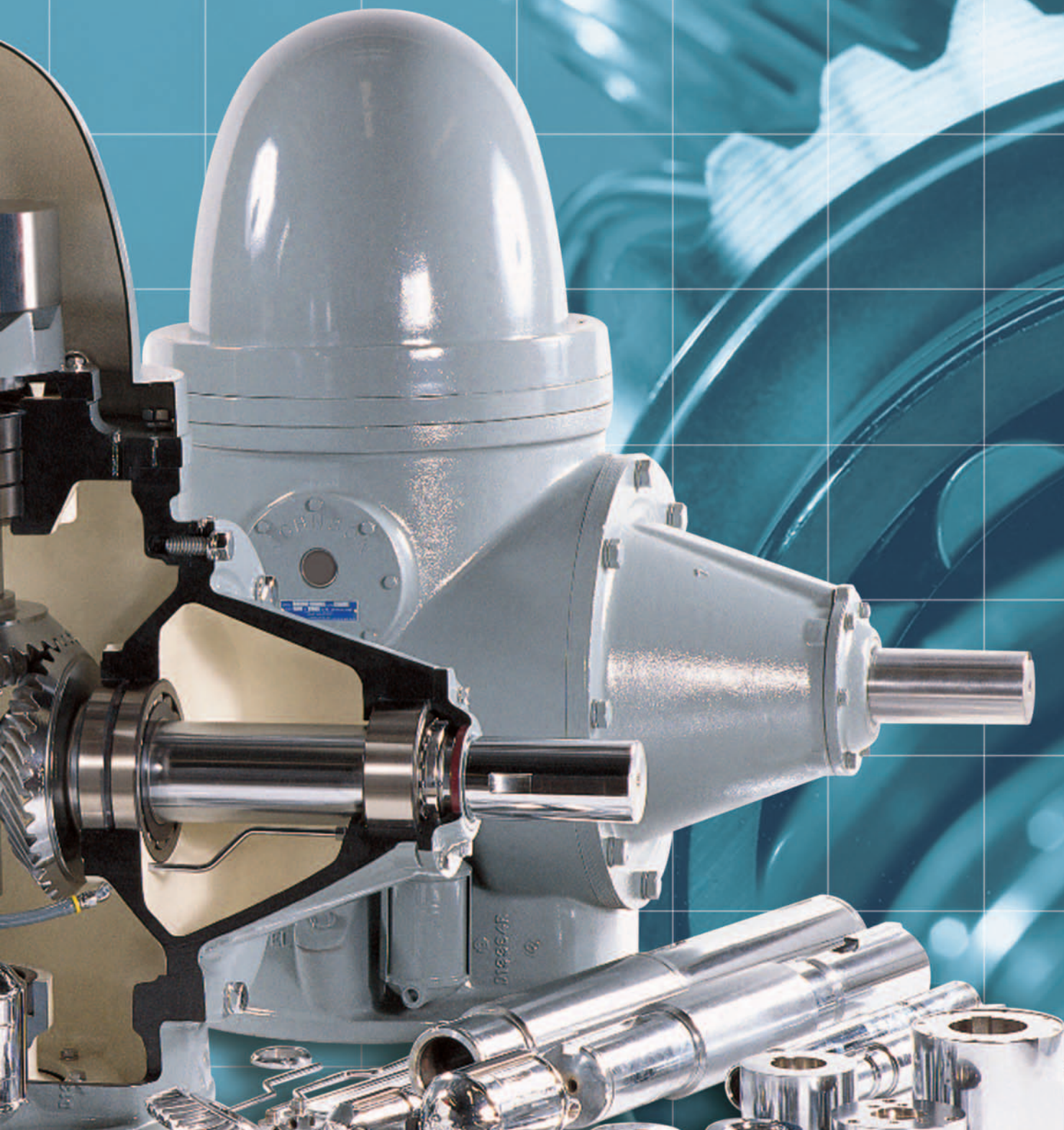


# **JG** **JOHNSON GEAR**

*Right Angle Gear Drive*

**RIGHT ANGLE DRIVES FOR  
IRRIGATION, INDUSTRIAL, MUNICIPAL  
AND FIRE PROTECTION**





# JOHNSON RIGHT ANGLE GEAR DRIVE

THESE FEATURES MEAN CONTINUOUS ON-STREAM PERFORMANCE,  
LOW MAINTENANCE AND DEPENDABILITY

★ **NON-REVERSE COUPLING**, with four pins, standard on hollow-shaft drives

★ **RATCHET PLATE**, high strength ductile iron construction for longer lasting ramps.

**THRUST BEARINGS** angular-contact, and pressure lubricated

**HOUSING** High tensile strength cast gray iron Grade G3000

**OIL SIGHT GLASS** for quick visual inspection of gear lubrication (Not shown)

★ **HOLLOW or SOLID SHAFT** made from 4140 steel

**OIL COOLER** externally mounted with top and bottom cooling water connections. Standard for all models H60 thru H1500

★ **DOME**, weather proof and light weight with cap

**SPIRAL BEVEL GEARS** for quite, high torque operation

**INNER BEARING**, double spherical roller bearing

★ **SPRAG NON-REVERSE** (optional)

**DOUBLE LIP OIL SEAL**

**OUTER BEARING**, angular contact, double row

**PUMP BEARING**, deep groove ball bearing, single row

**PUMP RUNNER**, positive displacement oil pump for pressure lubrication of bearings

\* marks a new or improved design



# GET MORE DRIVE FOR YOUR PUMPING DOLLAR!

## BENEFITS AND APPLICATIONS

The Johnson Right Angle Gear Drive provides positive power transmission from horizontal prime movers to vertical pump shafts. It offers economy, efficiency, space-saving, and the ability to function well under varying climatic conditions.

Johnson Right Angle Gear Drives (Factory Mutual Approved) are used in a variety of applications such as: irrigation; municipal water supply and sewage disposal; fire protection; flood protection; cooling towers; wind towers; and marine service.

A variety of models are available to meet specific requirements of high and low speed prime movers and pumps.

## HORSEPOWER RATING

The Johnson Right Angle Gear Drive model number indicates the normal horsepower rating at 1760 RPM of the vertical pump shaft. The first number of each ratio relationship shown in Table 1 refers to the horizontal shaft speed. Horsepower and thrust capacities in Table 2 are based on vertical shaft speed and apply, regardless of gear ratios.

## SERVICE FACTOR

Ratings in the catalog tables incorporate an adequate service factor for continuous duty when driving a centrifugal or turbine type deep well pump.

To select the correct size gear drives, use the tabulated values directly to match the horsepower required by the pump. On other applications consult factory.

The AGMA service factor for the spiral bevel gears is 1.5 or greater. Specific values for given applications are available on request.

Other items that influence the unit ratings are bearings, shafts, temperature, and lubrication. All were considered in compiling Table 2 on ratio selection. The recommendation is to stay within the tabulated ratings; consult the factory regarding any variations. Overloading will void warranty.

When oil cooler equipped drives are operated at rated capacity, coolant at about 70° F should be available for oil cooler use. Low thrust loads, slow speeds, good air circulation and intermittent operation also influence final selection.

## ROTATION

The direction of rotation of the vertical shaft is as viewed from above and the rotation of the horizontal shaft is as if seen from the stub end. See drawings designated Figs. 1 through 4 on following pages.

Gear drives with special rotations (as designated in Figs. 2, 3 and 4) and gear drives with speed decreasing ratios of 7:4 or higher are manufactured to order. Such orders are not subject to cancellation without charge for parts processed.

**TABLE 1.**

| Vert<br>Shaft<br>R.P.M. | Horizontal Shaft R.P.M.               |      |      |      |      |      |       |      |
|-------------------------|---------------------------------------|------|------|------|------|------|-------|------|
|                         | Speed Increasing Ratios-Driver:Driven |      |      |      |      |      |       |      |
|                         | 1:2                                   | 4:7  | 2:3  | 3:4  | 4:5  | 5:6  | 10:11 | 1:1  |
| 580                     | 290                                   | 331  | 387  | 435  | 464  | 483  | 527   | 580  |
| 720                     | 360                                   | 411  | 480  | 540  | 576  | 600  | 655   | 720  |
| 860                     | 430                                   | 491  | 573  | 645  | 688  | 717  | 782   | 860  |
| 1160                    | 580                                   | 663  | 773  | 870  | 928  | 967  | 1055  | 1160 |
| 1460                    | 730                                   | 834  | 973  | 1095 | 1168 | 1217 | 1327  | 1460 |
| 1760                    | 880                                   | 1006 | 1173 | 1320 | 1408 | 1467 | 1600  | 1760 |
| 3460 *                  | 1730                                  | 1977 | 2307 | 2595 | 2768 | 2883 | 3145  | 3460 |

| Vert<br>Shaft<br>R.P.M. | Horizontal Shaft R.P.M.               |      |      |      |      |      |      |      |      |      |      |
|-------------------------|---------------------------------------|------|------|------|------|------|------|------|------|------|------|
|                         | Speed Decreasing Ratios-Driver:Driven |      |      |      |      |      |      |      |      |      |      |
|                         | 11:10                                 | 6:5  | 5:4  | 4:3  | 3:2  | 7:4  | 2:1  | 9:4  | 5:2  | 11:4 | 3:1  |
| 580                     | 638                                   | 696  | 725  | 733  | 870  | 1015 | 1160 | 1305 | 1450 | 1595 | 1740 |
| 720                     | 792                                   | 864  | 900  | 960  | 1080 | 1260 | 1440 | 1620 | 1800 | 1980 | 2160 |
| 860                     | 946                                   | 1032 | 1075 | 1147 | 1290 | 1505 | 1720 | 1935 | 2150 | 2365 | 2580 |
| 1160                    | 1276                                  | 1392 | 1450 | 1547 | 1740 | 2030 | 2320 | 2610 | 2900 | 3190 | 3480 |
| 1460                    | 1606                                  | 1752 | 1825 | 1947 | 2190 | 2555 | 2920 | 3285 | 3560 | --   | --   |
| 1760                    | 1936                                  | 2112 | 2200 | 2347 | 2640 | 3080 | 3520 | --   | --   | --   | --   |

\* Consult factory

# THRUST CAPACITY

## HOLLOW SHAFT DRIVES

Large capacity thrust bearings are provided to handle a wide range of pump equipment and heads of water. In most instances, the natural thrust of the gears is used to reduce the load on the bearings. This condition necessitates a minimum downthrust requirement to prevent a bearing separation. Unless otherwise specified, Johnson Gear drive units are furnished with a thrust bearing arrangement DT. Ratings shown in the STANDARD column apply except for Model H750-H1500, which are designed with a spherical roller thrust bearing in order to accommodate large thrust capacities and to provide maximum up-thrust protection.

The TWO-WAY column shows the ratings for bearing arrangement DF. Upthrust and

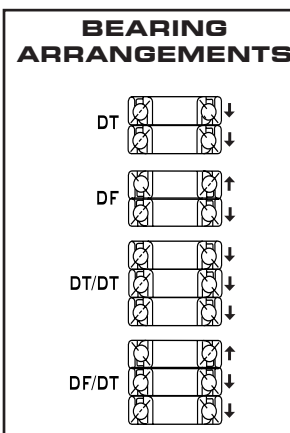
downthrust can be accommodated with this configuration.

When the downthrust exceeds the values of the STANDARD column, select a suitable size from the HEAVY THRUST column. These ratings are for bearing arrangement DT/DT.

The heavy duty model can also be furnished with bearing arrangement of DF/DT. The downthrust ratings are taken from the STANDARD column. The upthrust ratings are taken from the TWO-WAY column.

## OTHER DRIVES

Ratings for **Combination**, **Solid Shaft**, and **Redi-Torq®** drives are taken from the TWO-WAY column. Consult the factory when there are conditions not covered by the following table.



**TABLE 2. THRUST CAPACITY (in pounds)**

| Model | Vertical Shaft RPM | H. P. | Standard       |       | Heavy |       | Two-Way                | Model | Vertical Shaft RPM | H. P. | Standard       |       | Heavy |       | Two-Way                |
|-------|--------------------|-------|----------------|-------|-------|-------|------------------------|-------|--------------------|-------|----------------|-------|-------|-------|------------------------|
|       |                    |       | Dowthrust Only |       |       |       | Down or Up Thrust Max. |       |                    |       | Dowthrust Only |       |       |       | Down or Up Thrust Max. |
|       |                    |       | Min.           | Max.  | Min.  | Max.  |                        |       |                    |       | Min.           | Max.  | Min.  | Max.  |                        |
| H20   | 1160               | 15    |                | 1400  | 750   | 2300  | 1400                   | H250  | 720                | 125   | 3600           | 12650 | 3600  | 17500 | 7800                   |
|       | 1460               | 17    |                | 1300  | 750   | 2200  | 1300                   |       | 860                | 145   | 3450           | 12000 | 3450  | 16700 | 7400                   |
|       | 1760               | 20    |                | 1200  | 750   | 2000  | 1200                   |       | 1160               | 180   | 3200           | 11200 | 3200  | 15500 | 7000                   |
|       | 3460               | 30    |                | 1000  | 750   | 1600  | 1000                   |       | 1460               | 215   | 3000           | 10600 | 3000  | 14600 | 6500                   |
| H40   | 1160               | 30    | 900            | 4400  |       |       | 2600                   | H300  | 1760               | 250   | 2900           | 10000 | 2900  | 14000 | 6300                   |
|       | 1460               | 35    | 850            | 4200  |       |       | 2500                   |       | 720                | 150   | 3750           | 13700 | 3750  | 18800 | 8200                   |
|       | 1760               | 40    | 800            | 4000  |       |       | 2400                   |       | 860                | 174   | 3550           | 13000 | 3600  | 17900 | 7800                   |
| H60   | 860                | 34    | 1450           | 6000  |       |       | 3600                   | H350  | 1160               | 216   | 3350           | 12200 | 3350  | 16700 | 7300                   |
|       | 1160               | 43    | 1300           | 5500  |       |       | 3300                   |       | 1460               | 258   | 3150           | 11500 | 3150  | 15700 | 6900                   |
|       | 1460               | 52    | 1250           | 5200  |       |       | 3100                   |       | 1760               | 300   | 3000           | 11000 | 3000  | 15000 | 6600                   |
|       | 1760               | 60    | 1200           | 5000  |       |       | 3000                   |       | 720                | 175   | 4250           | 16300 | 4200  | 20000 | 9800                   |
| H80   | 860                | 46    | 2050           | 7400  | 1500  | 9700  | 4400                   | H425  | 860                | 203   | 4050           | 15500 | 4000  | 19000 | 9300                   |
|       | 1160               | 58    | 1950           | 6900  | 1500  | 9100  | 4100                   |       | 1160               | 252   | 3750           | 14400 | 3750  | 17800 | 8600                   |
|       | 1460               | 69    | 1800           | 6400  | 1500  | 8300  | 3800                   |       | 1460               | 301   | 3550           | 13600 | 3500  | 16700 | 8200                   |
|       | 1760               | 80    | 1700           | 6000  | 1500  | 8000  | 3000                   |       | 1760               | 350   | 3400           | 13000 | 3400  | 16000 | 7800                   |
| H110  | 860                | 63    | 2350           | 7400  | 1800  | 9700  | 4400                   | H500  | 720                | 213   | 4650           | 18700 | 4750  | 25000 | 11200                  |
|       | 1160               | 80    | 2200           | 6900  | 1800  | 9100  | 4100                   |       | 860                | 246   | 4450           | 17900 | 4550  | 24000 | 10700                  |
|       | 1460               | 95    | 2050           | 6400  | 1800  | 8500  | 3800                   |       | 1160               | 306   | 4150           | 16600 | 4200  | 22000 | 10000                  |
|       | 1760               | 110   | 1900           | 6000  | 1800  | 8000  | 3000                   |       | 1460               | 366   | 3900           | 15700 | 4000  | 21000 | 9400                   |
| H125  | 720                | 63    | 2900           | 8500  | 2800  | 12200 | 5100                   | H600  | 1760               | 425   | 3800           | 15000 | 3800  | 20000 | 9000                   |
|       | 860                | 72    | 2700           | 8000  | 2650  | 11600 | 4800                   |       | 580                | 215   | 6048           | 21600 | 6048  | 28800 | 12900                  |
|       | 1160               | 90    | 2550           | 7500  | 2500  | 10800 | 4500                   |       | 690                | 240   | 5712           | 20400 | 5712  | 27200 | 12000                  |
|       | 1460               | 108   | 2400           | 7000  | 2300  | 10100 | 4200                   |       | 720                | 250   | 5250           | 18700 | 5250  | 25000 | 11200                  |
| 1760  | 125                | 2200  | 6500           | 2200  | 9500  | 3900  | 860                    |       | 290                | 5000  | 17900          | 5000  | 24000 | 10700 |                        |
| H150  | 720                | 75    | 3050           | 9800  | 3150  | 15000 | 5900                   | H1200 | 1160               | 360   | 4650           | 16600 | 4600  | 22000 | 10000                  |
|       | 860                | 87    | 2950           | 9400  | 3000  | 14300 | 5600                   |       | 1460               | 430   | 4400           | 15700 | 4400  | 21000 | 9400                   |
|       | 1160               | 108   | 2750           | 8800  | 2800  | 13300 | 5300                   |       | 1760               | 500   | 4200           | 15000 | 4200  | 20000 | 9000                   |
|       | 1460               | 129   | 2600           | 8300  | 2600  | 12500 | 5000                   |       | 580                | 258   | 6336           | 23000 | 6336  | 36000 | 13800                  |
| H200  | 1760               | 150   | 2500           | 8000  | 2500  | 12000 | 4800                   | H1500 | 690                | 288   | 5900           | 21700 | 5900  | 34000 | 13000                  |
|       | 720                | 100   | 3600           | 12000 | 3400  | 16200 | 6750                   |       | 720                | 300   | 5500           | 20000 | 5500  | 33500 | 12000                  |
|       | 860                | 116   | 3300           | 11000 | 3200  | 15300 | 6300                   |       | 860                | 348   | 5200           | 19000 | 5200  | 31500 | 11400                  |
|       | 1160               | 144   | 3050           | 10200 | 3000  | 14300 | 5700                   |       | 1160               | 432   | 4900           | 17800 | 4900  | 28700 | 10700                  |
|       | 1460               | 172   | 2850           | 9500  | 2850  | 13500 | 5300                   |       | 1460               | 516   | 4600           | 16700 | 4600  | 26500 | 10000                  |
|       | 1760               | 200   | 2700           | 9000  | 2700  | 13000 | 5100                   |       | 1760               | 600   | 4400           | 16000 | 4400  | 25000 | 9600                   |

Ratings shown are for Fig. 1, rotation only. Consult factory for other figure ratings.

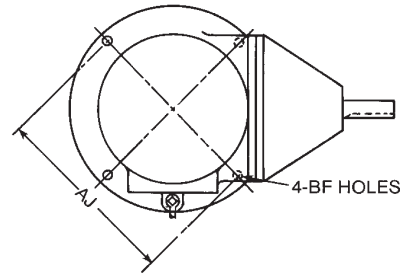
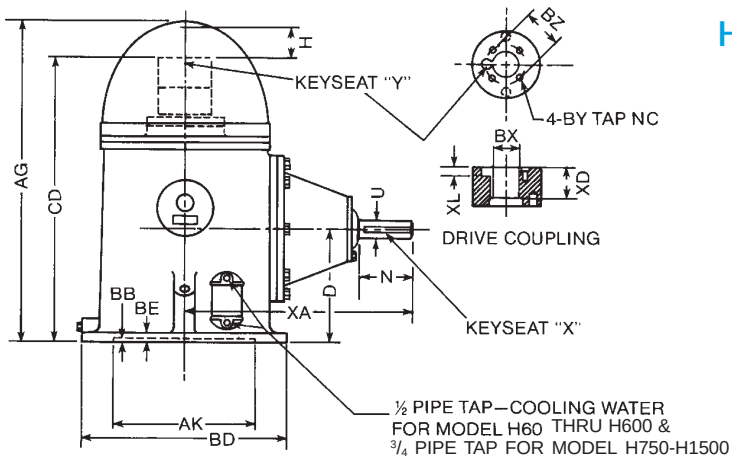
| Model | Vertical Shaft RPM | H. P. | max down thrust | Model | Vertical Shaft RPM | H. P. | max down thrust | Model | Vertical Shaft RPM | H. P. | max down thrust | Model | Vertical Shaft RPM | H. P. | max down thrust |
|-------|--------------------|-------|-----------------|-------|--------------------|-------|-----------------|-------|--------------------|-------|-----------------|-------|--------------------|-------|-----------------|
| H750  | 580                | 322   | 47520           | H1000 | 580                | 430   | 47520           | H1200 | 580                | 516   | 57600           | H1500 | 580                | 645   | 57600           |
|       | 690                | 360   | 44880           |       | 690                | 480   | 44880           |       | 690                | 576   | 54400           |       | 690                | 720   | 54400           |
|       | 720                | 375   | 44220           |       | 720                | 500   | 44220           |       | 720                | 600   | 53600           |       | 720                | 750   | 53600           |
|       | 860                | 435   | 41580           |       | 860                | 580   | 41580           |       | 860                | 696   | 50400           |       | 860                | 870   | 50400           |
|       | 1160               | 540   | 37950           |       | 1160               | 720   | 37950           |       | 1160               | 864   | 46000           |       | 1160               | 1080  | 46000           |
|       | 1460               | 645   | 34980           |       | 1460               | 860   | 34980           |       | 1460               | 1032  | 42400           |       | 1460               | 1290  | 42400           |
|       | 1760               | 750   | 33000           |       | 1760               | 1000  | 33000           |       | 1760               | 1200  | 40000           |       | 1760               | 1500  | 40000           |

**TABLE 3. HORSEPOWER AND THRUST BEARING RATINGS**

| Vertical Shaft RPM      | 580 | 690 | 720 | 860 | 960 | 1160 | 1460 | 1760 | 2000 | 2200 | 2400* | 2800* | 3000* | 3520* |
|-------------------------|-----|-----|-----|-----|-----|------|------|------|------|------|-------|-------|-------|-------|
| % of HP at 1760 RPM     | 43  | 48  | 50  | 58  | 63  | 72   | 86   | 100  | 105  | 111  | 116   | 128   | 133   | 150   |
| % of Thrust of 1760 RPM | 144 | 136 | 134 | 126 | 122 | 115  | 106  | 100  | 96   | 92   | 90    | 85    | 83    | 79    |

\* Consult factory when vertical shaft speed exceeds 2200 RPM.

## HOLLOW SHAFT DRIVE



U-XA-N and X dimensions for all speed decreasing ratios in Models H150 and up are subject to change. See Table 8 on page 7. CD and H dimensions for all heavy thrust drives are subject to change. See Table 6 at bottom of page.

**TABLE 4. DIMENSIONS (in inches)**

| Model    | CD                             | D                              | U                              | XA                             | N                             | AG                             | H                             | BE                            | BD                             | AJ                             | AK                             | BB                             | BF                              | Keyseat X                                                                                      | Max Bx                          |                                 | XD                            |
|----------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------------------|--------------------------------|-------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------|-------------------------------|
|          |                                |                                |                                |                                |                               |                                |                               |                               |                                |                                |                                |                                |                                 |                                                                                                | Fig. 1, 4                       | Fig. 2, 3                       |                               |
| H20      | 14 <sup>1</sup> / <sub>2</sub> | 6 <sup>3</sup> / <sub>8</sub>  | 1 <sup>1</sup> / <sub>8</sub>  | 13                             | 2 <sup>3</sup> / <sub>4</sub> | 18                             | 3                             | 5 <sup>5</sup> / <sub>8</sub> | 10                             | 9 <sup>1</sup> / <sub>8</sub>  | 8 <sup>1</sup> / <sub>4</sub>  | 3 <sup>3</sup> / <sub>16</sub> | 7 <sup>1</sup> / <sub>16</sub>  | 1 <sup>1</sup> / <sub>4</sub> X 3 <sup>1</sup> / <sub>8</sub> X 2 <sup>1</sup> / <sub>4</sub>  | 1                               | NA                              | 1 <sup>1</sup> / <sub>4</sub> |
| H40 (12) | 20 <sup>3</sup> / <sub>4</sub> | 9                              | 1-7/8                          | 16                             | 3 <sup>1</sup> / <sub>2</sub> | 24 <sup>3</sup> / <sub>4</sub> | 4                             | 3 <sup>3</sup> / <sub>4</sub> | 12                             | 9 <sup>1</sup> / <sub>8</sub>  | 8 <sup>1</sup> / <sub>4</sub>  | 3 <sup>3</sup> / <sub>16</sub> | 7 <sup>1</sup> / <sub>16</sub>  | 3 <sup>3</sup> / <sub>8</sub> X 3 <sup>1</sup> / <sub>16</sub> X 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub>   | 1 <sup>1</sup> / <sub>4</sub>   | 1 <sup>3</sup> / <sub>4</sub> |
| H40      | 20 <sup>3</sup> / <sub>4</sub> | 9                              | 1-7/8                          | 16                             | 3 <sup>1</sup> / <sub>2</sub> | 24 <sup>3</sup> / <sub>4</sub> | 4                             | 3 <sup>3</sup> / <sub>4</sub> | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>8</sub> X 3 <sup>1</sup> / <sub>16</sub> X 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub>   | 1 <sup>1</sup> / <sub>4</sub>   | 1 <sup>3</sup> / <sub>4</sub> |
| H60      | 20 <sup>3</sup> / <sub>4</sub> | 9                              | 1-7/8                          | 16                             | 3 <sup>1</sup> / <sub>2</sub> | 24 <sup>3</sup> / <sub>4</sub> | 4                             | 3 <sup>3</sup> / <sub>4</sub> | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>8</sub> X 3 <sup>1</sup> / <sub>16</sub> X 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub>   | 1 <sup>1</sup> / <sub>4</sub>   | 1 <sup>3</sup> / <sub>4</sub> |
| H80      | 20 <sup>3</sup> / <sub>4</sub> | 9                              | 1-7/8                          | 16 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub> | 24 <sup>3</sup> / <sub>4</sub> | 4                             | 3 <sup>3</sup> / <sub>4</sub> | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 3/8 X 3/16 X 2-3/4                                                                             | 1 <sup>1</sup> / <sub>2</sub>   | NA                              | 1 <sup>3</sup> / <sub>4</sub> |
| H110     | 25                             | 11 <sup>3</sup> / <sub>8</sub> | 2                              | 17 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub> | 29 <sup>1</sup> / <sub>2</sub> | 4                             | 1                             | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>2</sub> X 1 <sup>1</sup> / <sub>4</sub> X 2 <sup>3</sup> / <sub>4</sub>  | 1 <sup>1</sup> / <sub>2</sub>   | 1 <sup>1</sup> / <sub>2</sub>   | 2 <sup>1</sup> / <sub>8</sub> |
| H125     | 25                             | 11 <sup>3</sup> / <sub>8</sub> | 2                              | 17 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub> | 29 <sup>1</sup> / <sub>2</sub> | 4                             | 1                             | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>2</sub> X 1 <sup>1</sup> / <sub>4</sub> X 2 <sup>3</sup> / <sub>4</sub>  | 1 <sup>1</sup> / <sub>2</sub>   | 1 <sup>1</sup> / <sub>2</sub>   | 2 <sup>1</sup> / <sub>8</sub> |
| H150     | 30                             | 13 <sup>3</sup> / <sub>4</sub> | 2 <sup>1</sup> / <sub>16</sub> | 20 <sup>1</sup> / <sub>2</sub> | 4 <sup>3</sup> / <sub>4</sub> | 34 <sup>1</sup> / <sub>2</sub> | 4                             | 1                             | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> X 5 <sup>1</sup> / <sub>16</sub> X 3 <sup>3</sup> / <sub>4</sub> | 1 <sup>15</sup> / <sub>16</sub> | 1 <sup>3</sup> / <sub>4</sub>   | 2 <sup>3</sup> / <sub>8</sub> |
| H200     | 30                             | 13 <sup>3</sup> / <sub>4</sub> | 2 <sup>1</sup> / <sub>16</sub> | 20 <sup>1</sup> / <sub>2</sub> | 4 <sup>3</sup> / <sub>4</sub> | 34 <sup>1</sup> / <sub>2</sub> | 4                             | 1                             | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> X 5 <sup>1</sup> / <sub>16</sub> X 3 <sup>3</sup> / <sub>4</sub> | 1 <sup>15</sup> / <sub>16</sub> | 1 <sup>3</sup> / <sub>4</sub>   | 2 <sup>3</sup> / <sub>8</sub> |
| H250     | 34 <sup>1</sup> / <sub>4</sub> | 15                             | 2 <sup>3</sup> / <sub>4</sub>  | 24                             | 5 <sup>1</sup> / <sub>2</sub> | 40                             | 5 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>8</sub> | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> X 5 <sup>1</sup> / <sub>16</sub> X 4 <sup>3</sup> / <sub>4</sub> | 2                               | 2                               | 2 <sup>5</sup> / <sub>8</sub> |
| H300     | 34 <sup>1</sup> / <sub>4</sub> | 15                             | 2 <sup>3</sup> / <sub>4</sub>  | 24                             | 5 <sup>1</sup> / <sub>2</sub> | 40                             | 5 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>8</sub> | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> X 5 <sup>1</sup> / <sub>16</sub> X 4 <sup>3</sup> / <sub>4</sub> | 2                               | 2                               | 2 <sup>5</sup> / <sub>8</sub> |
| H350     | 38 <sup>1</sup> / <sub>2</sub> | 16 <sup>1</sup> / <sub>2</sub> | 2 <sup>3</sup> / <sub>4</sub>  | 29                             | 5 <sup>1</sup> / <sub>2</sub> | 46                             | 7                             | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> X 5 <sup>1</sup> / <sub>16</sub> X 4 <sup>3</sup> / <sub>4</sub> | 2 <sup>3</sup> / <sub>16</sub>  | 2 <sup>3</sup> / <sub>16</sub>  | 3                             |
| H425     | 39 <sup>1</sup> / <sub>2</sub> | 16 <sup>1</sup> / <sub>2</sub> | 3                              | 30                             | 5 <sup>3</sup> / <sub>4</sub> | 46                             | 6 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>4</sub> X 3 <sup>3</sup> / <sub>8</sub> X 4 <sup>3</sup> / <sub>4</sub>  | 2 <sup>7</sup> / <sub>16</sub>  | 2 <sup>7</sup> / <sub>16</sub>  | 3 <sup>3</sup> / <sub>8</sub> |
| H500     | 39 <sup>1</sup> / <sub>2</sub> | 16 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub>  | 31                             | 6 <sup>1</sup> / <sub>4</sub> | 46                             | 6 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 7 <sup>7</sup> / <sub>8</sub> X 7 <sup>1</sup> / <sub>16</sub> X 5 <sup>1</sup> / <sub>2</sub> | 2 <sup>7</sup> / <sub>16</sub>  | 2 <sup>7</sup> / <sub>16</sub>  | 3 <sup>3</sup> / <sub>8</sub> |
| H600     | 42 <sup>1</sup> / <sub>2</sub> | 16 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub>  | 33                             | 7 <sup>1</sup> / <sub>2</sub> | 51                             | 8                             | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 7 <sup>7</sup> / <sub>8</sub> X 7 <sup>1</sup> / <sub>16</sub> X 5 <sup>1</sup> / <sub>2</sub> | 2 <sup>11</sup> / <sub>16</sub> | 2 <sup>11</sup> / <sub>16</sub> | 4                             |
| H750     | 45                             | 20 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub>  | 33                             | 7 <sup>3</sup> / <sub>4</sub> | 54                             | 7                             | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 7 <sup>7</sup> / <sub>8</sub> X 7 <sup>1</sup> / <sub>16</sub> X 6 <sup>1</sup> / <sub>4</sub> | 3 <sup>3</sup> / <sub>16</sub>  | 3 <sup>3</sup> / <sub>16</sub>  | 4                             |
| H1000    | 45                             | 20 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub>  | 33                             | 7 <sup>3</sup> / <sub>4</sub> | 54                             | 7                             | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 7 <sup>7</sup> / <sub>8</sub> X 7 <sup>1</sup> / <sub>16</sub> X 6 <sup>1</sup> / <sub>4</sub> | 3 <sup>3</sup> / <sub>16</sub>  | 3 <sup>3</sup> / <sub>16</sub>  | 4                             |
| H1200    | 45 <sup>3</sup> / <sub>4</sub> | 19                             | 4                              | 36                             | 7 <sup>1</sup> / <sub>2</sub> | 54                             | 7 <sup>5</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>2</sub> | 30 <sup>1</sup> / <sub>2</sub> | 26*                            | 22                             | 3 <sup>3</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 1 X 1 <sup>1</sup> / <sub>2</sub> X 7                                                          | 3 <sup>3</sup> / <sub>16</sub>  | 3 <sup>3</sup> / <sub>16</sub>  | 4                             |
| H1500    | 45 <sup>3</sup> / <sub>4</sub> | 19                             | 4                              | 36                             | 7 <sup>1</sup> / <sub>2</sub> | 54                             | 7 <sup>5</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>2</sub> | 30 <sup>1</sup> / <sub>2</sub> | 26*                            | 22                             | 3 <sup>3</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 1 X 1 <sup>1</sup> / <sub>2</sub> X 7                                                          | 3 <sup>3</sup> / <sub>16</sub>  | 3 <sup>3</sup> / <sub>16</sub>  | 4                             |

\*Also 5/8-11 Tap on 14-3/4 Bolt Circle 1" Deep  
NA - Not Available

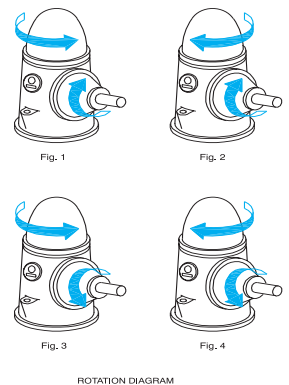
**TABLE 5. STANDARD DRIVE COUPLING DIMENSIONS**

| BX Bore                         | BZ Bolt Circle                | BY Tap | XL Depth                        | Y Keyseat                                                       |
|---------------------------------|-------------------------------|--------|---------------------------------|-----------------------------------------------------------------|
| 3/4                             | 1 <sup>3</sup> / <sub>8</sub> | 10-32  | 5 <sup>1</sup> / <sub>16</sub>  | 3 <sup>1</sup> / <sub>16</sub> X 3 <sup>1</sup> / <sub>32</sub> |
| 1                               | 1 <sup>3</sup> / <sub>8</sub> | 10-32  | 7 <sup>1</sup> / <sub>16</sub>  | 1 <sup>1</sup> / <sub>4</sub> X 1 <sup>1</sup> / <sub>8</sub>   |
| 1 <sup>3</sup> / <sub>16</sub>  | 1 <sup>3</sup> / <sub>4</sub> | 1/4-20 | 7 <sup>1</sup> / <sub>16</sub>  | 1 <sup>1</sup> / <sub>4</sub> X 1 <sup>1</sup> / <sub>8</sub>   |
| 1 <sup>1</sup> / <sub>4</sub>   | 1 <sup>3</sup> / <sub>4</sub> | 1/4-20 | 9 <sup>1</sup> / <sub>16</sub>  | 1 <sup>1</sup> / <sub>4</sub> X 1 <sup>1</sup> / <sub>8</sub>   |
| 1 <sup>7</sup> / <sub>16</sub>  | 2 <sup>1</sup> / <sub>8</sub> | 1/4-20 | 9 <sup>1</sup> / <sub>16</sub>  | 3 <sup>3</sup> / <sub>8</sub> X 3 <sup>3</sup> / <sub>16</sub>  |
| 1 <sup>1</sup> / <sub>2</sub>   | 2 <sup>1</sup> / <sub>8</sub> | 1/4-20 | 9 <sup>1</sup> / <sub>16</sub>  | 3 <sup>3</sup> / <sub>8</sub> X 3 <sup>3</sup> / <sub>16</sub>  |
| 1 <sup>11</sup> / <sub>16</sub> | 2 <sup>1</sup> / <sub>2</sub> | 1/4-20 | 9 <sup>1</sup> / <sub>16</sub>  | 3 <sup>3</sup> / <sub>8</sub> X 3 <sup>3</sup> / <sub>16</sub>  |
| 1 <sup>15</sup> / <sub>16</sub> | 2 <sup>1</sup> / <sub>2</sub> | 1/4-20 | 11 <sup>1</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>2</sub> X 1 <sup>1</sup> / <sub>4</sub>   |
| 2 <sup>3</sup> / <sub>16</sub>  | 3 <sup>1</sup> / <sub>4</sub> | 3/8-16 | 11 <sup>1</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>2</sub> X 1 <sup>1</sup> / <sub>4</sub>   |
| 2 <sup>7</sup> / <sub>16</sub>  | 3 <sup>1</sup> / <sub>4</sub> | 3/8-16 | 11 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> X 5 <sup>1</sup> / <sub>16</sub>  |
| 2 <sup>11</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>4</sub> | 3/8-16 | 11 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> X 5 <sup>1</sup> / <sub>16</sub>  |
| 2 <sup>15</sup> / <sub>16</sub> | 4 <sup>1</sup> / <sub>4</sub> | 3/8-16 | 15 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>4</sub> X 3 <sup>3</sup> / <sub>8</sub>   |

**TABLE 6. STANDARD DRIVE HEAVY THRUST DIMENSIONS**

| Model  | CD                             | H                             |
|--------|--------------------------------|-------------------------------|
| H80HT  | 21 <sup>1</sup> / <sub>2</sub> | 2 <sup>3</sup> / <sub>4</sub> |
| H110HT | 26 <sup>1</sup> / <sub>4</sub> | 2 <sup>3</sup> / <sub>4</sub> |
| H125HT | 26 <sup>1</sup> / <sub>2</sub> | 2 <sup>1</sup> / <sub>2</sub> |
| H150HT | 31 <sup>1</sup> / <sub>4</sub> | 2 <sup>3</sup> / <sub>4</sub> |
| H200HT | 31 <sup>1</sup> / <sub>4</sub> | 2 <sup>3</sup> / <sub>4</sub> |
| H250HT | 36                             | 3 <sup>1</sup> / <sub>2</sub> |
| H300HT | 36                             | 3 <sup>1</sup> / <sub>2</sub> |
| H350HT | 40 <sup>1</sup> / <sub>4</sub> | 5 <sup>1</sup> / <sub>4</sub> |
| H425HT | 39 <sup>1</sup> / <sub>2</sub> | 6 <sup>1</sup> / <sub>4</sub> |
| H500HT | 42                             | 3 <sup>3</sup> / <sub>4</sub> |
| H600HT | 42 <sup>1</sup> / <sub>2</sub> | 8                             |

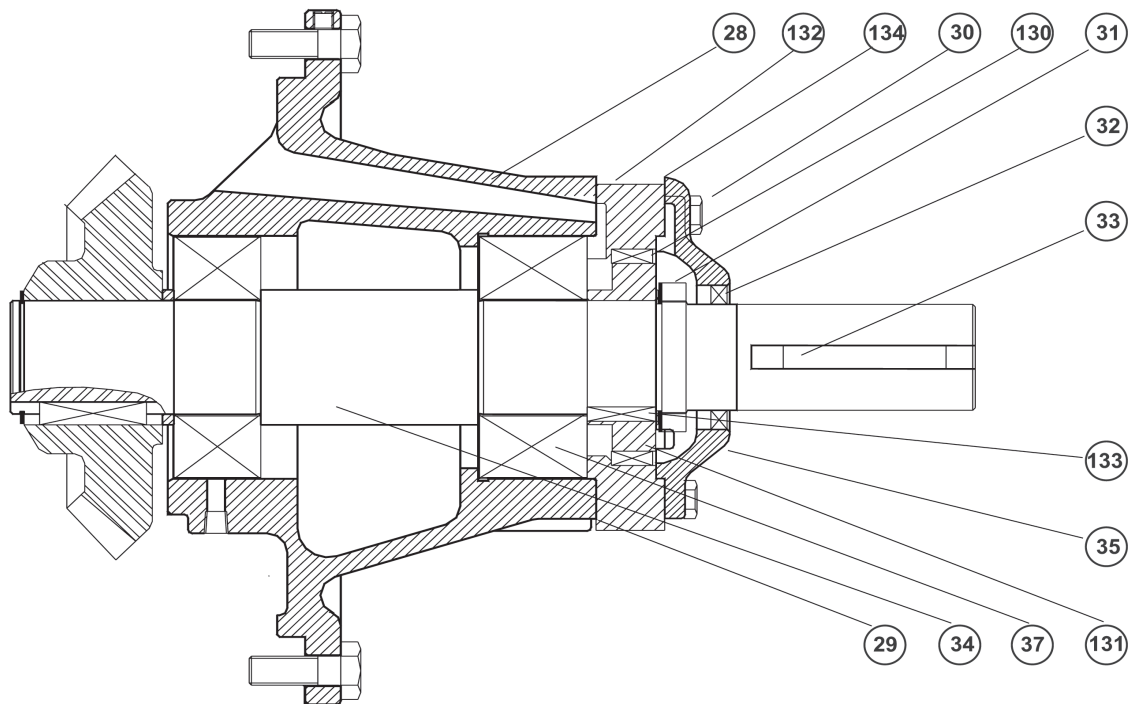
## ROTATION



Gear drives with special rotations (Figs. 2, 3, and 4) and gear drives with speed decreasing ratios of 7:4 or higher are manufactured to order, and such orders are not subject to cancellation without charge for parts processed.

SEE PAGES 10 & 11 FOR SOLID SHAFT DRIVES

## SPRAG NON-REVERSE CLUTCH

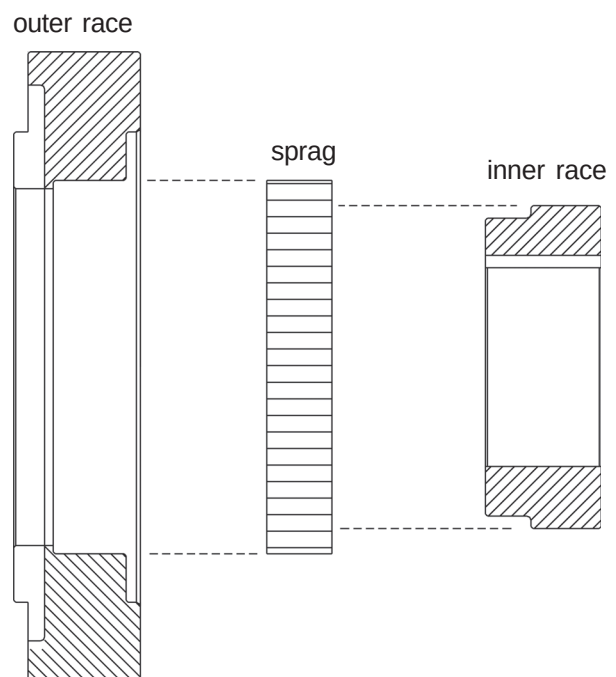


### **SPRAG NON-REVERSE**

| No. | Part Name                  | No. | Part Name                |
|-----|----------------------------|-----|--------------------------|
| 28  | Horizontal Housing         | 35  | Horizontal Housing Cover |
| 29  | Gasket-Outer race          | 37  | Outer Bearing            |
| 30  | Capscrew-Horiz. Hsg. Cover | 130 | Sprag Clutch             |
| 31  | Locknut & Washer           | 131 | Inner Race               |
| 32  | Oil Seal                   | 132 | Outer Race               |
| 33  | Key                        | 133 | Key                      |
| 34  | Drive Shaft                | 134 | Gasket-Horz. Hsg. Cover  |

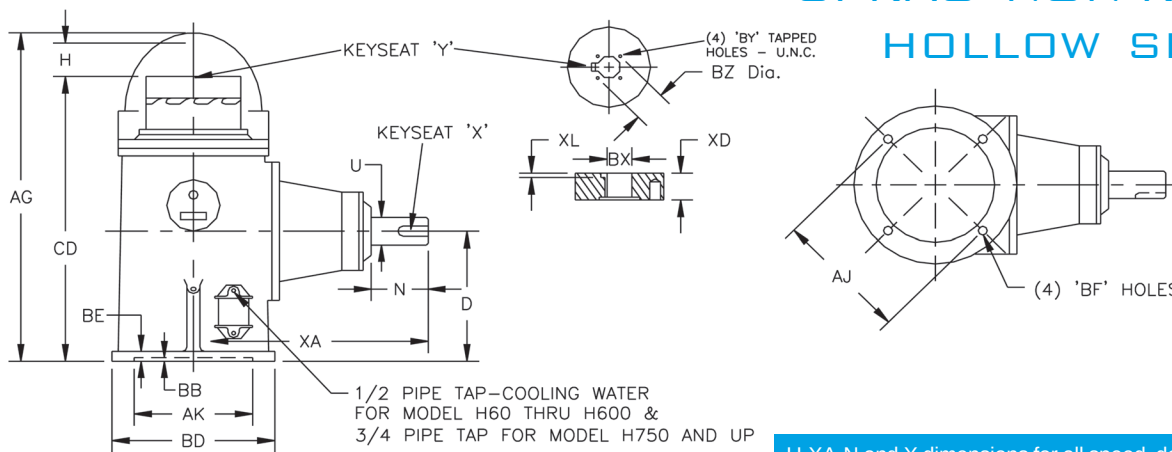
### Provides Extra Non-Reverse Protection

We would like to introduce our version of the sprag non-reverse clutch. This device works as an instant lock and is mounted on the horizontal input shaft of the gear drive. It is fashioned from an industrial automotive transmission. The sprag is mounted between an inner and outer race, which are case hardened, made from 8620 alloy steel, and precision ground to size to insure long life. We believe our design to be superior due to the fact that the mating parts are register fit to allow exact alignment at all times. This design allows replacement in the field without alignment tools saving valuable time.





## SPRAG NON-REVERSE HOLLOW SHAFT



U-XA-N and X dimensions for all speed decreasing ratios in Models H150 and up are subject to change. See Table 8 at bottom of page. CD and H dimensions for all heavy thrust drives are subject to change. See Table 6 on page 5.

**TABLE 7. DIMENSIONS (in inches)**

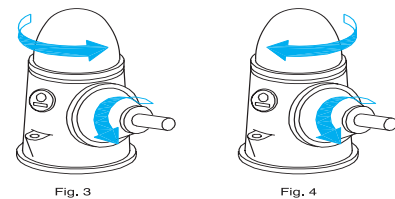
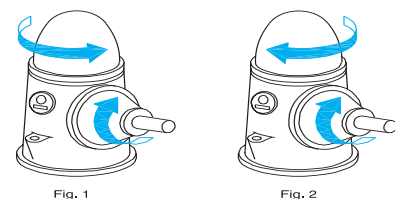
| Model | CD                             | D                              | U                              | XA                               | N                             | AG                             | H                             | BE                            | BD                             | AJ                             | AK                             | BB                           | BF                            | Keyseat X                                                                                  | Max Bx                          |                                 | XD                            |
|-------|--------------------------------|--------------------------------|--------------------------------|----------------------------------|-------------------------------|--------------------------------|-------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|------------------------------|-------------------------------|--------------------------------------------------------------------------------------------|---------------------------------|---------------------------------|-------------------------------|
|       |                                |                                |                                |                                  |                               |                                |                               |                               |                                |                                |                                |                              |                               |                                                                                            | Fig. 1, 4                       | Fig. 2, 3                       |                               |
| H80   | 20 <sup>1</sup> / <sub>4</sub> | 9                              | 1 <sup>7</sup> / <sub>8</sub>  | 17 <sup>11</sup> / <sub>16</sub> | 3 <sup>1</sup> / <sub>2</sub> | 24 <sup>3</sup> / <sub>4</sub> | 4                             | <sup>3</sup> / <sub>4</sub>   | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | <sup>3</sup> / <sub>16</sub> | <sup>11</sup> / <sub>16</sub> | <sup>1</sup> / <sub>2</sub> X <sup>1</sup> / <sub>4</sub> X 2 <sup>3</sup> / <sub>4</sub>  | 1 <sup>1</sup> / <sub>2</sub>   | NA                              | 1 <sup>3</sup> / <sub>4</sub> |
| H110  | 25                             | 11 <sup>3</sup> / <sub>8</sub> | 2                              | 18 <sup>11</sup> / <sub>16</sub> | 3 <sup>1</sup> / <sub>2</sub> | 29 <sup>1</sup> / <sub>2</sub> | 4                             | 1                             | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | <sup>3</sup> / <sub>16</sub> | <sup>11</sup> / <sub>16</sub> | <sup>1</sup> / <sub>2</sub> X <sup>1</sup> / <sub>4</sub> X 2 <sup>3</sup> / <sub>4</sub>  | 1 <sup>1</sup> / <sub>2</sub>   | 1 <sup>1</sup> / <sub>2</sub>   | 2 <sup>1</sup> / <sub>8</sub> |
| H125  | 25                             | 11 <sup>3</sup> / <sub>8</sub> | 2                              | 18 <sup>11</sup> / <sub>16</sub> | 3 <sup>1</sup> / <sub>2</sub> | 29 <sup>1</sup> / <sub>2</sub> | 4                             | 1                             | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | <sup>3</sup> / <sub>16</sub> | <sup>11</sup> / <sub>16</sub> | <sup>1</sup> / <sub>2</sub> X <sup>1</sup> / <sub>4</sub> X 2 <sup>3</sup> / <sub>4</sub>  | 1 <sup>1</sup> / <sub>2</sub>   | 1 <sup>1</sup> / <sub>2</sub>   | 2 <sup>1</sup> / <sub>8</sub> |
| H150  | 30                             | 13 <sup>1</sup> / <sub>4</sub> | 2 <sup>7</sup> / <sub>16</sub> | 22 <sup>3</sup> / <sub>16</sub>  | 4 <sup>3</sup> / <sub>4</sub> | 34 <sup>1</sup> / <sub>2</sub> | 4                             | 1                             | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | <sup>3</sup> / <sub>16</sub> | <sup>11</sup> / <sub>16</sub> | <sup>5</sup> / <sub>8</sub> X <sup>5</sup> / <sub>16</sub> X 3 <sup>3</sup> / <sub>4</sub> | 1 <sup>15</sup> / <sub>16</sub> | 1 <sup>3</sup> / <sub>4</sub>   | 2 <sup>3</sup> / <sub>8</sub> |
| H200  | 30                             | 13 <sup>1</sup> / <sub>4</sub> | 2 <sup>7</sup> / <sub>16</sub> | 22 <sup>3</sup> / <sub>16</sub>  | 4 <sup>3</sup> / <sub>4</sub> | 34 <sup>1</sup> / <sub>2</sub> | 4                             | 1                             | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | <sup>3</sup> / <sub>16</sub> | <sup>11</sup> / <sub>16</sub> | <sup>5</sup> / <sub>8</sub> X <sup>5</sup> / <sub>16</sub> X 3 <sup>3</sup> / <sub>4</sub> | 1 <sup>15</sup> / <sub>16</sub> | 1 <sup>3</sup> / <sub>4</sub>   | 2 <sup>3</sup> / <sub>8</sub> |
| H250  | 34 <sup>1</sup> / <sub>4</sub> | 15                             | 2 <sup>3</sup> / <sub>4</sub>  | 25 <sup>11</sup> / <sub>16</sub> | 5 <sup>1</sup> / <sub>2</sub> | 40                             | 5 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>8</sub> | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | <sup>3</sup> / <sub>16</sub> | <sup>11</sup> / <sub>16</sub> | <sup>5</sup> / <sub>8</sub> X <sup>5</sup> / <sub>16</sub> X 4 <sup>3</sup> / <sub>4</sub> | 2                               | 2                               | 2 <sup>5</sup> / <sub>8</sub> |
| H300  | 34 <sup>1</sup> / <sub>4</sub> | 15                             | 2 <sup>3</sup> / <sub>4</sub>  | 25 <sup>11</sup> / <sub>16</sub> | 5 <sup>1</sup> / <sub>2</sub> | 40                             | 5 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>8</sub> | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | <sup>3</sup> / <sub>16</sub> | <sup>11</sup> / <sub>16</sub> | <sup>5</sup> / <sub>8</sub> X <sup>5</sup> / <sub>16</sub> X 4 <sup>3</sup> / <sub>4</sub> | 2                               | 2                               | 2 <sup>5</sup> / <sub>8</sub> |
| H350  | 38 <sup>1</sup> / <sub>2</sub> | 16 <sup>1</sup> / <sub>2</sub> | 2 <sup>3</sup> / <sub>4</sub>  | 30 <sup>11</sup> / <sub>16</sub> | 5 <sup>1</sup> / <sub>2</sub> | 46                             | 7                             | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | <sup>3</sup> / <sub>8</sub>  | <sup>15</sup> / <sub>16</sub> | <sup>5</sup> / <sub>8</sub> X <sup>5</sup> / <sub>16</sub> X 4 <sup>3</sup> / <sub>4</sub> | 2 <sup>3</sup> / <sub>16</sub>  | 2 <sup>3</sup> / <sub>16</sub>  | 3                             |
| H425  | 39 <sup>1</sup> / <sub>2</sub> | 16 <sup>1</sup> / <sub>2</sub> | 3                              | 31 <sup>11</sup> / <sub>16</sub> | 5 <sup>3</sup> / <sub>4</sub> | 46                             | 6 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | <sup>3</sup> / <sub>8</sub>  | <sup>15</sup> / <sub>16</sub> | <sup>3</sup> / <sub>4</sub> X <sup>3</sup> / <sub>8</sub> X 4 <sup>3</sup> / <sub>4</sub>  | 2 <sup>7</sup> / <sub>16</sub>  | 2 <sup>7</sup> / <sub>16</sub>  | 3 <sup>3</sup> / <sub>8</sub> |
| H500  | 39 <sup>1</sup> / <sub>2</sub> | 16 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub>  | 32 <sup>11</sup> / <sub>16</sub> | 6 <sup>3</sup> / <sub>4</sub> | 46                             | 6 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | <sup>3</sup> / <sub>8</sub>  | <sup>15</sup> / <sub>16</sub> | <sup>7</sup> / <sub>8</sub> X <sup>7</sup> / <sub>16</sub> X 5 <sup>1</sup> / <sub>2</sub> | 2 <sup>7</sup> / <sub>16</sub>  | 2 <sup>7</sup> / <sub>16</sub>  | 3 <sup>3</sup> / <sub>8</sub> |
| H600  | 42 <sup>1</sup> / <sub>2</sub> | 16 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub>  | 34 <sup>3</sup> / <sub>4</sub>   | 7 <sup>1</sup> / <sub>2</sub> | 51                             | 8                             | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | <sup>3</sup> / <sub>8</sub>  | <sup>15</sup> / <sub>16</sub> | <sup>7</sup> / <sub>8</sub> X <sup>7</sup> / <sub>16</sub> X 5 <sup>1</sup> / <sub>2</sub> | 2 <sup>11</sup> / <sub>16</sub> | 2 <sup>11</sup> / <sub>16</sub> | 4                             |

\*Also 5/8-11 Tap on 14-3/4 Bolt Circle 1" Deep  
NA - Not Available

**TABLE 8. DRIVE SHAFT  
MODIFICATIONS FOR SPEED  
DECREASING RATIOS  
(in inches)**

| Model | RATIOS          | U                             | XA                             | N                             | KEYSEAT X                                                                                  |
|-------|-----------------|-------------------------------|--------------------------------|-------------------------------|--------------------------------------------------------------------------------------------|
| H150  | 7:4-2:1-5:2-3:1 | 2 <sup>1</sup> / <sub>4</sub> | 20 <sup>1</sup> / <sub>2</sub> | 4 <sup>3</sup> / <sub>4</sub> | <sup>1</sup> / <sub>2</sub> X <sup>1</sup> / <sub>4</sub> X 3 <sup>1</sup> / <sub>2</sub>  |
| H200  | 5:2-3:1         | 2 <sup>1</sup> / <sub>4</sub> | 20 <sup>1</sup> / <sub>2</sub> | 4 <sup>3</sup> / <sub>4</sub> | <sup>1</sup> / <sub>2</sub> X <sup>1</sup> / <sub>4</sub> X 3 <sup>1</sup> / <sub>2</sub>  |
| H350  | 7:4-2:1-9:4     | 2 <sup>3</sup> / <sub>4</sub> | 29                             | 5 <sup>1</sup> / <sub>2</sub> | <sup>5</sup> / <sub>8</sub> X <sup>5</sup> / <sub>16</sub> X 4 <sup>1</sup> / <sub>2</sub> |
|       | 11:4-5:2        | 2 <sup>3</sup> / <sub>4</sub> | 30                             | 5 <sup>3</sup> / <sub>4</sub> | <sup>5</sup> / <sub>8</sub> X <sup>5</sup> / <sub>16</sub> X 4 <sup>1</sup> / <sub>2</sub> |
| H425  | 7:4-2:1-9:4     | 2 <sup>3</sup> / <sub>4</sub> | 30                             | 5 <sup>3</sup> / <sub>4</sub> | <sup>5</sup> / <sub>8</sub> X <sup>5</sup> / <sub>16</sub> X 4 <sup>1</sup> / <sub>2</sub> |
|       | 5:2-11:4-3:1    | 2 <sup>3</sup> / <sub>4</sub> | 30                             | 5 <sup>3</sup> / <sub>4</sub> | <sup>5</sup> / <sub>8</sub> X <sup>5</sup> / <sub>16</sub> X 4 <sup>1</sup> / <sub>2</sub> |
| H500  | 7:4-2:1-9:4     | 2 <sup>3</sup> / <sub>4</sub> | 30                             | 5 <sup>3</sup> / <sub>4</sub> | <sup>5</sup> / <sub>8</sub> X <sup>5</sup> / <sub>16</sub> X 4 <sup>1</sup> / <sub>2</sub> |
|       | 5:2-11:4-3:1    | 2 <sup>3</sup> / <sub>4</sub> | 30                             | 5 <sup>3</sup> / <sub>4</sub> | <sup>5</sup> / <sub>8</sub> X <sup>5</sup> / <sub>16</sub> X 4 <sup>1</sup> / <sub>2</sub> |
| H600  | 7:4-2:1-9:4     | 3                             | 31 <sup>1</sup> / <sub>2</sub> | 6                             | <sup>3</sup> / <sub>4</sub> X <sup>3</sup> / <sub>8</sub> X 4 <sup>1</sup> / <sub>2</sub>  |
|       | 5:2-11:4-3:1    | 3                             | 31 <sup>1</sup> / <sub>2</sub> | 6                             | <sup>3</sup> / <sub>4</sub> X <sup>3</sup> / <sub>8</sub> X 4 <sup>1</sup> / <sub>2</sub>  |
| H750  | 4:3-3:2         | 3 <sup>3</sup> / <sub>4</sub> | 36                             | 7 <sup>1</sup> / <sub>4</sub> | <sup>7</sup> / <sub>8</sub> X <sup>7</sup> / <sub>16</sub> X 5 <sup>1</sup> / <sub>2</sub> |
|       | 7:4-2:1-9:4     | 3                             | 34                             | 5 <sup>1</sup> / <sub>2</sub> | <sup>3</sup> / <sub>4</sub> X <sup>3</sup> / <sub>8</sub> X 4 <sup>1</sup> / <sub>2</sub>  |
|       | 5:2-11:4-3:1    | 3                             | 34                             | 5 <sup>1</sup> / <sub>2</sub> | <sup>3</sup> / <sub>4</sub> X <sup>3</sup> / <sub>8</sub> X 4 <sup>1</sup> / <sub>2</sub>  |

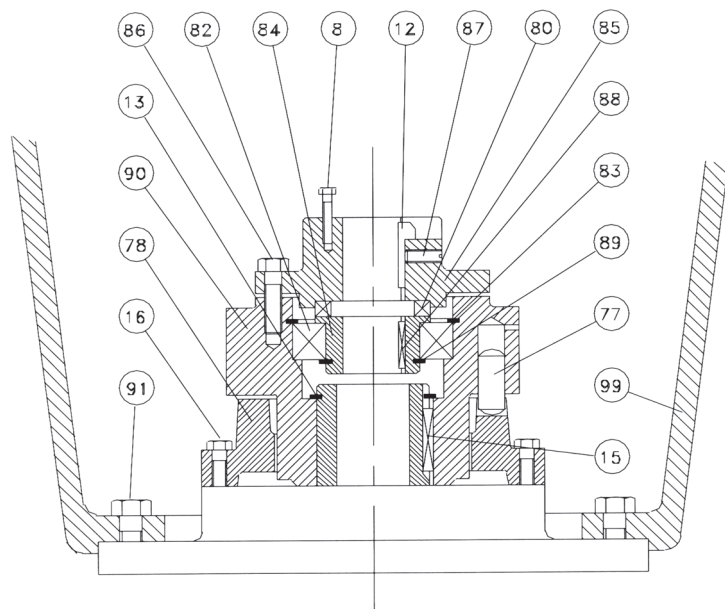
## ROTATION



ROTATION DIAGRAM

Gear drives with special rotations (Figs. 2, 3, and 4) and gear drives with speed decreasing ratios of 7:4 or higher are manufactured to order, and such orders are not subject to cancellation without charge for parts processed.

# COMBINATION



## COMBINATION NON-REVERSE

| No. | Part Name            | No. | Part Name                    |
|-----|----------------------|-----|------------------------------|
| 8   | Capscrew             | 84  | Steady Bearing Adaptor       |
| 12  | Gib Key              | 85  | Upper Coupling Combination   |
| 13  | External Snap Ring   | 86  | Stainless Steel Capscrews    |
| 15  | Key (Lower Coupling) | 87  | Set Screws                   |
| 16  | Capscrew             | 88  | Key (Steady Bearing Adaptor) |
| 77  | Ratchet Pins         | 89  | External Snap Ring           |
| 78  | Thrust Bearing Cover | 90  | Lower Coupling Combination   |
| 80  | Wave Spring          |     | Non Reverse                  |
| 82  | Steady Bearing       | 91  | Capscrew                     |
| 83  | Internal Snap Ring   | 99  | Motor Stand                  |

## Fast Changeover Prevents Costly Downtime in Emergencies

The Combination Drive—widely preferred by municipalities, waterworks corporations, and those responsible for fire and flood protection—provides pumping assurance when emergencies occur. Either a motor or a mechanical power unit can drive the pump to prevent costly service interruptions. When one of the driving units is down the pump can be operated by the other.

**Hollow Shaft Motor.** In a normal hollow shaft motor application either a throughshaft or a coupling and shaft combination can be used between the electric motor and the right angle gear drive. When the electric motor is doing the driving, the upper half of the gear drive coupling is free to rotate with the pump headshaft and the gears do not revolve. In case of electric motor or power failure the pump can be driven by a mechanical power unit by simply installing stainless steel bolts, supplied with the gear drive.

The improved coupling design gives better protection to the sealed steady bearing and eliminates the possibility of accidental engagement.

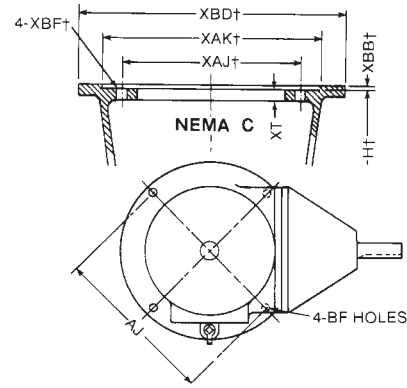
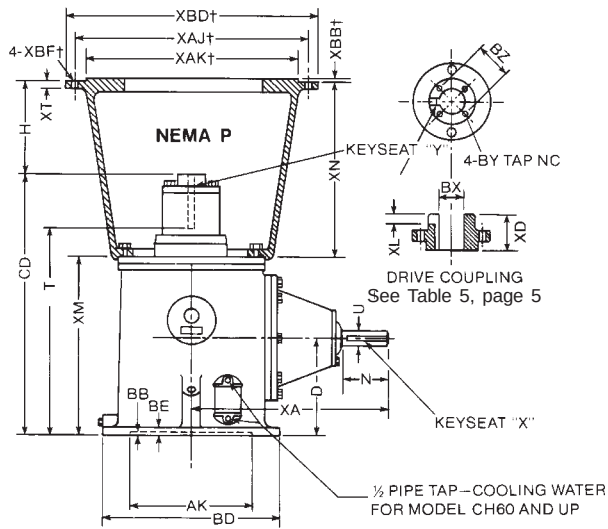
**Thrust Load Transfer.** If the electric motor has to be removed, the thrust load of the pump can be transferred from the motor thrust bearing to the gear drive. This simply requires adjusting a nut on the pump headshaft to bring the pump impellers to the proper setting.

**Solid Shaft Motor.** With this type of motor the gear drive carries the thrust load of the pump. The gears revolve when either the electric motor or horizontal drive unit is being used. The recommendation is to use a standard over-running clutch coupling between the engine and the gear drive, and a flexible coupling between the electric motor and the gear drive. (See page 11 for dimensions.)

For various combination drive arrangements consult the factory.



## COMBINATION DRIVES - HOLLOW SHAFT



For CD and H dimensions for all heavy thrust drives see Table 11 at bottom of page. U-XA-N and X dimensions for all speed decreasing ratios in Models CH150 and up are subject to change. See Table 8 on page 7.

**TABLE 9. COMBINATION DRIVE DIMENSIONS (HOLLOW SHAFT) IN INCHES**

| Model     | CD                             | D                              | U                              | XA                             | N                             | XM                             | H                              | BE                            | BD                             | AJ                             | AK                             | BB                             | BF                              | Keyseat X                                                                                      |
|-----------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------------------|--------------------------------|--------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|------------------------------------------------------------------------------------------------|
| CH20      | 16                             | 6 <sup>3</sup> / <sub>8</sub>  | 1 <sup>1</sup> / <sub>8</sub>  | 13                             | 2 <sup>3</sup> / <sub>4</sub> | 11 <sup>1</sup> / <sub>4</sub> | 7 <sup>3</sup> / <sub>4</sub>  | 5 <sup>5</sup> / <sub>8</sub> | 10                             | 9 <sup>1</sup> / <sub>8</sub>  | 8 <sup>1</sup> / <sub>4</sub>  | 3 <sup>1</sup> / <sub>16</sub> | 7 <sup>1</sup> / <sub>16</sub>  | 1 <sup>1</sup> / <sub>4</sub> x 1 <sup>1</sup> / <sub>8</sub> x 2 <sup>1</sup> / <sub>4</sub>  |
| CH40 (12) | 22 <sup>1</sup> / <sub>4</sub> | 9                              | 1 <sup>1</sup> / <sub>2</sub>  | 16                             | 3 <sup>1</sup> / <sub>2</sub> | 15 <sup>1</sup> / <sub>4</sub> | 9                              | 3 <sup>3</sup> / <sub>4</sub> | 12                             | 9 <sup>1</sup> / <sub>8</sub>  | 8 <sup>1</sup> / <sub>4</sub>  | 3 <sup>1</sup> / <sub>16</sub> | 7 <sup>1</sup> / <sub>16</sub>  | 3 <sup>3</sup> / <sub>8</sub> x 3 <sup>3</sup> / <sub>16</sub> x 2 <sup>3</sup> / <sub>4</sub> |
| CH40      | 22 <sup>1</sup> / <sub>4</sub> | 9                              | 1 <sup>1</sup> / <sub>2</sub>  | 16                             | 3 <sup>1</sup> / <sub>2</sub> | 15 <sup>1</sup> / <sub>4</sub> | 9                              | 3 <sup>3</sup> / <sub>4</sub> | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>8</sub> x 3 <sup>3</sup> / <sub>16</sub> x 2 <sup>3</sup> / <sub>4</sub> |
| CH60      | 22 <sup>1</sup> / <sub>4</sub> | 9                              | 1 <sup>1</sup> / <sub>2</sub>  | 16                             | 3 <sup>1</sup> / <sub>2</sub> | 15 <sup>1</sup> / <sub>4</sub> | 9                              | 3 <sup>3</sup> / <sub>4</sub> | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>8</sub> x 3 <sup>3</sup> / <sub>16</sub> x 2 <sup>3</sup> / <sub>4</sub> |
| CH80      | 22 <sup>1</sup> / <sub>4</sub> | 9                              | 1 <sup>7</sup> / <sub>8</sub>  | 16 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub> | 15 <sup>1</sup> / <sub>4</sub> | 9                              | 3 <sup>3</sup> / <sub>4</sub> | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>2</sub> x 1 <sup>1</sup> / <sub>4</sub> x 2 <sup>3</sup> / <sub>4</sub>  |
| CH110     | 26 <sup>3</sup> / <sub>4</sub> | 11 <sup>3</sup> / <sub>8</sub> | 2                              | 17 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub> | 19 <sup>5</sup> / <sub>8</sub> | 9 <sup>7</sup> / <sub>8</sub>  | 1                             | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>2</sub> x 1 <sup>1</sup> / <sub>4</sub> x 2 <sup>3</sup> / <sub>4</sub>  |
| CH125     | 26 <sup>3</sup> / <sub>4</sub> | 11 <sup>3</sup> / <sub>8</sub> | 2                              | 17 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub> | 19 <sup>5</sup> / <sub>8</sub> | 9 <sup>7</sup> / <sub>8</sub>  | 1                             | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>2</sub> x 1 <sup>1</sup> / <sub>4</sub> x 2 <sup>3</sup> / <sub>4</sub>  |
| CH150     | 31 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>4</sub> | 2 <sup>7</sup> / <sub>16</sub> | 20 <sup>1</sup> / <sub>2</sub> | 4 <sup>3</sup> / <sub>4</sub> | 23 <sup>5</sup> / <sub>8</sub> | 10 <sup>3</sup> / <sub>8</sub> | 1                             | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> x 5 <sup>5</sup> / <sub>16</sub> x 3 <sup>3</sup> / <sub>4</sub> |
| CH200     | 31 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>4</sub> | 2 <sup>7</sup> / <sub>16</sub> | 20 <sup>1</sup> / <sub>2</sub> | 4 <sup>3</sup> / <sub>4</sub> | 23 <sup>5</sup> / <sub>8</sub> | 10 <sup>3</sup> / <sub>8</sub> | 1                             | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> x 5 <sup>5</sup> / <sub>16</sub> x 3 <sup>3</sup> / <sub>4</sub> |
| CH250     | 36                             | 15                             | 2 <sup>3</sup> / <sub>4</sub>  | 24                             | 5 <sup>1</sup> / <sub>2</sub> | 26 <sup>5</sup> / <sub>8</sub> | 12 <sup>3</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>8</sub> | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> x 5 <sup>5</sup> / <sub>16</sub> x 4 <sup>3</sup> / <sub>4</sub> |
| CH300     | 36                             | 15                             | 2 <sup>3</sup> / <sub>4</sub>  | 24                             | 5 <sup>1</sup> / <sub>2</sub> | 26 <sup>5</sup> / <sub>8</sub> | 12 <sup>3</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>8</sub> | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> x 5 <sup>5</sup> / <sub>16</sub> x 4 <sup>3</sup> / <sub>4</sub> |
| CH350     | 40 <sup>1</sup> / <sub>2</sub> | 16 <sup>1</sup> / <sub>2</sub> | 2 <sup>3</sup> / <sub>4</sub>  | 29                             | 5 <sup>1</sup> / <sub>2</sub> | 29 <sup>5</sup> / <sub>8</sub> | 13 <sup>3</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22 *                           | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> x 5 <sup>5</sup> / <sub>16</sub> x 4 <sup>3</sup> / <sub>4</sub> |
| CH425     | 41 <sup>3</sup> / <sub>4</sub> | 16 <sup>1</sup> / <sub>2</sub> | 3                              | 30                             | 5 <sup>3</sup> / <sub>4</sub> | 29 <sup>5</sup> / <sub>8</sub> | 12 <sup>1</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22 *                           | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>4</sub> x 3 <sup>3</sup> / <sub>16</sub> x 4 <sup>3</sup> / <sub>4</sub> |
| CH500     | 41 <sup>3</sup> / <sub>4</sub> | 16 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub>  | 31                             | 6 <sup>3</sup> / <sub>4</sub> | 29 <sup>5</sup> / <sub>8</sub> | 12 <sup>1</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22 *                           | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 7 <sup>5</sup> / <sub>8</sub> x 7 <sup>5</sup> / <sub>16</sub> x 5 <sup>1</sup> / <sub>2</sub> |
| CH600     | 45 <sup>1</sup> / <sub>4</sub> | 16 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub>  | 33                             | 7 <sup>1</sup> / <sub>2</sub> | 31 <sup>7</sup> / <sub>8</sub> | 10 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22 *                           | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 7 <sup>5</sup> / <sub>8</sub> x 7 <sup>5</sup> / <sub>16</sub> x 5 <sup>1</sup> / <sub>2</sub> |

**TABLE 10.**

**MAX. DRIVE COUPLING BORE SIZE  
AVAILABLE MOTOR STAND**

| Model | XD                            | Max. BX                         |                                 | T                              | MOTOR STAND                    |                                | XT                            | Top† Flange                                                                     |
|-------|-------------------------------|---------------------------------|---------------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------------------|---------------------------------------------------------------------------------|
|       |                               | Fig. 1 & 4                      | Fig. 2 & 3                      |                                | XN                             | SPECIAL                        |                               |                                                                                 |
| CH20  | 1 <sup>3</sup> / <sub>4</sub> | 1                               | NA                              | 13 <sup>1</sup> / <sub>4</sub> | 12 <sup>1</sup> / <sub>2</sub> | 10                             | 1 <sup>1</sup> / <sub>2</sub> | Dimensions XBD, XAJ, XAK, XBB, and XBF to suit NEMA "P" or "C" electric motors. |
| CH40  | 2 <sup>3</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>2</sub>   | 1 <sup>1</sup> / <sub>4</sub>   | 18                             | 16                             | 12 <sup>1</sup> / <sub>2</sub> | 5 <sup>5</sup> / <sub>8</sub> |                                                                                 |
| CH60  | 2 <sup>3</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>2</sub>   | 1 <sup>1</sup> / <sub>4</sub>   | 18                             | 16                             | 12 <sup>1</sup> / <sub>2</sub> | 5 <sup>5</sup> / <sub>8</sub> |                                                                                 |
| CH80  | 2 <sup>3</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>2</sub>   | NA                              | 18                             | 16                             | 12 <sup>1</sup> / <sub>2</sub> | 5 <sup>5</sup> / <sub>8</sub> |                                                                                 |
| CH110 | 2 <sup>3</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>2</sub>   | 1 <sup>1</sup> / <sub>2</sub>   | 23                             | 17                             | ---                            | 3 <sup>3</sup> / <sub>4</sub> |                                                                                 |
| CH125 | 2 <sup>3</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>2</sub>   | 1 <sup>1</sup> / <sub>2</sub>   | 23                             | 17                             | ---                            | 3 <sup>3</sup> / <sub>4</sub> |                                                                                 |
| CH150 | 2 <sup>3</sup> / <sub>8</sub> | 1 <sup>3</sup> / <sub>4</sub>   | 1 <sup>3</sup> / <sub>4</sub>   | 27 <sup>1</sup> / <sub>2</sub> | 19                             | ---                            | 3 <sup>3</sup> / <sub>4</sub> |                                                                                 |
| CH200 | 2 <sup>3</sup> / <sub>8</sub> | 1 <sup>3</sup> / <sub>4</sub>   | 1 <sup>3</sup> / <sub>4</sub>   | 27 <sup>1</sup> / <sub>2</sub> | 19                             | ---                            | 3 <sup>3</sup> / <sub>4</sub> |                                                                                 |
| CH250 | 2 <sup>5</sup> / <sub>8</sub> | 2                               | 2                               | 31 <sup>1</sup> / <sub>2</sub> | 22                             | ---                            | 3 <sup>3</sup> / <sub>4</sub> |                                                                                 |
| CH300 | 2 <sup>5</sup> / <sub>8</sub> | 2                               | 2                               | 31 <sup>1</sup> / <sub>2</sub> | 22                             | ---                            | 3 <sup>3</sup> / <sub>4</sub> |                                                                                 |
| CH350 | 3 <sup>1</sup> / <sub>8</sub> | 2 <sup>3</sup> / <sub>16</sub>  | 2 <sup>3</sup> / <sub>16</sub>  | 35 <sup>1</sup> / <sub>2</sub> | 24                             | 15                             | 1                             |                                                                                 |
| CH425 | 3 <sup>3</sup> / <sub>8</sub> | 2 <sup>7</sup> / <sub>16</sub>  | 2 <sup>7</sup> / <sub>16</sub>  | 35 <sup>3</sup> / <sub>4</sub> | 24                             | 15                             | 1                             |                                                                                 |
| CH500 | 3 <sup>3</sup> / <sub>8</sub> | 2 <sup>7</sup> / <sub>16</sub>  | 2 <sup>7</sup> / <sub>16</sub>  | 35 <sup>3</sup> / <sub>4</sub> | 24                             | 15                             | 1                             |                                                                                 |
| CH600 | 4                             | 2 <sup>11</sup> / <sub>16</sub> | 2 <sup>11</sup> / <sub>16</sub> | 38 <sup>1</sup> / <sub>4</sub> | 24                             | ---                            | 1                             |                                                                                 |

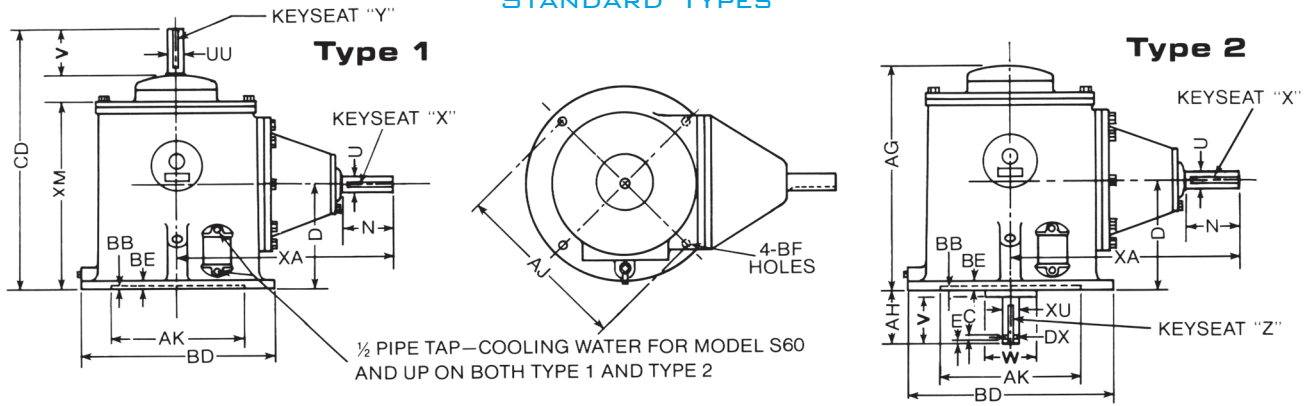
The combination drive is desirable where 24-hour service is mandatory and is preferred by municipalities and waterworks corporations. Electric motor or engine may be used to drive the pump, permitting removal of either for repairs without interrupting service. As with the standard drive, combination applications are also available with solid shaft construction. See page 10.

**TABLE 11.  
COMBINATION DRIVE  
HEAVY THRUST  
DIMENSIONS**

| Model   | CD                             | H                              | T                              |
|---------|--------------------------------|--------------------------------|--------------------------------|
| CH80HT  | 22 <sup>3</sup> / <sub>4</sub> | 8 <sup>1</sup> / <sub>4</sub>  | 19 <sup>1</sup> / <sub>4</sub> |
| CH110HT | 28                             | 8 <sup>5</sup> / <sub>8</sub>  | 24 <sup>1</sup> / <sub>4</sub> |
| CH125HT | 28                             | 8 <sup>5</sup> / <sub>8</sub>  | 24 <sup>1</sup> / <sub>4</sub> |
| CH150HT | 33 <sup>1</sup> / <sub>4</sub> | 8 <sup>7</sup> / <sub>8</sub>  | 29                             |
| CH200HT | 33 <sup>1</sup> / <sub>4</sub> | 8 <sup>7</sup> / <sub>8</sub>  | 29                             |
| CH250HT | 37 <sup>3</sup> / <sub>4</sub> | 10 <sup>5</sup> / <sub>8</sub> | 33 <sup>1</sup> / <sub>4</sub> |
| CH300HT | 37 <sup>3</sup> / <sub>4</sub> | 10 <sup>5</sup> / <sub>8</sub> | 33 <sup>1</sup> / <sub>4</sub> |
| CH350HT | 42 <sup>1</sup> / <sub>4</sub> | 11 <sup>5</sup> / <sub>8</sub> | 37 <sup>1</sup> / <sub>4</sub> |
| CH425HT | 43 <sup>3</sup> / <sub>4</sub> | 10 <sup>1</sup> / <sub>8</sub> | 37 <sup>3</sup> / <sub>4</sub> |
| CH500HT | 44 <sup>1</sup> / <sub>2</sub> | 9 <sup>3</sup> / <sub>8</sub>  | 38 <sup>1</sup> / <sub>2</sub> |
| CH600HT | 45 <sup>1</sup> / <sub>4</sub> | 10 <sup>1</sup> / <sub>2</sub> | 38 <sup>1</sup> / <sub>4</sub> |

# SOLID SHAFT

## STANDARD TYPES



All shaft dimensions for preliminary use only. Contact factory for certified prints

**TABLE 12. SOLID SHAFT STANDARD DRIVE DIMENSIONS (IN INCHES)**

| Model    | D                              | U                              | XA                             | N                             | BE                            | BD                             | AJ                             | AK                             | BB                             | BF                              | Keyseat X                                                                                      |
|----------|--------------------------------|--------------------------------|--------------------------------|-------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|------------------------------------------------------------------------------------------------|
| S20      | 6 <sup>3</sup> / <sub>8</sub>  | 1 <sup>1</sup> / <sub>8</sub>  | 13                             | 2 <sup>3</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> | 10                             | 9 <sup>1</sup> / <sub>8</sub>  | 8 <sup>1</sup> / <sub>4</sub>  | 3 <sup>3</sup> / <sub>16</sub> | 7 <sup>1</sup> / <sub>16</sub>  | 1 <sup>1</sup> / <sub>4</sub> X 1 <sup>1</sup> / <sub>8</sub> X 2 <sup>1</sup> / <sub>4</sub>  |
| S40 (12) | 9                              | 1 <sup>1</sup> / <sub>2</sub>  | 16                             | 3 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub> | 12                             | 9 <sup>1</sup> / <sub>8</sub>  | 8 <sup>1</sup> / <sub>4</sub>  | 3 <sup>3</sup> / <sub>16</sub> | 7 <sup>1</sup> / <sub>16</sub>  | 3 <sup>3</sup> / <sub>8</sub> X 3 <sup>3</sup> / <sub>16</sub> X 2 <sup>3</sup> / <sub>4</sub> |
| S40      | 9                              | 1 <sup>1</sup> / <sub>2</sub>  | 16                             | 3 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub> | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>8</sub> X 3 <sup>3</sup> / <sub>16</sub> X 2 <sup>3</sup> / <sub>4</sub> |
| S60      | 9                              | 1 <sup>1</sup> / <sub>2</sub>  | 16                             | 3 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub> | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>8</sub> X 3 <sup>3</sup> / <sub>16</sub> X 2 <sup>3</sup> / <sub>4</sub> |
| S80      | 9                              | 1 <sup>7</sup> / <sub>8</sub>  | 16 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub> | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>2</sub> X 1 <sup>1</sup> / <sub>4</sub> X 2 <sup>3</sup> / <sub>4</sub>  |
| S110     | 11 <sup>3</sup> / <sub>8</sub> | 2                              | 17 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub> | 1                             | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>2</sub> X 1 <sup>1</sup> / <sub>4</sub> X 2 <sup>3</sup> / <sub>4</sub>  |
| S125     | 11 <sup>3</sup> / <sub>8</sub> | 2                              | 17 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub> | 1                             | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>2</sub> X 1 <sup>1</sup> / <sub>4</sub> X 2 <sup>3</sup> / <sub>4</sub>  |
| S150     | 13 <sup>1</sup> / <sub>4</sub> | 2 <sup>7</sup> / <sub>16</sub> | 20 <sup>1</sup> / <sub>2</sub> | 4 <sup>3</sup> / <sub>4</sub> | 1                             | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> X 5 <sup>5</sup> / <sub>16</sub> X 3 <sup>3</sup> / <sub>4</sub> |
| S200     | 13 <sup>1</sup> / <sub>4</sub> | 2 <sup>7</sup> / <sub>16</sub> | 20 <sup>1</sup> / <sub>2</sub> | 4 <sup>3</sup> / <sub>4</sub> | 1                             | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> X 5 <sup>5</sup> / <sub>16</sub> X 3 <sup>3</sup> / <sub>4</sub> |
| S250     | 15                             | 2 <sup>3</sup> / <sub>4</sub>  | 24                             | 5 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>8</sub> | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> X 5 <sup>5</sup> / <sub>16</sub> X 4 <sup>3</sup> / <sub>4</sub> |
| S300     | 15                             | 2 <sup>3</sup> / <sub>4</sub>  | 24                             | 5 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>8</sub> | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> X 5 <sup>5</sup> / <sub>16</sub> X 4 <sup>3</sup> / <sub>4</sub> |
| S350     | 16 <sup>1</sup> / <sub>2</sub> | 2 <sup>3</sup> / <sub>4</sub>  | 29                             | 5 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 5 <sup>5</sup> / <sub>8</sub> X 5 <sup>5</sup> / <sub>16</sub> X 4 <sup>3</sup> / <sub>4</sub> |
| S425     | 16 <sup>1</sup> / <sub>2</sub> | 3                              | 30                             | 5 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>4</sub> X 3 <sup>3</sup> / <sub>8</sub> X 4 <sup>3</sup> / <sub>4</sub>  |
| S500     | 16 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub>  | 31                             | 6 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 7 <sup>7</sup> / <sub>8</sub> X 7 <sup>7</sup> / <sub>16</sub> X 5 <sup>1</sup> / <sub>2</sub> |
| S600     | 16 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub>  | 33                             | 7 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 7 <sup>7</sup> / <sub>8</sub> X 7 <sup>7</sup> / <sub>16</sub> X 5 <sup>1</sup> / <sub>2</sub> |

\*Also 5/8-11 Tap on 14-3/4 Bolt Circle 1" Deep

**TABLE 13.**

| Model   | Type 1                         |                               |                               |                               |                                | Type 2                        |                               |                                |                               |                               |                               |                               |                               |                                |
|---------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------------------|-------------------------------|-------------------------------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------------------|
|         | CD                             | UU                            | V                             | Y                             | XM                             | XU                            | AH                            | AG                             | Z                             | DX                            | C                             | E                             | V                             | W                              |
| S20     | 16 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>8</sub> | 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 11 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 3 <sup>1</sup> / <sub>4</sub> | 13 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 1                             | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 2 <sup>3</sup> / <sub>8</sub> | 4 <sup>3</sup> / <sub>4</sub>  |
| S40(12) | 22                             | 1 <sup>3</sup> / <sub>4</sub> | 3 <sup>7</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 15 <sup>1</sup> / <sub>4</sub> | 1 <sup>7</sup> / <sub>8</sub> | 4 <sup>3</sup> / <sub>4</sub> | 18 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>7</sup> / <sub>8</sub> | 5                              |
| S40     | 22                             | 1 <sup>3</sup> / <sub>4</sub> | 3 <sup>7</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 15 <sup>1</sup> / <sub>4</sub> | 1 <sup>7</sup> / <sub>8</sub> | 4 <sup>3</sup> / <sub>4</sub> | 18 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>7</sup> / <sub>8</sub> | 5                              |
| S60     | 22                             | 1 <sup>3</sup> / <sub>4</sub> | 3 <sup>7</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 15 <sup>1</sup> / <sub>4</sub> | 1 <sup>7</sup> / <sub>8</sub> | 4 <sup>3</sup> / <sub>4</sub> | 18 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>7</sup> / <sub>8</sub> | 5                              |
| S80     | 22                             | 1 <sup>3</sup> / <sub>4</sub> | 3 <sup>7</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 15 <sup>1</sup> / <sub>4</sub> | 1 <sup>7</sup> / <sub>8</sub> | 4 <sup>3</sup> / <sub>4</sub> | 18 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>7</sup> / <sub>8</sub> | 5                              |
| S110    | 27                             | 2 <sup>1</sup> / <sub>8</sub> | 4 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 19 <sup>5</sup> / <sub>8</sub> | 2 <sup>1</sup> / <sub>8</sub> | 5                             | 22 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>3</sup> / <sub>4</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 4 <sup>1</sup> / <sub>2</sub> | 8 <sup>1</sup> / <sub>8</sub>  |
| S125    | 27                             | 2 <sup>1</sup> / <sub>8</sub> | 4 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 19 <sup>5</sup> / <sub>8</sub> | 2 <sup>1</sup> / <sub>8</sub> | 5                             | 22 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>3</sup> / <sub>4</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 4 <sup>1</sup> / <sub>2</sub> | 8 <sup>1</sup> / <sub>8</sub>  |
| S150    | 31 <sup>1</sup> / <sub>2</sub> | 2 <sup>3</sup> / <sub>8</sub> | 4 <sup>1</sup> / <sub>2</sub> | 5 <sup>5</sup> / <sub>8</sub> | 23 <sup>1</sup> / <sub>8</sub> | 2 <sup>3</sup> / <sub>8</sub> | 6                             | 27 <sup>1</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> | 2                             | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 5 <sup>3</sup> / <sub>4</sub> | 9 <sup>1</sup> / <sub>4</sub>  |
| S200    | 31 <sup>1</sup> / <sub>2</sub> | 2 <sup>3</sup> / <sub>8</sub> | 4 <sup>1</sup> / <sub>2</sub> | 5 <sup>5</sup> / <sub>8</sub> | 23 <sup>1</sup> / <sub>8</sub> | 2 <sup>3</sup> / <sub>8</sub> | 6                             | 27 <sup>1</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> | 2                             | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 5 <sup>3</sup> / <sub>4</sub> | 9 <sup>1</sup> / <sub>4</sub>  |
| S250    | 35 <sup>3</sup> / <sub>8</sub> | 2 <sup>5</sup> / <sub>8</sub> | 4 <sup>3</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> | 26 <sup>3</sup> / <sub>4</sub> | 2 <sup>5</sup> / <sub>8</sub> | 6                             | 31                             | 5 <sup>5</sup> / <sub>8</sub> | 2 <sup>1</sup> / <sub>4</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 5 <sup>3</sup> / <sub>4</sub> | 9 <sup>1</sup> / <sub>4</sub>  |
| S300    | 35 <sup>3</sup> / <sub>8</sub> | 2 <sup>5</sup> / <sub>8</sub> | 4 <sup>3</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> | 26 <sup>3</sup> / <sub>4</sub> | 2 <sup>5</sup> / <sub>8</sub> | 6                             | 31                             | 5 <sup>5</sup> / <sub>8</sub> | 2 <sup>1</sup> / <sub>4</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 5 <sup>3</sup> / <sub>4</sub> | 9 <sup>1</sup> / <sub>4</sub>  |
| S350    | 39                             | 2 <sup>5</sup> / <sub>8</sub> | 4 <sup>3</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> | 29 <sup>7</sup> / <sub>8</sub> | 2 <sup>5</sup> / <sub>8</sub> | 6                             | 34 <sup>3</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> | 2 <sup>1</sup> / <sub>4</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 5 <sup>3</sup> / <sub>4</sub> | 10 <sup>1</sup> / <sub>2</sub> |
| S425    | 40 <sup>1</sup> / <sub>4</sub> | 3 <sup>1</sup> / <sub>2</sub> | 4 <sup>3</sup> / <sub>4</sub> | 7 <sup>7</sup> / <sub>8</sub> | 29 <sup>7</sup> / <sub>8</sub> | 3 <sup>1</sup> / <sub>4</sub> | 7 <sup>1</sup> / <sub>4</sub> | 36                             | 3 <sup>3</sup> / <sub>4</sub> | 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 6                             | 10 <sup>1</sup> / <sub>2</sub> |
| S500    | 40 <sup>1</sup> / <sub>4</sub> | 3 <sup>1</sup> / <sub>2</sub> | 5 <sup>1</sup> / <sub>4</sub> | 7 <sup>7</sup> / <sub>8</sub> | 29 <sup>7</sup> / <sub>8</sub> | 3 <sup>1</sup> / <sub>4</sub> | 7 <sup>1</sup> / <sub>4</sub> | 36                             | 3 <sup>3</sup> / <sub>4</sub> | 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 6                             | 10 <sup>1</sup> / <sub>2</sub> |
| S600    | 43 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub> | 5 <sup>1</sup> / <sub>2</sub> | 7 <sup>7</sup> / <sub>8</sub> | 31 <sup>7</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>4</sub> | 8                             | 38 <sup>1</sup> / <sub>2</sub> | 7 <sup>7</sup> / <sub>8</sub> | 3 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 6                             | 10 <sup>1</sup> / <sub>2</sub> |

♦ For Dimensions of S750-H1500 Contact Factory.

## ROTATION

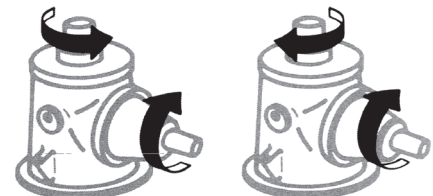


FIG. 1

FIG. 2

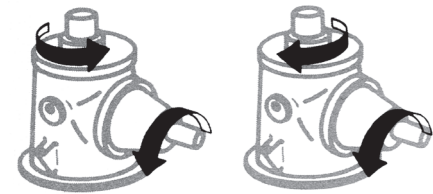
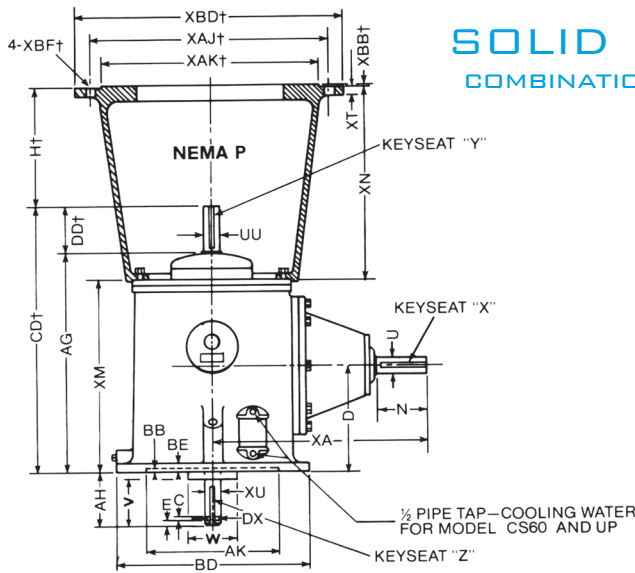


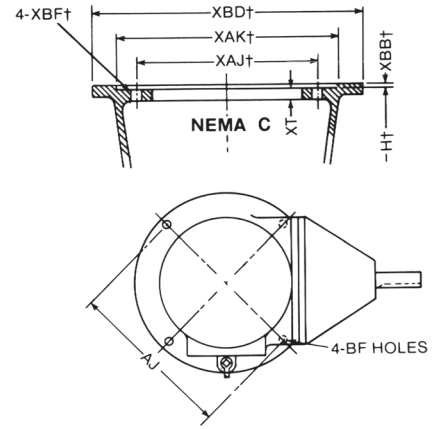
FIG. 3

FIG. 4

All solid gear drives are manufactured to order, and such orders are not subject to cancellation without charge for parts processed.



## SOLID SHAFT COMBINATION TYPE 3



All shaft dimensions for preliminary use only.  
Contact factory for certified prints

**TABLE 14. SOLID SHAFT STANDARD DRIVE DIMENSIONS (IN INCHES)**

| Model     | D                              | U                              | XA                             | N                             | BE                            | BD                             | AJ                             | AK                             | BB                             | BF                              | XU                            | AH                            | Keyseat X                                                                                      | Z                             |
|-----------|--------------------------------|--------------------------------|--------------------------------|-------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|-------------------------------|-------------------------------|------------------------------------------------------------------------------------------------|-------------------------------|
| CS20      | 6 <sup>3</sup> / <sub>8</sub>  | 1 <sup>1</sup> / <sub>8</sub>  | 13                             | 2 <sup>3</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> | 10                             | 9 <sup>1</sup> / <sub>8</sub>  | 8 <sup>1</sup> / <sub>4</sub>  | 3 <sup>3</sup> / <sub>16</sub> | 7 <sup>7</sup> / <sub>16</sub>  | 1 <sup>1</sup> / <sub>4</sub> | 3 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> x 1 <sup>1</sup> / <sub>8</sub> x 2 <sup>1</sup> / <sub>4</sub>  | 1 <sup>1</sup> / <sub>4</sub> |
| CS40 (12) | 9                              | 1 <sup>1</sup> / <sub>2</sub>  | 16                             | 3 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub> | 12                             | 9 <sup>1</sup> / <sub>8</sub>  | 8 <sup>1</sup> / <sub>4</sub>  | 3 <sup>3</sup> / <sub>16</sub> | 7 <sup>7</sup> / <sub>16</sub>  | 1 <sup>7</sup> / <sub>8</sub> | 4 <sup>3</sup> / <sub>4</sub> | 3 <sup>3</sup> / <sub>8</sub> x 3 <sup>3</sup> / <sub>16</sub> x 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub> |
| CS40      | 9                              | 1 <sup>1</sup> / <sub>2</sub>  | 16                             | 3 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub> | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 1 <sup>7</sup> / <sub>8</sub> | 4 <sup>3</sup> / <sub>4</sub> | 3 <sup>3</sup> / <sub>8</sub> x 3 <sup>3</sup> / <sub>16</sub> x 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub> |
| CS60      | 9                              | 1 <sup>1</sup> / <sub>2</sub>  | 16                             | 3 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub> | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 1 <sup>7</sup> / <sub>8</sub> | 4 <sup>3</sup> / <sub>4</sub> | 3 <sup>3</sup> / <sub>8</sub> x 3 <sup>3</sup> / <sub>16</sub> x 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub> |
| CS80      | 9                              | 1 <sup>7</sup> / <sub>8</sub>  | 16 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub> | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 1 <sup>7</sup> / <sub>8</sub> | 4 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub> x 1 <sup>1</sup> / <sub>4</sub> x 2 <sup>3</sup> / <sub>4</sub>  | 1 <sup>1</sup> / <sub>2</sub> |
| CS110     | 11 <sup>3</sup> / <sub>8</sub> | 2                              | 17 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub> | 1                             | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 2 <sup>1</sup> / <sub>8</sub> | 5                             | 1 <sup>1</sup> / <sub>2</sub> x 1 <sup>1</sup> / <sub>4</sub> x 2 <sup>3</sup> / <sub>4</sub>  | 1 <sup>1</sup> / <sub>2</sub> |
| CS125     | 11 <sup>3</sup> / <sub>8</sub> | 2                              | 17 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub> | 1                             | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 2 <sup>1</sup> / <sub>8</sub> | 5                             | 1 <sup>1</sup> / <sub>2</sub> x 1 <sup>1</sup> / <sub>4</sub> x 2 <sup>3</sup> / <sub>4</sub>  | 1 <sup>1</sup> / <sub>2</sub> |
| CS150     | 13 <sup>1</sup> / <sub>4</sub> | 2 <sup>7</sup> / <sub>16</sub> | 20 <sup>1</sup> / <sub>2</sub> | 4 <sup>3</sup> / <sub>4</sub> | 1                             | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 2 <sup>3</sup> / <sub>8</sub> | 6                             | 5 <sup>5</sup> / <sub>8</sub> x 5 <sup>3</sup> / <sub>16</sub> x 3 <sup>3</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> |
| CS200     | 13 <sup>1</sup> / <sub>4</sub> | 2 <sup>7</sup> / <sub>16</sub> | 20 <sup>1</sup> / <sub>2</sub> | 4 <sup>3</sup> / <sub>4</sub> | 1                             | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 2 <sup>3</sup> / <sub>8</sub> | 6                             | 5 <sup>5</sup> / <sub>8</sub> x 5 <sup>3</sup> / <sub>16</sub> x 3 <sup>3</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> |
| CS250     | 15                             | 2 <sup>3</sup> / <sub>4</sub>  | 24                             | 5 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>8</sub> | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 2 <sup>5</sup> / <sub>8</sub> | 6                             | 5 <sup>5</sup> / <sub>8</sub> x 5 <sup>3</sup> / <sub>16</sub> x 4 <sup>3</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> |
| CS300     | 15                             | 2 <sup>3</sup> / <sub>4</sub>  | 24                             | 5 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>8</sub> | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>16</sub> | 11 <sup>1</sup> / <sub>16</sub> | 2 <sup>5</sup> / <sub>8</sub> | 6                             | 5 <sup>5</sup> / <sub>8</sub> x 5 <sup>3</sup> / <sub>16</sub> x 4 <sup>3</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> |
| CS350     | 16 <sup>1</sup> / <sub>2</sub> | 2 <sup>3</sup> / <sub>4</sub>  | 29                             | 5 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 2 <sup>5</sup> / <sub>8</sub> | 6                             | 5 <sup>5</sup> / <sub>8</sub> x 5 <sup>3</sup> / <sub>16</sub> x 4 <sup>3</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> |
| CS425     | 16 <sup>1</sup> / <sub>2</sub> | 3                              | 30                             | 5 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 3 <sup>1</sup> / <sub>4</sub> | 7 <sup>1</sup> / <sub>4</sub> | 3 <sup>3</sup> / <sub>4</sub> x 3 <sup>3</sup> / <sub>8</sub> x 4 <sup>3</sup> / <sub>4</sub>  | 3 <sup>3</sup> / <sub>4</sub> |
| CS500     | 16 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub>  | 31                             | 6 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 3 <sup>1</sup> / <sub>4</sub> | 7 <sup>1</sup> / <sub>4</sub> | 7 <sup>7</sup> / <sub>8</sub> x 7 <sup>7</sup> / <sub>16</sub> x 5 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub> |
| CS600     | 16 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub>  | 33                             | 7 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>4</sub> | 24 <sup>1</sup> / <sub>2</sub> | 22*                            | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub>  | 15 <sup>1</sup> / <sub>16</sub> | 3 <sup>3</sup> / <sub>4</sub> | 8                             | 7 <sup>7</sup> / <sub>8</sub> x 7 <sup>7</sup> / <sub>16</sub> x 5 <sup>1</sup> / <sub>2</sub> | 7 <sup>7</sup> / <sub>8</sub> |

\*Also 5/8-11 Tap on 14-3/4 Bolt Circle 1" Deep

**TABLE 15.**

| Model    | UU                            | AG                             | XM                             | XT                            | MOTOR STAND                    |                                | Y                             | DX                            | C                             | E                             | V                             | W                              |
|----------|-------------------------------|--------------------------------|--------------------------------|-------------------------------|--------------------------------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------------------|
|          |                               |                                |                                |                               | XN                             | SPECIAL                        |                               |                               |                               |                               |                               |                                |
| CS20     | 1 <sup>1</sup> / <sub>8</sub> | 13 <sup>1</sup> / <sub>2</sub> | 11 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub> | 12 <sup>1</sup> / <sub>2</sub> | 10                             | 1 <sup>1</sup> / <sub>4</sub> | 1                             | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 2 <sup>3</sup> / <sub>8</sub> | 4 <sup>3</sup> / <sub>4</sub>  |
| CS40(12) | 1 <sup>3</sup> / <sub>4</sub> | 18 <sup>1</sup> / <sub>8</sub> | 15 <sup>1</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> | 16                             | 12 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>7</sup> / <sub>8</sub> | 5                              |
| CS40     | 1 <sup>3</sup> / <sub>4</sub> | 18 <sup>1</sup> / <sub>8</sub> | 15 <sup>1</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> | 16                             | 12 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>7</sup> / <sub>8</sub> | 5                              |
| CS60     | 1 <sup>3</sup> / <sub>4</sub> | 18 <sup>1</sup> / <sub>8</sub> | 15 <sup>1</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> | 16                             | 12 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>7</sup> / <sub>8</sub> | 5                              |
| CS80     | 1 <sup>3</sup> / <sub>4</sub> | 18 <sup>1</sup> / <sub>8</sub> | 15 <sup>1</sup> / <sub>4</sub> | 5 <sup>5</sup> / <sub>8</sub> | 16                             | 12 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>7</sup> / <sub>8</sub> | 5                              |
| CS110    | 2 <sup>1</sup> / <sub>8</sub> | 22 <sup>1</sup> / <sub>2</sub> | 19 <sup>5</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>4</sub> | 17                             | -                              | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>3</sup> / <sub>4</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 4 <sup>1</sup> / <sub>2</sub> | 8 <sup>1</sup> / <sub>8</sub>  |
| CS125    | 2 <sup>1</sup> / <sub>8</sub> | 22 <sup>1</sup> / <sub>2</sub> | 19 <sup>5</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>4</sub> | 17                             | -                              | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>3</sup> / <sub>4</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 4 <sup>1</sup> / <sub>2</sub> | 8 <sup>1</sup> / <sub>8</sub>  |
| CS150    | 2 <sup>3</sup> / <sub>8</sub> | 27                             | 23 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>4</sub> | 19                             | -                              | 5 <sup>5</sup> / <sub>8</sub> | 2                             | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 5 <sup>3</sup> / <sub>4</sub> | 9 <sup>1</sup> / <sub>4</sub>  |
| CS200    | 2 <sup>3</sup> / <sub>8</sub> | 27                             | 23 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>4</sub> | 19                             | -                              | 5 <sup>5</sup> / <sub>8</sub> | 2                             | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 5 <sup>3</sup> / <sub>4</sub> | 9 <sup>1</sup> / <sub>4</sub>  |
| CS250    | 2 <sup>5</sup> / <sub>8</sub> | 30 <sup>5</sup> / <sub>8</sub> | 26 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>4</sub> | 22                             | -                              | 5 <sup>5</sup> / <sub>8</sub> | 2 <sup>1</sup> / <sub>4</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 5 <sup>3</sup> / <sub>4</sub> | 9 <sup>1</sup> / <sub>4</sub>  |
| CS300    | 2 <sup>5</sup> / <sub>8</sub> | 30 <sup>5</sup> / <sub>8</sub> | 26 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>4</sub> | 22                             | 15                             | 5 <sup>5</sup> / <sub>8</sub> | 2 <sup>1</sup> / <sub>4</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 5 <sup>3</sup> / <sub>4</sub> | 10 <sup>1</sup> / <sub>2</sub> |
| CS350    | 2 <sup>5</sup> / <sub>8</sub> | 34 <sup>1</sup> / <sub>4</sub> | 29 <sup>7</sup> / <sub>8</sub> | 1                             | 24                             | 15                             | 5 <sup>5</sup> / <sub>8</sub> | 2 <sup>1</sup> / <sub>4</sub> | 3 <sup>3</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>8</sub> | 5 <sup>3</sup> / <sub>4</sub> | 10 <sup>1</sup> / <sub>2</sub> |
| CS425    | 3 <sup>1</sup> / <sub>2</sub> | 35 <sup>1</sup> / <sub>2</sub> | 29 <sup>7</sup> / <sub>8</sub> | 1                             | 24                             | 15                             | 7 <sup>7</sup> / <sub>8</sub> | 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 6                             | 10 <sup>1</sup> / <sub>2</sub> |
| CS500    | 3 <sup>1</sup> / <sub>2</sub> | 35                             | 29 <sup>7</sup> / <sub>8</sub> | 1                             | 24                             | 15                             | 7 <sup>7</sup> / <sub>8</sub> | 2 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 6                             | 10 <sup>1</sup> / <sub>2</sub> |
| CS600    | 3 <sup>1</sup> / <sub>2</sub> | 38                             | 31 <sup>7</sup> / <sub>8</sub> | 1                             | 24                             | -                              | 7 <sup>7</sup> / <sub>8</sub> | 3 <sup>3</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub> | 1 <sup>1</sup> / <sub>2</sub> | 6                             | 10 <sup>1</sup> / <sub>2</sub> |

†Dimensions XBD, XAJ, XAK, XBB, XBF, DD, CD and H to suit NEMA "P" or "C" electric motors.

## ROTATION

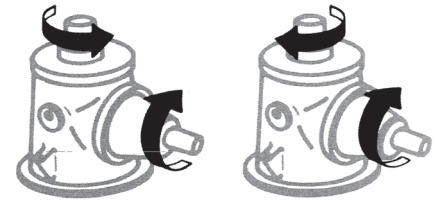


FIG. 1

FIG. 2

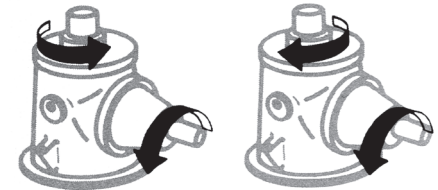


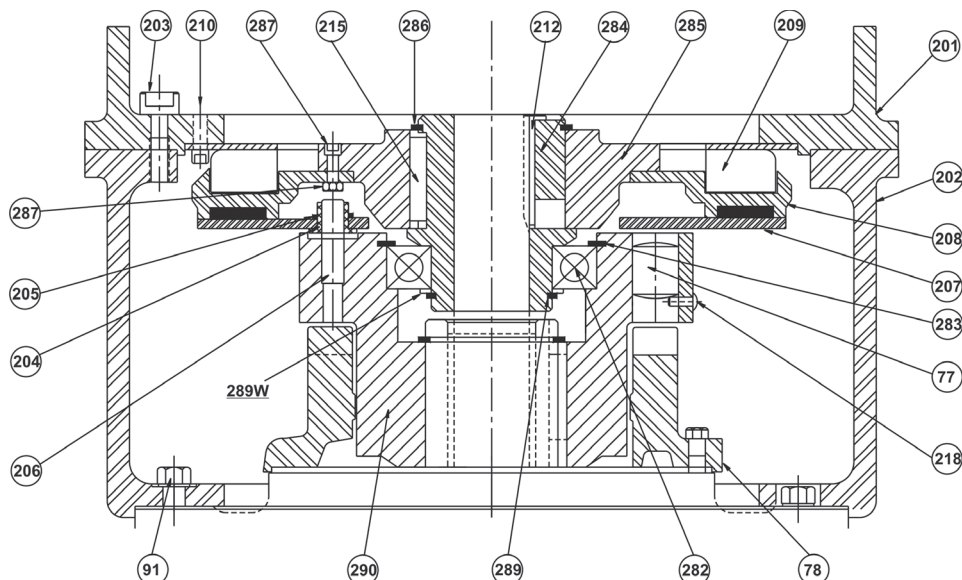
FIG. 3

FIG. 4

All solid gear drives are manufactured to order, and such orders are not subject to cancellation without charge for parts processed.



## REDI-TORQ



\*Drive Plate (207) Shown Engaged - Gap Should Approximately be 3/32 When Disengaged

### **REDI-TORQ SUB ASSEMBLY**

| No. | Part Name            | No.  | Part Name            |
|-----|----------------------|------|----------------------|
| 77  | Ratchet Pins         | 212  | Gib Key              |
| 78  | Thrust Bearing Cover | 215  | Rotor Hub Key        |
| 91  | Capscrew             | 218  | Fil. Hd. Screws      |
| 201 | Upper Motor Stand    | 282  | Steady Bearing       |
| 202 | Lower Motor Stand    | 283  | Snap Ring            |
| 203 | Socket Head Capscrew | 284  | Rotor Bushing        |
| 204 | Drive Pin Bushings   | 285  | Rotor Hub            |
| 205 | Retainer Rings       | 286  | Snap Ring            |
| 206 | Drive Pins           | 287  | Socket Head Capscrew |
| 207 | Drive Plate          | 287N | Flexloc Nuts         |
| 208 | Rotor                | 289  | Snap Ring            |
| 209 | Field                | 289W | Snap Ring Washer     |
| 210 | Socket Head Capscrew | 290  | Lower Coupling       |

## Provides Automatic Operation for Pumping Stations and Storm Drainage.

The Redi-Torq drive is desirable where 24-hour service is mandatory and automatic operation is desired. It is preferred by municipalities and waterworks corporations.

Electric motor or engine may be used to drive the pump permitting removal of either for repairs without interrupting service.

### **Redi-Torq HOLLOW SHAFT DRIVE**

Incorporates all of the features of the standard Combination Drive described on page 8 with the added capability of automatic power changeover through a magnetic clutch. Operation is as follows: interruption of electric power initiates starting of engine through the control panel. \* Redi-Torq clutch is energized and the engine drives the pump. Return of electric power initiates engine shutdown and returns operation of pump to the electric motor.

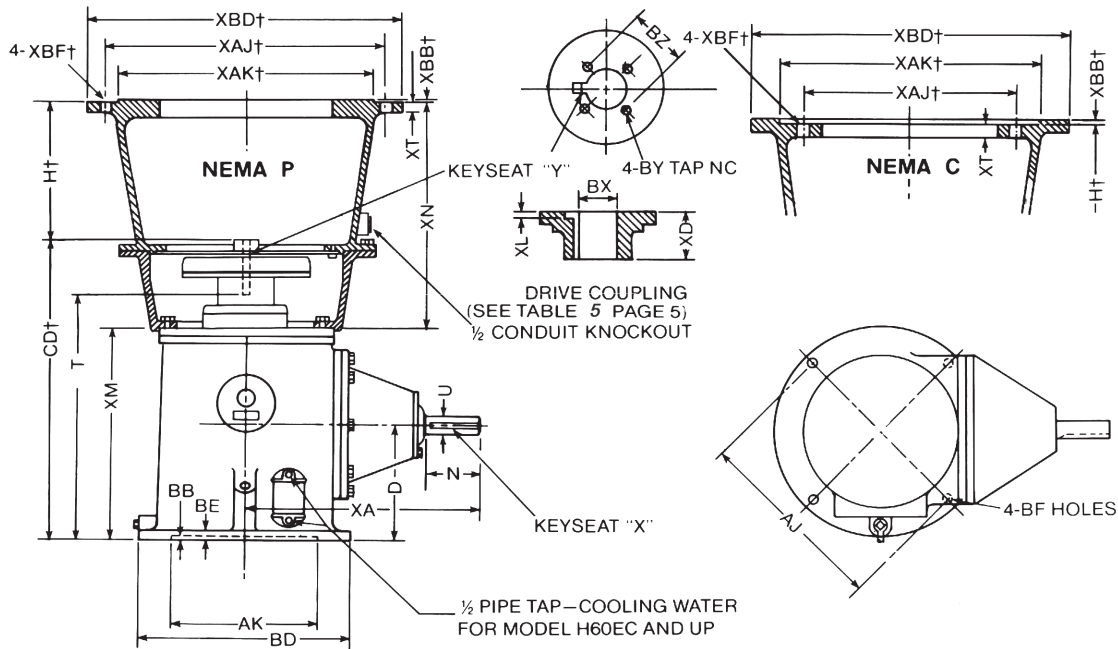
The Redi-Torq drive permits the use of standard flexible shafting or coupling between engine and gear drive, and engines need not be equipped with mechanical clutches. Interruption of the Redi-Torq circuit permits testing or tuneup of the engine without affecting the pump shaft. This permits continuous pumping by the electric motor while the engine is being tuned.

*\*We do not furnish the control system for the Redi-Torq of which there are several standard makes available, in addition to those made by some engine manufacturers and dealers.*

*Any control system used should preferably energize the Redi-Torq clutch at engine idle speed or at start of cranking cycle (static engagement). Either method requires a throttle or governor speed control to "gradually" advance the engine from idle to full load speed.*

**Caution:** Engagement of Redi-Torq clutch should never be made at full load speed.

# HOLLOW SHAFT REDI-TORQ DRIVE



U-XA-N and X dimensions for Models H150EC and H200EC are subject to change. See Table 8 on page 7.

**TABLE 16. REDI-TORQ® DRIVE DIMENSIONS (IN INCHES)**

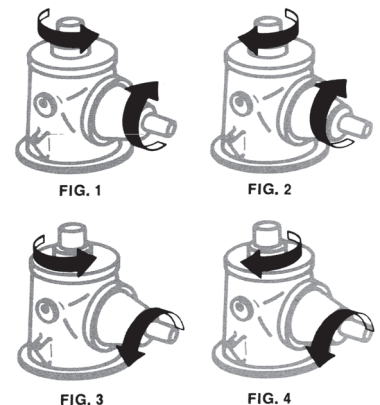
| Model    | CD                             | D                              | U                              | XA                             | N                             | XM                             | H                             | BD                             | AJ                             | AK                             | BB                             | BE                            | BF                              | Keyseat X                                                                                      | MOTOR STAND                    |                               |
|----------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------------------|--------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------------------|---------------------------------|------------------------------------------------------------------------------------------------|--------------------------------|-------------------------------|
|          |                                |                                |                                |                                |                               |                                |                               |                                |                                |                                |                                |                               |                                 |                                                                                                | XN                             | XT                            |
| H40-12EC | 22 <sup>3</sup> / <sub>4</sub> | 9                              | 1 <sup>1</sup> / <sub>2</sub>  | 16                             | 3 <sup>1</sup> / <sub>2</sub> | 15 <sup>1</sup> / <sub>4</sub> | 9 <sup>1</sup> / <sub>8</sub> | 12                             | 9 <sup>1</sup> / <sub>8</sub>  | 8 <sup>1</sup> / <sub>4</sub>  | 3 <sup>1</sup> / <sub>16</sub> | 3 <sup>1</sup> / <sub>4</sub> | 7 <sup>1</sup> / <sub>16</sub>  | 3 <sup>1</sup> / <sub>8</sub> × 3 <sup>1</sup> / <sub>16</sub> × 2 <sup>3</sup> / <sub>4</sub> | 16 <sup>5</sup> / <sub>8</sub> | 5 <sup>5</sup> / <sub>8</sub> |
| H40EC    | 22 <sup>3</sup> / <sub>4</sub> | 9                              | 1 <sup>1</sup> / <sub>2</sub>  | 16                             | 3 <sup>1</sup> / <sub>2</sub> | 15 <sup>1</sup> / <sub>4</sub> | 9 <sup>1</sup> / <sub>8</sub> | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>16</sub> | 3 <sup>1</sup> / <sub>4</sub> | 7 <sup>1</sup> / <sub>16</sub>  | 3 <sup>1</sup> / <sub>8</sub> × 3 <sup>1</sup> / <sub>16</sub> × 2 <sup>3</sup> / <sub>4</sub> | 16 <sup>5</sup> / <sub>8</sub> | 5 <sup>5</sup> / <sub>8</sub> |
| H60EC    | 22 <sup>3</sup> / <sub>4</sub> | 9                              | 1 <sup>1</sup> / <sub>2</sub>  | 16                             | 3 <sup>1</sup> / <sub>2</sub> | 15 <sup>1</sup> / <sub>4</sub> | 9 <sup>1</sup> / <sub>8</sub> | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>16</sub> | 3 <sup>1</sup> / <sub>4</sub> | 11 <sup>1</sup> / <sub>16</sub> | 3 <sup>1</sup> / <sub>8</sub> × 3 <sup>1</sup> / <sub>16</sub> × 2 <sup>3</sup> / <sub>4</sub> | 16 <sup>5</sup> / <sub>8</sub> | 5 <sup>5</sup> / <sub>8</sub> |
| H110EC   | 27 <sup>1</sup> / <sub>2</sub> | 11 <sup>3</sup> / <sub>8</sub> | 2                              | 17 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>2</sub> | 19 <sup>5</sup> / <sub>8</sub> | 9 <sup>1</sup> / <sub>8</sub> | 16 <sup>1</sup> / <sub>2</sub> | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>16</sub> | 1                             | 11 <sup>1</sup> / <sub>16</sub> | 1 <sup>1</sup> / <sub>2</sub> × 1 <sup>1</sup> / <sub>4</sub> × 2 <sup>3</sup> / <sub>4</sub>  | 17                             | 5 <sup>5</sup> / <sub>8</sub> |
| H150EC   | 32 <sup>7</sup> / <sub>8</sub> | 13 <sup>1</sup> / <sub>4</sub> | 2 <sup>7</sup> / <sub>16</sub> | 20 <sup>1</sup> / <sub>2</sub> | 4 <sup>3</sup> / <sub>4</sub> | 23 <sup>1</sup> / <sub>8</sub> | 8 <sup>3</sup> / <sub>4</sub> | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>16</sub> | 1                             | 11 <sup>1</sup> / <sub>16</sub> | 5 <sup>1</sup> / <sub>8</sub> × 5 <sup>1</sup> / <sub>16</sub> × 3 <sup>3</sup> / <sub>4</sub> | 18 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub> |
| H200EC   | 32 <sup>7</sup> / <sub>8</sub> | 13 <sup>1</sup> / <sub>4</sub> | 2 <sup>7</sup> / <sub>16</sub> | 20 <sup>1</sup> / <sub>2</sub> | 4 <sup>3</sup> / <sub>4</sub> | 23 <sup>1</sup> / <sub>8</sub> | 8 <sup>3</sup> / <sub>4</sub> | 20                             | 14 <sup>3</sup> / <sub>4</sub> | 13 <sup>1</sup> / <sub>2</sub> | 3 <sup>1</sup> / <sub>16</sub> | 1                             | 11 <sup>1</sup> / <sub>16</sub> | 5 <sup>1</sup> / <sub>8</sub> × 5 <sup>1</sup> / <sub>16</sub> × 3 <sup>3</sup> / <sub>4</sub> | 18 <sup>1</sup> / <sub>2</sub> | 3 <sup>3</sup> / <sub>4</sub> |

**TABLE 17.**

| Model    | XD                            | XL                            | Max. BX                         |                               | T                              | CLUTCH VOLTAGE |     |
|----------|-------------------------------|-------------------------------|---------------------------------|-------------------------------|--------------------------------|----------------|-----|
|          |                               |                               | Fig. 1&4                        | Fig. 2&3                      |                                | STD            | OPT |
| H40-12EC | 4 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 1 <sup>7</sup> / <sub>16</sub>  | 1 <sup>1</sup> / <sub>4</sub> | 18 <sup>1</sup> / <sub>2</sub> | 12             | 6   |
| H40EC    | 4 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 1 <sup>7</sup> / <sub>16</sub>  | 1 <sup>1</sup> / <sub>4</sub> | 18 <sup>1</sup> / <sub>2</sub> | 12             | 6   |
| H60EC    | 4 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>4</sub> | 1 <sup>7</sup> / <sub>16</sub>  | 1 <sup>1</sup> / <sub>4</sub> | 18 <sup>1</sup> / <sub>2</sub> | 12             | 6   |
| H110EC   | 4 <sup>5</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>4</sub> | 1 <sup>1</sup> / <sub>2</sub>   | 1 <sup>1</sup> / <sub>2</sub> | 22 <sup>7</sup> / <sub>8</sub> | 12             | 24  |
| H150EC   | 5 <sup>3</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>4</sub> | 1 <sup>15</sup> / <sub>16</sub> | 1 <sup>3</sup> / <sub>4</sub> | 27 <sup>1</sup> / <sub>2</sub> | 12             | 24  |
| H200EC   | 5 <sup>3</sup> / <sub>8</sub> | 1 <sup>1</sup> / <sub>4</sub> | 1 <sup>15</sup> / <sub>16</sub> | 1 <sup>3</sup> / <sub>4</sub> | 27 <sup>1</sup> / <sub>2</sub> | 12             | 24  |

† Dimensions XBD, XAJ, XAK, XBB, and XBF to suit NEMA "P" or "C" electric motors.

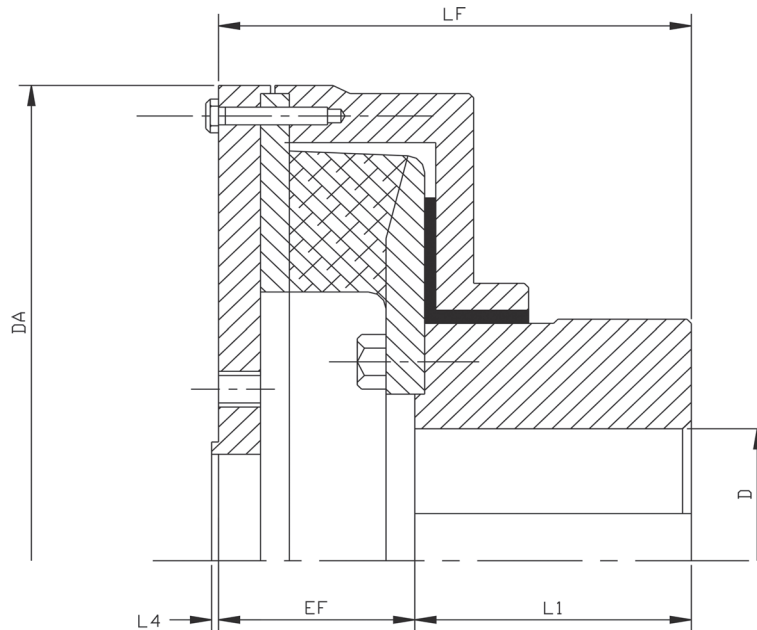
## ROTATION



All Redi-Torq drives are manufactured to order, and such orders are not subject to cancellation without charge for parts processed.

For standard drive coupling size see Table 5 page 5.

## TORSIONAL COUPLINGS



**TABLE 18.**

| TC-VSK coupling size | DA     | D     | L1    | LF    | EF    | L4    | Total weight lb | Compatible Drive Flanges | Application  |
|----------------------|--------|-------|-------|-------|-------|-------|-----------------|--------------------------|--------------|
| TC-VSK15-1500        | 8.740  | 1.500 | 2.559 | 4.094 | 1.535 | 0.079 | 31.6            | 1350, 1410               | H40/60       |
| TC-VSK15-1875        | 8.740  | 1.875 | 2.559 | 4.094 | 1.535 | 0.079 | 31.6            | 1480, 1550               | H80          |
| TC-VSK25-2000        | 10.551 | 2.000 | 2.559 | 4.488 | 1.929 | 0.079 | 45.7            | 1480, 1550, 1610, 1710   | H110/125     |
| TC-VSK25-2437        | 10.551 | 2.437 | 2.559 | 4.488 | 1.929 | 0.079 | 45.7            | 1480, 1550, 1610, 1710   | H150/200     |
| TC-VSK45-2750        | 12.598 | 2.750 | 3.150 | 5.472 | 2.347 | 0.098 | 88.1            | 1610, 1710, 1810         | H250/300/350 |
| TC-VSK50-3000        | 14.173 | 3.000 | 3.937 | 6.732 | 2.795 | 0.098 | 119.2           | 1610, 1710, 1810         | H425         |
| TC-VSK50-3500        | 14.173 | 3.500 | 3.937 | 6.732 | 2.795 | 0.098 | 119.2           | 1610, 1710, 1810         | H500         |

### Increase Your Pumping System Protection

The use of diesel engines to drive right angle drives and pumping systems has increased over recent years and with that, technological improvements in components have caused drastic reductions in engine weight, increased compression ratios and turbo charging. These changes have resulted in the transfer of power from the engine to the driven equipment to not be as smooth as before.

Premature failure of the components in a pump system can occur when operating at or near (+/-10%) a torsional resonant speed. With engine driven systems, it is not uncommon for one or more resonant speeds to exist between zero (0) rpm and the operating speed of the system. Continued operation at a resonant speed will result in torsional vibrations, which can be damaging to all components in the system. Vibratory torque, much higher than the rated torque of the driven components, is not uncommon.

Typical modes of failure are broken crank shafts, drive line shafts, drive line shafts twisting in two, broken input shafts, and broken gear teeth. Unusual rumbling and clattering noise from the

gear drive at specific speed is the most common indication of torsional vibrations. As the speed is increased or decreased, the noise will disappear. Noise is a result of the gear teeth separating and clashing together very rapidly when the vibratory torque exceeds the drive torque, typically at a resonant speed. Transition through a resonant speed is not normally damaging, but operation at or near the resonant speed, should be avoided.

To avoid operation at a resonant speed, it may be necessary to make a change to the speed of the engine with respect to the pump, or change the elastic characteristics; a torsional coupling needs to be added to the system.

The torsional coupling is designed and installed with systems using U-joint type drive-lines and standard gear drives. The coupling is usually self-supporting and is selected with the best compromise of torsional characteristics for engines operating between 1200 and 2400 rpm. In most cases, the coupling can be installed with minimal modifications to the drive-line shaft and guarding system. Guarding systems, should always be used around rotating shafts and couplings. Johnson

## HOW TO ORDER

Please supply the following data when ordering or inquiring about Johnson Right Angle Gear Drives:  
STANDARD and COMBINATION DRIVES:

|                                                          |                                                                        |
|----------------------------------------------------------|------------------------------------------------------------------------|
| Model _____                                              | Pump Shaft Diameter (BX) _____                                         |
| Ratio (See Table 1) _____ Pump RPM _____ Drive RPM _____ | Duty: Continuous _____ Intermittent _____                              |
| Rotation (See diagrams) _____                            | COMBINATION and REDI-TORQ DRIVES:                                      |
| Horsepower Required by Pump _____                        | Motor Stand Information Required (See Table 10)                        |
| Maximum Downthrust _____ Upthrust _____                  | Specify NEMA P or NEMA C frame size.                                   |
| (See Table 2 for minimum downthrust)                     | XN _____ XBD _____ XAK _____ XAJ _____                                 |
|                                                          | For combination drives with solid shafts furnish details for coupling. |

---

## WARRANTY

1. The Johnson Right Angle Gear Drive is warranted to be free from defects in material and workmanship under normal use and service for a period of one year from the date of factory shipment by us for the original purchaser and then only when operated within the rated capacity for which it was sold and in accordance with recognized usage and practice. Our obligation under this warranty is limited to the replacement of any part or parts which shall be returned to us with transportation charges prepaid, within one year after shipment for the original purchaser; and, which it is determined by the company, to have proven defective under normal and proper use. This warranty shall not apply to any drive which has been altered or repaired outside our factory without our written consent and approval, or any drive which has been subject to misuse, neglect, accident, improper oiling, or torsional damage.

2. We make no warranty of any kind whatever, express or implied, in regard to bearings, trade accessories, machinery, or other articles of merchandise not manufactured by us. The bearings which we have selected for the thrust position will cover most installations, but there are many cases which will require special treatment.

3. Johnson Gear is a supplier of only one component in the pumping system; we have no control over system design, or engine selection. It is the responsibility of those who select the equipment for the pumping project to assure that damage to any component does not occur due to Torsional Vibration. Johnson Gear will award a three-year warranty to any drive that is equipped with a torsional dampening devise, located between the engine flywheel and the gear drive.

4. No warranty or guarantee is binding upon the company and no asserted breach thereof can be claimed against the company unless the company has been notified in detail and in writing of any alleged defect within seven (7) days after the discovery thereof.

5. The express warranties and guarantee contained herein are exclusive and are made in lieu of any other representation by the company or its agents, and any implied warranty of Merchantability or Fitness for a Particular Purpose are hereby expressly disclaimed. It is agreed that the language contained herein shall be the final and exclusive expression of the agreement with respect to sale of equipment by the company.



## APPROXIMATE SHIPPING WEIGHTS AND DIMENSIONS

| Model  | Net Weight<br>Lbs. | Gross Weight. Lbs       |         | Box Dimensions in Inches |       |        | Volume  |
|--------|--------------------|-------------------------|---------|--------------------------|-------|--------|---------|
|        |                    | Domestic &<br>Container | Plywood | Width                    | Depth | Height | Cu. Ft. |
| H20    | 120                | 145                     | 170     | 26                       | 19    | 38     | 11      |
| H40-12 | 225                | 250                     | 280     | 26                       | 19    | 38     | 11      |
| H40    | 240                | 265                     | 295     | 26                       | 19    | 38     | 11      |
| H60    | 250                | 275                     | 305     | 26                       | 19    | 38     | 11      |
| H80    | 280                | 305                     | 335     | 26                       | 19    | 38     | 11      |
| H110   | 385                | 410                     | 440     | 26                       | 19    | 38     | 11      |
| H125   | 395                | 420                     | 450     | 26                       | 19    | 38     | 11      |
| H150   | 640                | 680                     | 720     | 34                       | 23    | 47     | 21      |
| H200   | 640                | 680                     | 720     | 34                       | 23    | 47     | 21      |
| H250   | 900                | 1000                    | 1050    | 41                       | 31    | 54     | 40      |
| H300   | 900                | 1000                    | 1050    | 41                       | 31    | 54     | 40      |
| H350   | 1350               | 1470                    | 1520    | 47                       | 31    | 56     | 47      |
| H425   | 1540               | 1650                    | 1700    | 47                       | 31    | 56     | 47      |
| H500   | 1580               | 1690                    | 1740    | 47                       | 31    | 56     | 47      |
| H600   | 1970               | 2100                    | 2200    | 47                       | 31    | 56     | 47      |
| H750   | 2100               | 2200                    | 2340    | 47                       | 31    | 64     | 54      |
| H1000  | 2100               | 2200                    | 2340    | 47                       | 31    | 64     | 54      |
| H1200  | 3160               | 3260                    | 3500    | 54                       | 36    | 64     | 72      |
| H1500  | 3160               | 3260                    | 3500    | 54                       | 36    | 64     | 72      |



# JOHNSON GEAR

*Right Angle Gear Drive*

**CELEBRATING 100 YEARS**

**1905 - 2005**



***“Right Angle Gear Drives  
For Irrigation, Industrial,  
Municipal, and Fire  
Protection”***



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