

Hollow Shaft



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200 Series Optimount® Product Reference Guide

F200 Series Optimount® Helical Gear Flanged Reducers

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Selection/Rating Information – Pages 253-256

Lubrication – Pages 267-268

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Basic Model
Dimensions – Page 259



F200H Series
Horizontal Base Model
Dimensions – Page 260



F200V Series
Vertical Base Model
Dimensions – Page 260

200 Series Optimount® Helical Gear Non-Flanged Reducers

Ordering Information – Pages 249-251

Selection/Rating Information – Pages 253-256

Lubrication – Pages 267-268

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Basic Model
Dimensions – Pages 261



200H Series
Horizontal Base Model
Dimensions – Page 262



200V Series
Vertical Base Model
Dimensions – Page 262

200 Series Optimount® Helical Gear Accessories and Options

Ordering Information – Page 249



Shaft Kits / Reaction Rods
Dimensions – Pages 264



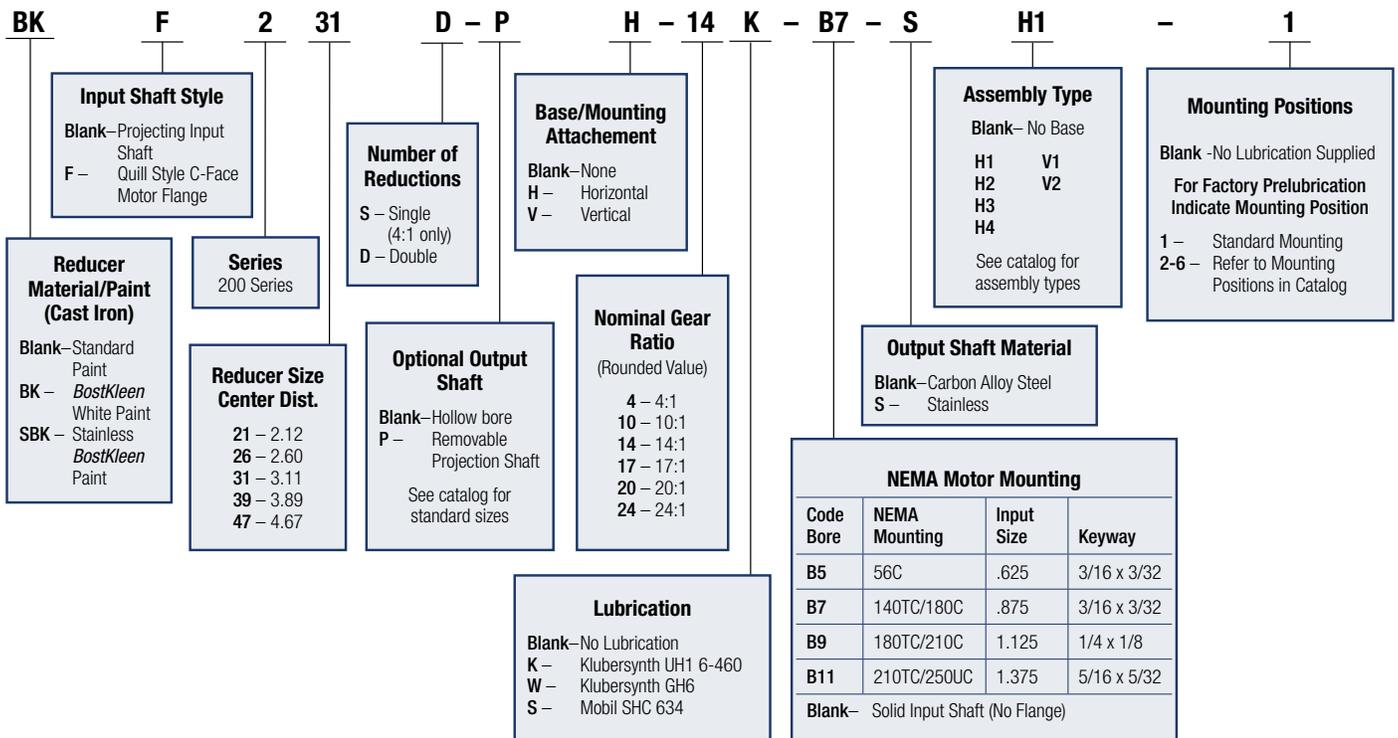
Base Kits
Vertical/Horizontal
Dimensions – Page 265

200 Series Optimount® Numbering System / How to Order

Catalog Numbering System

When ordering please note the complete catalog number and/or the (5-digit) item code. With either of these two numbers your local Boston Distributor will have several alternatives to enter your order into the Boston Gear system.

200 Series Catalog Number



How to Order

Specify Model Number (Basic Hollow Output Shaft Reducer), Ratio, Input Bore Code, Horizontal or Vertical Base Kit and Output Shaft Kit.

EXAMPLE:

F239DPH-14-B9**

Order:

1 Pc. F239D-14-B9 (Basic Flanged Reducer) (39272)

1 Pc. X239-3PK (Output Shaft Kit) (23904)

1 Pc. X239-11HK (Horizontal Base Kit) (68658)

*Shipped separately unless otherwise specified.

**If components are to be factory assembled, specify Assembly Type and Mounting Position, see Page 240

200 Series Optimount® Helical Gear Speed Reducers

To properly select a speed reducer, the following application information should be known.

1. Service Factor or AGMA Service Class.
2. Output Horsepower or Torque
3. Output RPM or Ratio

Non-Motorized Speed Reducer

1. Determine application service factor from table 1 or from application classification tables on pages 348-349.
2. Determine design Horsepower or Torque.
 - Design HP = Application HP x S.F.
 - Design Torque = Application Torque x S.F.
3. Select a Speed reducer that satisfies output RPM, service class and/or output torque requirement. Ref. rating tables pages 257-258.
4. Overhung shaft load should be checked when belt or chain drives are used, to prevent premature shaft or bearing failure. Reference page 251 for calculations.

Example

Select a parallel shaft helical speed reducer for a uniformly loaded assembly belt conveyor to operate 12 hrs/day, to be driven at 1150 RPM input. Output RPM Approx. 80, Torque requirement is 2200 lb-in.

1. Application Service Factor = 1.25
2. Design Torque = 2200 x 1.25 = 2750 LB-IN.
3. Select at speed and torque level of at least 2750 LB-IN or greater
4. Order 239D-14 (Item Code 39052)

NOTE: The use of an auxiliary drive between the speed reducer and the driven machine reduces the torque required at the output shaft in direct proportion to the auxiliary drive ratio.

A 3:1 chain ratio would reduce the torque requirement at the output shaft of the reducer to one-third, resulting in a smaller unit size selection.

Service Factor Table

| AGMA CLASS OF SERVICE | SERVICE FACTOR | OPERATING CONDITIONS |
|-----------------------|----------------|---|
| I | 1.00 | Moderate Shock-not more than 15 minutes in 2 hours. Uniform Load-not more than 10 hours per day. |
| II | 1.25 | Moderate Shock-not more than 10 hours per day. Uniform Load-more than 10 hours per day. |
| | 1.50 | Heavy Shock-not more than 15 minutes in 2 hours. Moderate Shock-more than 10 hours per day. |
| III | 1.75 | Heavy Shock-not more than 10 hours per day. |
| | 2.00 | Heavy Shock-more than 10 hours per day. |

For complete AGMA Service Factors and Load Classifications, see Engineering Pages 348-349.

200 Series Ratio and Capacity Selection Tables

(Service Factor 1.0)

| Catalog Number | Item Code | INPUT RPM | | | | | | | | Gear Ratio | O.H.L. (LB.)* | Weight (Lb.) |
|----------------|-----------|-----------|-----------------------|-------|--------|---------|-----------------------|-------|--------|------------|---------------|--------------|
| | | 1750 | | | | 1150 | | | | | | |
| | | O/P RPM | Output Torque (LB-IN) | HP | | O/P RPM | Output Torque (LB-IN) | HP | | | | |
| | | | | Input | Output | | | Input | Output | | | |
| 221D-14 | 39004 | 121 | 403 | 0.80 | 0.77 | 80 | 403 | 0.53 | 0.51 | 14.45 | 490 | 23 |
| 226D-14 | 39020 | | 711 | 1.43 | 1.37 | | 772 | 1.02 | 0.97 | | 660 | 38 |
| 231D-14 | 39036 | | 1500 | 3.00 | 2.88 | | 1781 | 2.34 | 2.25 | | 780 | 57 |
| 239D-14 | 39052 | | 2842 | 5.69 | 5.46 | | 3168 | 4.17 | 4.00 | | 875 | 96 |
| 247D-14 | 39068 | | 4736 | 9.48 | 9.10 | | 5662 | 7.45 | 7.15 | | 1070 | 140 |
| 221D-17 | 39006 | 101 | 410 | 0.69 | 0.66 | 67 | 410 | 0.45 | 0.43 | 17.28 | 500 | 23 |
| 226D-17 | 39022 | | 754 | 1.26 | 1.21 | | 805 | 0.89 | 0.85 | | 675 | 38 |
| 231D-17 | 39038 | | 1644 | 2.75 | 2.64 | | 1857 | 2.04 | 1.96 | | 800 | 57 |
| 239D-17 | 39054 | | 2959 | 5.00 | 4.80 | | 3219 | 3.54 | 3.40 | | 900 | 96 |
| 247D-17 | 39070 | | 5071 | 8.49 | 8.15 | | 5775 | 6.34 | 6.10 | | 1100 | 135 |

Ref. Page 257

200 Series Optimount® Helical Gear Speed Reducers

Motorized Speed Reducer

1. Determine application service factor from the table on page 250 or from pages 348-349.
2. Determine output speed required.
3. Determine HP or output torque requirement.
4. Select based on output speed and horsepower requirement for given service class.
5. Check overhung load Ref. calculation.

Example

Select a Parallel Shaft Helical Gear Flanged Speed Reducer and motor to drive a uniformly loaded line shaft 12 hours/day, requiring approximately 1 1/2 HP at 100 RPM.

Power Requirement
 230/460 volt
 3 phase
 60 Hz

1. Select service factor class from pages 348-349 or from Table 1.
 Service class = II
2. Output RPM = 100
3. 1 1/2 HP
4. Select a 1 1/2 HP drive that will satisfy service class II.
5. O.H.L = 800 LBS. Ref. pg. 257
6. Order: 1 – F231D-17-B7 (39250)
 1 – JUTF Motor Ref. page 339 for specific manufacturer.

Overhung Load

If the output shaft of a speed reducer is connected to the driven machine by other than a flexible coupling, an overhung load is imposed on the shaft. This load may be calculated as follows:

$$OHL = \frac{2 TK}{D}$$

- OHL = Overhung Load (LB.)
- T = Shaft Torque (LB.-INS.)
- D = PD of Sprocket, Pinion or Pulley (IN.)
- K = Load Connection Factor

Load Connection Factor (K)

| | |
|---------------------------------|------|
| Sprocket or Timing Belt | 1.00 |
| Pinion and Gear Drive | 1.25 |
| Pulley and V-Belt Drive..... | 1.50 |
| Pulley and Flat Belt Drive..... | 2.50 |

An overhung load greater than permissible load value may be reduced to an acceptable value by the use of a sprocket, pinion or pulley of a larger PD. Relocation of the load closer to the center of reducer will also increase OHL capacity.

Permissible Overhung Loads and Output Shaft Thrust Loads are listed for each reducer in the Tables on Pages 257-258.

200 Series Output RPM and Capacity Selection Tables

@ 1750 RPM Input

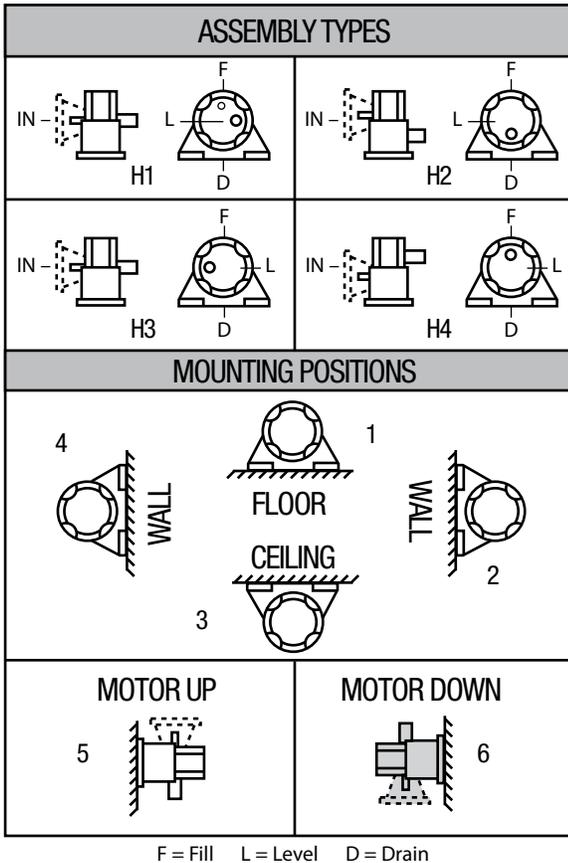
| Output RPM | Ratio | Non-Flanged Reducers | | | | | Flanged Reducers (Gearmotors) | | | | | AC Motor† | DC Motor†† | |
|-------------|-------|------------------------|-------|--------|----------------|-----------|-------------------------------|------------------------|---------------|----------------|-------------|--------------|--------------------|---------------------------|
| | | Gear Capacity | | | Catalog Number | Item Code | Ratings | | | Catalog Number | Item Code | | | |
| | | Output Torque (LB-IN.) | HP | | | | Motor HP | Output Torque (LB-IN.) | Service Class | | | | | |
| | | | Input | Output | | | | | | | | | | |
| 101 (Cont.) | 17.28 | 1644 | 2.75 | 2.64 | 231D-17 | 39038 | 3 | *1644 | * | F231D-17-B9 | 47227 | LUTF | PM18300 | |
| | | | | | | | 2 | 1194 | I | F231D-17-B7 | 39250 | KUTF JUTF | PM18200 PM18150 | |
| | | | | | | | 1 1/2 | 896 | II | | | | | |
| | | | | | | | | 1 | 597 | III | F231D-17-B5 | 39246 | HUTF-5/8 | PM9100 5/8 PM18100 5/8 |
| | | | | | | | | 5 | *2956 | * | F239D-17-B9 | 39276 | MUTF LUTF | PM18500 PM18300 |
| | | | | | | | | 3 | 1498 | II | | | | |
| | | | | | | | | 2 | 1194 | III | F239D-17-B7 | 39274 | KUTF | PM18200 |
| | | | | | | 7 1/2 | 4478 | I | F247D-17-B11 | 47233 | NUTF | — | | |

Reference Page 255



200 Series Optimount® Mounting Positions

200 SERIES—HORIZONTAL BASE



NOTE: Shaded positions are not recommended when used as a motorized reducer and should be avoided if possible.

Mountings are designated by combining identification for assembly type and mounting position (Example Mtg. H1).

Mounting H1 is standard and will be furnished unless otherwise specified.

SIZES 221 TO 247

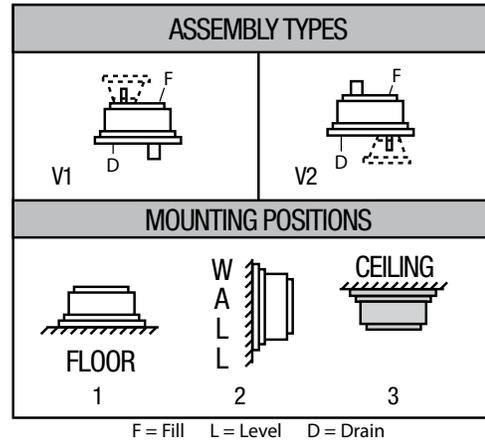
All other assemblies are available at no additional charge. The assembly types shown indicate the four possible arrangements of the Reductor in the base.

Any of these assemblies may be installed in the various floor sidewall or ceiling mounting positions shown by relocating oil plugs in proper positions. *Reference pages 267-268.*

CAUTION

Mounting of speed reducers in overhead positions may be hazardous. Use of external guides or supports is strongly recommended for overhead mounting.

200 SERIES—VERTICAL BASE



Mountings are designated by combining identification for assembly type and mounting position (Example Mtg. V1).

Mounting V1 is standard and will be furnished unless otherwise specified. All other mountings are available at no additional charge.

SIZES 221 TO 247

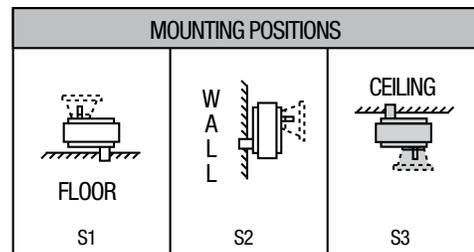
Assemblies V1 & V2 may be installed in the various floor, side-wall or ceiling mounting positions shown.

Sidewall Mounted Reducers must be located with one edge of the base parallel to the floor so that oil plugs can be properly located.

Mounting designations other than standard must be included with each Reductor order.

200 SERIES

SHAFT MOUNTING



Mounting S2 is standard and will be furnished unless otherwise specified. Mountings S1 & S3 are available at a slight additional charge.

SIZES 221 TO 247

Shaft Mounted Reducers may be installed in floor, sidewall or ceiling mounting positions by proper relocation of oil plugs. *Reference to pages 267-268.*

200 Series Output RPM and Capacity Selection Tables

@ 1750 RPM Input

FOR RATINGS AT OTHER INPUT SPEEDS, SEE TABLES ON PAGES 257-258
ORDER BY CATALOG NUMBER OR ITEM CODE

| Output RPM | Ratio | Non-Flanged Reducers | | | | | Flanged Reducers (Gearmotors) | | | | | AC Motors† | DC Motors†† | |
|------------|-------|------------------------|-------|--------|----------------|-----------------|-------------------------------|------------------------|---------------|----------------|-------------|-------------|---------------------------|----------|
| | | Gear Capacity | | | Catalog Number | Item Code | Ratings | | | Catalog Number | Item Code | | | |
| | | Output Torque (LB-IN.) | HP | | | | Motor HP | Output Torque (LB-IN.) | Service Class | | | | | |
| | | | Input | Output | | | | | | | | | | |
| 431 | 4.06 | 289 | 2.02 | 1.98 | 221S-4 | 39012 | 1 | 142 | III | F221S-4-B5 | 39214 | HUTF-5/8 | PM9100 5/8 PM18100 5/8 | |
| | | | | | | | 3/4 | 106 | III | | | GUTF | PM975 | |
| | | 455 | 3.17 | 3.11 | 226S-4 | 39028 | 2 | 284 | II | F226S-4-B7 | 39236 | KUTF | PM18200 | |
| | | | | | | | 1 1/2 | 213 | III | | | JUTF | PM18150 | |
| | | 950 | 6.63 | 6.50 | 231S-4 | 39044 | 5 | 716 | I | F231S-4-B9 | 39264 | MUTF | PM18500 | |
| | | | | | | | 3 | 423 | III | | | LUTF | PM18300 | |
| | | 1900 | 13.26 | 12.99 | 239S-4 | 39060 | 10 | 1432 | I | F239S-4-B11 | 39290 | PUTF | — | |
| | | | | | | | 7 1/2 | 1074 | II | | | NUTF | — | |
| | | 2851 | 19.90 | 19.50 | 247S-4 | 39076 | 5 | 716 | III | F239S-4-B9 | 39288 | MUTF | PM18500 | |
| | | | | | | | 10 | 1432 | II | | | PUTF | — | |
| | | | | | | | | 7 1/2 | 1074 | III | F247S-4-B11 | 39308 | NUTF | — |
| | | 178 | 9.84 | 390 | 1.15 | 1.10 | 221D-10 | 39002 | 1 | 340 | I | F221D-10-B5 | 39202 | HUTF-5/8 |
| 3/4 | 255 | | | | | | | | II | GUTF | PM975 | | | |
| 1/2 | 170 | | | | | | | | III | FUTF | PM950 | | | |
| 672 | 2.00 | | | 1.90 | 226D-10 | 39018 | 2 | 660 | I | F226D-10-B7 | 39220 | KUTF | PM18200 | |
| | | | | | | | 1 1/2 | 510 | I | | | JUTF | PM18150 | |
| | | | | | | | 1 | 340 | II | F226D-10-B5 | 39218 | HUTF-5/8 | PM9100 5/8 PM18100 5/8 | |
| 3/4 | 255 | | | III | GUTF | PM975 PM1875 | | | | | | | | |
| 1322 | 3.89 | | | 3.73 | 231D-10 | 39034 | 3 | 1020 | I | F231D-10-B9 | 39242 | LUTF | PM18300 | |
| | | | | | | | 2 | 680 | II | F231D-10-B7 | 39240 | KUTF | PM18200 | |
| | | | | | | | 1 1/2 | 510 | III | | | JUTF | PM18150 | |
| 2426 | 7.12 | | | 6.84 | 239D-10 | 39050 | 5 | 1700 | I | F239D-10-B9 | 39268 | MUTF | PM18500 | |
| | | | | | | | 3 | 1020 | III | | | LUTF | PM18300 | |

Class I (S.F. = 1.00) Class II (S.F. = 1.50) Class III (S.F. = 2.00)

† AC Motors – 230/460-3-60 TEFC, for specific motor manufacturers and 5 digit item code refer to pages 337-339.

††DC Motors – 90 VDC or 180 VDC where applicable, for specific motor manufacturers and 5 digit item code ref. pages 340 and 341.

200 Series Output RPM and Capacity Selection Tables

@ 1750 RPM Input

FOR RATINGS AT OTHER INPUT SPEEDS, SEE TABLES ON PAGES 245-246
ORDER BY CATALOG NUMBER OR ITEM CODE

| Output RPM | Ratio | Non-Flanged Reducers | | | | | Flanged Reducers (Gearmotors) | | | | | AC Motors† | DC Motors†† |
|----------------|-------|------------------------|-------|--------|----------------|-----------|-------------------------------|---|---------------|----------------|-----------|--------------------------|---|
| | | Gear Capacity | | | Catalog Number | Item Code | Ratings | | | Catalog Number | Item Code | | |
| | | Output Torque (LB-IN.) | HP | | | | Motor HP | Output Torque (LB-IN.) | Service Class | | | | |
| | | | Input | Output | | | | | | | | | |
| 178 (Cont.) | 9.84 | 4641 | 13.64 | 13.09 | 247D-10 | 39066 | 10 | 3400 | I | F247D-10-B11 | 39296 | PUTF NUTF | — |
| | | | | | | | 7 1/2 | 2550 | II | | | | — |
| 121 | 14.45 | 403 | .80 | .77 | 221D-14 | 39004 | 3/4 | 374 | I | F221D-14-B5 | 39204 | GUTF FUTF EUTF | PM975 PM950 PM933 |
| | | | | | | | 1/2 | 250 | II | | | | |
| | | | | | 1/3 | 166 | III | | | | | | |
| | | | | | 226D-14 | 39020 | 1 1/2 | *711 | * | F226D-14-B7 | 39224 | JUTF | PM18150 |
| | | | | | | | 1 | 500 | I | | | | |
| | | | | | 231D-14 | 39036 | 3/4 | 374 | II | F226D-14-B5 | 39222 | HUTF-5/8 GUTF FUTF | PM9100 5/8 PM18100 5/8 PM975 PM950 |
| | | | | | | | 1/2 | 250 | III | | | | |
| | | | | | | | 3 | 1500 | I | | | | |
| | | | | | 239D-14 | 39052 | 2 | 998 | II | F231D-14-B9 | 47226 | LUTF | PM18300 |
| | | | | | | | 1 1/2 | 750 | III | | | | |
| | | | | | | | 1 | 500 | III | | | | |
| | | | | | 247D-14 | 39068 | 5 | 2497 | I | F231D-14-B7 | 39248 | KUTF JUTF | PM18200 PM18150 |
| | | | | | | | 3 | 1498 | II | | | | |
| | | | | | | | 2 | 998 | III | | | | |
| 247D-14 | 39068 | 10 | *4736 | * | F239D-14-B9 | 39272 | MUTF LUTF | PM18500 PM18300 | | | | | |
| | | 7 1/2 | 3745 | I | | | | | | | | | |
| | | 5 | 2497 | II | | | | | | | | | |
| 247D-14 | 39068 | 3 | 1498 | III | F239D-14-B7 | 39270 | KUTF | PM18200 | | | | | |
| | | 3 | 1498 | III | | | | | | | | | |
| | | 3 | 1498 | III | | | | | | | | | |
| 101 | 17.28 | 410 | .69 | .66 | 221D-17 | 39006 | 3/4 | *410 | * | F221D-17-B5 | 39206 | GUTF FUTF EUTF | PM975 PM950 PM933 |
| | | | | | | | 1/2 | 298 | I | | | | |
| | | | | | 1/3 | 199 | III | | | | | | |
| | | | | | 226D-17 | 39022 | 1 1/2 | *754 | * | F226D-17-B7 | 47220 | JUTF | PM18150 |
| 1 | 597 | I | | | | | | | | | | | |
| 226D-17 | 39022 | 3/4 | 448 | II | F226D-17-B5 | 39226 | HUTF-5/8 GUTF FUTF | PM9100 5/8 PM18100 5/8 PM975 PM950 | | | | | |
| | | 1/2 | 298 | III | | | | | | | | | |

Class I (S.F. = 1.00) Class II (S.F. = 1.50) Class III (S.F. = 2.00)

† AC Motors – 230/460-3-60 TEFC, for specific motor manufacturers and 5 digit item code refer to pages 337-339.

†† DC Motors – 90 VDC or 180 VDC where applicable, for specific motor manufacturers and 5 digit item code ref. pages 340 and 341.

*Rating Limited to Gear Capacity.

200 Series Output RPM and Capacity Selection Tables

@ 1750 RPM Input

FOR RATINGS AT OTHER INPUT SPEEDS, SEE TABLES ON PAGES 245-246
ORDER BY CATALOG NUMBER OR ITEM CODE

| Output RPM | Ratio | Non-Flanged Reducers | | | | | Flanged Reducers (Gearmotors) | | | | | AC Motors† | DC Motors‡ |
|-------------|-------|------------------------|-------|--------|----------------|-----------|-------------------------------|------------------------|---------------|----------------|-----------|--------------|---------------------------|
| | | Gear Capacity | | | Catalog Number | Item Code | Ratings | | | Catalog Number | Item Code | | |
| | | Output Torque (LB-IN.) | HP | | | | Motor HP | Output Torque (LB-IN.) | Service Class | | | | |
| | | | Input | Output | | | | | | | | | |
| 101 (Cont.) | 17.28 | 1644 | 2.75 | 2.64 | 231D-17 | 39038 | 3 | *1644 | * | F231D-17-B9 | 47227 | LUTF | PM18300 |
| | | | | | | | 2 | 1194 | I | F231D-17-B7 | 39250 | KUTF JUTF | PM18200 PM18150 |
| | | | | | | | 1 1/2 | 896 | II | | | | |
| | | 2959 | 4.96 | 4.76 | 239D-17 | 39054 | 1 | 597 | III | F231D-17-B5 | 39246 | HUTF-5/8 | PM9100 5/8 PM18100 5/8 |
| | | | | | | | 5 | *2956 | * | F239D-17-B9 | 39276 | MUTF LUTF | PM18500 PM18300 |
| | | | | | | | 3 | 1498 | II | | | | |
| | | | | | | | 2 | 1194 | III | F239D-17-B7 | 39274 | KUTF | PM18200 |
| | | | | | | | 7 1/2 | 4478 | I | F247D-17-B11 | 47233 | NUTF | — |
| | | | | | | | 5 | 2986 | II | F247D-17-B9 | 39300 | MUTF LUTF | PM18500 PM18300 |
| 87.4 | 20.03 | 398 | .57 | .55 | 221D-20 | 39008 | 1/2 | 346 | I | F221D-20-B5 | 39208 | FUTF | PM950 |
| | | | | | | | 1/3 | 230 | II | | | EUTF | PM933 |
| | | | | | | | 1/4 | 173 | III | | | DUTF | PM925 |
| | | 758 | 1.09 | 1.05 | 226D-20 | 39024 | 1 | 692 | I | F226D-20-B5 | 39228 | HUTF-5/8 | PM9100 5/8 |
| | | | | | | | 3/4 | 519 | II | | | GUTF | PM18100 5/8 |
| | | | | | | | 1/2 | 346 | III | | | FUTF | PM975 PM950 |
| | | 1679 | 2.43 | 2.33 | 231D-20 | 39040 | 3 | *1679 | * | F231D-20-B9 | 47228 | LUTF | PM18300 |
| | | | | | | | 2 | 1384 | I | F231D-20-B7 | 39254 | KUTF JUTF | PM18200 PM18150 |
| | | | | | | | 1 1/2 | 1038 | II | | | | |
| | | | | | | | 1 | 692 | III | F231D-20-B5 | 39252 | HUTF-5/8 | PM9100 5/8 PM18100 5/8 |
| | | 3022 | 4.36 | 4.19 | 239D-20 | 39056 | 5 | *3022 | * | F239D-20-B9 | 39280 | MUTF LUTF | PM18500 PM18300 |
| | | | | | | | 3 | 2076 | I | | | | |
| | | | | | | | 2 | 1384 | III | F239D-20-B7 | 39278 | KUTF | PM18200 |
| | | 5198 | 7.51 | 7.21 | 247D-20 | 39072 | 7 1/2 | 5192 | I | F247D-20-B11 | 47234 | NUTF | — |
| | | | | | | | 5 | 3461 | II | F247D-20-B9 | 39302 | MUTF LUTF | PM18500 PM18300 |
| 3 | 2076 | | | | | | III | | | | | | |

Class I (S.F. = 1.00) Class II (S.F. = 1.50) Class III (S.F. = 2.00)

† AC Motors – 230/460-3-60 TEFC, for specific motor manufacturers and 5 digit item code refer to pages 337-339.

‡ DC Motors – 90 VDC or 180 VDC where applicable, for specific motor manufacturers and 5 digit item code ref. pages 340 and 341.

*Rating Limited to Gear Capacity.

200 Series Output RPM and Capacity Selection Tables

@ 1750 RPM Input

FOR RATINGS AT OTHER INPUT SPEEDS, SEE TABLES ON PAGES 245-246
ORDER BY CATALOG NUMBER OR ITEM CODE

| Output RPM | Ratio | Non-Flanged Reducers | | | | | Flanged Reducers (Gearmotors) | | | | | AC Motors† | DC Motors†† |
|------------|-------|------------------------|-------|--------|----------------|-----------|-------------------------------|------------------------|---------------|----------------|-----------|-------------|---------------------------|
| | | Gear Capacity | | | Catalog Number | Item Code | Ratings | | | Catalog Number | Item Code | | |
| | | Output Torque (LB-IN.) | HP | | | | Motor HP | Output Torque (LB-IN.) | Service Class | | | | |
| | | | Input | Output | | | | | | | | | |
| 73 | 23.95 | 414 | .50 | .48 | 221D-24 | 39010 | 1/2 | 414 | I | F221D-24-B5 | 39210 | FUTF | PM950 |
| | | | | | | | 1/3 | 275 | I | | | EUTF | PM933 |
| | | | | | | | 1/4 | 206 | III | | | DUTF | PM925 |
| | | 809 | .98 | .94 | 226D-24 | 39026 | 1 | 809 | I | F226D-24-B5 | 39230 | HUTF-5/8 | PM9100 5/8 PM18100 5/8 |
| | | | | | | | 3/4 | 620 | II | | | GUTF | PM975 |
| | | | | | | | 1/2 | 414 | III | | | FUTF | PM950 |
| | | 1791 | 2.17 | 2.08 | 231D-24 | 39042 | 2 | 1655 | I | F231D-24-B7 | 39258 | KUTF | PM18200 |
| | | | | | | | 1 1/2 | 1242 | II | | | JUTF | PM18150 |
| | | | | | | | 1 | 828 | III | | | F231D-24-B5 | 39256 |
| | | 3175 | 3.83 | 3.68 | 239D-24 | 39058 | 5 | *3175 | * | F239D-24-B9 | 39284 | MUTF | PM18500 |
| | | | | | | | 3 | 2483 | I | | | LUTF | PM18300 |
| | | | | | | | 2 | 1655 | II | F239D-24-B7 | 39282 | KUTF | PM18200 |
| | | | | | | | | | | | | 1 1/2 | 1241 |
| | | 5478 | 6.61 | 6.35 | 247D-24 | 39074 | 7 1/2 | *5478 | * | F247D-24-B11 | 47235 | NUTF | — |
| | | | | | | | 5 | 4138 | I | F247D-24-B9 | 39304 | MUTF | PM18500 |
| | | | | | | | 3 | 2483 | III | | | LUTF | PM18300 |

Class I (S.F. = 1.00) Class II (S.F. = 1.50) Class III (S.F. = 2.00)

† AC Motors – 230/460-3-60 TEFC, for specific motor manufacturers and 5 digit item code refer to pages 337-339.

†† DC Motors – 90 VDC or 180 VDC where applicable, for specific motor manufacturers and 5 digit item code ref. pages 340 and 341.

* Rating Limited to Gear Capacity.

200 Series Ratio and Capacity Selection Tables

Non-Flanged Reducers; Input Speeds 1750 and 1150 RPM

Service Factor 1.0

ORDER BY CATALOG NUMBER OR ITEM CODE

| Catalog Number | Item Code | INPUT RPM | | | | | | | | Gear Ratio | O.H.L. (LB.)* | Weight (Lb.) |
|----------------|-----------|-----------|-----------------------|-------|--------|---------|-----------------------|-------|--------|------------|---------------|--------------|
| | | 1750 | | | | 1150 | | | | | | |
| | | O/P RPM | Output Torque (LB-IN) | HP | | O/P RPM | Output Torque (LB-IN) | HP | | | | |
| | | | | Input | Output | | | Input | Output | | | |
| 221S-4 | 39012 | 431 | 289 | 2.02 | 1.98 | 283 | 300 | 1.38 | 1.35 | 4.06 | 350 | 25 |
| 226S-4 | 39028 | | 455 | 3.17 | 3.11 | | 552 | 2.53 | 2.48 | | 475 | 40 |
| 231S-4 | 39044 | | 959 | 6.63 | 6.56 | | 1144 | 5.24 | 5.14 | | 575 | 58 |
| 239S-4 | 39060 | | 1900 | 13.26 | 12.99 | | 2545 | 11.67 | 11.44 | | 650 | 96 |
| 247S-4 | 39076 | | 2851 | 19.90 | 19.50 | | 3557 | 16.32 | 15.99 | | 800 | 137 |
| 221D-10 | 39002 | 178 | 390 | 1.15 | 1.10 | 117 | 404 | 0.78 | 0.75 | 9.84 | 460 | 23 |
| 226D-10 | 39018 | | 672 | 2.90 | 1.90 | | 723 | 1.40 | 1.34 | | 615 | 38 |
| 231D-10 | 39034 | | 1322 | 3.89 | 3.73 | | 1581 | 3.05 | 2.93 | | 720 | 60 |
| 239D-10 | 39050 | | 2426 | 7.12 | 6.85 | | 2860 | 5.52 | 5.30 | | 800 | 99 |
| 247D-10 | 39066 | | 4641 | 13.64 | 13.10 | | 5071 | 9.79 | 9.40 | | 980 | 140 |
| 221D-14 | 39004 | 121 | 403 | 0.80 | 0.77 | 80 | 403 | 0.53 | 0.51 | 14.45 | 490 | 23 |
| 226D-14 | 39020 | | 711 | 1.43 | 1.37 | | 772 | 1.02 | 0.97 | | 660 | 38 |
| 231D-14 | 39036 | | 1500 | 3.00 | 2.88 | | 1781 | 2.34 | 2.25 | | 780 | 57 |
| 239D-14 | 39052 | | 2842 | 5.69 | 5.46 | | 3168 | 4.17 | 4.00 | | 875 | 96 |
| 247D-14 | 39068 | | 4736 | 9.48 | 9.10 | | 5662 | 7.45 | 7.15 | | 1070 | 140 |
| 221D-17 | 39006 | 101 | 410 | 0.69 | 0.66 | 67 | 410 | 0.45 | 0.43 | 17.28 | 500 | 23 |
| 226D-17 | 39022 | | 754 | 1.26 | 1.21 | | 805 | 0.89 | 0.85 | | 675 | 38 |
| 231D-17 | 39038 | | 1644 | 2.75 | 2.64 | | 1857 | 2.04 | 1.96 | | 800 | 57 |
| 239D-17 | 39054 | | 2959 | 5.00 | 4.80 | | 3219 | 3.54 | 3.40 | | 900 | 96 |
| 247D-17 | 39070 | | 5071 | 8.49 | 8.15 | | 5775 | 6.34 | 6.10 | | 1100 | 135 |
| 221D-20 | 39008 | 87 | 398 | 0.57 | 0.55 | 57 | 411 | 0.39 | 0.37 | 20.03 | 510 | 23 |
| 226D-20 | 39024 | | 758 | 1.09 | 1.05 | | 838 | 0.79 | 0.76 | | 695 | 38 |
| 231D-20 | 39040 | | 1679 | 2.43 | 2.33 | | 1916 | 1.81 | 1.75 | | 825 | 57 |
| 239D-20 | 39056 | | 3022 | 4.36 | 4.19 | | 3299 | 3.12 | 3.01 | | 925 | 96 |
| 247D-20 | 39072 | | 5198 | 7.51 | 7.21 | | 5862 | 5.56 | 5.34 | | 1125 | 135 |
| 221D-24 | 39010 | 73 | 414 | 0.50 | 0.48 | 48 | 404 | 0.31 | 0.31 | 23.95 | 525 | 23 |
| 226D-24 | 39026 | | 809 | 0.98 | 0.94 | | 819 | 0.65 | 0.62 | | 715 | 38 |
| 231D-24 | 39042 | | 1791 | 2.17 | 2.08 | | 1886 | 1.50 | 1.44 | | 850 | 57 |
| 239D-24 | 39058 | | 3175 | 3.83 | 3.68 | | 3353 | 2.66 | 2.55 | | 950 | 96 |
| 247D-24 | 39074 | | 5478 | 6.61 | 6.35 | | 5760 | 4.57 | 4.39 | | 1150 | 135 |

* Overhung Load (O.H.L.) in (LB's) is at center of Output Shaft Extension and with no Thrust Load.

| Size | Shaft Dia. (Ins.) | Input Shaft | | Output Shaft |
|------|-------------------|--|-----|--|
| | | Allowable Overhung Load in Lbs. (No Thrust) at 1 and 2 Shaft diameters from Oil Seal | | Allowable Thrust Load In Lbs. (No Overhung Load) |
| | | 1 | 2 | |
| 221 | 1/2 | 80 | 60 | 700 |
| 226 | 5/8 | 100 | 80 | 1000 |
| 231 | 15/16 | 160 | 120 | 1100 |
| 239 | 1-3/8 | 325 | 225 | 1200 |
| 247 | 1-9/16 | 400 | 300 | 1300 |



200 Series Ratio and Capacity Selection Tables

Non-Flanged Reducers; Input Speeds 690 and 100 RPM

Service Factor 1.0

ORDER BY CATALOG NUMBER OR ITEM CODE

| Catalog Number | Item Code | INPUT RPM | | | | | | | | Gear Ratio | O.H.L. (LB.)* | Weight (Lb.) |
|----------------|-----------|-----------|-----------------------|-------|--------|---------|-----------------------|-------|--------|------------|---------------|--------------|
| | | 690 | | | | 100 | | | | | | |
| | | O/P RPM | Output Torque (LB-IN) | HP | | O/P RPM | Output Torque (LB-IN) | HP | | | | |
| | | | | Input | Output | | | Input | Output | | | |
| 221S-4 | 39012 | 170 | 313 | .86 | 0.84 | 25 | 343 | 0.14 | 0.13 | 4.06 | 465 | 25 |
| 226S-4 | 39028 | | 624 | 1.71 | 1.68 | | 682 | 0.28 | 0.27 | | 620 | 40 |
| 231S-4 | 39044 | | 1275 | 3.51 | 3.44 | | 1417 | 0.56 | 0.55 | | 730 | 58 |
| 239S-4 | 39060 | | 2795 | 7.69 | 7.54 | | 3113 | 1.24 | 1.22 | | 810 | 96 |
| 247S-4 | 39076 | | 4045 | 11.14 | 10.91 | | 4670 | 1.86 | 1.83 | | 995 | 137 |
| 221D-10 | 39002 | 70 | 405 | .47 | 0.45 | 10 | 426 | 0.07 | 0.07 | 9.84 | 530 | 23 |
| 226D-10 | 39018 | | 798 | .93 | 0.89 | | 985 | 0.17 | 0.16 | | 720 | 38 |
| 231D-10 | 39034 | | 1834 | 2.12 | 2.04 | | 2140 | 0.36 | 0.35 | | 860 | 60 |
| 239D-10 | 39050 | | 3202 | 3.71 | 3.56 | | 3624 | 0.61 | 0.58 | | 860 | 99 |
| 247D-10 | 39066 | | 5605 | 6.49 | 6.24 | | 6012 | 1.01 | 0.97 | | 1160 | 140 |
| 221D-14 | 39004 | 48 | 413 | .32 | 0.31 | 7 | 431 | 0.50 | 0.05 | 14.45 | 550 | 23 |
| 226D-14 | 39020 | | 821 | .65 | 0.62 | | 1051 | 0.13 | 0.12 | | 750 | 38 |
| 231D-14 | 39036 | | 1898 | 1.50 | 1.44 | | 2148 | 0.25 | 0.24 | | 900 | 57 |
| 239D-14 | 39052 | | 3360 | 2.66 | 2.55 | | 3780 | 0.43 | 0.42 | | 1000 | 96 |
| 247D-14 | 39068 | | 5868 | 4.64 | 4.45 | | 6060 | 0.69 | 0.67 | | 1200 | 140 |
| 221D-17 | 39006 | 40 | 403 | .27 | 0.26 | 6 | 432 | 0.04 | 0.04 | 17.28 | 550 | 23 |
| 226D-17 | 39022 | | 834 | .56 | 0.53 | | 1068 | 0.10 | 0.10 | | 750 | 38 |
| 231D-17 | 39038 | | 1986 | 1.30 | 1.26 | | 2153 | 0.21 | 0.20 | | 900 | 57 |
| 239D-17 | 39054 | | 3421 | 2.26 | 2.17 | | 3790 | 0.36 | 0.35 | | 1000 | 96 |
| 247D-17 | 39070 | | 5904 | 3.90 | 3.74 | | 6076 | 0.58 | 0.56 | | 1200 | 135 |
| 221D-20 | 39008 | 34 | 406 | .23 | 0.22 | 5 | 434 | 0.03 | 0.03 | 20.03 | 550 | 23 |
| 226D-20 | 39024 | | 878 | .50 | 0.48 | | 1072 | 0.09 | 0.08 | | 750 | 38 |
| 231D-20 | 39040 | | 2005 | 1.14 | 1.10 | | 2158 | 0.18 | 0.17 | | 900 | 57 |
| 239D-20 | 39056 | | 3446 | 1.96 | 1.88 | | 3800 | 0.31 | 0.30 | | 1000 | 96 |
| 247D-20 | 39072 | | 5958 | 3.39 | 3.26 | | 6094 | 0.50 | 0.48 | | 1200 | 135 |
| 221D-24 | 39010 | 29 | 409 | .20 | 0.19 | 4 | 436 | 0.03 | 0.03 | 23.95 | 550 | 23 |
| 226D-24 | 39026 | | 893 | .43 | 0.41 | | 1080 | 0.08 | 0.07 | | 750 | 38 |
| 231D-24 | 39042 | | 2046 | .97 | 0.94 | | 2162 | 0.15 | 0.14 | | 900 | 57 |
| 239D-24 | 39058 | | 3492 | 1.67 | 1.60 | | 3811 | 0.26 | 0.25 | | 1000 | 96 |
| 247D-24 | 39074 | | 5988 | 2.85 | 2.74 | | 6109 | 0.43 | 0.40 | | 1200 | 135 |

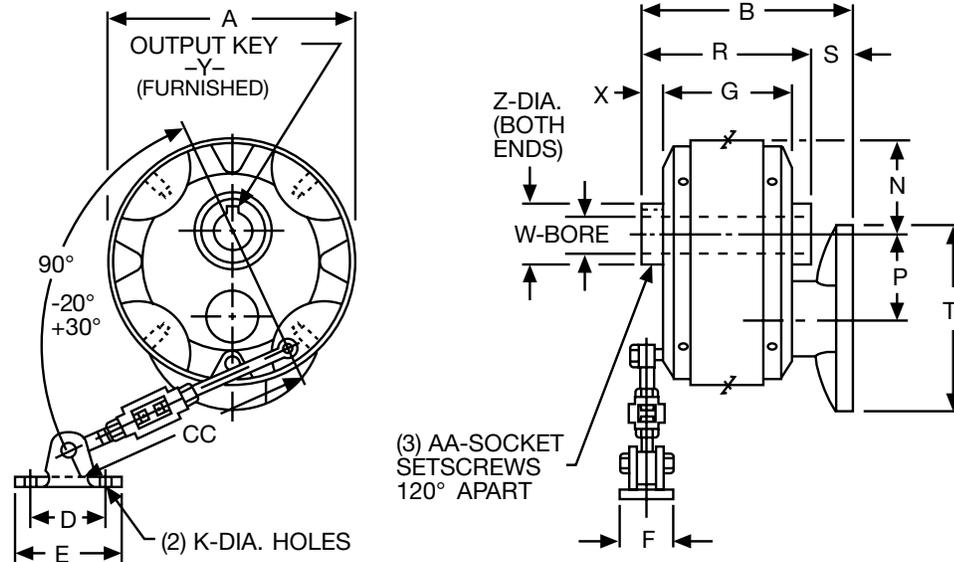
* Overhung Load (O.H.L.) in (LB's) is at center of Output Shaft Extension and with no Thrust Load.

| Size | Shaft Dia. (Ins.) | Input Shaft | | Output Shaft |
|------|-------------------|--|-----|--|
| | | Allowable Overhung Load in Lbs. (No Thrust) at 1 and 2 Shaft diameters from Oil Seal | | Allowable Thrust Load In Lbs. (No Overhung Load) |
| | | 1 | 2 | |
| 221 | 1/2 | 80 | 60 | 700 |
| 226 | 5/8 | 100 | 80 | 1000 |
| 231 | 15/16 | 160 | 120 | 1100 |
| 239 | 1-3/8 | 325 | 225 | 1200 |
| 247 | 1-9/16 | 400 | 300 | 1300 |

200 Series Flanged Reducer Dimensions

F200 Series; F221-247 Sizes Hollow Shaft

For ordering information See Page 249.



ALL DIMENSIONS IN INCHES

| Size | A | B | | | D | E | F | G | K | N | P | R | S | | |
|------|-------|---------------|-------|-------|------|------|------|------|-----|------|------|------|---------------|-------|-------|
| | | NEMA Mounting | | | | | | | | | | | NEMA Mounting | | |
| | | 56C 140TC | 180TC | 210TC | | | | | | | | | 56C 140TC | 180TC | 210TC |
| 221 | 6.19 | 6.13 | — | — | 2.25 | 3.31 | 1.06 | 3.31 | .41 | 2.19 | 2.12 | 4.31 | 1.81 | — | — |
| 226 | 7.50 | 6.69 | — | — | 2.25 | 3.31 | 1.06 | 4.06 | .41 | 2.81 | 2.60 | 5.19 | 1.50 | — | — |
| 231 | 8.88 | 7.19 | 8.06 | — | 2.63 | 3.69 | 1.06 | 4.75 | .41 | 3.44 | 3.11 | 5.88 | 1.31 | 2.19 | — |
| 239 | 11.19 | 7.94 | 9.06 | 9.06 | 2.63 | 3.69 | 1.06 | 5.44 | .41 | 4.03 | 3.89 | 6.69 | 1.25 | 2.38 | 2.38 |
| 247 | 12.88 | — | 9.56 | 10.31 | 3.00 | 4.31 | 1.31 | 5.94 | .94 | 4.88 | 4.67 | 7.31 | — | 2.25 | 3.00 |

| Size | T | | | W +.001 -.000 | Output | | | Z | AA | CC | Optional Reaction Rod Kit | |
|------|---------------|-------|-------|---------------------|--------|------------|-------|--------|---------|-------|---------------------------|-------|
| | NEMA Mounting | | | | X | Y | | | | | Item Catalog # | Code |
| | 56C 140TC | 180TC | 210TC | | | Sq. | LGTH. | | | | | |
| 221 | 6.56 | — | — | 1.0000 | .50 | 1/4 x 7/32 | 1-3/8 | 1.3750 | 10-32 | 18-12 | X221-76K | 24188 |
| 226 | 6.56 | — | — | 1.2500 | .56 | 1/4 x 7/32 | 1-1/2 | 1.7702 | 1/4-28 | 30-24 | X226-76K | 24190 |
| 231 | 6.56 | 9.25 | — | 1.4375 | .56 | 3/8 x 5/16 | 1-3/4 | 2.1638 | 1/4-28 | 30-24 | X231-76K | 24192 |
| 239 | 6.56 | 9.25 | 10.13 | 1.9375 | .63 | 1/2 x 3/8 | 2 | 2.5575 | 5/16-24 | 30-24 | X239-76K | 24194 |
| 247 | — | 9.25 | 10.13 | 2.1875 | .69 | 1/2 x 3/8 | 2-1/4 | 2.9512 | 3/8-24 | 30-24 | X247-76K | 24196 |

Refer to Page 264 for Shaft Kit and for Reaction Rod Kit.
Note: For external reference surfaces, refer to page 265.

J

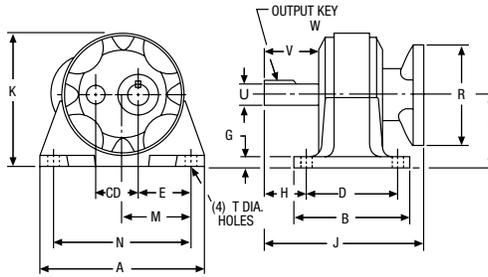
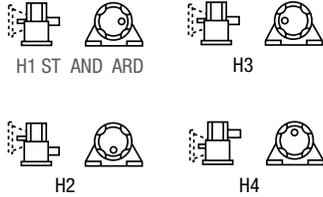
200 Series Flanged Reducer Dimensions

F200 Series; Horizontal Base Projecting Shaft

For ordering information See Page 249.

Parallel Shafts

ASSEMBLY TYPES*



ALL DIMENSIONS IN INCHES

| NEMA Mounting | Input | |
|---------------|--------------------------|-------------|
| | Bore +.0015 -.0000 | Keyway |
| 56C | .625 | 3/16 × 3/32 |
| 140TC | .875 | 3/16 × 3/32 |
| 180TC | 1.125 | 1/4 × 1/8 |
| 210TC | 1.375 | 5/16 × 5/32 |

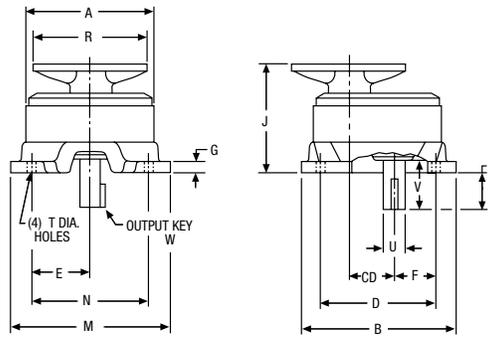
| Size | C.D. | A | B | D | E | G | H | J | | | | K | M | N |
|------|------|-------|-------|------|------|------|------|---------------|-------|-------|-------|-------|------|-------|
| | | | | | | | | NEMA Mounting | | | | | | |
| | | | | | | | | 56C | 140TC | 180TC | 210TC | | | |
| 221 | 2.12 | 8.75 | 6.00 | 4.75 | 2.72 | .50 | 2.16 | 8.50 | — | — | — | 6.84 | 3.63 | 7.25 |
| 226 | 2.60 | 11.00 | 7.38 | 5.75 | 3.56 | .63 | 2.59 | 9.56 | 9.56 | — | — | 8.38 | 4.50 | 9.00 |
| 231 | 3.11 | 12.50 | 8.50 | 6.75 | 4.13 | .75 | 2.72 | 10.34 | 10.84 | 11.22 | — | 9.88 | 5.13 | 10.25 |
| 239 | 3.89 | 15.50 | 9.75 | 7.75 | 4.94 | .88 | 3.38 | — | 11.84 | 12.97 | 12.97 | 12.34 | 6.50 | 13.00 |
| 247 | 4.67 | 17.50 | 10.75 | 8.50 | 5.94 | 1.00 | 3.81 | — | 13.97 | 13.53 | 14.72 | 14.19 | 7.50 | 15.00 |

| Size | P | R | | | | T Holes | Low Speed Shaft | | | | Approx. Weight (Lbs.) | Optional | |
|------|------|---------------|-------|-------|-------|---------|---------------------|------|-------|--------|-----------------------|----------------------------|--------------------------------|
| | | NEMA Mounting | | | | | U +.000 -.001 | V | W-Key | | | Base Kit No. (Ref. Pg 249) | Output Shaft Kit (Ref. Pg 248) |
| | | 56C | 140TC | 180TC | 210TC | | | | Sq. | LENGTH | | | |
| 221 | 3.75 | 6.56 | — | — | — | 13/32 | 1.0000 | 2.25 | 1/4 | 1-1/4 | 28 | X221-11HK | X221-3PK |
| 226 | 4.62 | 6.56 | 6.56 | — | — | 15/32 | 1.2500 | 2.75 | 1/4 | 1-5/8 | 43 | X226-11HK | X226-3PK |
| 231 | 5.44 | 6.56 | 6.56 | 9.25 | — | 17/32 | 1.3750 | 3.00 | 5/16 | 1-3/4 | 69 | X231-11HK | X231-3PK |
| 239 | 6.75 | — | 6.96 | 9.25 | 10.13 | 19/32 | 1.8750 | 3.75 | 1/2 | 2 | 124 | X239-11HK | X239-3PK |
| 247 | 7.75 | — | 9.25 | 10.13 | 10.13 | 21/32 | 2.1250 | 4.25 | 1/2 | 2-1/2 | 166 | X247-11HK | X247-3PK |

F200 Series; Vertical Base Projecting Shaft

Parallel Shafts

ASSEMBLY TYPES*



ALL DIMENSIONS IN INCHES

| NEMA Mounting | Input | |
|---------------|--------------------------|-------------|
| | Bore +.0015 -.0000 | Keyway |
| 56C | .625 | 3/16 × 3/32 |
| 140TC | .875 | 3/16 × 3/32 |
| 180TC | 1.125 | 1/4 × 1/8 |
| 210TC | 1.375 | 5/16 × 5/32 |

| Size | C.D. | A | B | D | E | F | G | J | | | | M | N |
|------|------|-------|-------|-------|------|------|------|---------------|-------|-------|-------|-------|-------|
| | | | | | | | | NEMA Mounting | | | | | |
| | | | | | | | | 56C | 140TC | 180TC | 210TC | | |
| 221 | 2.12 | 6.19 | 8.00 | 5.75 | 2.88 | 1.97 | .50 | 6.53 | — | — | — | 8.25 | 5.75 |
| 226 | 2.60 | 7.50 | 9.63 | 7.00 | 3.50 | 2.56 | .63 | 7.13 | 7.13 | — | — | 9.88 | 7.00 |
| 231 | 3.11 | 8.88 | 11.00 | 8.25 | 4.13 | 3.13 | .75 | 7.69 | 8.19 | 8.88 | — | 11.25 | 8.25 |
| 239 | 3.89 | 11.19 | 13.63 | 10.25 | 5.13 | 3.56 | .88 | — | 8.75 | 9.88 | 9.88 | 13.88 | 10.25 |
| 247 | 4.67 | 12.88 | 15.50 | 11.75 | 5.88 | 4.31 | 1.00 | — | — | 10.31 | 9.88 | 16.00 | 11.75 |

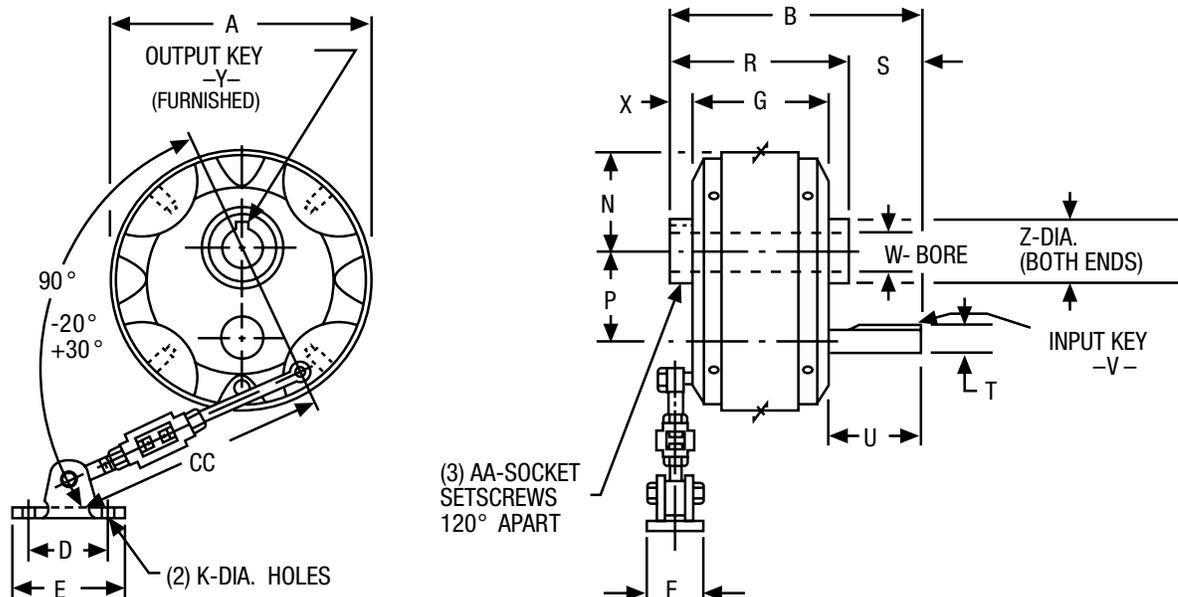
| Size | P | R | | | | T Holes | Low Speed Shaft | | | | Approx. Weight (Lbs.) | Optional | |
|------|------|---------------|-------|-------|-------|---------|---------------------|------|-------|--------|-----------------------|----------------------------|--------------------------------|
| | | NEMA Mounting | | | | | U +.000 -.001 | V | W-Key | | | Base Kit No. (Ref. Pg 249) | Output Shaft Kit (Ref. Pg 248) |
| | | 56C | 140TC | 180TC | 210TC | | | | Sq. | LENGTH | | | |
| 221 | 1.97 | 6.56 | — | — | — | 13/32 | 1.0000 | 2.25 | 1/4 | 1-1/4 | 28 | X221-11VK | X221-3PK |
| 226 | 2.44 | 6.56 | 6.56 | — | — | 15/32 | 1.2500 | 2.75 | 1/4 | 1-5/8 | 43 | X226-11VK | X226-3PK |
| 231 | 2.66 | 6.56 | 6.56 | 9.25 | — | 17/32 | 1.3750 | 3.00 | 5/16 | 1-3/4 | 69 | X231-11VK | X231-3PK |
| 239 | 3.09 | — | 6.96 | 9.25 | 10.13 | 19/32 | 1.8750 | 3.75 | 1/2 | 2 | 124 | X239-11VK | X239-3PK |
| 247 | 3.66 | — | 9.25 | 10.13 | 10.13 | 21/32 | 2.1250 | 4.25 | 1/2 | 2-1/2 | 166 | X247-11VK | X247-3PK |

*Assemblies define output (slow speed) shaft projection with respect to input (high speed) shaft and mounting surface, viewed from end of output shaft. Input may be rotated clockwise or counterclockwise. Input and Output shafts of Single reduction (S) units rotate in opposite directions, Double reduction (D) units in the same direction.

200 Series Non-Flanged Reducer Dimensions

200 Series; 221-247 Sizes Hollow Shaft

For ordering information See Page 249.



ALL DIMENSIONS IN INCHES

| Size | A | B | D | E | F | G | K | N | P | R | S |
|------|-------|-------|------|------|------|------|-----|------|------|------|------|
| 221 | 6.19 | 5.88 | 2.25 | 3.31 | 1.06 | 3.31 | .41 | 2.19 | 2.12 | 4.31 | 1.50 |
| 226 | 7.50 | 7.50 | 2.25 | 3.31 | 1.06 | 4.06 | .41 | 2.19 | 2.60 | 5.18 | 2.31 |
| 231 | 8.88 | 8.37 | 2.62 | 3.69 | 1.06 | 4.75 | .41 | 3.44 | 3.11 | 5.88 | 2.50 |
| 239 | 11.19 | 10.25 | 2.62 | 3.69 | 1.06 | 5.44 | .41 | 4.03 | 3.89 | 6.69 | 3.56 |
| 247 | 12.88 | 10.88 | 3.00 | 4.31 | 1.31 | 5.94 | .41 | 4.88 | 4.67 | 7.31 | 3.56 |

| Size | High Speed Shaft | | | | Low Speed Shaft | | | | Z | AA | CC Max-Min | Optional* Reaction Rod Kit | |
|------|---------------------|------|------|--------|---------------------|-----|------------|-------|--------|---------|---------------|-------------------------------|--------------|
| | T +.000 -.001 | U | V | | W +.001 -.000 | X | Y | | | | | Catalog Number | Item Code |
| | | | Sq. | Lgth. | | | Sq. | Lgth. | | | | | |
| 221 | .5000 | 2.00 | 1/8 | 7/8 | 1.0000 | .50 | 1/4 x 7/32 | 1-3/8 | 1.3750 | #10-32 | 18-12 | X221-76K | 24188 |
| 226 | .6250 | 2.88 | 3/16 | 1 | 1.2500 | .56 | 1/4 x 7/32 | 1-1/2 | 1.7702 | 1/4-28 | 30-24 | X226-76K | 24190 |
| 231 | .9375 | 3.06 | 1/4 | 1-1/4 | 1.4375 | .56 | 3/8 x 5/16 | 1-3/4 | 2.1638 | 1/4-28 | 30-24 | X231-76K | 24192 |
| 239 | 1.3750 | 4.19 | 5/16 | 2-7/16 | 1.9375 | .62 | 1/2 x 3/8 | 2 | 2.5575 | 5/16-24 | 30-24 | X239-76K | 24194 |
| 247 | 1.5675 | 4.25 | 3/8 | 2-1/4 | 2.1875 | .69 | 1/2 x 3/8 | 2-1/4 | 2.9512 | 3/8-24 | 30-24 | X247-76K | 24196 |

* See page 264 for dimensions



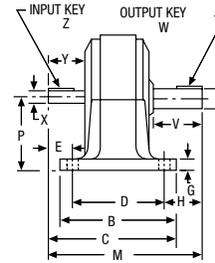
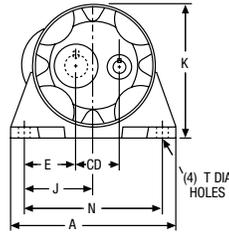
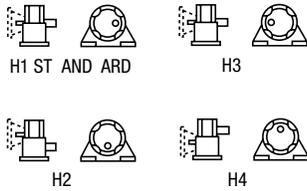
200 Series Non-Flanged Reducer Dimensions

200 Series; Horizontal Base Projecting Shaft

Parallel Shafts

For ordering information See Page 249.

ASSEMBLY TYPES*



ALL DIMENSIONS IN INCHES

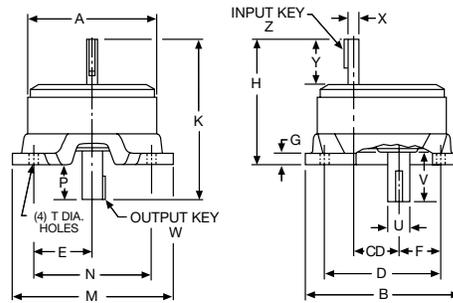
| Size | C.D. | A | B | C | D | E | G | H | J | K | M | N | P |
|------|------|-------|-------|-------|------|------|------|------|------|-------|-------|-------|------|
| 221 | 2.12 | 8.75 | 6.00 | 6.72 | 4.75 | 2.72 | .50 | 2.16 | 3.63 | 6.84 | 8.25 | 7.25 | 3.75 |
| 226 | 2.60 | 11.00 | 7.38 | 8.59 | 5.75 | 3.56 | .63 | 2.59 | 4.50 | 8.38 | 10.38 | 9.00 | 4.62 |
| 231 | 3.11 | 12.50 | 8.50 | 9.69 | 6.75 | 4.13 | .75 | 2.72 | 5.13 | 9.88 | 11.53 | 10.25 | 5.44 |
| 239 | 3.89 | 15.50 | 9.75 | 11.78 | 7.75 | 4.94 | .88 | 3.38 | 6.50 | 12.34 | 14.16 | 13.00 | 6.75 |
| 247 | 4.67 | 17.50 | 10.75 | 12.59 | 8.50 | 5.94 | 1.00 | 3.81 | 7.50 | 14.19 | 15.28 | 15.00 | 7.75 |

| Size | C.D. | T Holes | Low Speed Shaft | | | | High Speed Shaft | | | | Approx. Weight (Lbs.) | Optional | |
|------|------|---------|---------------------|------|-------|-------|---------------------|------|-------|--------|-----------------------|---------------------------------|---|
| | | | U +.000 -.001 | V | W-Key | | X +.000 -.001 | Y | Z-Key | | | Base Kit No. (Ref. page 251) | Output Shaft Kit No. (Ref. page 250) |
| | | | | | Sq. | Lgth. | | | Sq. | Lgth. | | | |
| 221 | 2.12 | 13/32 | 1.0000 | 2.25 | 1/4 | 1-1/4 | .5000 | 2.06 | 1/8 | 7/8 | 22 | X221-11HK | X221-3PK |
| 226 | 2.60 | 15/32 | 1.2500 | 2.75 | 1/4 | 1-1/4 | .6250 | 2.88 | 3/16 | 1 | 39 | X226-11HK | X226-3PK |
| 231 | 3.11 | 17/32 | 1.3750 | 3.00 | 5/16 | 1-3/4 | .9375 | 3.06 | 1/4 | 1-1/4 | 60 | X231-11HK | X231-3PK |
| 239 | 3.89 | 19/32 | 1.8750 | 3.75 | 1/2 | 2 | 1.3750 | 4.19 | 5/16 | 2-7/16 | 104 | X239-11HK | X239-3PK |
| 247 | 4.67 | 21/32 | 2.1250 | 4.25 | 1/2 | 2-1/2 | 1.5625 | 4.25 | 3/8 | 2-1/4 | 148 | X247-11HK | X247-3PK |

200 Series; Vertical Base Projecting Shaft

Parallel Shafts

ASSEMBLY TYPES*



ALL DIMENSIONS IN INCHES

| Size | C.D. | A | B | D | E | F | G | H | K | M | N | P |
|------|------|-------|-------|-------|------|------|------|-------|-------|-------|-------|------|
| 221 | 2.12 | 6.19 | 8.00 | 5.75 | 2.88 | 1.97 | .50 | 6.28 | 8.25 | 8.25 | 5.75 | 1.97 |
| 226 | 2.60 | 7.50 | 9.63 | 7.00 | 3.50 | 2.56 | .63 | 7.94 | 10.38 | 9.88 | 7.00 | 2.44 |
| 231 | 3.11 | 8.88 | 11.00 | 8.25 | 4.13 | 3.13 | .75 | 8.88 | 11.53 | 11.25 | 8.25 | 2.66 |
| 239 | 3.89 | 11.19 | 13.63 | 10.25 | 5.13 | 3.56 | .88 | 11.06 | 14.16 | 13.88 | 10.25 | 3.09 |
| 247 | 4.67 | 12.88 | 15.50 | 11.75 | 5.88 | 4.31 | 1.00 | 11.63 | 15.28 | 16.00 | 11.75 | 3.66 |

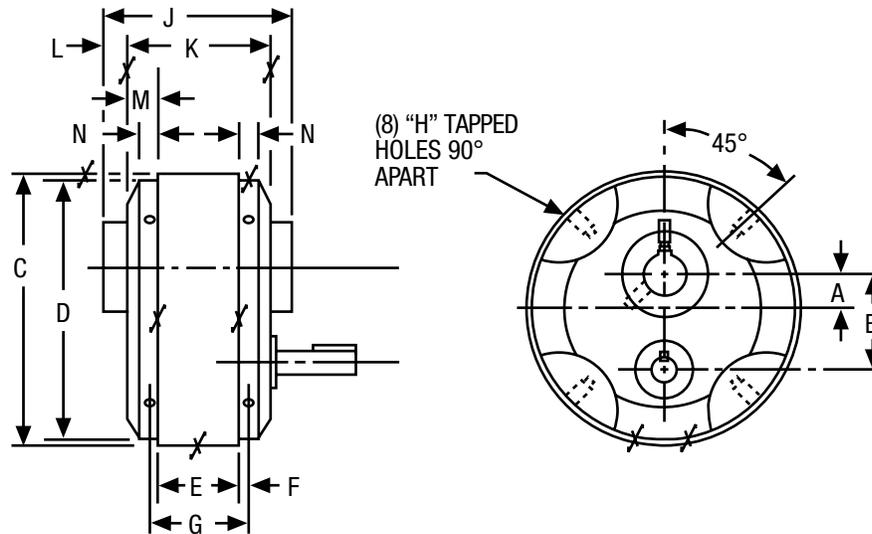
| Size | C.D. | T Holes | Low Speed Shaft | | | | High Speed Shaft | | | | Approx. Weight (Lbs.) | Optional | |
|------|------|---------|---------------------|------|-------|-------|---------------------|------|-------|--------|-----------------------|---------------------------------|---|
| | | | U +.000 -.001 | V | W-Key | | X +.000 -.001 | Y | Z-Key | | | Base Kit No. (Ref. page 251) | Output Shaft Kit No. (Ref. page 250) |
| | | | | | Sq. | Lgth. | | | Sq. | Lgth. | | | |
| 221 | 2.12 | 13/32 | 1.0000 | 2.25 | 1/4 | 1-1/4 | .5000 | 2.06 | 1/8 | 7/8 | 22 | X221-11VK | X221-3PK |
| 226 | 2.60 | 15/32 | 1.2500 | 2.75 | 1/4 | 1-1/4 | .6250 | 2.88 | 3/16 | 1 | 39 | X226-11VK | X226-3PK |
| 231 | 3.11 | 17/32 | 1.3750 | 3.00 | 5/16 | 1-3/4 | .9375 | 3.06 | 1/4 | 1-1/4 | 60 | X231-11VK | X231-3PK |
| 239 | 3.89 | 19/32 | 1.8750 | 3.75 | 1/2 | 2 | 1.3750 | 4.19 | 5/16 | 2-7/16 | 104 | X239-11VK | X239-3PK |
| 247 | 4.67 | 21/32 | 2.1250 | 4.25 | 1/2 | 2-1/2 | 1.5625 | 4.25 | 3/8 | 2-1/4 | 148 | X247-11VK | X247-3PK |

* Assemblies define output (slow speed) shaft projection with respect to input (high speed) shaft and mounting surface, viewed from end of output shaft. Input may be rotated clockwise or counterclockwise.

• Input and Output shafts of Single reduction (S) units rotate in opposite directions, Double reduction (D) units in the same direction.

200 Series Optimount® Dimensions

200 Series; 221-247 Sizes External Reference Surfaces



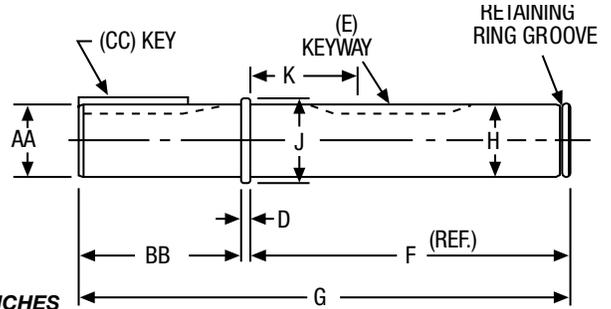
ALL DIMENSIONS IN INCHES

| Size | A ±.005 | B +.002 -.000 | C* +.000 -.010 | D* +.000 -.003 | E* +.000 -.004 | F | G | H | | J | K | L | M | N |
|------|------------|---------------------|----------------------|----------------------|----------------------|-----|------|---------|-------|------|------|-----|------|-----|
| | | | | | | | | Size | Depth | | | | | |
| 221 | .904 | 2.123 | 6.193 | 5.998 | 2.000 | .19 | 2.38 | 1/4-20 | 9/16 | 4.31 | 3.31 | .50 | .66 | .44 |
| 226 | .936 | 2.595 | 7.495 | 7.248 | 2.062 | .38 | 2.81 | 5/16-18 | 5/8 | 5.19 | 4.06 | .56 | 1.00 | .69 |
| 231 | 1.000 | 3.114 | 8.870 | 8.624 | 2.625 | .34 | 3.31 | 3/8-16 | 3/4 | 5.88 | 4.75 | .56 | 1.06 | .69 |
| 239 | 1.560 | 3.893 | 11.182 | 10.936 | 3.312 | .34 | 4.00 | 3/8-16 | 3/4 | 6.69 | 5.44 | .62 | 1.06 | .69 |
| 247 | 1.560 | 4.671 | 12.870 | 12.624 | 3.687 | .38 | 4.44 | 7/16-14 | 7/8 | 7.31 | 5.94 | .69 | 1.12 | .75 |

*Tolerance on Dimensions Apply Only to Housing before Painting.

200 Series Shaft Kits / Reaction Rod Kits

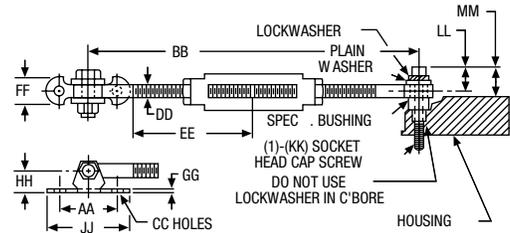
Steel Projecting Output Shafts (Insertable)



ALL DIMENSIONS IN INCHES
ORDER BY CATALOG NUMBER OR ITEM CODE

| Size | AA | BB | CC | | D | E | F | G | H | J | K | Kit Catalog Number | Item Code |
|------|------------------|-------|------|-------|-----|----------------------|------|-------|------------------|------|------|--------------------|-----------|
| | | | Sq. | Lgth. | | | | | | | | | |
| 221 | .9995 .9985 | 2-1/4 | 1/4 | 1-1/4 | .12 | 1/4 x 1/8 x 1-13/32 | 4.47 | 6.84 | .9998 .9988 | 1.16 | 1.45 | X221-3PK | 23888 |
| 226 | 1.2495 1.2485 | 2-3/4 | 1/4 | 1-1/4 | .12 | 1/4 x 1/8 x 1-17/32 | 5.38 | 8.25 | 1.2498 1.2488 | 1.41 | 1.83 | X226-3PK | 23892 |
| 231 | 1.3745 1.3735 | 3 | 5/16 | 1-3/4 | .16 | 3/8 x 3/16 x 1-25/32 | 6.09 | 9.25 | 1.4373 1.4363 | 1.62 | 2.75 | X231A-3PK | 63124 |
| 239 | 1.8745 1.8735 | 3-3/4 | 1/2 | 2 | .16 | 1/2 x 1/4 x 2-1/32 | 7.00 | 10.91 | 1.9373 1.9363 | 2.12 | 2.33 | X239-3PK | 23904 |
| 247 | 2.1245 2.1235 | 4-1/4 | 1/2 | 2-1/2 | .16 | 1/2 x 1/4 x 2-9/32 | 7.26 | 12.03 | 2.1873 2.1863 | 2.44 | 2.51 | X247-3PK | 23910 |

Reaction Rod Kits



ALL DIMENSIONS IN INCHES
ORDER BY CATALOG NUMBER OR ITEM CODE

| Size | AA | BB* | | CC | DD | EE | FF | GG | HH | JJ | KK | LL | MM | Kit Catalog Number | Item Code |
|------|------|------|------|-----|-----|------|------|-----|------|------|---------------------|------|------|--------------------|-----------|
| | | Max. | Min. | | | | | | | | | | | | |
| 221 | 2.25 | 18 | 12 | .41 | .38 | 4.50 | 1.06 | .16 | .78 | 3.31 | 1/4-20 x 1-3/4 lg. | .62 | .64 | X221-76K | 24188 |
| 226 | 2.25 | 30 | 24 | .41 | .50 | 10 | 1.06 | .16 | .78 | 3.31 | 1/4-20 x 2-1/4 lg. | .66 | .94 | X226-76K | 24190 |
| 231 | 2.62 | 30 | 24 | .41 | .62 | 10 | 1.06 | .19 | .94 | 3.69 | 5/16-18 x 2-1/2 lg. | .81 | 1.12 | X231-76K | 24192 |
| 239 | 2.62 | 30 | 24 | .41 | .62 | 10 | 1.06 | .19 | .94 | 3.69 | 3/8-16 x 2-3/4 lg. | .91 | 1.44 | X239-76K | 24194 |
| 247 | 3.00 | 30 | 24 | .47 | .75 | 10 | 1.31 | .21 | 1.12 | 4.21 | 7/16-14 x 3 lg. | 1.03 | 1.41 | X247-76K | 24196 |

* BB dimension can be reduced by cutting off threaded rods.

INSTALLATION INFORMATION

The ideal position of the reaction rod is at 90° from a line drawn through the center of the hollow shaft and the point where reaction rod is attached to the housing or bracket.

This is illustrated in Figure 1, along with allowable angular deviations.

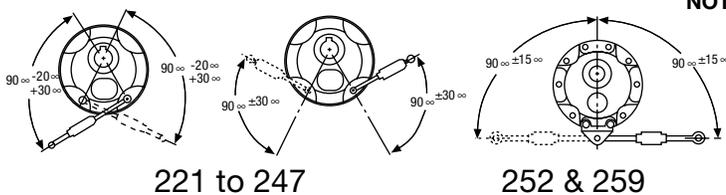
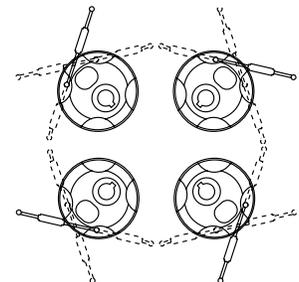


Figure 1

Figure 2 illustrates in a typical manner the possible reaction rod positions for shaft mounted reducers in horizontal or vertical positions.

NOTE: The reaction rod must be attached to the housing only at the screw locations identified by the spot faced surfaces or to the reaction rod bracket attached to the housing.

Figure 2



200 Series Base Kits

Base Kits (Cast Iron)



HORIZONTAL

| Kit Catalog No. | Item Code |
|-----------------|-----------|
| X221-11HK | 68643 |
| X226-11HK | 68654 |
| X231-11HK | 68656 |
| X239-11HK | 68658 |
| X247-11HK | 68660 |



VERTICAL

| Kit Catalog No. | Item Code |
|-----------------|-----------|
| X221-11VK | 68644 |
| X226-11VK | 68655 |
| X231-11VK | 68657 |
| X239-11VK | 68659 |
| X247-11VK | 68661 |



200 Series Optimount® Washdown Duty



200 SERIES – BOST-KLEEN™

- Washable and Scrubbable
- Stainless Steel Output Shafts
- Exposed hardware made of stainless steel
- Durable, Non-Absorbent, Non-Toxic White Epoxy Finish, USDA Approved
- Corrosion Resistant
- 1/4 to 20 Horsepower Range
- Single and Double Reducton Rations – 4:1 to 24:1
- Standard NEMA C-Face and Projecting Input Shaft Configurations
- Parallel Shafts
- Horizontal and Vertical Mounting Kits
- Projecting and Hollow Output Shafts

STAINLESS BOST-KLEEN™

- Includes all features of the Standard WHITE BOST-KLEEN Reducers
- U.S.D.A. Approved for use in Food Processing and Handling Industry where incidental food contact may occur
- Durable Stainless Steel Epoxy Coating System Utilizes a unique #316L Stainless Steel Leafing Pigment. This catalyzed system creates a HARD, NON-TOXIC METALLIC FINISH

BISSC Certified Basic Model Numbers, Dimensions And Available Ratios

| White BOST-KLEEN | | Stainless BOST-KLEEN | | Center Distance | NEMA Mounting | Input Shaft Dia. +.000 -.001 | Output Shaft Dia. +.000 -.001 | Available Ratios |
|------------------|------------|----------------------|------------|-----------------|--------------------|------------------------------------|-------------------------------------|------------------|
| NON-FLANGED Type | Quill Type | NON-FLANGED Type | Quill Type | | | | | |
| BK221 | BKF221 | SBK221 | SBKF221 | 2.12 | 56C | .500 | 1.000 | 4,10,14,17,20,24 |
| BK226 | BKF226 | SBK226 | SBKF226 | 2.60 | 56C,140TC | .625 | 1.2500 | 4,10,14,17,20,24 |
| BK231 | BKF231 | SBK231 | SBKF231 | 3.11 | 56C,140TC,180TC | .9375 | 1.3750 | 4,10,14,17,20,24 |
| BK239 | BKF239 | SBK239 | SBKF239 | 3.89 | 140TC,180TC, 210TC | 1.375 | 1.8750 | 4,10,14,17,20,24 |
| BK247 | BKF247 | SBK247 | SBKF247 | 4.67 | 180TC,210TC | 1.5625 | 2.1250 | 4,10,14,17,20,24 |

J

Warning: Boston Gear speed reducers are normally shipped without lubricant. They must be filled to the proper level with the recommended lubricant before operation.

CAUTION

- For safe operation of any gear drive, all rotating shafts and auxiliary components must be shielded to conform with applicable safety standards. You must consider overall operational system safety at all times.
- When using a gear drive to raise or lower a load, such as in hoisting applications, provision must be made for external braking. Under no conditions should a speed reducer be considered self-locking.
- Mounting of speed reducers in overhead positions may be hazardous. Use of external guides or supports is strongly recommended for overhead mounting.

General Instructions

1. When mounting, use maximum possible bolt size and secure gear drive to a rigid foundation. Periodic inspection of all bolts is recommended.
2. Align all shafts accurately. Improper alignment can result in failure. Use of flexible couplings is recommended to compensate for slight misalignment.
3. Arrange the drain and breather plug per your mounting position as indicated on page 268. The breather plug should also be located in the *Fill* position.
4. Auxiliary drive components (such as sprockets, gears and pulleys) should be mounted on the shafts as close as possible to the housing to minimize effects of overhung loads. Avoid force fits that might damage bearings or gears.
5. Gear drives are nameplated for 1750 RPM Input Speed and Class I Service. For lower Input Speeds and other Service Class, refer to catalog rating information.
6. Input Speeds of 1750 and lower are shown in catalog rating tables for speed reducing applications. This does not represent the maximum speed. Since speed limitation is based on pitching velocity and varies with size and ratio.

Shaft Mounted Installation

Mount reducer on the shaft to be driven, as close to the supporting bearing as possible, and tighten end setscrews. For installations requiring an adapter bushing, the setscrews must pass through clearance holes in the bushing. For severe applications, the driven shaft should be spot drilled for these setscrews.

Instructions for Flanged Models

F200 (Quill Type Input)

1. Assemble the key to the motor shaft and coat the shaft with anti-seize compound. Insert the motor shaft into the reducer input shaft.
2. Rotate the motor to proper position and firmly secure to flange with four hex-head cap screws.

CAUTION - If the motor does not readily seat itself, check to determine if key has moved axially along motor shaft, causing interference. Staking of the keyway adjacent to the motor key will facilitate this procedure.

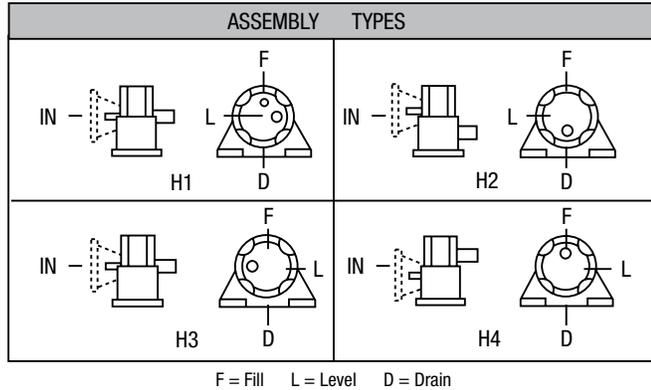
Location of Filler, Level and Drain Plugs

Optimount reducers may be mounted in any position shown with the following exceptions:

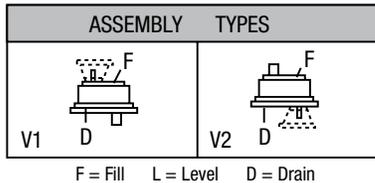
Filler, level and drain plugs are completely interchangeable and should be arranged to suit the required mounting positions. Four (4) pipe tapped holes for these plugs are located on the input shaft side of the housing and one (1) on the opposite side.

200 Series Optimount® Assembly Types & Lubrication

200 SERIES HORIZONTAL BASE



200 SERIES VERTICAL BASE



Recommended Lubricants

The following tables indicate the type and viscosity of lubricant suitable for reducers operating at various temperatures.

Lubrication and maintenance instructions are provided with each speed reducer. These instructions should be followed for best results. It is important that the proper type of oil be used since many oils are not suitable for the lubrication of gears. Various types of gearing require different types of lubricants.

The lubricant must remain free from oxidation and contamination by water or debris since only a very thin film of oil stands between efficient operation and failure. To assure long service life, the reducer should be periodically drained (preferably while warm) and refilled to the proper level with a recommended gear oil. Under normal environmental conditions oil changes, are suggested after the initial 250 hours of operation, and thereafter, at regular intervals of 2500 hours or every 6 months. Synthetic lubricants will allow extended lubrication intervals due to its increased resistance to thermal and oxidation degradation. It is suggested that the initial oil change be made at 1500 hours and, thereafter, at 5000 hour intervals.

During the initial period of operation, higher than normal operating temperatures may be seen. This is due to the initial break-in of the gear set. The temperature of Helical Gear Reducers may reach 160°F.

Enclosed Helical

| Recommended Oil (or equivalent) | Viscosity Range S&S @ 100°F | Oil Type | ISO Viscosity Grade No. |
|---------------------------------|-----------------------------|----------|-------------------------|
| Klubersynth* UH1 6-460 | 1950/2500 | PAG | 460 |
| Mobile SHC634 | 1950/2500 | PAO | 320 / 460 |

Ambient temperature range of -20F to +125F is suitable for standard configured products and ratings. Contact technical support for operating conditions beyond this range.

| Recommended Lubricant | Boston Gear Item Code Quart |
|-----------------------|-----------------------------|
| Klubersynth UH1 6-460 | 65159 |
| Mobile SHC634 | 51493 |

CAUTION: Relubricate more frequently, if drive is operated in high ambient temperatures or unusually contaminated atmospheres. High loads and operating temperatures will also require more frequent relubrication.

* Synthetic recommendation is exclusively for Klubersynth UH1 6-460.
 ‡ The UH1 6-460 lubricant will perform at temperatures considerably higher than 225°F. However, the factory should always be consulted prior to operating at higher temperatures, as damage may occur to oil seals and other components.

Drain Plug must be installed in the lower most location of the housing. This plug will be on the input shaft side of the housing for positions H1, H3, H4 and V2. The opposite for position V1 and may be either side for H2.

The **Vented Filler Plug** should be installed in the uppermost location. This plug will be on the input shaft side for positions H1, H2, or H3, on either side for H4 and must be tightened into position with the arrow pointing upward.

For vertical mounting (V1 and V2), this plug must be tightened with arrow pointing toward the center.

Level Plug position will be as indicated for horizontal positions. For vertical positions the oil level is established by an oil level distance measured from the outer surface of the housing from the oil filler hole.

| Size | Single Reduction | | Double Reduction | |
|------|--------------------|----------------|--------------------|----------------|
| | Oil Dist. (Inches) | Capacity (Qts) | Oil Dist. (Inches) | Capacity (Qts) |
| 221 | 1.25 | .38 | 1.00 | .50 |
| 226 | 1.62 | .75 | 1.38 | 1.00 |
| 231 | 2.00 | 1.25 | 1.62 | 1.50 |
| 239 | 2.12 | 2.75 | 1.88 | 3.00 |
| 247 | 2.25 | 4.00 | 1.88 | 4.25 |