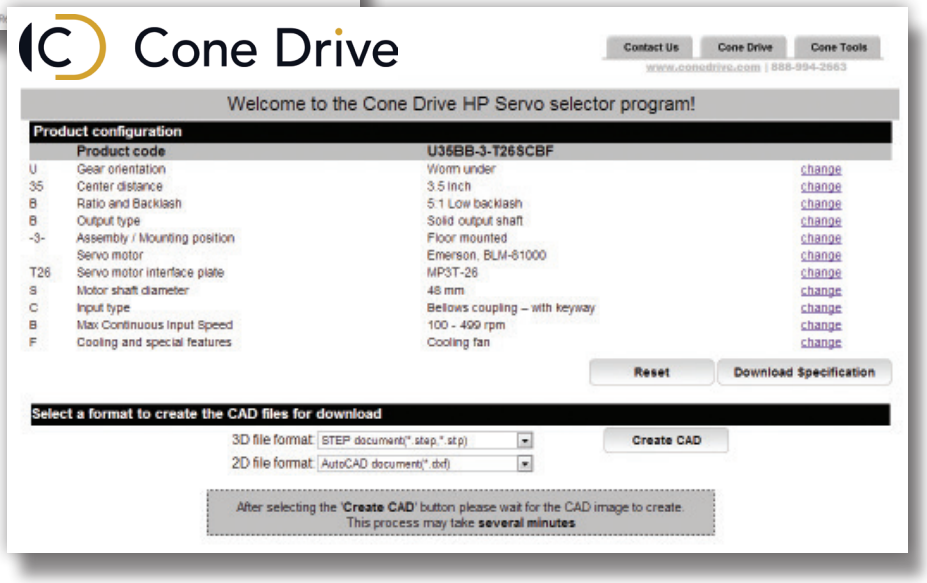
The Cone Drive design gear set can carry loads which would require cylindrical worm gearing to be much larger and heavier.

CONFIGURATOR TOOL

Cone Drive Drawing Downloads

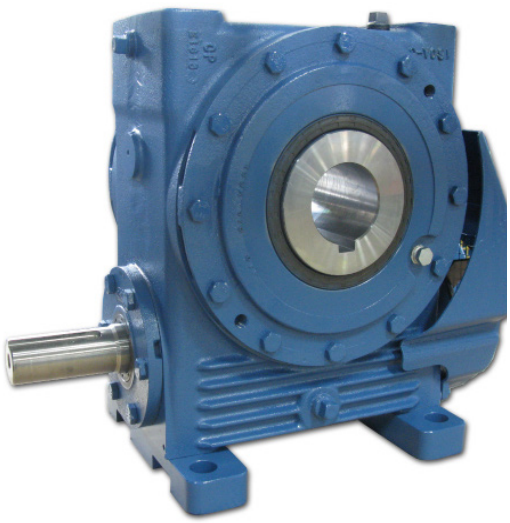
Visit www.Conedrive.com

Download 2-D or 3-D models of standard single reduction reducers



Products Drawings & Models Available for Download Include:

- Model HP
- Series B
- AccuDrive (Servo rated range)
- Model HP Servo
- Model HP A



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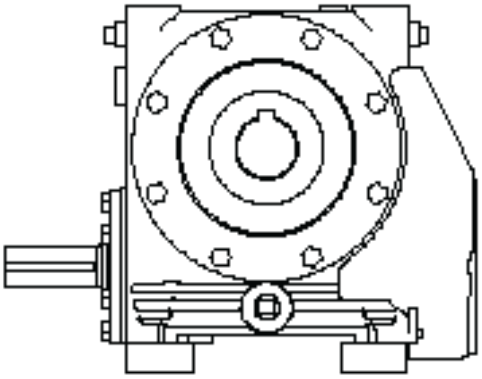
GENERAL DESCRIPTION

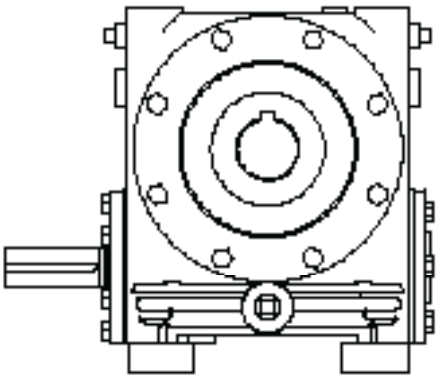
Single Reduction Units

The four units in this range are 100, 125, 160 and 200, based on a single universal case for each size, giving a high degree of common parts and interchangeability. Under-driven, over-driven and vertical types provide a choice of shaft arrangements in meeting the requirements of a wide variety of applications in the medium power range up to 100 HP.

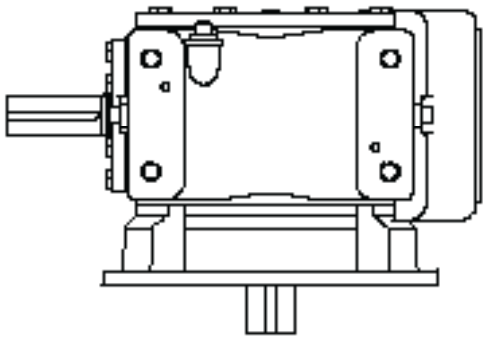
Model HP-A gives a choice of 12 standard ratios from 5/1 to 70/1 and important features include high efficiencies and load carrying capacities combined with long life and reliability in service.



Single Reduction Units (Worm)
(Fan Cooled)



Single Reduction Units (Worm)
(Not Fan Cooled)



Output Flange Units

MAKING A SELECTION FOR YOUR APPLICATION

We look forward to serving you. Please phone us at 1-888-994-2663 for help specifying gear ratio, speed, duty cycle, and backlash. Or tell us about your application by faxing us the information below to 1-888-907-2663. Our dedicated teams are waiting for your call.

1. Application:
   - General type of application or machine.
   - Specific consideration; eg. positioning accuracy, shock loading, or self-locking.
2. Duty cycle:
   - Continuous or intermittent
     If continuous:
     - Hours per week

     If intermittent:
     - How many starts and stops per hour.
     - Average “on” time per hour.
3. Ratio and operating speed:
   - Variable or continuous speed input.
   - Preferred input speed.
   - Desired output speed.
4. Loading:
   - Horsepower or torque available or required for starting, running, and stopping.
   - General type of driving motor; eg. AC motor, servo motor, or hydraulic motor.
   - Special load classification; eg. shock loading, reversing, potential for emergency stops.
   - Unusually high inertia loading at the input or output shaft.
   - Overhung and/or thrust loading on shafts.
5. Environmental:
   - Any unusual environmental conditions such as high or low temperature, grit or other contaminants, or wet or spray exposure.
6. Configuration:
   - With or without a Cone Drive supplied drive motor.
   - Flange mounting provisions for the drive motor.
   - Solid or hollow output shaft.
   - Special modifications, dimensions, or features desired.

If Cone Drive is to provide the motor, please provide the following information:

1. Horsepower (HP)
2. RPM
3. Frame Size
4. Phase
5. Cycle (Hertz)
6. Voltage
7. Enclosure
8. Type
9. Design
10. Duty
11. Percent slip
12. Brake rating
13. Conduit box location when exact location is required (see view)

If customer is to furnish and mount the motor, please provide the following information so that the correct motor adaptor and coupling will be provided.

1. Horsepower (HP)
2. Frame size
3. Speed
4. Motor pilot diameter
5. Motor shaft dimensions
6. Brake rating (when units or motors are to be equipped with brakes having a torque rating that exceeds the unit or motor rating, the brake rating must be used to select unit size.
7. Complete coupling information (if alternate coupling is required and is not being furnished by Cone Drive)

SELECTION PROCEDURE

The Procedure for Determining Speed Reducer Load Capacity is as Follows:

1. Determine the proper service factor by matching your duty requirements with the "Service Factor" chart in this section.

2. Determine the actual input horsepower required to drive the reducer. In case of operating worm speed under 100 RPM. use only output torque ratings. Multiply this horsepower or torque value by the appropriate service factor rather than adjust the ratings in the Catalog. This will give you the adjusted horsepower or torque required.

3. Find the ratio by dividing the speed of the input shaft by the speed of the output shaft.

4. Referring to the ratings (See pages 23 - 29) section, select a unit, at the given worm RPM and ratio, having a corresponding mechanical rating (or one slightly in excess) to the adjusted horsepower or torque.

5. Check the actual input horsepower to be transmitted (horsepower before applying service factor) against the thermal rating listed in the same table as in 4 above. The thermal rating defines the maximum horsepower which can be transmitted continuously (30 minutes or longer). This is based on an oil sump temperature rise of 100°F above ambient, and must not exceed 200°F. If the thermal rating is a lower value than the mechanical rating, choose the unit on the basis of the thermal rating. Exceptions to this rule are applications, where operation is intermittent and does not permit thermal build-up. For applications involving multiple cycles the average horsepower required should be compared with the thermal rating of the reducer. Where water-cooled units are used, thermal ratings can be obtained from our Traverse City, Michigan office; where fan cooled units are used, use the fan cooled thermal ratings shown on the fan cooled pages in the Traditional Products Section.

6. If either input or output shaft is connected to driver or driven mechanism other than by direct shaft coupling, calculate overhung load requirements (Chain Pull) by dividing the torque demand by the pitch radius of the sprocket, sheave, spur or helical gear used. Multiply by the following factor:
As modified by the applicable service factor, this load may not exceed the overhung load rating listed under Chain Pull in the HP. and Torque Ratings Tables. The Chain Pull figures are based on the center of the load being no further from the center line of the reducer than one-half the keyway length on the output shaft extension. When Chain Pull approaches full rated capacity as listed, use heat-treated foundation bolts (150,000 PSI tensile strength).

7. Cone Drive's Application Engineering Department is available to assist you with selection of the reducer for your application. Computer programs and technical personnel are available to discuss your application. We invite you to forward all pertinent data to Cone Drive's Traverse City, Michigan office or your local representative for our full review and selection assistance.

Type of Drive	Overhung Load Factor
Chain Sprocket	1.00
Spur or helical gearing	1.25
"V" belt sheave	1.50
Flat belt sheave	2.50

Horsepower, Speed and Torque Relationship

Formula 1: $P = \frac{T_W n}{63{,}000}$

Formula 2: $T_W = \frac{P \cdot 63{,}000}{n}$

Formula 3: $T_G = T_W \cdot m_G \cdot \eta$

Definitions

M_G = gear ratio $\frac{N_G}{N_W}$

n = rotational speed of worm (rpm)

P = power input to worm (Horsepower)

T_W = input torque (inch pounds)

T_G = output torque (inch pounds)

η = efficiency (percent)

SERVICE FACTORS (DUTY CYCLE)

Service Factors

Duty Cycle	Hours/Day	Uniform	Moderate Shock	Heavy Shock	Extreme Shock
	1/2	0.8	0.9	1.0	1.2
	2	0.9	1	1.2	1.3
	10	1	1.3	1.5	1.7
	24	1.3	1.5	1.7	2

For continuous operation thermal ratings must be considered.
See Rating Charts in reducer section.

Example 1

10 HP 1750 RPM motor input, 10 hr per day service with moderate shock loading. This requires a **1.3 service factor**. Selection of a reducer from the Mechanical HP ratings charts is based on 10 HP x 1.3 = 13.00 HP. Thermal ratings shown in the ratings charts must be adequate for 13 HP input.

Example 2

5 HP 1750 RPM motor input, uniform loading operating approximately 2 hour per day. This requires a 0.9 service factor. Selection of a reducer from mechanical HP ratings charts in based on 5 HP * 0.9 =4.5 Hp. Thermal consideration is not required.

Cone Drive Worm Gears Work in Any Environment

Cone Drive double-enveloping worm gear reducers are operating in extreme environments all over the world.

Here are more examples:

- **Food Processing and Chemical Mixing**
  The reducer is designed to withstand corrosion and protect the mixture from contamination.
- **Coal Mining**
  Feeder breaker drives are built to survive the dust, dirt, grim and shock loads, and do it all in a severely limited space.
- **Marine Applications**
  Naval ship capstans and winches driven by Cone Drives shed the effects of salt water spray.
- **Taconite and Phosphate Handling**
  Cone Drive has solved the problem of fine dust working its way into gearboxes, which can contaminate lubricants and ruin gear sets.

UNIT DESIGNATIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
EXAMPLE	A	1	2	5	5	5	.	0	F	R	N	-	1	-	F

1 Series

2 - 4 Size

1	0	0
1	2	5
1	6	0
2	0	0

5 Revision

5

6, 7, 8 Nominal Overall Ratio

5	.	0
7	.	5
1	0	.
1	2	.
1	5	.
2	0	.
2	5	.
3	0	.
4	0	.
5	0	.
6	0	.
7	0	.

9 Unit Version

W	-	Std Unit
F	-	Std Unit with Output Flange on Left**
H	-	Std Unit with Output Flange on Right**
B	-	Std Unit with Base Mounted Feet
V	-	Std Vertical Unit with Output Flange mounted on Left** and with Drywell
J	-	Std Vertical Unit with Output Flange mounted on Right** and with Drywell

* Looking into input shaft with unit in mounting position #1 (worm under)

10 Input Type

R	-	Reducer unit - (Inch Input)
M	-	Reducer Unit - (Metric Input)
T	-	Reducer Unit (Double Extended Inch Input)
N	-	Reducer Unit (Double Extended Metric Input)
A	-	Unit to Allow Fitting of Motor
B	-	Unit to Allow Fitting of Motor with Double Extended (Inch)

11 Output Shaft****

N	-	Inch Single Extension on Left
B	-	Inch Single Extension on Right
Q	-	Inch Reduced, Single Extension on Left
T	-	Inch Reduced, Single Extension on Right
P	-	Inch Double Extension
G	-	Inch Reduced Double Extension
A	-	Inch Hollow Shaft
C	-	Metric Single Extension on Left
E	-	Metric Single Extension on Right
L	-	Metric Reduced Single Extension on Left
M	-	Metric Reduced Single Extension on Right
D	-	Metric Double Extension
R	-	Metric Reduced Double Extension
H	-	Metric Hollow Shaft

**** Additional Bore Sizes Available See Page 15

12 Motor Adapter (Type "A" Units) ***

-	-	Reducer Unit
V	-	NEMA 143/145TC Motor Flange
X	-	NEMA 182/184TC Motor Flange
Y	-	NEMA 213/215TC Motor Flange
D	-	NEMA 254/256TC Motor Flange

**** Custom motor adaption available upon request

13 - 14 Mounting Position

1	-	Worm Under
2	-	Worm Over
3	-	Output Vertical, Input Right
4	-	Output Vertical, Input Left
5	-	Input Vertical, Input Extension Up
6	-	Input Vertical, Input Extension Down

15 Special Options

-	-	None
F	-	Fan Cooled - Fan opposite of input
L	-	Low Backlash
D	-	Dbl Oil Seals

**** Additional Options Available See Page 11

*3D Model Configurator Available at www.Conedrive.com

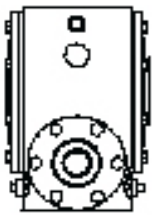
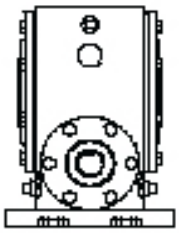
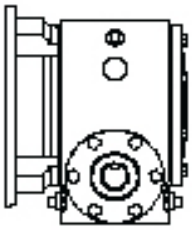
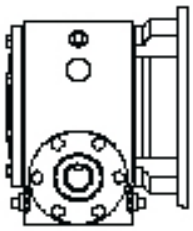
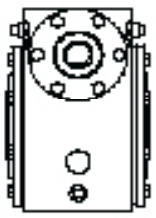
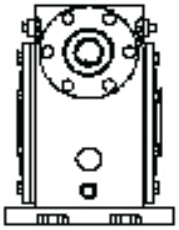
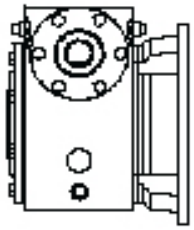
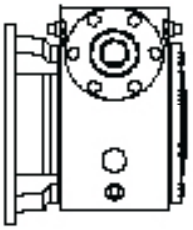
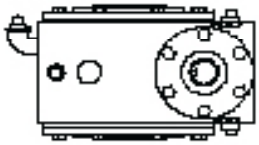
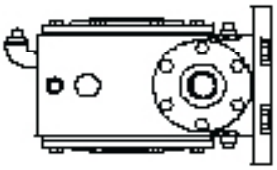
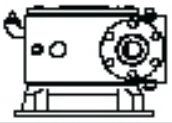
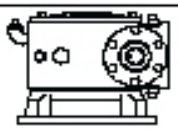
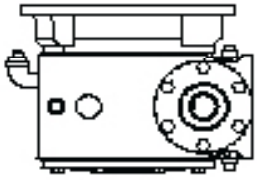
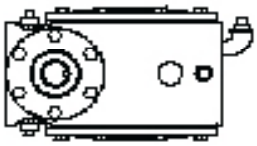
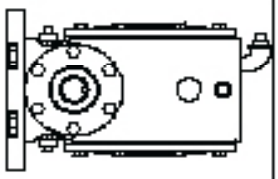
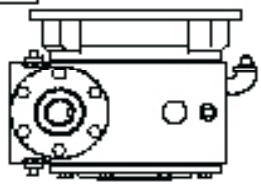
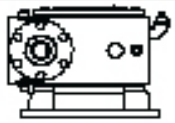
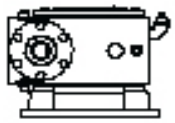
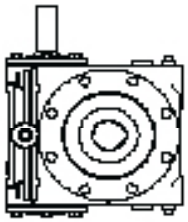
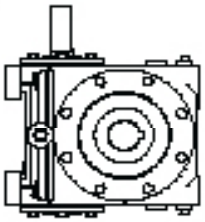
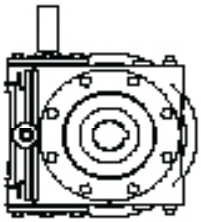
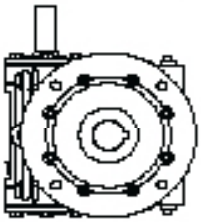
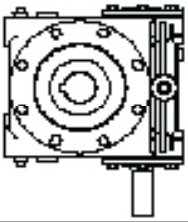
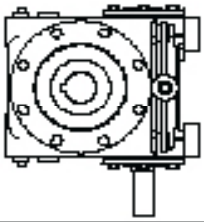
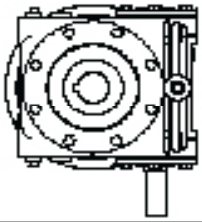
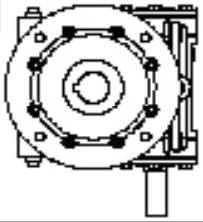
GEAR UNIT FEATURES – COLUMN 15 ENTRY

Column 15 Entry	Fan Cooled	Low Backlash	Double Oil Seals	Viton Seals
-				
A				●
B	●	●		
C			●	●
D			●	
E		●		●
F	●			
G	●		●	
H		●	●	
I	●			●
J		●	●	●
K	●		●	●
L		●		
M	●	●		●
N	●	●	●	
O	●	●	●	●

Other special features available with the HP - A include:

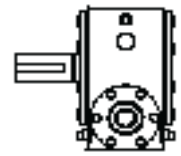
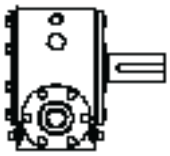
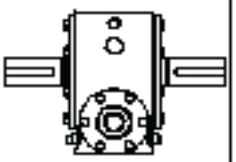
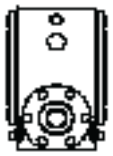
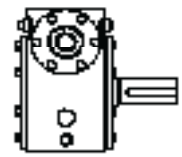
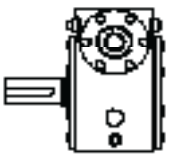
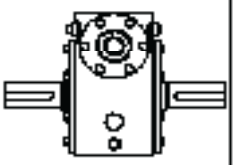
- Ratios not listed on the rating pages
- Hollow output bore diameters
- Shrink disc shafts
- Solid output shaft diameters or shaft lengths
- Input shafts with custom diameters or lengths
- Shaft materials such as stainless steel
- Motor adaptation (servo / hydraulic / IEC)
- Paint
    - White epoxy
    - Steelit
    - Custom colors

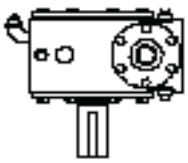
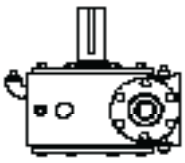
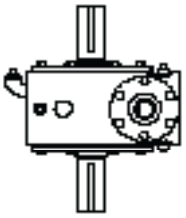
MOUNTING POSITIONS

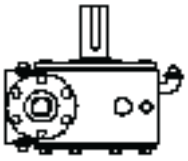
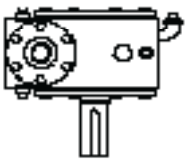
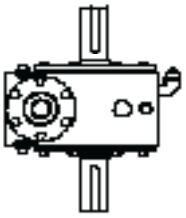
COLUMN 13 ENTRY	UNIT VERSION - COLUMN 9 ENTRY			
	BASIC UNIT	BASE MOUNTED FEET	OUTPUT FLANGE	OUTPUT FLANGE
1	W 	B 	F 	H 
2	W 	B 	F 	H 
3	W 	B 	V DRYWELL INCLUDED  F 	H 
4	W 	B 	F 	J DRYWELL INCLUDED  H 
5	W 	B 	F 	H 
6	W 	B 	F 	H 

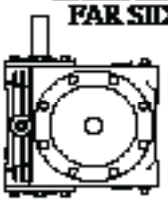
UNIT HANDLING - OUTPUT SHAFT POSITIONS

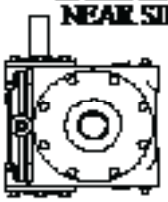
COLUMN 13 ENTRY	OUTPUT SHAFT POSITIONS - COLUMN 11 ENTRY			
	SINGLE EXTENSION	SINGLE EXTENSION	DOUBLE EXTENSION	HOLLOW SHAFT
1	N Q C L	B T E M	P R D G	A H
2	N Q C L	B T E M	P R D G	A H
3	N Q C L	B T E M	P R D G	A H
4	N Q C L	B T E M	P R D G	A H
5	N Q C L	B T E M	P R D G	A H
6	N Q C L	B T E M	P R D G	A H

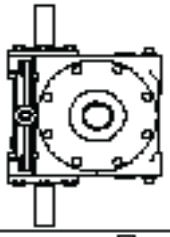
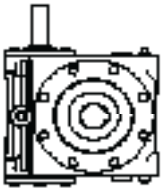
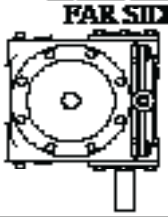








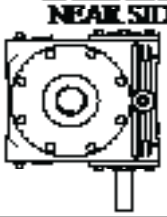




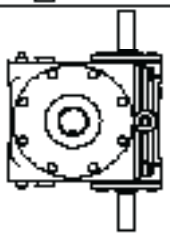
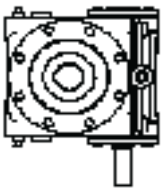










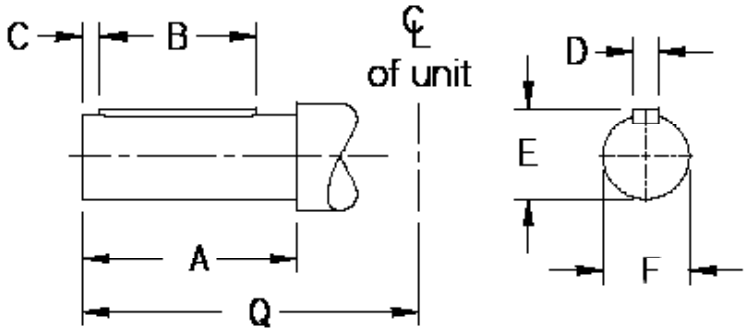
EXACT RATIOS

Single Reduction (worm)

Nominal Ratio Column Entry			Size 100	Size 125	Size 160	Size 200
6	7	8	Exact Ratio	Exact Ratio	Exact Ratio	Exact Ratio
5	.	0	5.143	5.125	5.125	5.1
7	.	5	7.4	7.4	7.571	7.571
1	0	.	9.75	9.75	9.8	9.8
1	2	.	12.333	12.333	12.25	12.25
1	5	.	15.5	15.5	14.667	15.333
2	0	.	19.5	19.5	20.5	20.5
2	5	.	25	25	24.5	24.5
3	0	.	30	30	30	30
4	0	.	40	40	40	40
5	0	.	50	50	50	50
6	0	.	60	60	60	60
7	0	.	70	70	70	70

OUTPUT OPTIONS - ADDITIONAL FEATURES

Outputshaft Options, COLUMN 11 ENTRY



Size Of Unit	Type Of Output Shaft	Column 11 Entry		Dimensions In Inches (Metric Shafts In Mm)						
		Single Ext.	Double Ext.	A	B	C	D	E	F Dia.	Q
A100	Std Inch *	N,B	P	4.61	3.31	-	.500/.498	2.218/2.210	2.000/1.999	8.86
	Inch Red. Dia.*	Q,T	R	4.21	2.69	-	.375/.373	1.917/1.909	1.750/1.749	8.46
	Metric	C, E	D	116.32	90.00	10	14/13.957	53.500/53.210	50.02/50	225.00
	Metric Red. Dia.	F, J	G	106.99	56.00	10	14/13.957	48.500/48.210	45.02/45	215.00
A125	Std Inch *	N,B	P	5.17	4.00	-	.625/.623	2.773/2.765	2.500/2.499	10.04
	Inch Red. Dia.*	Q,T	R	4.36	2.75	-	.500/.498	2.218/2.210	2.000/1.999	9.06
	Metric	C, E	D	131.28	100.00	12	18/17.957	69.000/68.690	65.02/65	255.00
	Metric Red. Dia.	F, J	G	110.82	56.00	11	16/15.957	59.000/58.710	55.02/55	230.00
A160	Std Inch *	N,B	P	6.27	4.63	-	.750/.748	3.327/3.319	3.000/2.999	11.61
	Inch Red. Dia.*	Q,T	R	5.49	2.69	-	.625/.623	2.773/2.765	2.500/2.499	10.83
	Metric	C, E	D	159.14	100.00	13	20/19.948	79.520/79.210	75.01/75.03	295.00
	Metric Red. Dia.	F, J	G	139.36	82.00	12	18/17.957	69.000/68.690	65.01/65.03	275.00
A200	Std Inch *	N,B	P	6.69	5.88	-	.875/.873	4.007/3.999	3.500/3.499	12.20
	Inch Red. Dia.*	Q,T	R	5.12	4.63	-	.750/.748	3.327/3.319	3.000/2.999	13.98
	Metric	C, E	D	170.00	140.00	15.5	25/24.948	95.000/94.5900	90.04/90.01	310.00
	Metric Red. Dia.	F, J	G	130.00	100.00	14	22/21.948	85.000/84.690	80.03/80.01	355.00

*Inch shafts have an open ended keyway, therefore no 'C' dimension is required.

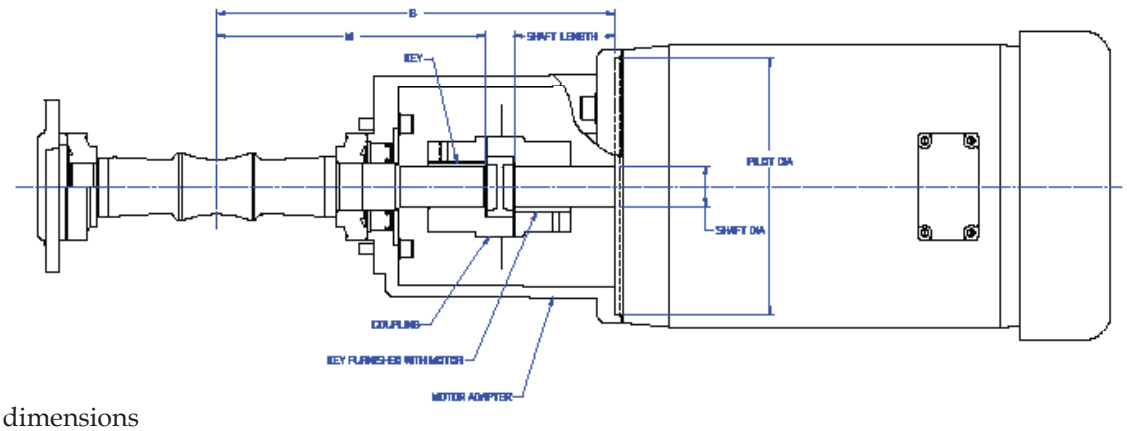
*Inch and metric reduced diameters available as special order.

Standard Hollow Bore Options

Size of Unit	Column 11 Entry	Type of Output Shaft	Bore Diameter	Keyway Dimensions
A100	A	Inch	2.001 / 2.002	1/2 X 1/4
	H	Metric	50.03 / 50.08	14 x 3.8
A125	A	Inch	2.500 / 2.5003	5/8 x 5/16
	H	Metric	65.00 / 65.07	18 x 4.4
A160	A	Inch	3.000 / 3.003	3/4 x 3/8
	H	Metric	75.02 / 75.08	20 x 4.9
A200	A	Inch	3.501 / 3.503	7/8 x 1/4
	H	Metric	90.04 / 90.09	25 x 5.4

MOTOR ADAPTORS & MOTOR DETAILS

Motor Adaptors



A100 motor adapter dimensions

Position 12 Motor Code	Motor Frame Size	Motor Pilot Diameter, (in)	Motor Shaft Length, (in)	Motor Shaft Diameter, (in)	Coupling Part Number	Dimension B (in)	Dimension M (in)
V	143 TC 145 TC	4.500	2.125	0.875	720219	10.94	7.91
X	182 TC 184 TC	8.500	2.625	1.125	720220	13.11	9.53
Y	213 TC 215 TC		3.125	1.375	720206		8.80
D	254 TC 256 TC		3.750	1.625	720218		8.27

A125 motor adapter dimensions

Position 12 Motor Code	Motor Frame Size	Motor Pilot Diameter, (in)	Motor Shaft Length, (in)	Motor Shaft Diameter, (in)	Coupling Part Number	Dimension B (in)	Dimension M (in)
V	143 TC 145 TC	4.500	2.125	0.875	720216	12.09	9.09
X	182 TC 184 TC	8.500	2.625	1.125	720217	13.90	10.43
Y	213 TC 215 TC		3.125	1.375	720218		9.94
D	254 TC 256 TC		3.750	1.625	720259		9.57

A160 motor adapter dimensions

Position 12 Motor Code	Motor Frame Size	Motor Pilot Diameter, (in)	Motor Shaft Length, (in)	Motor Shaft Diameter, (in)	Coupling Part Number	Dimension B (in)	Dimension M (in)
V	143 TC 145 TC	4.500	2.125	0.875	720207	12.83	9.85
X	182 TC 184 TC	8.500	2.625	1.125	720269	14.65	11.11
Y	213 TC 215 TC		3.125	1.375	720270		10.61
D	254 TC 256 TC		3.750	1.625	720262		10.36

A200 motor adapter dimensions

Position 12 Motor Code	Motor Frame Size	Motor Pilot Diameter, (in)	Motor Shaft Length, (in)	Motor Shaft Diameter, (in)	Coupling Part Number	Dimension B (in)	Dimension M (in)
X	182 TC 184 TC	8.500	2.625	1.125	720316	17.28	13.58
Y	213 TC 215 TC		3.125	1.375	720317		13.15
D	254 TC 256 TC		3.750	1.625	720313		12.52

OVERHUNG LOADS (LB) ON SHAFTS

Maximum permissible overhung loads

When a sprocket, gear etc. is mounted on the shaft a calculation, as below, must be made to determine the overhung load on the shaft, and the results compared to the maximum permissible overhung loads tabulated. Overhung loads can be reduced by increasing the diameter of the sprocket, gear, etc. If the maximum permissible overhung load is exceeded, the sprocket, gear, etc. should be mounted on a separate shaft, flexibly coupled and supported in its own bearings, or the gear unit shaft should be extended to run in an outboard bearing. Alternatively, a larger gear is often a less expensive solution.
Permissible overhung loads vary according to the direction of rotation. The values tabulated are for the most unfavorable direction with unit transmitting full rated power and the load P applied midway along the shaft extension. Hence they can sometimes be increased for a more favorable direction of rotation, or if the power transmitted is less than the rated capacity of the gear unit, or if the load is applied nearer to the gear unit case. Refer to Cone Drive for further details. In any event, the sprocket, gear etc. should be positioned as close as possible to the gear unit case in order to reduce bearing loads and shaft stresses, and to prolong life.
All units will accept 100% momentary overload on stated capacities.

Overhung load (lb)

$$P = \frac{HP \times 126{,}000 \times K}{N \times D}$$

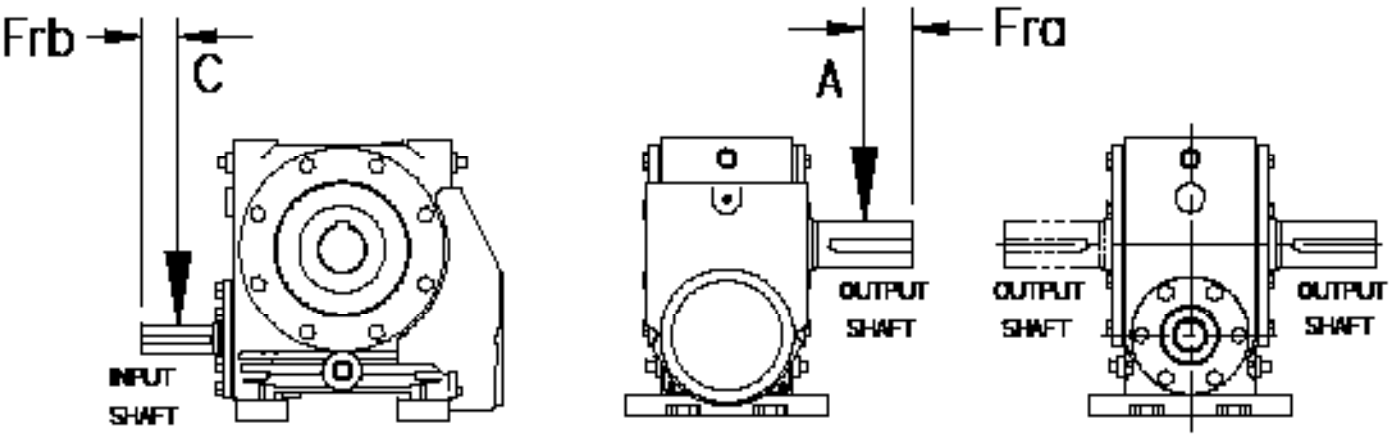
where

P = equivalent overhung load (lb)
HP = power transmitted by the shaft (HP)
N = speed of shaft (rpm)
D = pitch diameter of sprocket, etc. (in)
K = factor

Note: 1 lb = 0.4536 kg = 4.4484 Newtons.

Overhung member	K (factor)
Chain sprocket*	1.00
Spur or helical pinion	1.25
Vee belt sheave	1.50
Flat belt pulley	2.00

* If multistrand chain drives are equally loaded and the outer strand is further than dimension A output or B input, refer to Cone Drive.



Distance midway along the shaft extension

Size of unit	Dimension A (inches)	Dimension C (inches)
100	2.165	1.14
125	2.360	1.615
160	2.655	1.615
200	3.345	1.615

OVERHUNG LOADS (LB) & AXIAL THRUSTS (LB)

Overhung Loads (Fra) & Axial Thrust Capacities On Output Shaft

		OUTPUT Rev/min							
		700	500	350	230	140	95	70	15 & UNDER
A100	OHL (Fra)	3,160	3,250	3,380	3,570	3,890	3,890	3,880	3,880
	THRUST	3,060	3,060	3,060	3,060	3,060	3,060	3,060	3,060
A125	OHL (Fra)	4,220	4,390	4,510	4,740	5,620	5,620	5,620	5,620
	THRUST	3,880	3,880	3,880	3,880	3,880	3,880	3,880	3,880
A160	OHL (Fra)	5,870	6,170	6,270	6,600	7,990	8,080	8,080	8,030
	THRUST	4,480	4,480	4,480	4,480	4,480	4,480	4,480	4,480
A200	OHL (Fra)	6,960	7,420	7,480	7,700	9,780	10,200	10,200	10,100
	THRUST	4,530	4,530	4,530	4,530	4,530	4,530	4,530	4,520

Reducer Overhung Loads (Frb) On Input Shaft

AT 1,750 rev/min

	RATIO	SIZE			
		A100	A125	A160	A200
SINGLE REDUCTION UNIT	5	1,600	1,680	2,470	3,340
	7.5	1,620	1,790	2,580	3,480
	10	1,630	1,790	2,540	3,390
	12.5	1,630	1,800	2,450	3,180
	15	1,490	1,850	2,170	2,900
	20	1,660	1,830	1,930	2,490
	25	952	1,740	2,220	2,720
	30	1,310	1,630	1,820	1,940
	40	1,360	2,170	1,620	1,720
	50	1,260	1,640	1,770	2,620
	60	1,150	1,310	2,050	3,150
	70	1,570	1,140	2,050	2,780

REDUCER BACKLASH LEVEL

The following chart lists the backlash for standard reducers. Backlash is defined as the amount of movement at the pitch line of the gear with the worm locked and the gear set on exact center distance. When the gear set is assembled into a machine or reducer, the assembled backlash may fall outside of the limits shown in the table depending on worm and gear bearing looseness, and the actual center distance on which the gear set is mounted. Backlash is measured at the pitch line of the gear and is not dependent on ratio. Backlash is generally not measured at the worm because the amount of rotation of the worm with gear locked is a function of ratio.

Standard Backlash

Size	Rpm Input								
	100-499			500-999			1000-2000		
	Inches	Degrees	Arc Minutes	Inches	Degrees	Arc Minutes	Inches	Degrees	Arc Minutes
100	0.010	0.18	11	0.011	0.20	12	0.013	0.23	14
125	0.011	0.16	9	0.012	0.17	10	0.014	0.20	12
160	0.012	0.14	9	0.013	0.16	9	0.015	0.18	11
200	0.014	0.12	7	0.016	0.14	8	0.019	0.17	10

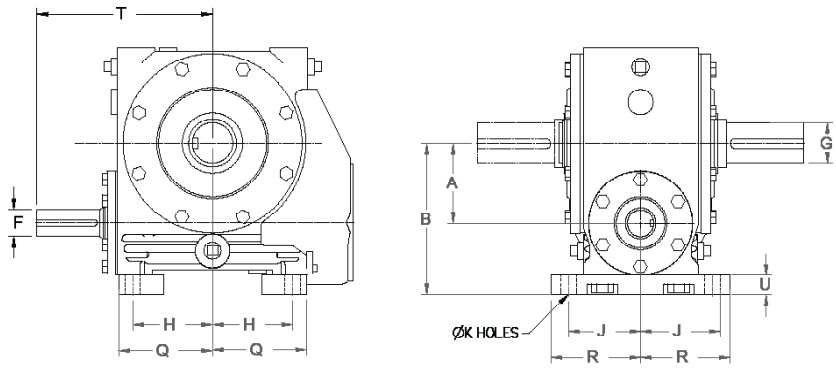
Nominal Backlash values in inches, degrees, and arcminutes for standard backlash reducers.
Backlash in inches is measured at pitch line.

Low Backlash

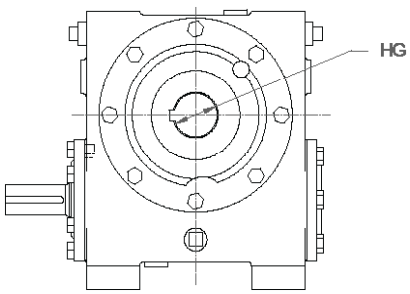
Size	Rpm Input								
	100-499			500-999			1000-2000		
	Inches	Degrees	Arc Minutes	Inches	Degrees	Arc Minutes	Inches	Degrees	Arc Minutes
100	0.003	0.05	3	0.004	0.07	4	0.006	0.11	6
125	0.003	0.04	3	0.004	0.06	3	0.006	0.09	5
160	0.003	0.04	2	0.004	0.05	3	0.006	0.07	4
200	0.003	0.03	2	0.005	0.04	3	0.008	0.07	4

Nominal Backlash values in inches, degrees, and arcminutes for low backlash reducers.
Backlash in inches is measured at pitch line.

COMPETITOR INTERCHANGE DIMENSIONS



Solid Output Option



Hollow Output Option

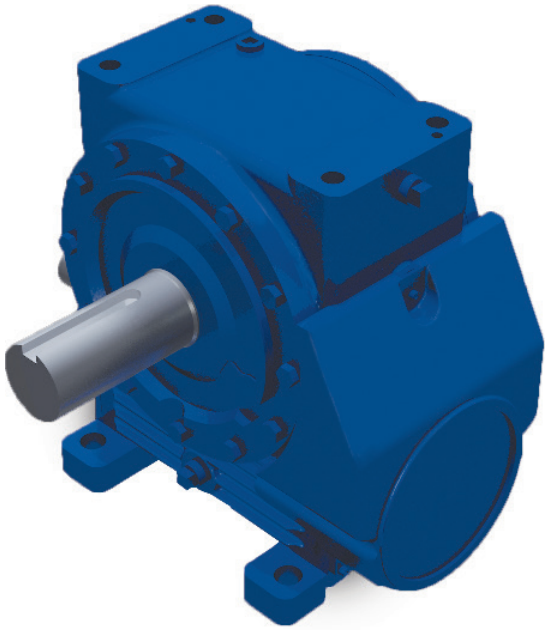
	Model	A	B	F	HG	G	H	J	Q	R	T
Cone Drive	A1005	100 (3.94)	8.11	1.375	2.000	2.000	4.23	4.04	5.47	5.04	8.86
Renold - WM Metric Series	WM100	100 (3.94)	8.11	35 (1.38)	50 (1.97)	50 (1.97)	4.23	4.04	5.51	4.92	8.86
Renold - WM Inch Series	WM4	4.00	8.25	1.250	2.250	2.000	4.25	4.00	5.51	4.92	9.02
Flender - Cavex	CUA100	100 (3.94)	7.48	1.10	50 (1.97)	48 (1.89)	3.35	3.35	8.50	7.87	6.85
Delroyd	E40	4.00	8.25	1.125	2.438	1.750	4.25	4.375	5.188	5.25	7.75
Winsmith	DS941	100 (3.94)	9.69	1.500	2.438	2.250	5.25	4.13	6.38	5.00	9.00
Cleveland	40ES	4.00	7.75	1.125	2.500	1.750	3.56	3.75	4.50	4.38	7.75
Rossi	RV100	100 (3.94)	7.09	1.1	1.890	1.890	3.55	2.58	4.645	3.25	6.22

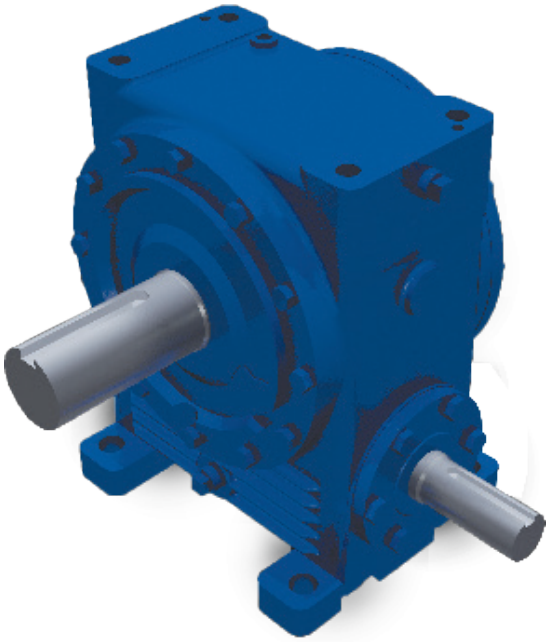
	Model	A	B	F	HG	G	H	J	Q	R	T
Cone Drive	A1255	125 (4.92)	9.33	1.625	2.500	2.500	4.92	4.43	6.30	5.51	10.83
Renold - WM Metric Series	WM125	125 (4.92)	9.33	40 (1.57)	65 (2.56)	65 (2.56)	4.92	4.43	6.50	5.51	10.83
Renold - WM Inch Series	WM5	5.00	9.50	1.500	2.750	2.500	4.87	4.37	6.50	5.51	10.24
Flender - Cavex	CUA120	120 (4.72)	8.85	32 (1.26)	60 (2.36)	55 (2.17)	3.94	3.94	5.00	4.63	7.87
Delroyd	E50	5.00	9.63	1.375	2.938	2.000	4.75	4.875	5.75	6.00	8.75
Winsmith	DS951	125 (4.92)	10.67	1.500	2.875	2.500	6.38	4.50	7.65	5.63	9.73
Cleveland	50ES & 50M	5.00	9.00	1.375	3.000	2.000	4.38	3.88	5.50	4.38	8.75
Rossi	RV125	125 (4.92)	8.86	1.26	2.362	2.362	4.43	3.05	4.92	3.82	7.36

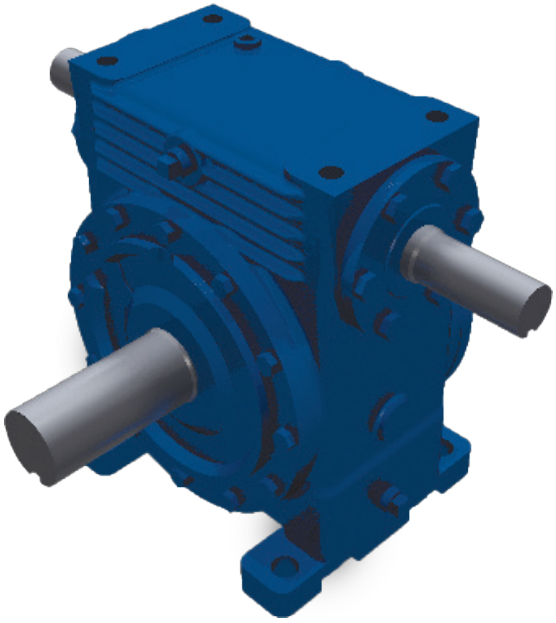
	Model	A	B	F	HG	G	H	J	Q	R	T
Cone Drive	A1605	160 (6.30)	11.22	1.875	3.000	3.000	5.71	4.73	7.28	5.91	12.20
Renold - WM Metric Series	WM160	160 (6.30)	11.22	45 (1.77)	75 (2.95)	75 (2.95)	5.71	4.73	6.89	6.10	12.20
Renold - WM Inch Series	WM6	6.00	11.00	1.500	3.250	3.000	5.25	4.75	6.89	6.10	10.98
Flender - Cavex	CUA160	160 (6.30)	11.42	42 (1.65)	75 (2.95)	70 (2.76)	5.12	10.04	6.38	5.81	10.00
Delroyd	E60	6.00	11.00	1.500	3.438	2.250	5.25	5.25	6.63	6.50	10.25
Winsmith	DS961	150 (5.91)	12.16	1.750	3.000	3.125	6.88	5.13	8.29	6.38	11.10
Winsmith	DS971	175 (6.89)	14.77	1.750	3.250	3.500	8.13	6.25	9.70	7.63	13.25
Cleveland	60ES & 60M	6.00	11.00	1.500	3.500	2.500	5.62	5.25	6.75	6	11.50
Rossi	RV160	160 (6.30)	11.02	1.496	2.756	2.756	5.355	3.60	6.79	4.565	10.28

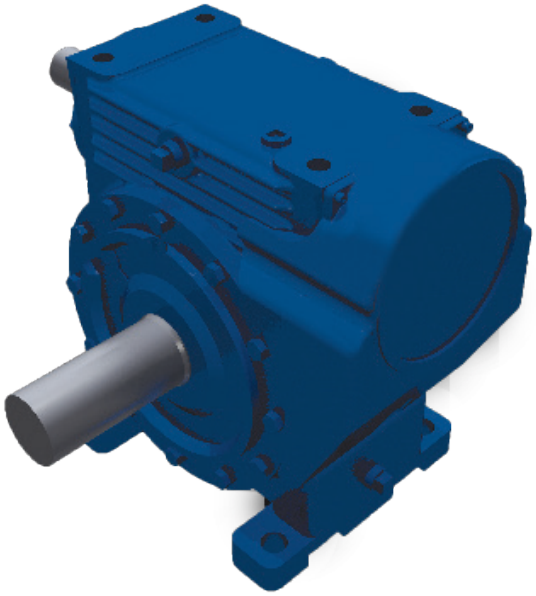
	Model	A	B	F	HG	G	H	J	Q	R	T
Cone Drive	A2005	200 (7.87)	13.38	2.000	3.500	3.500	6.79	5.22	8.87	6.50	13.58
Renold - WM Metric Series	WM200	200 (7.87)	13.38	50 (1.97)	90 (3.54)	90 (3.54)	6.79	5.22	8.86	6.69	13.50
Renold - WM Inch Series	WM8	8.00	13.75	1.750	3.750	3.500	6.75	5.25	8.86	6.69	13.50
Flender - Cavex	CUA200	200 (7.87)	13.78	55 (2.17)	95 (3.74)	90 (3.54)	6.20	5.81	7.80	6.89	12.32
Delroyd	E80	8.00	13.75	1.875	4.438	2.750	6.75	6.00	16.50	14.50	12.50
Winsmith	DS981	200 (7.87)	16.37	2.000	3.750	3.875	9.25	6.75	11.10	8.38	15.50
Cleveland	70ES & 70M	7.00	12.25	1.625	4.000	2.750	6.5	5.75	7.75	6.50	12.50
Rossi	RV200	200 (7.87)	13.18	1.890	3.543	3.543	6.73	4.22	8.49	5.32	13.23

Worm Under







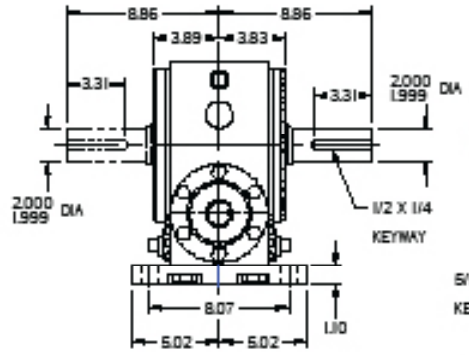


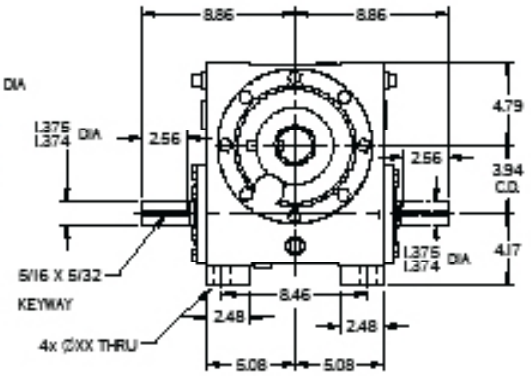
Worm Over

SINGLE REDUCTION - A100

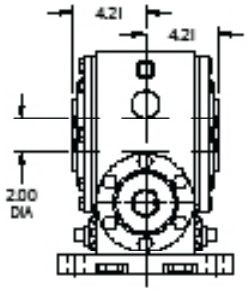
Single Reduction - A100

Worm Under

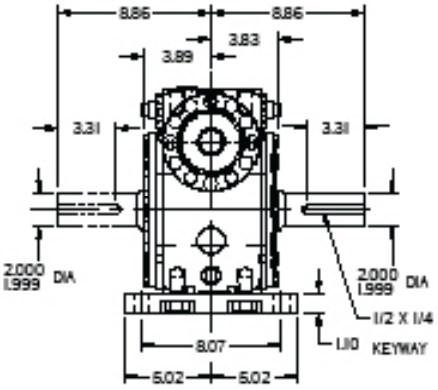


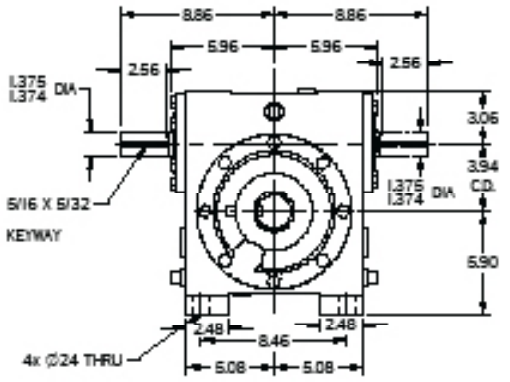


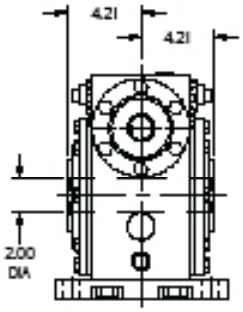
Hollow Shaft



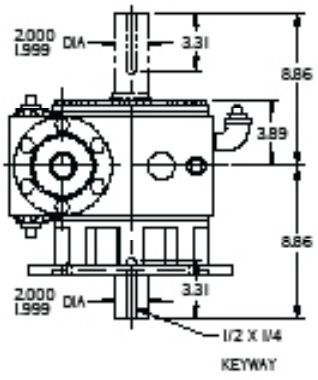
Worm Over

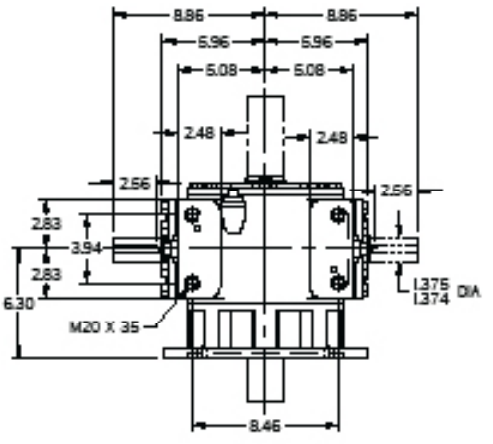


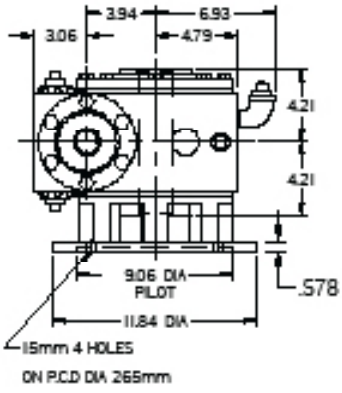




Output Vertical







SINGLE REDUCTION - A100

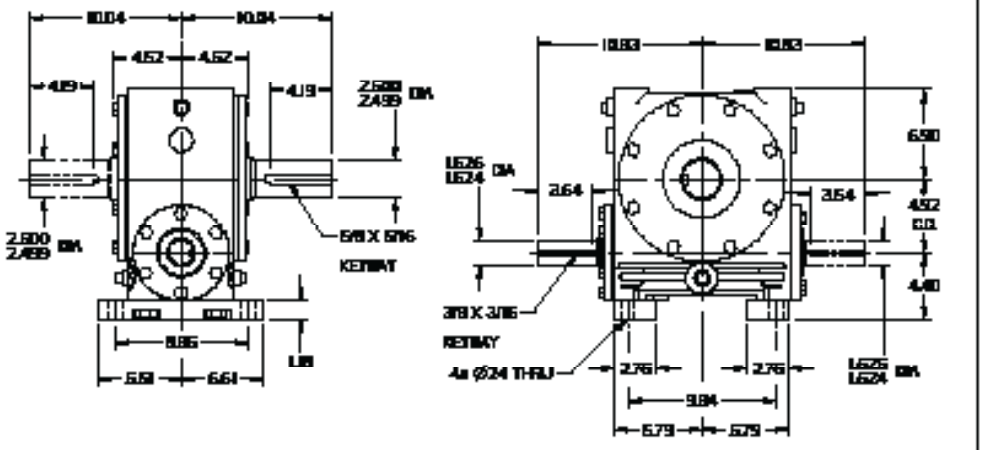
Ratio	Rating	Worm RPM															
		100		200		300		580		720		870		1150		1750	
		hp	kw	hp	kw	hp	kw	hp	kw	hp	kw	hp	kw	hp	kw	hp	kw
5.1	Mechanical	4.17	3.11	7.65	5.70	10.71	7.99	17.14	12.78	19.34	14.42	21.28	15.87	24.85	18.53	30.46	22.71
	Thermal	4.17	3.11	6.81	5.07	7.55	5.63	7.57	5.65	7.62	5.68	8.53	6.36	8.56	6.38	8.56	6.38
	Fan Thermal	NA		NA		NA		NA		NA		NA		16.43	12.25	20.19	15.06
	Efficiency %	89		90		91		91		91		92		92		92	
	O.T	11,997	1,355	11,129	1,257	10,509	1,187	8,702	983	7,914	894	7,286	823	6,436	727	5,185	586
7.4	Mechanical	3.53	2.63	6.45	4.81	9.10	6.79	14.80	11.04	16.79	12.52	18.58	13.86	21.56	16.08	26.75	19.95
	Thermal	3.53	2.63	5.56	4.15	6.05	4.51	6.32	4.71	6.93	5.17	7.31	5.45	7.70	5.74	7.70	5.74
	Fan Thermal	NA		NA		NA		NA		NA		NA		14.78	11.02	18.17	13.55
	Efficiency %	86		88		89		89		90		91		91		91	
	O.T.	14,165	1,600	13,162	1,487	12,533	1,416	10,597	1,197	9,791	1,106	9,017	1,019	7,958	899	6,489	733
9.7	Mechanical	2.98	2.22	5.44	4.06	7.71	5.75	12.73	9.49	14.55	10.85	16.11	12.01	18.76	13.99	23.26	17.34
	Thermal	2.98	2.22	4.68	3.49	5.02	3.74	5.39	4.02	6.33	4.72	6.36	4.74	6.97	5.20	6.97	5.20
	Fan Thermal	NA		NA		NA		NA		NA		NA		13.37	9.97	16.44	12.26
	Efficiency %	83		85		86		87		89		89		90		90	
	O.T	15,247	1,723	14,243	1,609	13,623	1,539	11,759	1,329	11,063	1,250	10,142	1,146	9,029	1,020	7,357	831
12.3	Mechanical	2.63	1.96	4.79	3.57	6.82	5.09	11.27	8.40	12.93	9.64	14.34	10.69	16.61	12.39	20.77	15.49
	Thermal	2.63	1.96	4.09	3.05	4.35	3.24	4.95	3.69	5.56	4.15	5.78	4.31	6.31	4.71	6.31	4.71
	Fan Thermal	NA		NA		NA		NA		NA		NA		12.11	9.03	14.89	11.10
	Efficiency %	81		83		84		86		88		88		89		89	
	O.T.	16,593	1,875	15,473	1,748	14,859	1,679	12,990	1,468	12,221	1,381	11,281	1,275	9,997	1,129	8,212	928
15.5	Mechanical	2.31	1.72	4.21	3.14	6.00	4.47	9.94	7.41	11.41	8.51	12.67	9.45	14.69	10.95	18.34	13.68
	Thermal	2.31	1.72	3.56	2.65	3.75	2.80	4.54	3.39	4.83	3.60	5.15	3.84	5.56	4.15	5.61	4.18
	Fan Thermal	NA		NA		NA		NA		NA		NA		10.68	7.96	13.23	9.87
	Efficiency %	79		81		82		85		86		87		88		88	
	O.T	17,766	2,007	16,584	1,874	15,935	1,800	14,190	1,603	13,263	1,498	12,313	1,391	10,925	1,234	8,977	1,014
19.5	Mechanical	1.87	1.39	3.41	2.54	4.84	3.61	8.05	6.00	9.25	6.90	10.27	7.66	11.92	8.89	14.86	11.08
	Thermal	1.87	1.39	3.05	2.28	3.19	2.38	4.11	3.06	4.13	3.08	4.16	3.10	4.42	3.30	4.69	3.50
	Fan Thermal	NA		NA		NA		NA		NA		NA		8.49	6.33	11.07	8.26
	Efficiency %	75		77		78		83		83		83		84		85	
	O.T.	17,297	1,954	16,191	1,829	15,539	1,756	14,189	1,603	13,143	1,485	12,094	1,366	10,743	1,214	8,901	1,006
25.0	Mechanical	1.47	1.10	2.68	2.00	3.81	2.84	6.36	4.74	7.29	5.44	8.11	6.05	9.41	7.02	11.72	8.74
	Thermal	1.47	1.10	2.68	2.00	3.00	2.24	3.63	2.71	3.63	2.71	4.06	3.03	4.31	3.22	4.31	3.22
	Fan Thermal	NA		NA		NA		NA		NA		NA		8.28	6.17	10.17	7.59
	Efficiency %	71		75		77		81		81		83		84		84	
	O.T	16,426	1,856	15,849	1,791	15,418	1,742	13,989	1,580	12,918	1,459	12,183	1,376	10,828	1,223	8,861	1,001
30.0	Mechanical	1.23	0.92	2.24	1.67	3.19	2.38	5.32	3.97	6.11	4.56	6.79	5.06	7.88	5.88	9.80	7.31
	Thermal	1.23	0.92	2.24	1.67	2.46	1.84	2.76	2.06	3.14	2.34	3.29	2.45	3.45	2.57	3.45	2.57
	Fan Thermal	NA		NA		NA		NA		NA		NA		6.62	4.94	8.14	6.07
	Efficiency %	68		70		72		75		78		79		80		80	
	O.T.	15,787	1,784	14,845	1,677	14,468	1,635	12,999	1,469	12,511	1,413	11,651	1,316	10,363	1,171	8,471	957
40.0	Mechanical	0.93	0.69	1.69	1.26	2.41	1.80	4.01	2.99	4.60	3.43	5.12	3.82	5.95	4.44	7.39	5.51
	Thermal	0.93	0.69	1.69	1.26	2.09	1.56	2.46	1.84	2.76	2.06	2.76	2.06	2.88	2.14	2.88	2.14
	Fan Thermal	NA		NA		NA		NA		NA		NA		5.52	4.11	6.78	5.06
	Efficiency %	61		63		67		72		75		75		76		76	
	O.T	14,247	1,610	13,420	1,516	13,547	1,531	12,534	1,416	12,083	1,365	11,124	1,257	9,916	1,120	8,092	914
50.0	Mechanical	0.74	0.55	1.36	1.01	1.93	1.44	3.21	2.39	3.69	2.75	4.11	3.06	4.78	3.56	5.93	4.42
	Thermal	0.74	0.55	1.36	1.01	1.92	1.43	2.30	1.72	2.46	1.84	2.46	1.84	2.56	1.91	2.56	1.91
	Fan Thermal	NA		NA		NA		NA		NA		NA		4.78	3.56	5.93	4.42
	Efficiency %	54		60		64		70		72		72		73		73	
	O.T.	12,645	1,429	12,815	1,448	12,975	1,466	12,218	1,380	11,631	1,314	10,720	1,211	9,550	1,079	7,796	881
60.0	Mechanical	0.62	0.46	1.13	0.84	1.61	1.20	2.68	2.00	3.09	2.30	3.43	2.56	3.99	2.98	4.95	3.69
	Thermal	0.62	0.46	1.13	0.84	1.61	1.20	2.03	1.51	2.16	1.61	2.23	1.66	2.30	1.72	2.30	1.72
	Fan Thermal	NA		NA		NA		NA		NA		NA		3.99	2.98	4.95	3.69
	Efficiency %	53		59		61		66		68		69		70		70	
	O.T	12,433	1,405	12,645	1,429	12,389	1,400	11,540	1,304	11,029	1,246	10,292	1,163	9,174	1,036	7,491	846
70.0	Mechanical	0.53	0.40	0.97	0.72	1.38	1.03	2.30	1.72	2.65	1.98	2.95	2.20	3.42	2.55	4.25	3.17
	Thermal	0.53	0.40	0.97	0.72	1.38	1.03	1.97	1.47	2.09	1.56	2.16	1.61	2.23	1.66	2.23	1.66
	Fan Thermal	NA		NA		NA		NA		NA		NA		3.42	2.55	4.25	3.17
	Efficiency %	52		58		60		65		67		68		69		69	
	O.T.	12,214	1,380	12,446	1,406	12,201	1,378	11,380	1,286	10,880	1,229	10,155	1,147	9,054	1,023	7,393	835

Ratings shown are based on using the recommended synthetic lubricant (see approved lubricants)

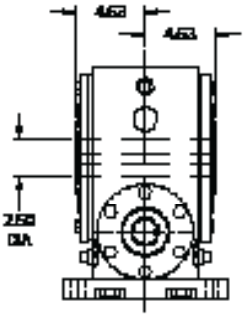
SINGLE REDUCTION - A125

Single Reduction - A125

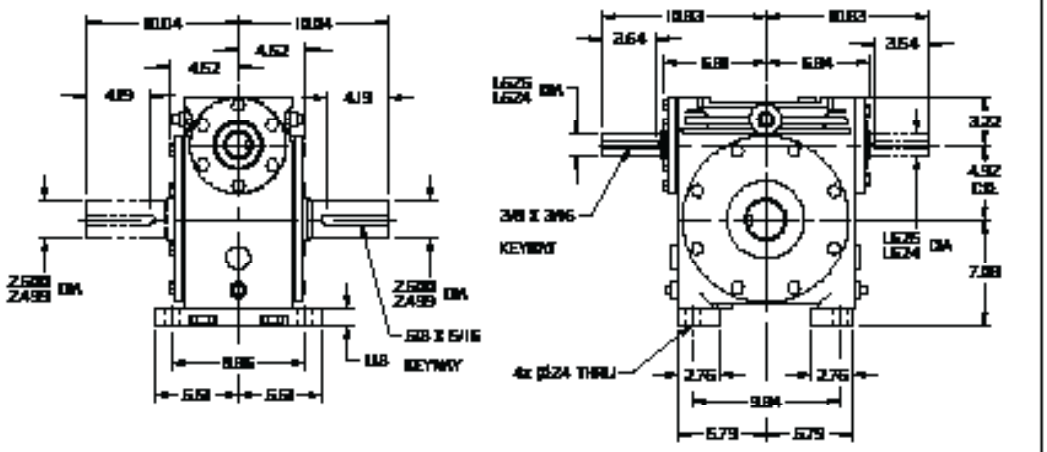
Worm Under

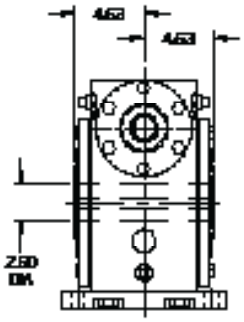


Hollow Shaft

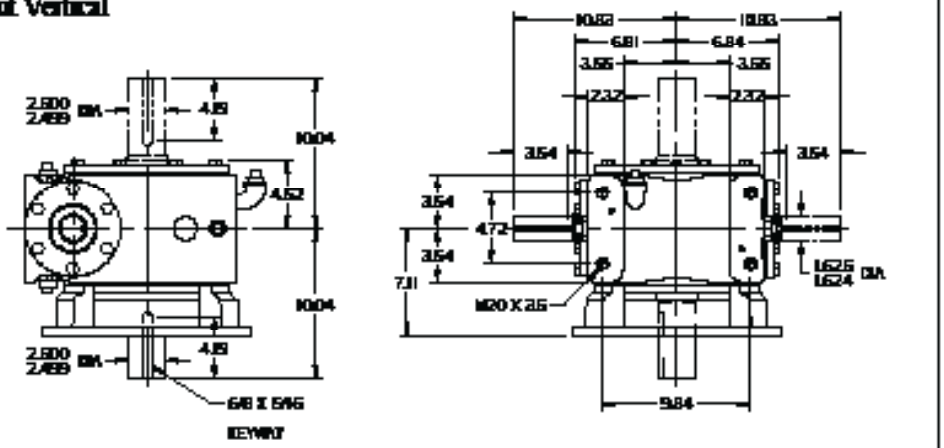


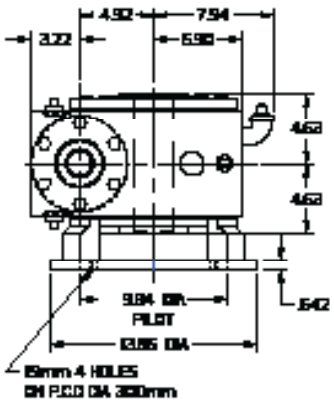
Worm Over





Output Vertical





SINGLE REDUCTION - A125

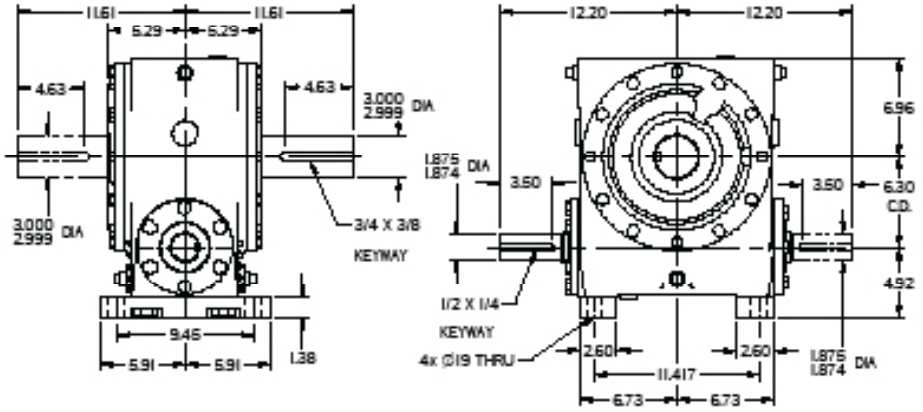
Ratio	Rating	Worm RPM															
		100		200		300		580		720		870		1150		1750	
		hp	kw	hp	kw	hp	kw	hp	kw	hp	kw	hp	kw	hp	kw	hp	kw
5.1	Mechanical	8.15	6.08	14.89	11.10	20.57	15.34	31.27	23.32	35.02	26.11	38.83	28.96	44.91	33.49	53.95	40.23
	Thermal	8.15	6.08	13.76	10.26	16.01	11.94	16.07	11.98	16.20	12.08	19.33	14.41	19.41	14.47	19.41	14.47
	Fan Thermal	NA		NA		NA		NA		NA		NA		35.40	26.40	44.03	32.83
	Efficiency %	92		93		94		94		94		95		95		95	
	O.T	24,175	2,731	22,321	2,522	20,779	2,348	16,348	1,847	14,756	1,667	13,680	1,546	11,971	1,352	9,452	1,068
7.4	Mechanical	6.88	5.13	12.58	9.38	17.50	13.05	27.13	20.23	30.47	22.72	33.81	25.21	39.16	29.20	47.51	35.43
	Thermal	6.88	5.13	10.43	7.77	11.67	8.70	12.37	9.23	14.08	10.50	15.22	11.35	16.44	12.26	16.44	12.26
	Fan Thermal	NA		NA		NA		NA		NA		NA		30.00	22.37	37.31	27.82
	Efficiency %	89		91		92		92		93		94		94		94	
	O.T.	28,591	3,230	26,573	3,002	24,917	2,815	20,076	2,268	18,354	2,074	16,951	1,915	14,929	1,687	11,902	1,345
9.7	Mechanical	5.81	4.33	10.66	7.95	14.90	11.11	23.56	17.57	26.50	19.76	29.34	21.88	34.12	25.44	41.82	31.19
	Thermal	5.81	4.33	8.34	6.22	9.12	6.80	10.00	7.46	12.41	9.25	12.48	9.31	14.20	10.59	14.20	10.59
	Fan Thermal	NA		NA		NA		NA		NA		NA		25.91	19.32	32.22	24.03
	Efficiency %	86		88		89		90		92		92		93		93	
	O.T	30,820	3,482	28,890	3,264	27,225	3,076	22,507	2,543	20,820	2,352	19,091	2,157	16,965	1,917	13,667	1,544
12.3	Mechanical	5.13	3.83	9.40	7.01	13.17	9.82	20.95	15.62	23.56	17.57	26.08	19.45	30.35	22.63	37.17	27.72
	Thermal	5.13	3.83	7.07	5.27	7.61	5.68	8.97	6.69	10.43	7.77	10.97	8.18	12.36	9.22	12.36	9.22
	Fan Thermal	NA		NA		NA		NA		NA		NA		22.54	16.81	28.04	20.91
	Efficiency %	84		86		87		89		91		91		92		92	
	O.T.	33,521	3,787	31,468	3,555	29,725	3,358	25,000	2,825	23,037	2,603	21,214	2,397	18,880	2,133	15,194	1,717
15.5	Mechanical	4.50	3.36	8.26	6.16	11.57	8.63	18.49	13.79	20.86	15.56	22.99	17.14	26.81	19.99	32.85	24.50
	Thermal	4.50	3.36	5.98	4.46	6.36	4.75	8.03	5.99	8.67	6.47	9.42	7.03	10.43	7.77	10.54	7.86
	Fan Thermal	NA		NA		NA		NA		NA		NA		19.02	14.18	23.91	17.83
	Efficiency %	82		84		85		88		89		90		91		91	
	O.T	35,878	4,053	33,709	3,808	31,858	3,599	27,337	3,089	25,098	2,836	23,122	2,612	20,623	2,330	16,626	1,878
19.5	Mechanical	3.64	2.71	6.66	4.97	9.37	6.99	14.97	11.16	16.87	12.58	18.60	13.87	21.69	16.17	26.68	19.90
	Thermal	3.64	2.71	5.00	3.73	5.27	3.93	7.10	5.30	7.15	5.33	7.21	5.37	7.78	5.80	8.38	6.25
	Fan Thermal	NA		NA		NA		NA		NA		NA		14.19	10.58	19.00	14.17
	Efficiency %	78		80		81		86		86		86		87		88	
	O.T.	35,042	3,959	32,903	3,717	31,227	3,528	27,332	3,088	24,845	2,807	22,691	2,564	20,248	2,288	16,541	1,869
25.0	Mechanical	2.86	2.13	5.25	3.91	7.37	5.50	11.82	8.81	13.34	9.95	14.73	10.98	17.11	12.76	21.07	15.71
	Thermal	2.86	2.13	4.45	3.32	4.90	3.65	6.13	4.57	6.13	4.57	7.00	5.22	7.54	5.62	7.54	5.62
	Fan Thermal	NA		NA		NA		NA		NA		NA		13.75	10.25	17.10	12.75
	Efficiency %	74		78		80		84		84		86		87		87	
	O.T	33,356	3,769	32,248	3,643	30,950	3,497	26,951	3,045	24,509	2,769	22,932	2,591	20,389	2,304	16,498	1,864
30.0	Mechanical	2.39	1.78	4.39	3.27	6.16	4.59	9.90	7.38	11.15	8.31	12.32	9.19	14.33	10.69	17.62	13.14
	Thermal	2.39	1.78	3.63	2.71	3.92	2.92	4.45	3.32	5.16	3.85	5.44	4.06	5.76	4.30	5.76	4.30
	Fan Thermal	NA		NA		NA		NA		NA		NA		10.52	7.84	13.08	9.75
	Efficiency %	71		73		75		78		81		82		83		83	
	O.T.	32,117	3,629	30,288	3,422	29,119	3,290	25,171	2,844	23,717	2,680	21,943	2,479	19,550	2,209	15,795	1,785
40.0	Mechanical	1.80	1.34	3.31	2.47	4.65	3.47	7.46	5.56	8.41	6.27	9.29	6.93	10.80	8.05	13.29	9.91
	Thermal	1.80	1.34	2.88	2.15	3.27	2.44	3.92	2.92	4.45	3.32	4.45	3.32	4.67	3.48	4.67	3.48
	Fan Thermal	NA		NA		NA		NA		NA		NA		8.51	6.35	10.59	7.90
	Efficiency %	64		66		70		75		78		78		79		79	
	O.T	29,079	3,285	27,552	3,113	27,348	3,090	24,310	2,747	22,968	2,595	20,993	2,372	18,690	2,112	15,124	1,709
50.0	Mechanical	1.45	1.08	2.66	1.98	3.73	2.78	6.00	4.47	6.76	5.04	7.45	5.56	8.67	6.47	10.67	7.96
	Thermal	1.45	1.08	2.65	1.98	2.97	2.21	3.63	2.71	3.92	2.92	3.92	2.92	4.08	3.04	4.08	3.04
	Fan Thermal	NA		NA		NA		NA		NA		NA		7.45	5.55	9.26	6.91
	Efficiency %	57		63		67		73		75		75		76		76	
	O.T.	25,967	2,934	26,370	2,979	26,246	2,965	23,777	2,686	22,171	2,505	20,239	2,287	18,056	2,040	14,599	1,649
60.0	Mechanical	1.21	0.90	2.22	1.66	3.11	2.32	5.01	3.74	5.64	4.21	6.22	4.64	7.25	5.41	8.91	6.64
	Thermal	1.21	0.90	2.22	1.66	2.72	2.03	3.16	2.36	3.38	2.52	3.50	2.61	3.63	2.71	3.63	2.71
	Fan Thermal	NA		NA		NA		NA		NA		NA		6.62	4.94	8.23	6.14
	Efficiency %	56		62		64		69		71		72		73		73	
	O.T	25,557	2,887	25,997	2,937	25,115	2,837	22,514	2,544	21,025	2,375	19,464	2,199	17,400	1,966	14,047	1,587
70.0	Mechanical	1.04	0.78	1.90	1.42	2.67	1.99	4.30	3.21	4.85	3.62	5.34	3.98	6.22	4.64	7.65	5.70
	Thermal	1.04	0.78	1.90	1.42	2.65	1.98	3.06	2.28	3.27	2.44	3.38	2.52	3.50	2.61	3.50	2.61
	Fan Thermal	NA		NA		NA		NA		NA		NA		6.22	4.64	7.65	5.70
	Efficiency %	55		61		63		68		70		71		72		72	
	O.T.	25,212	2,848	25,610	2,893	24,754	2,797	22,216	2,510	20,781	2,348	19,218	2,171	17,183	1,941	13,878	1,568

Ratings shown are based on using the recommended synthetic lubricant (see approved lubricants)

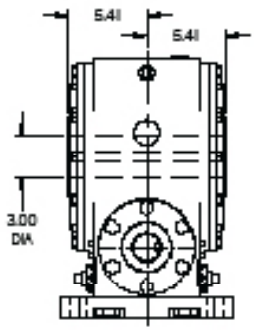
SINGLE REDUCTION - A160

Single Reduction - A160

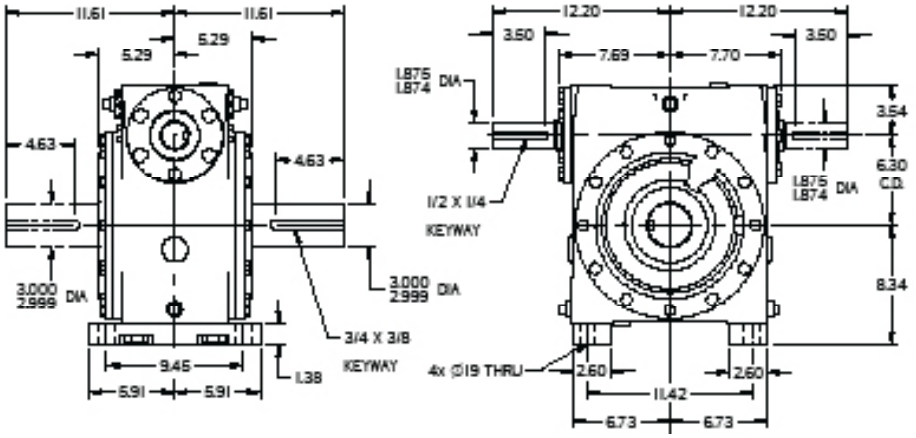
Worm Under

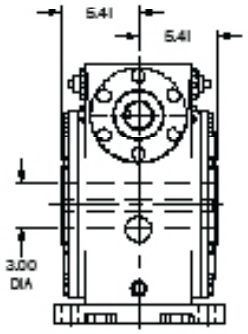


Hollow Shaft

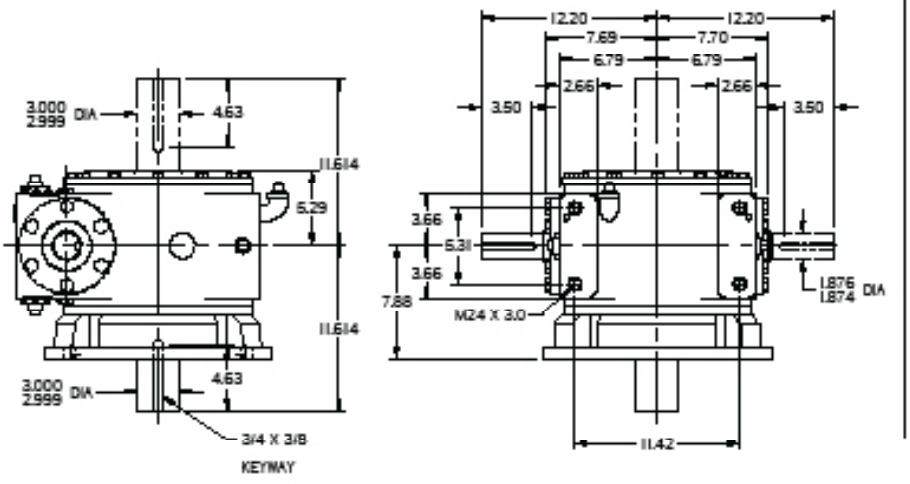


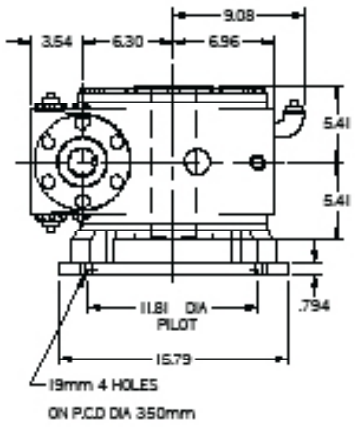
Worm Over





Output Vertical





SINGLE REDUCTION - A160

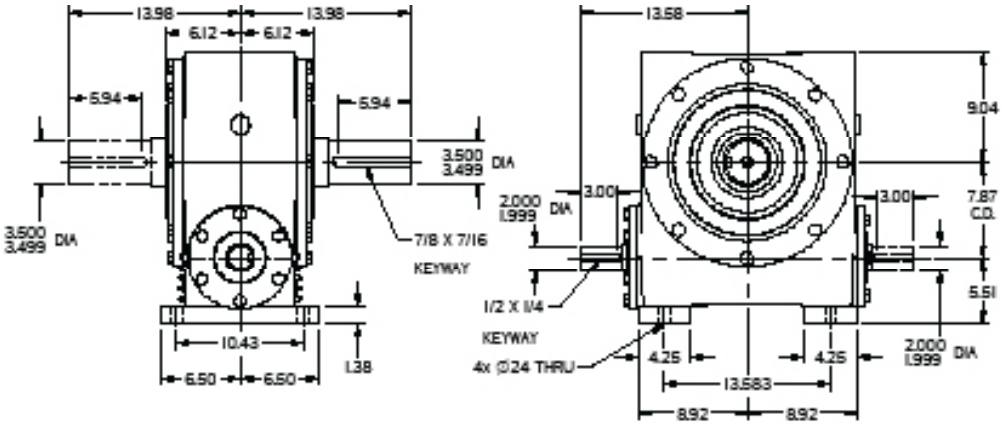
Ratio	Rating	Worm RPM															
		100		200		300		580		720		870		1150		1750	
		hp	kw	hp	kw	hp	kw	hp	kw	hp	kw	hp	kw	hp	kw	hp	kw
5.1	Mechanical	14.97	11.16	26.71	19.92	35.61	26.55	51.64	38.51	57.84	43.13	63.39	47.27	71.91	53.62	82.83	61.77
	Thermal	14.85	11.07	16.99	12.67	19.77	14.74	19.84	14.79	20.00	14.91	23.87	17.80	23.96	17.87	23.96	17.87
	Fan Thermal	NA		NA		NA		NA		NA		NA		47.20	35.20	58.02	43.27
	Efficiency %	92		93		94		94		94		95		95		95	
	O.T	44,387	5,015	40,049	4,525	35,982	4,065	26,994	3,050	24,369	2,753	22,333	2,523	19,170	2,166	14,511	1,639
7.5	Mechanical	12.49	9.31	22.50	16.78	30.40	22.67	44.36	33.08	49.76	37.11	54.88	40.92	62.81	46.84	72.82	54.30
	Thermal	10.91	8.14	12.64	9.43	14.12	10.53	15.01	11.19	17.21	12.83	18.50	13.80	20.07	14.96	20.07	14.96
	Fan Thermal	NA		NA		NA		NA		NA		NA		39.53	29.48	48.59	36.24
	Efficiency %	89		90		91		92		93		93		94		94	
	O.T.	52,991	5,987	48,532	5,483	44,198	4,993	33,543	3,790	30,648	3,463	28,122	3,177	24,480	2,766	18,653	2,107
9.8	Mechanical	10.65	7.94	19.31	14.40	26.35	19.65	39.08	29.14	43.97	32.79	48.62	36.26	55.69	41.53	64.86	48.37
	Thermal	8.79	6.56	10.25	7.65	11.20	8.35	12.30	9.17	15.28	11.39	15.36	11.45	17.49	13.04	17.49	13.04
	Fan Thermal	NA		NA		NA		NA		NA		NA		34.45	25.69	42.34	31.57
	Efficiency %	86		88		89		90		92		92		93		93	
	O.T	56,696	6,406	52,564	5,939	48,363	5,464	37,503	4,237	34,714	3,922	31,787	3,591	27,828	3,144	21,300	2,406
12.2	Mechanical	9.47	7.06	17.19	12.82	23.51	17.53	35.01	26.11	39.44	29.41	43.60	32.51	49.99	37.28	58.80	43.85
	Thermal	7.66	5.71	8.77	6.54	9.45	7.05	11.10	8.28	12.94	9.65	13.60	10.14	15.32	11.42	15.32	11.42
	Fan Thermal	NA		NA		NA		NA		NA		NA		30.17	22.50	37.09	27.66
	Efficiency %	84		86		87		89		91		91		92		92	
	O.T.	61,569	6,956	57,168	6,459	52,747	5,959	41,505	4,689	38,318	4,329	35,233	3,981	30,899	3,491	23,884	2,698
14.6	Mechanical	8.65	6.45	15.71	11.71	21.55	16.07	32.14	23.97	36.18	26.98	40.02	29.84	45.95	34.26	54.17	40.39
	Thermal	6.82	5.09	7.69	5.74	8.21	6.13	10.19	7.60	11.20	8.35	12.26	9.14	13.64	10.17	13.64	10.17
	Fan Thermal	NA		NA		NA		NA		NA		NA		26.87	20.04	33.03	24.63
	Efficiency %	82		84		85		88		89		90		91		91	
	O.T	65,722	7,425	61,179	6,912	56,596	6,394	45,129	5,099	41,421	4,680	38,308	4,328	33,650	3,802	26,067	2,945
20.5	Mechanical	6.40	4.77	11.63	8.67	15.98	11.92	23.90	17.82	26.92	20.07	29.74	22.18	34.22	25.52	40.40	30.13
	Thermal	5.40	4.03	5.99	4.47	6.34	4.72	8.52	6.35	8.52	6.35	8.64	6.44	9.31	6.94	10.00	7.46
	Fan Thermal	NA		NA		NA		NA		NA		NA		18.34	13.67	24.22	18.06
	Efficiency %	78		80		81		86		86		86		87		88	
	O.T.	64,110	7,243	59,924	6,770	55,660	6,288	45,652	5,158	41,427	4,680	37,971	4,290	33,439	3,778	26,210	2,961
24.5	Mechanical	5.38	4.01	9.77	7.29	13.43	10.01	20.16	15.03	22.65	16.89	25.05	18.68	28.82	21.49	34.08	25.41
	Thermal	4.73	3.52	5.55	4.14	6.08	4.53	7.66	5.71	7.66	5.71	8.64	6.44	9.31	6.94	9.38	6.99
	Fan Thermal	NA		NA		NA		NA		NA		NA		18.34	13.67	22.71	16.94
	Efficiency %	74		78		80		84		84		86		87		87	
	O.T	61,726	6,974	58,971	6,663	55,342	6,253	45,164	5,103	40,885	4,619	38,227	4,319	33,652	3,802	26,177	2,957
30.0	Mechanical	4.41	3.29	8.03	5.99	11.03	8.23	16.55	12.34	18.60	13.87	20.58	15.35	23.65	17.64	28.02	20.89
	Thermal	4.17	3.11	4.48	3.34	4.84	3.61	5.50	4.10	6.37	4.75	6.72	5.01	7.12	5.31	7.12	5.31
	Fan Thermal	NA		NA		NA		NA		NA		NA		14.02	10.46	17.24	12.85
	Efficiency %	71		73		75		78		81		82		83		83	
	O.T.	59,139	6,682	55,369	6,256	52,128	5,889	42,058	4,752	39,543	4,468	36,661	4,142	32,267	3,646	25,113	2,837
40.0	Mechanical	3.32	2.48	6.06	4.52	8.31	6.20	12.47	9.30	14.01	10.45	15.52	11.57	17.85	13.31	21.13	15.76
	Thermal	3.32	2.48	3.56	2.65	4.03	3.01	4.84	3.61	5.50	4.10	5.50	4.10	5.76	4.30	5.76	4.30
	Fan Thermal	NA		NA		NA		NA		NA		NA		11.35	8.46	13.95	10.40
	Efficiency %	64		66		70		75		78		78		79		79	
	O.T	53,544	6,049	50,372	5,691	48,868	5,521	40,620	4,589	38,247	4,321	35,070	3,962	30,902	3,491	24,041	2,716
50.0	Mechanical	2.66	1.98	4.86	3.62	6.67	4.97	10.01	7.46	11.24	8.38	12.46	9.29	14.33	10.69	16.97	12.65
	Thermal	2.66	1.98	3.27	2.44	3.67	2.73	4.48	3.34	4.84	3.61	4.84	3.61	5.04	3.76	5.04	3.76
	Fan Thermal	NA		NA		NA		NA		NA		NA		9.93	7.41	12.21	9.10
	Efficiency %	57		63		67		73		75		75		76		76	
	O.T.	47,815	5,402	48,210	5,447	46,898	5,299	39,692	4,484	36,873	4,166	33,832	3,822	29,829	3,370	23,221	2,624
60.0	Mechanical	2.22	1.66	4.06	3.03	5.57	4.15	8.36	6.23	9.38	6.99	10.41	7.76	11.97	8.93	14.18	10.57
	Thermal	2.22	1.66	3.18	2.37	3.36	2.51	3.90	2.91	4.17	3.11	4.32	3.22	4.48	3.34	4.48	3.34
	Fan Thermal	NA		NA		NA		NA		NA		NA		8.83	6.58	10.85	8.09
	Efficiency %	56		62		64		69		71		72		73		73	
	O.T	47,059	5,317	47,529	5,370	44,877	5,070	37,583	4,246	34,968	3,951	32,556	3,678	28,722	3,245	22,364	2,527
70.0	Mechanical	1.91	1.42	3.48	2.60	4.79	3.57	7.17	5.35	8.05	6.00	8.93	6.66	10.28	7.67	12.18	9.08
	Thermal	1.91	1.42	3.10	2.31	3.27	2.44	3.78	2.82	4.03	3.01	4.17	3.11	4.32	3.22	4.32	3.22
	Fan Thermal	NA		NA		NA		NA		NA		NA		8.51	6.35	10.46	7.80
	Efficiency %	55		61		63		68		70		71		72		72	
	O.T.	46,353	5,237	46,821	5,290	44,319	5,007	37,085	4,190	34,519	3,900	32,144	3,632	28,385	3,207	22,106	2,498

Ratings shown are based on using the recommended synthetic lubricant (see approved lubricants)

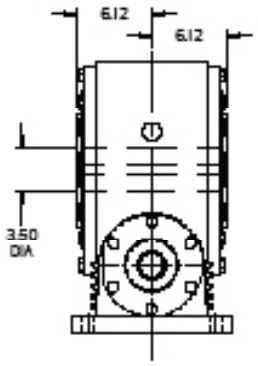
SINGLE REDUCTION - A200

Single Reduction - A200

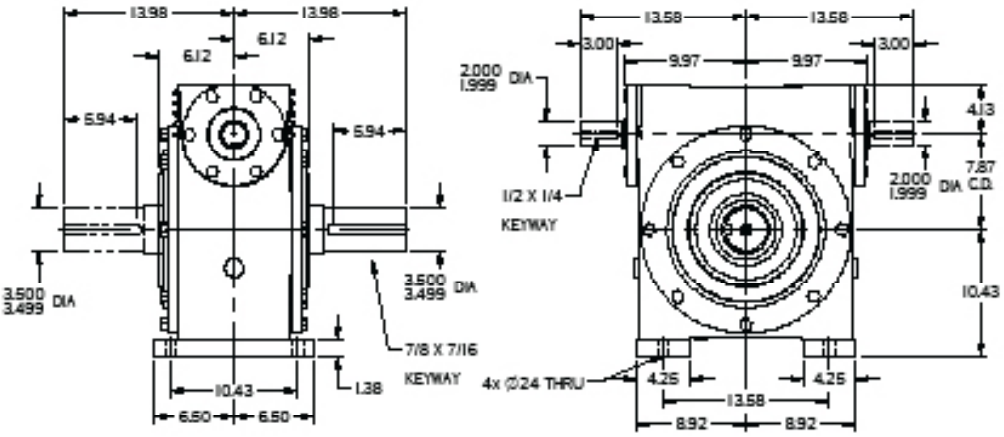
Worm Under

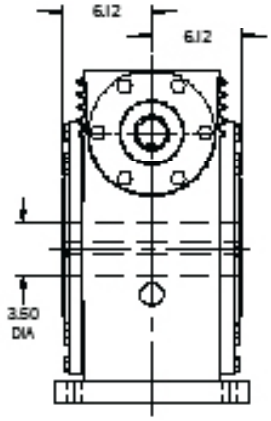


Hollow Shaft

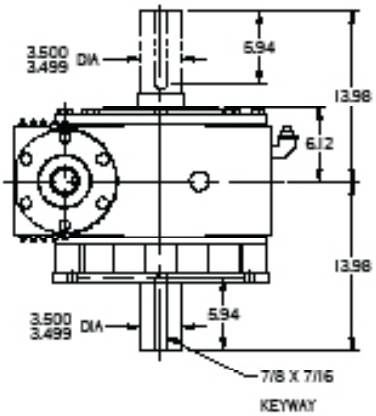


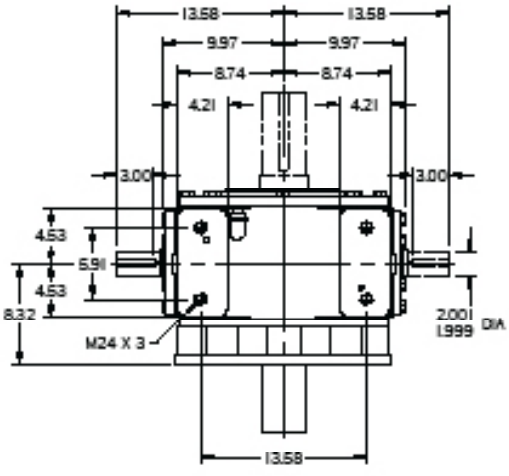
Worm Over

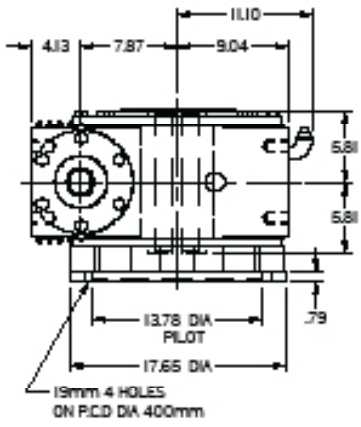




Output Vertical







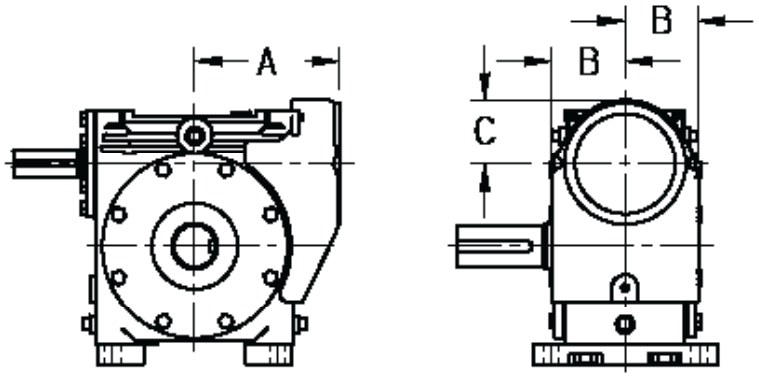
SINGLE REDUCTION - A200

Ratio	Rating	Worm RPM															
		100		200		300		580		720		870		1150		1750	
		hp	kw	hp	kw	hp	kw	hp	kw	hp	kw	hp	kw	hp	kw	hp	kw
5.1	Mechanical	29.09	21.69	51.22	38.19	67.15	50.07	95.91	71.52	107.12	79.88	117.46	87.59	131.20	97.84	151.57	113.03
	Thermal	25.35	18.90	28.99	21.62	33.75	25.16	33.86	25.25	34.08	25.41	40.68	30.34	40.84	30.46	40.84	30.46
	Fan Thermal	NA		NA		NA		NA		NA		NA		77.30	57.65	95.02	70.86
	Efficiency %	92		93		94		94		94		95		95		95	
	O.T	85,874	9,702	76,444	8,637	67,532	7,630	49,899	5,638	44,913	5,074	41,183	4,653	34,809	3,933	26,426	2,986
7.5	Mechanical	24.20	18.05	43.18	32.20	57.56	42.92	83.16	62.01	93.26	69.54	102.31	76.29	115.94	86.46	133.28	99.39
	Thermal	18.56	13.84	21.51	16.04	24.02	17.91	25.54	19.05	29.28	21.84	31.48	23.47	34.14	25.46	34.14	25.46
	Fan Thermal	NA		NA		NA		NA		NA		NA		64.61	48.18	79.42	59.23
	Efficiency %	89		90		91		92		93		93		94		94	
	O.T.	102,633	11,595	93,121	10,521	83,669	9,453	62,878	7,104	57,444	6,490	52,424	5,923	45,190	5,106	34,139	3,857
9.8	Mechanical	20.77	15.49	37.48	27.95	50.76	37.85	74.21	55.34	83.32	62.13	91.95	68.57	104.93	78.25	121.87	90.88
	Thermal	14.96	11.16	17.45	13.01	19.06	14.21	20.92	15.60	25.99	19.38	26.12	19.48	29.75	22.18	29.75	22.18
	Fan Thermal	NA		NA		NA		NA		NA		NA		56.30	41.98	69.21	51.61
	Efficiency %	86		88		89		90		92		92		93		93	
	O.T	110,570	12,492	102,041	11,529	93,186	10,528	71,226	8,047	65,786	7,433	60,108	6,791	52,437	5,924	40,021	4,522
12.2	Mechanical	18.48	13.78	33.37	24.88	45.41	33.86	66.60	49.66	74.88	55.84	83.05	61.93	94.76	70.66	110.29	82.24
	Thermal	13.03	9.72	14.92	11.12	16.08	11.99	18.89	14.08	22.02	16.42	23.13	17.25	26.06	19.43	26.06	19.43
	Fan Thermal	NA		NA		NA		NA		NA		NA		49.32	36.78	60.62	45.21
	Efficiency %	84		86		87		89		91		91		92		92	
	O.T.	120,078	13,566	110,988	12,539	101,860	11,508	78,964	8,921	72,759	8,220	67,114	7,583	58,566	6,617	44,794	5,061
15.3	Mechanical	16.36	12.20	29.61	22.08	40.31	30.06	59.57	44.42	66.96	49.93	74.14	55.29	84.75	63.20	98.47	73.43
	Thermal	11.27	8.40	12.65	9.43	13.48	10.05	16.97	12.66	18.38	13.71	20.04	14.95	22.21	16.56	22.38	16.69
	Fan Thermal	NA		NA		NA		NA		NA		NA		42.03	31.34	52.06	38.82
	Efficiency %	82		84		85		88		89		90		91		91	
	O.T	129,176	14,594	119,744	13,529	109,995	12,427	87,170	9,848	79,778	9,013	73,869	8,346	64,590	7,297	49,352	5,576
20.5	Mechanical	12.48	9.31	22.62	16.87	30.87	23.02	45.66	34.05	51.29	38.25	56.86	42.40	65.15	48.58	75.78	56.51
	Thermal	9.19	6.85	10.19	7.60	10.78	8.04	14.50	10.81	14.50	10.81	14.70	10.96	15.83	11.81	17.01	12.69
	Fan Thermal	NA		NA		NA		NA		NA		NA		29.97	22.35	39.58	29.52
	Efficiency %	78		80		81		86		86		86		87		88	
	O.T.	125,037	14,127	116,561	13,169	107,504	12,146	87,243	9,857	78,934	8,918	72,594	8,202	63,656	7,192	49,158	5,554
24.5	Mechanical	10.50	7.83	19.01	14.18	25.99	19.38	38.52	28.72	43.35	32.33	47.90	35.72	54.87	40.92	63.95	47.69
	Thermal	8.04	6.00	9.44	7.04	10.34	7.71	13.03	9.72	13.03	9.72	14.70	10.96	15.83	11.81	15.96	11.90
	Fan Thermal	NA		NA		NA		NA		NA		NA		29.97	22.35	37.13	27.68
	Efficiency %	74		78		80		84		84		86		87		87	
	O.T	120,589	13,624	114,707	12,960	107,108	12,101	86,319	9,752	78,244	8,840	73,087	8,257	64,066	7,238	49,128	5,550
30.0	Mechanical	8.61	6.42	15.61	11.64	21.35	15.92	31.63	23.59	35.59	26.54	39.38	29.37	45.08	33.62	52.58	39.21
	Thermal	7.10	5.29	7.62	5.69	8.23	6.14	9.36	6.98	10.83	8.08	11.44	8.53	12.11	9.03	12.11	9.03
	Fan Thermal	NA		NA		NA		NA		NA		NA		22.92	17.09	28.17	21.01
	Efficiency %	71		73		75		78		81		82		83		83	
	O.T.	115,535	13,053	107,703	12,168	100,890	11,399	80,386	9,082	75,679	8,550	70,142	7,925	61,498	6,948	47,137	5,326
40.0	Mechanical	6.49	4.84	11.76	8.77	16.09	12.00	23.86	17.79	26.85	20.02	29.70	22.15	34.04	25.38	39.71	29.61
	Thermal	5.72	4.26	6.05	4.51	6.86	5.12	8.23	6.14	9.36	6.98	9.36	6.98	9.80	7.31	9.80	7.31
	Fan Thermal	NA		NA		NA		NA		NA		NA		18.55	13.83	22.81	17.01
	Efficiency %	64		66		70		75		78		78		79		79	
	O.T	104,605	11,818	97,806	11,050	94,580	10,686	77,739	8,783	73,305	8,282	67,101	7,581	58,923	6,657	45,171	5,103
50.0	Mechanical	5.20	3.88	9.43	7.03	12.90	9.62	19.16	14.29	21.60	16.11	23.84	17.78	27.34	20.39	31.93	23.81
	Thermal	4.79	3.57	5.56	4.15	6.24	4.65	7.62	5.69	8.23	6.14	8.23	6.14	8.58	6.40	8.58	6.40
	Fan Thermal	NA		NA		NA		NA		NA		NA		16.23	12.11	19.96	14.88
	Efficiency %	57		63		67		73		75		75		76		76	
	O.T.	93,411	10,554	93,608	10,576	90,767	10,255	75,966	8,583	70,878	8,008	64,732	7,313	56,918	6,431	43,675	4,934
60.0	Mechanical	4.34	3.24	7.88	5.88	10.77	8.03	16.00	11.93	18.03	13.44	19.91	14.85	22.84	17.03	26.68	19.90
	Thermal	4.34	3.24	5.42	4.04	5.72	4.26	6.64	4.95	7.10	5.29	7.35	5.48	7.62	5.69	7.62	5.69
	Fan Thermal	NA		NA		NA		NA		NA		NA		14.43	10.76	17.74	13.23
	Efficiency %	56		62		64		69		71		72		73		73	
	O.T	91,934	10,387	92,285	10,426	86,856	9,813	71,931	8,127	67,216	7,594	62,292	7,038	54,808	6,192	42,065	4,753
70.0	Mechanical	3.73	2.78	6.76	5.04	9.26	6.91	13.73	10.24	15.48	11.54	17.09	12.74	19.60	14.62	22.92	17.09
	Thermal	3.73	2.78	5.28	3.94	5.56	4.15	6.43	4.80	6.86	5.12	7.10	5.29	7.35	5.48	7.35	5.48
	Fan Thermal	NA		NA		NA		NA		NA		NA		13.91	10.38	17.10	12.75
	Efficiency %	55		61		63		68		70		71		72		72	
	O.T.	90,557	10,231	90,911	10,271	85,780	9,691	70,978	8,019	66,353	7,497	61,505	6,949	54,126	6,115	41,581	4,698

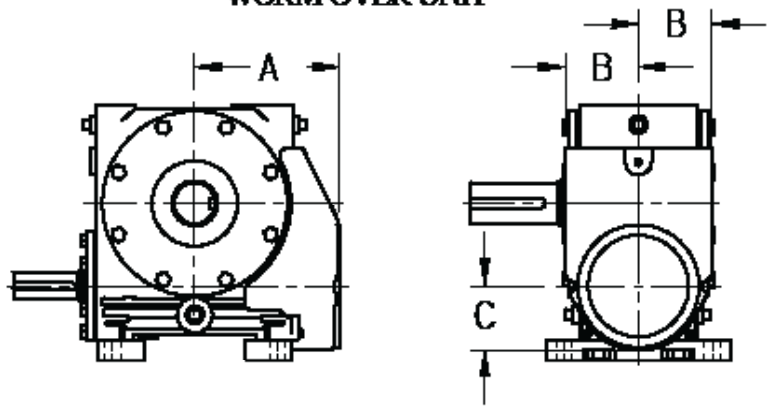
Ratings shown are based on using the recommended synthetic lubricant (see approved lubricants)

FAN COOLING DIMENSIONS

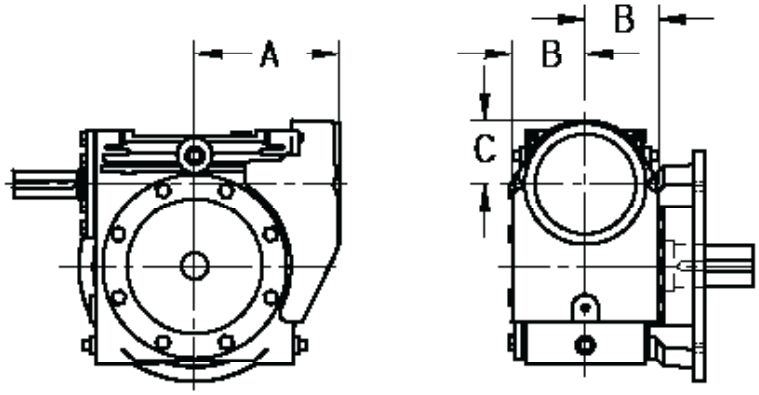
Fan Cooling ratings can be found on the individual rating tables.



WORM OVER UNIT



WORM UNDER UNIT



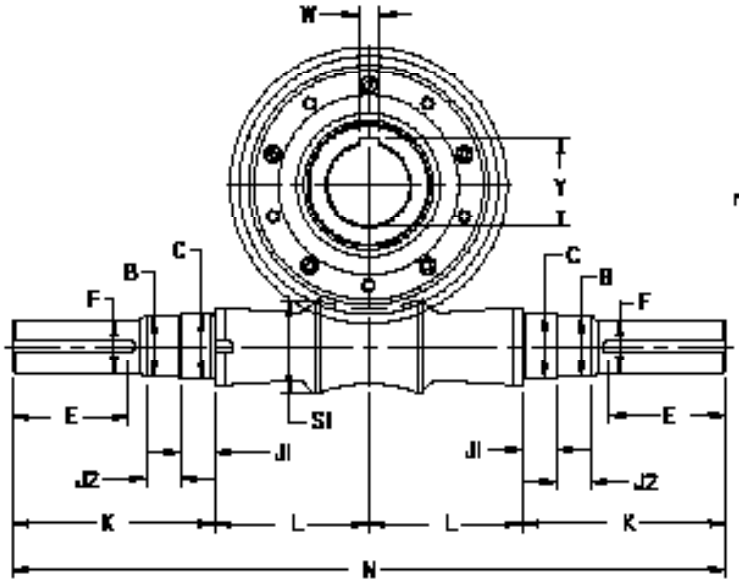
GEAR VERTICAL UNIT

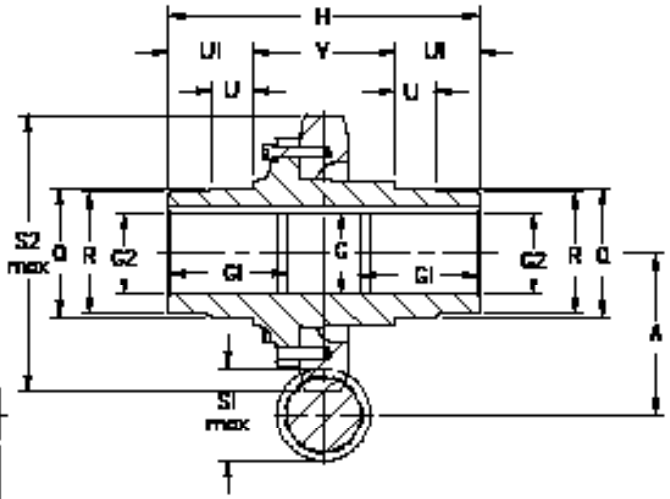
Values shown in table are inches.

SIZE	A	B	C
100	7.80	4.06	3.39
125	8.62	4.48	3.95
160	9.72	5.23	4.20
200	12.80	6.24	5.31

IMPORTANT: Do not restrict air intake flow to fan.

OPEN WORM GEAR SETS





Dimensions S1, S2 & T vary with ratio

All dimensions are in inches.

SIZE OF UNIT	A	B Dia.	C Dia.	D Dia.	E	F Dia.	G Dia.	G1	G2 Dia.	H	J1	J2	K
100	3.94	1.4961 1.4941	1.5000 1.4995	1.5758 1.5752	2.28	1.3750 1.3744	2.025 2.015	2.76	2.0024 2.0012	7.87	0.91	1.06	5.71
125	4.92	1.890 1.888	1.9578 1.9573	1.9695 1.9689	3.23	1.6250 1.6244	2.525 2.515	3.35	2.5024 2.5012	9.45	1.06	1.14	7.13
160	6.30	1.9675 1.9660	2.1564 2.1559	2.1665 2.1658	3.23	1.8750 1.8744	3.025 3.015	3.74	3.0024 3.0012	10.83	1.14	1.22	7.72
200	7.87	2.1250 2.1235	2.1564 2.1559	2.5602 2.5595	3.23	2.0000 1.9993	3.525 3.515	4.13	3.5028 3.5014	11.61	1.30	1.69	8.19

SIZE OF UNIT	K1	L	N	Q Dia.	R Dia.	S1 Dia.	S2 Dia.	T	U	U1	V	W	Y
100	5/8"UNFx1 1/4"	3.15	17.72	3.1508 3.1500	3.069 3.066	2.031	7.01	1.56	1.10	2.28	3.31	0.501 0.500	2.167 2.161
125	5/8"UNFx1 1/4"	3.70	21.65	3.9384 3.9375	3.738 3.735	2.421	8.90	1.89	1.22	2.56	4.33	0.626 0.625	2.690 2.684
160	5/8"UNFx1 1/4"	4.49	24.41	4.3321 4.3312	4.132 4.129	3.065	11.14	2.22	1.50	2.83	5.16	0.751 0.750	3.213 3.207
200	5/8"UNFx1 1/4"	5.39	27.17	5.1197 5.1187	4.919 4.916	3.499	14.25	2.68	1.75	3.13	5.35	0.876 0.875	3.768 3.762

SHIPPING SPECIFICATIONS

SINGLE REDUCTION

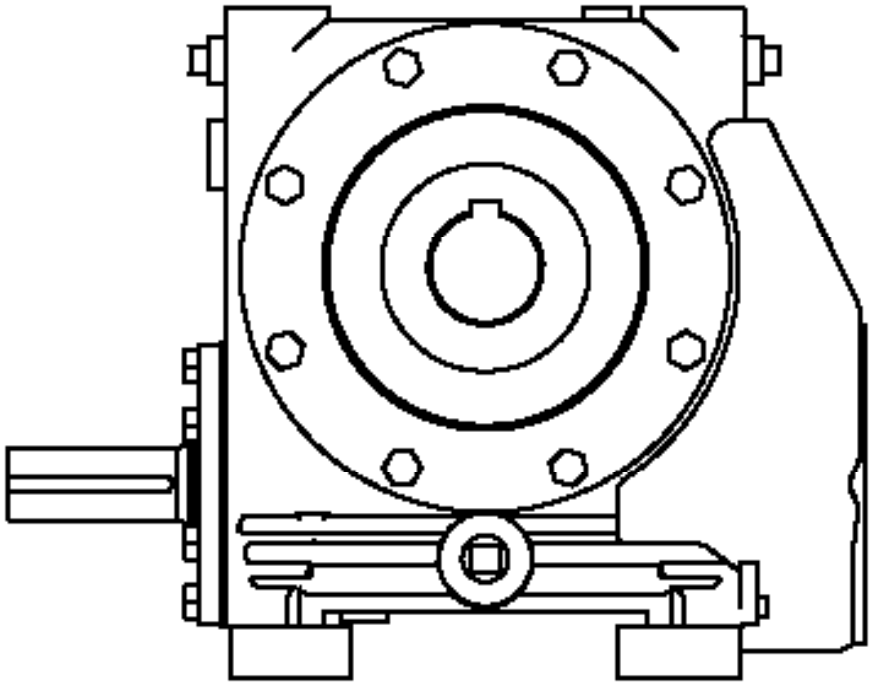
Size of Unit	Single Ext. Solid Output Shaft Reducer	Hollow Output Shaft Reducer	Output Flange	Hollow Output Shaft Reducer with Feet	Single Ext. Solid Output Shaft Reducer with Feet	Single Ext. Solid Output Shaft Reducer with Flange	Hollow Output Shaft Reducer with Flange
100	149	154	17	166	161	166	171
125	226	250	25	266	243	251	275
160	333	360	36	378	351	369	396
200	646	592	55	630	684	701	647

ALL WEIGHTS IN lb. ALL WEIGHTS EXCLUDE LUBRICANT.

Moments Of Inertia (Lb.in^2) Referred To Input Shaft

SINGLE REDUCTION

RATIO	A100	A125	A160	A200
5	6.14	17.10	41.42	98.15
7.5	4.72	12.99	26.49	60.37
10	3.77	10.53	21.88	48.72
12.5	3.46	9.59	18.87	40.65
15	3.41	8.60	18.23	34.97
20	2.94	8.06	17.82	32.94
25	3.20	8.22	16.14	29.94
30	2.93	7.98	18.26	33.94
40	2.84	7.21	16.10	28.27
50	2.65	7.02	14.41	25.71
60	2.60	6.78	13.93	24.28
70	2.71	6.64	14.89	23.40



LUBRICATION, INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS FOR MODEL HP-A CONE DRIVE SPEED REDUCERS

Cone Drive double-enveloping worm gear speed reducers are used throughout Industry to provide smooth and quiet speed reduction. When properly selected, applied and maintained, they will provide optimum performance.

IMPORTANT: In any applications of Cone Drive Products where breakage, damage, disconnection, any other malfunction of any drive train component, or excessive wear could result in personal injury or property damage, a fail safe device capable of stopping and holding the load in the event of such an occurrence must be incorporated after the drive train.

THE FOLLOWING INFORMATION IS FOR YOUR PROTECTION. PLEASE READ CAREFULLY.

1. Do not attempt to install or operate this reducer until all of these instructions are read and thoroughly understood. If you have any questions, please contact Cone Drive.
2. The horsepower or output torque capacity of this reducer and the service factor (maximum allowable operating cycle) are stamped on the reducer nameplate. These values are not to be exceeded as overloading can result in reducer failure.

   Exceeding the rating and duty cycle will void the warranty. Please contact Cone Drive with any questions regarding rating and service factors.
3. Each reducer is specifically arranged to operate at the input speed specified on the nameplate. If the input speed is not specified by the customer, it is set up for 1750 RPM and service factor 1.0. Do not operate the reducer at speeds or under service other than specified on the nameplate without contacting Cone Drive for specific instructions on oil level location and bearing settings.
4. Do not alter the reducer without approval from Cone Drive.
5. This reducer has moving mechanical components and connected electrical devices, operating under high voltage to achieve its intended purpose. Operation and repair should only be done by qualified personnel.
6. Before servicing a speed reducer, the main electrical disconnect must be moved to and locked in the off-position. The person performing the work should post on that disconnect a warning to others not to turn on the power.
7. It is normal for the reducer to operate at a housing temperature of up to 200º F. To prevent burns, proper guards or shields must be provided by the purchaser or user to prevent personnel from touching the reducer.
8. Cone Drive products are furnished without guard covers. It is the responsibility of the purchase or user to provide guards for all exposed shafting, couplings, sprockets, sheaves, belts, chains, clutches, and any other moving parts in accordance with current local, state and federal requirements.
9. Failure to follow the instructions contained in this bulletin may result in unit failure, property damage or personal injury.

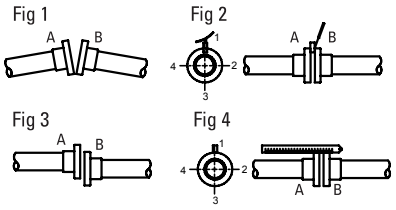
FINISH COAT PAINTING

Cone Drive speed reducers are furnished with a prime coat of paint on exterior housing surfaces. The reducer should be painted with a finish coat to protect the housing exterior, particularly if subjected to outdoor service, periodic washdown or harsh environments. Mask all shafts, oil seals, tags, name plates, oil level stickers, breathers, gauges etc. before painting. (Painting seal lips can result in oil leakage.)

INSTALLATION

IMPORTANT: Unless otherwise specified on the reducer or in accompanying documentation, all Cone Drive speed reducers are shipped without oil and must be filled to the oil level gage or plug with the proper oil before start-up. See the following section on lubrication.

1. The speed reducer must be securely mounted to a rigid flat foundation or base plate. If necessary, shim under the reducer feet to provide a flat mounting surface.
2. Bolt the reducer to the foundation or mounting base using the largest diameter bolt that will fit through the foot holes of the reducer. Be sure to use a bolt in all available mounting feet holes. Mount the reducer using bolts to SAE Grade 8 or ISO Grade 8.8 minimum.
3. SHAFT ALIGNMENT COUPLING CONNECTIONS
   Recommended angular alignment to be within ½ degree and axial alignment to be within +/-.005" unless otherwise specified by coupling manufacturer.



Angular Errors

1) Take up end float pushing in shaft ends
2) Using thickness and feeler gauges, take readings in positions 1, 2, 3 and 4 (Fig 2).
3) Adjust unit by shimming under feet.

Eccentric Errors

1) Place straight edge across coupling halves at points 1, 2, 3, and 4 (Fig 4). If coupling diameters are not equal, use feeler gauge equal to half the difference in diameters.
2) If error is in vertical plane, adjust height of unit. If error is in horizontal plane, move unit transversely.

4. Couplings, sheaves and sprockets should be mounted on the reducer shafts carefully. Do not pound or hammer them onto the shafts as this will damage bearings and oil seals.
5. Sprockets and sheaves should be mounted as close to the reducer as possible and "V" belts and chains adjusted to the proper tension to keep bearing loading and shaft deflection to a minimum. Too much tension in belts and improper location of sheaves and sprockets will lead to excessive chain pull, bearing wear and shaft deflection. For specific information on chain pull capacity, shaft stress and bearing life please contact Cone Drive.
6. NOTE: Exposed metal parts are coated with a commercial rust inhibitor. This rust inhibitor must be removed prior to installation. Failure to do so may result in difficulty in assembling close tolerance mating components.
7. Before starting motor review motor rotation, reducer rotation and required direction of driven machine to ensure that the motor is wired for proper direction of rotation. In many instances a machine must run in one direction and failure to wire the motor properly can result in damage to the driven machine.
8. IMPORTANT: Fill unit to proper level with recommended oil. Grease all fittings with recommended grease (see section on lubrication). Note: Some reducers may have been factory filled. Read all tags.

NOTE: All reducers are built for one mounting position, i.e.; floor mounted or wall mounted with worm vertical up or ceiling mounted, etc. If the reducer is to be mounted in any position other than the position for which it was furnished, contact Cone Drive for information on relocating oil level, grease packing bearings, etc., before start-up. If a reducer is operated in a mounting position other than the position for which it was assembled, reducer failure may occur from improper oil level or grease fitting location resulting in lack of lubrication to the gearset and bearings.

START-UP

1. After the reducer has been properly mounted, aligned and lubricated, it is ready for start-up.
2. Make sure driven machine is clear of all obstructions and all safety guards and covers are in place, according to appropriate local, state and federal requirements. If possible, turn motor shaft by hand to confirm drive system is operating freely and in correct direction of rotation.
3. Jog motor to confirm proper rotation.
4. Operate reducer with minimum load for approximately 15 minutes (in both directions if applicable) to seat gears, bearings, and oil seals

OPERATION

1. All reducers require a few hours of "run-in" under load to achieve optimum efficiency. During this initial run-in the reducer will probably run warmer than normal and draw more current than after the run-in period. Reducers operating at a very low load or speed will take much longer to run-in and even if operated continuously at low load or speed may never achieve the efficiency that they would if operated at or near their catalog rating.
2. IMPORTANT: Normal reducer operating temperature measured on the oil sump area of the housing should typically not exceed 100° F over ambient. Maximum operating temperature is 200° F. Excessive oil sump temperature is indicative of overloading, misalignment, or improper or marginal lubrication. Continuous operation of the reducer with the oil sump temperature above 200° F will result in breakdown of the oil and failure of the reducer.

MAINTENANCE

1. The reducer oil levels should be checked regularly and the recommended oil added as required to maintain the proper oil level.
2. Grease fittings and nilos rings are furnished when required. They should be greased with a high quality lithium base NLGI #2 or NLGI #3 bearing grease once per year, and care should be taken not to over-fill.
3. The reducer, particularly finned areas and fan covers, should be kept clean to allow maximum heat dissipation.
4. All reducers and foundation bolts should be checked for tight ness after three (3) months of service and annually thereafter.
5. If a reducer is to be repaired, contact Cone Drive for detailed instructions, drawings, parts lists, etc. If it is necessary field service is available.
6. If a reducer is to be returned, contact Cone Drive for instructions and a return material authorization (CASE) number.

OIL CHANGE

If an approved synthetic lubricant is used, it should be changed after 5000 hours of operation or once per year, whichever occurs first. See Cone Drive's Approved List of Lubricants (23169) for recommended lubricants. These change intervals are recommended for units operating under favorable conditions. Where operating conditions are severe, such a rapid rise and fall in temperature of the gear case with accompanied sweating of the inside walls and resulting formation of sludge, or where operation is in moist or dusty atmospheres, or in the presence of chemical fumes or extended running at sump temperatures in excess of 180° F, it may be necessary to change the oil at intervals of one to three months. It is recommended a sampling program be established with your lubricant manufacturer where reducers are exposed to the severe operating conditions, mentioned above.

If switching to a different type of lubricant, care should be taken to thoroughly flush out all of the old lubricant before filling with new lubricant. Mixing of different lubricants can result in degraded performance or failure.

STORAGE RECOMMENDATIONS FOR CONE DRIVE SPEED REDUCERS

If a reducer is to be stored or shut down for more than 60 days, it should be protected from water condensation and corrosion as follows:

Any enclosed system of gearing is subject to water condensation on the inside of the reducer caused by fluctuating ambient temperatures. This condensation can cause severe rusting of the worm and bearings which could lead to premature failure of the reducer. However, this condition can be prevented by following the recommendations outlined for various storage conditions. If the reducer is furnished with a motor, follow the motor manufacturer's recommendations for motor preservation.

1. Standard Shipping Procedure - Protection for Maximum Storage Duration of 60 Days. Cone Drive speed reducers are treated inside using a rust inhibitor, the exterior is painted with one coat of primer, and all exposed shafting coated with a rust preventative prior to shipment. This procedure is intended to protect the reducers during shipment and short term inside storage for a maximum period of sixty (60) days after shipment.

2. Long Term Storage (Indoors) for Periods up to One Year.
   2a. Fill the reducer completely full with one of the lubricants shown on Cone Drive's Approved List of Lubricants (23169). A copy of theis lubricant list is shipped with each unit.

   2b. Rotate the worm shaft and gearshaft at least every 60 days to keep the seals from sticking to the shafts.

   2c. If it is not practical to rotate the wormshaft periodically, it is recommended to purchase a spare set of oil seals to have on hand in case of seal leakage at start-up.

   2d. Before putting the reducer into service, lower the oil in the reducer to the proper operating level.

3. Long Term Storage (Outdoors) for Periods Up to One Year. Proceed as in (2) with the following additions:

   3a. After filling the unit with oil, plug the breather with a pipe plug and wire the breather to the unit.

   3b. Paint the outside of the unit with a finish coat of paint. (Reducer from the factory is prime coated only.)

   3c. Coat all exposed shafting with a long term rust preventative.

4. Extended Storage Periods Exceeding One Year. Immediately after receipt of the reducer:

   4a. Apply finish paint to the exterior of the unit, excluding shafts and mounting points.

   4b. Coat all exposed unpainted surfaces with a long term rust preventative.

   4c. Place the unit in a vapor corrosion inhibitor (VCI) bag and seal the bag air tight.

   4d. Crate the unit and cover the crate to keep out water.

   4e. Purchase a spare set of oil seals to have on hand in case of leakage at start-up.

LUBRICATION DATA

Lubrication is very important for successful operation of Cone Drive gearsets and speed reducers. Inadequate lubrication can result in increased power consumption, added maintenance and gearset failure. Please review the following recommendations and the "Approved List of Lubricants" shipped with all Cone Drive gearsets and speed reducers. Cone Drive recommends only those lubricants listed or any lubricant which meets all the requirements of AGMA (American Gear Manufacturers Association) 9004-D94 "Lubrication of Industrial Enclosed Gear Drives" as it applies to double enveloping worm gearing. Use of other lubricants can result in gearset failure which will not be covered under warranty. See reducers nameplate for the recommended lubricant.

TYPE OF OIL

Rated performance of Cone Drive products is based on synthetic lubricants. Using a mineral oil will reduce the mechanical power and output torque ratings by 25%.

AMBIENT TEMPERATURE

The oils shown in Cone Drive's Approved List of Lubricants (23169) are for use in an ambient temperature range of approximately 15° to 125°F with the low end of the range depending on the pour point of the specific oil used. If the ambient temperature will be below or above this range please contact Cone Drive for specific recommendations on proper lubricant as well as proper oil seal and shim materials.

OIL SUMP TEMPERATURES

The maximum recommended oil sump temperature is 200°F. Where reducers will be used at maximum ambient and full catalog rating. Contact Cone Drive for lubrication recommendations.

SLUDGE

It is necessary that the oil be clean and free from sludge at all times to obtain long life from a gear unit. Sludge in gear units may be caused by excessive heat, from dust and dirt and other contaminates and by the presence of moisture or chemical fumes. Therefore, every precaution should be taken to prevent water and foreign particles from entering the gear case.

OIL LEVEL

Cone Drive reducers are furnished with a bronze colored hex head pipe plug to indicate oil level. An oil level tag is affixed to the unit near the oil level indicator. Oil level should always be checked with the unit stopped. Estimated oil capacities for standard reducers are listed in Oil Capacity for Model HP-A (25173) and are shipped with all Cone Drive gearsets and reducers.

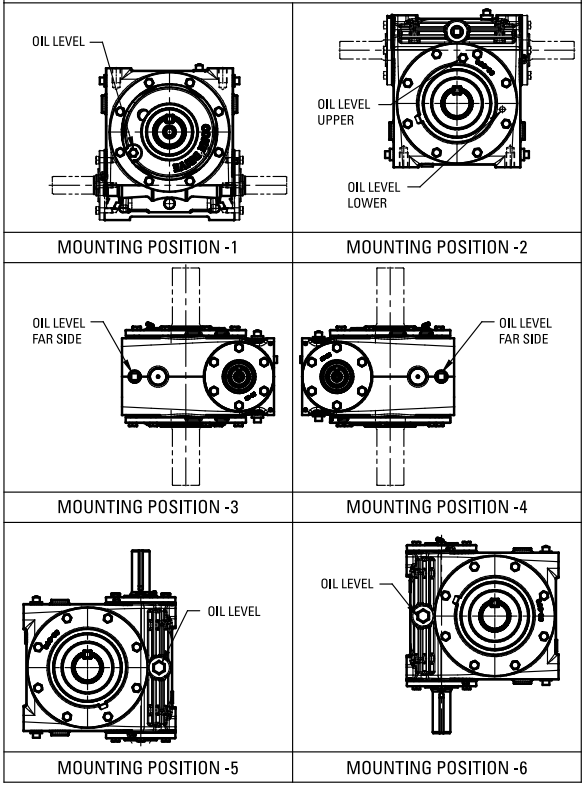
EXTREME PRESSURE (E.P.) LUBRICANTS

Extreme Pressure (E.P.) lubricants or cylinder oils with sulphur-phosphorus additives are not acceptable and should not be used in Cone Drive Speed reducers or worm gearing.

		SIZE			
MOUNTING POSITION	OUTPUT	100	125	160	200
1	SOLID	1.86	3.19	5.86	12.22
	HOLLOW	1.6	2.77	5.45	12.22
2	SOLID, UPPER	3.12	7.07	9.58	13.91
	HOLLOW, UPPER	2.59	5.93	6.92	13.91
	SOLID, LOWER	1.68	3.19	5.78	9.24
	HOLLOW, LOWER	1.52	2.83	4.36	9.24
3	SOLID	1.95	3.65	6.3	11.62
	HOLLOW	1.44	2.61	5.41	11.62
	DRYWELL	1.67	3.11	5.76	10.68
4	SOLID	1.95	3.65	6.3	11.62
	HOLLOW	1.44	2.61	5.41	11.62
	DRYWELL	1.67	3.11	5.76	10.68
5	SOLID	2.07	3.71	6.44	11.41
	HOLLOW	1.61	2.88	5.05	11.41
6	SOLID	2.07	3.71	6.44	11.41
	HOLLOW	1.61	2.88	5.05	11.41

ALL VOLUMES IN LITERS

STANDARD OIL LEVELS



OIL LEVEL

BEARING GREASE:
High quality lithium base NLGI #2 or NLGI #3

NOTES:

Note #1 - For a complete list of approved synthetic and mineral based oils please see our "Approved List of Lubricants" file available at www.conedrive.com/library/userfiles/ApprovedLubrication.pdf. You can also contact Cone Drive by calling 888-994-2663.

Note #2 - Worm gears operating at a sliding velocity in excess of 10 m/s (2,000 ft. per min.) may require force feed lubrication. For force feed lubrication recommendations, see our Product Catalog or contact our Application Engineers.

Note #3 - If a reducer is to be operated at an input rpm other than that shown on the name plate, contact our Application Engineers for recommendations.

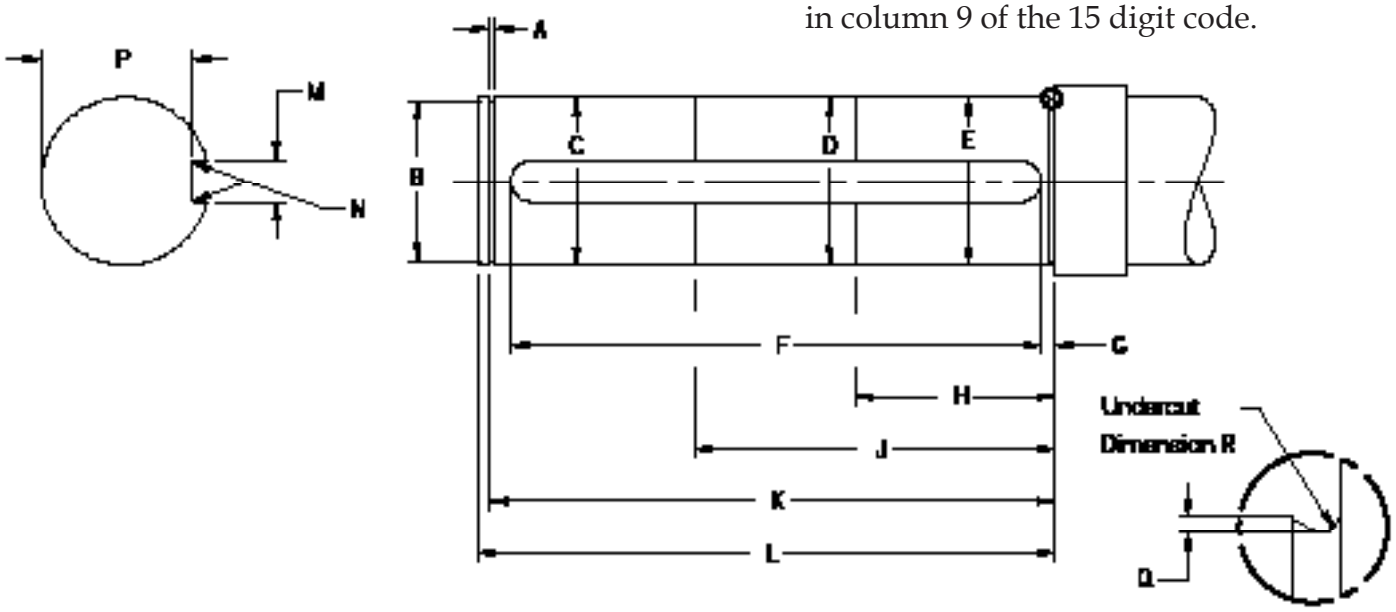
Note #4 - Pour point of the oil used should be 5° C (9° F) less than the minimum ambient temperature expected. For special temperature or operating conditions, contact our Application Engineers for the proper lubrication selection.

IMPORTANT: Do not overfill units. Fill to center line of oil gauge or to pipe plug identified with oil level sticker. Oil capacities will vary due to mounting positions or type of gearshaft mounting used, such as solid shaft, hollow shaft or spread bearings. Each reducer is built and oil levels are set at the factory for a specific mounting position.

CUSTOMER SHAFT DETAIL

Shaft Mount Units

Applies to only units with a drywell with a hollow output shaft or letters "J" or "V" in column 9 of the 15 digit code.



Dimensions shown in table are for metric bores.

SIZE		A	B Dia.	C Dia.	D Dia.	E Dia.	F	G	H	J	K	L	M	N	P	Q	R
A100 Drywell Metric	high	2.35	46.75	50	49.75	50	180	11	70	130	202.13	207	14	0.4	44.5	1	1.2
	low	2.15	47	50.02	49.77	50.02	180.5				202.08		13.95		44.3		
A125 Drywell Metric	high	2.85	62	65.04	64.79	65.04	220.3	11	85	155	242.63	248	18	0.4	58	1	1.2
	low	2.65	61.7	65.01	64.76	65.01	220				242.58		17.95		57.8		
A160 Drywell Metric	high	2.85	72	75.03	74.78	75.03	250.5	14	95	180	277.65	283	20	0.6	67.5	1	1.2
	low	2.65	17.7	75.01	74.76	75.01	250				277.58		19.95		67.3		
A200 Drywell Metric	high	3.35	86.5	90.04	89.79	90.04	250.5	23	105	190	298.14	304	25	0.6	81	1	1.2
	low	3.15	86.1	90.01	89.76	90.01	250				298.09		24.95		80.8		

Dimensions shown in table are for inch bores.

SIZE		A	B Dia.	C Dia.	D Dia.	E Dia.	F	G	H	J	K	L	M	N	P	Q	R
A100 Drywell Inch	high	0.072	1.891	2.000	1.990	2.000	7.28	0.28	2.76	5.12	7.945	8.15	0.501	0.020	1.775	0.04	0.05
	low	0.068	1.881	1.999	1.989	1.999	7.24				7.943		0.499		1.781		
A125 Drywell Inch	high	0.091	2.366	2.500	2.490	2.500	8.91	0.28	3.35	6.10	9.539	9.76	0.626	0.020	2.148	0.04	0.05
	low	0.086	2.354	2.499	2.489	2.499	8.86				9.537		0.624		2.142		
A160 Drywell Inch	high	0.108	2.844	3.000	2.990	3.000	10.28	0.28	3.74	7.09	10.934	11.14	0.751	0.020	2.702	0.04	0.05
	low	0.103	2.832	2.999	2.989	2.999	10.24				10.932		0.749		2.696		
A200 Drywell Inch	high	0.125	3.322	3.500	3.490	3.500	11.03	0.28	4.13	7.48	11.738	11.97	0.876	0.060	3.132	0.04	0.05
	low	0.120	3.310	3.499	3.489	3.499	10.99				11.735		0.874		3.126		

NOTES

NOTES

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