HAMPTON
MAKISHINKO

WORM GEAR REDUCERS

This catalog has been designed to be a clear, complete and accurate reference tool for everyone who works with worm gear speed reducers.

The front portion of the catalog is devoted to general specifying and ordering information. We have emphasized those reducer styles most commonly specified throughout the country. Other special order units are outlined on page 6.

We have simplified and condensed key dimensional information, and a complete parts list can be found in the back pages.

The MAKISHINKO Universal units which we now stock, are growing in popularity, including the Universal U-CHS shown on page 36.

On the final page, a troubleshooting chart is included for reference. If you still have unanswered questions after reviewing all of the above data, don't hesitate to contact Hampton   for additional information.

Contents

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A word about **MAKISHINKO** and **HAMPTON**

MAKISHINKO Co., Ltd.
MAKISHINKO Co., Ltd. is Japan's largest manufacturer of worm gear speed reducers.

The company began production in 1940 and markets its products under several brand names. In 1968, MAKISHINKO opened a new manufacturing facility and began exporting its products to the United States.

A family-owned and managed business, MAKISHINKO employs 200. The company's manufacturing facilities can produce 50,000 units per month. In addition, the company maintains an excellent development and testing laboratory.

MAKISHINKO worm gear speed reducers are quality products with a proven track record of reliable performance. Hampton Products is proud to be the national distributor in the United States for this fine product line.

MAKISHINKO has distributors in many other countries, which may be of assistance to equipment manufacturers selling internationally.

HAMPTON
Based in Eugene, Oregon, Hampton is one of the nation's leading distributors of power transmission products for industrial applications.

Hampton deals solely in major components for raw energy conversion. The company promotes and sells a group of carefully selected and non-competitive product lines, manufactured either in the United States or in Japan.
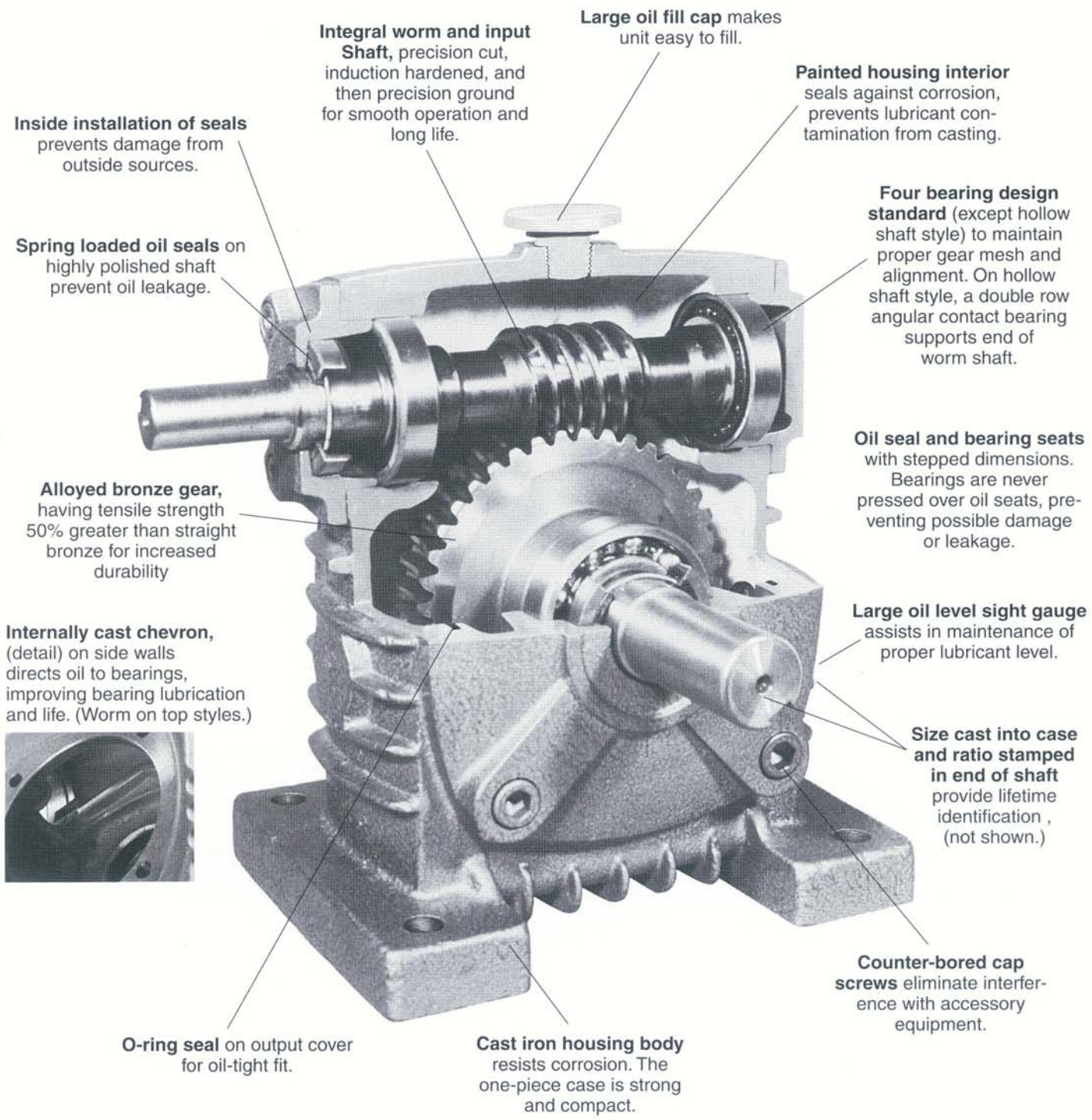The company maintains its own sales offices and warehouse in Eugene, Oregon and has a large organization of sales representatives throughout the United States and Canada which is backed by a network of stocking distributors.

Makishinko acquired ISO9001:2000 on March 2003.

Integral worm and input Shaft, precision cut, induction hardened, and then precision ground for smooth operation and long life.

Large oil fill cap makes unit easy to fill.

Inside installation of seals prevents damage from outside sources.

Painted housing interior seals against corrosion, prevents lubricant contamination from casting.

Spring loaded oil seals on highly polished shaft prevent oil leakage.

Four bearing design standard (except hollow shaft style) to maintain proper gear mesh and alignment. On hollow shaft style, a double row angular contact bearing supports end of worm shaft.

Alloyed bronze gear, having tensile strength 50% greater than straight bronze for increased durability

Oil seal and bearing seats with stepped dimensions. Bearings are never pressed over oil seats, preventing possible damage or leakage.

Internally cast chevron, (detail) on side walls directs oil to bearings, improving bearing lubrication and life. (Worm on top styles.)

Large oil level sight gauge assists in maintenance of proper lubricant level.

Size cast into case and ratio stamped in end of shaft provide lifetime identification , (not shown.)

Counter-bored cap screws eliminate interference with accessory equipment.

O-ring seal on output cover for oil-tight fit.

Cast iron housing body resists corrosion. The one-piece case is strong and compact.

Engineering and Design Characteristics

MAKISHINKO worm gear speed reducers are designed for fixed ratio applications with 90 degree drive. Compared to helical speed reducers, worm gear speed reducers offer two important advantages: lower cost and more compact dimensions. Because of their differences in efficiency and mechanical capacity, selection of worm gear reducers over helical gear units requires analysis of the application (see Engineering and Application Data, page 10).

These units incorporate many MAKISHINKO engineering and manufacturing features not found in other worm gear reducers. The result is a competitively priced speed reducer that we are proud to compare with any in the world.

Hampton stocks various styles of MAKISHINKO worm gear speed reducers. Available units include standard worm-on-top and worm-on-bottom designs, with or without C-face adapters. Ratios from 10:1 to 60:1 and shaft center distances from 1¼" to 10" are ready for immediate shipment from Hampton extensive inventory.

More specialized units are available from the MAKISHINKO manufacturing plant.

Service life: Operated within the listed rated capacity and with the recommended care, maintenance and lubricant, MAKISHINKO worm gear speed reducers are designed for a service life of approximately 26,000 hours at AGMA Service Factor 1.0. Because these reducers are pre-engineered products and application conditions vary, no specific service life warranty is stated or implied.

Housing: Standard one-piece main housings of close-grained cast iron are heavily ribbed and finned in the bearing and gear areas. This provides rigid support to maintain proper gear mesh alignment. One low speed cover is blind, which strengthens the casing and prevents deflection. The gearbox size is cast into the housing (except on Universal Mount). The housing is painted with a primer and styrene alkyd resin finish coat and units need no further painting.

For larger OEM orders where weight is a concern, MAKISHINKO also can furnish diecast aluminum housings.

Worm shaft: The integral worm and input shafts are manufactured from solid bar stock and heat treated to achieve mechanical strength, toughness and shock resistance. The worm is precision cut, then induction hardened, and finally precision ground. Induction hardening provides a deeper and more uniform effect for toughness and service life as compared to case hardening heat treating processes. Oil seal seats, bearing seats, shoulders and shaft extensions are ground. The stepped dimensions of the oil seal and bearing seats eliminate the pressing of bearings over the oil seat, thus preventing damage and possible leakage.

Worm shaft material:
- Minimum tensile strength: 100,000 PSI
- Minimum yield point: 70,000 PSI
- Elongation (2 inch): 17% minimum'
- Hardness: 210 BHN (Brinell Hardness Number)
- Worm induction surface hardened to 45-48 Rockwell C

Oil seals: All seals are nitrile, spring loaded, single lip type. Nitrile is used because of its good oil resistance, wear resistance and low temperature properties.

Worm gear (wheel): The gear is double chill cast onto a high tensile cast iron central hub. Chill casting provides desirable mechanical properties to the gear related to wear resistance and strength, not obtainable with a forged gear. The cast assembly is double locked-both rotationally and laterally-to ensure permanent joining. The gear's alloyed bronze withstands shock loads and efficiently transmits normal loads with a minimum of frictional loss.

Worm wheel material :
- Chill cast alloyed bronze (Similar to ASTM B271 alloy 9D)
- Minimum tensile strength: 71.000 PSI
- Hardness: 120 BHN
- Elongation (2 inch): 20% minimum

Shafting: All shafts through size 250 are AIS1 1045 steel. Oversized shafts on most models help prevent deflection and the resulting misalignment at the gear mesh.
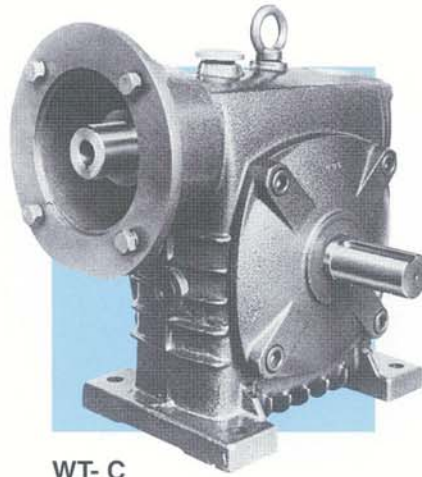
Covers: Covers are close-grained cast-iron, except for high speed covers in sizes 50 to 135 and low speed covers in sizes 50 to 80 which are of die cast aluminum.

C-face flanges: All motor flanges are close-grained cast iron.

Handing: The handing on all units is readily changed by reversing the worm shaft.
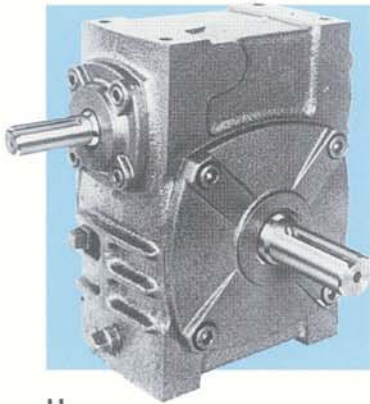
U-CHS
Universal Mount, Hollow input shaft, C-face motor flange

WT- C
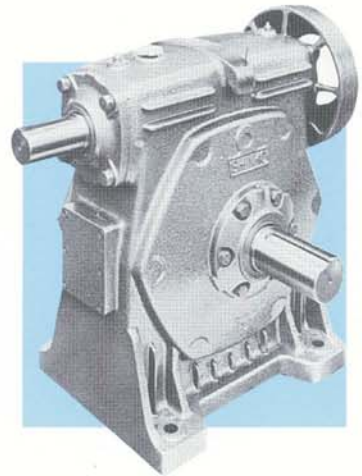Worm at Top, C-face motor flange

WT-CHS
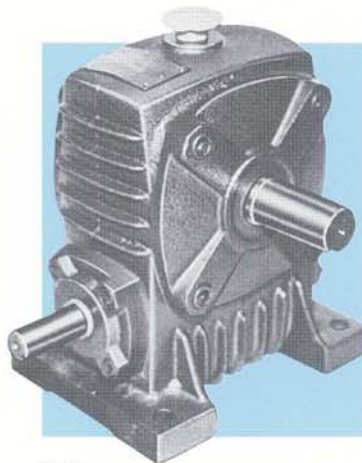Worm at Top, Hollow input shaft, C-face motor flange
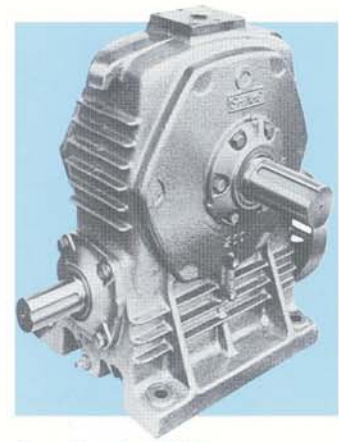
U
Universal Mount

WT
Worm at Top

Fan Cooled WT

DW
Double Reduction Worm /Worm

WB
Worm at Bottom

Fan Cooled WB

Special Order Reducer Styles

Other Reducer Styles MAKISHINKO manufactures a variety of reducers for special applications. Our salesmen or representatives have MAKISHINKO catalog sillustrating these various units. While Hampton does not regularly carry these units in stock, they may be ordered from the factory. Please contact us for price, delivery and engineering information. If an Original Equipment Manufacturer wishes to standardize on MAKISHINKO equipment, Hampton will be happy to maintain a backup stock of special units.
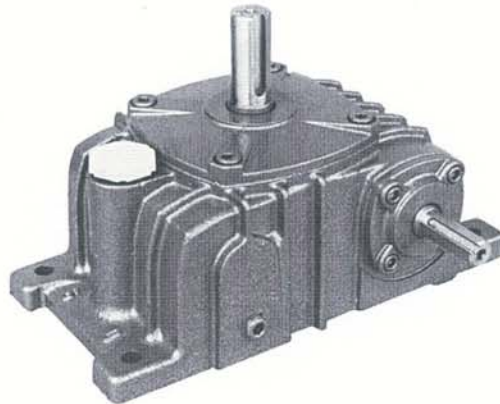
Output Flanges
Universal units, U and U-CHS, can be supplied with an output mounting flange when quantity warrants. Ask Hampton for drawings.
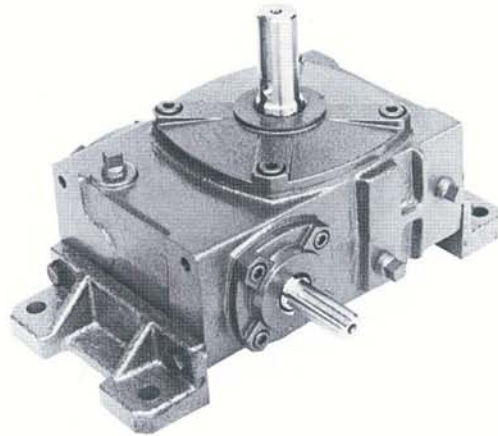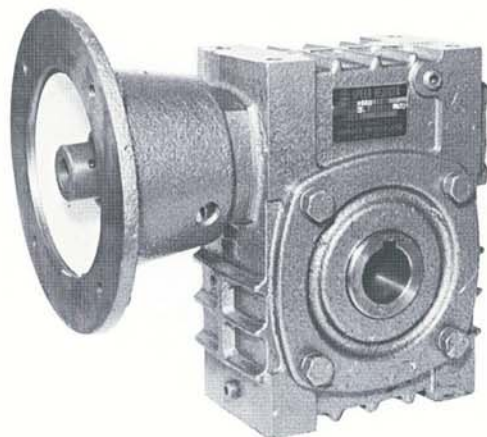
Universal U style
with mounting rails
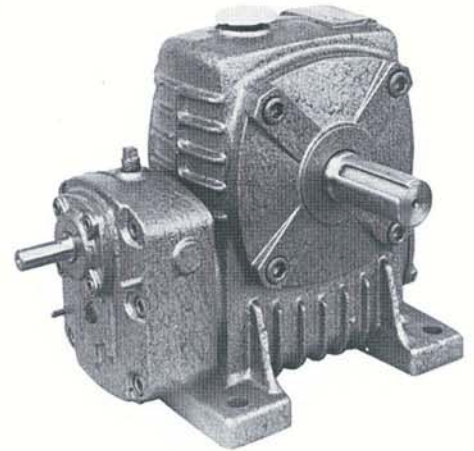
Helical/Worm Double Reduction

Vertical Output Shaft

Hollow Output Shaft Universal Style Maximum Bore Sizes

Size	Maximum Bore
50	1"
60	1-3/16"
70	1-5/16"
80	1-9/16"
100	1-13/16"
120	2"
135	2-1/2"

Universal Mount
with hollow output shaft

Required Information

Proper selection depends upon the complete knowledge of the application. Several important factors must first be taken into consideration. It will be necessary to determine the following :

1. Service Factor. Determine service factor for the application depending on the number of hours of operation each day, the driven load, and type of prime mover.
2. Torque. Multiply the actual reducer input horsepower and output torque required to operate the driven equipment by the service factor obtained in Step 1 to determine the equivalent rating.
3. Ratio. Determine reducer ratio based on input speed and required output speed.
4. Size of Reducer. Refer to rating tables to select a speed reducer size which has the desired characteristics of input and output speeds, and also the capacity to equal or exceed the required equivalent ratings of horsepower and torque.
5. Overhung Load. The overhung load on all shafts which are not directly connected must be calculated, using the formula given in the Engineering section, to determine whether the selected reducer has an overhung load capacity which exceeds the actual load capacity of the drive.
6. Mounting. Determine the proper mounting position most suitable for the application.

Selection Example

Select the correct reducer to drive, through a chain/sprocket auxiliary drive, a refuse conveyor with the following requirements supplied by user.

1. Eight hour continuous service; moderate shock loading.
2. Input 3HP, 1750RPM motor.
3. 2525 inch pounds output torque required from the reducer.
4. 58 RPM output speed.
5. 10 tooth sprocket with a pitch diameter of 5.759 inches on output shaft.
6. Input worm over right hand output shaft, horizontally mounted.

Step 1:

From the Service Factor Table on page 12, an eight hour service-moderate shock loading gives a service factor of 1.25.

Step 2:

$2525 \times 1.25 = 3156$ in-lb output torque capacity required.

Step 3:

$$RATIO = \frac{1750}{58} = 30:1$$

Step 4:

From the catalog rating tables on page 16, the smallest unit capable of handling 3156 in-lb output torque at 30:1 reduction is size 100. A 3 HP motor is below the 4.33 HP maximum for this reducer, so the motor is not too large.

Step 5:

A 3HP, 1750 RPM motor will produce, at full load, 9.05 ft-lb of torque. Computing for torque at the output shaft ($9.05 \times 12 \times 30 \times .79$ efficiency) a torque of 2574 in-lb is achieved which meets the requirements of the driven equipment.

Step 6:

$OHL = 2525 \times 1.0, 2.88 = 877$ pounds, 877 pounds is below the 1010 pounds overhung load rating of the reducer selected.

Step 7:

Worm over, right hand output shaft conforms to the WT series of Makishinko reducers. Use 100 WT 30 R which has a 30:1 ratio and is horizontally floor mounted.

Ordering

To order a MAKISHINKO worm gear speed reducer, specify the size, model, ratio and assembly and mounting position as shown at right. If seals or bearings other than those regularly supplied with the units are required, please specify on the order.

Size
50 through 500
Model
WT-Worm on top
WB-Worm on bottom
WT-C-Worm on top,
  C-face adapter
WB-C-Worm on bottom,
  C-face adapter
WT-CHS-Hollow worm
  on top, C-face adapter
DW-Double worm
DW-C-Double worm,
  C-face adapter
DW-CHS-Double worm,
  Hollow worm, C-face
  adapter
U-Universal

Ratio
10:1 through 60:1

Assembly
R-Right hand
L-Left hand
D-Double extended

Special Modifications
DLS-Double lip seals
TB-All taper bearings
(Sizes 50 through 135)
DIS-Double input shaft
CM-Ceiling mount
HO-Hollow output shaft
HOF-Hollow output shaft
  with flange

Example: "WT-C 60 50R"
is a Size 60, Worm on top with C-face adapter, in a 50:1 ratio with Right Handed Assembly.

Warranty

Hampton warrants that the equipment manufactured by MAKISHINKO will deliver successfully its rated capacity as indicated in this catalog, provided it is properly installed, maintained and operated in the environment and within the limits of speed, torque or other load conditions for which it was sold. Damage caused by misuse, negligence, or accident is not covered.

All MAKISHINKO products are warranted to be free from defects in materials and workmanship to the original buyer for one year from the time the unit is placed in operation, or for a period of 18 months from the date of shipment to the buyer, whichever period is shorter.

The seller's sole obligation under this warranty shall be to repair or replace any defective product or part thereof, which is returned to Hampton or a designated service center, transportation prepaid, within the period mentioned above, and which upon examination is determined to be defective. Hampton reserves the right of inspection and will make the final decision on warranty claims.

Hampton liability under This warranty, or under any other warranty, whether expressed or implied in law or in fact, shall be limited to the repair or replacement of defective units or parts, and in no event shall be liable for consequential or indirect damages.
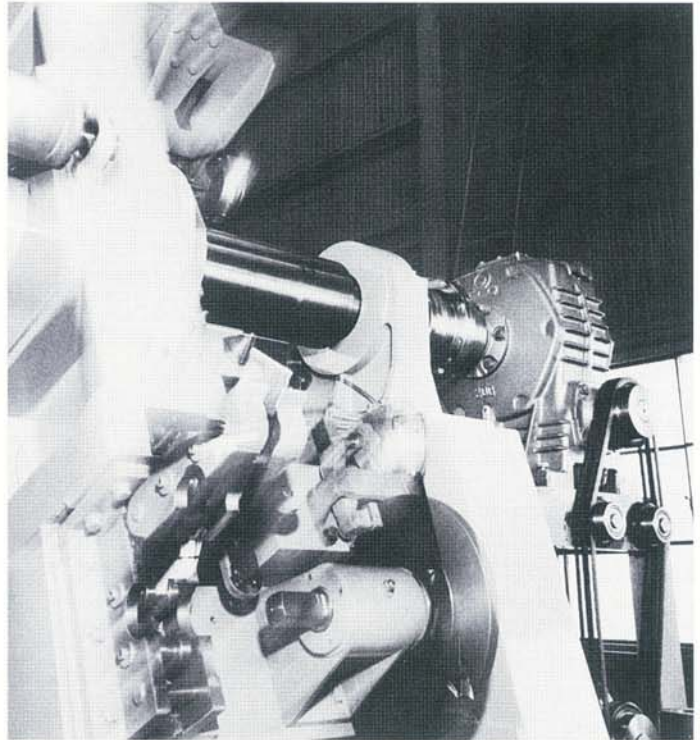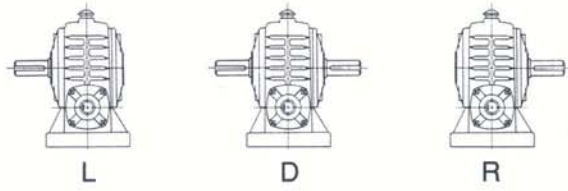

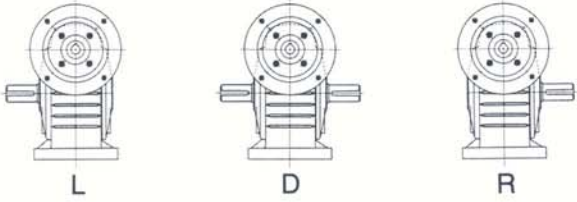**100% quality assurance.** Units through all units given an air pressure test. If any leakage is indicated, the unit is submerged in water to pinpoint the source.
The offending component is replaced to make the unit leak-free. All units are run under a no-load test, shown above, where inspectors check for unusual noise levels or amperage draw which would indicate bearing, gearing or alignment problems.

Models WT, WT-C, WT-CHS

Standard

| L | D | R |

Left of Sidewall

| LL | LD | LR |

Ceiling

| CL | CD | CR |

Right of Sidewall

| RL | RD | RR |

Models WB, WB-C

Standard

| L | D | R |

Left of Sidewall

| LL | LD | LR |

Ceiling

| CL | CD | CR |

Right of Sidewall

| RL | RD | RR |

Engineering and Application Data
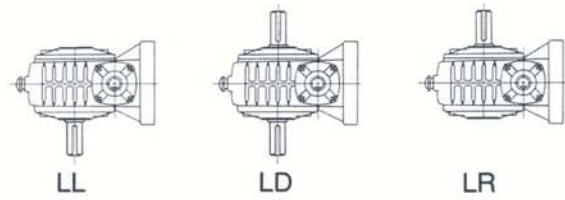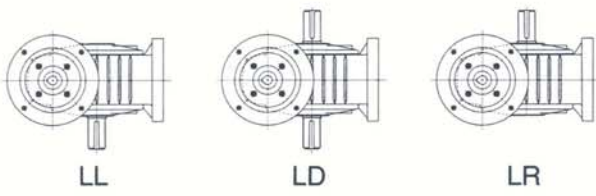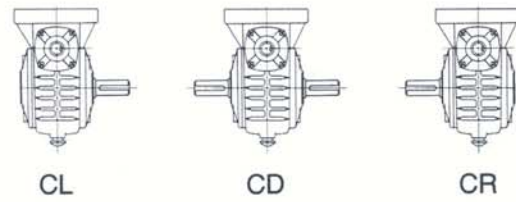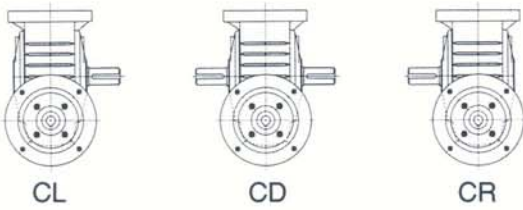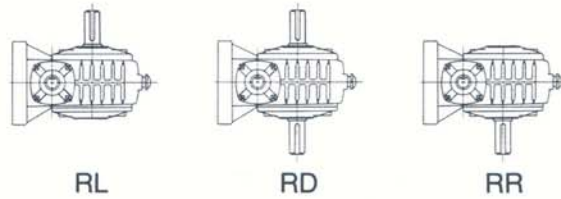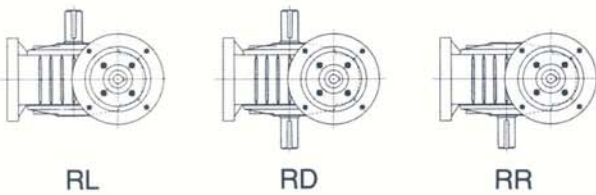
Horsepower

Horsepower is the term used to measure the amount of work done in a given period of time. A unit of one horse-power is the amount of power required to lift 33,000 pounds one foot in one minute. Therefore, one horsepower equals 33,000 foot pounds of work per minute for any combination of load, time and distance.

$$Hp = \frac{\text{Load in pounds} \times \text{velocity in feet per minute}}{33,000}$$

Horsepower ratings are used primarily when the ratio of the unit is comparatively low (generally single reduction reducers under 60:1 ratio) and the input speed is over 100 RPM. When the ratios are higher or the input speed lower, torque ratings should be used to select a unit of proper size.

Ratio

Ratio is the relation of the high speed (input power source) RPM to the slow speed (output) RPM.

$$RATIO = \frac{\text{RPM of Driver}}{\text{Required Output RPM}}$$

Example: If we have a motor at 1800 RPM and a required output speed of 30 RPM;

$$RATIO = \frac{1800}{30} = 60:1$$

Torque

Torque is the twisting force or the power required to produce rotational motion. It is expressed as the product of the force (push, pull) and the perpendicular distance, or radius, from the center of the rotation through which this force is applied. Therefore, for any combination of load and radius:

TORQUE = Force in Pounds x Radius in Inches
$$T = L \times R$$

Torque is usually measured or calculated in foot pounds or inch pounds (the latter is used herein).

Example: If a crank arm on the end of a shaft is 20 inches long, and rotation starts when a weight of 100 pounds is hung on the end of the crank arm, how much torque was applied?

TORQUE (T) = Load (L) × Radius (R)
$$= 100 \times 20$$
$$= 2000 \text{ inch pounds}$$

Torque requirements should always be calculated or measured for the maximum load. The torque required to start rotation is always greater than that required to keep it in motion; therefore, STARTING TORQUE REQUIRED FOR MAXIMUM LOAD should be used in selecting a reducer.

Torque is not changed by the elements of SPEED or TIME. The same torque is required in the above example to run the shaft at 100 revolutions per minute, 500 RPM or 1000 RPM.

Compounding

Compounding is the placing of an intermediate or auxiliary drive between the output shaft of the reducer and the driven machine. Compounding has three advantages:

1. The exact speed required for the machine can probably be obtained while using standard ratio reducers.
2. Smaller ratios can transmit higher horsepowers, and because the torque compounds in the same manner as the reduction ratios, it is possible that a smaller reducer can be used for the application.
3. The overall physical size of the drive unit is reduced.

Example: An application requiring 1800 inch pounds of torque and 60:1 ratio directly coupled to the load would requirethe full 1800 inch pounds of torque at the output shaft. If an intermediate or auxiliary drive of 3:1 reduction can be used between the output shaft of the reducer and the driven machine, the reducer output torque can be reduced to 600 inch pounds.

Torque - Horsepower Relationship

Horsepower and torque are distinct and separate factors. However, they are definitely interrelated. The relationship of horsepower and torque is the force exerted through a given distance. The distinction is the element of time. The following formula will demonstrate this relationship:

$$HP = \frac{\text{Load in Pounds} \times \text{Velocity in Feet per Minute}}{33,000}$$

Because velocity in feet per minute is a factor of radius and revolutions per minute, it may be expressed as:

$$VELOCITY = \frac{\text{Radius(in)} \times 2 \times 3.14 \times RPM}{12}$$

It is possible to express horsepower as follows:

$$HP = \frac{L \times 2 \times R \times 3.14 \times RPM}{12 \times 33,000}$$
$$= \frac{L \times R \times 6.28 \times RPM}{33,000 \times 12}$$
$$= \frac{L \times R \times RPM}{63,025}$$

Since torque equals load (L) ×radius (R):

$$HP=\frac{T\times RPM}{63,025} \text{ or } T=\frac{HP\times 63,025}{RPM}$$

From the Formula, $T=\frac{HP\times 63,025}{RPM}$, note that as the

speed increases, the torque decreases. As speed decreases, torque increases, as long as the horsepower remains constant.

Example: The torque requirements on the 20 inch crank (proceeding example) remains at 2000 inch pounds at 100 RPM, 500 RPM or 1000 RPM. However, the horsepower required at these speeds will vary. Using the above formula, the horsepower required at 100 RPM is 3.17; at 500 RPM, 15.9; and 1000 RPM, 31.7.

Efficiency

The efficiency of worm gear speed reducers depends on the lead angle of the worm, the input speed to the unit, and the type and temperature of the lubricant.

Although no efficiencies are listed in the catalog, they may be easily calculated by the following formula:

$$Efficiency=\frac{Horsepower\ Output}{Horsepower\ Input}$$

Overhung Load

Unlike torque which is an axial load, overhung load (OHL) is a radial load acting on the shaft of the reducer and occurs only when a gear, pinion, sprocket, pulley or sheave, etc., is mounted on the output shaft of the reducer. For simplicity this is called a bending load.

If it is great enough, it will set up excessive strains on the shaft and bearings, causing fatigue failure. A calculation should always be made to determine whether the actual overhung load exceeds the rated overhung load capacity of the reducer.

This calculation can be made using the formula:

$$OHL=\frac{HP\times 63,025\times K}{N\times R}=\frac{T\times K}{R}$$

Where: OHL = Overhung load
      HP = HP transmitted by shaft
       T = Torque carried by shaft
      N = RPM of shaft
      R = Pitch radius of gear, sprocket, sheave, etc.
      K = Factor for overhung load from table

Overhung Load Factors (K)
Auxiliary Drive

Sprocket/chain	1.00
Gear/gear	1.25
Gear/gear belt	1.25
Sheave/V-belt	1.50
Pulley/flat belt	2.50

To minimize the bending action, always mount the gear, sprocket, sheave, etc., as close to the housing of the reducer as possible.

The permissible overhung loads shown in the tables are calculated for perpendicular loads applied to the shaft at a distance one shaft diameter from the reducer housing.

For loads acting at a greater distance than one shaft diameter from the housing, the following conversion factors must be applied to the overhung load capacities.

Load center	Multiply OHL capacity by this factor
one shaft diameter from housing face:	1.00
two shaft diameters from housing face:	.65
three shaft diameters from housing face:	.45
four shaft diameters from housing face:	.35
five shaft diameters from housing face:	.30

If the calculated overhung load exceeds the values listed in the rating tables, either:

1. Increase the pitch radius of the sprocket, sheave, pinion, etc
2. Use a larger gear head.
3. Provide an outboard bearing.
4. Consult with Hampton Power Products.

The minimum allowable radius for any given drive may be determined by the following formula:

$$MINIMUM\ RADIUS =\frac{T\times K}{OHL\ capacity\ of\ reducer}$$

Motor Selection

It may be to the user's advantage to use a 6-pole, 1200 RPM motor instead of a 4-pole, 1800 RPM motor to obtain the desired output speed. The higher efficiency of the worm gear with a smaller reduction may allow use of a smaller size gearbox, and these savings may exceed the added costs of the motor.

Example: A Size 100 50:1 reducer with a 2 HP @ 1200 RPM motor costs about 75% as much as a Size 120 70:1 reducer with a 2 HP @ 1800 RPM motor, while rated horsepower and speed are similar.

Service Factor

Rated load is defined as the unit rating with a service factor of 1.0.

Service factors are applied to provide a satisfactory life expectancy of the reducer. The service factor allows high horsepower and torque to be transmitted during short periods of operation. Normal starting or peak loads of 300% of input rated loads are permissible. This is within good practical standards and not considered an overload.

Horsepower and output torque capacities shown in the ratings tables are calculated on 1.0 service factor for continuous 8-10 hour per day operation, uniform load, with electric motor drive. For applications conforming to a 1.0 service factor, the catalog ratings may be used directly. When selecting a reducer for other applications under different service conditions, multiply the actual input horsepower or output torque by the appropriate service factor (see table below) to obtain the equivalent value of horsepower and torque. These equivalent values may then be compared directly with the ratings in the tables.

Where the unit selected has a higher rating than that actually required, the additional horsepower output will give the user a greater expected service life.

Reducer Service Factors

Prime Mover	Duration of Service Total Operating Time per Day	Driven Machine Load Classificatio		
		Uniform	Moderate Shock	Heavy Shoc
Electric Motor	Occasional ¹/₂ Hour	0.80	0.90	1.00
	Intermittent 2 Hours	0.90	1.00	1.25
	10 Hours	1.00	1.25	1.50
	24 Hours	1.25	1.50	1.75
Multi-Cylinder Internal Combustion Engine	Occasional ¹/₂ Hour	0.90	1.00	1.25
	Intermittent 2 Hours	1.00	1.25	1.50
	10 Hours	1.25	1.50	1.75
	24 Hours	1.50	1.75	2.00
Single Cylinder Internal Combustion Engine	Oceasional ¹/₂ Hour	1.00	1.25	1.50
	Intermittent 2 Hours	1.25	1.50	1.75
	10 Hours	1.50	1.75	2.00
	24 Hours	1.75	2.00	2.25

Service Factors for Applications Involving Frequent Stops and Starts-More than 10 Starts Per Hour				
Electric Motor	Occasional ¹/₂ Hour	0.90	1.00	1.25
	Intermittent 2 Hours	1.00	1.25	1.50
	10 Hours	1.25	1.50	1.75
	24 Hours	1.50	1.75	2.00

Two-pole Motors

Under certain circumstances, users have been able to use 3600 RPM motors, but this should be done with great care because it may exceed the thermal limits of the reducer. Such applications are beyond the scope of our standard warranty.

Self -Locking Features

A worm gear is self-locking or non-reversible when the gear can not drive the worm. This condition can occur when the lead angle of the worm is less than the friction angle.

Generally, there are two cases where the self-locking feature may be applied:

Case 1 : Self-locking of the worm and gear when the load is at REST.

Case 2: Self-locking of the worm and gear when the load is in DOWNWARD MOTION. This requires the load being lowered to stop after the power is shut off.

However, vibrations from an outside source or the slightest start of the worm often upsets the static conditions of locked gearing enough to start motion.

In addition, standard worm gears will not self-lock completely with single thread screws. This characteristic and the other unpredictable factors mentioned above make it advisable to use a brake on the input shaft of the reducer rather than to rely on the self-locking feature of the gearing. If complete self-locking is required, consult Hampton

Thermal Rating

Current standards allow a maximum oil operating temperature rise of 140° F (60° C) above ambient temperature or a maximum operating temperature of 194° F (90° C). Any oil temperature rise above these amounts will cause severe damage to seals and excessive wear, resulting in reduced unit life.

Because of sliding friction, worm gears run hotter than other types of speed reducers. The reducer housing may be too hot to touch under certain operating conditions. Suitable temperature measuring devices should be used to determine actual oil operating temperatures if a problem is suspected.

While the data in the MAKISHINKO rating tables are mechanical, field experience has shown that units can be expected to operate within thermal standards, providing that input horsepower limits stipulated and service factor adjustments described in this catalog are followed.

For applications where loads are at design levels and operation is continuous, worm bottom style units will run cooler than worm top models, and are recommended.

Lower operating temperatures will also result when synthetic oil is used. These oils provide better lubrication, improving efficiency and reducing thermal rise.

Backlash

All worm gears have an engineered minimum and maximum backlash. Backlash is measured as the rotational movement of the worm wheel at the pitch diameter with the worm stationary. MAKISHINKO's backlash generally conforms to AGMA Class 1. Specific data is available by ratio and size from Hampton

Driven machines with load classes

MS = Moderate shock load
U = Uniform load
HS = Heavy shock load
24 = 24 hours per day service factor
* = Consult Hampton

Agitators
pure liquids/U
liquids and solids/MS
liquids-variable density/MS
Blowers
lobe/MS
vane/U
Brewing and Distilling
bottling machinery/U
brew kettles-cont. duty/U
cookers-cont. duty/U
mash tubs-cont. duty/U
scale hopper-frequent starts/MS
Car dumpers/HS
Car pullers/MS
Clarifiers/U
Clay working machinery
brick press/HS
briquette machine/HS
clay working machinery/MS
pug mill/MS
Compressors
lobe/MS
reciprocating
    multi-cylinder/MS
    single-cylinder/HS
Conveyors
uniformly loaded or fed
apron/MS
assembly/U
belt/U
bucket/U
chain/U
flight/U
floor/U
oven/U
screw/ U
trolley/U
Conveyors
not uniformly loaded or fed
apron/MS
assembly/MS
belt/MS
bucket/MS
chain/MS
flight/MS
live roll/*
oven/MS
reciprocating/HS
screw/ M S
shaker/HS
Cranes
bridge travel/*
trolley travel/*

Crushers, ore or stone/HS

Elevators
bucket-uniform load/U
bucket-heavy load/MS
bucket-cont./U

centrifugal discharge/U
escalators/ U
freight/MS
gravity discharge/U
man lifts/*
passenger/*
Fans
cooling towers
    forced d raft/*
    induced draft/*
Feeders
apron/MS
belt/MS
disc/U
reciprocating/HS
screw/ MS
Food industry
beet slicer/MS
cereal cooker/U
dough mixer/MS
meat grinders/MS
Hoists
heavy duty/HS
medium duty/MS
skip hoist/MS
Line shafts
driving processing equipment/MS
light/U
other line shafts/U
Lumber industry
burner conveyor/MS
chain transfer/HS
craneway transfer/HS
edgerfeed/MS
gang feed/MS
green chain/MS
live rolls/HS
log deck/HS
log haul-incline/HS
log haul-well type/HS
log turning device/HS
main log conveyor/HS
off bearing rolls/MS
planer feed chains/MS
planer floor chains/MS
re-saw merry-go-round con-
veyor/MS
roll cases/HS
slab conveyor/HS
small waste conveyor belt/U
small waste conveyor-chain/MS
sorting table/MS
tipple hoist conveyor/MS
tipple hoist drive/MS
transfer conveyors/MS
transfer rolls/MS
tray drive/MS
trimmer feed/MS
waste conveyor//MS
Machine tools
bending roll/MS

other machine tools
    auxiliary drives/U
    main drives/MS
Metal mills
draw bench carriage and main
drive/MS
forming machines/HS
slitters/MS
table conveyors
    non-reversing group
    drives/MS
    individual drives/HS
    reversing/*
wire drawing and flattening ma-
chine/MS
wire winding machine/MS
Mills-rotary type
ball 24/MS
cement kilns 24/MS
dryers and coolers 24/MS
kilns, other than cement/MS
pebble 24/MS
rod /24
    plain/MS
    wedge bar/MS
tumbling barrels/HS
Mixers
concrete mixers-cont./MS
concrete mixers-inter./MS
constant density/U
variable density/MS
Oil industry
chillers/Ms
paraffin filter press/MS
rotary kilns/MS
Paper mills
agitators (mixers)/MS
beater and pulper/MS
bleacher/U
calenders/MS
calenders-super/HS
converting machine, except
cutters, platers/MS
conveyors/ U
couch/MS
cutters-platers/HS
cylinders/MS
dryers/MS
felt stretcher/MS
felt whipper/HS
jordans/HS
log haul/HS
presses/U
pulp machine reel/MS
stock chest/MS
suction roll/U
washers and thickeners/MS
winders/U
Pullers, barge haul/HS
Pumps
proportioning/MS

reciprocating
    single acting, 3 or more
    cylinders/MS
    double acting, 2 or more cylin-
    ders/MS
    single acting, 1 or 2 cylinders/*
    double acting, single cylinder/*
rotary
    gear type/U
    lobe, vane/U
Rubber & plastics industry
extruders/MS
laboratory equipment/MS
mixing mills 24/HS
refiners 24/MS
rubber calenders 24/MS
rubber mill-2 on line 24/MS
rubber mill-3 on line 24/U
sheeter 24/MS
tire building machines/*
tire and tube press openers/*
tubers and strainers 24/MS
warming mills 24/MS
Sand muller/MS
Sewage disposal equipment
bar screens/U
chemical feeders/U
collectors/U
dewatering screws/MS
grit collectors/U
scum breakers/MS
slow or rapid mixers/MS
sludge collectors/U
thickeners/MS
vacuum filters/MS
Screens
air washing/U
rotary-stone or gravel/MS
traveling water intake/U
Slab pushers/MS
Stokers/U
Textile industry
batchers/MS
calenders/MS
cards/MS
dry cans/MS
dryers/MS
dyeing machinery/MS
knitting machines/*
looms/MS
mangles/MS
nappers/MS
pads/MS
range drives/*
slashers/MS
soapers/MS
spinners/MS
tenter frames/MS
washers/MS
winders/MS
Winch/MS

Single Reduction Reducers - Horsepower and Torque Ratings

The horsepower/torque rating values shown apply to all Single Reduction series regardless of model. The values are all published at AGMA service factor 1.0 but may be modified from time to time by the use of a different service factor (see Service Factor Table on page 12). Listed here are the maximum torque in inch/pounds and output horsepower values for all standard ratios at selected input speeds. (Some nominal ratios in Sizes 155 to 250 are not exact. See the table on page 26.)

The effective service factor of any unit selected is the product of the rated gearbox input horsepower divided by the horsepower rating of the motor used.

The efficiency of the unit is the product of the output horsepower divided by the input horsepower.

The actual horsepower or torque at the output shaft for any specific application is the product of the motor horsepower or torque demanded by the load multiplied by the reducer efficiency.

The horsepower value of the electric motor used should never exceed the published input horsepower in the following tables unless a service factor less than 1.0 is appropriate (very light duty applications).

When table output torque ratings are the same for different input RPM's, the output shaft torque limitations have been reached. To stay within design limitations, using the formula for torque on page 10, torque becomes a constant and input horsepower must be reduced as RPM is lowered.

For example, on Size 60, the 10:1 ratio reaches the shaft design limitation at 300 RPM whilethe 30:1 reaches it at 900 RPM.

Ratings for Double Reduction Worm-worm begin on page 28. Hampton salesmen can supply data for Worm-helical units.

Selection example: For the Size 70 10:1 unit high-lighted below: $2.95 \div 3.63 = 81.3\%$ efficiency.

The unit is rated for an input horsepower of 3.63 HP. If you specified a 3 HP motor, you would have a service factor of $3.63 \div 3.0 = 1.2$ SF. This would be adequate for many applications in which electric motors are the prime mover.

A 3 HP @ 1800 RPM motor produces about 109 in/lb of torque (depending on the manufacturer). The horsepower at full load at the output shaft will be $3.0 \text{ HP} \times .813 = 2.44$ HP. The torque at the output shaft will be $109 \text{ in/lb} \times 10 \times .813 = 886$ in/lb.

RATIO	1800 RPM INPUT SPEED			
	In. HP	Out. HP	OUTPUT TORQUE	Ir H
7.5				
10	3.63	2.95	1030	3.
15	2.52	1.06	1030	2.

Size 50 All single reduction models, 1-31/32 inch center distance. Torque in Inch/Pounds

Ratio	1800 RPM INPUT SPEED			1200 RPM INPUT SPEED			900 RPM INPUT SPEED			600 RPM INPUT SPEED			300 RPM INPUT SPEED			MAXIMUM TORQUE 100 RPM INPUT		
	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE
10	1.48	1.19	410	1.21	0.943	490	936	0.719	500	0.638	0.479	500	0.332	0.240	500	0.117	0.080	500
15	1.11	0.85	440	0.87	0.639	500	0.664	0.479	500	0.456	0.319	500	0.240	0.160	500	0.086	0.053	500
20	0.66	0.50	350	0.53	0.382	400	0.432	0.308	430	0.312	0.219	460	0.177	0.116	490	0.065	0.040	500
25	0.76	0.49	430	0.63	0.383	500	0.493	0.288	500	0.344	0.192	500	0.189	0.096	500	0.072	0.032	500
30	0.70	0.47	490	0.51	0.319	500	0.393	0.240	500	0.276	0.160	500	0.150	0.080	500	0.056	0.027	500
40	0.45	0.29	410	0.37	0.227	480	0.303	0.180	500	0.212	0.120	500	0.115	0.060	500	0.043	0.020	500
50	0.40	0.23	400	0.34	0.178	460	0.306	0.143	500	0.204	0.096	500	0.113	0.048	500	0.044	0.016	500
60	0.33	0.19	400	0.27	0.146	460	0.223	0.117	490	0.161	0.079	500	0.088	0.040	500	0.033	0.013	500

Size 60 All single reduction models, 2-3/8 inch center distance. Torque in Inch/Pounds

Ratio	1800 RPM INPUT SPEED			1200 RPM INPUT SPEED			900 RPM INPUT SPEED			600 RPM INPUT SPEED			300 RPM INPUT SPEED			MAXIMUM TORQUE 100 RPM INPUT		
	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE
10	2.46	1.98	690	2.06	1.62	850	1.75	1.35	950	1.33	1.01	1060	0.723	0.528	1110	0.257	0.176	1110
15	1.84	1.42	750	1.54	1.15	910	1.32	0.96	1010	0.99	0.71	1110	0.522	0.353	1110	0.189	0.117	1110
20	1.26	0.93	650	1.05	0.74	780	0.91	0.63	880	0.70	0.47	980	0.410	0.257	1080	0.155	0.088	1110
25	1.22	0.85	740	1.05	0.70	910	0.91	0.58	1020	0.69	0.42	1110	0.372	0.212	1110	0.140	0.071	1110
30	1.15	0.78	820	0.98	0.63	990	0.85	0.52	1100	0.59	0.35	1110	0.322	0.176	1110	0.121	0.059	1110
40	0.85	0.54	760	0.74	0.43	910	0.64	0.36	1010	0.49	0.26	1110	0.273	0.132	1110	0.105	0.044	1110
50	0.77	0.48	850	0.63	0.37	980	0.53	0.31	1070	0.39	0.21	1110	0.211	0.106	1110	0.079	0.035	1110
60	0.65	0.39	820	0.53	0.30	960	0.45	0.25	1040	0.34	0.18	1110	0.187	0.088	1110	0.070	0.029	1110

Size 70 All single reduction models, 2-3/4 inch center distance. Torque in Inch/Pounds

Ratio	1800 RPM INPUT SPEED			1200 RPM INPUT SPEED			900 RPM INPUT SPEED			600 RPM INPUT SPEED			300 RPM INPUT SPEED			MAXIMUM TORQUE 100 RPM INPUT		
	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE
10	3.63	2.95	1030	3.09	2.46	1290	2.68	2.09	1460	2.07	1.59	1670	1.21	0.894	1880	0.462	0.319	2010
15	2.52	1.96	1030	2.16	1.64	1290	1.87	1.38	1450	1.45	1.05	1650	0.86	0.589	1860	0.333	0.210	1980
20	1.92	1.47	1030	1.62	1.19	1250	1.38	0.98	1380	1.05	0.74	1550	0.61	0.407	1710	0.236	0.143	1810
25	1.82	1.27	1110	1.60	1.08	1410	1.42	0.91	1590	1.15	0.70	1840	0.71	0.402	2110	0.287	0.143	2250
30	1.77	1.22	1280	1.54	1.01	1600	1.35	0.85	1790	1.07	0.65	2050	0.64	0.358	2250	0.243	0.119	2250
40	1.28	0.85	1200	1.09	0.68	1440	0.95	0.57	1600	0.74	0.43	1790	0.44	0.234	1970	0.178	0.083	2080
50	1.11	0.71	1250	0.94	0.56	1470	0.81	0.47	1630	0.63	0.34	1800	0.37	0.186	1950	0.150	0.065	2060
60	0.96	0.57	1210	0.81	0.45	1410	0.70	0.37	1560	0.54	0.27	1700	0.32	0.145	1830	0.129	0.051	1910

All ratings per AGMA standards.
The values used in the table are at AGMA service factor 1.0

Horsepower and Torque Ratings, Continued

Size 80 All single reduction models, 3-5/32 inch center distance. Torque in Inch/Pounds

Ratio	1800 RPM INPUT SPEED			1200 RPM INPUT SPEED			900 RPM INPUT SPEED			600 RPM INPUT SPEED			300 RPM INPUT SPEED			MAXIMUM TORQUE 100 RPM INPUT		
	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE
10	4.95	4.03	1410	4.24	3.41	1790	3.70	2.91	2040	2.93	2.26	2370	1.75	1.30	2730	0.672	0.468	2950
15	3.68	2.88	1510	3.17	2.43	1920	2.77	2.07	2170	2.20	1.59	2510	1.33	0.92	2890	0.520	0.331	3130
20	2.73	2.05	1440	2.37	1.74	1830	2.09	1.48	2070	1.67	1.10	2390	1.01	0.65	2740	0.403	0.235	2960
25	2.59	1.92	1680	2.24	1.60	2100	1.95	1.35	2360	1.53	1.02	2690	0.92	0.57	3020	0.361	0.204	3210
30	2.38	1.66	1740	2.08	1.40	2210	1.85	1.19	2490	1.50	0.92	2890	0.90	0.51	3210	0.340	0.170	3210
40	1.75	1.14	1590	1.55	0.96	2030	1.38	0.81	2280	1.13	0.63	2630	0.72	0.36	3020	0.293	0.127	3210
50	1.60	1.01	1770	1.42	0.84	2220	1.25	0.71	2470	1.01	0.54	2840	0.62	0.30	3180	0.244	0.102	3210
60	1.30	0.79	1670	1.14	0.65	2040	1.00	0.54	2260	0.80	0.41	2590	0.49	0.26	2850	0.203	0.080	3030

Size 100 All single reduction models, 3-15/16 inch center distance. Torque in Inch/Pounds

Ratio	1800 RPM INPUT SPEED			1200 RPM INPUT SPEED			900 RPM INPUT SPEED			600 RPM INPUT SPEED			300 RPM INPUT SPEED			MAXIMUM TORQUE 100 RPM INPUT		
	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE
10	9.09	7.47	2610	7.53	6.09	3200	6.79	5.43	3810	5.57	4.34	4560	3.02	2.27	4770	1.07	0.76	4770
15	6.40	5.09	2670	5.40	4.18	3290	4.85	3.70	3890	3.97	2.92	4600	2.16	1.51	4770	0.78	0.50	4770
20	5.21	4.09	2860	4.49	3.45	3620	3.93	2.93	4110	3.12	2.26	4750	1.69	1.14	4770	0.60	0.38	4770
25	4.01	3.07	2690	3.47	2.59	3400	3.04	2.20	3850	2.41	1.69	4440	1.37	0.91	4770	0.50	0.30	4770
30	4.33	3.10	3260	3.73	2.56	4030	3.39	2.27	4740	2.42	1.51	4770	1.31	0.76	4770	0.49	0.25	4770
40	3.25	2.27	3170	2.84	1.92	4030	2.52	1.62	4540	1.86	1.14	4770	1.01	0.59	4770	0.38	0.19	4770
50	2.46	1.64	2880	2.19	1.38	3630	1.91	1.16	4080	1.54	0.89	4690	0.86	0.45	4770	0.33	0.15	4770
60	2.05	1.33	2790	1.81	1.11	3490	1.59	0.93	3890	1.27	0.71	4460	0.75	0.38	4770	0.29	0.13	4770

Size 120 All single reduction models, 4-23/32 inch center distance. Torque in Inch/Pounds

Ratio	1800 RPM INPUT SPEED			1200 RPM INPUT SPEED			900 RPM INPUT SPEED			600 RPM INPUT SPEED			300 RPM INPUT SPEED			MAXIMUM TORQUE 100 RPM INPUT		
	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE
10	14.00	11.60	4050	11.60	9.49	4980	10.40	8.39	5880	8.71	6.89	7200	4.89	3.71	7810	1.74	1.24	7810
15	10.30	8.26	4340	8.66	6.67	5340	7.80	6.01	6320	6.53	4.87	7670	3.48	2.40	7810	1.26	0.83	7810
20	7.36	5.69	3990	6.18	4.64	4880	5.60	4.14	5800	4.73	3.35	7040	2.78	1.86	7810	1.03	0.62	7810
25	6.70	5.40	4730	5.93	4.56	5990	5.20	3.80	6790	4.12	2.98	7810	2.16	1.49	7810	0.78	0.50	7810
30	6.90	5.00	5250	5.86	4.08	6248	5.33	3.62	7600	3.86	2.48	7810	2.09	1.24	7810	0.79	0.41	7810
40	4.60	3.14	4390	3.94	2.56	5380	3.64	2.29	6410	3.12	1.83	7680	1.74	0.93	7810	0.67	0.31	7810
50	4.09	2.85	4990	3.58	2.41	6340	3.18	2.02	7143	2.43	1.49	7810	1.32	0.74	7810	0.50	0.25	7810
60	2.80	1.88	3950	2.53	1.58	4970	2.29	1.35	5690	1.90	1.05	6630	1.23	0.62	7790	0.47	0.21	7810

All ratings per AGMA standards.
The values used in the table are at AGMA service factor 1.0

Size 135 All single reduction models, 5-5/16 inch center distance. Torque in Inch/Pounds

Ratio	1800 RPM INPUT SPEED			1200 RPM INPUT SPEED			900 RPM INPUT SPEED			600 RPM INPUT SPEED			300 RPM INPUT SPEED			MAXIMUM TORQUE 100 RPM INPUT		
	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE
10	19.90	16.60	5830	16.50	13.60	7170	14.70	11.80	8250	12.30	9.84	10300	7.72	5.99	12600	2.73	2.00	12600
15	14.60	11.90	6240	12.20	9.72	7650	10.90	8.60	9030	9.19	7.01	11000	5.45	3.99	12600	1.96	1.33	12600
20	11.30	9.07	6350	9.52	7.46	7840	8.57	6.63	9280	6.98	5.22	11000	1.20	3.00	12600	1.51	1.00	12600
25	9.15	7.22	6320	7.85	6.05	7940	6.95	5.24	9180	5.60	4.09	10700	3.45	2.40	12600	1.24	0.80	12600
30	9.64	7.18	7550	8.19	5.90	9300	7.43	5.23	11000	5.99	3.99	12600	3.20	2.00	12600	1.20	0.66	12600
40	6.91	5.03	7050	5.94	4.16	8730	5.37	3.66	10200	4.44	2.86	12000	2.50	1.50	12600	0.93	0.50	12600
50	5.15	3.64	6370	4.47	3.04	7980	1.01	2.48	8700	3.28	2.03	10700	2.09	1.19	12500	0.79	0.40	12600
60	3.82	2.58	5430	3.33	2.16	6800	3.00	1.86	7820	2.47	1.44	9080	1.59	0.85	10700	0.66	0.31	11700
70	3.42	2.23	5320	3.02	1.88	6670	2.73	1.61	7620	2.26	1.25	8700	1.47	0.74	10000	0.62	0.27	11400

Size 155 All single reduction models, 6-3/32 inch center distance. Torque in Inch/Pounds

Ratio	1800 RPM INPUT SPEED			1200 RPM INPUT SPEED			900 RPM INPUT SPEED			600 RPM INPUT SPEED			300 RPM INPUT SPEED			MAXIMUM TORQUE 100 RPM INPUT		
	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE
10	32.90	27.30	9110	26.40	21.70	9890	22.30	18.10	12060	17.80	14.30	14320	11.70	8.99	17960	5.53	4.00	20830
15	22.90	18.50	9200	18.10	14.40	9890	15.40	12.00	12060	12.10	9.31	13970	5.06	5.84	17530	3.82	2.55	20830
20	14.90	11.80	8200	11.90	9.29	8850	10.00	7.70	10580	8.01	5.94	12230	5.18	3.65	15100	2.45	1.58	19610
25	12.00	9.41	8120	9.54	7.28	8680	8.05	6.04	10410	6.39	4.61	11890	4.09	2.80	14490	1.93	1.20	18570
30	13.30	9.78	9720	10.40	7.55	10580	9.08	6.32	12670	7.24	4.87	14582	4.77	2.92	17530	2.35	1.26	20830
40	9.32	6.67	9200	7.40	5.11	9720	6.28	4.22	11630	5.02	3.19	13190	3.25	1.91	15790	1.60	0.81	20220
50	7.13	4.97	8580	5.76	3.84	9110	4.89	3.17	10930	3.90	2.37	12230	2.53	1.41	14582	1.23	0.59	18400
60	5.85	3.99	8270	4.72	3.05	8850	3.94	2.48	10240	3.20	1.87	11540	2.10	1.12	13880	1.01	0.46	17360
70	4.10	2.60	6170	3.50	2.10	7590	3.30	1.80	8950	2.90	1.50	10900	2.00	1.00	13900	0.93	0.36	15600

Size 175 All single reduction models, 6-7/8 inch center distance. Torque in Inch/Pounds

Ratio	1800 RPM INPUT SPEED			1200 RPM INPUT SPEED			900 RPM INPUT SPEED			600 RPM INPUT SPEED			300 RPM INPUT SPEED			MAXIMUM TORQUE 100 RPM INPUT		
	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE
10	46.80	39.10	13020	37.70	31.30	15620	31.70	26.00	17360	25.20	20.40	20390	16.60	12.90	25770	7.83	5.75	29510
15	33.00	26.70	13360	25.90	20.80	15620	22.10	17.50	17530	17.30	13.40	20220	11.40	8.44	25340	5.44	3.70	29510
20	22.80	18.20	12230	18.00	14.20	14320	15.20	11.70	15790	12.10	9.15	18400	7.87	5.62	22650	3.71	2.43	29420
25	16.30	12.70	10936	12.80	9.89	12750	10.80	8.18	14060	8.66	6.31	16310	5.50	3.82	19790	2.64	1.64	25510
30	19.00	14.10	14140	15.00	11.00	16490	12.90	9.20	18400	10.20	7.04	21090	6.37	4.23	25430	3.30	1.84	29510
40	13.20	9.60	12930	10.40	7.36	14840	8.96	6.12	16490	7.10	4.65	18740	1.69	2.80	22650	2.29	1.19	28900
50	9.78	6.81	11710	7.98	5.37	13880	6.64	4.32	14840	5.28	3.25	16830	3.46	1.94	20050	1.70	0.82	25430
60	8.23	5.74	11450	6.62	4.41	13190	5.56	3.60	14400	4.45	2.70	16230	2.90	1.62	19440	1.40	0.67	24300
70	5.60	3.80	9200	4.80	3.10	11300	4.50	2.80	13500	3.80	2.20	15900	2.50	1.40	19400	1.09	0.50	21400

All ratings per AGMA standards.
The values used in the table are at AGMA service factor 1.0

Horsepower and Torque Ratings, Continued

Size 200 All single reduction models, 7-7/8 inch center distance.

Ratio	1800 RPM INPUT SPEED			1200 RPM INPUT SPEED			900 RPM INPUT SPEED			600 RPM INPUT SPEED			300 RPM INPUT SPEED			MAXIMUM TORQUE 100 RPM INPUT		
	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE
10	52.6	44.00	15710	41.80	34.80	18660	35.60	29.30	20910	28.00	22.80	24390	18.50	14.40	30900	8.69	6.43	41310
15	39.5	32.10	17180	30.90	25.00	20050	26.30	21.00	22480	20.60	16.10	25860	13.60	10.00	32370	6.42	4.43	42530
20	30.2	24.30	16750	23.80	18.90	19610	20.10	15.70	21700	15.90	12.10	25250	10.30	7.48	30980	4.85	3.23	40180
25	23.3	18.50	15970	18.40	14.30	18570	15.50	11.90	20570	12.40	9.24	23870	7.97	5.59	28900	3.76	2.40	37410
30	25.1	18.80	20130	19.80	14.60	23430	16.90	12.10	26040	13.30	9.32	29940	8.78	5.60	35930	4.29	2.44	42530
40	18.2	13.30	18480	14.30	10.30	21430	12.30	8.62	23780	9.56	6.43	26640	6.44	3.94	32630	3.12	1.67	41660
50	13.8	9.84	16920	11.20	7.76	20050	9.29	6.21	21430	7.33	4.69	24300	4.83	2.80	28990	2.35	1.18	36800
60	11.5	8.01	16310	9.64	6.49	19790	7.76	5.05	20570	6.12	3.77	23000	4.03	2.26	27600	1.97	0.94	34720

Size 225 All single reduction models, 8-27/32 inch center distance.

Ratio	1800 RPM INPUT SPEED			1200 RPM INPUT SPEED			900 RPM INPUT SPEED			600 RPM INPUT SPEED			300 RPM INPUT SPEED			MAXIMUM TORQUE 100 RPM INPUT		
	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE
10	71.2	60.2	20740	56.7	47.70	24650	48.1	40.10	27680	37.90	31.20	32280	24.90	19.80	41050	11.60	8.81	54770
15	56.8	46.9	24300	44.4	36.40	28290	37.8	30.60	31680	29.50	23.50	36620	19.30	14.70	45740	9.10	6.50	59890
20	43.4	35.2	24300	34.1	27.40	28380	28.8	22.80	31500	22.70	17.60	36540	14.70	10.80	44960	6.90	4.70	58500
25	33.4	26.8	23170	26.3	20.80	26990	22.2	17.30	29850	17.60	13.40	34720	11.20	8.12	42010	5.26	3.49	54250
30	37.3	28.7	29680	29.3	22.30	34630	24.9	18.50	38360	19.60	14.20	44090	12.70	8.54	53030	6.17	3.72	59890
40	25.9	19.3	26640	20.4	14.90	30980	17.6	12.50	34630	13.60	9.36	38790	0.09	5.72	47390	4.38	2.44	59890
50	19.4	14.2	24470	15.6	11.10	28990	12.9	8.96	30900	10.10	6.77	35060	6.65	1.04	41830	3.20	1.71	53120
60	16.0	11.3	22740	13.2	9.19	27600	10.6	7.15	28640	8.37	5.35	32110	5.51	3.20	38450	2.68	1.35	48690

Size 250 All single reduction models, 9-27/32 inch center distance.

Ratio	1800 RPM INPUT SPEED			1200 RPM INPUT SPEED			900 RPM INPUT SPEED			600 RPM INPUT SPEED			300 RPM INPUT SPEED			MAXIMUM TORQUE 100 RPM INPUT		
	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE
10	96.6	81.3	28030	78.4	65.7	34020	65.5	54.70	37750	51.8	42.60	44090	34.20	27.10	56240	16.10	12.10	73780
15	72.3	59.3	30720	57.9	47.2	36710	49.0	39.70	41140	38.3	30.30	47210	25.30	19.20	59800	12.00	8.53	73780
20	55.3	45.0	31850	43.3	35.0	37150	36.4	29.00	41050	28.7	22.40	47650	18.60	13.80	58850	8.71	6.01	73780
25	41.0	33.1	29680	32.1	25.6	34450	27.3	21.30	38270	21.5	16.50	44520	13.70	9.96	53640	6.44	1.30	69520
30	47.2	35.8	37060	37.1	27.9	43310	31.0	23.00	47820	24.7	17.60	54940	16.30	10.80	67180	7.98	4.73	73780
40	32.9	24.6	34800	25.9	19.1	40620	22.8	16.40	46610	17.2	11.90	50950	11.40	7.30	62060	5.48	3.11	73780
50	23.7	17.3	31160	18.7	13.5	36280	15.8	11.00	39750	12.2	8.23	44350	8.12	4.97	53550	3.91	2.10	68050
60	20.2	14.6	30380	16.8	11.9	36970	13.4	9.21	38100	10.5	6.10	42790	6.91	4.13	51290	3.32	1.73	64750

All ratings per AGMA standards.
The values used in the table are at AGMA service factor 1.0

Size 300 All single reduction models, 11-13/16 inch center distance.

Ratio	1800 RPM INPUT SPEED			1200 RPM INPUT SPEED			900 RPM INPUT SPEED			600 RPM INPUT SPEED			300 RPM INPUT SPEED			MAXIMUM TORQUE 100 RPM INPUT		
	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE
10	137.0	116.0	41570	111.0	94.3	50430	93.3	78.7	56150	73.5	61.10	65360	48.30	38.90	83410	22.70	17.40	104160
15	116.0	96.8	51810	93.2	77.2	61970	78.8	64.9	69440	61.4	49.60	79760	40.40	31.40	100680	18.90	13.80	104160
20	93.8	77.1	53290	73.5	60.1	62320	61.6	49.9	69000	48.5	38.50	79850	31.70	24.10	99820	14.70	10.40	104160
25	70.1	56.6	48860	55.6	44.6	57720	46.1	36.6	63270	36.5	28.30	73340	23.70	17.40	89400	13.30	9.15	104160
30	80.1	62.3	66740	62.8	48.6	78030	52.4	40.2	86100	41.5	30.70	98080	23.30	16.20	104160	13.00	8.21	104160
40	57.0	43.5	60060	44.6	33.7	69870	39.3	29.2	80810	29.7	21.30	87660	18.80	12.50	104160	9.26	5.55	104160
50	40.6	29.9	51640	31.8	23.1	59970	27.4	19.6	67790	21.1	14.40	74900	13.90	8.75	90270	6.77	3.79	104160
60	32.3	23.5	49470	25.3	18.1	57110	21.5	15.0	63190	16.6	11.10	70390	11.00	6.71	84800	5.35	2.85	104160

Size 350 All single reduction models, 13-25/32 inch center distance.

Ratio	1800 RPM INPUT SPEED			1200 RPM INPUT SPEED			900 RPM INPUT SPEED			600 RPM INPUT SPEED			300 RPM INPUT SPEED			MAXIMUM TORQUE 100 RPM INPUT		
	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE
10	203.0	172.0	61620	183.0	155.0	66740	164.0	139.0	74560	108.0	90.7	96340	71.1	57.8	123250	33.40	25.90	156240
15	174.0	144.0	77600	157.0	130.0	84020	140.0	116.0	92780	92.3	75.1	120650	60.2	47.3	151900	28.40	21.00	156240
20	147.0	122.0	82110	135.0	112.0	90270	117.0	96.4	97210	77.5	62.2	124990	50.1	38.6	156240	23.70	17.10	156240
25	112.0	92.3	79680	100.0	82.2	85150	88.8	72.4	93710	58.0	45.9	118916	37.3	28.1	145820	17.30	12.20	156240
30	120.0	94.1	100770	107.0	84.1	107630	93.3	72.6	116310	62.4	46.9	150160	34.3	24.3	156240	19.50	12.50	156240
40	87.9	67.7	91140	78.6	60.4	97210	69.5	53.2	106760	45.6	33.4	134540	28.2	19.3	156240	14.20	8.77	156240
50	64.5	48.9	84540	57.8	43.7	90270	50.5	37.9	98080	33.2	23.6	122380	21.7	14.3	148420	10.20	6.08	156240
60	49.4	36.4	75420	44.2	32.4	80720	38.7	28.1	86800	25.3	17.3	170630	16.8	10.5	130200	8.06	4.47	156240

Size 400 All single reduction models, 15-3/4 inch center distance.

Ratio	1800 RPM INPUT SPEED			1200 RPM INPUT SPEED			900 RPM INPUT SPEED			600 RPM INPUT SPEED			300 RPM INPUT SPEED			MAXIMUM TORQUE 100 RPM INPUT		
	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE	In. HP	Out. HP	OUTPUT TORQUE
10				238.0	202.0	107630	201.0	170.0	121500	158.0	133.0	142350	104.0	85.5	182280	49.00	38.10	223940
15				196.0	163.0	130200	163.0	135.0	144950	127.0	104.0	167520	84.7	67.1	215260	40.10	29.70	223940
20				148.0	122.0	130200	126.0	103.0	145820	98.6	79.5	168390	63.9	49.6	210920	30.00	21.80	223940
25				124.0	101.0	131930	103.0	84.4	145820	81.5	65.0	168390	52.5	40.1	207450	24.40	17.50	223940
30				129.0	100.0	161440	110.0	85.1	182280	90.7	68.7	220470	48.6	34.8	223940	27.20	17.50	223940
40				92.4	70.0	150160	77.5	59.0	166650	61.0	45.1	190960	38.0	26.3	223940	19.00	11.80	223940
50				71.8	54.4	140610	59.9	45.0	155320	46.8	33.9	175330	30.5	20.5	212660	14.50	8.76	223940
60				57.4	42.8	130200	48.2	35.4	144080	37.4	26.4	161440	24.6	16.0	196160	11.70	6.82	223940

[1]Units run at 1800 RPM require auxiliary oil cooling. Consult Hampton

Larger size units are available.

All ratings per AGMA standards.
The values used in the table are at AGMA service factor 1.0

Combined Tables of Dimensions WT, WB, WT-C, WT-CHS

See page 27 for Double Reduction Worm (DW) dimensions.

Combined Table of Dimensions

Size	CD	A WT or WB	A WT-C or WB-C	A WT-CHS	B WT or WB	B WT-C or WB-C	B WT-CHS	C WT WT-C WT-CHS	C WB WB-C	D	E	F	G WT WT-C WT-CHS	G WB WB-C
50	$1^{31}/_{32}$	7	$9^1/_4$	$6^5/_8$	$4^1/_8$	$6^3/_8$	$3^3/_4$	$5^1/_8$	$1^{31}/_{32}$	$4^5/_{16}$	$5^9/_{16}$	$^{19}/_{32}$	$7^1/_8$	$7^1/_8$
60	$2^3/_8$	$7^3/_4$	10	$7^3/_{16}$	$4^3/_4$	7	$4^1/_{16}$	$5^{29}/_{32}$	$2^3/_8$	$4^3/_4$	6	$^{25}/_{32}$	$8^1/_4$	$8^1/_4$
70	$2^3/_4$	$9^1/_4$	$11^1/_2$	$8^{17}/_{32}$	$5^1/_2$	$7^3/_4$	$4^{27}/_{32}$	$6^7/_8$	$2^3/_4$	$5^7/_8$	$7^1/_2$	$^{25}/_{32}$	$9^1/_4$	$9^1/_4$
80	$3^5/_{32}$	$10^1/_2$	$12^3/_4$	$9^{23}/_{32}$	$6^5/_{16}$	$8^9/_{16}$	$5^1/_2$	$7^7/_8$	$3^5/_{32}$	$7^1/_{16}$	$8^{13}/_{16}$	$^{25}/_{32}$	$10^3/_4$	$10^3/_4$
100	$3^{15}/_{16}$	$12^3/_4$	$15^5/_8$	$12^3/_{16}$	$7^1/_2$	$10^3/_8$	$6^7/_8$	$9^{27}/_{32}$	$3^{15}/_{16}$	$8^{11}/_{16}$	$10^{11}/_{16}$	$^{31}/_{32}$	$13^1/_2$	$13^1/_2$
120	$4^{23}/_{32}$	$15^1/_4$	$18^1/_8$	–	$9^1/_{16}$	$11^{15}/_{16}$	–	$11^{13}/_{16}$	$4^{23}/_{32}$	$10^1/_4$	$12^3/_4$	$1^3/_{16}$	16	16
135	$5^5/_{16}$	$17^1/_4$	$20^1/_8$	–	$10^1/_4$	$13^1/_8$	–	$13^{25}/_{32}$	$5^5/_{16}$	$11^7/_{16}$	$13^{13}/_{16}$	$1^3/_{16}$	18	18
155	$6^3/_{32}$	$19^1/_2$	$22^7/_8$	–	$11^7/_8$	$15^1/_4$	–	$15^{11}/_{32}$	$5^5/_{16}$	$12^5/_8$	15	$1^1/_4$	$19^1/_2$	$19^1/_8$
175	$6^7/_8$	$21^3/_4$	$24^3/_4$	–	$12^{13}/_{16}$	$15^3/_{16}$	–	$17^1/_8$	$6^5/_{16}$	$13^4/_3$	$16^1/_4$	$1^{15}/_{32}$	$21^1/_2$	$21^7/_8$
200	$7^7/_8$	$26^1/_2$	–	–	$13^3/_4$	–	–	$19^9/_{32}$	$6^7/_8$	$13^4/_3$	$16^3/_4$	$1^{21}/_{32}$	$24^1/_2$	$24^4/_5$
225	$8^{27}/_{32}$	$28^3/_4$	–	–	$14^3/_4$	–	–	$21^7/_{16}$	$7^1/_2$	$15^3/_8$	$19^3/_8$	$1^{25}/_{32}$	$27^1/_4$	$27^3/_8$
250	$9^{27}/_{32}$	32	–	–	$16^1/_2$	–	–	$23^5/_8$	$7^7/_8$	$17^5/_{16}$	$21^1/_2$	$1^7/_8$	$29^1/_2$	$29^3/_4$
300	$11^{13}/_{16}$	38	–	–	$19^1/_2$	–	–	–	$7^1/_2$	$20^1/_2$	$24^1/_2$	$2^1/_4$	–	$32^1/_4$
350	$13^{25}/_{32}$	45	–	–	$22^7/_{16}$	–	–	–	$8^{15}/_{32}$	$23^1/_2$	$27^1/_2$	$2^{15}/_{16}$	–	37
400	$15^3/_4$	48	–	–	$24^7/_{16}$	–	–	–	$9^{27}/_{32}$	26	31	$3^3/_8$	–	$42^1/_2$
450	$17^{23}/_{32}$	53	–	–	$27^3/_8$	–	–	–	$10^1/_{32}$	30	35	$3^9/_{16}$	–	47
500	$19^{11}/_{16}$	62	–	–	$31^7/_8$	–	–	–	$11^{13}/_{32}$	35	41	$3^9/_{16}$	–	52

General Notes

- Dimensions are in inches. Differences between WT, WB, WT-C, WC-B and WT-CHS as indicated.
- Not every configuration is shown in drawings.
- Standard assembly bolts are metric high strength socket-head cap screws, counterbored into covers to prevent interference with accessory parts installed on the shaft.
- Shaft diameters and external keyways are machined in inch dimensions. All other dimensions are machine metric and con-verted to inch dimensions in table.
- Shaft tolerances :
  Under 3/4": +.0000 -.0005
  3/4" – 1 3/8": +.0000 -.0008
  13/b" – 1 3/4": +.0000 -.001
  Over 1 3/4": +.0000 -.0012
- Dimensions A, B and M for mod-els 50 to 80 are based on a 6-1/2" motor flange. Models 100 through 175 are based on a 9" flange. A, B and M dimensions may vary from those shown depending on the motor size and flange size used. Consult Hampton if these dimensions are critical.

WT

WB

M		N	O		P	Q	Z	High Speed Shaft			Low Speed Shaft			Size
WT or WB	WT-C, WB-C, WT-CHS		WT WT-C WT-CHS	WB WB-C				U	V	a×b	S	T	c×d	
5³/₄	7	3³/₄	3⁵/₃₂	3¹⁵/₁₆	3³/₄	4³/₄	¹³/₃₂	⁵/₈	1³/₁₆	³/₁₆ × ³/₃₂	³/₄	1⁹/₁₆	³/₁₆ × ³/₃₂	50
6¹/₂	7⁵/₈	4³/₈	3¹⁷/₃₂	4³/₄	4¹/₈	5¹/₈	¹³/₃₂	³/₄	1⁹/₁₆	³/₁₆ × ³/₃₂	⁷/₈	2	³/₁₆ × ³/₃₂	60
7¹¹/₁₆	8³/₈	5¹/₈	4¹/₈	5¹/₂	4¹/₂	6	¹⁹/₃₂	⁷/₈	1⁹/₁₆	³/₁₆ × ³/₃₂	1¹/₈	2³/₈	¹/₄ × ¹/₈	70
8¹/₄	8³/₄	5¹/₂	4²³/₃₂	6⁵/₁₆	5⁵/₁₆	6¹¹/₁₆	¹⁹/₃₂	1¹/₈	2	¹/₄ × ¹/₈	1³/₈	2⁹/₁₆	⁵/₁₆ × ⁵/₃₂	80
10¹/₄	11³/₁₆	6¹¹/₁₆	5²⁹/₃₂	7⁷/₈	6¹/₈	7¹/₂	¹⁹/₃₂	1³/₈	2	⁵/₁₆ × ⁵/₃₂	1¹/₂	3	³/₈ × ³/₁₆	100
11⁷/₁₆	12	7¹/₂	7³/₃₂	9⁷/₁₆	7¹/₁₆	9¹/₁₆	²³/₃₂	1¹/₂	2⁹/₁₆	³/₈ × ³/₁₆	1³/₄	3³/₈	³/₈ × ³/₁₆	120
12⁵/₈	12³/₄	8¹/₄	8¹⁵/₃₂	10⁵/₈	7⁷/₈	9⁷/₈	²³/₃₂	1⁵/₈	3	³/₈ × ³/₁₆	2¹/₄	3³/₄	¹/₂ × ¹/₄	135
15¹/₄	14⁷/₈	9¹⁵/₁₆	9¹/₄	11¹³/₃₂	8¹¹/₁₆	11	²⁵/₃₂	1⁵/₈	3³/₈	³/₈ × ³/₁₆	2¹/₂	4³/₈	⁵/₈ × ⁵/₁₆	155
16	14¹³/₁₆	10⁵/₁₆	10¹/₄	13³/₁₆	9⁷/₈	12³/₈	²⁵/₃₂	1⁷/₈	3³/₈	¹/₂ × ¹/₄	2³/₄	4³/₈	⁵/₈ × ⁵/₁₆	175
18⁷/₈	–	12	11¹³/₃₂	14³/₄	11³/₈	14³/₈	²⁷/₃₂	2	3³/₄	¹/₂ × ¹/₄	2⁷/₈	4¹⁵/₁₆	³/₄ × ³/₈	200
20¹¹/₁₆	–	13³/₁₆	12¹⁹/₃₂	16¹¹/₃₂	13	16¹/₄	1¹/₁₆	2¹/₄	3³/₄	¹/₂ × ¹/₄	3¹/₄	5¹/₂	³/₄ × ³/₈	225
22	–	14³/₁₆	13²⁵/₃₂	17²³/₃₂	15	18¹/₄	1¹/₁₆	2¹/₄	4³/₈	¹/₂ × ¹/₄	3¹/₂	6¹/₈	⁷/₈ × ⁷/₁₆	250
24¹/₂	–	16³/₁₆	–	19⁵/₁₆	14¹/₁₂	17³/₄	1¹³/₃₂	2³/₄	4¹⁵/₁₆	⁵/₈ × ⁵/₁₆	3³/₄	6¹¹/₁₆	⁷/₈ × ⁷/₁₆	300
28¹/₂	–	18⁷/₈	–	22¹/₄	17	20¹/₂	1¹¹/₁₆	3	5¹¹/₁₆	³/₄ × ³/₈	4³/₄	7¹/₂	1¹/₄ × ⁷/₁₆	350
30¹/₂	–	19³/₄	–	25¹⁹/₃₂	18¹/₂	23	1¹¹/₁₆	3¹/₄	5¹⁵/₁₆	³/₄ × ³/₈	5	7⁷/₈	1¹/₄ × ⁷/₁₆	400
34¹/₂	–	21¹/₂	–	27³/₄	20	25	1¹¹/₁₆	3¹/₄	7¹/₁₆	³/₄ × ³/₈	5¹/₂	8¹/₁₆	1¹/₄ × ⁷/₁₆	450
37¹/₂	–	24	–	31³/₃₂	23	28	1⁷/₈	3³/₄	8¹/₁₆	⁷/₈ × ⁷/₁₆	6³/₄	9⁷/₁₆	1³/₄ × ⁵/₈	500

- Keys for external key ways are not supplied.
- Standard NEMA C-face adapters up to Size 80 have a single opening which provides access to the coupling and a drain hole.
- WT-CHS Sizes 120 and 135 available from factory.

- Left hand threaded worms or other modifications to the shafts or to the reducer housing can be supplied upon request. Consult Hampton
- All worm gears are bi-directional.
- Sizes 200 and larger are fan cooled.

Motor Frame, Motor Coupling Half, Coupling key way Dimensions

Motor Frame	AJ	AK	BD	BE	BF	Motor Coupling Half			
						U	V	Y	a×b
56¹	5⁷/₈	4¹/₂	6¹/₂	⁵/₈	¹³/₃₂	⁵/₈	1⁷/₈	2¹/₄	³/₁₆ × ³/₃₂
143TC, 145TC	5⁷/₈	4¹/₂	6¹/₂	⁵/₈	¹³/₃₂	⁷/₈	2¹/₈	2¹/₄	³/₁₆ × ³/₃₂
182TC, 184TC	7¹/₄	8¹/₂	9	³/₄	¹⁷/₃₂	1¹/₈	3	3¹/₈	¹/₄ × ¹/₈
213TC, 215TC	7¹/₄	8¹/₂	9	³/₄	¹⁷/₃₂	1³/₈	3³/₈	3¹/₂	⁵/₁₆ × ⁵/₃₂
254TC, 256TC	7¹/₄	8¹/₂	10	³/₄	¹⁷/₃₂	1⁵/₈	3¹/₂	3⁵/₈	³/₈ × ³/₁₆

¹Motors supplied by Hampton are 56 frame below one horsepower, and may be either 56 frame or 143T/145T frame in one horsepower. No 56 frame motors are supplied above one horsepower.

Note on WTC Flange couplings for 56 and 143/5 frames, Size 50-135; for 182/4 frames, Size 80-135; for 213/5 frames Size 80-175; for 254/6 frames, Size 155-175.

WT-C (Also WB-C and WB-CHS reference)

Motor Selection. WT-CHS Units

	10:1	15:1	20:1	25:1	30:1	40:1	50:1	60:1
50	⁵/₈"bore							
60	⁷/₈"bore							
70								
80	1¹/₈"bore		⁷/₈ or 1¹/₈			⁷/₈"bore		
100	1¹/₈"bore						⁷/₈"bore	

Bushings to change ⁷/₈" bore to ⁵/₈" bore are available.

Oil Capacities ; Interchange able Bearings

Oil Capacities
As explained in the Lubrication section on page 37, MAKISHINKO units are normally shipped without oil, except on special OEM orders from the factory. Proper oil capacity will vary with mounting position.

When standard WT, WB WT-C and WT-CHS are mounted normally, simply add lubricant to the center of the oil level sight gauge (to the red dot) while the unit is not rotating-and before operation. These units must be operated with the vented filler caps provided, or internal case pressure may "pop" the oil sight gauge because of its large surface area.

When the above units are mounted in the Special Mounting positions shown on page 34-35, fill with the quantities specified below.

Follow the table below for Universal and Aluminum Universal units, which do not have oil level sight gauges.

Oil Capacities for various Mounting Positions

Size	Horizontal mount (positions L, D, R)				Sidewall mount (positions LL, LD, LR, RL, RD, RR)		Ceiling mount (positions CL, CD, CR)			
	WT		WB		WT/ WB		WT		WB	
50	9oz.	.27lit.	5.5oz.	.18lit.	13oz.	.39lit.	5.5oz.	.18lit.	9oz.	.27lit.
60	14oz.	.41lit.	8oz.	.24lit.	1 pt.4oz.	.59lit.	8oz.	.24lit.	14oz.	.41lit.
70	1pt.8oz.	.71lit.	1pt.1oz.	.50lit.	2pt.4oz.	1.07lit.	1pt.1oz.	.50lit.	1pt.8oz.	.71lit.
80	2pt.7oz.	1.15lit.	1pt.11oz.	.80lit.	3pt.3oz.	1.51lit.	1pt.11oz.	.80lit.	2pt.7oz.	1.15lit.
100	4pt.10oz.	2.19lit.	2pt.12oz.	1.30lit.	6pt.5oz.	2.99lit.	2pt.12oz.	1.30lit.	4pt.10oz.	2.19lit.
120	10pt.2oz.	4.79lit.	4pt.12oz.	2.25lit.	10pt.9oz.	5.80lit.	4pt.12oz.	2.25lit.	10pt.2oz.	4.79lit.
135	13pt.5oz.	6.30lit.	7pt.10oz.	3.61lit.	15pt.14oz.	7.51lit.	7pt.10oz.	3.61lit.	13pt.5oz.	6.30lit.
155	13pt.11oz.	6.48lit.	7pt.13oz.	3.70lit.			7pt.13oz.	3.70lit.	13pt.11oz.	6.48lit.
175	16pt.14oz.	7.98lit.	9pt.8oz.	4.50lit.			9pt.8oz.	4.50lit.	16pt.14oz.	7.98lit.
200	18pt.14oz.	8.93lit.	13pt.8oz.	6.39lit.			13pt.8oz.	6.39lit.	18pt.14oz.	8.93lit.
225	24pt.3oz.	11.45lit.	16pt.	7.57lit.			16pt.	7.57lit.	24pt.3oz.	11.45lit.
250	36pt.	17.00lit.	19pt.	8.99lit.			19pt.	8.99lit.	36pt.	17.00lit.

Size	High Speed Shaft		Low Speed Shaft	
	WT, WB, WT-C, U	WT-CHS[3]	Standard	Alternate
50	6203	5203	6204	30204
60	30204	5204	6206	30206
70	30205	5205	6206	30206
80	30206	5206	6207	30207
100	30207	5207	6208	30208
120	30308	5210	6210	30210
135	30309	5211	6212	30212
155	30310		32213	
175	30311		32214	
200	32312		32215	
225	30313[1]		32217	
	6313[2]			
250	30314[1]		32219	
	6314[2]			

Interchangeable Bearings

[1]Two tapered roller bearings back-to-back, at end opposite drive end, hold any thrust load.
[2]Ball bearing at drive end allows for thermal expansion of input shaft. This arrangement is appropriate for units with longer bearing spans.
[3]Double row angular contact bearings with external grease fittings provide 24 − contact angles and can support lateral thrust loads as well as radial loads.
Conrad bearings are Non-filling Slot type. Do not use maximum capacity, Filling Slot type.

For incline mounting (45°) of WT and WB units, use oil quantity for horizontally mounted WT units.

Lubrication

Abrasion generally tends to be higher in worm gears than in spur, bevel, or helical gear types and proper lubrication oils and methods are more important for optimum results.

Quality essential. Caution: The use of inappropriate lubricants will result in severe worm wheel wear and failure. Maintenance of a proper oil film is critical to the successful operation of any worm gear. Do not use "all purpose" oils, engine oil or any lubricant not specifically formulated for worm gear service!

Extreme Pressure (EP) lubricants. We only recommend the use of today's advanced EP lubricants, which reduce wear. Consult your lubricant supplier for other recommendations not shown below. Extreme pressure lubricants may contain toxic additives, so you should consult your supplier before using in the food industry.

Recommended lubricants must meet or exceed these extreme pressure (EP)standards:

| 15° to 60° F (−9° to 16℃) | AGMA**7EP** | cSt@104F(40C):**414-506** |
| 50° to 125° F (10° to 52℃) | AGMA**8EP** | cSt@104F(40C):**612-748** |

Interchangeable Oil Seals

Size	Single Lip Oil Seal[1]		
	High Speed	High Speed WT-CHS/UCHS	Low Speed
50	MHS-17307	MHS-26388	MHS-20358
60	MHS-20358	MHS-34458	MHS-25408
70	MHS-25408	MHS-38508	MHS-305011
80	MHS-305011	–	MHS-355511
80-6 ½"	–	MHS-40528	MHS-355511
80-9"	–	MHS-50659	MHS-355511
100	MHS-355511	MHS-55709	MHS-406212
120	MHS-406212	N/A	MHS-507212
135	MHS-456812	N/A	MHS-608212
155	MHS-456812	N/A	MHS-658812
175	MHS-507212	N/A	MHS-709513
200	MHS-557812	N/A	MHS-7510013
225	MHS-608212	N/A	MHS-8511013
250	MHS-658812	N/A	MHS-9512013

Synthetic lubricants. While expensive, synthetic oils from Mobil Oil Corp. and Keystone have been shown to improve efficiency and to lower operating temperatures in worm gears. Caution: Never mix synthetic and non-synthetic oils! Flush reducer with a general purpose solvent such as kerosene when changing between types.

Units shipped empty. We normally ship units without oil for two reasons. First, MAKISHINKO units are supplied with a vented fill plug to allow the unit to "breathe," which could cause oil spillage during shipment and installation if the units were inverted. Second, users may have individual preferences for lubricant brands or suppliers.

[1]Double lip seals may be installed at the factory or by Hampton PT for specific nvironments. Consult price sheets.
[2]DW-CHS Size 32/40 high speed seal is 26344.

General Notes
- All seals are nitrile, spring loaded lip type, metric sized. They are available from HPT and most seal distributors.
- Seals supplied in MAKISHINKO units are manufactured by Koyo under license from Chicago Rawhide.
- Seals are installed from the inside of the covers so that a protective cage is formed around the seal to help prevent damage from outside sources.
- Standard seals are single lip because field reports and user experience indicate this provides the best performance. For example, the Chicago Rawhide Bulletin #457854 states, "Exhaustive testing by CR and major equipment manufacturers has shown that a dirt lip is usually unnecessary and can, in fact, be detrimental overall to seal performance."

OEM oil-filled option. Oil can be supplied for OEM shipments made directly from the factory if specified at the time of quotation and ordering. Whenever we ship oil-filled units, we insert a solid fill plug and supply a vented fill plug for installation by the customer.

High speed grease fittings. Sizes 155 through 250 and all WT-CHS units have a grease fitting on the high speed cover. Depending on mounting position, the cover must be rotated to keep the fitting oriented up, oroil leakage may result. Grease regularly.

Extreme temperature fluctuations. Consult your lubricant supplier when operating temperatures vary widely. A multi-weight EP oil may be required.

Lubricating procedures. We recommend the following procedures :

1. Fill. The reducer should be filled with the appropriate oil to the center of the oil gauge **before operating the unit.**
Do not overfill. Excessive oil levels result in higher operating temperatures and are as undesirable as using too little oil. Iffitting is present, grease it before operation.

2. 85-hour flush. After approximately 85 hours of operation, the reducer must be drained, flushed thoroughly with a light oil, and refilled with fresh, recommended oil.

3. 2500 hour service. This flushing and refilling should be repeated every 2500 hours. Grease fittings.

Ball Bearing Type
Guide to Low Speed Shaft
Overhung Load - Pounds

This guide applies to all single reduction models using ball bearings to support the low speed shaft assembly and is based upon 1800 RPM input speed. The load is to be applied one shaft diameter from the housing face, and applies to single shaft extension units only. The guide is for pure radial loads only. In event of combination radial and thrust loads, or for double extended low speed shafts, or for input speeds other than 1800 RPM; consult Hampton

Low Speed Shaft OHL in Pounds

Ratio	Unit Size						
	50	60	70	80	100	120	135
10	380	400	550	810	630	760	1330
15	440	470	650	960	770	930	1580
20	440	560	760	1130	910	1160	1860
25	440	620	870	1250	1030	1260	2110
30	440	610	850	1240	1010	1220	2040
40	440	720	1000	1460	1200	1530	2470
50	440	810	1140	1630	1380	1730	2840
60	440	810	1230	1790	1520	1940	3160

Taper Roller Bearing Type
Guide to Low Speed Shaft Overhung Load - Pounds

This guide applies to all single reduction models using taper roller bearings to support the low speed shaft assembly and is based upon 1800 RPM input speed. Taper roller bearings are not standard on units from Model 50 to Model 135. Consult price list for bearing modification. The load is to be applied one shaft diameter from the housing face and applies to single shaft extension units only. The guide is for pure radial loads only. In event of combination radial and thrust loads, or for double extended low speed shafts, or for input speeds other than 1800 RPM, or for higher load requirements consult Hampton

Low Speed Shaft OHL in Pounds

Ratio	Unit Size																
	50	60	70	80	100	120	135	155	175	200	225	250	300	350	400	450	500
10	440	810	820	1790	1520	1140	2000	6310	7550	8710	9670	11050	9300	*	*	*	*
15	440	810	980	1790	1520	1400	2370	6310	7550	8710	9670	11050	10240	*	*	*	*
20	440	810	1140	1790	1520	1740	2790	6310	7550	8710	9670	11050	11270	14430	*	*	*
30	440	810	1280	1790	1520	1830	3060	6310	7550	8710	9670	11050	12450	*	*	*	*
40	440	810	1280	1790	1520	2300	3710	6310	7550	8710	9670	11050	14970	18300	*	*	*
50	440	810	1280	1790	1520	2600	4150	6310	7550	8710	9670	11050	14970	20330	*	*	*
60	440	810	1280	1790	1520	2610	4150	6310	7550	8710	9670	11050	14970	20330	*	*	*

*Indicates that input speeds of less than 1800 RPM are required.

Note: The OHL rating is based on the bearing, output shaft or gear case housing as limiting. Where based on bearings, the load capacity will increase as the ratio increases, because output speed is slower and expected bearing life is longer.

Guide to High Speed Shaft
Overhung Load - Pounds

This guide applies to all
standard work gears. The
load ratings are for radial
loads applied one shaft di-
ameter from the housing
face with the shaft RPM as
shown. For double ex-
tended input shafts, the
load rating is for each end.
   Consult Hampton
for load capacities at other
RPM's.

High Speed Shaft OHL in Pounds

Unit Size	Ratio	1800 RPM	1200 RPM	900 RPM
50	all	110	110	110
60	all	176	176	176
70	all	265	265	265
80	all	353	353	353
100	all except	441	441	441
	30:1	390	430	441
120	all	662	662	662
135	all except	882	882	882
	30:1	706	767	772
155	all except	1103	1103	1103
	10:1 &15:1	662	662	662
	30:1	441	441	441
175	all	1213	1213	1213
200	all	1323	1323	1323
225	all except	1543	1543	1543
	10:1	1466	1543	1543
	15:1	1493	1543	1543
	30:1	1477	1543	1543
250	10:1	1638	1764	1764
	15:1	1700	1764	1764
	20:1	1722	1764	1764
	25:1	1764	1764	1764
	30:1	1671	1764	1764
	40:1	1751	1764	1764
	50:1	1764	1764	1764
	60:1	1764	1764	1764
300	10:1	1771	1918	2062
	15:1	1764	1925	2059
	20:1	1806	2000	2159
	25:1	2205	2205	2205
	30:1	1707	1885	2037
	40:1	1843	2051	2165
	50:1	2205	2205	2205
	60:1	2037	2205	2205

Unit Size	Ratio	1800 RPM	1200 RPM	900 RPM
350	10:1	2009	2168	2326
	15:1	1991	2148	2298
	20:1	1996	2181	2324
	25:1	2104	2320	2518
	30:1	1910	2117	2262
	40:1	2082	2291	2481
	50:1	2209	2459	2622
	60:1	2340	2615	2646
400	10:1	2355	2518	2672
	15:1	2366	2547	2741
	20:1	2430	2657	2833
	25:1	2463	2708	2924
	30:1	2271	2507	2664
	40:1	2461	2712	2924
	50:1	2591	2862	3100
	60:1	2697	3001	3248
450	10:1	2833	3027	3202
	15:1	2688	2897	3094
	20:1	2842	3091	3292
	25:1	2924	3222	3460
	30:1	2569	2825	2988
	40:1	2875	3151	3389
	50:1	3074	3411	3689
	60:1	3230	3601	3894
500	10:1	2615	2758	2840
	15:1	2509	2679	2805
	20:1	2648	2847	3032
	25:1	2763	3016	3199
	30:1	2388	2586	2712
	40:1	2690	2939	3142
	50:1	2941	3237	3499
	60:1	3118	3471	3753

Weights ;
Nominal and
Actual
Ratios

Weights in pounds without oil.

Size	Style					
	U	WT	WT-C	WT-CHS	WB	WB-C
50	13	16	21	18	16	21
60	17	20	29	25	20	29
70	27	31	39	35	31	39
80	49	42	49	47*	42	49
100	73	87	101	97**	87	101
120	110	140	145	–	140	145
135	169	197	202	–	197	202
155	–	282	–	–	282	–
175	–	320	–	–	320	–
200	–	489	–	–	489	–
225	–	662	–	–	662	–
250	–	882	–	–	915	–
300	–		–	–	1323	–
350	–		–	–	1983	–
400	–		–	–	2646	–
450	–		–	–	3528	–
500	–		–	–	4410	–

Shipping weights are shown. For weight-critical applications, consult Hampton for precise net weight of unit.

*Weight for 7/8" bore shaft; units with 1-1/8" bore shafts weigh 53 lb.
**Weight for 7/8" bore shaft; units with 1-1/8" bore shafts weigh 101 lb.

Nominal and Actual Ratios
WT and WB Models

Size	Ratio							
	10:1	15:1	20:1	25:1	30:1	40:1	50:1	60:1
155	9.66	14.5	Nom[1]	Nom	29	Norn	Nom	Norn
175	9.66	14.5	19.5	Norn	29	39	Nom	58
200	10.33	15.5	Nom	Nom	31	Nom	Nom	59
225	Norn	Nom	Nom	Nom	Nom	Nom	Norn	58
250	Norn	Norn	20.5	26	Norn	41	52	Norn

[1]Nominal and actual ratio are the same.

Designed to provide high reduction ratios in an integral unit, the MAKISHINKO DW Worm-worm series is Based on standard gearing components from MAKI-SHINKO single reduction units. DW input and output shafts rotate in the same direction.

This configuration allows some flexibility in input/output shaft orientation. The handing of the high speed worm can easily be changed to allow straight-through or same-side input/output. The high speed (primary) gear case can also be specified input shaft up, requiring a permanently sealed bearing on the top bearing.

Because both gear cases of DW reducers normally share a common lubricant supply, the slow speed gearbox is usually based on a worm-bottom (WB) style, although a Universal case mounted worm bottom can also be used. To main-tain the proper lubricant level, DW units are traditionally mounted in the standard, feet down, position. Sidewall mounting with the output shaft up is also acceptable, but the mounting position must be specified with the order so we can install a permanently sealed top bearing. Other mounting positions require that we install a special seal between gearcases.

The nominal size of DW units is based on the larger, secondary case, and the primary case is always three sizes smaller than the secondary case (Example: 50/80). This fact allows you to easily find overhung load ratings, bearing and seal information from the appropriate single reduction section in this catalog.

Consult Hampton for data on MAKISHINKO 's Worm/Helical units.

Available in C-face Hollow Shaft and Coupling Style
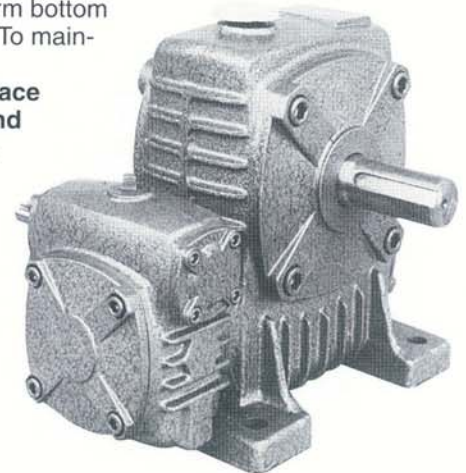
Shaft Direction

LR   RL   RR   LL

Mounting Positions

| LR | LD | LL | RR | RD | RL |
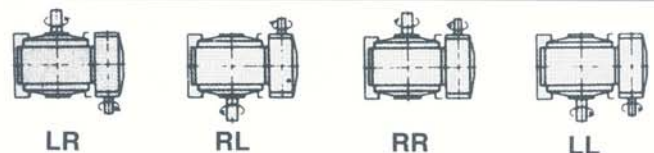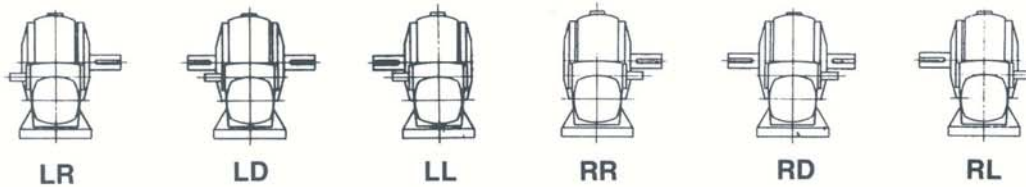
Note: DW units can also be ordered with modifications to allow sidewall mounting. Consult Hampton

DW Sizes 60 through 175

DW Sizes 200 through 500
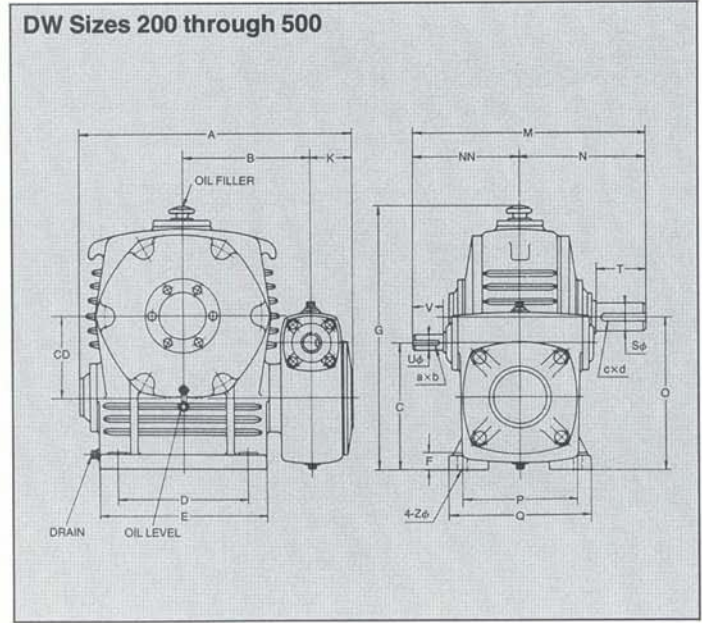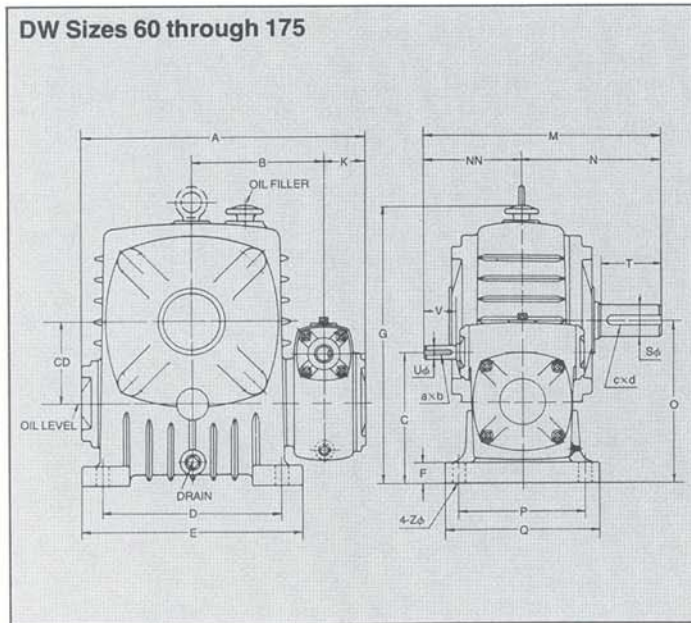
DW Dimensions

Size	CD	A	B	C	D	E	F	G	K	M	N	NN	O	P	Q	Z	High Speed Shaft			Low Speed Shaft		
																	U	V	a×b	S	T	c×d
60	$2^3/_8$	$8^1/_2$	$3^{15}/_{16}$	$3^5/_8$	$4^3/_4$	6	$^{25}/_{32}$	$8^1/_4$	$1^9/_{16}$	$7^3/_4$	$4^3/_8$	$3^3/_8$	$4^3/_4$	$4^1/_8$	$5^1/_8$	$^{13}/_{32}$	$^7/_{16}$	$^{31}/_{32}$	$^3/_{32}×^3/_{64}$	1	2	$^1/_4×^1/_8$
70	$2^3/_4$	$10^1/_4$	$4^3/_4$	$4^5/_{16}$	$5^7/_8$	$7^1/_2$	$^{25}/_{32}$	$9^5/_8$	$1^3/_4$	$8^3/_4$	$5^1/_8$	$3^5/_8$	$5^1/_2$	$4^1/_2$	6	$^{19}/_{32}$	$^1/_2$	1	$^1/_8×^1/_{16}$	$1^1/_8$	$2^3/_8$	$^1/_4×^1/_8$
80	$3^5/_{32}$	$11^1/_2$	$5^5/_{16}$	$5^1/_8$	$7^1/_{16}$	$8^{13}/_{16}$	$^{25}/_{32}$	$10^3/_4$	2	$9^{11}/_{16}$	$5^1/_2$	$4^3/_{16}$	$6^5/_{16}$	$5^5/_{16}$	$6^{11}/_{16}$	$^{19}/_{32}$	$^5/_8$	$1^3/_{16}$	$^3/_{16}×^3/_{32}$	$1^3/_8$	$2^9/_{16}$	$^5/_{16}×^5/_{32}$
100	$3^{15}/_{16}$	$13^3/_4$	$6^{11}/_{32}$	$6^5/_{16}$	$8^{11}/_{16}$	$10^{11}/_{16}$	$^{31}/_{32}$	$13^1/_2$	$2^5/_{32}$	$11^7/_{16}$	$6^{11}/_{16}$	$4^3/_4$	$7^7/_8$	$6^1/_8$	$7^1/_2$	$^{19}/_{32}$	$^3/_4$	$1^9/_{16}$	$^3/_{16}×^3/_{32}$	$1^1/_2$	3	$^3/_8×^3/_{16}$
120	$4^{23}/_{32}$	16	$7^9/_{32}$	$7^1/_2$	$10^1/_4$	$12^3/_4$	$1^3/_{16}$	16	$2^{17}/_{32}$	13	$7^1/_2$	$5^1/_2$	$9^7/_{16}$	$7^1/_{16}$	$9^1/_{16}$	$^{23}/_{32}$	$^7/_8$	$1^9/_{16}$	$^3/_{16}×^3/_{32}$	$1^3/_4$	$3^3/_8$	$^3/_8×^3/_{16}$
135	$5^5/_{16}$	18	$8^{15}/_{32}$	$8^{15}/_{32}$	$11^7/_{16}$	$13^{13}/_{16}$	$1^3/_{16}$	18	$2^{25}/_{32}$	$14^9/_{16}$	$8^1/_4$	$6^5/_{16}$	$10^5/_8$	$7^7/_8$	$9^7/_8$	$^{23}/_{32}$	$1^1/_8$	2	$^1/_4×^1/_8$	$2^1/_4$	$3^3/_4$	$^1/_2×^1/_4$
155	$6^3/_{32}$	$21^1/_2$	$10^1/_8$	$9^1/_4$	$12^5/_8$	15	$1^1/_4$	$19^1/_8$	$3^3/_8$	$17^7/_{16}$	$9^{15}/_{16}$	$7^1/_2$	$11^{13}/_{32}$	$8^{11}/_{16}$	11	$^{25}/_{32}$	$1^3/_8$	2	$^5/_{16}×^5/_{32}$	$2^1/_2$	$4^3/_8$	$^5/_8×^5/_{16}$
175	$6^7/_8$	24	$11^7/_{16}$	11	$13^3/_4$	$16^1/_4$	$1^5/_{32}$	$21^7/_8$	$3^{13}/_{16}$	$19^3/_8$	$10^5/_{16}$	$9^1/_{16}$	$13^3/_{16}$	$9^7/_8$	$12^3/_8$	$^{25}/_{32}$	$1^1/_2$	$2^9/_{16}$	$^3/_8×^3/_{16}$	$2^3/_4$	$4^3/_8$	$^5/_8×^5/_{16}$
200	$7^7/_8$	$26^1/_4$	$12^3/_{16}$	$12^1/_4$	$13^3/_4$	$16^3/_4$	$1^{21}/_{32}$	$24^5/_8$	$4^5/_{16}$	$22^1/_4$	12	$10^1/_4$	$14^3/_4$	$11^3/_8$	$14^3/_8$	$^{27}/_{32}$	$1^5/_8$	3	$^3/_8×^3/_{16}$	$2^7/_8$	$4^{15}/_{16}$	$^3/_4×^3/_8$
225	$8^{27}/_{32}$	$28^3/_4$	$13^3/_8$	$13^5/_8$	$15^3/_8$	$19^3/_8$	$1^{25}/_{32}$	$27^3/_8$	$4^3/_8$	$25^1/_8$	$13^3/_{16}$	$11^{15}/_{16}$	$16^{11}/_{32}$	13	$16^1/_4$	$1^1/_{16}$	$1^5/_8$	$3^3/_8$	$^3/_8×^3/_{16}$	$3^1/_4$	$5^1/_2$	$^3/_4×^3/_8$
250	$9^{27}/_{32}$	32	15	$14^3/_4$	$17^5/_{16}$	$21^1/_2$	$1^7/_8$	$29^3/_4$	5	27	$14^3/_{16}$	$12^{13}/_{16}$	$17^{23}/_{32}$	15	$18^1/_4$	$1^1/_{16}$	$1^7/_8$	$3^3/_8$	$^1/_2×^1/_4$	$3^1/_2$	$6^1/_8$	$^7/_8×^7/_{16}$
300	$11^{13}/_{16}$	36	$17^5/_{16}$	$14^3/_8$	$20^1/_2$	$24^1/_2$	$2^1/_4$	$32^1/_4$	5	29	$16^3/_{16}$	$12^{13}/_{16}$	$19^5/_{16}$	$14^1/_2$	$17^3/_4$	$1^{13}/_{32}$	$1^7/_8$	$3^3/_8$	$^1/_2×^1/_4$	$3^3/_4$	$6^{11}/_{16}$	$^7/_8×^7/_{16}$
350	$13^{25}/_{32}$	$42^3/_4$	$19^7/_8$	$16^3/_8$	$23^1/_2$	$27^1/_2$	$2^{15}/_{16}$	37	$5^5/_8$	$32^3/_4$	$18^7/_8$	$13^7/_8$	$22^1/_4$	17	$20^1/_2$	$1^{11}/_{16}$	2	$3^3/_4$	$^1/_2×^1/_4$	$4^3/_4$	$7^1/_2$	$1^1/_4×^7/_{16}$
400	$15^3/_4$	46	$21^7/_8$	$18^3/_4$	26	31	$3^3/_8$	$42^1/_2$	$5^7/_8$	$34^1/_2$	$19^3/_4$	$14^3/_4$	$25^{19}/_{32}$	$18^1/_2$	23	$1^{11}/_{16}$	$2^1/_4$	$3^3/_4$	$^1/_2×^1/_4$	5	$7^7/_8$	$1^1/_4×^7/_{16}$
450	$17^{23}/_{32}$	$49^3/_4$	$23^5/_8$	$18^{15}/_{16}$	30	35	$3^9/_{16}$	47	$5^7/_8$	$36^1/_4$	$21^1/_2$	$14^3/_4$	$27^3/_4$	20	25	$1^{11}/_{16}$	$2^1/_4$	$3^3/_4$	$^1/_2×^1/_2$	$5^1/_2$	$8^1/_{16}$	$1^1/_4×^7/_{16}$
500	$19^{11}/_{16}$	$57^3/_4$	$27^3/_8$	$21^1/_4$	35	41	$3^9/_{16}$	52	$6^3/_8$		24	$16^5/_8$	$31^{13}/_{32}$	23	28	$1^7/_8$	$2^1/_4$	$4^3/_8$	$^1/_2×^1/_4$	$6^3/_4$	$9^1/_{16}$	$1^3/_4×^5/_8$

Double Reduction Horsepower and Torque Ratings

1800 RPM Input Speed DW Style Rating Table

RATIO	SIZE 60 MAX. OUTPUT TORQUE 1010 IN-LB		SIZE 70 MAX. OUTPUT TORQUE 2170 IN-LB		SIZE 80 MAX. OUTPUT TORQUE 3040 IN-LB		SIZE 100 MAX. OUTPUT TORQUE 4340 IN-LB		SIZE 120 MAX. OUTPUT TORQUE 7290 IN-LB		SIZE 135 MAX. OUTPUT TORQUE 12150 IN-LB	
	INPUT HP	OUTPUT HP	INPUT HP	OUTPUT HP	INPUT HP	OUTPUT HP	INPUT HP	OUTPUT HP	INPUT HP	OUTPUT HP	INPUT HP	OUTPUT HP
100	.54	.28	1.13	.62	1.50	.87	2.10	1.23	3.47	2.08	5.60	3.45
150	.39	.19	.81	.42	1.09	.58	1.51	.83	2.49	1.38	4.00	2.29
200	.32	.14	.63	.31	.90	.42	1.17	.62	2.04	1.05	3.13	1.75
225	.28	.13*	.58	.28*	.78	.39	1.09	.55	1.80	.92	2.85	1.54
250	.26	.12	.55	.24	.76	.35	1.03	.50	1.70	.83	2.61	1.38
300	.23	.09	.44	.20	.84	.29	.84	.41	1.47	.70	2.24	1.17
375	.20	.08*	.42	.16*	.56	.23	.75	.34	1.25	.55	1.88	.92
400	.19	.07	.37	.15	.54	.21	.67	.31	1.15	.52	1.77	.87
450	.17	.07	.35	.13	.47	.19	.66	.28	1.07	.46	1.69	.76
500	.17	.05	.31	.12	.44	.17	.58	.25	1.03	.42	1.47	.70
600	.14	.04	.26	.10	.39	.14	.50	.20	.88	.35	1.31	.88
625	.13	.04*	.29	.09*	.38	.13	.48	.20	.76	.35	1.21	.55
750	.12	.04	.25	.08	.34	.12	.48	.16	.79	.28	1.15	.46
800	.13	.03	.25	.07	.46	.10	.52	.15	.94	.26	1.35	.43
900	.11	.03	.22	.06	.30	.09	.42	.13	.69	.23	1.06	.39
1000	.09	.03	.21	.07	.28	.08	.36	.13	.66	.21	.88	.35
1200	.08	.03	.20	.05	.23	.07	.28	.11	.51	.17	.76	.29
1250	.08	.03*	.19	.05*	.23	.07	.31	.09	.48	.16	.72	.28
1500	.08	.01	.16	.04	.21	.05	.31	.08	.52	.13	.72	.23
1600	Consult HPT		Consult HPT		.21	.05	.27	.08	.47	.13	.68	.21
1800	Consult HPT		Consult HPT		.19	.05	.24	.07	.40	.12	.63	.19
2000	Consult HPT		Consult HPT		.19	.04	.24	.07	.44	.11	.56	.17
2400	Consult HPT		Consult HPT		.16	.04	.19	.05	.35	.08	.50	.15
2500	Consult HPT*		Consult HPT*		.16	.04	.20	.05	.32	.08	.47	.13
3000	Consult HPT		Consult HPT		.13	.03	.16	.04	.24	.07	.42	.12
3600	Consult HPT		Consult HPT		.12	.03	.15	.04	.24	.05	.38	.09

*Special Order Ratio

1200 RPM Input Speed DW Style Rating Table

RATIO	SIZE 60 MAX. OUTPUT TORQUE 1010 IN-LB		SIZE 70 MAX. OUTPUT TORQUE 2170 IN-LB		SIZE 80 MAX. OUTPUT TORQUE 3040 IN-LB		SIZE 100 MAX. OUTPUT TORQUE 4340 IN-LB		SIZE 120 MAX. OUTPUT TORQUE 7290 IN-LB		SIZE 135 MAX. OUTPUT TORQUE 12150 IN-LB	
	INPUT HP	OUTPUT HP	INPUT HP	OUTPUT HP	INPUT HP	OUTPUT HP	INPUT HP	OUTPUT HP	INPUT HP	OUTPUT HP	INPUT HP	OUTPUT HP
100	.38	.19	.79	.42	1.05	.58	1.47	.83	2.41	1.38	3.88	2.29
150	.27	.13	.58	.28	.76	.39	1.07	.55	1.75	.92	2.77	1.54
200	.22	.09	.42	.20	.54	.29	.77	.41	1.44	.70	2.17	1.17
225	.20	.08*	.40	.19*	.56	.25	.77	.36	1.26	.62	2.00	1.03
250	.19	.08	.39	.16	.55	.23	.74	.34	1.21	.55	1.84	.92
300	.16	.06	.29	.13	.38	.19	.54	.27	1.02	.46	1.56	.78
375	.15	.05*	.29	.11*	.40	.15	.54	.21	.89	.38	1.34	.62
400	.13	.04	.25	.10	.29	.14	.41	.20	.82	.35	1.23	.58
450	.12	.04	.25	.09	.33	.13	.47	.19	.76	.31	1.19	.51
500	.12	.03	.21	.08	.24	.11	.35	.16	.73	.28	1.02	.46
600	.10	.03	.15	.06	.21	.09	.31	.13	.62	.23	.92	.39
625	.09	.03*	.21	.07*	.27	.09	.35	.13	.54	.23	.84	.38
750	.08	.03	.19	.05	.24	.08	.35	.11	.56	.19	.82	.31
800	.09	.02	.17	.05	.23	.07	.32	.10	.67	.07	.96	.29
900	.08	.02	.13	.04	.17	.06	.27	.09	.47	.15	.73	.25
1000	.07	.01	.16	.04	.20	.05	.27	.08	.47	.13	.63	.23
1200	.07	.01	.15	.04	.16	.05	.20	.07	.38	.12	.55	.19
1250	.07	.01*	.13	.03*	.17	.04	.23	.07	.35	.11	.52	.19
1500	.05	.01	.12	.03	.16	.04	.23	.05	.38	.09	.52	.15
1600	Consult HPT		Consult HPT		.15	.04	.19	.05	.35	.08	.48	.15
1800	.05	.01	.11	.03	.13	.03	.17	.04	.29	.08	.45	.13
2000	Consult HPT		Consult HPT		.15	.03	.17	.04	.32	.07	.40	.12
2400	Consult HPT		Consult HPT		.12	.03	.13	.04	.25	.05	.36	.09
2500	Consult HPT*		Consult HPT*		.12	.03	.15	.03	.23	.05	.34	.09
3000	Consult HPT		Consult HPT		.09	.01	.12	.03	.19	.04	.29	.08
3600	Consult HPT		Consult HPT		.07	.01	.11	.03	.17	.04	.28	.07

*Special Order Ratio

Double Reduction Horsepower and Torque Ratings

900 RPM Input Speed DW Style Rating Table

RATIO	SIZE 60 MAX. OUTPUT TORQUE 1010 IN-LB		SIZE 70 MAX. OUTPUT TORQUE 2170 IN-LB		SIZE 80 MAX. OUTPUT TORQUE 3040 IN-LB		SIZE 100 MAX. OUTPUT TORQUE 4340 IN-LB		SIZE 120 MAX. OUTPUT TORQUE 7290 IN-LB		SIZE 135 MAX. OUTPUT TORQUE 12150 IN-LB	
	INPUT HP	OUTPUT HP	INPUT HP	OUTPUT HP	INPUT HP	OUTPUT HP	INPUT HP	OUTPUT HP	INPUT HP	OUTPUT HP	INPUT HP	OUTPUT HP
100	.29	.15	.62	.31	.82	.43	1.14	.62	1.88	1.05	3.01	1.72
150	.21	.09	.46	.20	.60	.29	.83	.42	1.37	.70	2.17	1.15
200	.17	.07	.33	.15	.40	.21	.60	.31	1.11	.52	1.68	.87
225	.16	.07*	.32	.13*	.43	.19	.60	.28	.99	.46	1.58	.76
250	.15	.06	.31	.12	.43	.17	.58	.24	.97	.42	1.45	.70
300	.13	.04	.23	.10	.29	.14	.42	.20	.82	.35	1.21	.50
375	.11	.03*	.23	.08*	.32	.12	.43	.16	.71	.28	1.05	.46
400	.10	.03	.18	.07	.22	.10	.33	.15	.64	.26	.96	.43
450	.09	.02	.19	.07	.27	.09	.36	.13	.60	.23	.95	.39
500	.09	.02	.16	.06	.18	.08	.27	.12	.58	.21	.81	.35
600	.08	.02	.13	.05	.17	.07	.25	.10	.48	.17	.72	.29
625	.08	.03*	.17	.05*	.21	.07	.27	.09	.43	.16	.67	.28
750	.07	.01	.15	.04	.20	.05	.28	.08	.47	.13	.66	.23
800	.07	.01	.10	.03	.17	.05	.24	.07	.32	.13	.74	.21
900	.06	.01	.10	.03	.12	.04	.19	.06	.37	.11	.59	.19
1000	.05	.01	.12	.03	.16	.04	.21	.07	.39	.11	.51	.17
1200	.05	.01	.11	.03	.13	.04	.16	.05	.29	.08	.44	.15
1250	.05	.01*	.11	.03*	.13	.04	.17	.05	.28	.08	.42	.13
1500	.04	.01	.08	.03	.13	.03	.19	.04	.31	.07	.42	.12
1600	Consult HPT		Consult HPT		.12	.03	.15	.04	.27	.07	.39	.11
1800	.04	.01	.08	.01	.11	.03	.15	.04	.23	.05	.38	.09
2000	Consult HPT		Consult HPT		.12	.03	.15	.03	.27	.05	.32	.08
2400	Consult HPT		Consult HPT		.09	.01	.11	.03	.20	.04	.29	.07
2500	Consult HPT*		Consult HPT*		.09	.01	.12	.03	.19	.44	.28	.07
3000	Consult HPT		Consult HPT		.08	.01	.09	.03	.15	.04	.24	.05
3600	Consult HPT		Consult HPT		.07	.01	.08	.01	.15	.03	.23	.05

*Special Order Ratio

For DW ratings at other input
speeds, consult Hampton

The following section describes modifications that apply to special mounting positions. All involve additional charges to the customer. When units are purchased for OEM requirements, modified units will be supplied direct from the factory, and such modifications will be less expensive when done there. For more immediate requirements, Hampton will make necessary modifications. Note also that some of the modifications described below are mandatory for proper performance and others (for example, oil sight gauge relocation) are discretionary.

Only some of the many possible mounting positions are shown on these pages. For drawings and available modifications for other mounting positions, consult Hampton
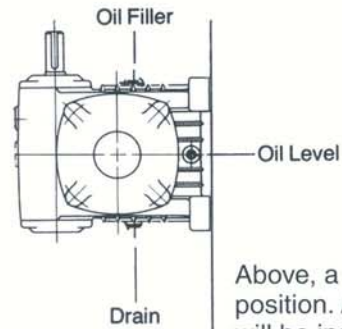
Above, a sidewall mounting position. An oil level plug will be inserted where the oil drain normally is. A vented oil fill plug or drain plug will be installed where the oil sight gauge normally is, depending on whether the input shaft is up or down. A drain or fill plug, as appropriate, will be installed on the opposite position. Grease fitting installation is required in top high speed bearing when input revolution is slower than 300 RPM.

Special Mounting
Positions
WT Model 50 through 135
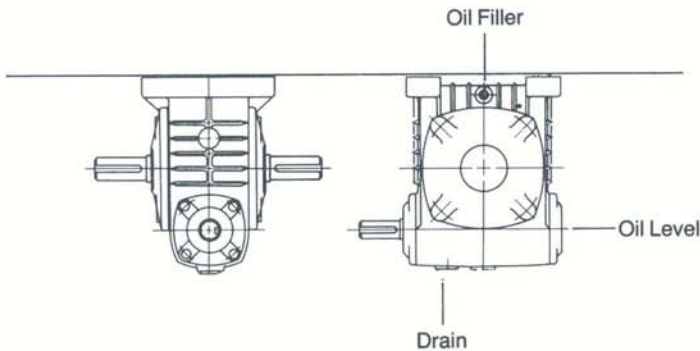
Above, a ceiling mounting position. There is no problem with lubrication at low speed revolution , because the input shaft is always in lubricant. A vented oil fill plug will be substituted for the oil drain plug, and a solid drain plug will be substituted for the normal vented fill plug. An oil level gauge will be installed at the centerline of the input shaft in either the solid cover or the housing.
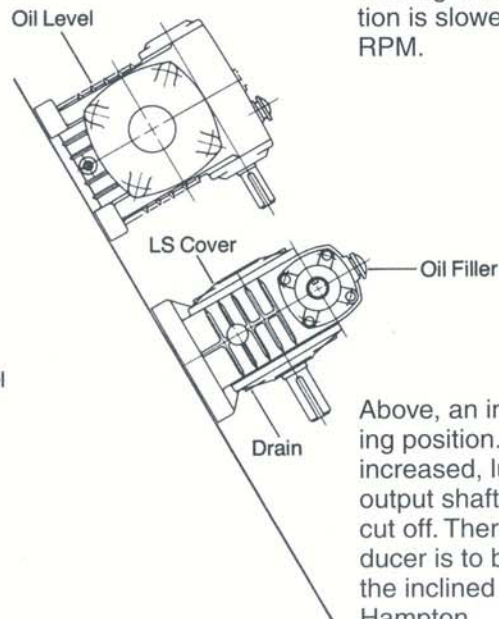
Above, an inclined mounting position. As the angle is increased, lubrication of the output shaft top bearing is cut off. Therefore, if the reducer is to be mounted in the inclined position, Hampton should be advised of output speeds, angle of mounting and orientation so that recommendations can be made regarding suitable oil levels, addition of grease fittings and positioning of oil drains. Grease fittings are always required when the output shaft is driven at a speed lower than 20 RPM.

Considerations for Special Mounting , Continued

UP

Special Mounting Positions
WB Models 50 through 135

Oil Filler

Oil Level

Drain

LS Cover

Oil Filler
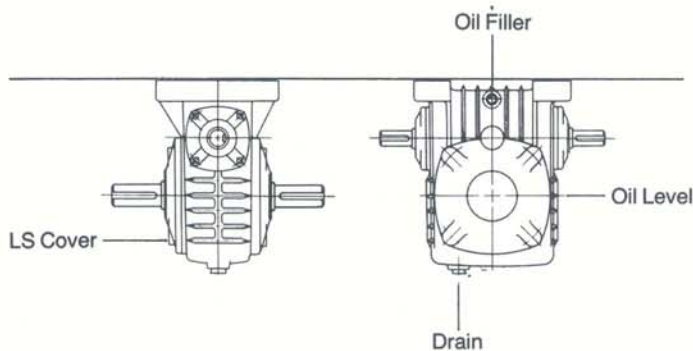
Oil Level

Drain

Above, a ceiling mounting position. An oil level gauge will be installed in the center of the housing. A vented oil fill plug will be substituted for the oil drain plug, and a solid drain plug will be substituted for the normal vented fill plug. Grease fitting installation is required when the revolution of the input shaft is lower than 300 RPM.

Note on mounting with motor down (motor under): MAKISHINO's experience Has shown that aspring- Loaded seal on a highly Polished shaft (provided as standard) gives satisfactory sealing life with minimal risk. In the absence of harsh environmental conditions, the seal should last as long as the worm gear.
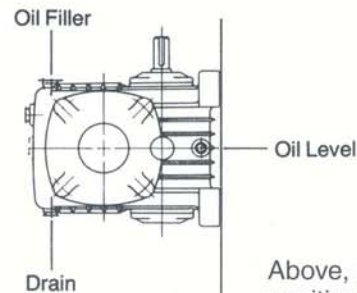
Above, a sidewall mounting position. If the output shaft is down, drain and fill plugs must be installed where shown. If the output shaft is up, only a new oil drain plug must be installed. An oil sight gauge must be installed at the centerline. Grease fitting installation is required in top high speed bearing when input revolution is slowerthan 300 RPM

Oil Level

LS Cover

Oil Filler

Drain
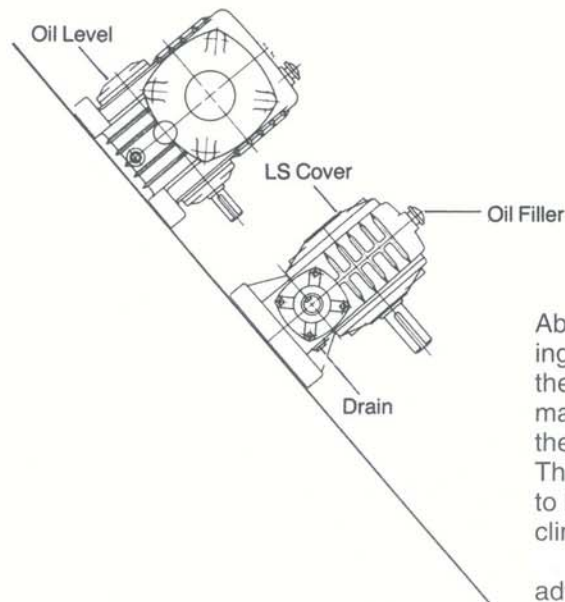
Above, an inclined mounting position. Lubrication of the output shaft top bearing may become a problem as the angle is increased. Therefore, if the reducer is to be mounted in the inclined position, Hampton should be advised of output speeds, angle of mounting and orientation so that recommendations can be made regarding suitable oil levels, addition of grease fittings and positioning of oil drains.

Worm Top
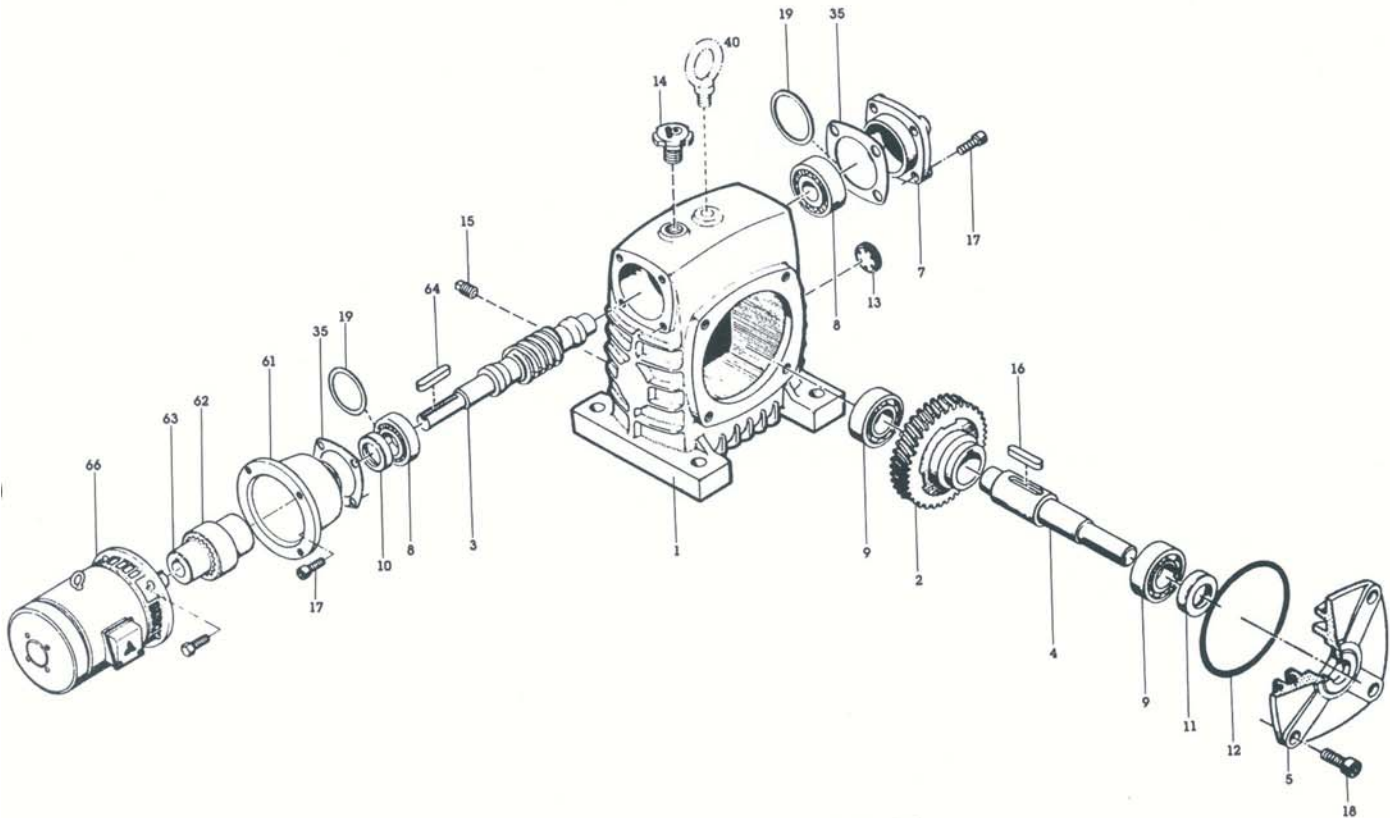
Parts List
Standard Reducer

No.	Part Description
1.	Housing
2.	Gear, Worm
3.	Wormshaft
4.	Shaft - Output
5.	Cover, Low Speed
6.	Cover, High Speed, Open[1]
7.	Cover, High Speed, Closed[6]
8.	Bearing, High Speed
9.	Bearing, Low Speed
10.	Oil Seal, High Speed
11.	Oil Seal, Low Speed
12.	"O" Ring
13.	Gauge, Oil Level
14.	Plug, Oil Fill

Complete sets of spare parts for all but the largest of units are stocked in our Eugene warehouse. Parts such as seals and gear sets can usually be shipped the same day.

Worm Bottom
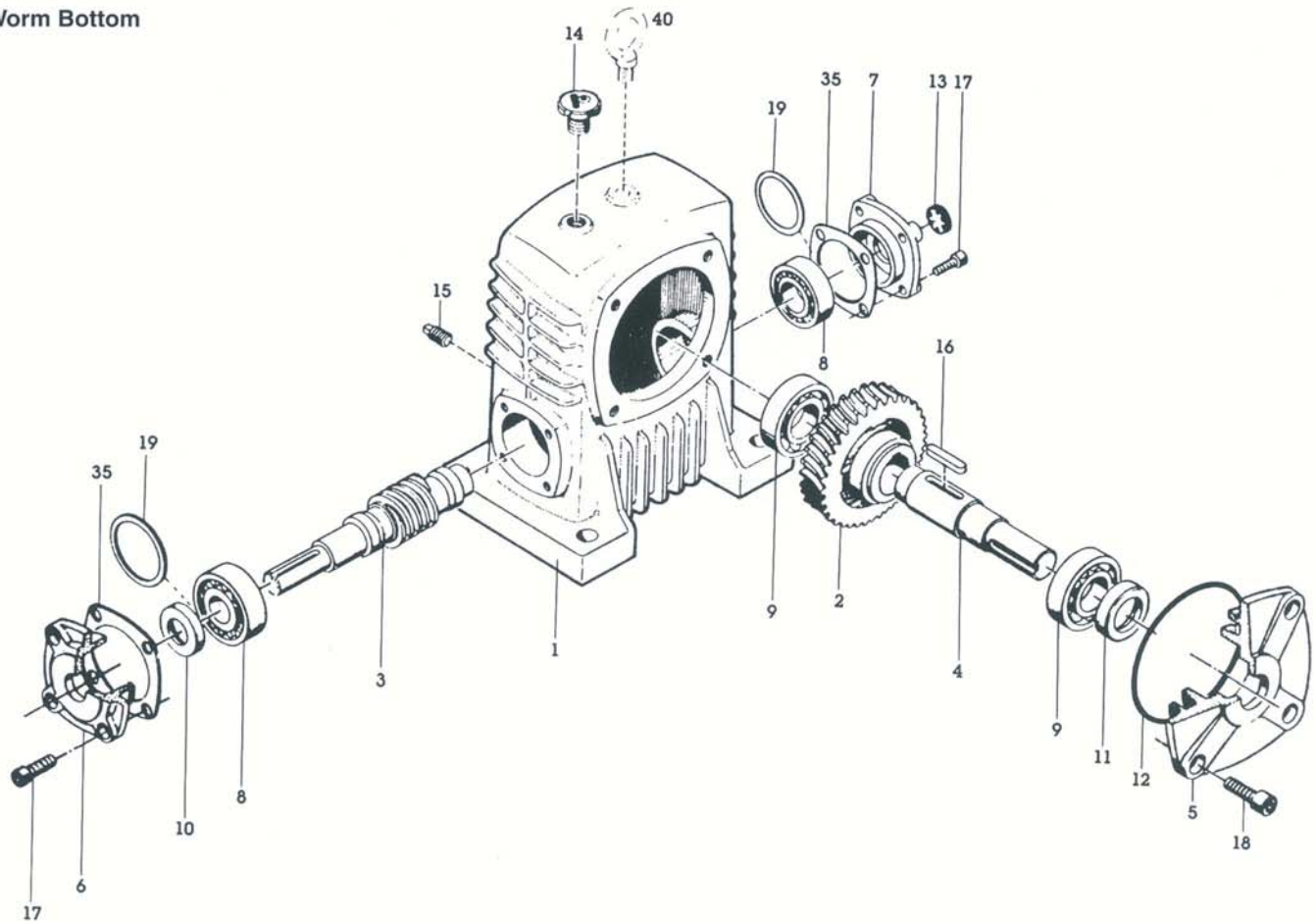
15.	Plug, Drain
16.	Key, Worm Gear & Shaft
17.	Cap Screw, High Speed Cover[2]
18.	Cap Screw, Low Speed Cover
19.	Shim, High Speed Bearing
20.	Shim, Low Speed Bearing[3]
21.	High Speed Cover, WT-CHS
35.	Gasket, High Speed Cover
40.	Eye Bolt (Size 100-135 only)[4]
50.	Retaining Ring-Gearcase
61.	Flange, Motor Mounting Adapter[1]
62.	Coupling Half, Reducer Input
63.	Coupling Half, Motor Shaft
64.	Key (WTC/WBC only)
66.	Motor[5]
67.	Grease Fitting
68.	Retaining Ring-Worm Shaft

To order parts, please furnish complete model description, ratio, and unit serial number. Furnish motor frame size of motor shaft diameter for C-face units. See page 8 for complete ordering information.

[1]For standard Model WT and WB reducers, order Part No. 6 High Speed Open Cover. For WT-C and WB-C units, order Part No. 61, Motor Flange.

[2]Cap screws (No. 17) for C-face Adapter (No. 61) are longer than those for High Speed Cover (No. 6).

[3]Part No. 20 is used only on units supplied with tapered roller bearings (not shown).

[4]On units larger than Size 135, lifting lugs are integral.

[5]Motor (No. 66) is always supplied separately.

[6]With sight gauge if worm bottom.

General Note
Sizes 155 through 250 are provided with grease fittings for high speed bearings. Also, all WT-CHS units are supplied with a grease fitting for the double row angular contact bearing.

Worm Top Hollow Shaft


Note
When units are mounted in other positions than shown, this cover may be rotated to keep grease fitting up or sideways. This facilitates lubrication and prevents oil leakage. (The spring-loaded ball check is designed to prevent grease leakage when inverted, but not oil leakage.)

Tapped holes for jacking screws standard on current production.
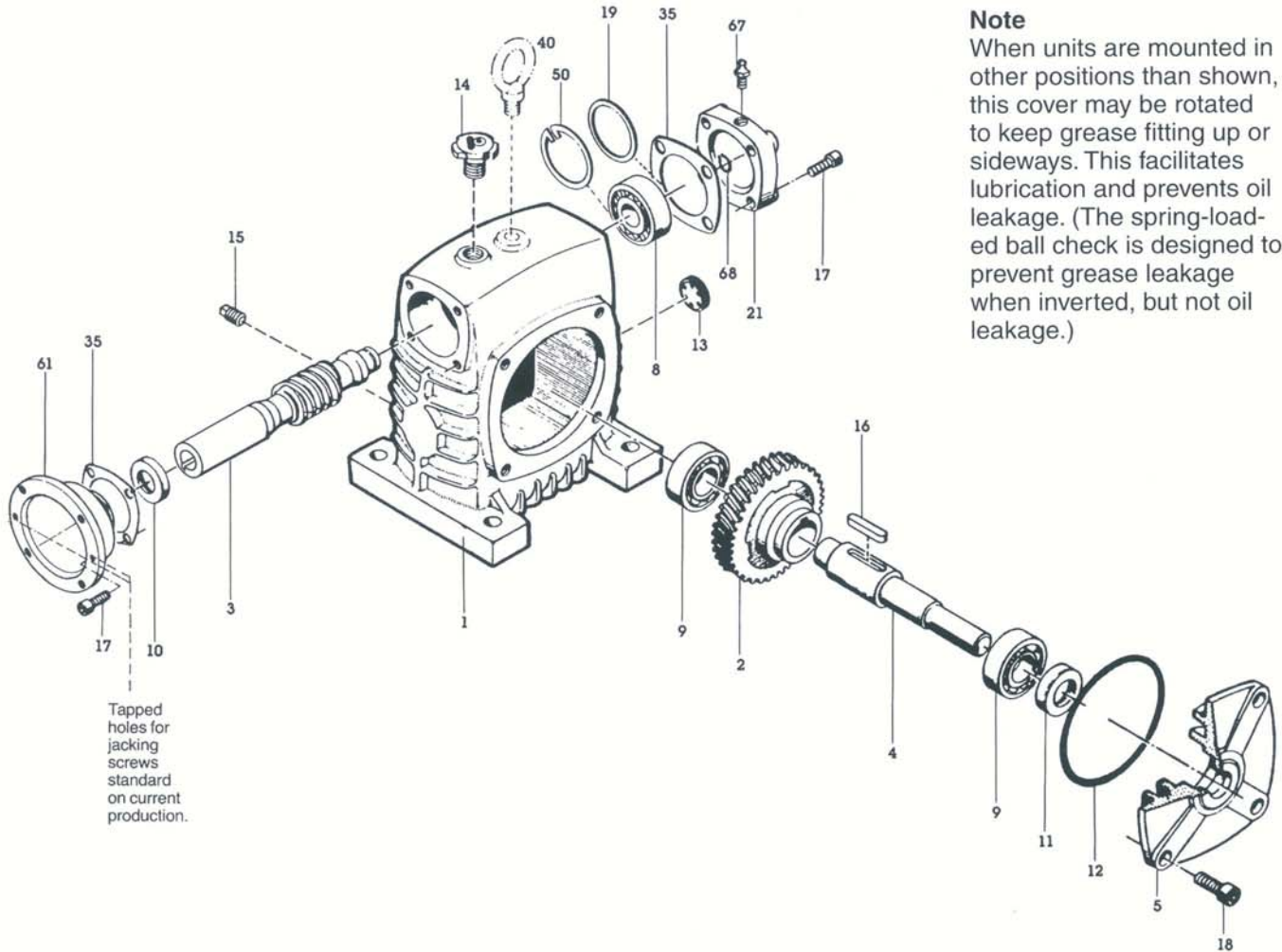
See previous page for parts descriptions and notes.

Universal Reducer Dimensions

U Universal Unit, Drilled and Tapped
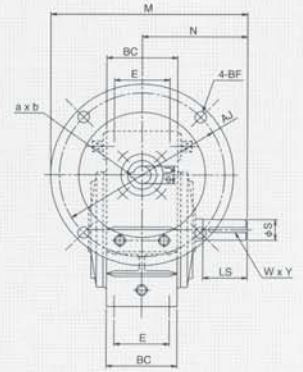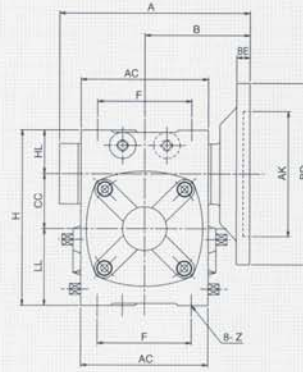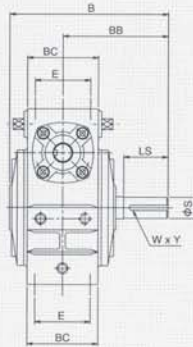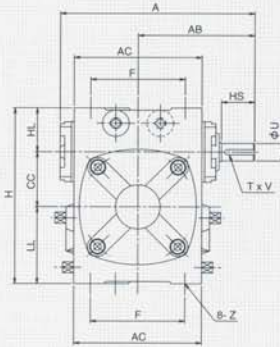
U-CHS

Reducer Dimensions

Size	A	AB	AC	B	BB	BC	CD	E	F	H	HL	LL	Z	INPUT SHAFT			OUTPUT SHAFT		
														HS	U	T×V	LS	S	W×Y
50	7	$4\frac{1}{8}$	$4\frac{17}{32}$	$5\frac{23}{32}$	$3\frac{3}{4}$	$2\frac{3}{4}$	$1\frac{31}{32}$	$1\frac{31}{32}$	$3\frac{11}{32}$	$6\frac{5}{16}$	$1\frac{19}{32}$	$2\frac{3}{4}$	$\frac{1}{4}$x20	$1\frac{3}{16}$	$\frac{5}{8}$	$\frac{3}{16}\times\frac{3}{32}$	$1\frac{9}{16}$	$\frac{3}{4}$	$\frac{3}{16}\times\frac{3}{32}$
60	$7\frac{3}{4}$	$4\frac{3}{4}$	$4\frac{31}{32}$	$6\frac{1}{2}$	$4\frac{3}{8}$	$3\frac{5}{32}$	$2\frac{3}{8}$	$2\frac{3}{16}$	$4\frac{5}{32}$	$7\frac{11}{32}$	$1\frac{29}{32}$	$3\frac{3}{32}$	$\frac{5}{16}$x18	$1\frac{9}{16}$	$\frac{3}{4}$	$\frac{3}{16}\times\frac{3}{32}$	2	$\frac{7}{8}$	$\frac{3}{16}\times\frac{3}{32}$
70	$9\frac{1}{4}$	$5\frac{1}{2}$	$6\frac{1}{8}$	$7\frac{11}{16}$	$5\frac{1}{8}$	$3\frac{9}{16}$	$2\frac{3}{4}$	$2\frac{9}{16}$	$4\frac{15}{16}$	$8\frac{15}{32}$	$2\frac{3}{16}$	$3\frac{9}{16}$	$\frac{3}{8}$x16	$1\frac{9}{16}$	$\frac{7}{8}$	$\frac{3}{16}\times\frac{3}{32}$	$2\frac{3}{8}$	$1\frac{1}{8}$	$\frac{1}{4}\times\frac{1}{8}$
80	$10\frac{1}{2}$	$6\frac{5}{16}$	$6\frac{7}{8}$	$8\frac{9}{32}$	$5\frac{1}{2}$	$3\frac{15}{16}$	$3\frac{5}{32}$	$2\frac{3}{4}$	$5\frac{17}{32}$	$9\frac{27}{32}$	$2\frac{9}{16}$	$4\frac{5}{32}$	$\frac{7}{16}$x14	2	$1\frac{1}{8}$	$\frac{1}{4}\times\frac{1}{8}$	$2\frac{9}{16}$	$1\frac{3}{8}$	$\frac{5}{16}\times\frac{5}{32}$
100	$12\frac{3}{4}$	$7\frac{1}{2}$	$8\frac{13}{32}$	$10\frac{1}{4}$	$6\frac{11}{16}$	$4\frac{23}{32}$	$3\frac{15}{16}$	$3\frac{9}{16}$	$7\frac{3}{32}$	$12\frac{7}{32}$	$3\frac{5}{32}$	$5\frac{1}{8}$	$\frac{1}{2}$x13	2	$1\frac{3}{8}$	$\frac{5}{16}\times\frac{5}{32}$	3	$1\frac{1}{2}$	$\frac{3}{8}\times\frac{3}{16}$
120	$15\frac{5}{32}$	$9\frac{1}{16}$	$10\frac{13}{32}$	$11\frac{7}{16}$	$7\frac{1}{2}$	$4\frac{3}{4}$	$4\frac{23}{32}$	$3\frac{15}{16}$	$8\frac{21}{32}$	$14\frac{9}{16}$	$3\frac{3}{4}$	$6\frac{1}{8}$	$\frac{9}{16}$x12	$2\frac{9}{16}$	$1\frac{1}{2}$	$\frac{3}{8}\times\frac{3}{16}$	$3\frac{11}{32}$	$1\frac{3}{4}$	$\frac{3}{8}\times\frac{3}{16}$
135	$17\frac{1}{8}$	$10\frac{1}{4}$	$11\frac{31}{32}$	$12\frac{19}{32}$	$8\frac{9}{32}$	$5\frac{29}{32}$	$5\frac{5}{16}$	$4\frac{11}{32}$	$10\frac{1}{4}$	$16\frac{3}{4}$	$4\frac{1}{8}$	$7\frac{9}{32}$	$\frac{5}{8}$x11	3	$1\frac{5}{8}$	$\frac{3}{8}\times\frac{3}{16}$	$3\frac{3}{4}$	$2\frac{1}{4}$	$\frac{1}{2}\times\frac{1}{4}$

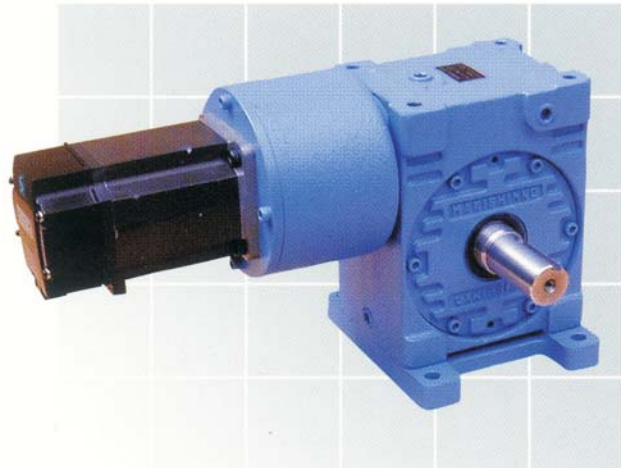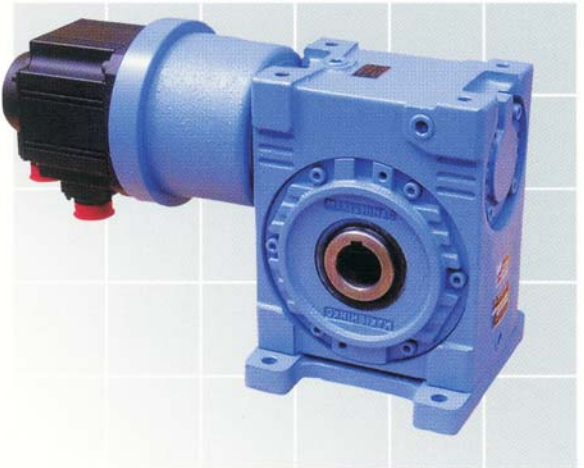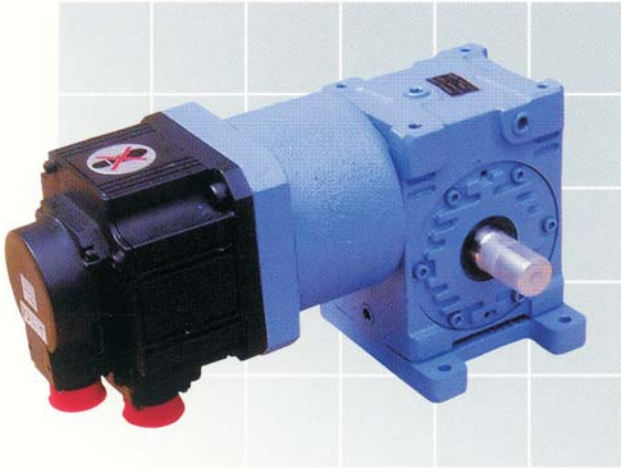| Size	A	B	AB	AC	CD	E	F	H	HL	LL	M	N	Z	OUTPUT SHAFT		
														LS	S	W×Y
50	$6\frac{7}{8}$	$3\frac{3}{4}$	$4\frac{1}{8}$	$4\frac{17}{32}$	$1\frac{31}{32}$	$1\frac{31}{32}$	$3\frac{11}{32}$	$6\frac{5}{16}$	$1\frac{19}{32}$	$2\frac{3}{4}$	7	$3\frac{3}{4}$	$\frac{1}{4}\times20$	$1\frac{9}{16}$	$\frac{3}{4}$	$\frac{3}{16}\times\frac{3}{32}$
60	$7\frac{3}{16}$	$4\frac{1}{16}$	$4\frac{3}{4}$	$4\frac{31}{32}$	$2\frac{3}{8}$	$2\frac{3}{16}$	$4\frac{5}{32}$	$7\frac{11}{32}$	$1\frac{29}{32}$	$3\frac{3}{32}$	$7\frac{5}{8}$	$4\frac{3}{8}$	$\frac{5}{16}\times18$	2	$\frac{7}{8}$	$\frac{3}{16}\times\frac{3}{32}$
70	$8\frac{17}{32}$	$4\frac{27}{32}$	$5\frac{1}{2}$	$6\frac{1}{8}$	$2\frac{3}{4}$	$2\frac{9}{16}$	$4\frac{15}{16}$	$8\frac{15}{32}$	$2\frac{3}{16}$	$3\frac{9}{16}$	$8\frac{3}{8}$	$5\frac{1}{8}$	$\frac{3}{8}\times16$	$2\frac{3}{8}$	$1\frac{1}{8}$	$\frac{1}{4}\times\frac{1}{8}$
80	$9\frac{23}{32}$	$5\frac{1}{2}$	$6\frac{5}{16}$	$6\frac{7}{8}$	$3\frac{5}{32}$	$2\frac{3}{4}$	$5\frac{17}{32}$	$9\frac{27}{32}$	$2\frac{9}{16}$	$4\frac{5}{32}$	$8\frac{3}{4}$	$5\frac{1}{2}$	$\frac{7}{16}\times14$	$2\frac{9}{16}$	$1\frac{3}{8}$	$\frac{5}{16}\times\frac{5}{32}$
100	$12\frac{3}{16}$	$6\frac{7}{8}$	$7\frac{1}{2}$	$8\frac{13}{32}$	$3\frac{15}{16}$	$3\frac{9}{16}$	$7\frac{3}{32}$	$12\frac{7}{32}$	$3\frac{5}{32}$	$5\frac{1}{8}$	$11\frac{3}{16}$	$6\frac{11}{16}$	$\frac{1}{2}\times13$	3	$1\frac{1}{2}$	$\frac{3}{8}\times\frac{3}{16}$
120	$15\frac{1}{4}$	$11\frac{7}{16}$	$9\frac{1}{16}$	$10\frac{13}{32}$	$4\frac{23}{32}$	$3\frac{15}{16}$	$8\frac{21}{32}$	$14\frac{9}{16}$	$3\frac{3}{4}$	$6\frac{1}{8}$	12	$7\frac{1}{2}$	$\frac{9}{16}\times12$	$3\frac{11}{32}$	$1\frac{3}{4}$	$\frac{3}{8}\times\frac{3}{16}$
135	$17\frac{1}{4}$	$12\frac{5}{8}$	$10\frac{1}{4}$	$11\frac{31}{32}$	$5\frac{5}{16}$	$4\frac{11}{32}$	$10\frac{1}{4}$	$16\frac{3}{4}$	$4\frac{1}{8}$	$7\frac{9}{32}$	$12\frac{3}{4}$	$8\frac{1}{4}$	$\frac{5}{8}\times11$	$3\frac{3}{4}$	$2\frac{1}{4}$	$\frac{1}{2}\times\frac{1}{4}$

Note: U Style feet are fastened on with countersunk cap screws into threaded holes in reducer body.

Properly installed and maintained, MAKISHINKO worm gear speed reducers should operate efficiently and dependably.
If problems occur, refer to the chart below, or contact Hampton

Problem	Causes	Remedies
Overheating experienced	1. Overload. 2. Insufficient or excess oil. 3. Incorrect oil. 4. Oil seal damaged.	Check loading and service factor. Check oil level. Flush and add recommended oil. Replace, add oil.
Reducer " buzzes"	1. Gears damaged. 2. Bearings damaged. 3. Inadequate lubrication. 4. Foreign matter in reducer.	Replace gears. Replace bearings. Add oil. Flush and change oil.
Unusual vibrations experienced	1. Worm gear distorted. 2. Worn worm. 3. Foreign matter in reducer. 4. Damaged or worn bearings. 5. Loose bolts.	Replace gear. Replace worm. Flush and change oil. Replace bearings. Tighten.
Oil leakage experienced	1. Oil seal damaged. 2. Packing damaged. 3. Drain plug loose. 4. Oil gauge damaged.	Replace seal. Replace packing. Tighten. Replace gauge.
Shafts will not rotate	1. Worm and worm gear overheating. 2. Bearings damaged. 3. Solid foreign matter in gearbox.	Repair or replace. Replace bearings. Disassemble, clean, refill.
Input shaft skids, output shaft does not rotate	1. Gears worn. 2. Broken output shaft. 3. Worn input shaft. 4. Broken key.	Replace gears Replace shaft. Replace shaft. Replace key.
Wear appears rapid or excessive	1. Overloading. 2. Inadequate lubrication. 3. Bearings damaged. 4. High ambient temperature.	Adjust load or resize unit. Follow recommendations. Replace bearings and gears. Resize to larger units.

MA series

MA series, servo motor flange