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Section Contents

HM Series Features / How to Order 240

HM Series standard products 241

Mounting Assemblies. 242

Lubrication / Operating Instructions 242-243

Helical Multiplier Ratings. 244

Helical Multiplier Dimentions 245

Features / How to Order

Use alone as either a speed reducer or increaser or in combination with a 700 Series worm gear reducer to create an efficient right angle double reduction speed reducer.

- Close grained cast iron housing and flanges
- Hardened steel helical gearing for long life
- Anti-friction bearings
- Double lip seals guard against oil leakage
- Brass spring loaded breather plug keeps out dirt and water
- Optional steel bolt on base
- Double bearing design on input and output shaftt

Unit Size	Optional Base Kits	
	Catalog Description	Item Code
1	HMF1 Base Kit	83501
2	HMF2 Base Kit	83502
3	HMF3 Base Kit	83503



Flanged

Numbering System

HMF - 2 - 1.5 - K - B5 - B7 – B

Type
HMF-Quill Flange Input

Size
1
2
3

Ratio
1.5:1
2:1
3:1
4:1
5:1

Lubrication
K – Klubersynth UH1 6-460

Input Flange Size
B5 – 56C
B7 – 140TC
B9 – 180TC
B11 – 210TC

Output Flange Size
B5 – 56C
B7 – 140TC
B9 – 180TC
B11 – 210TC

Mounting Position
Horizonal:
A
B
C
D
Vertical:
F

Available Styles

Model	Input	Output
HMF1	B5	B5
HMF 2	B5	B5
	B5	B7
	B7	B5
HMF3	B7	B7
	B9	B9
	B9	B11
	B11	B9
	B11	B11

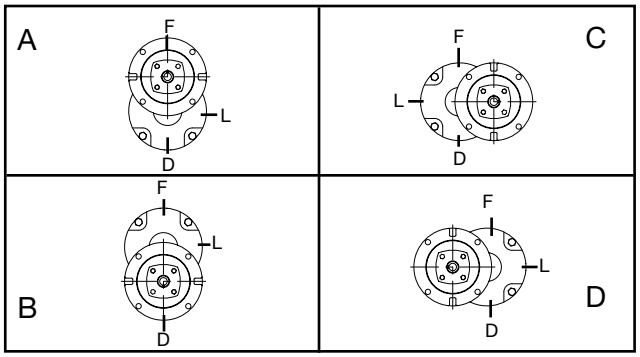
NEMA C-Face Models

Catalog Number	Item Code
HMF1-1.5K-B5-B5	F05001
HMF1-2K-B5-B5	F05002
HMF1-3K-B5-B5	F05003
HMF1-4K-B5-B5	F05004
HMF1-5K-B5-B5	F05005
HMF2-1.5K-B5-B5	F05006
HMF2-1.5K-B5-B7	F05007
HMF2-1.5K-B7-B5	F05008
HMF2-1.5K-B7-B7	F05009
HMF2-2K-B5-B5	F05010
HMF2-2K-B5-B7	F05011
HMF2-2K-B7-B5	F05012
HMF2-2K-B7-B7	F05013
HMF2-3K-B5-B5	F05014
HMF2-3K-B5-B7	F05015
HMF2-3K-B7-B5	F05016
HMF2-3K-B7-B7	F05017
HMF2-4K-B5-B5	F05018
HMF2-4K-B5-B7	F05019
HMF2-4K-B7-B5	F05020
HMF2-4K-B7-B7	F05021
HMF2-5K-B5-B5	F05022
HMF2-5K-B5-B7	F05023
HMF2-5K-B7-B5	F05024
HMF2-5K-B7-B7	F05025

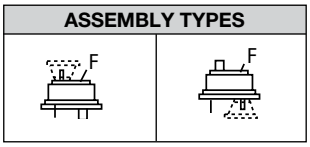
Catalog Number	Item Code
HMF3-1.5K-B11-B11	F05026
HMF3-1.5K-B11-B9	F05027
HMF3-1.5K-B9-B11	F05028
HMF3-1.5K-B9-B9	F05029
HMF3-2K-B11-B11	F05030
HMF3-2K-B11-B9	F05031
HMF3-2K-B9-B11	F05032
HMF3-2K-B9-B9	F05033
HMF3-3K-B11-B11	F05034
HMF3-3K-B11-B9	F05035
HMF3-3K-B9-B11	F05036
HMF3-3K-B9-B9	F05037
HMF3-4K-B11-B11	F05038
HMF3-4K-B11-B9	F05039
HMF3-4K-B9-B11	F05040
HMF3-4K-B9-B9	F05041
HMF3-5K-B11-B11	F05042
HMF3-5K-B11-B9	F05043
HMF3-5K-B9-B11	F05044
HMF3-5K-B9-B9	F05045

Helical Multiplier Lubrication

Horizontal Mounting



Vertical Mounting



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

Ambient (Room) Temperature	Recommended Oil (or equivalent)	Viscosity Range S&S @ 100°F	Oil Type	ISO Viscosity Grade No.
–20° to 225°F ‡ (-29°C to 107°C)	Klubersynth* UH1 6-460	1950/2500	PAG	460
–30° to 225°F ‡ (-34°C to 107°C)	Mobile SHC634	1950/2500	PAO	320/460

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 B, C, D and A, may be either side for A.

The **Vented Filler Plug** should be installed in the uppermost location. This plug will be on the input shaft side for positions A, C, or D, on either side for B and must be tightened into position.

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	Flanged		Non-Flanged	
	Weight (lbs.)	Capacity (ozs)	Weight (lbs.)	Capacity (ozs)
1	18	11	14	11
2	25	14	21	14
3	50	28	43	28

Installation, Lubrication and Operation Instructions

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

These instructions must be read thoroughly before installing or operating speed reducers. File instructions for future reference.

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 230. 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.

Instructions for Flanged Models

HMF (Quill Type Input)

1. Assemble the key to the motor shaft and coat the quill bore 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

Helical-Multiplier reducers may be mounted in any position shown.

Filler, level and drain plugs are completely interchangeable and should be arranged to suit the required mounting positions.

Horsepower and Torque Capacities (Service Factor 1.0)

Series Size			HMF Size 1			HMF Size 2			HMF Size 3		
				Output			Output			Output	
Ratio	Input RPM	Output RPM	Input HP	HP	Torque (Lb. In.)	Input HP	HP	Torque (Lb. In.)	Input HP	HP	Torque (Lb. In.)
1.5	1750	1167	3.29	3.19	172	13.60	13.19	712	17.79	17.26	932
2	1750	875	2.74	2.66	192	11.76	11.41	822	15.38	14.92	1075
3	1750	583	2.06	2.00	216	9.48	9.20	944	12.39	12.02	1299
4	1750	437	1.45	1.41	203	6.88	6.67	962	8.99	8.72	1258
5	1750	350	1.05	1.02	183	5.06	4.91	884	6.61	6.41	1155

Output Shaft Thrust Rating (lbs.)

	1.5:1	2:1	3:1	4:1	5:1
HMF1	153	169	193	213	230
HMF2	230	253	289	319	345
HMF3	313	345	394	435	470

Overhung Loads (lbs.)

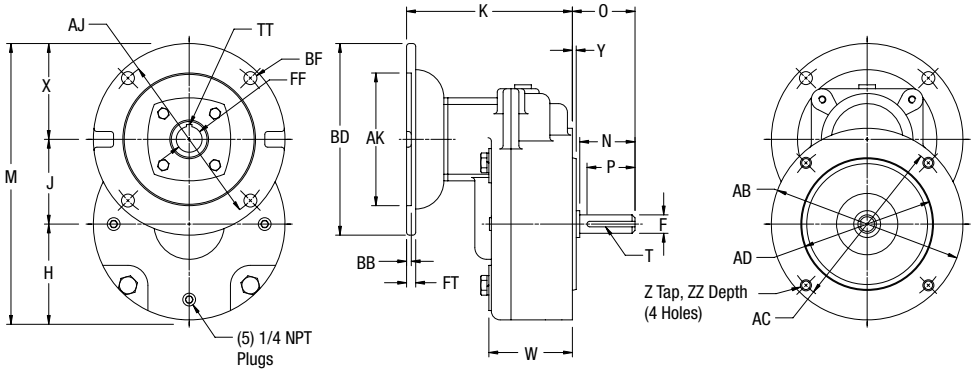
	HMF Size 1	HMF Size 2		HMF Size 3	
Input	200	200		350	
Output	315	B5 375	B7 750	B9 1100	B11 1135

Ratings Shown Reflect Maximum Gear Capacity With KLUBERSYNTH UH1 6-460 Lubricant.

Overhung Load is at centerline of output shaft projection and with NO THRUST Load.

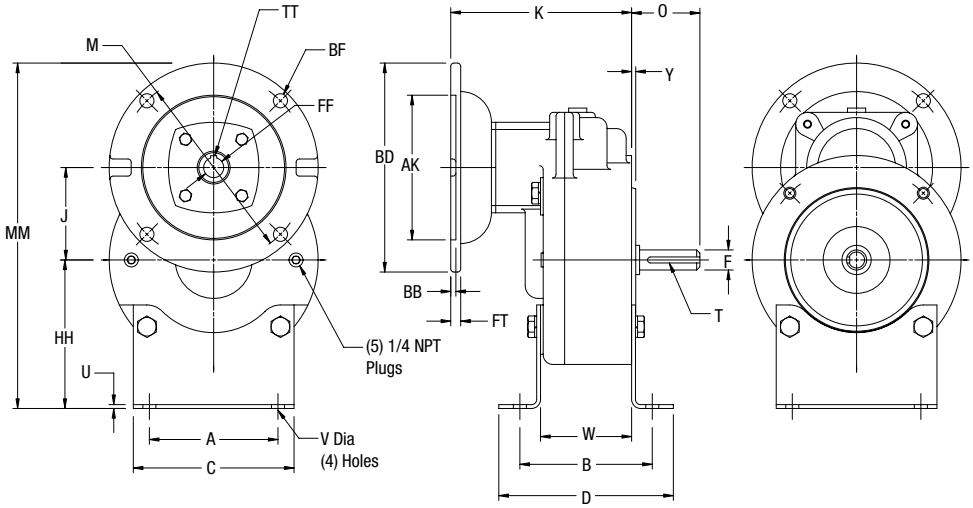
Maximum Input Speed 1750 RPM

HMF Basic





HMF with Base





ALL DIMENSIONS IN INCHES

Size	Output Flange	Foot				Main Dimensions										
		A	B	C	D	F	H	HH	J	K	M	MM	N	O	P	T
1	B5	4.00	3.87	5.00	5.18	0.625	2.39	4.62	1.675	4.19	7.31	9.54	1.89	2.04	1.57	3/16X3/32
2	B5	4.00	4.12	5.00	5.44	0.625	3.37	4.62	2.875	5.00	9.49	10.74	1.84	1.90	1.57	3/16X3/32
	B7	4.00	4.12	5.00	5.44	0.875	3.37	4.62	2.875	5.00	9.49	10.74	1.84	1.90	1.57	3/16X3/32
3	B9	5.13	4.74	6.37	6.15	1.125	4.25	4.81	2.875	6.44	11.63	12.19	2.50	3.31	1.97	1/4X1/8
	B11	5.13	4.74	6.37	6.15	1.375	4.25	4.81	2.875	6.44	11.63	12.19	2.50	3.31	1.97	5/16X5/32

Size	Main Dimensions					Output Flange				
	U	V	W	X	Y	Z	ZZ	AB	AC	AD
1	0.12	0.406	1.95	3.25	0.16	3/8 - 16	Thru	6.5	5.875	4.5
2	0.12	0.406	3.00	3.25	0.16	3/8 - 16	0.75	6.5	5.875	4.5
3	0.16	0.500	3.35	4.50	0.31	1/2 - 13	Thru	- -	7.250	8.5

Size	Input Flange	Input Flange							
		AJ	AK	BD	BF	BB	FF	FT	TT
1	B5	5.875	4.5	6.5	0.43	0.16	0.625	0.35	3/16x3/32
2	B5	5.875	4.5	6.5	0.41	0.16	0.625	0.43	3/16x3/32
	B7	5.875	4.5	6.5	0.41	0.16	0.875	0.43	3/16x3/32
3	B9	7.250	8.5	9.0	0.59	0.24	1.125	0.59	1/4x1/8
	B11	7.250	8.5	9.0	0.59	0.24	1.375	0.59	5/16x5/32

Notes



Hollow Shaft



Section Contents

Product Reference Guide 248

Numbering System / How To Order 249

Selection Procedure 250-251

Mounting Positions 252

Output RPM Selection Tables 253-256

Reducer Ratings 257-258

Dimensions 259-263

Accessories 264-265

Washdown Duty 266

Lubrication 267-268

Parts List 269

J

F200 Series Optimount® Helical Gear Flanged Reducers

Ordering Information – Pages 249-251
Selection/Rating Information – Pages 253-256
Lubrication – Pages 267-268
Motor Selection – Pages 334, 337-341



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
Motor Selection – Pages 334, 337-341



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

J



Shaft Kits / Reaction Rods
Dimensions – Pages 264



Base Kits
Vertical/Horizontal
Dimensions – Page 265

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

BK F 2 31 D – P H – 14 K – B7 – S H1 – 1

Input Shaft Style
Blank–Projecting Input Shaft
F – Quill Style C-Face Motor Flange

Reducer Material/Paint (Cast Iron)
Blank–Standard Paint
BK – *BostKleen* White Paint
SBK – Stainless *BostKleen* Paint

Series
200 Series

Reducer Size Center Dist.
21 – 2.12
26 – 2.60
31 – 3.11
39 – 3.89
47 – 4.67

Number of Reductions
S – Single (4:1 only)
D – Double

Optional Output Shaft
Blank–Hollow bore
P – Removable Projection Shaft
See catalog for standard sizes

Base/Mounting Attachement
Blank–None
H – Horizontal
V – Vertical

Nominal Gear Ratio
(Rounded Value)
4 – 4:1
10 – 10:1
14 – 14:1
17 – 17:1
20 – 20:1
24 – 24:1

Lubrication
Blank–No Lubrication
K – Klubersynth UH1 6-460
W – Klubersynth GH6
S – Mobil SHC 634

NEMA Motor Mounting

Code Bore	NEMA Mounting	Input Size	Keyway
B5	56C	.625	3/16 x 3/32
B7	140TC/180C	.875	3/16 x 3/32
B9	180TC/210C	1.125	1/4 x 1/8
B11	210TC/250UC	1.375	5/16 x 5/32

Blank– Solid Input Shaft (No Flange)

Output Shaft Material
Blank–Carbon Alloy Steel
S – Stainless

Assembly Type
Blank– No Base
H1 **V1**
H2 **V2**
H3
H4
See catalog for assembly types

Mounting Positions
Blank -No Lubrication Supplied
For Factory Prelubrication Indicate Mounting Position
1 – Standard Mounting
2-6 – Refer to Mounting Positions in Catalog

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

J

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		403	0.80	0.77		403	0.53	0.51		490	23
226D-14	39020		711	1.43	1.37		772	1.02	0.97		660	38
231D-14	39036	121	1500	3.00	2.88	80	1781	2.34	2.25	14.45	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		410	0.69	0.66		410	0.45	0.43		500	23
226D-17	39022		754	1.26	1.21		805	0.89	0.85		675	38
231D-17	39038	101	1644	2.75	2.64	67	1857	2.04	1.96	17.28	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

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.

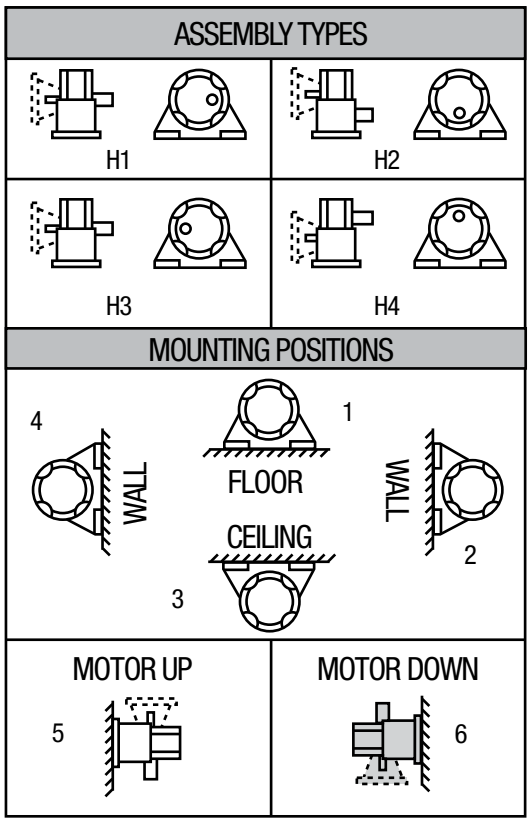
200 Series Output RPM and Capacity Selection Tables

@ 1750 RPM Input

Output RPM	Ratio	Non-Flanged Reducers: Gear Capacity: Output Torque (LB-IN.)	Non-Flanged Reducers: Gear Capacity: HP: Input	Non-Flanged Reducers: Gear Capacity: HP: Output	Non-Flanged Reducers: Catalog Number	Non-Flanged Reducers: Item Code	Flanged Reducers (Gearmotors): Ratings: Motor HP	Ratings: Output Torque (LB-IN.)	Ratings: Service Class	Flanged Reducers (Gearmotors): Catalog Number	Flanged Reducers (Gearmotors): Item Code	AC Motors†	DC Motors††
101 (Cont.)	17.28	1644	2.75	2.64	231D-17	39038	3	*1644	*	F231D-17-B9	47227	LUTF	PM18300
							2 1 1/2	1194 896	I II	F231D-17-B7	39250	KUTF JUTF	PM18200 PM18150
							1	597	III	F231D-17-B5	39246	HUTF-5/8	PM9100 5/8 PM18100 5/8
		2959	4.96	4.76	239D-17	39054	5 3	*2956 1498	* II	F239D-17-B9	39276	MUTF LUTF	PM18500 PM18300
							2	1194	III	F239D-17-B7	39274	KUTF	PM18200
							7 1/2	4478	I	F247D-17-B11	47233	NUTF	—

Reference Page 255

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

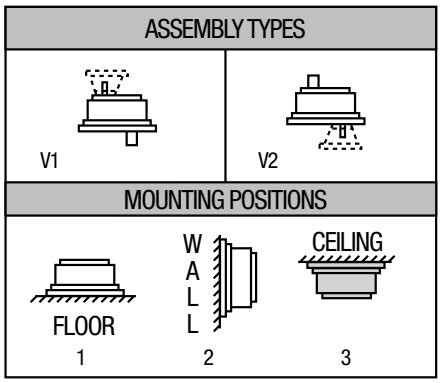
All other assemblies are available at no additional charge. The assembly types shown indicate the four possible arrangements of the Reductor in the base.

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

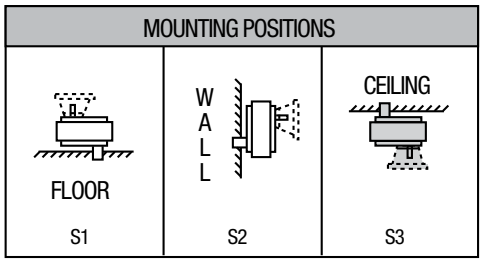
Assemblies V1 & V2 may be installed in the various floor, side-wall or ceiling mounting positions shown.

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

J

@ 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	—
							5	716	III	F239S-4-B9	39288	MUTF	PM18500
		2851	19.90	19.50	247S-4	39076	10	1432	II	F247S-4-B11	39308	PUTF	—
							7 1/2	1074	III			NUTF	—
178	9.84	390	1.15	1.10	221D-10	39002	1	340	I	F221D-10-B5	39202	HUTF-5/8	PM9100 5/8 PM18100 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.

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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 Input	HP Output			Motor HP	Output Torque (LB-IN.)	Service Class				
178 (Cont.)	9.84	4641	13.64	13.09	247D-10	39066	10 7 1/2	3400 2550	I II	F247D-10-B11	39296	PUTF NUTF	— —
							5	1700	III	F247D-10-B9	39294	MUTF	PM18500
121	14.45	403	.80	.77	221D-14	39004	3/4 1/2 1/3	374 250 166	I II III	F221D-14-B5	39204	GUTF FUTF EUTF	PM975 PM950 PM933
		711	1.43	1.37	226D-14	39020	1 1/2	*711	*	F226D-14-B7	39224	JUTF	PM18150
							1 3/4 1/2	500 374 250	I II III	F226D-14-B5	39222	HUTF-5/8 GUTF FUTF	PM9100 5/8 PM18100 5/8 PM975 PM950
		1500	3.00	2.88	231D-14	39036	3	1500	I	F231D-14-B9	47226	LUTF	PM18300
							2 1 1/2	998 750	II III	F231D-14-B7	39248	KUTF JUTF	PM18200 PM18150
							1	500	III	F231D-14-B5	39244	HUTF-5/8	PM9100 5/8 PM18100 5/8
		2842	5.69	5.46	239D-14	39052	5 3	2497 1498	I II	F239D-14-B9	39272	MUTF LUTF	PM18500 PM18300
							2	998	III	F239D-14-B7	39270	KUTF	PM18200
		4736	9.48	9.10	247D-14	39068	10 7 1/2 5	*4736 3745 2497	* I II	F247D-14-B11	47232	PUTF NUTF MUTF	— — PM18500
							3	1498	III	F247D-14-B9	39298	LUTF	PM18300
101	17.28	410	.69	.66	221D-17	39006	3/4 1/2 1/3	*410 298 199	* I III	F221D-17-B5	39206	GUTF FUTF EUTF	PM975 PM950 PM933
		754	1.26	1.21	226D-17	39022	1 1/2	*754	*	F226D-17-B7	47220	JUTF	PM18150
							1 3/4 1/2	597 448 298	I II III	F226D-17-B5	39226	HUTF-5/8 GUTF FUTF	PM9100 5/8 PM18100 5/8 PM975 PM950

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.

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@ 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 Input	HP Output			Motor HP	Output Torque (LB-IN.)	Service Class				
101 (Cont.)	17.28	1644	2.75	2.64	231D-17	39038	3	*1644	*	F231D-17-B9	47227	LUTF	PM18300
							2 1 1/2	1194 896	I II	F231D-17-B7	39250	KUTF JUTF	PM18200 PM18150
							1	597	III	F231D-17-B5	39246	HUTF-5/8	PM9100 5/8 PM18100 5/8
		2959	4.96	4.76	239D-17	39054	5 3	*2956 1498	* II	F239D-17-B9	39276	MUTF LUTF	PM18500 PM18300
							2	1194	III	F239D-17-B7	39274	KUTF	PM18200
		5071	8.49	8.15	247D-17	39070	7 1/2	4478	I	F247D-17-B11	47233	NUTF	—
							5 3	2986 1791	II III	F247D-17-B9	39300	MUTF LUTF	PM18500 PM18300
87.4	20.03	398	.57	.55	221D-20	39008	1/2 1/3 1/4	346 230 173	I II III	F221D-20-B5	39208	FUTF EUTF DUTF	PM950 PM933 PM925
		758	1.09	1.05	226D-20	39024	1 3/4 1/2	692 519 346	I II III	F226D-20-B5	39228	HUTF-5/8 GUTF FUTF	PM9100 5/8 PM18100 5/8 PM975 PM950
		1679	2.43	2.33	231D-20	39040	3	*1679	*	F231D-20-B9	47228	LUTF	PM18300
							2 1 1/2	1384 1038	I II	F231D-20-B7	39254	KUTF JUTF	PM18200 PM18150
							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 3	*3022 2076	* I	F239D-20-B9	39280	MUTF LUTF	PM18500 PM18300
							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 3	3461 2076	II III	F247D-20-B9	39302	MUTF LUTF	PM18500 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.

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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	HUTF-5/8	PM9100 5/8 PM18100 5/8
		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	III			JUTF	PM18150
		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.

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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		289	2.02	1.98		300	1.38	1.35		350	25
226S-4	39028		455	3.17	3.11		552	2.53	2.48		475	40
231S-4	39044	431	959	6.63	6.56	283	1144	5.24	5.14	4.06	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		390	1.15	1.10		404	0.78	0.75		460	23
226D-10	39018		672	2.90	1.90		723	1.40	1.34		615	38
231D-10	39034	178	1322	3.89	3.73	117	1581	3.05	2.93	9.84	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		403	0.80	0.77		403	0.53	0.51		490	23
226D-14	39020		711	1.43	1.37		772	1.02	0.97		660	38
231D-14	39036	121	1500	3.00	2.88	80	1781	2.34	2.25	14.45	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		410	0.69	0.66		410	0.45	0.43		500	23
226D-17	39022		754	1.26	1.21		805	0.89	0.85		675	38
231D-17	39038	101	1644	2.75	2.64	67	1857	2.04	1.96	17.28	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		398	0.57	0.55		411	0.39	0.37		510	23
226D-20	39024		758	1.09	1.05		838	0.79	0.76		695	38
231D-20	39040	87	1679	2.43	2.33	57	1916	1.81	1.75	20.03	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		414	0.50	0.48		404	0.31	0.31		525	23
226D-24	39026		809	0.98	0.94		819	0.65	0.62		715	38
231D-24	39042	73	1791	2.17	2.08	48	1886	1.50	1.44	23.95	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

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		313	.86	0.84		343	0.14	0.13		465	25
226S-4	39028		624	1.71	1.68		682	0.28	0.27		620	40
231S-4	39044	170	1275	3.51	3.44	25	1417	0.56	0.55	4.06	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		405	.47	0.45		426	0.07	0.07		530	23
226D-10	39018		798	.93	0.89		985	0.17	0.16		720	38
231D-10	39034	70	1834	2.12	2.04	10	2140	0.36	0.35	9.84	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		413	.32	0.31		431	0.50	0.05		550	23
226D-14	39020		821	.65	0.62		1051	0.13	0.12		750	38
231D-14	39036	48	1898	1.50	1.44	7	2148	0.25	0.24	14.45	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		403	.27	0.26		432	0.04	0.04		550	23
226D-17	39022		834	.56	0.53		1068	0.10	0.10		750	38
231D-17	39038	40	1986	1.30	1.26	6	2153	0.21	0.20	17.28	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		406	.23	0.22		434	0.03	0.03		550	23
226D-20	39024		878	.50	0.48		1072	0.09	0.08		750	38
231D-20	39040	34	2005	1.14	1.10	5	2158	0.18	0.17	20.03	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		409	.20	0.19		436	0.03	0.03		550	23
226D-24	39026		893	.43	0.41		1080	0.08	0.07		750	38
231D-24	39042	29	2046	.97	0.94	4	2162	0.15	0.14	23.95	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

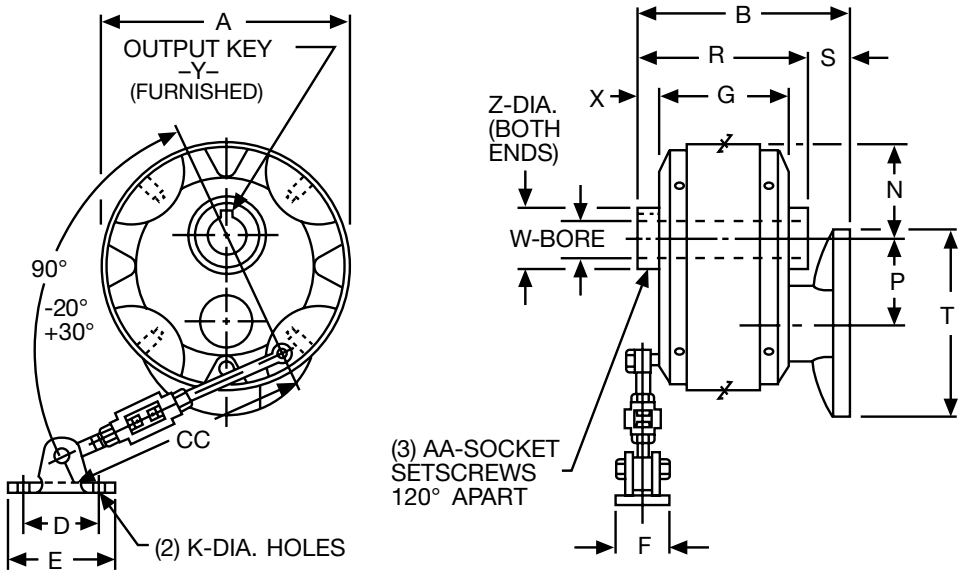
* Overhung Load (O.H.L.) in (LB's) is at center of Output Shaft Extension and with no Thrust Load.

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

F200 Series; F221-247 Sizes

Hollow Shaft

For ordering information See Page 249.



ALL DIMENSIONS IN INCHES

Size	A	B NEMA Mounting 56C 140TC	B NEMA Mounting 180TC	B NEMA Mounting 210TC	D	E	F	G	K	N	P	R	S NEMA Mounting 56C 140TC	S NEMA Mounting 180TC	S NEMA Mounting 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 NEMA Mounting 56C 140TC	T NEMA Mounting 180TC	T NEMA Mounting 210TC	Output W +.001 –.000	Output X	Output Y Sq.	Output Y LGTH.	Z	AA	CC	Optional Reaction Rod Kit Item Catalog #	Optional Reaction Rod Kit Code
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

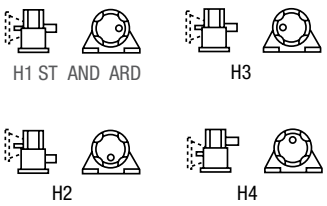
200 Series Flanged Reducer Dimensions

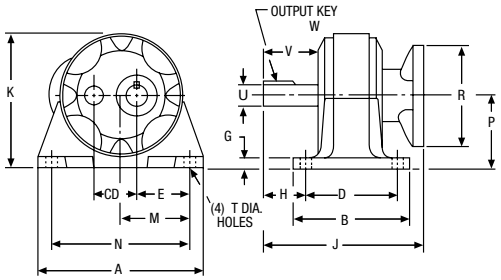
F200 Series; Horizontal Base Projecting Shaft

For ordering information See Page 249.

Parallel Shafts

ASSEMBLY TYPES*





ALL DIMENSIONS IN INCHES

NEMA Mounting	Input Bore +.0015 -.0000	Input 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 NEMA Mounting 56C	J NEMA Mounting 140TC	J NEMA Mounting 180TC	J NEMA Mounting 210TC	K	M	N
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 NEMA Mounting 56C	R NEMA Mounting 140TC	R NEMA Mounting 180TC	R NEMA Mounting 210TC	T Holes	Low Speed Shaft U +.000 –.001	Low Speed Shaft V	Low Speed Shaft W-Key Sq.	Low Speed Shaft W-Key LENGTH	Approx. Weight (Lbs.)	Optional Base Kit No. (Ref. Pg 249)	Optional Output Shaft Kit (Ref. Pg 248)
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

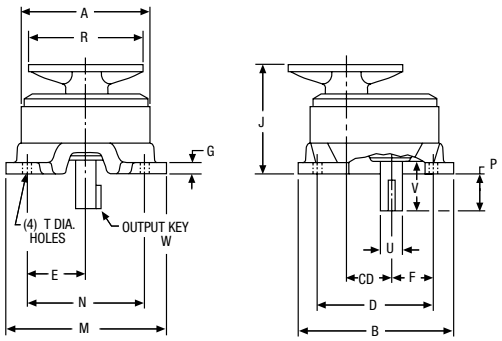
ASSEMBLY TYPES*



V1 STANDARD



V2



ALL DIMENSIONS IN INCHES

NEMA Mounting	Input Bore +.0015 -.0000	Input 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 NEMA Mounting 56C	J NEMA Mounting 140TC	J NEMA Mounting 180TC	J NEMA Mounting 210TC	M	N
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 NEMA Mounting 56C	R NEMA Mounting 140TC	R NEMA Mounting 180TC	R NEMA Mounting 210TC	T Holes	Low Speed Shaft U +.000 –.001	Low Speed Shaft V	Low Speed Shaft W-Key Sq.	Low Speed Shaft W-Key LENGTH	Approx. Weight (Lbs.)	Optional Base Kit No. (Ref. Pg 249)	Optional Output Shaft Kit (Ref. Pg 248)
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

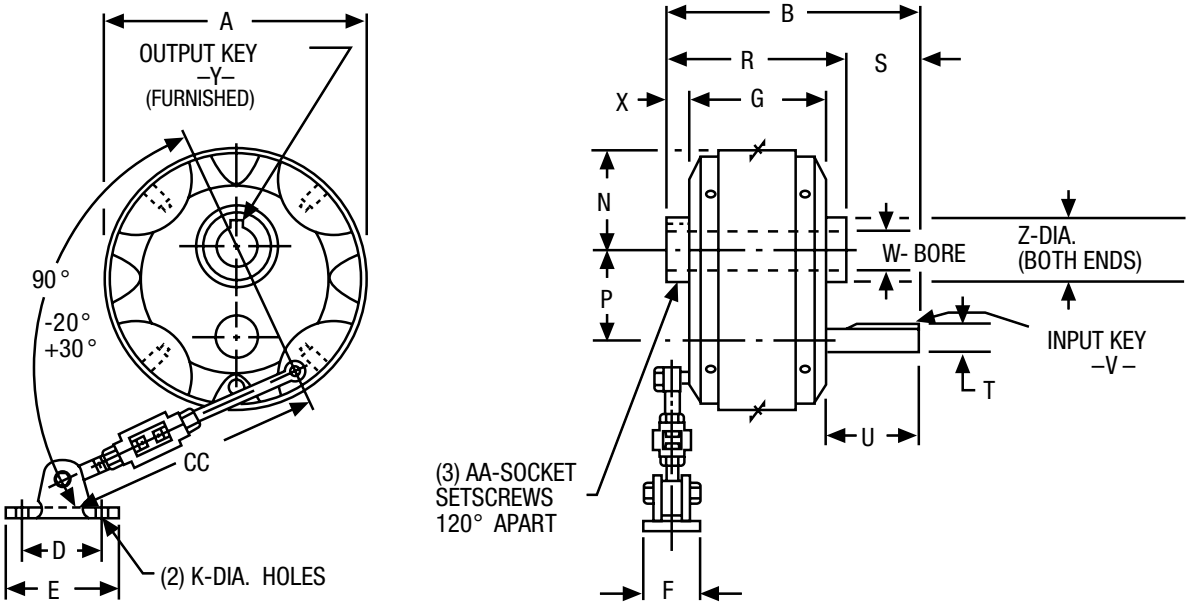
*Assemblies define output (slow speed) shaft projection with respect to input (high speed) shaft and mounting surface, viewed from end of output shaft. Input may be rotated clockwise or counterclockwise. Input and Output shafts of Single reduction (S) units rotate in opposite directions, Double reduction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

J

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

	High Speed Shaft				Low Speed Shaft							Optional* Reaction Rod Kit	
	T		V		W		Y						
Size	+.000 –.001	U	Sq.	Lgth.	+.001 –.000	X	Sq.	Lgth.	Z	AA	CC Max-Min	Catalog Number	Item Code
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

J

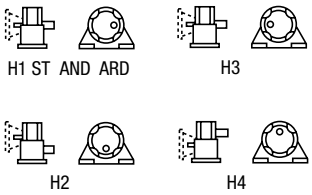
200 Series Non-Flanged Reducer Dimensions

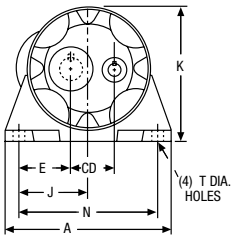
200 Series; Horizontal Base Projecting Shaft

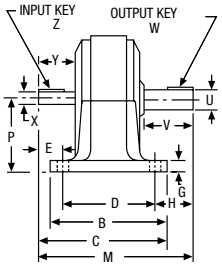
Parallel Shafts

For ordering information See Page 249.

ASSEMBLY TYPES*







ALL DIMENSIONS IN INCHES

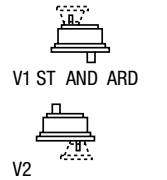
Size	C.D.	A	B	C	D	E	G	H	J	K	M	N	P
221	2.12	8.75	6.00	6.72	4.75	2.72	.50	2.16	3.63	6.84	8.25	7.25	3.75
226	2.60	11.00	7.38	8.59	5.75	3.56	.63	2.59	4.50	8.38	10.38	9.00	4.62
231	3.11	12.50	8.50	9.69	6.75	4.13	.75	2.72	5.13	9.88	11.53	10.25	5.44
239	3.89	15.50	9.75	11.78	7.75	4.94	.88	3.38	6.50	12.34	14.16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

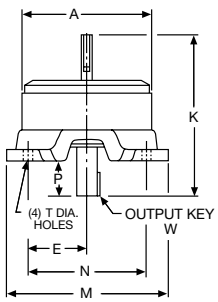
			Low Speed Shaft				High Speed Shaft					Optional	
					W-Key				Z-Key				
Size	C.D.	T Holes	U +.000 –.001	V	Sq.	Lgth.	X +.000 –.001	Y	Sq.	Lgth.	Approx. Weight (Lbs.)	Base Kit No. (Ref. page 251)	Output Shaft Kit No. (Ref. page 250)
221	2.12	13/32	1.0000	2.25	1/4	1-1/4	.5000	2.06	1/8	7/8	22	X221-11HK	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

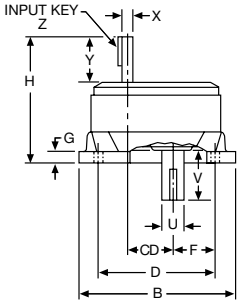
200 Series; Vertical Base Projecting Shaft

Parallel Shafts

ASSEMBL Y 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

			Low Speed Shaft				High Speed Shaft					Optional	
					W-Key				Z-Key				
Size	C.D.	T Holes	U +.000 –.001	V	Sq.	Lgth.	X +.000 –.001	Y	Sq.	Lgth.	Approx. Weight (Lbs.)	Base Kit No. (Ref. page 251)	Output Shaft Kit No. (Ref. page 250)
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

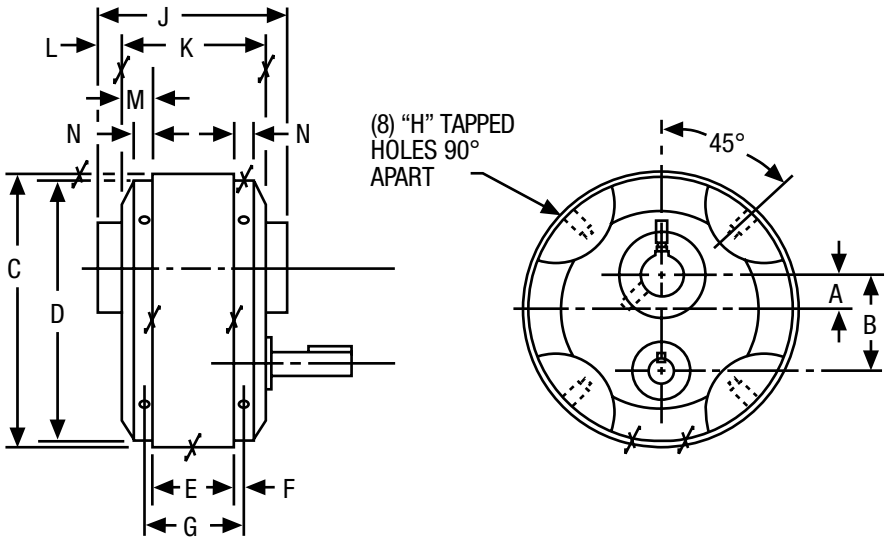
* Assemblies define output (slow speed) shaft projection with respect to input (high speed) shaft and mounting surface, viewed from end of output shaft. Input may be rotated clockwise or counterclockwise.

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

J

200 Series; 221-247 Sizes

External Reference Surfaces



ALL DIMENSIONS IN INCHES

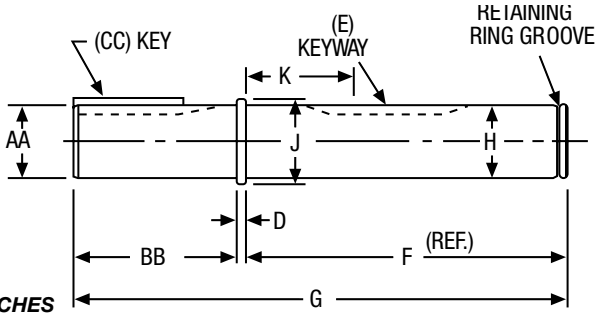
Size	A ±.005	B +.002 -.000	C* +.000 -.010	D* +.000 -.003	E* +.000 -.004	F	G	H		J	K	L	M	N
								Size	Depth					
221	.904	2.123	6.193	5.998	2.000	.19	2.38	1/4-20	9/16	4.31	3.31	.50	.66	.44
226	.936	2.595	7.495	7.248	2.062	.38	2.81	5/16-18	5/8	5.19	4.06	.56	1.00	.69
231	1.000	3.114	8.870	8.624	2.625	.34	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.

J

Steel Projecting Output Shafts (Insertable)



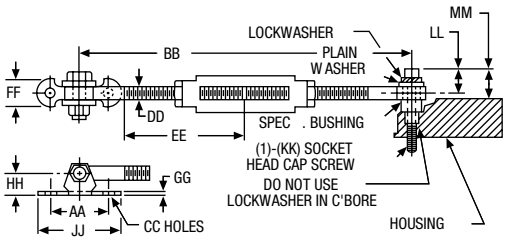


ALL DIMENSIONS IN INCHES
ORDER BY CATALOG NUMBER OR ITEM CODE

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.

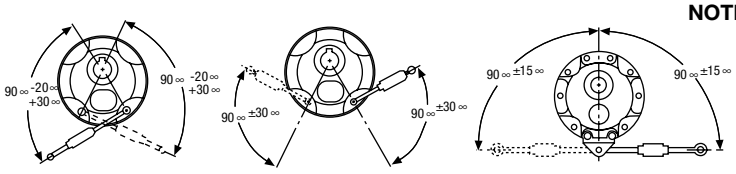
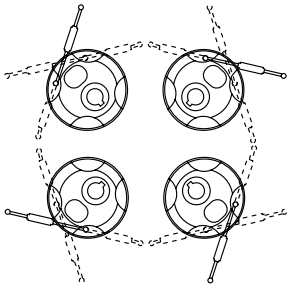


Figure 1

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



J

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
- 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						
NON-FLANGED Type	Quill Type	NON-FLANGED Type	Quill Type	Center Distance	NEMA Mounting	Input Shaft Dia. +.000 -.001	Output Shaft Dia. +.000 -.001	Available Ratios
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

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Installation, Lubrication and Operation Instructions

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.

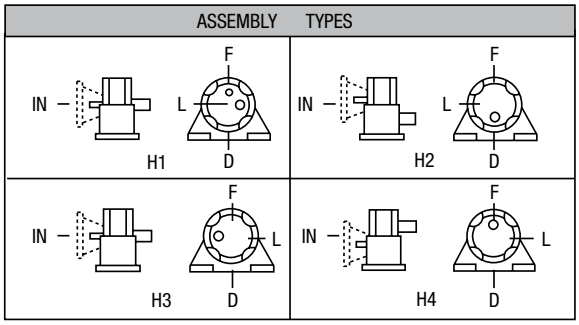
Location of Filler, Level and Drain Plugs

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

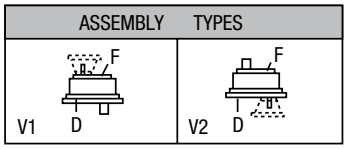
Filler, level and drain plugs are completely interchangeable and should be arranged to suit the required mounting positions. Four (4) pipe tapped holes for these plugs are located on the input shaft side of the housing and one (1) on the opposite side.

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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

Ambient (Room) Temperature	Recommended Oil (or equivalent)	Viscosity Range S&S @ 100°F	Oil Type	ISO Viscosity Grade No.
–20° to 225°F ‡ (-29°C to 107°C)	Klubersynth* UH1 6-460	1950/2500	PAG	460
–30° to 225°F ‡ (-34°C to 107°C)	Mobile SHC634	1950/2500	PAO	320 / 460

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.

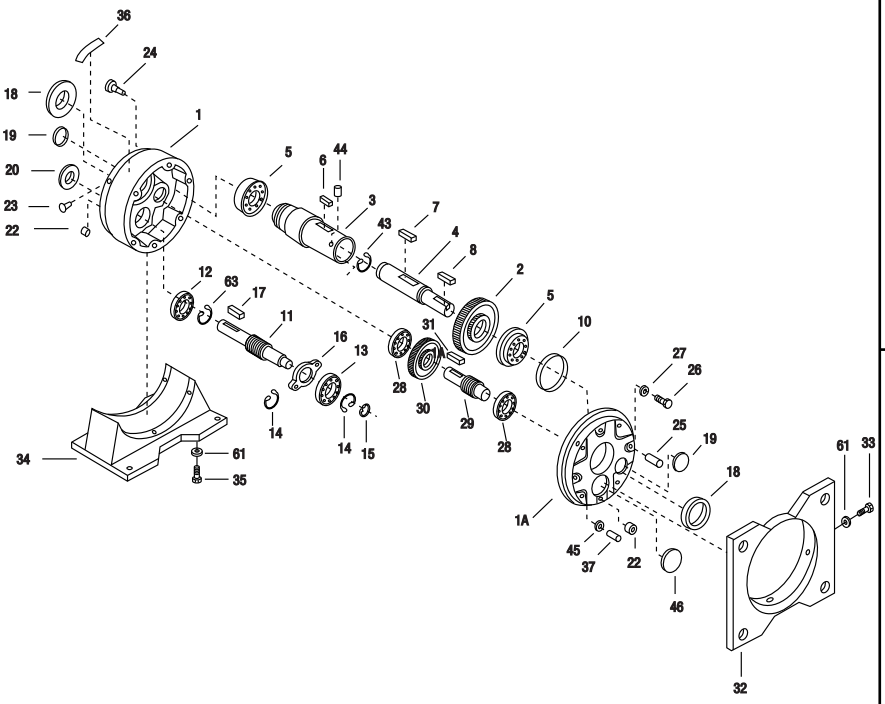
For vertical mounting (V1 and V2), this plug must be tightened with arrow pointing toward the center.

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.

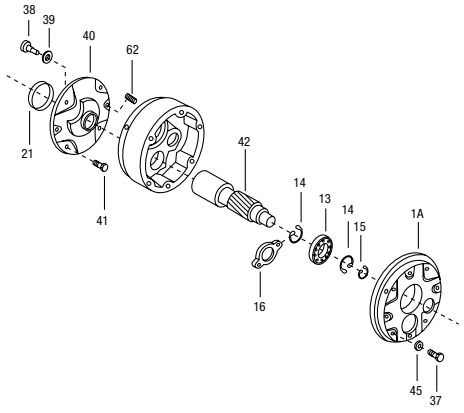
Size	Single Reduction		Double Reduction	
	Oil Dist. (Inches)	Capacity (Qts)	Oil Dist. (Inches)	Capacity (Qts)
221	1.25	.38	1.00	.50
226	1.62	.75	1.38	1.00
231	2.00	1.25	1.62	1.50
239	2.12	2.75	1.88	3.00
247	2.25	4.00	1.88	4.25

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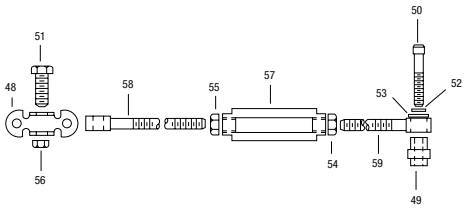
Models 221-247



Models F221-F247



Reaction Arm Kit



Part No.	Description of Part
1	HOUSING, BODY
1A	HOUSING, COVER
2	HELICAL GEAR (OUTPUT)
3	HOLLOW OUTPUT SHAFT
4	SOLID OUTPUT SHAFT, INSERT
4A	N/A
5	BALL BEARING
6	KEY, OUTPUT GEAR
7	KEY
8	KEY
9	N/A
10	SHIM
11	INPUT HELICAL PINION
12	BALL BEARING
13	BALL BEARING
14	RETAINING RING (FOR 221 ONLY)
15	RETAINING RING
16	BEARING RETAINER (FOR 226-247)
17	KEY
18	OIL SEAL
19	BORE PLUG
20	OIL SEAL
21	OIL SEAL

Part No.	Description of Part
22	PIPE PLUG
23	PLASTIC PLUG
24	VENTED OIL FILLER
25	DOWEL PIN
26	SOC. HEAD CAPSCREW
27	LOCKWASHER
28	BALL BEARING
29	INTERM. HELICAL PINION
30	INTERM. HELICAL GEAR
31	KEY, INTERM. GEAR
32	VERTICAL BASE
33	SOC. HEAD CAPSCREW
34	HORIZONTAL BASE
35	SOC. HEAD CAPSCREW
36	NAMEPLATE
37	BUTTON HD. CAPSCREW (FOR 226-247)
38	SOC. HEAD CAPSCREW
39	LOCKWASHER
40	MOTOR FLANGE
41	HEX HEAD CAPSCREW
42	MOTOR SHAFT (INPUT)
43	RETAINING RING
44	HEX. SOC. SETSCREW

Part No.	Description of Part
45	ROLLED WASHER (FOR 226-247)
46	BORE PLUG
47	N/A
48	CLEVIS
49	BUSHING
50	SOC. HEAD CAPSCREW
51	HEX HEAD CAPSCREW
52	LOCKWASHER
53	FLATWASHER
54	NUT
55	NUT, LEFT HAND
56	NUT, LOCK
57	TURNBUCKLE
58	EYEBOLT, ROD END (LEFT HAND)
59	EYEBOLT, ROD END
61	LOCKWASHER
62	HEX. SOC. SETSCREW
63	RETAINING RING

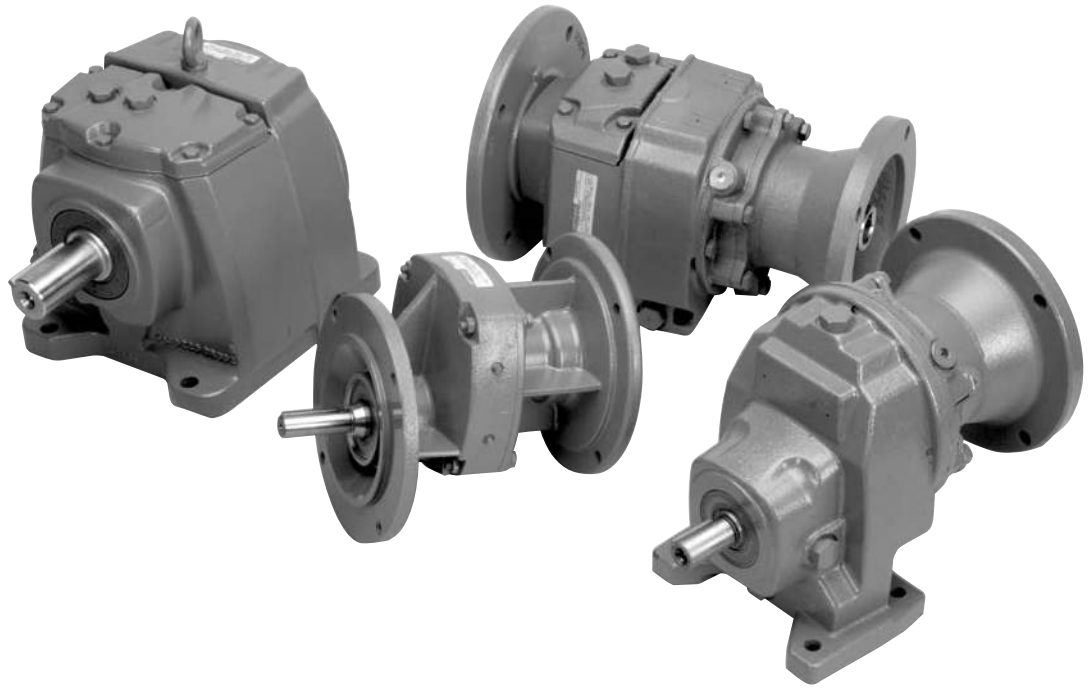
PART ORDERING INFORMATION: Be sure to provide complete Boston Gear catalog number from speed reducer nameplate, along with part description and number.

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Notes



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Section Contents

Product Reference Guide 272

Numbering System / How To Order 273

Selection Procedure. 274-275

Mounting Positions & Lubricants 276

Overhung Load 277

Output RPM Selection Tables 278-290

Reducer Ratings. 291-296

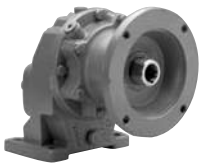
Dimensions 297-302

Washdown Duty 303

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F600B Series Helical Gear Flanged Reducers

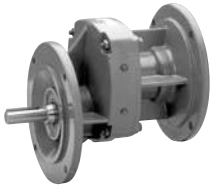
Ordering Information – Page 273
Lubrication – Page 276
Selection/Rating Information – Pages 278-290
Motor Selection – Pages 340 and 342



Single Reduction
Foot Mounted, Flange Input
Dimensions - Page 297



Double & Triple Reduction
Foot Mounted, Flange Input
Dimensions - Page 298



Single Reduction
Output Flange Mounted
Dimensions - Page 299



Double & Triple Reduction
Output Flange Mounted
Dimensions - Page 300

600B Series Helical Gear Non-Flanged Reducers

Ordering Information – Page 273
Lubrication – Page 276
Selection/Rating Information – Pages 278-290
Motor Selection – Pages 340 and 342



Single Reduction
Foot Mounted
Dimensions - Page 301



Double & Triple Reduction
Foot Mounted
Dimensions - Page 302

600 Series Catalog Number

*BK F 6 3 2 B F – 16 – K – B9 – MOTOR CATALOG NUMBER (If Required)

Input Shaft Style
Blank–Projecting Input Shaft
F – Quill Style C-Face Motor Flange

Reducer Size
1
2
3
4
5
6

Number of Reductions
1 – Single (4:1 only)
2 – Double
3 – Triple

Lubrication
Blank–No Lubrication
K – Klubersynth UH1 6-460

Reducer Material/Paint (Cast Iron)
Blank–Standard Paint
BK – *BostKleen* White Paint
SBK – Stainless *BostKleen* Paint

Series 600 Series

Base/Mounting Attachment
Blank–Foot Mounted
F – Output Flange

Nominal Gear Ratio
Refer to Selection Table for Available Ratios

NEMA Motor Mounting

Code Bore	NEMA Mounting	Input Size	Keyway
B5	56C	.625	3/16 x 3/32
B7	140TC/180C	.875	3/16 x 3/32
B9	180TC/210C	1.125	1/4 x 1/8
B11	210TC/250UC	1.375	5/16 x 5/32
B13	250TC	1.625	3/8 x 3/16
Blank–	Solid Input Shaft (No Flange)		

***Example —** Above listed configuration is an example part number using this numbering system.

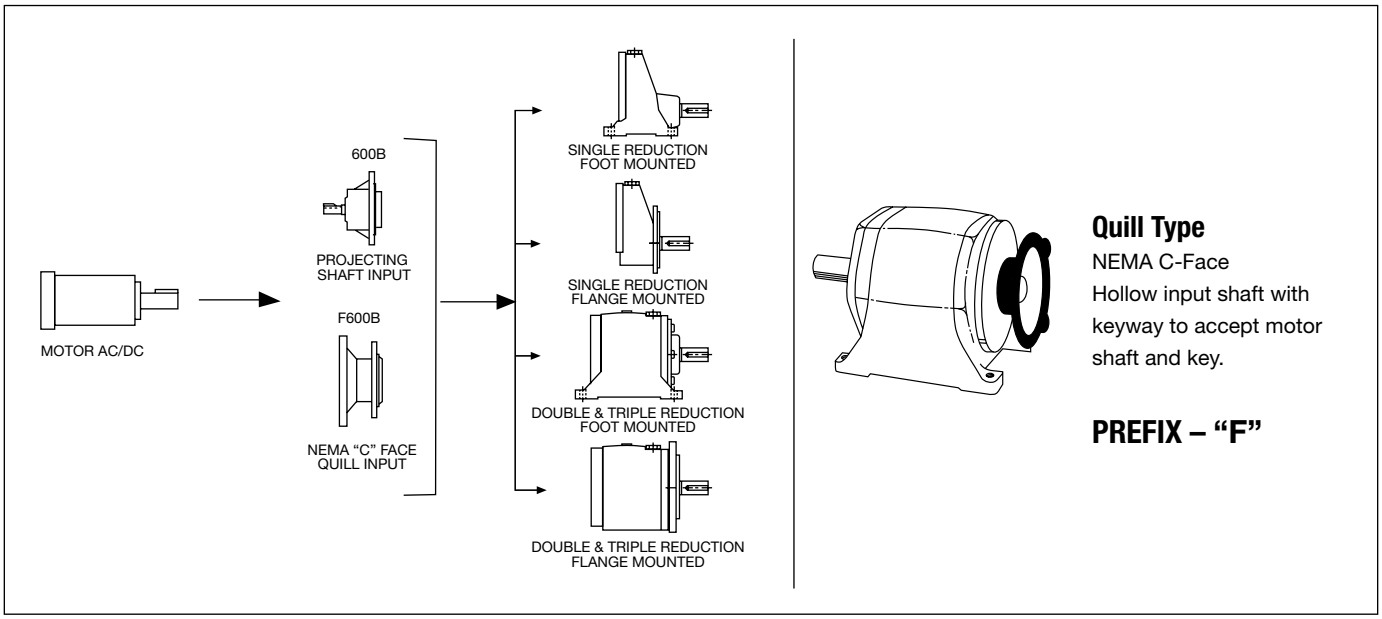
How to Order

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

Example: Required flanged input, reducer size 3, 16:1 ratio, double reduction, no lubrication, NEMA mounting 182TC motor to be 3 HP, 1750 RPM, 230/460 volt, 3 phase, 60 Hz totally enclosed fan cooled

Order: 1 pc F632B-16-B9 or 5 digit item code 28300
1 pc LUTF, ref page 334.

Available Configurations



Quill Type
NEMA C-Face
Hollow input shaft with keyway to accept motor shaft and key.

PREFIX – "F"

Note: For applications requiring backstop or other special considerations, please consult factory.

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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 291-296.
4. Overhung shaft load should be checked when belt or chain drives are used, to prevent premature shaft or bearing failure. Reference page 275 for calculations.

Example

Select an in-line 600B Series Speed Reducer for a continuous duty concrete mixer requiring 8000 lb-in. of torque at approx. 35 RPM, to operate up to 8 hrs/day. The Speed Reducer will be driven at 1160 input RPM.

1. Application Service Factor = 1.25
2. Design Torque = 8000 x 1.25
   = 10,000 lb-in.
3. Select at speed and torque level of 10,000 lb-ins. or greater
4. Order 652B-32 (Item Code 28698)

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 1

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. Heavy Shock-more than 10 hours per day.
	2.00	

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

600 Series Ratio and Capacity Selection Tables

Non-Flanged Reducers; Input Speeds 1750 and 1150 RPM

Service Factor 1.0*

Catalog Number†	Item Code	Input Speed						Gear Ratio††
		1750 RPM			1160 RPM			
		Approx. Output RPM	Output Torque (LB-IN)(Max.)	Input HP (Max.)	Approx. Output RPM	Output Torque (LB-IN) (Max.)	Input HP (Max.)	
612C-32	28682	55	791	0.7	36	821	.42	33.48
622B-32	28685	55	1780	1.68	36	1799	1.13	30.55
632B-32	28690	55	3977	3.79	36	4023	2.54	30.29
642B-32	28695	55	5910	5.4	36	6416	3.93	32.32
652B-32	28698	55	13826	12.52	36	14014	8.41	31.9
662B-32	28703	55	26088	25	36	26487	16.82	30.14
612C-40	28707	44	794	0.57	29	799	0.38	40.32
622B-40	28710	44	1790	1.33	29	1804	0.89	38.84
632B-40	28713	44	4002	2.95	29	4038	1.97	39.2

Reference Page 295

K

Motorized Speed Reducer

1. Determine application service factor from table 1 page 274 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 (Reference calculation).

Example

Select an in-line motorized helical speed reducer and motor to drive a uniformly loaded line conveyor 24 hours/day requiring 3 HP at 35 RPM.

Power Requirement
230/460 volt
3 phase
60 hertz

1. Select Service Factor class pages 348-349 or from Table 1 page 274. Service Class = II
2. Output RPM = 35
3. 5 HP
4. Select a 5 HP drive that will satisfy min. of II service class.
5. O.H.L = 3670 # page 277
6. Order: 1 – F652B-50-B11 (28748) Ref. Pg. 287
   1 – NUTF Motor Ref. page 337 for specific motor mfg.

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 277.

600 Series Output RPM and Capacity Selection Tables

@ 1750 RPM Input

FOR RATINGS AT OTHER INPUT SPEEDS, SEE TABLES ON PAGES 291-296.
ORDER BY CATALOG NUMBER OR ITEM CODE

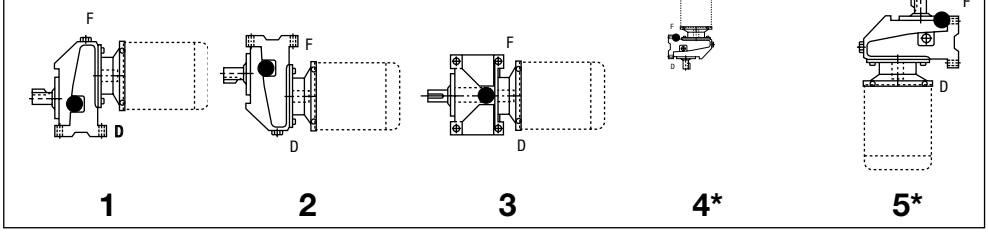
Output RPM	Ratio*	Non-Flanged Reducers: Gear Capacity: Output Torque (LB-IN.)	Non-Flanged Reducers: Gear Capacity: HP: Input	Non-Flanged Reducers: Gear Capacity: HP: Output	Non-Flanged Reducers: Catalog No. (Item Code)	Flanged Reducers (Gearmotors): Ratings: Motor HP	Ratings: Output Torque (LB-IN.)	Ratings: S.C.**	Catalog Numbers (Item Code): Foot Mounted	Catalog Numbers (Item Code): Output Flange Mounted	AC Motors†	DC Motors††
35	50	6100	3.46	3.25	643B-50 (28742)	3	5288	I	F643B-50-B9 (28743)	F643BF-50-B9 (28744)	LUTF	PM18300
						2	3525	II	F643B-50-B7 (28745)	F643BF-50-B7 (28746)	KUTF	PM18200
						1.5	2644	III			JUTF	PM18150
		14004	8.03	7.71	652B-50 (28747)	7.5	13048	I	F652B-50-B11 (28748)	F652BF-50-B11 (28749)	NUTF	—
						5	8699	II	F652B-50-B9 (28750)	F652BF-50-B9 (28751)	MUTF	—
						3	5219	III			LUTF	PM18300

* Gear Ratio is Approximate. For Actual Gear Ratio Reference Page 291-296.
** 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 334, 340 and 341.
Overhung Load Ratings refer to Pages 277.

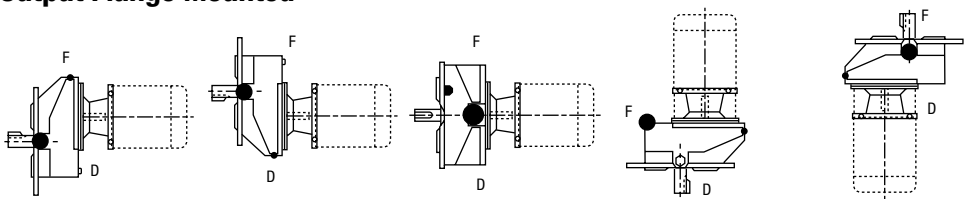
600 Series Mounting Positions & Lubrication

K

Foot Mounted



Output Flange Mounted



CAUTION

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

Mounting positions are the same for multiple reduction units, and for non-flanged reducers.
F - Fill • - Oil Level, D - Drain.
* Position 4 and 5, Level Should be 1/2" Below Top Fill.

Recommended Lubricant

Synthetic lubricants are recommended for 600B Series reducers, and at all times, the lubricant must remain free from contamination. During the initial break-in of the gear set, higher than normal operating temperatures may result.

An initial oil change should be made after the first 1,500-hours of operation and at 5,000-hour intervals thereafter. Relubrication should be performed at shorter intervals if the reducer operates in high ambient temperatures or unusually contaminated environments.

For operating temperatures in excess of 225°F special seal considerations may be necessary.

Recommended Lubricant	Ambient (Room) Temperature	ISO Viscosity Grade No.	Boston Gear Item Code
			Quart
Klubersynth UH1 6-460	–20° to 225°F (-29° TO 107°C)	460	65159
Mobil SHC634	-30° to 225°F (-34° TO 107°C)	320/460	51493

FOOT MOUNTED REDUCERS†

Frame Size	Quarts per Mounting Position				
	1	2	3	4	5
611C	*	*	*	*	*
621B	0.37	0.74	0.53	0.58	1.06
631B	0.26	1.06	0.63	0.69	1.27
641B	0.95	2.01	1.48	2.22	2.22
651B	2.09	4.42	3.33	4.05	3.15
661B	3.38	7.71	6.34	6.13	8.03
612C/613C	*	*	*	*	*
622B/623B	0.63	1.16	0.90	1.22	1.48
632B/633B	1.00	2.38	2.43	2.38	2.85
642B/643B	1.69	4.76	4.62	4.76	4.65
652B/653B	3.49	7.08	7.08	7.93	7.93
662B/663B	5.49	13.95	13.21	15.53	14.48

OUTPUT FLANGE MOUNTED REDUCERS†

Frame Size	Quarts per Mounting Position				
	1	2	3	4	5
611CF	*	*	*	*	*
621BF	0.37	0.74	0.53	0.58	1.06
631BF	0.26	1.06	0.63	0.69	1.27
641BF	0.95	2.01	1.48	2.22	2.22
651BF	2.09	4.42	3.33	4.05	3.15
661BF	3.38	7.71	6.34	6.13	8.03
612CF/613CF	*	*	*	*	*
622BF/623BF	0.63	††	††	1.22	1.48
632BF/633BF	1.00	††	††	2.38	2.85
642BF/643BF	1.69	††	††	4.76	4.65
652BF/653BF	3.49	††	††	7.93	7.93
662BF/663BF	5.49	††	††	15.53	14.48

* Prelubricated for life.
† Oil capacities apply to non-flanged reducers as well.
†† Use mounting position number 1. Cannot use on mounting position 2 & 3.

Single Reduction Overhung Load (lbs.)*

Output RPM	Reducer Size					
	611	621	631	641	651	661
>1000	84	222	230	500	580	802
801-1000	80	229	250	600	615	757
551-800	75	240	288	648	674	1041
451-550	54	320	360	668	874	1234
351-450	33	334	370	806	1244	1495
<350	153	366	457	786	1560	1744

* Load is assumed to be in the center of the shaft extension

Multiple Reduction Overhung Load (lbs.)

Output RPM	Reducer Size					
	610	620	630	640	650	660
301-450	-----	455	460	890	1755	1983
201-300	-----	469	557	1200	1829	2065
151-200	129	591	670	1233	2013	2065
101-150	138	603	685	1296	2015	2163
51-100	388	701	850	1305	2472	2213
31-50	600	1030	1105	1305	3424	3733
16-30	600	1297	1357	1905	3670	4580
<15	600	1345	1610	1905	4340	4580

600 Series Output RPM and Capacity Selection Tables

@ 1750 RPM Input

K

FOR RATINGS AT OTHER INPUT SPEEDS, SEE TABLES ON PAGES 291-296.
ORDER BY CATALOG NUMBER OR ITEM CODE.

Output RPM	Ratio*	Non-Flanged Reducers				Flanged Reducers (Gearmotors)					AC Motors†	DC Motors††
		Gear Capacity			Catalog No. (Item Code)	Ratings			Catalog Numbers (Item Code)			
		Output Torque (LB-IN.)	HP			Motor HP	Output Torque (LB-IN.)	S.C.**	Foot Mounted	Output Flange Mounted		
			Input	Output								
1094	1.6	338	6.15	6.03	621B-1.6 (28000)	5	275	I	F621B-1.6-B9 (28001)	F621BF-1.6-B9 (28002)	MUTF	PM18500
						3	165	III	F621B-1.6-B7 (28003)	F621BF-1.6-B7 (28004)	LUTF	PM18300
		623	11.39	11.16	631B-1.6 (28005)	10	547	I	F631B-1.6-B11 (28006)	F631BF-1.6-B11 (28007)	PUTF	—
						7.5	410	II	F631B-1.6-B9 (28008)	F631BF-1.6-B9 (28009)	NUTF	—
						5	273	III			MUTF	PM18500
		761	13.43	13.16	641B-1.6 (28010)	10	568	I	F641B-1.6-B11 (28011)	F641BF-1.6-B11 (28012)	PUTF	—
						7.5	426	II			NUTF	—
						5	284	III	F641B-1.6-B9 (28013)	F641BF-1.6-B9 (28014)	MUTF	PM18500
		2292	41.74	40.91	651B-1.6 (28015)	20	1101	III	F651B-1.6-B13 (28016)	—	SUTF	—
		3230	57.18	56.03	661B-1.6 (28017)	20	1129	III	F661B-1.6-B13 (28018)	—	SUTF	—
875	2.0	212	3.06	3.00	611C-2 (28019)	2	138	II	F611C-2-B7 (28020)	F611CF-2-B7 (28021)	KUTF	PM18200
						1.5	104	III			JUTF	PM18150
		399	5.65	5.54	621B-2 (28022)	5	353	I	F621B-2-B9 (28023)	F621BF-2-B9 (28024)	MUTF	PM18500
						3	212	II			KUTF	PM18300
						2	141	III	F621B-2-B7 (28025)	F621BF-2-B7 (28026)	KUTF	PM18200
		708	10.35	10.14	631B-2 (28027)	10	684	I	F631B-2-B11 (28028)	F631BF-2-B11 (28029)	PUTF	—
						7.5	513	II			NUTF	—
						5	342	III	F631B-2-B9 (28030)	F631BF-2-B9 (28031)	MUTF	PM18500
		1030	14.33	14.04	641B-2 (28032)	10	720	I	F641B-2-B11 (28033)	F641BF-2-B11 (28034)	PUTF	—
						7.5	540	II			NUTF	—
						5	360	III	F641B-2-B9 (28035)	F641BF-2-B9 (28036)	MUTF	PM18500
		2521	36.29	35.56	651B-2 (28037)	20	1390	II	F651B-2-B13 (28038)	—	SUTF	—
						15	1043	III			RUTF	—

* Gear Ratio is Approximate. For Actual Gear Ratio Reference Page 291-296.
** 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 334, 340 and 341.
Overhung Load Ratings refer to Pages 277.

@ 1750 RPM Input

FOR RATINGS AT OTHER INPUT SPEEDS, SEE TABLES ON PAGES 291-296.
ORDER BY CATALOG NUMBER OR ITEM CODE.

Output RPM	Ratio*	Non-Flanged Reducers				Flanged Reducers (Gearmotors)					AC Motors†	DC Motors††
		Gear Capacity			Catalog No. (Item Code)	Ratings			Catalog Numbers (Item Code)			
		Output Torque (LB-IN.)	HP			Motor HP	Output Torque (LB-IN.)	S.C.**	Foot Mounted	Output Flange Mounted		
			Input	Output								
875 (Cont)	2.0	3735	52.88	51.82	661B-2 (28039)	20	1411	III	F661B-2-B13 (28040)	—	SUTF	—
700	2.5	275	3.06	3.00	611C-2.5 (28041)	2	180	II	F611C-2.5-B7 (28042)	F611CF-2.5-B7 (28043)	KUTF	PM18200
						1.5	135	III			JUTF	PM18150
		442	4.86	4.76	621B-2.5 (28044)	3	273	II	F621B-2.5-B9 (28045)	F621BF-2.5-B9 (28046)	LUTF	PM18300
						2	182	III	F621B-2.5-B7 (28047)	F621BF-2.5-B7 (28048)	KUTF	PM18200
		708	7.88	7.22	631B-2.5 (28049)	7.5	675	I	F631B-2.5-B11 (28050)	F631BF-2.5-B11 (28051)	NUTF	—
						5	450	II	F631B-2.5-B9 (28052)	F631BF-2.5-B9 (28053)	MUTF	PM18500
						3	270	III			LUTF	PM18300
		1273	13.96	13.68	641B-2.5 (28054)	10	910	I	F641B-2.5-B11 (28055)	F641BF-2.5-B11 (28056)	PUTF	—
						7.5	683	II			NUTF	—
						5	455	III	F641B-2.5-B9 (28057)	F641BF-2.5-B9 (28058)	MUTF	PM18500
		4152	48.17	47.21	661B-2.5 (28062)	20	1722	III	F661B-2.5-B13 (28063)	—	SUTF	—
557	3.2	340	2.98	2.92	611C-3.2 (28064)	2	229	II	F611C-3.2-B7 (28065)	F611CF-3.2-B7 (28066)	KUTF	PM18200
						1.5	171	III			JUTF	PM18150
		442	3.86	3.78	621B-3.2 (28067)	3	344	I	F621B-3.2-B9 (28069)	F621BF-3.2-B9 (28070)	LUTF	PM18300
						2	229	II	F621B-3.2-B7 (28071)	F621BF-3.2-B7 (28072)	KUTF	PM18200
						1.5	172	III			JUTF	PM18150
		708	6.50	6.37	631B-3.2 (28073)	5	545	I	F631B-3.2-B9 (28074)	F631BF-3.2-B9 (28075)	MUTF	PM18500
						3	327	III			LUTF	PM18300

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600 Series Output RPM and Capacity Selection Tables

@ 1750 RPM Input

K

FOR RATINGS AT OTHER INPUT SPEEDS, SEE TABLES ON PAGES 291-296.
ORDER BY CATALOG NUMBER OR ITEM CODE.

Output RPM	Ratio*	Non-Flanged Reducers				Flanged Reducers (Gearmotors)					AC Motors†	DC Motors††
		Gear Capacity			Catalog No. (Item Code)	Ratings			Catalog Numbers (Item Code)			
		Output Torque (LB-IN.)	HP			Motor HP	Output Torque (LB-IN.)	S.C.**	Foot Mounted	Output Flange Mounted		
			Input	Output								
557 (Cont)	3.2	1127	10.10	9.90	641B-3.2 (28076)	10	1115	I	F641B-3.2-B11 (28077)	F641BF-3.2-B11 (28078)	PUTF	—
						7.5	836	II			LUTF	—
						5	557	III	F641B-3.2-B9 (28079)	F641BF-3.2-B9 (28080)	MUTF	PM18500
		2894	25.76	25.24	651B-3.2 (28081)	20	2244	I	F651B-3.2-B13 (28082)	—	SUTF	—
						15	1683	II			RUTF	—
						10	1122	III	F651B-3.2-B11 (28084)	F651BF-3.2-B11 (28085)	PUTF	—
		4655	42.96	42.10	661B-3.2 (28086)	20	2166	III	F661B-3.2-B13 (28087)	—	SUTF	—
438	4.0	372	2.58	2.53	611C-4 (28088)	2	288	I	F611C-4-B7 (28089)	F611CF-4-B7 (28092)	KUTF	PM18200
						1.5	216	II			JUTF	PM18150
						1	144	III	F611C-4-B5 (28091)	F611CF-4-B5 (28090)	HUTF-5/8	PM18100 PM9100-5/8
		442	3.19	3.1262	621B-4 (28093)	3	416	I	F621B-4-B9 (28094)	F621BF-4-B9 (28095)	LUTF	PM18300
						2	277	II	F621B-4-B7 (28096)	F621BF-4-B7 (28097)	KUTF	PM18200
						1.5	208	III			JUTF	PM18150
		708	5.15	5.05	631B-4 (28098)	5	686	I	F631B-4-B9 (28099)	F631BF-4-B9 (28100)	MUTF	PM18500
						3	412	II			LUTF	PM18300
						2	274	III	F631B-4-B7 (28106)	F631BF-4-B7 (28107)	JUTF	PM18150
		1315	9.42	9.23	641B-4 (28108)	7.5	1045	I	F641B-4-B11 (28109)	F641BF-4-B11 (28110)	NUTF	—
						5	697	II	F641B-4-B9 (28111)	F641BF-4-B9 (28112)	MUTF	PM18500
						3	418	III			LUTF	PM18300
		2903	20	19.60	651B-4 (28113)	20	2900	I	F651B-4-B13 (28114)	F651BF-4-B13 (28115)	SUTF	—
						15	2175	II			RUTF	—
						10	1450	III	F651B-4-B11 (28116)	F651BF-4-B11 (28118)	PUTF	—

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@ 1750 RPM Input

FOR RATINGS AT OTHER INPUT SPEEDS, SEE TABLES ON PAGES 291-296.
ORDER BY CATALOG NUMBER OR ITEM CODE.

Output RPM	Ratio*	Non-Flanged Reducers				Flanged Reducers (Gearmotors)					AC Motors†	DC Motors††
		Gear Capacity				Ratings			Catalog Numbers (Item Code)			
		Output Torque (LB-IN.)	HP		Catalog No. (Item Code)	Motor HP	Output Torque (LB-IN.)	S.C.**	Foot Mounted	Output Flange Mounted		
			Input	Output								
438 (Cont)	4.0	5221	38.16	37.40	661B-4 (28119)	20 15	2738 2053	II III	F661B-4-B13 (28120)	—	SUTF RUTF	— —
350	5.0	192	1.05	1.03	611C-5 (28121)	1 .75 .5	182 137 91	I II III	F611C-5-B5 (28122)	F611CF-5-B5 (28123)	HUTF-5/8 GUTF FUTF	PM9100-5/8 PM18100-5/8 PM975 PM1875 PM950
		442	2.55	2.50	621B-5 (28124)	2 1.5	347 260	I II	F621B-5-B7 (28125)	F621BF-5-B7 (28126)	KUTF JUTF	PM18200 PM18150
						1	174	III	F621B-5-B5 (28127)	F621BF-5-B5 (28128)	HUTF-5/8	PM9100-5/8 PM18100-5/8
		708	4.11	4.03	631B-5 (28129)	3	516	II	F631B-5-B9 (28130)	F631BF-5-B9 (28131)	LUTF	PM18300
						2	344	III	F631B-5-B7 (28132)	F631BF-5-B7 (28133)	KUTF	PM18200
		1327	7.73	7.575	641B-5 (28134)	7.5	1289	I	F641B-5-B11 (28135)	F641BF-5-B11 (28137)	NUTF	—
						5 3	859 515	II III	F641B-5-B9 (28138)	F641BF-5-B9 (28139)	MUTF LUTF	PM18500 PM18300
		2903	16.01	15.69	651B-5 (28140)	15	2715	I	F651B-5-B13 (28141)	—	RUTF	—
						10 7.5	1810 1357	II III	F651B-5-B11 (28143)	F651BF-5-B11 (28144)	PUTF NUTF	— —
		5221	30.49	29.88	661B-5 (28145)	20 15	3422 2567	II III	F661B-5-B13 (28146)	—	SUTF RUTF	— —
278	6.3	1251	5.63	5.52	622B-6.3 (28147)	5 3	1109 666	I II	F622B-6.3-B9 (28148)	F622BF-6.3-B9 (28149)	MUTF LUTF	PM18500 PM18300
						2	444	III	F622B-6.3-B7 (28150)	F622BF-6.3-B7 (28151)	KUTF	PM18200
		2208	10.45	10.03	632B-6.3 (28152)	10 7.5	2108 1581	I II	F632B-6.3-B11 (28153)	F632BF-6.3-B11 (28154)	PUTF NUTF	— —
						5	1054	III	F632B-6.3-B9 (28155)	F632BF-6.3-B9 (28159)	MUTF	PM18500

* Gear Ratio is Approximate. For Actual Gear Ratio Reference Page 291-296.
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600 Series Output RPM and Capacity Selection Tables

@ 1750 RPM Input

K

FOR RATINGS AT OTHER INPUT SPEEDS, SEE TABLES ON PAGES 291-296.
ORDER BY CATALOG NUMBER OR ITEM CODE.

Output RPM	Ratio*	Non-Flanged Reducers				Flanged Reducers (Gearmotors)					AC Motors†	DC Motors††
		Gear Capacity			Catalog No. (Item Code)	Ratings			Catalog Numbers (Item Code)			
		Output Torque (LB-IN.)	HP			Motor HP	Output Torque (LB-IN.)	S.C.**	Foot Mounted	Output Flange Mounted		
			Input	Output								
278 (Cont)	6.3	3615	16.28	15.63	642B-6.3 (28157)	15	3323	I	F642B-6.3-B13 (28158)	—	SUTF	—
						10	2215	II	F642B-6.3-B11 (28160)	F642BF-6.3-B11 (28161)	PUTF	—
						7.5	1661	III			NUTF	—
		7883	36.83	35.36	652B-6.3 (28162)	20	4292	II	F652B-6.3-B13 (28163)	—	SUTF	—
						15	3219	III			RUTF	—
		11903	53.87	51.72	662B-6.3 (28164)	20	4410	III	F662B-6.3-B13 (28165)	—	SUTF	—
219	8	762	2.69	2.58	612C-8 (28166)	2	564	I	F612C-8-B7 (28167)	F612CF-8-B7 (28168)	KUTF	PM18200
						1.5	423	II			JUTF	PM181500
						1	282	III	F612C-8-B5 (28169)	F612CF-8-B5 (28170)	HUTF-5/8	PM9100-5/8 PM18100-5/8
		1252	4.37	4.20	622B-8 (28171)	3	858	I	F622B-8-B9 (28172)	F622BF-8-B9 (28173)	LUTF	PM18300
						2	572	III	F622B-8-B7 (28174)	F622BF-8-B7 (28175)	KUTF	PM18200
		2208	7.95	7.63	632B-8 (28176)	7.5	2079	I	F632B-8-B11 (28177)	F632BF-8-B11 (28178)	NUTF	—
						5	1386	II	F632B-8-B9 (28179)	F632BF-8-B9 (28180)	MUTF	PM18500
						3	832	III			LUTF	PM18300
		3615	12.83	12.32	642B-8 (28181)	10	2813	I	F642B-8-B11 (28184)	F642BF-8-B11 (28185)	PUTF	—
						7.5	2110	II			NUTF	
						5	1407	III	F642B-8-B9 (28182)	F642BF-8-B9 (28183)	MUTF	PM18500
		10329	38.77	37.22	652B-8 (28186)	20	5315	II	F652B-8-B13 (28187)	—	SUTF	—
						15	3986	III			RUTF	—
		18252	66.63	63.96	662B-8 (28188)	20	5474	III	F662B-8-B13 (28199)	—	SUTF	—
175	10	768	2.17	2.08	612C-10 (28190)	2	705	I	F612C-10-B7 (28191)	F612CF-10-B7 (28192)	KUTF	PM18200
						1.5	529	II			JUTF	PM18150
						1	353	III	F612C-10-B5 (28193)	F612CF-10-B5 (28194)	HUTF-5/8	PM9100-5/8 PM18100-5/8

* Gear Ratio is Approximate. For Actual Gear Ratio Reference Page 291-296.
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@ 1750 RPM Input

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Output RPM	Ratio*	Non-Flanged Reducers				Flanged Reducers (Gearmotors)					AC Motors†	DC Motors††
		Gear Capacity			Catalog No. (Item Code)	Ratings			Catalog Numbers (Item Code)			
		Output Torque (LB-IN.)	HP			Motor HP	Output Torque (LB-IN.)	S.C.**	Foot Mounted	Output Flange Mounted		
			Input	Output								
175 (Cont)	10	1252	3.46	3.32	622B-10 (28195)	3	1081	I	F622B-10-B9 (28196)	F622BF-10-B9 (28198)	LUTF	PM18300
						2	721	II	F622B-10-B7 (28199)	F622BF-10-B7 (28200)	KUTF	PM18200
						1.5	541	III			JUTF	PM18150
		2208	6.56	6.30	632B-10 (28201)	5	1680	II	F632B-10-B9 (28202)	F632BF-10-B9 (28203)	MUTF	PM18500
						3	1008	III			LUTF	PM18300
		3615	10.49	10.07	642B-10 (28204)	10	3449	I	F642B-10-B11 (28207)	F642BF-10-B11 (28208)	PUTF	—
						7.5	2587	II			NUTF	—
						5	1719	III	F642B-10-B9 (28861)	F642BF-10-B5 (28862)	MUTF	PM18500
		11933	35.65	34.22	652B-10 (28209)	20	6684	II	F652B-10-B13 (28210)	—	SUTF	—
						15	5013	III			RUTF	—
		20956	60.86	58.43	662B-10 (28211)	20	6871	III	F662B-10-B13 (28212)	—	SUTF	—
140	12.5	772	1.82	1.75	612C-12.5 (28213)	1.5	634	I	F612C-12.5-B7 (28214)	F612CF-12.5-B7 (28215)	JUTF	PM18150
						1	423	II	F612C-12.5-B5 (28216)	F612CF-12.5-B5 (28217)	HUTF-5/8	PM9100-5/8 PM18100-5/8
						.75	317	III			GUTF	PM975 PM1875
		1252	2.87	2.76	622B-12.5 (28218)	2	872	I	F622B-12.5-B7 (28219)	F622BF-12.5-B7 (28220)	KUTF	PM18200
						1.5	654	II			JUTF	PM18150
						1	436	III	F622B-12.5-B5 (28221)	F622BF-12.5-B5 (28222)	HUTF-5/8	PM9100 5/8 PM18100 5/8
		2208	5.2	4.99	632B-12.5 (28223)	5	2120	I	F632B-12.5-B9 (28224)	F632BF-12.5-B9 (28225)	MUTF	PM18500
						3	1272	II			LUTF	PM18300
						2	848	III	F632B-12.5-B7 (28226)	F632BF-12.5-B7 (28227)	KUTF	PM18200
		3615	8.39	8.05	642B-12.5 (28228)	7.5	3227	I	F642B-12.5-B11 (28231)	F642BF-12.5-B11 (28863)	NUTF	—
						5	2151	II	F642B-12.5-B9 (28876)	F642BF-12.5-B9 (28864)	MUTF	PM18500
						3	1291	III			LUTF	PM18300

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600 Series Output RPM and Capacity Selection Tables

@ 1750 RPM Input

K

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Output RPM	Ratio*	Non-Flanged Reducers				Flanged Reducers (Gearmotors)					AC Motors†	DC Motors††
		Gear Capacity			Catalog No. (Item Code)	Ratings			Catalog Numbers (Item Code)			
		Output Torque (LB-IN.)	HP			Motor HP	Output Torque (LB-IN.)	S.C.**	Foot Mounted	Output Flange Mounted		
			Input	Output								
140 (Cont)	12.5	12844	30.33	29.12	652B-12.5 (28232)	20 15	8453 6340	II III	F652B-12.5-B13 (28234)	—	SUTF RUTF	— —
		23128	47.77	45.86	662B-12.5 (28235)	20	8592	III	F662B-12.5-B13 (28236)	—	SUTF	—
109	16	777	1.46	1.40	612C-16 (28251)	1 .75 .5	530 398 265	I II III	F612C-16-B5 (28252)	F612CF-16-B5 (28254)	HUTF-5/8 GUTF FUTF	PM9100-5/8 PM18100-5/8 PM975 PM1875 PM950
		1252	2.29	2.20	622B-16 (28256)	2 1.5	1091 819	I II	F622B-16-B7 (28265)	F622BF-16-B7 (28276)	KUTF JUTF	PM18200 PM18150
						1	546	III	F622B-16-B5 (28277)	F622BF-16-B5 (28284)	HUTF-5/8	PM9100 5/8 PM18100 5/8
		2208	4.15	3.98	632B-16 (28291)	3	1593	II	F632B-16-B9 (28300)	F632BF-16-B9 (28302)	LUTF	PM18300
						2	1062	III	F632B-16-B7 (28306)	F632BF-16-B7 (28328)	KUTF	PM18200
		3615	6.81	6.54	642B-16 (28330)	5 3	2649 1589	I III	F642B-16-B9 (28355)	F642BF-16-B9 (28360)	MUTF LUTF	PM18500 PM18300
		13452	24.63	23.64	652B-16 (28366)	20 15	10900 8175	I II	F652B-16-B13 (28384)	—	SUTF RUTF	— —
						10	5450	III	F652B-16-B11 (28385)	F652BF-16-B11 (28388)	PUTF	—
		23788	45.28	43.47	662B-16 (28390)	20	10486	III	F662B-16-B13 (28395)	—	SUTF	—
88	20	783	1.12	1.08	612C-20 (28396)	1 .75 .5	699 525 350	I II III	F612C-20-B5 (28538)	F612CF-20-B5 (28564)	HUTF-5/8 GUTF FUTF	PM9100-5/8 PM18100-5/8 PM975 PM1875 PM950
		1252	1.80	1.73	622B-20 (28570)	1.5	1040	I	F622B-20-B7 (28573)	F622BF-20-B7 (28586)	JUTF	PM18150
						1 .75	694 520	II III	F622B-20-B5 (28587)	F622BF-20-B5 (28588)	HUTF-5/8 GUTF	PM9100 5/8 PM18100 5/8 PM975 PM1875

* Gear Ratio is Approximate. For Actual Gear Ratio Reference Page 291-296.
** 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 334, 340 and 341.
Overhung Load Ratings refer to Pages 277.

@ 1750 RPM Input

FOR RATINGS AT OTHER INPUT SPEEDS, SEE TABLES ON PAGES 291-296.
ORDER BY CATALOG NUMBER OR ITEM CODE.

Output RPM	Ratio*	Non-Flanged Reducers				Flanged Reducers (Gearmotors)					AC Motors†	DC Motors††
		Gear Capacity			Catalog No. (Item Code)	Ratings			Catalog Numbers (Item Code)			
		Output Torque (LB-IN.)	HP			Motor HP	Output Torque (LB-IN.)	S.C.**	Foot Mounted	Output Flange Mounted		
			Input	Output								
88 (Cont)	20	2208	3.21	3.08	632B-20 (28589)	3	2060	I	F632B-20-B9 (28590)	F632BF-20-B9 (28591)	LUTF	PM18300
						2	1373	II	F632B-20-B7 (28592)	F632BF-20-B7 (28593)	KUTF	PM18200
						1.5	1030	III			JUTF	PM18150
		3615	6	5.76	642B-20 (28594)	5	2995	I	F642B-20-B9 (28597)	F642BF-20-B9 (28598)	MUTF	PM18500
						3	1797	III			LUTF	PM18300
		13601	19.86	19.07	652B-20 (28650)	15	10249	I	F652B-20-B13 (28651)	—	RUTF	—
						10	6833	II	F652B-20-B11 (28652)	F652BF-20-B11 (28653)	PUTF	—
						7.5	5124	III			NUTF	—
		24111	36.51	35.05	662B-20 (28654)	20	13181	II	F662B-20-B13 (28655)	—	SUTF	—
						15	9886	III			RUTF	—
70	25	787	.89	0.85	612C-25 (28656)	.75	663	I	F612C-25-B5 (28657)	F612CF-25-B5 (28658)	GUTF	PM975
						.5	442	II			FUTF	PM1875
						.33	292	III			EUTF	PM950
												PM933
		877	1	0.96	622B-25 (28659)	1	877	I	F622B-25-B5 (28660)	F622BF-25-B5 (28662)	HUTF-5/8	PM9100 5/8
						.75	658	II				PM18100 5/8
						.5	439	III			GUTF	PM975
											FUTF	PM1875
												PM950
		2208	2.51	2.41	632B-25 (28663)	2	1758	I	F632B-25-B7 (28664)	F632BF-25-B7 (28665)	KUTF	PM18200
						1.5	1319	II			JUTF	PM18150
						1	879	III	F632B-25-B5 (28666)	F632BF-25-B5 (28667)	HUTF-5/8	PM9100-5/8
												PM18100
		3615	4.23	4.23	642B-25 (28668)	3	2559	I	F642B-25-B9 (28672)	F642BF-25-B9 (28673)	LUTF	PM18300
						2	1706	III	F642B-25-B7 (28877)	F642BF-25-B7 (28878)	KUTF	PM18200
		13727	15.52	14.90	652B-25 (28674)	15	13245	I	F652B-25-B13 (28675)	—	RUTF	—
						10	8830	II	F652B-25-B11 (28676)	F652BF-25-B11 (28677)	PUTF	—
						7.5	6623				NUTF	—

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Overhung Load Ratings refer to Pages 277.

600 Series Output RPM and Capacity Selection Tables

@ 1750 RPM Input

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FOR RATINGS AT OTHER INPUT SPEEDS, SEE TABLES ON PAGES 291-296.
ORDER BY CATALOG NUMBER OR ITEM CODE.

Output RPM	Ratio*	Non-Flanged Reducers				Flanged Reducers (Gearmotors)					AC Motors†	DC Motors††
		Gear Capacity			Catalog No. (Item Code)	Ratings			Catalog Numbers (Item Code)			
		Output Torque (LB-IN.)	HP			Motor HP	Output Torque (LB-IN.)	S.C.**	Foot Mounted	Output Flange Mounted		
			Input	Output								
70 (Cont)	25	25876	31.03	29.79	662B-25 (28679)	20	16644	II	F662B-25-B13 (28681)	—	SUTF	—
						15	12483	III			RUTF	—
55	32	791	.7	0.67	612C-32 (28682)	.5	579	II	F612C-32-B5 (28683)	F612CF-32-B5 (28684)	FUTF	PM950
						.33	382	III			DUTF	PM925
		1780	1.68	1.61	622B-32 (28685)	1.5	1584	I	F622B-32-B7 (28686)	F622BF-32-B7 (28687)	JUTF	PM18150
						1	1056	II	F622B-32-B5 (28688)	F622BF-32-B5 (28689)	HUTF-5/8	PM9100-5/8
						.75	792	III			GUTF	PM1800-5/8 PM975 PM1875
		3977	3.79	3.64	632B-32 (28690)	3	3140	I	F632B-32-B9 (28691)	F632BF-32-B9 (28692)	LUTF	PM18300
						2	2094	II	F632B-32-B7 (28693)	F632BF-32-B7 (28694)	KUTF	PM18200
						1.5	1570	III			DUTF	PM18150
		5910	5.40	5.18	642B-32 (28695)	5	5585	I	F643B-32-B9 (28696)	F642BF-32-B9 (28697)	MUTF	PM18500
						3	3351	II			LUTF	PM18300
						2	2234	III	F643B-32-B7 (28879)	F643BF-32-B7 (28880)	KUTF	PM18200
		13826	12.52	12.02	652B-32 (28698)	10	11025	I	F652B-32-B11 (28699)	F652BF-32-B11 (28700)	PUTF	—
						7.5	8268	II			NUTF	—
						5	5512	III	F652B-32-B9 (28701)	F652BF-32-B9 (28702)	MUTF	PM18500
		26088	25	24.00	662B-32 (28703)	20	20833	I	F662B-32-B13 (28704)	—	SUTF	—
						15	15625	II			RUTF	—
						10	10416	III	F662B-32-B11 (28705)	F662BF-32-B11 (28706)	PUTF	—
44	40	794	.57	0.55	612C-40 (28707)	.5	697	I	F612C-40-B5 (28708)	F612CF-40-B5 (28709)	FUTF	PM950
						.33	460	II			EUTF	PM933
						.25	348	III			DUTF	PM925
		1790	1.33	1.28	622B-40 (28710)	1	1342	I	F622B-40-B5 (28711)	F622BF-40-B5 (28712)	HUTF-5/8	PM9100-5/8
						.75	1007	II			GUTF	PM18100-5/8 PM975
						.5	671	III			FUTF	PM1875 PM950

* Gear Ratio is Approximate. For Actual Gear Ratio Reference Page 291-296.
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Overhung Load Ratings refer to Pages 277.

@ 1750 RPM Input

FOR RATINGS AT OTHER INPUT SPEEDS, SEE TABLES ON PAGES 291-296.
ORDER BY CATALOG NUMBER OR ITEM CODE.

Output RPM	Ratio*	Non-Flanged Reducers				Flanged Reducers (Gearmotors)					AC Motors†	DC Motors††
		Gear Capacity			Catalog No. (Item Code)	Ratings			Catalog Numbers (Item Code)			
		Output Torque (LB-IN.)	HP			Motor HP	Output Torque (LB-IN.)	S.C.**	Foot Mounted	Output Flange Mounted		
			Input	Output								
44 (Cont)	40	4002	2.95	2.83	632B-40 (28713)	2 1.5	2710 2032	I III	F632B-40-B7 (28714)	F632BF-40-B7 (28715)	KUTF JUTF	PM18200 PM18150
		6010	4.3	4.04	643B-40 (28716)	3	4172	II	F643B-40-B9 (28717)	F643BF-40-B9 (28718)	LUTF	PM18300
						2	2782	III	F643B-40-B7 (28719)	F643BF-40-B7 (28720)	KUTF	PM18200
		13901	10.5	10.08	652B-40 (28721)	10 7.5	13216 9912	I II	F652B-40-B11 (28722)	F652BF-40-B11 (28723)	PUTF NUTF	— —
						5	6608	III	F652B-40-B9 (28724)	F652BF-40-B9 (28725)	MUTF	PM18500
		26314	19.37	18.60	662B-40 (28726)	15	20337	II	F662B-40-B13 (28727)	—	RUTF	—
						10 7.5	13558 10168	III	F662B-40-B11 (28728)	F662BF-40-B11 (28729)	PUTF NUTF	— —
35	50	796	.45	0.42	613C-50 (28730)	.33 .25	549 416	II III	F613C-50-B5 (28731)	F613CF-50-B5 (28732)	EUTF DUTF	PM933 PM925
		1699	1	0.96	622B-50 (28733)	1 .75 .5	1699 1274 849	I II III	F622B-50-B5 (28734)	F622BF-50-B5 (28735)	HUTF-5/8 GUTF FUTF	PM9100-5/8 PM18100-5/8 PM975/PM1875 PM950
		4024	2.32	2.23	632B-50 (28736)	2 1.5	3469 2602	I II	F632B-50-B7 (28737)	F632BF-50-B7 (28738)	KUTF JUTF	PM18200 PM18150
						1	1735	III	F632B-50-B5 (28740)	F632BF-50-B5 (28741)	HUTF-5/8	PM9100-5/8 PM18100-5/8
		6100	3.46	3.25	643B-50 (28742)	3	5288	I	F643B-50-B9 (28743)	F643BF-50-B9 (28744)	LUTF	PM18300
						2 1.5	3525 2644	II III	F643B-50-B7 (28745)	F643BF-50-B7 (28746)	KUTF JUTF	PM18200 PM18150
		14004	8.03	7.71	652B-50 (28747)	7.5	13048	I	F652B-50-B11 (28748)	F652BF-50-B11 (28749)	NUTF	—
						5 3	8699 5219	II III	F652B-50-B9 (28750)	F652BF-50-B9 (28751)	MUTF LUTF	— PM18300

* Gear Ratio is Approximate. For Actual Gear Ratio Reference Page 291-296.
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†† DC Motors – 90 VDC or 180 VDC where applicable, for specific motor manufacturers and 5 digit item code ref. pages 334, 340 and 341.
Overhung Load Ratings refer to Pages 277.

600 Series Output RPM and Capacity Selection Tables

@ 1750 RPM Input

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FOR RATINGS AT OTHER INPUT SPEEDS, SEE TABLES ON PAGES 291-296.
ORDER BY CATALOG NUMBER OR ITEM CODE.

Output RPM	Ratio*	Non-Flanged Reducers				Flanged Reducers (Gearmotors)					AC Motors†	DC Motors††
		Gear Capacity			Catalog No. (Item Code)	Ratings			Catalog Numbers (Item Code)			
		Output Torque (LB-IN.)	HP			Motor HP	Output Torque (LB-IN.)	S.C.**	Foot Mounted	Output Flange Mounted		
			Input	Output								
35 (Cont)	50	26496	15.39	14.77	662B-50 (28752)	15	25770	I	F662B-50-B13 (28753)	—	RUTF	—
						10	17180	II	F662B-50-B11 (28754)	F662BF-50-B11 (28755)	PUTF	—
						7.5	12885	III			NUTF	PM18500
28	63	800	.4	0.38	613C-63 (28756)	.33	715	I	F613C-63-B5 (28757)	F613CF-63-B5 (28758)	EUTF	PM933
						.25	542	II			DUTF	PM925
		1406	.63	0.59	623B-63 (28759)	.5	1104	I	F623B-63-B5 (28760)	F623BF-63-B5 (28761)	FUTF	PM950
						.33	729	II			EUTF	PM933
						.25	552	III			DUTF	PM925
		4038	1.85	1.74	633B-63 (28762)	1.5	3259	I	F633B-63-B7 (28763)	F633BF-63-B7 (28764)	JUTF	PM18150
						1	2173	II	F633B-63-B5 (28765)	F633BF-63-B5 (28766)	HUTF-5/8	PM9100-5/8
						.75	1629	III			GUTF	PM18100-5/8 PM975 PM1875
		6100	2.73	2.57	643B-63 (28767)	2	4474	I	F643B-63-B7 (28768)	F643BF-63-B7 (28769)	KUTF	PM18200
						1.5	3356	II			JUTF	PM18150
						1	2237	III	F643B-63-B5 (28770)	F643BF-63-B5 (28771)	HUTF-5/8	PM9100 5/8 PM10100-5/8
		14084	6.48	6.09	653B-63 (28772)	5	10817	II	F653B-63-B9 (28773)	F653BF-63-B9 (28774)	MUTF	PM18500
						3	6490	III			LUTF	PM18300
		23239	11.13	10.46	663B-63 (28775)	10	20791	I	F663B-63-B11 (28776)	F663BF-63-B11 (28777)	PUTF	—
						7.5	15593	II			NUTF	—
						5	10396	II	F663B-63-B9 (28778)	F663BF-63-B9 (28779)	MUTF	PM18500
22	80	1519	.54	0.51	623B-80 (28780)	.5	1375	I	F623B-80-B5 (28781)	F623BF-80-B5 (28782)	FUTF	PM950
						.33	908	II			EUTF	PM933
						.25	688	III			DUTF	PM925
		4038	1.53	1.44	633B-80 (28783)	1.5	3952	I	F633B-80-B7 (28784)	F633BF-80-B7 (28785)	JUTF	PM18150
						1	2635	II	F633B-80-B5 (28786)	F633BF-80-B5 (28787)	HUTF-5/8	PM9100-5/8
						.75	1976	III			GUTF	PM18100-5/8 PM975

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@ 1750 RPM Input

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ORDER BY CATALOG NUMBER OR ITEM CODE.

Output RPM	Ratio*	Non-Flanged Reducers				Flanged Reducers (Gearmotors)					AC Motors†	DC Motors††
		Gear Capacity			Catalog No. (Item Code)	Ratings			Catalog Numbers (Item Code)			
		Output Torque (LB-IN.)	HP			Motor HP	Output Torque (LB-IN.)	S.C.**	Foot Mounted	Output Flange Mounted		
			Input	Output								
22 (Cont)	80	6100	2.2	2.07	643B-80 (28788)	2 1.5	5473 4104	I II	F643B-80-B7 (28789)	F643BF-80-B7 (28790)	KUTF JUTF	PM18200 PM18150
						1	2736	III	F643B-80-B5 (28791)	F643BF-80-B5 (28792)	HUTF-5/8	PM9100-5/8 PM18100-5/8
		14152	5.2	4.89	653B-80 (28793)	5 3	13558 8135	I II	F653B-80-B9 (28794)	F653BF-80-B9 (28796)	MUTF LUTF	PM18500 PM18300
						2	5423	III	F653B-80-B7 (28797)	F653BF-80-B7 (28798)	KUTF	PM18200
		25562	9.74	9.16	663B-80 (28799)	7.5	19604	I	F663B-80-B11 (28800)	F663BF-80-B11 (28801)	MUTF	PM18500
						5	13069	III	F663B-80-B9 (28802)	F663BF-80-B9 (28803)	LUTF	PM18300
18	100	1618	.48	0.45	623B-100 (28804)	.33 .25	1110 841	I III	F623B-100-B5 (28805)	F623BF-100-B5 (28806)	EUTF DUTF	PM933 PM925
		4038	1.21	1.14	633B-100 (28808)	1 .75 .5	3324 2493 1662	I II III	F633B-100-B5 (28809)	F633BF-100-B5 (28810)	HUTF-5/8 GUTF FUTF	PM9100-5/8 PM18100-5/8 PM975/PM1875 PM950
		6100	1.78	1.67	643B-100 (28811)	1.5	5133	I	F643B-100-B7 (28812)	F643BF-100-B7 (28813)	JUTF	PM18150
						1 .75	3422 2567	II III	F643B-100-B5 (28814)	F643BF-100-B5 (28815)	HUTF-5/8 GUTF	PM9100-5/8 PM18100-5/8 PM975 PM1875
		14222	4.04	3.80	653B-100 (28816)	2 1.5	7008 5256	I II	F653B-100-B7 (28817)	F653BF-100-B7 (28818)	KUTF JUTF	PM18200 PM18150
						1	3504	III	F653B-100-B5 (28819)	F653BF-100-B5 (28820)	HUTF-5/8	PM9100-5/8 PM18100-5/8
		26602	8.03	7.55	663B-100 (28821)	7.5	24753	I	F663B-100-B11 (28822)	F663BF-100-B11 (28823)	NUTF	—
						5 3	16502 9901	II III	F663B-100-B9 (28824)	F663BF-100-B9 (28825)	MUTF LUTF	PM18500 PM18300
14	125	1744	.41	0.39	623B-125 (28826)	.33 .25	1389 1052	I II	F623B-125-B5 (28827)	F623BF-125-B5 (28828)	EUTF DUTF	PM933 PM925

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600 Series Output RPM and Capacity Selection Tables

@ 1750 RPM Input

K

FOR RATINGS AT OTHER INPUT SPEEDS, SEE TABLES ON PAGES 291-296.
ORDER BY CATALOG NUMBER OR ITEM CODE.

Output RPM	Ratio*	Non-Flanged Reducers				Flanged Reducers (Gearmotors)					AC Motors†	DC Motors††
		Gear Capacity			Catalog No. (Item Code)	Ratings			Catalog Numbers (Item Code)			
		Output Torque (LB-IN.)	HP			Motor HP	Output Torque (LB-IN.)	S.C.**	Foot Mounted	Output Flange Mounted		
			Input	Output								
14	125	4038	.97	0.91	633B-125 (28829)	.75 .5 .33	3121 2080 1373	I II III	F633B-125-B5 (28830)	F633BF-125-B5 (28831)	GUTF FUTF EUTF	PM975 PM1875 PM950 PM933
		6100	1.45	1.36	643B-125 (28832)	1 .75 .5	4214 3161 2107	I II III	F643B-125-B5 (28833)	F643BF-125-B5 (28834)	HUTF-5/8 GUTF FUTF	PM9100-5/8 PM18100-5/8 PM975 PM1875 PM950
		14277	3.25	3.06	653B-125 (28835)	3 2	13125 8750	I II	F653B-125-B9 (28836)	F653BF-125-B9 (28839)	LUTF KUTF	PM18300 PM18200
						1.5	6562	III	F653B-125-B7 (28840)	F653BF-125-B7 (28841)	JUTF	PM18150
		27049	6.52	6.13	663B-125 (28842)	5	20653	II	F663B-125-B9 (28843)	F663BF-125-B9 (28844)	MUTF	PM18500
						3	12392	III	F663B-125-B7 (28845)	F663BF-125-B7 (28846)	LUTF	PM18300
11	160	6100	1.10	1.03	643B-160 (28847)	1 .75 .5	5485 4114 2743	I II III	F643B-160-B5 (28848)	F643BF-160-B5 (28849)	HUTF-5/8 GUTF FUTF	PM9100-5/8 PM18100-5/8 PM975 PM1875 PM950
		14317	2.72	2.56	653B-160 (28850)	2 1.5	10489 7867	I II	F653B-160-B7 (28851)	F653BF-160-B7 (28853)	KUTF JUTF	PM18200 PM18150
						1	5245	III	F653B-160-B5 (28854)	F653BF-160-B5 (28855)	HUTF-5/8	PM9100-5/8 PM18100-5/8
		27173	5.03	4.73	663B-160 (28856)	5 3	26881 16128	I II	F663B-160-B9 (28857)	F663BF-160-B9 (28858)	MUTF LUTF	PM18500 PM18300
						2	10752	III	F663B-160-B7 (28859)	F663BF-160-B7 (28860)	KUTF	PM18200

* Gear Ratio is Approximate. For Actual Gear Ratio Reference Page 291-296.
** 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 334, 340 and 341.
Overhung Load Ratings refer to Pages 277.

Non-Flanged Reducers; Input Speeds 1750 and 1160 RPM

Service Factor 1.0*

Catalog Number†	Item Code	Input Speed						Gear Ratio††
		1750 RPM			1160 RPM			
		Approx. Output RPM	Output Torque (LB-IN)(Max.)	Input HP (Max.)	Approx. Output RPM	Output Torque (LB-IN) (Max.)	Input HP (Max.)	
621B-1.6	28000	1094	338	6.15	725	399	4.8	1.56
631B-1.6	28005	1094	623	11.39	725	708	8.58	1.55
641B-1.6	28010	1094	761	13.43	725	897	10.49	1.61
651B-1.6	28015	1094	2292	41.74	725	2378	28.7	1.56
661B-1.6	28017	1094	3230	57.18	725	3677	43.14	1.6
611C-2	28019	875	212	3.06	580	212	2.03	1.96
621B-2	28022	875	399	5.65	580	442	4.14	2
631B-2	28027	875	708	10.35	580	708	6.86	1.94
641B-2	28032	875	1030	14.33	580	1214	11.2	2.04
651B-2	28037	875	2521	36.29	580	2610	24.9	1.97
661B-2	28039	875	3735	52.88	580	4256	39.95	2
611C-2.5	28041	700	275	3.06	464	276	2.03	2.55
621B-2.5	28044	700	442	4.86	464	442	3.22	2.58
631B-2.5	28049	700	708	7.88	464	708	5.22	2.55
641B-2.5	28054	700	1273	13.96	464	1327	9.65	2.58
651B-2.5	28059	700	2745	30.62	464	2835	20.96	2.54
661B-2.5	28062	700	4152	48.17	464	4731	36.38	2.44
611C-3.2	28064	557	340	2.98	368	348	2.02	3.24
621B-3.2	28067	557	442	3.86	368	442	2.56	3.25
631B-3.2	28073	557	708	6.50	368	708	4.31	3.09
641B-3.2	28076	557	1127	10.10	368	1327	7.89	3.16
651B-3.2	28081	557	2894	25.76	368	2903	17.13	3.18
661B-3.2	28086	557	4655	42.96	368	5221	31.94	3.07
611C-4	28088	438	372	2.58	290	380	1.75	4.08
621B-4	28093	438	442	3.19	290	442	2.11	3.93
631B-4	28098	438	708	5.15	290	708	3.41	3.89
641B-4	28108	438	1315	9.42	290	1327	6.31	3.95
651B-4	28113	438	2903	20	290	2903	13.26	4.11
661B-4	28119	438	5221	38.16	290	5221	25.3	3.88
611C-5	28121	350	192	1.05	230	179	0.65	5.17
621B-5	28124	350	442	2.55	230	442	1.69	4.92
631B-5	28129	350	708	4.11	230	708	2.73	4.88
641B-5	28134	350	1327	7.73	230	1327	5.12	4.87
651B-5	28140	350	2903	16.01	230	2903	10.62	5.13
661B-5	28145	350	5221	30.49	230	5221	20.21	4.85
622B-6.3	28147	278	1251	5.63	183	1252	3.73	6.43
632B-6.3	28152	278	2208	10.45	183	2208	6.92	6.1
642B-6.3	28157	278	3615	16.28	183	3615	10.79	6.41
652B-6.3	28162	278	7883	36.83	183	8159	25.13	6.21
662B-6.3	28164	278	11903	53.87	183	12354	37.06	6.38

* For applications requiring a service factor greater than 1.0, multiply the design torque or horsepower by the application factor, found on pages 348-349, before selection.

† Reducer dimensions can be found on pages 297-302.

†† Gear Ratio is the actual ratio rounded to the nearest hundredth.

Non-Flanged Reducers; Input Speeds 690 and 100 RPM

Service Factor 1.0*

K

Catalog Number†	Item Code	Input Speed						Gear Ratio††
		690 RPM			100 RPM			
		Approx. Output RPM	Output Torque (LB-IN)(Max.)	Input HP (Max.)	Approx. Output RPM	Output Torque (LB-IN) (Max.)	Input HP (Max.)	
621B-1.6	28000	431	425	3.04	63	425	0.44	1.56
631B-1.6	28005	431	708	5.10	63	708	0.74	1.55
641B-1.6	28010	431	959	6.65	63	959	0.96	1.61
651B-1.6	28015	431	2411	17.27	63	2411	2.50	1.56
661B-1.6	28017	431	3677	25.67	63	3677	3.72	1.6
611C-2	28019	345	210	1.20	50	210	0.17	1.96
621B-2	28022	345	442	2.47	50	442	0.36	2
631B-2	28027	345	708	4.08	50	708	0.59	1.94
641B-2	28032	345	1327	7.27	50	1327	1.05	2.04
651B-2	28037	345	2870	16.28	50	2870	2.36	1.97
661B-2	28039	345	4731	26.43	50	4731	3.83	2
611C-2.5	28041	276	276	1.21	40	276	0.18	2.55
621B-2.5	28044	276	442	1.91	40	442	0.28	2.58
631B-2.5	28049	276	708	3.10	40	708	0.45	2.55
641B-2.5	28054	276	1327	5.75	40	1327	0.83	2.58
651B-2.5	28059	276	2870	12.62	40	2870	1.83	2.54
661B-2.5	28062	276	4731	21.66	40	4731	3.14	2.44
611C-3.2	28064	240	350	1.21	31	350	0.17	3.24
621B-3.2	28067	216	442	1.52	31	442	0.22	3.25
631B-3.2	28073	216	708	2.56	31	708	0.37	3.09
641B-3.2	28076	216	1327	4.69	31	1327	0.68	3.16
651B-3.2	28081	216	2903	10.20	31	2903	1.48	3.18
661B-3.2	28086	216	5221	19.00	31	5221	2.75	3.07
611C-4	28088	173	375	1.03	25	375	0.15	4.08
621B-4	28093	173	442	1.26	25	442	0.18	3.93
631B-4	28098	173	708	2.03	25	708	0.29	3.89
641B-4	28108	173	1327	3.75	25	1327	0.54	3.95
651B-4	28113	173	2903	7.89	25	2903	1.14	4.11
661B-4	28119	173	5221	15.03	25	5221	2.18	3.88
611C-5	28121	138	178	0.38	20	178	0.06	5.17
621B-5	28124	138	442	1.00	20	442	0.15	4.92
631B-5	28129	138	708	1.62	20	708	0.23	4.88
641B-5	28134	138	1327	3.04	20	1327	0.44	4.87
651B-5	28140	138	2903	6.32	20	2903	0.92	5.13
661B-5	28145	138	5221	12.03	20	5221	1.74	4.85
622B-6.3	28147	110	1252	2.22	16	1252	0.32	6.43
632B-6.3	28152	110	2208	4.13	16	2208	0.60	6.1
642B-6.3	28157	110	3615	6.43	16	3615	0.93	6.41
652B-6.3	28162	110	8267	15.18	16	8267	2.20	6.21
662B-6.3	28164	110	12531	22.40	16	12531	3.25	6.38

* For applications requiring a service factor greater than 1.0, multiply the design torque or horsepower by the application factor, found on pages 348-349, before selection.

† Reducer dimensions can be found on pages 297-302.

†† Gear Ratio is the actual ratio rounded to the nearest hundredth.

Non-Flanged Reducers; Input Speeds 1750 and 1160 RPM

Service Factor 1.0*

Catalog Number†	Item Code	Input Speed						Gear Ratio††
		1750 RPM			1160 RPM			
		Approx. Output RPM	Output Torque (LB-IN)(Max.)	Input HP (Max.)	Approx. Output RPM	Output Torque (LB-IN) (Max.)	Input HP (Max.)	
612C-8	28166	219	762	2.69	144	775	1.82	8.16
622B-8	28171	219	1252	4.37	144	1252	2.89	8.28
632B-8	28176	219	2208	7.95	144	2208	5.27	8.02
642B-8	28181	219	3615	12.83	144	3615	8.5	8.14
652B-8	28186	219	10329	38.77	144	10729	26.69	7.69
662B-8	28188	219	18252	66.63	144	18254	44.17	7.92
612C-10	28190	175	768	2.17	115	777	1.46	10.2
622B-10	28195	175	1252	3.46	115	1252	2.3	10.43
632B-10	28201	175	2208	6.56	115	2208	4.35	9.72
642B-10	28204	175	3615	10.49	115	3615	6.95	9.95
652B-10	28209	175	11933	35.65	115	13476	26.68	9.67
662B-10	28211	175	20956	60.86	115	22907	44.17	9.94
612C-12.5	28213	140	772	1.82	92	776	1.22	12.23
622B-12.5	28218	140	1252	2.87	92	1252	1.9	12.61
632B-12.5	28223	140	2208	5.2	92	2208	3.44	12.27
642B-12.5	28228	140	3615	8.39	92	3615	5.56	12.45
652B-12.5	28232	140	12844	30.33	92	13603	21.29	12.23
662B-12.5	28235	140	23128	47.77	92	24062	37.06	12.43
612C-16	28251	109	777	1.46	72	785	0.98	15.35
622B-16	28256	109	1252	2.29	72	1252	1.52	15.79
632B-16	28291	109	2208	4.15	72	2208	2.75	15.36
642B-16	28330	109	3615	6.81	72	3615	4.51	15.33
652B-16	28366	109	13452	24.63	72	13728	16.66	15.77
662B-16	28390	109	23788	45.28	72	25221	31.82	15.17
612C-20	28396	88	783	1.12	58	792	0.75	20.24
622B-20	28570	88	1252	1.8	58	1252	1.19	20.07
632B-20	28589	88	2208	3.21	58	2208	2.13	19.87
642B-20	28594	88	3615	6	58	3615	3.47	17.33
652B-20	28650	88	13601	19.86	58	13829	13.39	19.77
662B-20	28654	88	24111	36.51	58	24929	25.02	19.07
612C-25	28656	70	787	0.89	46	787	0.59	25.59
622B-25	28659	70	877	1	46	867	0.65	25.39
632B-25	28663	70	2208	2.51	46	2208	1.66	25.44
642B-25	28668	70	3615	4.23	46	3615	2.8	24.68
652B-25	28674	70	13727	15.52	46	13932	10.44	25.55
662B-25	28679	70	25876	31.03	46	26310	20.91	24.08

* For applications requiring a service factor greater than 1.0, multiply the design torque or horsepower by the application factor, found on pages 348-349, before selection.

† Reducer dimensions can be found on pages 297-302.

†† Gear Ratio is the actual ratio rounded to the nearest hundredth.

Non-Flanged Reducers; Input Speeds 690 and 100 RPM

Service Factor 1.0*

K

Catalog Number†	Item Code	Input Speed						Gear Ratio††
		690 RPM			100 RPM			
		Approx. Output RPM	Output Torque (LB-IN)(Max.)	Input HP (Max.)	Approx. Output RPM	Output Torque (LB-IN) (Max.)	Input HP (Max.)	
612C-8	28166	86	779	1.09	13	779	0.16	8.16
622B-8	28171	86	1252	1.72	13	1252	0.25	8.28
632B-8	28176	86	2208	3.14	13	2208	0.46	8.02
642B-8	28181	86	3615	5.06	13	3615	0.73	8.14
652B-8	28186	86	10887	16.15	13	10887	2.34	7.69
662B-8	28188	86	18250	26.28	13	18250	3.81	7.92
612C-10	28190	69	783	0.88	10	783	0.13	10.2
622B-10	28195	69	1252	1.37	10	1252	0.20	10.43
632B-10	28201	69	2208	2.59	10	2208	0.38	9.72
642B-10	28204	69	3615	4.14	10	3615	0.60	9.95
652B-10	28209	69	13589	16.03	10	13589	2.32	9.67
662B-10	28211	69	22902	26.28	10	22902	3.81	9.94
612C-12.5	28213	55	786	0.73	8	786	0.11	12.23
622B-12.5	28218	55	1252	1.13	8	1252	0.16	12.61
632B-12.5	28223	55	2208	2.05	8	2208	0.30	12.27
642B-12.5	28228	55	3615	3.31	8	3615	0.48	12.45
652B-12.5	28232	55	13706	12.78	8	13706	1.85	12.23
662B-12.5	28235	55	24410	22.40	8	24410	3.25	12.43
612C-16	28251	43	790	0.59	6	790	0.09	15.35
622B-16	28256	43	1252	0.90	6	1252	0.13	15.79
632B-16	28291	43	2208	1.64	6	2208	0.24	15.36
642B-16	28330	43	3615	2.69	6	3615	0.39	15.33
652B-16	28366	43	13821	9.99	6	13821	1.45	15.77
662B-16	28390	43	25563	19.22	6	25563	2.79	15.17
612C-20	28396	35	794	0.45	5	794	0.06	20.24
622B-20	28570	35	1252	0.71	5	1252	0.10	20.07
632B-20	28589	35	2208	1.27	5	2208	0.18	19.87
642B-20	28594	35	3615	2.38	5	3615	0.34	17.33
652B-20	28650	35	13914	8.03	5	13914	1.16	19.77
662B-20	28654	35	25248	15.10	5	25248	2.19	19.07
612C-25	28656	28	798	0.36	4	798	0.05	25.59
622B-25	28659	28	861	0.39	4	861	0.06	25.39
632B-25	28663	28	2208	0.99	4	2208	0.14	25.44
642B-25	28668	28	3615	1.67	4	3615	0.24	24.68
652B-25	28674	28	14008	6.25	4	14008	0.91	25.55
662B-25	28679	28	26475	12.54	4	26475	1.82	24.08

* For applications requiring a service factor greater than 1.0, multiply the design torque or horsepower by the application factor, found on pages 348-349, before selection.

† Reducer dimensions can be found on pages 297-302.

†† Gear Ratio is the actual ratio rounded to the nearest hundredth.

Non-Flanged Reducers; Input Speeds 1750 and 1160 RPM

Service Factor 1.0*

Catalog Number†	Item Code	Input Speed						Gear Ratio††
		1750 RPM			1160 RPM			
		Approx. Output RPM	Output Torque (LB-IN)(Max.)	Input HP (Max.)	Approx. Output RPM	Output Torque (LB-IN) (Max.)	Input HP (Max.)	
612C-32	28682	55	791	0.7	36	821	.42	33.48
622B-32	28685	55	1780	1.68	36	1799	1.13	30.55
632B-32	28690	55	3977	3.79	36	4023	2.54	30.29
642B-32	28695	55	5910	5.4	36	6416	3.93	32.32
652B-32	28698	55	13826	12.52	36	14014	8.41	31.9
662B-32	28703	55	26088	25	36	26487	16.82	30.14
612C-40	28707	44	794	0.57	29	799	0.38	40.32
622B-40	28710	44	1790	1.33	29	1804	0.89	38.84
632B-40	28713	44	4002	2.95	29	4038	1.97	39.2
643B-40	28716	44	6010	4.3	29	6100	2.9	41.1
652B-40	28721	44	13901	10.5	29	14074	7.04	38.24
662B-40	28726	44	26314	19.37	29	26673	13.02	39.23
613C-50	28730	35	796	0.45	23	803	0.32	49.16
622B-50	28733	35	1699	1	23	1666	0.65	49.15
632B-50	28736	35	4024	2.32	23	4038	1.54	50.19
643B-50	28742	35	6100	3.46	23	6100	2.29	52.09
652B-50	28747	35	14004	8.03	23	14158	5.38	50.34
662B-50	28752	35	26496	15.39	23	26823	10.33	49.71
613C-63	28756	28	800	0.4	18	785	0.24	64.07
623B-63	28759	28	1406	0.63	18	1657	0.5	65.25
633B-63	28762	28	4038	1.85	18	4038	1.23	64.2
643B-63	28767	28	6100	2.73	18	6100	1.9	66.11
653B-63	28772	28	14084	6.48	18	14223	4.34	63.93
663B-63	28775	28	23239	11.13	18	26947	8.56	61.44
623B-80	28780	22	1519	0.54	14	1790	0.42	81.29
633B-80	28783	22	4038	1.53	14	4038	1.01	77.86
643B-80	28788	22	6100	2.2	14	6100	1.52	80.86
653B-80	28793	22	14152	5.2	14	14278	3.48	80.13
663B-80	28799	22	25562	9.74	14	27062	6.84	77.24
623B-100	28804	18	1618	0.48	12	1804	0.35	99.4
633B-100	28808	18	4038	1.21	12	4038	0.8	98.24
643B-100	28811	18	6100	1.78	12	6100	1.23	101.13
653B-100	28816	18	14222	4.04	12	14334	2.7	103.54
663B-100	28821	18	26602	8.03	12	27177	5.44	97.53
623B-125	28826	14	1744	0.41	9	1804	0.28	124.4
633B-125	28829	14	4038	0.97	9	4038	0.64	122.96
643B-125	28832	14	6100	1.45	9	6100	0.96	124.53
653B-125	28835	14	14277	3.25	9	14378	2.17	129.28
663B-125	28842	14	27049	6.52	9	27265	4.36	122.06
643B-160	28847	11	6100	1.1	7	6100	0.77	162.1
653B-160	28850	11	14317	2.72	7	14410	1.81	154.98
663B-160	28856	11	27173	5.03	7	27372	3.36	158.87

* For applications requiring a service factor greater than 1.0, multiply the design torque or horsepower by the application factor, found on pages 348-349, before selection.

† Reducer dimensions can be found on pages 297-302.

†† Gear Ratio is the actual ratio rounded to the nearest hundredth.

Non-Flanged Reducers; Input Speeds 690 and 100 RPM

Service Factor 1.0*

Catalog Number†	Item Code	Input Speed						Gear Ratio††
		690 RPM			100 RPM			
		Approx. Output RPM	Output Torque (LB-IN)(Max.)	Input HP (Max.)	Approx. Output RPM	Output Torque (LB-IN) (Max.)	Input HP (Max.)	
612C-32	28682	22	800	0.27	3	800	0.04	33.48
623B-32	28685	22	1804	0.67	3	1804	0.10	30.55
633B-32	28690	22	4023	1.51	3	4023	0.22	30.29
642B-32	28695	22	6100	2.15	3	6100	0.31	32.32
652B-32	28698	22	14083	5.03	3	14083	0.73	31.9
662B-32	28703	22	26634	10.08	3	26634	1.46	30.14
613C-40	28707	17	800	0.23	2.5	800	0.03	40.32
623B-40	28710	17	1804	0.54	2.5	1804	0.08	38.84
633B-40	28713	17	4038	1.20	2.5	4038	0.17	39.2
643B-40	28716	17	6100	1.73	2.5	6100	0.25	41.1
653B-40	28721	17	14138	4.31	2.5	14138	0.62	38.24
663B-40	28726	17	26802	7.96	2.5	26802	1.15	39.23
613C-50	28730	14	796	0.19	2	796	0.03	49.16
623B-50	28733	14	1804	0.43	2	1804	0.06	49.15
633B-50	28736	14	4038	0.94	2	4038	0.14	50.19
643B-50	28742	14	6100	1.36	2	6100	0.20	52.09
653B-50	28747	14	14215	3.29	2	14215	0.48	50.34
663B-50	28752	14	26941	6.31	2	26941	0.91	49.71
613C-63	28756	11	800	0.15	1.6	800	0.02	64.07
623B-63	28759	11	1804	0.32	1.6	1804	0.05	65.25
633B-63	28762	11	4038	0.73	1.6	4038	0.11	64.2
643B-63	28767	11	6100	1.07	1.6	6100	0.16	66.11
653B-63	28772	11	14274	2.60	1.6	14274	0.38	63.93
663B-63	28775	11	27053	5.13	1.6	27053	0.74	61.44
623B-80	28780	9	1804	0.26	1.3	1804	0.04	81.29
633B-80	28783	9	4038	0.60	1.3	4038	0.09	77.86
643B-80	28788	9	6100	0.88	1.3	6100	0.13	80.86
653B-80	28793	9	14324	2.08	1.3	14324	0.30	80.13
663B-80	28799	9	27162	4.10	1.3	27162	0.59	77.24
623B-100	28804	7	1804	0.21	1	1804	0.03	99.4
633B-100	28808	7	4038	0.48	1	4038	0.07	98.24
643B-100	28811	7	6100	0.70	1	6100	0.10	101.13
653B-100	28816	7	14375	1.62	1	14375	0.23	103.54
663B-100	28821	7	27260	3.26	1	27260	0.47	97.53
623B-125	28826	6	1380	0.13	0.8	1380	0.02	124.4
633B-125	28829	6	4038	0.38	0.8	4038	0.06	122.96
643B-125	28832	6	6100	0.57	0.8	6100	0.08	124.53
653B-125	28835	6	14415	1.30	0.8	14415	0.19	129.28
663B-125	28842	6	27348	2.61	0.8	27348	0.38	122.06
643B-160	28847	4	6100	0.44	0.6	6100	0.06	162.1
653B-160	28850	4	14444	1.09	0.6	14444	0.16	154.98
663B-160	28856	4	27442	2.01	0.6	27442	0.29	158.87

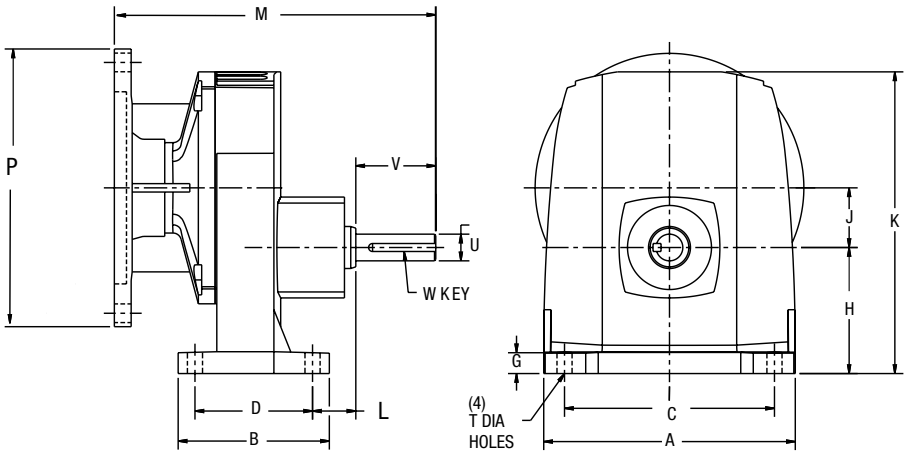
* For applications requiring a service factor greater than 1.0, multiply the design torque or horsepower by the application factor, found on pages 348-349, before selection.

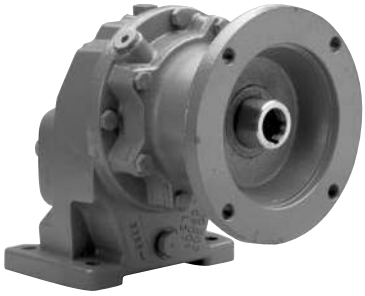
† Reducer dimensions can be found on pages 297-302.

†† Gear Ratio is the actual ratio rounded to the nearest hundredth.

F600B Series – Flanged Quill Type

Foot Mounted





Size	A	B	C	D	G	H	J	K	L
611C	5.90	3.54	4.92	2.76	.48	2.95	1.40	7.07	1.01
621B	6.14	4.13	4.72	2.95	.71	3.15	1.83	8.24	.71
631B	7.08	4.48	5.52	3.15	.77	3.54	2.48	9.76	.75
641B	9.69	5.30	7.48	3.94	1.00	4.41	2.76	11.69	1.08
651B	11.02	6.59	8.50	4.92	1.33	5.20	3.43	13.90	1.10
661B	13.65	7.76	10.24	6.30	1.71	6.30	4.33	17.36	1.18

	M						Low Speed Shaft				
	NEMA Mounting								W-Key		Approx. Weight (lb.)
	B5	B7	B9	B11	B13	T	*U	V	Sq.	Length	
Size	56C	140TC	180TC	210TC	250TC						
611C	8.50	8.50	– –	– –	– –	.35	.625	1.88	3/16	1.48	11
621B	10.43	10.43	12.15	– –	– –	.43	.750	1.50	3/16	1.28	30
631B	11.05	11.05	12.77	12.77	– –	.55	1.000	2.00	1/4	1.56	40
641B	– –	– –	14.17	14.17	– –	.63	1.375	2.75	5/16	2.40	62
651B	– –	– –	– –	15.54	16.75	.71	1.500	3.00	3/8	2.56	68
661B	– –	– –	– –	– –	17.48	.79	1.750	3.50	3/8	3.06	89
P	9.00	9.00	9.00								

Output shaft rotation is opposite input shaft rotation.

* Shaft extension tolerance: +.0000"; -.0005" up to 1.5" diameter inclusive. Larger diameters: +.000; -.001".

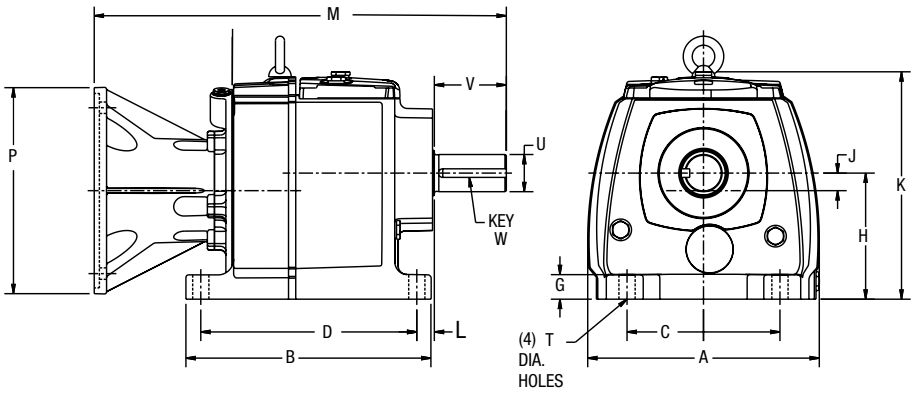
Dimensions to rough casting are approximate.

F600B Series – Flanged Quill Type

Foot Mounted

K





Size	A	B	C	D	G	H	J	K	L
612C/613C	5.90	4.92/5.71	4.92	4.13/4.92	.48	2.95	.28*	6.00	.87
622B/623B	6.76	7.68	4.33	6.50	.71	3.54	.33	6.60	.59
632B/633B	8.72	8.50	5.32	7.56	.84	4.53	.39	7.97	.51
642B/643B	10.13	10.72	6.68	9.45	1.07	5.51	.77	9.94	.77
652B/653B	12.00	10.86	9.06	9.25	1.37	7.09	1.02	11.89	.98
662B/663B	14.19	12.89	11.02	11.02	1.73	8.86	1.14	14.84	1.10

* 612/613 Only "J" is Higher than "H".

	M					T	Low Speed Shaft				Approx. Weight (lb.)
	NEMA Mounting								W-Key		
	B5	B7	B9	B11	B13		*U	V			
Size	56C	140TC	180TC	210TC	250TC				Sq.	Length	
612C/613C	9.29/10.08	– –	– –	– –	– –	.35	.750	1.75	3/16	1.48	17
622B/623B	13.00	13.00	14.72	– –	– –	.35	1.000	2.00	1/4	1.56	45
632B/633B	14.17	14.17	15.89	15.89	– –	.55	1.250	2.50	1/4	2.16	61
642B/643B	16.31	16.31	18.03	18.03	18.66	.71	1.500	3.00	3/8	2.56	90
652B/653B	17.88	17.88	19.60	19.60	20.81	.71	2.125	3.50	1/2	3.06	95
662B/663B	– –	20.29	22.01	22.01	23.24	.87	2.375	4.72	5/8	4.19	165
P	6.50	6.50	9.00	9.00	9.00						

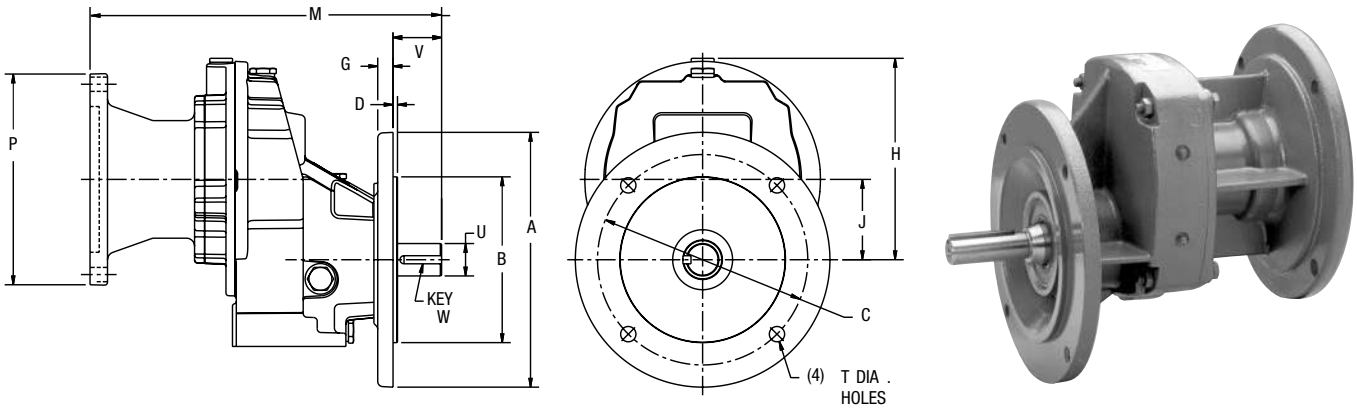
Output shaft rotation, relative to input shaft rotation, is identical for double reduction and opposite for triple reduction reducers.

* Shaft extension tolerance: +.0000"; -.0005" up to 1.5" diameter inclusive. Larger diameters: +.000; -.001".

Dimensions to rough casting are approximate.

F600B Series – Flanged Quill Type

Output Flange Mounted



Size	A	B	C	D	G	H	J
611CF*	6.50	4.50	5.88	.12	.39	4.65	1.40
621BF	6.30	4.33	5.12	.14	.39	4.82	1.83
631BF	7.87	5.12	6.50	.14	.47	6.22	2.48
641BF	9.83	7.09	8.46	.16	.47	7.28	2.76
651BF	11.80	9.06	10.43	.16	.59	8.70	3.43

* Output flange to NEMA 56C dimensions. (611CF only)

	M					Low Speed Shaft				
	NEMA Mounting									
	B5	B7	B9	B11				W-Key		Approx. Weight (lb.)
Size	56C	140TC	180TC	210TC	T	*U	V	Sq.	Length	
611CF	8.51	8.51	– –	– –	3/8-16 UNC	.625	2.06	3/16	1.48	13
621BF	10.74	10.74	12.46	– –	.35	.750	1.50	3/16	1.28	33
631BF	10.86	10.86	12.58	12.58	.47	1.000	1.50	1/4	1.16	44
641BF	– –	– –	14.56	14.56	.55	1.375	2.75	5/16	2.40	68
651BF	– –	– –	– –	16.31	.55	1.500	3.00	3/8	2.56	76
P	6.50	6.50	9.00	9.00						

Output shaft rotation is opposite input shaft rotation.

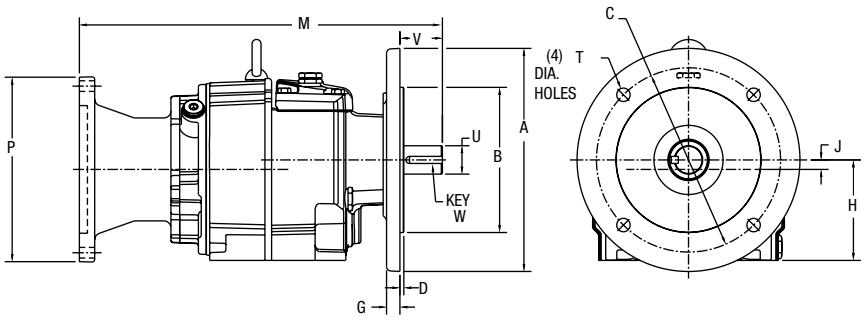
* Shaft extension tolerance: +.0000"; -.0005" up to 1.5" diameter inclusive. Larger diameters: +.000; -.001".

Dimensions to rough casting are approximate.

F600B Series – Flanged Quill Type

Output Flange Mounted





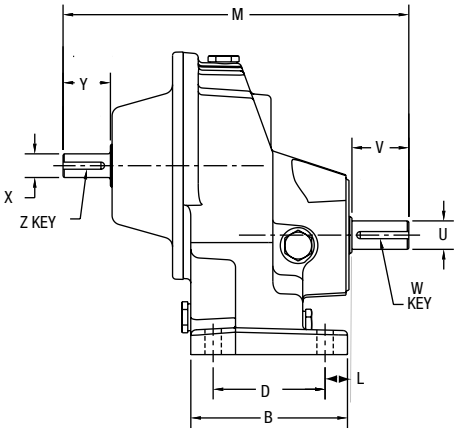
Size	A	B	C	D	G	H	J
612CF/613CF*	6.50	4.50	5.88	.12	.39	2.48	.28‡
622BF/623BF	7.87	5.12	6.50	.14	.47	3.54	.33
632BF/633BF	9.83	7.09	8.46	.16	.47	4.53	.39
642BF/643BF	11.80	9.06	10.43	.16	.47	5.51	.77
652BF/653BF	13.77	9.84	11.81	.16	.59	7.09	1.02
662BF/663BF	15.75	11.81	13.78	.20	.71	8.86	1.14

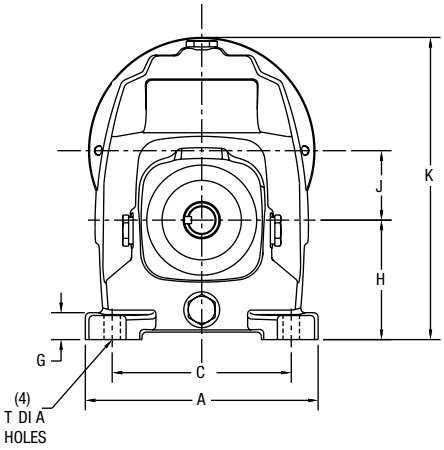
* Output flange to NEMA 56C dimensions. (612CF/613CF only)
‡ 612/613 "J" Is higher than "H"

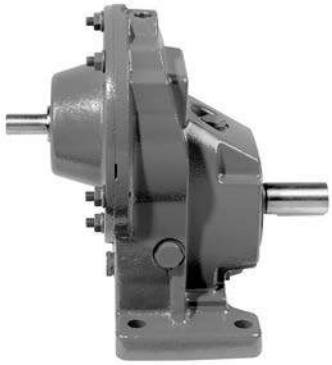
	M					Low Speed Shaft				Approx. Weight (lb.)
	NEMA Mounting							W-Key		
	B5	B7	B9	B11						
Size	56C	140TC	180TC	210TC	T	*U	V	Sq.	Length	
612CF/613CF	9.60/10.39	9.60/10.39	– –	– –	3/8-16 UNC	.625	2.06	3/16	1.48	18
622BF/623BF	12.81	12.81	14.53	– –	.47	1.000	1.50	1/4	1.16	47
632BF/633BF	14.56	14.56	16.28	16.28	.55	1.250	2.50	1/4	2.16	65
642BF/643BF	17.18	17.18	18.90	18.90	.55	1.500	3.00	3/8	2.56	98
652BF/653BF	18.63	18.63	20.35	20.35	.71	2.125	3.50	1/2	3.06	103
662BF/663BF	– –	21.26	22.99	22.99	.71	2.375	4.72	5/8	4.19	174
P	6.50	6.50	9.00	9.00						

Output shaft rotation, relative to input shaft rotation, is identical for double reduction and opposite for triple reduction reducers.
* Shaft extension tolerance: +.0000"; -.0005" up to 1.5" diameter inclusive. Larger diameters: +.000; -.001".
Dimensions to rough casting are approximate.

600B Series
Foot Mounted







Size	A	B	C	D	G	H	J	K	L	M
611C	5.90	3.54	4.92	2.76	.48	2.95	1.40	7.07	1.01	8.77
621B	6.14	4.13	4.72	2.95	.71	3.15	1.83	7.97	.71	9.12
631B	7.28	4.48	5.52	3.15	.77	3.54	2.48	9.67	.75	9.74
641B	9.69	5.30	7.48	3.94	1.00	4.41	2.76	11.69	1.08	12.88
651B	11.02	6.59	8.50	4.92	1.34	5.20	3.43	13.90	1.10	14.35
661B	13.65	7.76	10.24	6.30	1.61	6.30	4.33	17.37	1.18	16.73

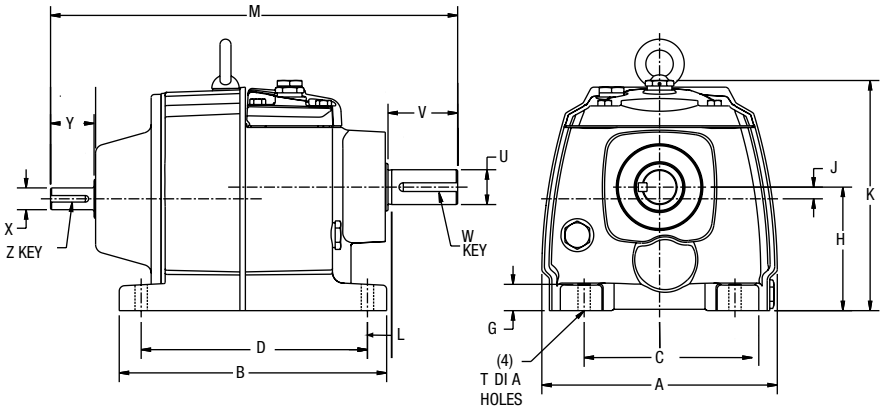
Size	T	Low Speed Shaft				High Speed Shaft				Approx. Weight (lb.)
				W-Key				Z-Key		
		*U	V	Sq.	Length	*X	Y	Sq.	Length	
611C	.35	.625	1.88	3/16	1.48	.500	1.00	9/32 Flat		9
621B	.43	.750	1.50	3/16	1.28	.625	1.25	3/16	1.00	23
631B	.55	1.000	2.00	1/4	1.56	.625	1.25	3/16	1.00	28
641B	.63	1.375	2.75	5/16	2.40	1.125	2.25	1/4	1.94	55
651B	.71	1.500	3.00	3/8	2.56	1.125	2.25	1/4	1.94	66
661B	.79	1.750	3.50	3/8	3.06	1.375	2.75	5/16	2.31	89

Output shaft rotation is opposite input shaft rotation.
* Shaft extension tolerance: +.0000"; -.0005" up to 1.5" diameter inclusive. Larger diameters: +.000; -.001".
Dimensions to rough casting are approximate.

600B Series

Foot Mounted





Size	A	B	C	D	G	H	J	K	L	M
612C/613C	5.90	4.92/5.71	4.92	4.13/4.92	.48	2.95	.28*	6.00	.87	9.56/10.35
622B/623B	6.76	7.68	4.33	6.50	.71	3.54	.33	6.60	.59	11.69
632B/633B	8.72	8.50	5.32	7.56	.84	4.53	.39	7.97	.51	12.86
642B/643B	10.13	10.72	6.68	9.45	1.07	5.51	.77	9.94	.77	16.59
652B/653B	12.00	10.86	9.06	9.25	1.37	7.09	1.02	11.89	.98	18.41
662B/663B	14.19	12.89	11.02	11.02	1.73	8.86	1.14	14.84	1.10	22.45

* 612C/613C Only "J" is higher than "H".

Size	T	Low Speed Shaft				High Speed Shaft				Approx. Weight (lb.)
				W-Key				Z-Key		
		*U	V	Sq.	Length	*X	Y	Sq.	Length	
612C/613C	.35	.750	1.75	3/16	1.48	.500	1.00	9/32 Flat		15
622B/623B	.35	1.000	2.00	1/4	1.56	.625	1.25	3/16	1.00	37
632B/633B	.55	1.250	2.50	1/4	2.16	.625	1.25	3/16	1.00	50
642B/643B	.71	1.500	3.00	3/8	2.56	1.125	2.25	1/4	1.94	87
652B/653B	.71	2.125	3.50	1/2	3.06	1.125	2.25	1/4	1.94	99
662B/663B	.87	2.375	4.72	5/8	4.15	1.375	2.75	5/16	2.31	198

Output shaft rotation, relative to input shaft rotation, is identical for double reduction and opposite for triple reduction reducers.
* Shaft extension tolerance: +.0000"; -.0005" up to 1.5" diameter inclusive. Larger diameters: +.000; -.001".
Dimensions to rough casting are approximate.



600B SERIES – BOST-KLEEN™

- Washable and Scrubbable
- Durable, Non-Absorbent, Non-Toxic White Epoxy Finish, USDA Approved
- Standard NEMA C-Face and Projecting Input Shaft Configurations
- Single, Double and Triple Reducton Rations – 1:6 TO 160:1
- Helical Gearing
- Output Mounting Flange Mount Attachment Available

BISCC Certified Basic Model Numbers, Dimensions and Available Ratios

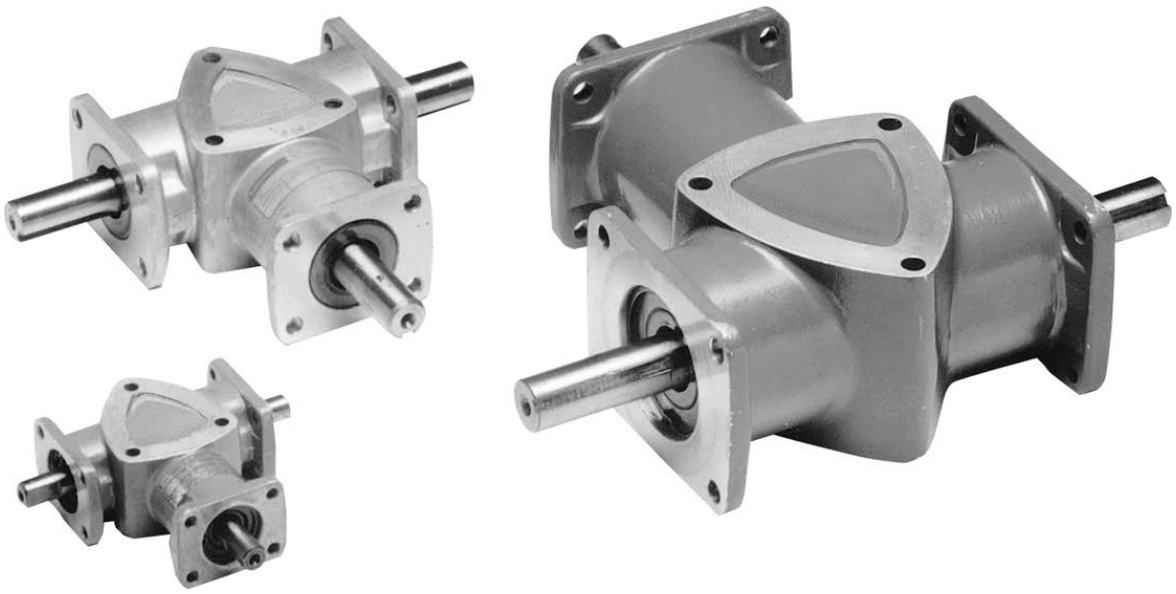
WHITE BOST-KLEEN		STAINLESS BOST-KLEEN		NEMA Mounting	INPUT SHAFT DIA. +.000 -.001*	OUTPUT SHAFT DIA. +.000 -.001*	AVAILABLE RATIOS
NON-FLANGED TYPE	QUILL TYPE	NON-FLANGED TYPE	QUILL TYPE				
BK611	BKF611	SBK611	SBKF611	56C	.500	.625	ALL
BK621	BKF621	SBK621	SBKF621	56C,140TC,180TC	.625	.750	ALL
BK631	BKF631	SBK631	SBKF631	56C,140TC,180TC,210TC	.625	1.000	ALL
BK641	BKF641	SBK641	SBKF641	140TC,180TC,210TC,250TC	1.125	1.375	ALL
BK651	BKF651	SBK651	SBKF651	180TC,210TC,250TC	1.125	1.500	ALL
BK661	BKF661	SBK661	SBKF661	210TC,250TC	1.375	1.750	ALL
BK612/613	BKF612/613	SBK612/613	SBKF612/613	56C	.500	.625	ALL
BK622/623	BKF622/623	SBK622/623	SBKF622/623	56C,140TC,180TC	.625	1.000	ALL
BK632/633	BKF632/633	SBK632/633	SBKF632/633	56C,140TC,180TC,210TC	.625	1.250	ALL
BK642/643	BKF642/643	SBK642/643	SBKF642/643	56C,140TC,180TC,210TC	1.125	1.500	ALL
BK652/653	BKF652/653	SBK652/653	SBKF652/653	56C,140TC,180TC,210TC	1.125	1.750	ALL
BK662/663	BKF662/663	SBK662/663	SBKF662/663	140TC,180TC,210TC	1.375	2.375	ALL

* Shaft extension tolerance: +.0000"; -.0005" up to 1.5" diameter inclusive. Larger diameters: +.000; -.001".

Notes

K





L

Section Contents

Features / How To Order 306

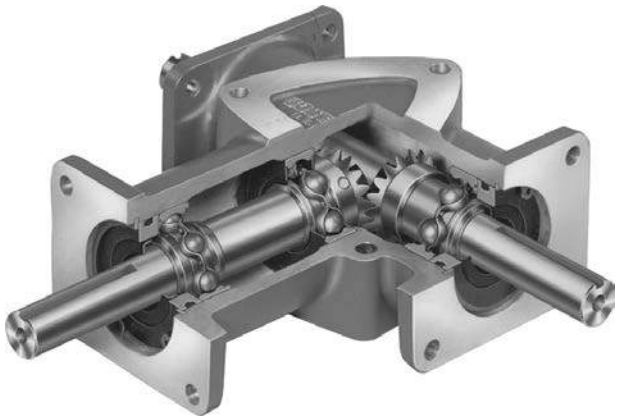
Selection Procedure 306-307

Dimensions 307

Parts List 308

Spiral Bevel Gear

1:1 and 2:1 Ratios



Boston Right-90 Bevel Gear Drives are available with single or double output shaft projections in three sizes with Horsepowers ranging from .13 to 3.5.

Features

- Spiral Bevel Gear Drives are designed for high efficiency, quiet operation and long service life. Gears are made of hardened alloy steel
- Precision ground alloy steel shafts are mounted on precision ball bearings
- Housings are made of aluminum alloy, with all mounting surfaces precision machined
- All shaft projections have high quality oil seals
- **Prelubricated for life**

L

Selection Procedure

Catalog ratings are based on Class I service (uniform—no shock— load, operating no more than 10 hours/day). For applications meeting these conditions selection may be made by comparing the actual load to be transmitted with the appropriate catalog rating. For other conditions selection must be made, based on an equivalent horsepower or torque, obtained by multiplying actual load by the proper service factor.

Selection Procedure:

1. Determine the correct service factor using Applications Classification Chart—Pages 348 & 349. If the application is not listed, obtain service factor from Service Factor Chart, Page 349.
2. Multiply the actual output horsepower or torque by the service factor to obtain the equivalent rating required.
3. Establish input and output speed and/or gear ratio required for the enclosed drive.
4. Selection of all bevel gear drives should be based on Steps 1 through 3 using Selection Chart for desired input and output speeds (including speed increasing drives) that satisfy the required equivalent horsepower or torque.

Reference

Lubrication—Prelubricated for Ambient
Temperature Range of 50° to 125°F.

How to Order

These units may be mounted in any position. When mounting by Flanges only, at least two Flanges must be secured.

TO ORDER: Specify Catalog Number and/or Item Code

EXAMPLE: RA1021 (49420)

Order By Catalog Number or Item Code

2-Way SHAFT		3-Way SHAFT		
Catalog Number	Item Code	Catalog Number	Item Code	Ratios
RA621	49416	RA631	49418	1:1
RA622	49417	RA632	49419	2:1
RA1021	49420	RA1031	49422	1:1
RA1022	49421	RA1032	49423	2:1
RA1521	49424	RA1531	49426	1:1
RA1522	49425	RA1532	49427	2:1

Thrust Load		Overhung Load (No Thrust)
RA6	50 lb max.	25 lb
RA10	100 lb max.	50 lb
RA15	200 lb max.	100 lb

Right-90 Series

BEVEL GEAR - RIGHT ANGLE SELECTION TABLES

(RATINGS FOR SERVICE FACTOR 1.0)

	RATIO	X-SHAFT INPUT RPM	OUTPUT RPM	RA621/631 OUTPUT HP	RA621/631 OUTPUT TORQUE†	RA1021/1031 OUTPUT HP	RA1021/1031 OUTPUT TORQUE†	RA1521/1531 OUTPUT HP	RA1521/1531 OUTPUT TORQUE†
	1:1	1750	1750	.91	31.1	2.19	74.9	3.5	125
		1150	1150	.61	31.8	1.47	76.5	2.5	135
		690	690	.37	32.1	0.9	78.1	1.6	142
		100	100	.06	35.9	0.14	83.8	.28	174
				RA622/632		RA1022/1032		RA1522/1532	
Reducer	2:1	1750	875	.26	17.8	1.07	73.2	1.8	132
		1150	575	.176	18.3	.72	75.0	1.4	150
		690	345	.108	18.7	.44	76.4	.89	162
		100	50	.016	19.2	.07	73.8	.14	175
Increaser*	1:2	1750	3500	.13	2.4	.55	10	1.8	33.0
		1150	2300	.10	2.6	.40	11.2	1.4	37.5
		690	1380	.06	2.8	.25	11.7	.89	40.5
		100	200	.01	3.0	.04	12.5	.14	43.8

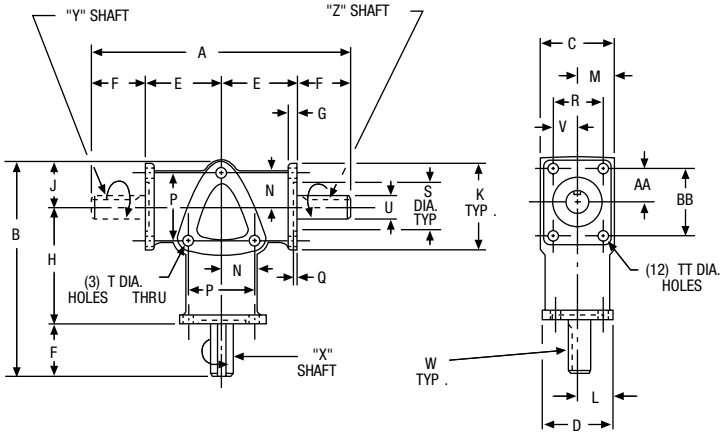
* Applicable ratings when used as a speed increaser, and driven by "Y" or "Z" shaft only.
† Torque (LB-IN.)
Input Horsepower approximately 5% higher than output horsepower shown above.



NOTE: See page 306 for features and how to order information.

L

Dimensions



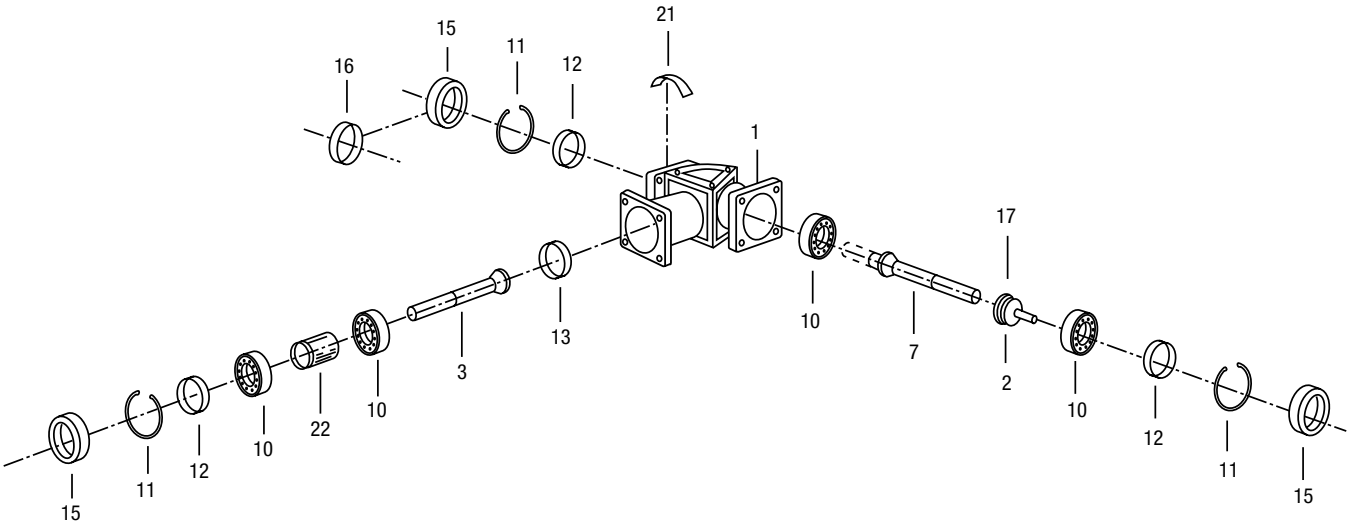
ALL DIMENSIONS IN INCHES **"Y" shaft omitted in 2-way sizes**

Size	A	B	C	D	E	F	G	H	J	K	L	M
RA6	3.95	3.66	1.25	1.22	1.38	.59	.19	2.16	.91	1.56	.61	.63
RA10	7.25	6.03	2.00	1.94	2.13	1.50	.25	3.25	1.28	2.44	.97	1.00
RA15	10.00	8.88	3.00	2.94	3.00	2.00	.31	5.00	1.88	3.75	1.47	1.50

Size	N	P	Q	R	S	T Holes	TT Holes	U +.000 –.001	ALL SHAFTS V	ALL SHAFTS W Keyway		AA	BB	Approx. Weight (Lbs.)
RA6	.66	1.31	.09	.88	.88	.194	.166	.375	.44	Flat		.59	1.19	3/4
RA10	.94	1.88	.09	1.38	1.38	.266	.266	.625	.69	3/16	3/32	.94	1.88	2-3/4
RA15	1.50	3.00	.13	2.25	2.13	.323	.323	.750	1.13	3/16	3/32	1.50	3.00	8

The letters X, Y and Z are used to designate specific shaft projections when ordering units with special shaft requirements.
NOTE: On 2:1 or 1:2 ratio's pinion will always be on X shaft.
No time relation between keyways on X, Y, or Z shafts.

RA600*/RA1000/RA1500 Series

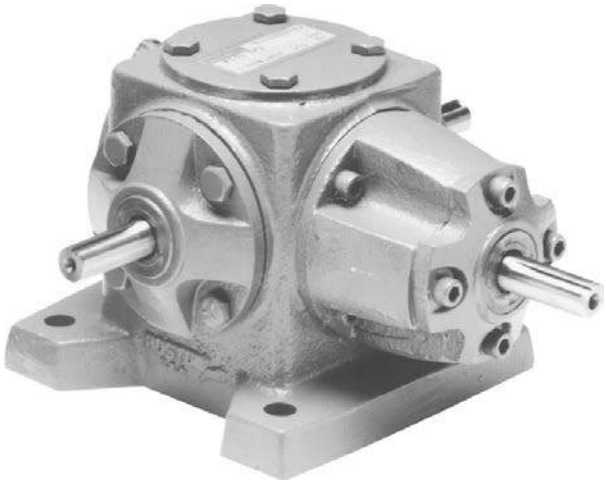


Part No.	Description of Part
1	HOUSING
2	OUTPUT GEAR
3	INPUT GEAR AND SHAFT
7	OUTPUT SHAFT
10	BALL BEARING
11	RETAINING RING
12	ADJUSTMENT SHIM
13	ADJUSTMENT SHIM
15	OIL SEAL
16	BORE PLUG
17	PIN
21	NAMEPLATE
22	SPACER

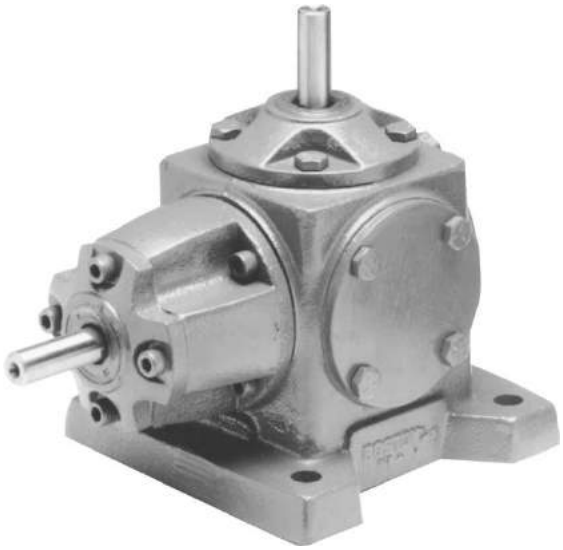
Part Ordering Information

Be sure to provide complete Boston Gear catalog number from speed reducer nameplate, along with part description and number.

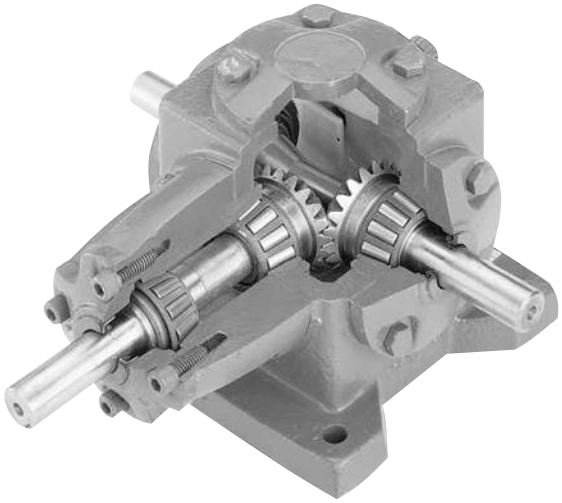
* No replacement parts available.



R100/R200



VR100/VR200



SPIRAL BEVEL GEAR

Boston “R” and “VR” 100 and 200 Series Spiral Bevel Gear Boxes are available in four sizes with horsepowers ranging from 2.19 to 50.92.

Features

- Spiral Bevel Gear Drives are designed for high efficiency, quiet operation and long service life. Gears are made of case-hardened alloy steel
- Shafts are heat treated, alloy steel mounted on heavy duty, tapered roller bearings
- Housings are made of cast iron, precision machined to assure accurate, permanent alignment of the gears

M

Section Contents

Numbering System / How To Order 310

Lubrication/Mounting. 310-311

Selection Charts 312

Dimensions 313

Parts List 314

Selection Procedure

Catalog ratings are based on Class I service (uniform load, operating no more than 10 hours/day). For applications meeting these conditions selection may be made by comparing the actual load to be transmitted with the appropriate catalog rating. For other conditions selection must be made, based on an equivalent horsepower or torque, obtained by multiplying actual load by the proper service factor.

Selection Procedure:

1. Determine the correct service factor using the Applications Classification Chart—Pages 348 & 349. If the application is not listed, obtain service factor from Service Factor Chart, Page 349.
2. Multiply the actual output horsepower or torque by the service factor to obtain the equivalent rating required.
3. Establish input and output speed and/or gear ratio required for the enclosed drive.
4. Selection of all bevel gear drives should be based on Steps 1 through 3 using Selection Chart for desired input and output speeds (including speed increasing drives) that satisfy the required equivalent horsepower or torque.

How to Order

R/VR Series Catalog Number **EXAMPLE:** R137-BM1 (40346)

SBK **VR** **1** **37** **K** **–** **N** **0** **–** **M5**

Reducer Material/ Paint (Cast Iron)
Blank–Standard Paint
BK – White *BostKleen* Paint
SBK– Stainless *Bost-Kleen* Paint

Housing Type
R – Horizontal
VR – Vertical

Ratio
1 – 1:1
2 – 2:1/1:2

Frame Size
31 – Size 31
37 – Size 37
46 – Size 46
58 – Size 58

Lubrication
Blank–No Lubrication
K – Klubersynth UH1 6-460
S – Mobil SHC 634

Assembly Type
A – R
B – R Standard
C – R
D – VR
E – VR
F – VR
G – VR
H – VR
J – VR
N – VR Standard
Q – VR
P – VR
See catalog for details

Rotation
Blank–Standard Rotation
0 – Opposite Relative Rotation
See catalog for details

Mounting Position

Horizontal (R)		Vertical (VR)	
M1	V1	M1	M7
M2	V2	M2	M8
M3		M3	V1
M4		M4	V3
		M5	V4
		M6	

See catalog for details

TO ORDER: Specify Catalog Number and or Item Code, Assembly Type and Mounting Position. (Ref. Page 314 for Item Code, Order Information)

M

Lubrication

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 therefore, 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 Bevel Gear Reducers may reach approximately 225°F.

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

Bevel Gear Reducers

Ambient (Room) Temperature	Recommended Oil (or equivalent)	Viscosity Range S&S @ 100°F	Lubricant AGMA No.	ISO Viscosity Grade No.
–20° to 225°F ‡ (-29°C to 107°C)	Klubersynth* UH1 6-460	1950/2500	-----	460
-30° to 225°F (-34°C to 107°C)	Mobil SHC634	1950/2500	-----	320/460

Model No.		Quantity Per Unit
R131/R231	VR131/VR231	1/2 Pint
R137/R237	VR137/VR237	1/2 Pint
R146/R246	VR146/VR246	1-1/2 Pints
R158/R258	VR158/VR258	2-1/2 Pints

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 Synthetic 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.

R100/R200 Series

Mountings

Mountings are designated by combining identification for Assembly Type and Mounting Position.
Example: Mtg. AM1.

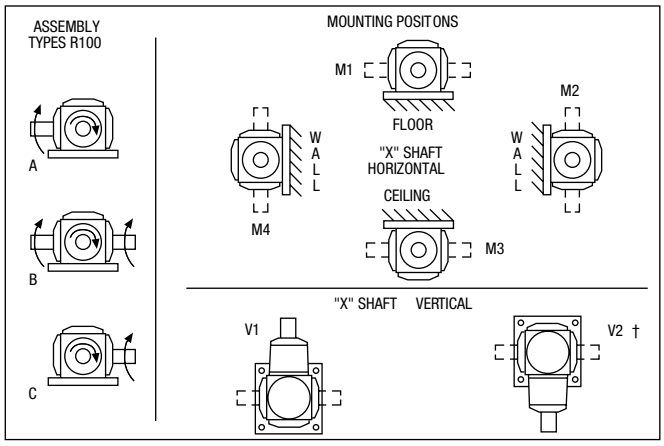
Assembly B is standard for Type R and Assembly N is standard for Type VR and will be furnished unless otherwise specified.

All assemblies can be mounted in any position shown with “X” Shaft horizontal by re-locating Oil Plugs in proper position.

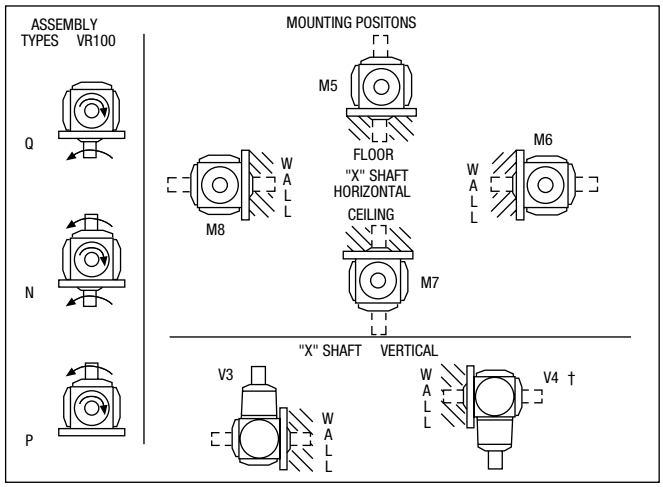
Mountings with “X” Shaft vertical available at a slight extra charge.

Shafts can rotate in either direction, arrows show standard relative rotation. Opposite relative rotation available at no additional charge.

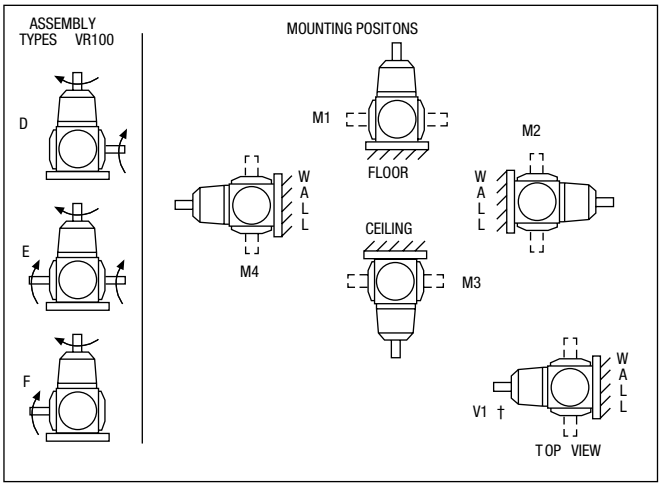
To order with opposite relative rotation, insert letter “O” between Assembly and Mounting code.
Example: AOM1.

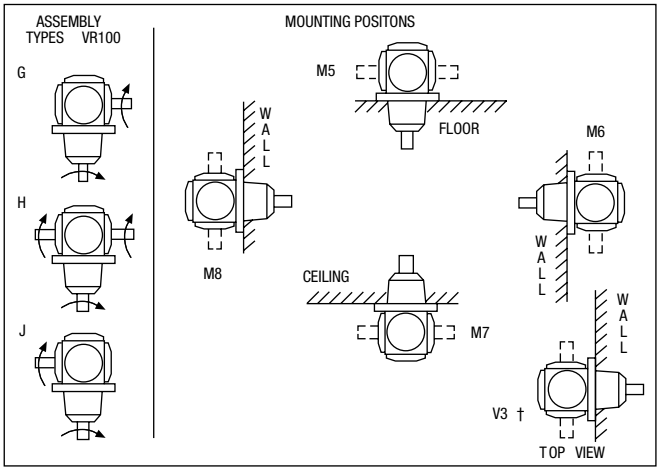


VR100/VR200 Series



Mountings shown below are available on an assembled to order basis.





Filler, level and drain plugs are located on the back side of views shown.

† Special filler, level and drain plugs provided.

R100/R200, VR100/VR200 Series

Selection Charts

	Ratio	Input RPM	Output RPM	R/VR131 Output HP	R/VR131 Output Torque†	R/VR137 Output HP	R/VR137 Output Torque†	R/VR146 Output HP	R/VR146 Output Torque†	R/VR158 Output HP	R/VR158 Output Torque†
	1:1	1750	1750	4.2	151	8.8	318	25.1	905	50.9	1834
		1150	1150	3.1	164	5.8	318	18.5	1012	40.9	2242
		690	690	1.9	174	3.5	318	11.4	1044	25.4	2324
		100	100	.40	252	.60	378	1.8	1145	4.0	2546
				R/VR231		R/VR237		R/VR246		R/VR258	
Reducer	2:1	1750	875	2.2	158	3.7	267	12.2	878	22.6	1620
		1150	575	1.5	161	2.5	272	8.2	900	15.2	1670
		690	345	.90	164	1.5	280	5.1	924	9.4	1717
		100	50	.15	189	.23	290	.77	970	1.5	1870
Increaser*	1:2	1750	3500	2.2	39.5	3.7	67	12.2	220	–	–
		1150	2300	1.5	40.2	2.5	68	8.2	225	15.2	418
		690	1380	.90	41.0	1.5	70	5.1	231	9.4	429
		100	200	.15	47.2	.23	72	.77	242	1.5	468

* **NOTE:** On 2:1 or 1:2 ratios, pinion will always be on X shaft.
† Torque (LB-INS)
I/P H.P. approx. 5% higher.

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Suggested Maximum Input Speeds**	
R & VR131, R & VR231	4000 RPM
R & VR137, R & VR237, R & VR246	3600 RPM
R & VR146, R & VR158, R & VR258	2500 RPM

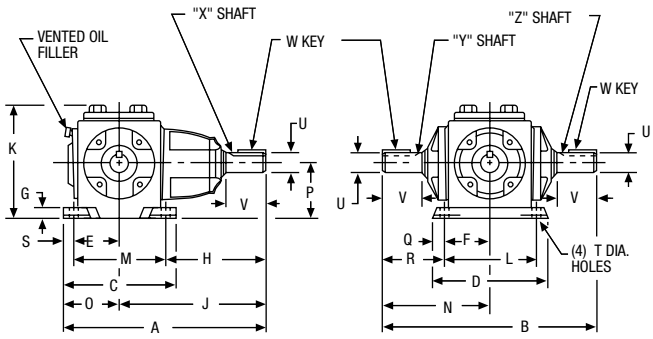
** Sound level, operating temperature and venting are usually affected at high operating speeds.

ORDER BY CATALOG NUMBER OR ITEM CODE

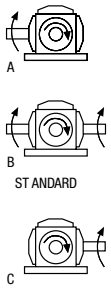
Horizontal Model R100/200					Vertical Model VR100/200				
		Item Code					Item Code		
		Assembly Type					Assembly Type		
Series	Ratio	AM1	BM1	CM1	Series	Ratio	QM5	NM5	PM5
R131 R231	1:1 2:1	40328 42860	40332 42864	40336 42868	VR131 VR231	1:1 2:1	42220 42928	42212 42920	42216 42924
R137 R237	1:1 2:1	40342 42874	40346 42878	40350 42882	VR137 VR237	1:1 2:1	42238 42946	42230 42938	42234 42942
R146 R246	1:1 2:1	40356 42888	40360 42892	40364 42896	VR146 VR246	1:1 2:1	42256 42964	42248 42956	42252 42960
R158 R258	1:1 2:1	40370 42902	40374 42906	40378 42910	VR158 VR258	1:1 2:1	42274 42982	42266 42974	42270 42978

R100/R200, VR100/VR200 Series

Dimensions – Horizontal Base Models



ASSEMBLY TYPES



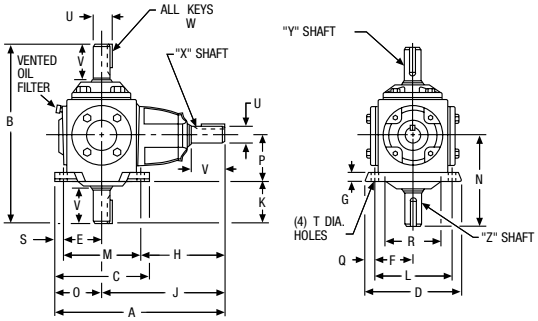
For mounting positions see page 311.

ALL DIMENSIONS IN INCHES

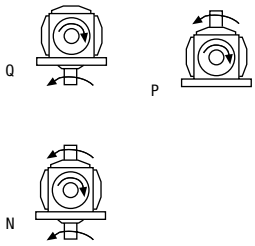
Model No.	A	B	C	D	E	F	G	H	J	K	L	M
R131/231	8.16	7.81	5.31	5.25	2.03	2.03	.63	3.47	5.50	4.78	4.06	4.06
R137/237	10.16	9.28	6.19	6.13	2.44	2.44	.63	4.63	7.06	5.72	4.88	4.88
R146/246	12.50	11.66	7.50	7.38	3.00	3.00	.75	5.75	8.75	6.75	6.00	6.00
R158/258	16.47	16.84	9.25	9.00	3.75	3.75	.88	8.09	11.84	8.56	7.50	7.50

Model No.	N	O	P	Q	R	S	T Holes	U +.000 -.001	V	W-Key Sq.	W-Key Lgth.	Approx. Weight (Lbs.)
R131/231	3.91	2.66	2.63	.59	1.88	.63	.44	.500	1.31	1/8	7/8	14
R137/237	4.64	3.09	3.00	.63	2.20	.66	.44	.750	1.69	3/16	1	27
R146/246	5.83	3.75	3.50	.69	2.83	.75	.53	1.000	1.94	1/4	1-1/4	51
R158/258	8.42	4.63	4.50	.75	4.67	.88	.56	1.500	3.44	3/8	2-1/4	104

Dimensions – Vertical Base Models



ASSEMBLY TYPES



For mounting positions see page 311.

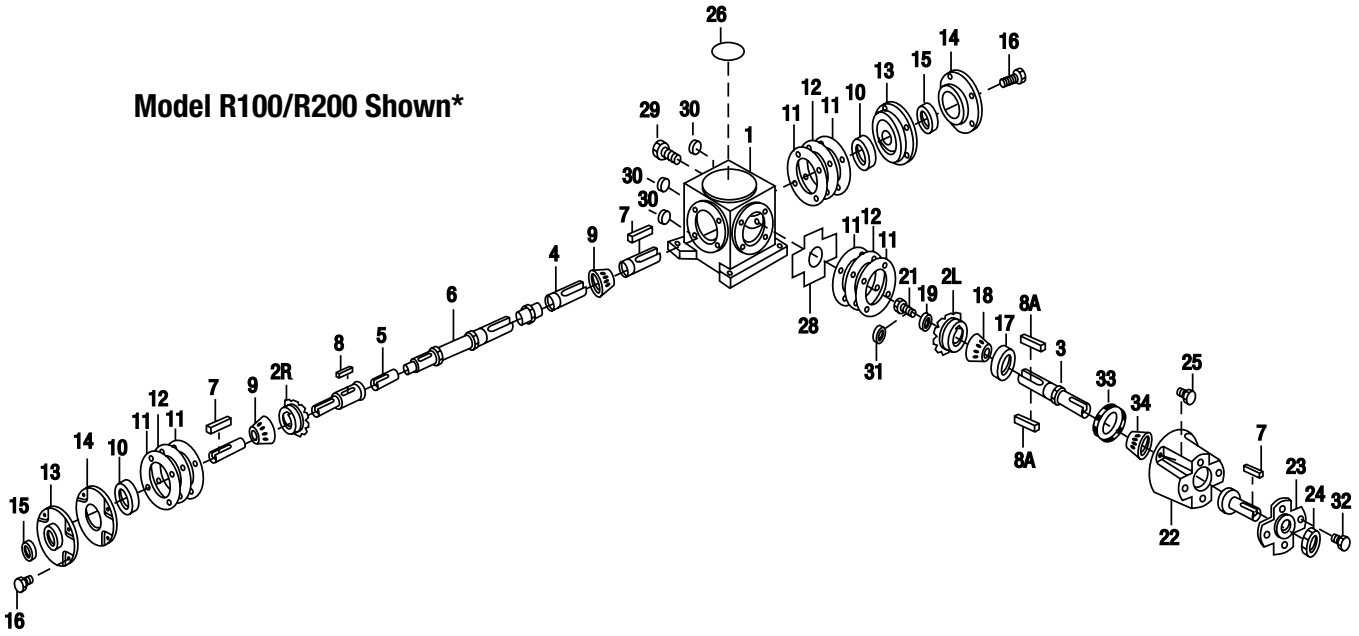
ALL DIMENSIONS IN INCHES

Model No.	A	B	C	D	E	F	G	H	J	K	L	M
VR131/231	8.16	7.81	5.31	5.25	2.03	2.03	.63	3.47	5.50	1.28	4.06	4.06
VR137/237	10.16	9.28	6.19	6.13	2.44	2.44	.63	4.63	7.06	1.64	4.88	4.88
VR146/246	12.50	11.66	7.50	7.38	3.00	3.00	.75	5.75	8.75	2.33	6.00	6.00
VR158/258	16.47	16.84	9.25	9.00	3.75	3.75	.88	8.09	11.84	3.92	7.50	7.50

Model No.	N	O	P	Q	R	S	T Holes	U +.000 -.001	V	W-Key Sq.	W-Key Lgth.	Approx. Weight (Lbs.)
VR131/231	3.91	2.66	2.63	.59	–	.63	.44	.500	1.31	1/8	7/8	14
VR137/237	4.64	3.09	3.00	.63	–	.66	.44	.750	1.69	3/16	1	27
VR146/246	5.83	3.75	3.50	.69	3.75	.75	.53	1.000	1.94	1/4	1-1/4	51
VR158/258	8.42	4.63	4.50	.75	4.50	.88	.56	1.500	3.44	3/8	2-1/4	104

The letters X, Y and Z are used to designate specific shaft projections when ordering units with special shaft requirements.

M



M

Part Ordering Information

Be sure to provide complete Boston Gear catalog number from speed reducer nameplate, along with part description and number.

* **Note:** Models R100/R200 parts common to VR100/VR200.

Item No.	Description of Part	Item No.	Description of Part	Item No.	Description of Part
1	Basic Housing	10	Bearing Cup, Output	23	Input Bearing Retainer
1A	Basic Housing - VR Series	11	Shim	24	Oil Seal, Input
2R	Spiral Miter or Bevel Gear (RH)	12	Shim	25	Soc. Head Capscrew
2L	Spiral Miter Gear or Bevel Pinion (LH)	13	Output Bearing Carrier (O/E)	26	Small Nameplate
3	Input Shaft	14	Output Bearing Carrier (C/E)	28	Baffle
4	Output Shaft-Double Proj	15	Oil Seal, Output	29	Vented Oil Filler
5	Output Shaft-Single Proj	16	Hex Head Capscrews	30	Socket Pipe Plug
6	Output Shaft-Single Proj	17	Bearing Cup, Input	31	Locknut-R & VR 231
7	Key	18	Bearing Cone, Input	32	Socket Head Capscrew
8	Key, Gear	19	Input Shaft Washer	33	Bearing Cup, Input
8A	Key, Gear or Pinion	21	Input Shaft Hex Hd Capscrew	34	Bearing Cone, Input
9	Bearing Cone, Output	22	Input Shaft Bearing Carrier		

Selection Procedure



MODEL NUMBERS AND RATIOS
Assembly types shown with
Dimensions on the following pages.

Model No.	Overhung Load (No Thrust)	
	From End of Shaft (Inches)	Load (Pounds)
R1200	–	–
R1210	1	500
R1400	1-1/4	900
R1500	1-1/2	1300

Catalog ratings are based on Class I service (uniform load, operating no more than 10 hours/day). For applications meeting these conditions selection may be made by comparing the actual load to be transmitted with the appropriate catalog rating. For other conditions selection must be made, based on an equivalent horsepower or torque, obtained by multiplying actual load by the proper service factor.

Selection Procedure:

1. Determine the correct service factor using the Applications Classification Chart—Pages 348 & 349. If the application is not listed, obtain service factor from Service Factor Chart on page 349.
2. Multiply the actual output torque or HP by the service factor to obtain the equivalent rating required.
3. Establish input and output speed and/or gear ratio required for the enclosed drive.
4. Selection of all bevel gear drives should be based on Steps 1 through 3 using Selection Chart for desired input and output speeds (including speed increasing drives) that satisfy the required equivalent horsepower or torque.

TO ORDER: Specify Model Number, Ratio and Assembly Type

EXAMPLE: R1211-1.5-A, Item Code (61037)

N

Section Contents

Selection Procedure / How To Order 315

R1000 Series - Item Codes 316

Mountings / Lubricants 317

Selection Charts 318-320

Dimensions 321-327

R1000 Series Bevel Gear Drives **Item Codes**

Series	Ratio	Assembly Type								
		A	B	D	F	H	I	J	K	L
R1200	1		54998	54999	06111					
	1.35		06112	06113	06114					
	1.5		06115	54995	06116					
	2		54996	54997	06117					
	3		06118	06119	06120					
R1211	1	61035								
	1.35	61036								
	1.5	61037								
R1214	1		61038	61042	61046					
	1.35		61039	61043	61047					
	1.5		61040	61044	61048					
	2		61041	61045	61049					
R1215	1		61083	61086	61089			61092		
	1.35		61084	61087	61090			61093		
	1.5		61085	61088	61091			61094		
R1216	1					61105	61108		61111	61115
	1.35					61106	61109		61113	61116
	1.5					61107	61110		61114	61117
R1412	1		61127	61130	61133					
	1.35		61128	61131	61134					
	1.5		61129	61132	61135					
R1413	1		61357	61361	61365					
	1.35		61358	61362	61366					
	1.5		61359	61363	61367					
	2		61360	61364	61368					
R1414	1		61082	61103	61155			61228		
	1.35		61172	61214	61226					
	1.5		61229	61236	61240			61260		
	2		61261	61263	61268			61273		
R1416	1					61369			61372	61375
	1.35					61370			61373	61376
	1.5					61371			61374	61377
R1511	1	61378								
	1.35	61379								
	1.5	61380								
R1514	1		61381	61385	61392					
	1.35		61382	61386	61393					
	1.5		61383	61387	61394					
	2		61384	61388	61395					
R1515	1		61713	61716	61719			61728		
	1.35		61714	61717	61720			61729		
	1.5		61715	61718	61727			61730		
R1516	1					61025			61028	61031
	1.35					61026			61029	61032
	1.5					61027			61030	61033

Item code listed for most commonly requested assembly models. Others may be available on request.
Assembly C, E, or G can be easily converted from assembly B, D or F respectively. See Page 317.

N

Mountings

Standard mounting is with all shafts horizontal to the floor. R1200 series units are provided with two pipe plugs and are non-vented. This allows the R1200 series to be mounted in any position without the need of moving plugs. Models R1211, R1216, R1416, and R1516 have (2) pipe plugs, oil vent-filler and oil drain, and should only be mounted in the horizontal position. All other models have (3) pipe plugs, oil vent-filler, level, drain, and are horizontal mount also. They may also be mounted with "X" shaft vertical down but are limited to oil vent-filler and oil level control – no oil drain plugs. Drives used in a vertical mounting application may require additional pipe plugs and/or grease fittings for proper lubrication and are considered special.

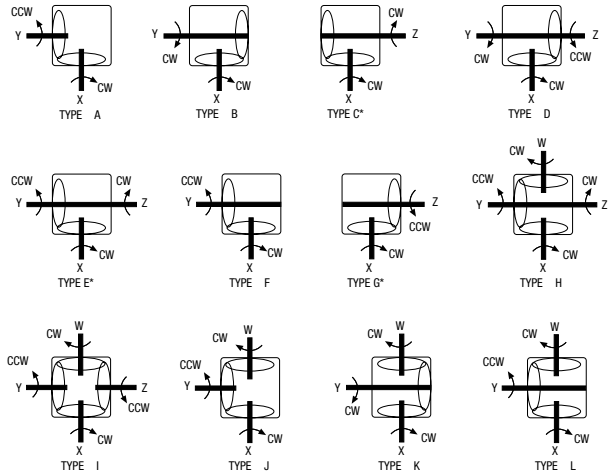
The R1000 Series right angle drives with forged gear teeth may have a somewhat higher noise level at the higher speed range and also more backlash as compared with our "R" and "VR" 100 and 200 Series right angle spiral gear drives.

On models where types "B", "D" & "F" are stocked, these can be easily converted, by the customer to types "C," "E" & "G" respectively by simply rotating the unit 180° to its opposite mounting surface and also switching the pipe plugs for vent and drain on all series except R1200. The R1200 unit is sealed and does not have a vented plug.

1– CLOCKWISE (CW) AND COUNTERCLOCKWISE (CCW) NOTATIONS INDICATE DIRECTION OF ROTATION OF SHAFTS WHEN FACING OUTER END OF SHAFT EXTENSIONS.

2– ARROWS SHOWN ON DRAWINGS ARE OVER THE TOP OF SHAFT EXTENSIONS.

3– THE LETTERS W, X, Y, Z SHOWN ADJACENT TO THE SHAFT EXTENSIONS ARE USED TO DESIGNATE SPECIFIC SHAFT EXTENSIONS WHEN ORDERING BOXES WITH SPECIAL SHAFTS.



* **Note:** Top and bottom of housings are both machined surfaces. By interchanging vent plug and drain plug you can convert B to C, D to E, F to G. On R1200 series, the plugs do not require changing.

Lubrication

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 Bevel Gear Reducers may reach approximately 225°F.

Bevel Gear Reducers

Ambient (Room) Temperature	Recommended Oil (or equivalent)	Viscosity Range S&S @ 100°F	Oil Type	ISO Viscosity Grade No.
–20° to 225°F ‡ (-29°C to 107°C)	Klubersynth* UH1 6-460	1950/2500	PAG	460
-30° to 225°F (-34°C to 107°C)	Mobil SHC634	1950/2500	PAO	320/460

Recommended Lubricant	Boston Gear Item Code
	Quart
Klubersynth UH1 6-460	65159
Mobil 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 synthetic 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.

** Model R1200 unit only is pre-lubricated with 5 oz of AGMA 5 EP Gear Lubricant.

N

R1200 Series

Selection Chart – Ratings For Service Factor (1.0)

				R1200**		R1211 R1215 R1216		R1214	
				Output		Output		Output	
	Ratio	Input RPM	Output RPM	HP	Torque*	HP	Torque*	HP	Torque*
	1:1	1750 1150 690 100	1750 1150 690 100	4.58 3.58 2.67 .79	165 196 241 500	31.15 22.71 15.20 3.09	1122 1245 1390 1945	28.33 20.65 14.08 2.81	1021 1132 1268 1769
Reducer	1.35:1	1750 1150 690 100	1296 852 511 74	3.44 2.70 2.02 .62	124 148 185 390	14.46 10.48 7.11 1.45	703 776 864 1230	13.14 9.53 6.46 1.31	639 706 785 1118
Reducer	1.5:1	1750 1150 690 100	1167 767 460 67	3.14 2.49 1.75 .35	113 136 158 222	13.17 9.54 6.46 1.26	712 785 873 1196	11.98 8.67 5.87 1.15	647 713 793 1087
Reducer	2:1	1750 1150 690 100	875 575 345 50	2.33 1.81 1.22 .24	84 99 109 152			7.80 6.36 4.88 .85	563 697 879 1070
Reducer	3:1	1750 1150 690 100	583 383 230 33	1.25 .87 .60 .52	45 48 54 74				
Increaser	1:1.35	1750 1150 690 100	2362 1552 932 135			14.46 10.48 7.11 1.45	366 404 457 663	13.14 9.53 6.46 1.31	333 364 415 580
Increaser	1:1.5	1750 1150 690 100	2625 1750 1032 150			13.17 9.54 6.46 1.26	300 326 375 503	11.98 8.67 5.87 1.15	273 297 340 459
Increaser	1:2	1750 1150 690 100	3500 2300 1380 200					7.80 6.36 4.88 .85	133 165 212 254

Note: On other than 1:1 ratios pinion will always be on X shaft.
* Torque (lb-ins)
** R1200 is prelubricated with 5 oz. of AGMA 5 EP Gear lubricant.
Input Horsepower approximately 5% higher than output horsepower shown above.

N

R1400 Series

Selection Chart – Ratings For Service Factor (1.0)

	Ratio	Input RPM	Output RPM	R1412 R1416 Output HP	R1412 R1416 Output Torque*	R1413 R1414 Output HP	R1413 R1414 Output Torque*
	1:1	1750 1150 690 100	1750 1150 690 100	— 52.26 35.82 6.53	— 2864 3225 4115	— 37.36 27.13 5.94	— 2022 2442 3741
Reducer	1.35:1	1750 1150 690 100	1296 850 511 74	38.39 27.97 19.06 3.59	1867 2070 2317 3051	34.91 25.43 17.34 3.26	1698 1882 2107 2775
Reducer	1.5:1	1750 1150 690 100	1167 767 460 67	35.56 25.74 16.77 2.90	1922 2117 2265 2745	32.34 23.41 15.25 2.64	1747 1925 2060 2496
Reducer	2:1	1750 1150 690 100	875 575 345 50			18.98 14.55 10.58 1.81	1367 1596 1905 2279
Increaser	1:1.35	1750 1150 690 100	2362 1552 932 135	— 27.97 19.06 3.59	— 1079 1224 1592	— 25.43 17.34 3.26	— 981 1114 1446
Increaser	1:1.5	1750 1150 690 100	2625 1750 1032 150	— 25.74 16.77 2.90	— 880 973 1158	— 23.40 15.25 2.64	— 800 885 1053
Increaser	1:2	1750 1150 690 100	3500 2300 1380 200			— 14.55 10.58 1.81	— 379 459 542

* Output Torque (lb-ins)

Input Horsepower approximately 5% higher than output horsepower shown above.

N

R1500 Series

Selection Chart – Ratings For Service Factor (1.0)

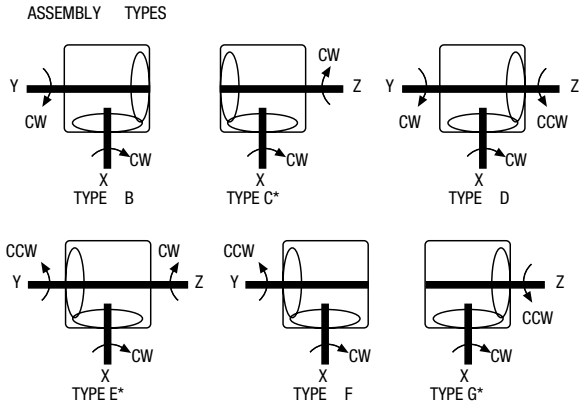
	Ratio	Input RPM	Output RPM	R1511 R1515 R1516 Output HP	R1511 R1515 R1516 Output Torque*	R1514 Output HP	R1514 Output Torque*
	1:1	690 300 100	690 300 100	94.54 46.99 17.60	8511 9872 11092	66.77 39.28 14.71	6011 8251 9270
Reducer	1.35:1	1150 690 300 100	852 511 222 74	79.29 52.10 24.89 9.24	5867 6332 7080 7885	49.60 47.38 22.64 8.41	3679 5759 6421 7153
Reducer	1.5:1	1150 690 300 100	767 460 200 67	58.90 38.62 18.40 6.81	4843 5216 5797 6438	23.20 15.90 8.16 3.33	1907 2147 2570 3145
Reducer	2:1	1750 1150 690 300 100	875 575 345 150 50			26.71 19.45 13.26 6.76 2.57	1925 2134 2388 2838 3242
Increaser	1:1.35	690 300 100	932 222 135	52.10 24.89 9.24	3342 6713 4098	47.38 22.64 8.41	3044 6106 3730
Increaser	1:1.5	690 300 100	1032 450 150	38.62 18.40 6.81	2241 2448 2718	15.90 8.16 3.33	922 1086 1329
Increaser	1:2	1150 690 300 100	2300 1380 600 200			19.45 13.26 6.76 2.57	506 575 674 769

* Torque (lb-ins)

Input Horsepower approximately 5% higher than output horsepower shown above.

N

R1200 Series
Dimensions

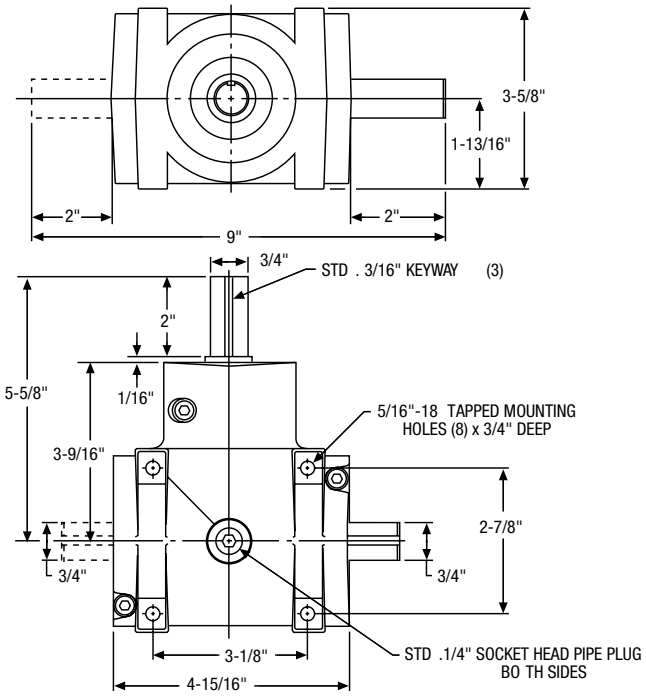


* Types “C,” “E” and “G” can be accomplished by rotating types “B,” “D” and “F” respectively 180°. No change in plugs are required.

Approx. Wt. – 7 Lbs

Note: On other than 1:1 ratio, pinion (small gear) will always be on X shaft.

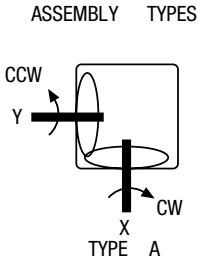
CW and CCW notations indicate direction of shaft rotation when facing outer end of shaft extensions. The letters W, X, Y, Z are used to designate specific shaft extensions when ordering boxes with special shafts.

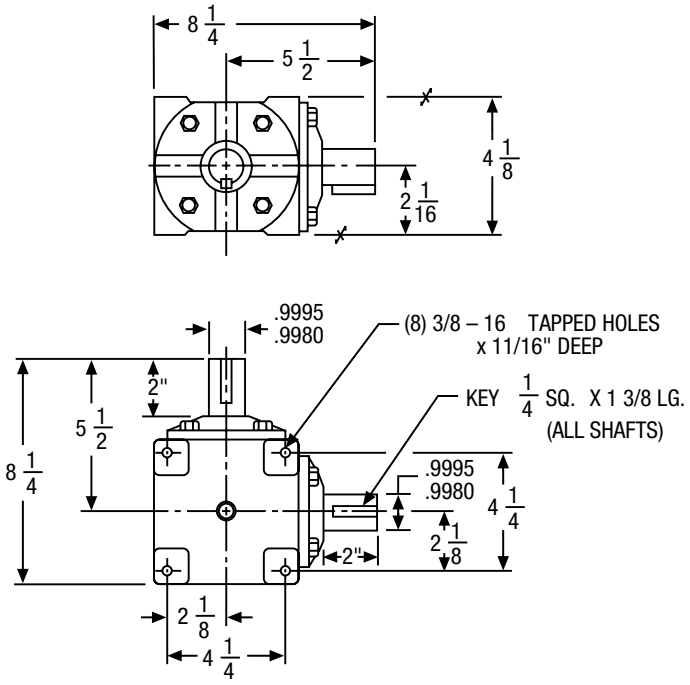


N

R1211 Series

Dimensions





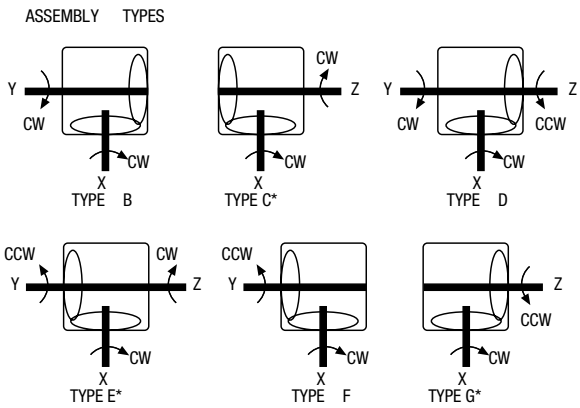
Oil Capacity – 16 ozs.

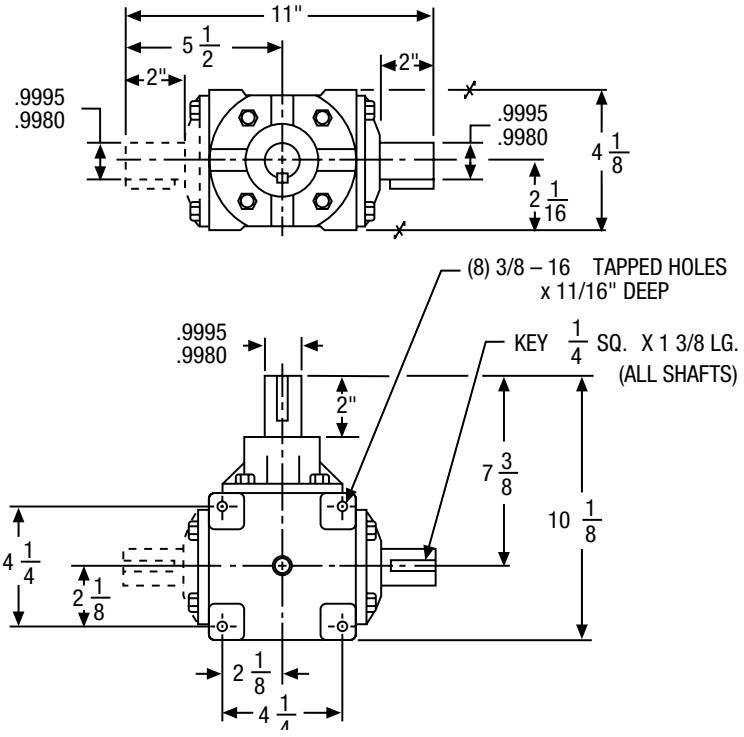
Approx. Wt. – 22 Lbs.

Note: On other than 1:1 ratio, pinion (small gear) will always be on X shaft.

R1214 Series

Dimensions





R1214 (2:1 RATIO ONLY is spiral bevel.)

Oil Capacity – 16 ozs.

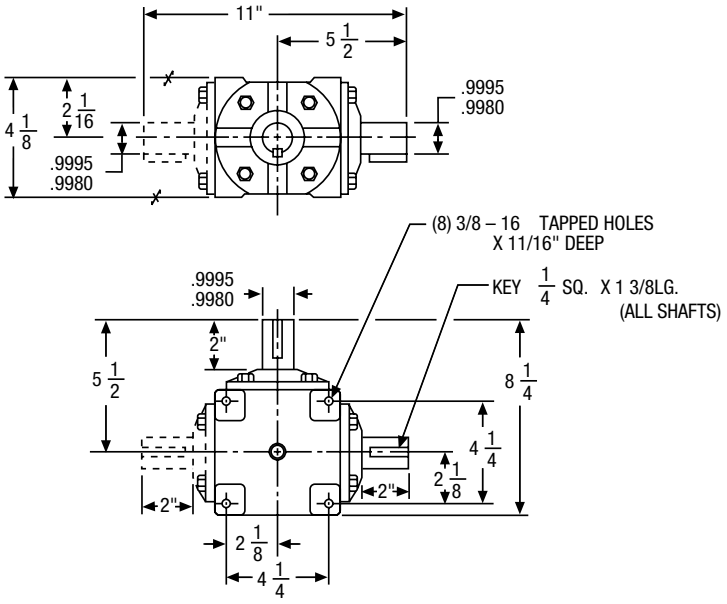
Approx. Wt. – 25 Lbs.

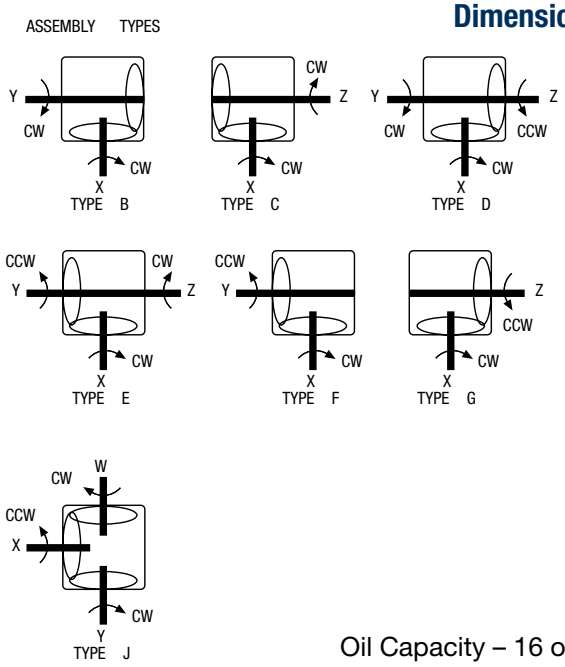
Note: On other than 1:1 ratio, pinion (small gear) will always be on X shaft.

CW and CCW notations indicate direction of shaft rotation when facing outer end of shaft extensions.
The letters W, X, Y, Z are used to designate specific shaft extensions when ordering boxes with special shafts.

R1215 Series

Dimensions





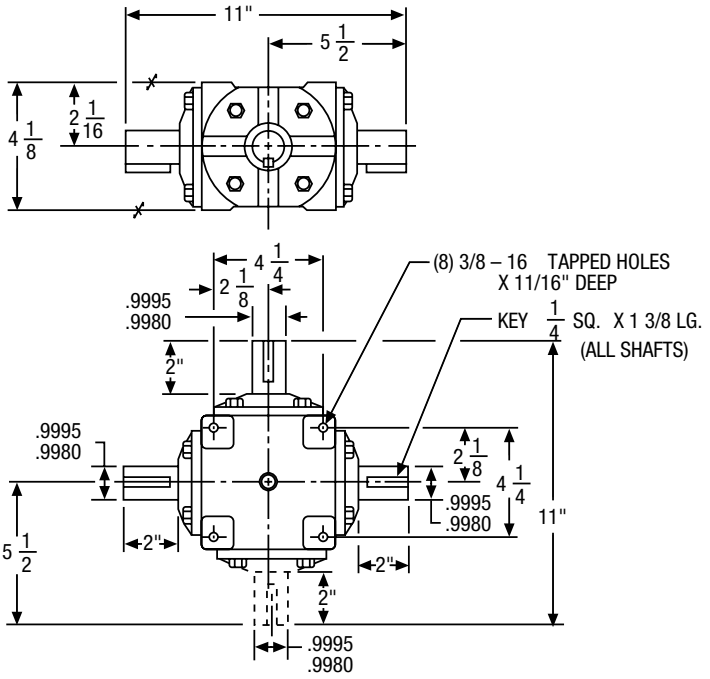
Oil Capacity – 16 ozs.

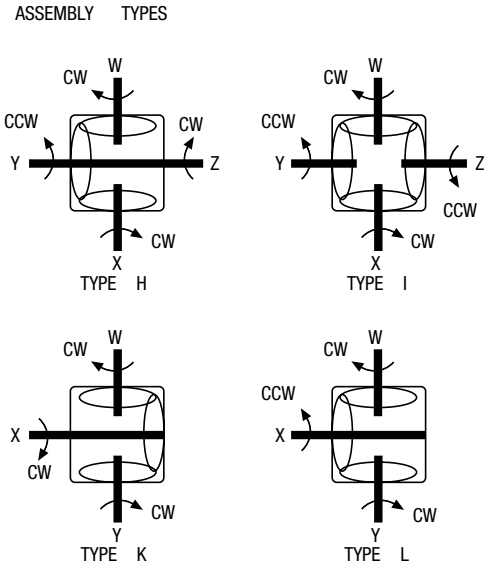
Approx. Wt. – 27 Lbs.

Note: On other than 1:1 ratio, pinion (small gear) will always be on X shaft.

R1216 Series

Dimensions





Oil Capacity – 16 ozs.

Approx. Wt. – 28 Lbs.

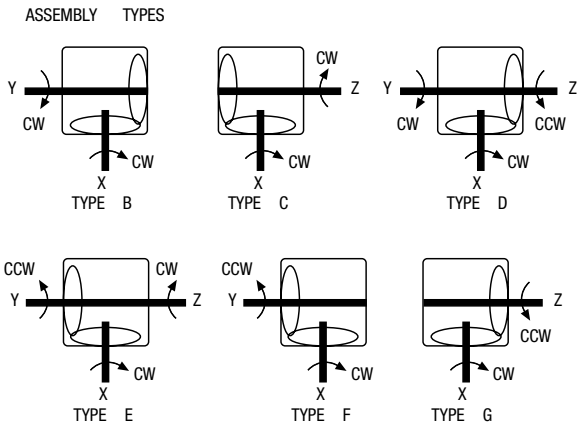
Note: On other than 1:1 ratio, pinion (small gear) will always be on Y/Z shaft.

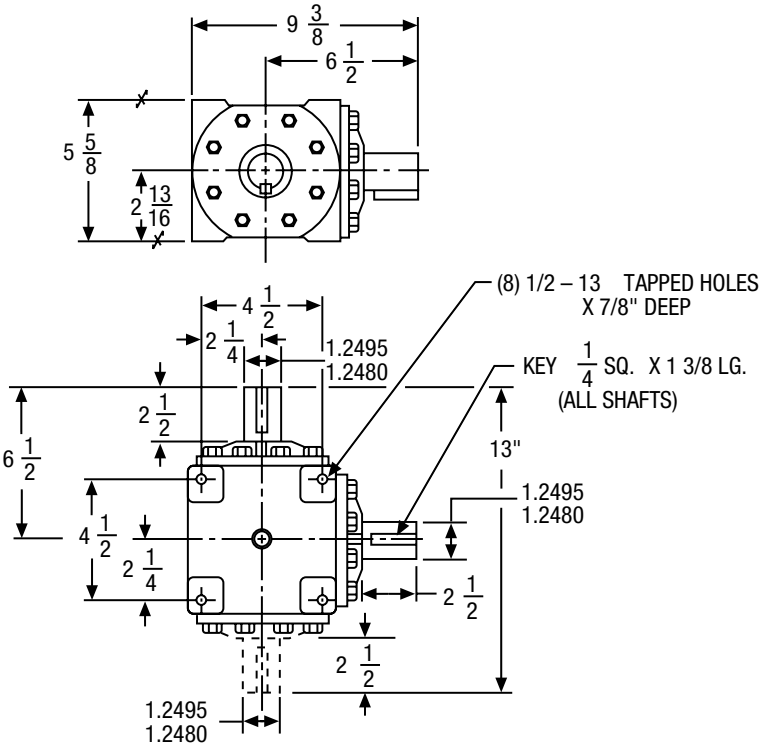
CW and CCW notations indicate direction of shaft rotation when facing outer end of shaft extensions.
The letters W, X, Y, Z are used to designate specific shaft extensions when ordering boxes with special shafts.

N

R1412 Series

Dimensions





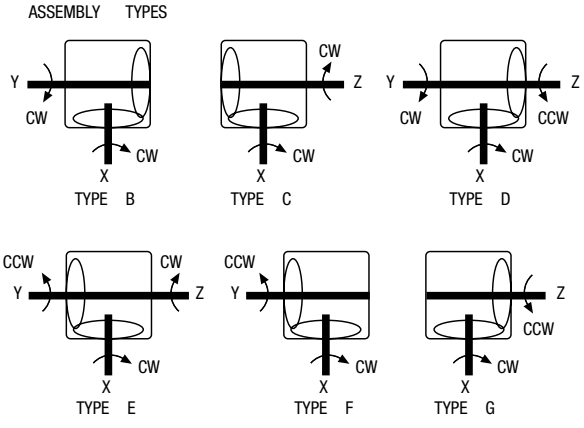
Oil Capacity – 24 ozs.

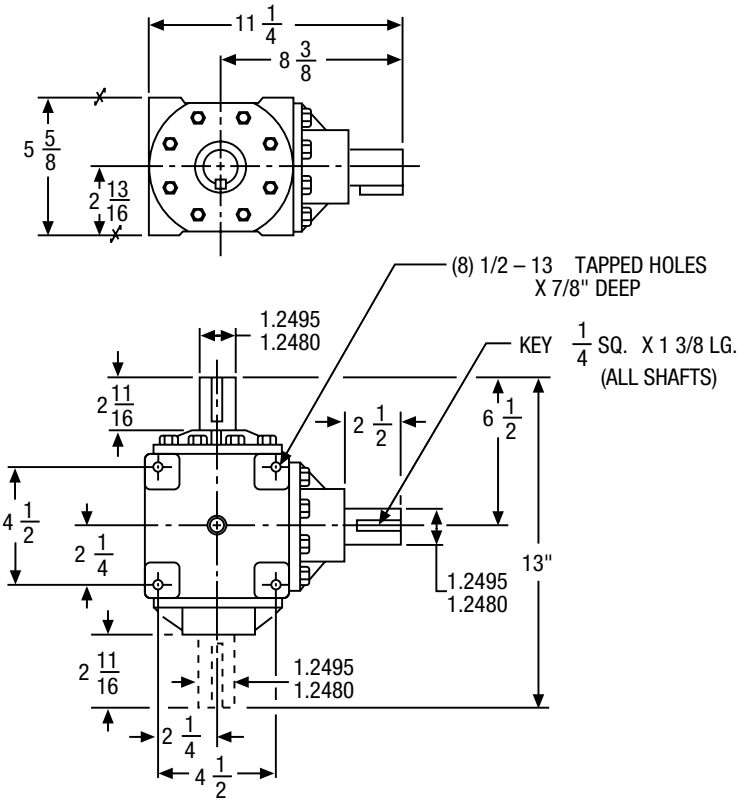
Approx. Wt. – 39 Lbs.

Note: On other than 1:1 ratio, pinion (small gear) will always be on X shaft.

R1413 Series

Dimensions





Oil Capacity – 32 ozs.

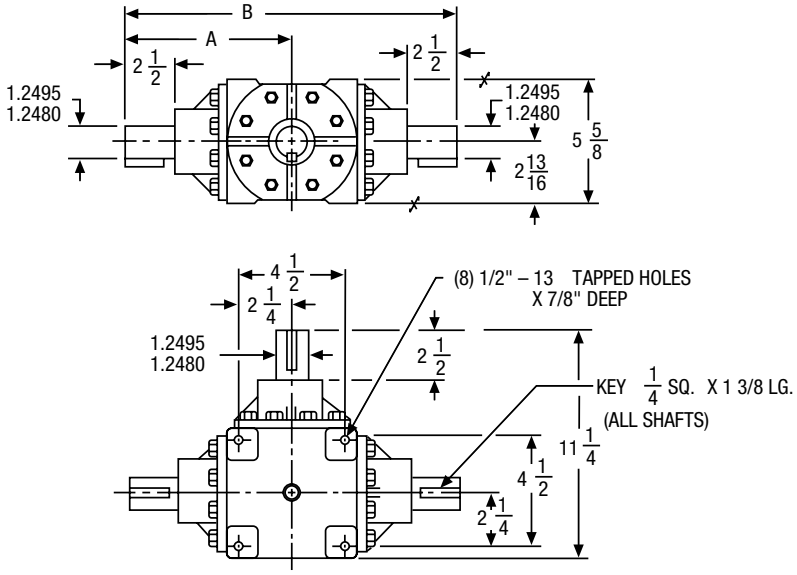
Approx. Wt. – 39 Lbs.

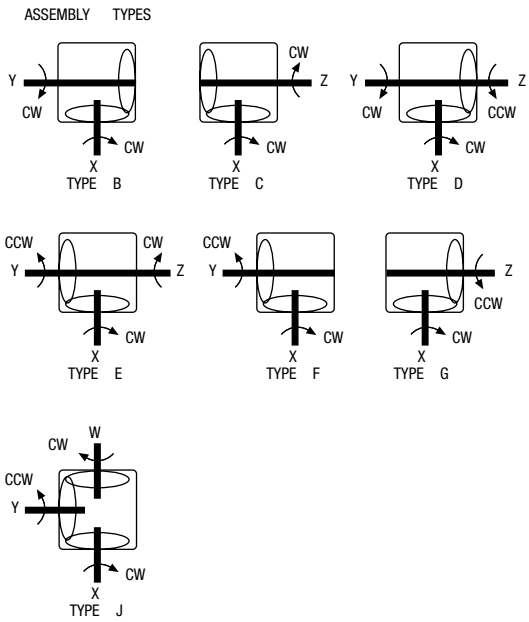
Note: On other than 1:1 ratio, pinion (small gear) will always be on X shaft.

CW and CCW notations indicate direction of shaft rotation when facing outer end of shaft extensions.
The letters W, X, Y, Z are used to designate specific shaft extensions when ordering boxes with special shafts.

R1414 Series

Dimensions





Note: Type J illustrated.

A	B	MTG. TYPE
8 3/8	16 3/4	J
6 1/2	13	All Others

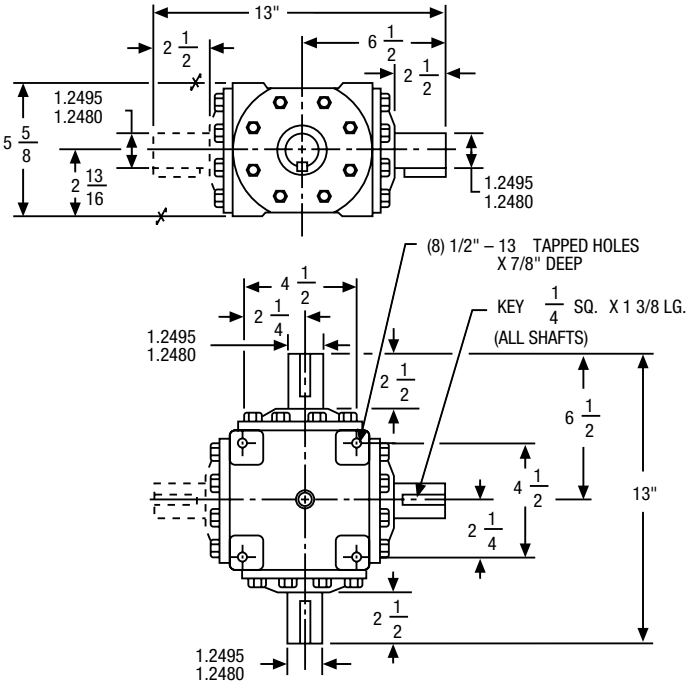
Oil Capacity – 32 ozs.

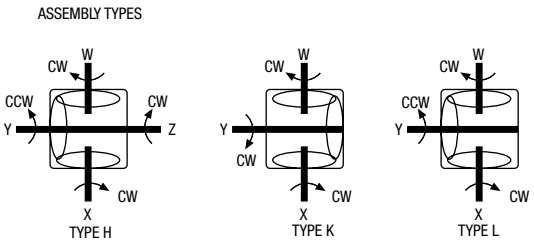
Approx. Wt. – 50 Lbs.

Note: On other than 1:1 ratio, pinion (small gear) will always be on X shaft.

R1416 Series

Dimensions





Oil Capacity – 24 ozs.

Approx. Wt. – 50 Lbs.

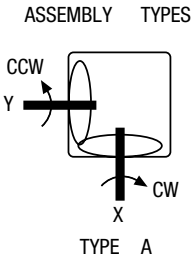
Note: On other than 1:1 ratio, pinion (small gear) will always be on X shaft.

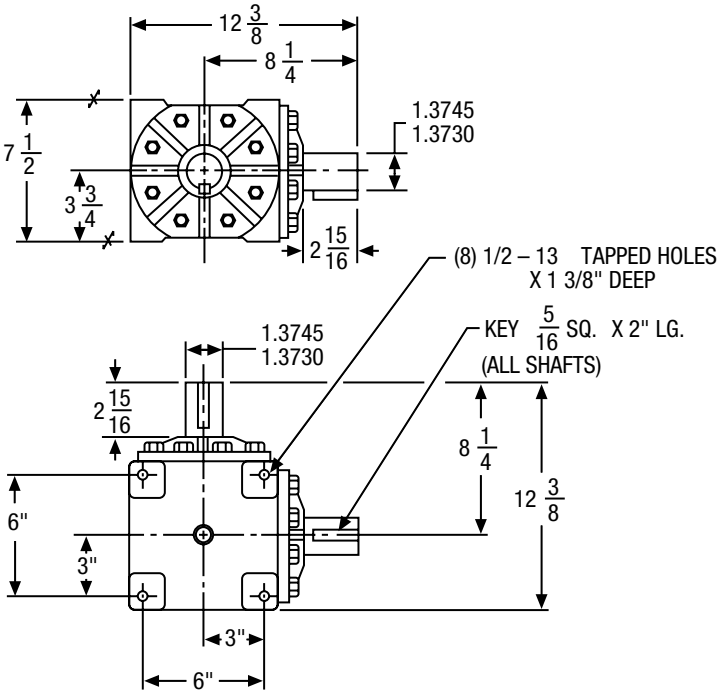
CW and CCW notations indicate direction of shaft rotation when facing outer end of shaft extensions. The letters W, X, Y, Z are used to designate specific shaft extensions when ordering boxes with special shafts.

N

R1511 Series

Dimensions





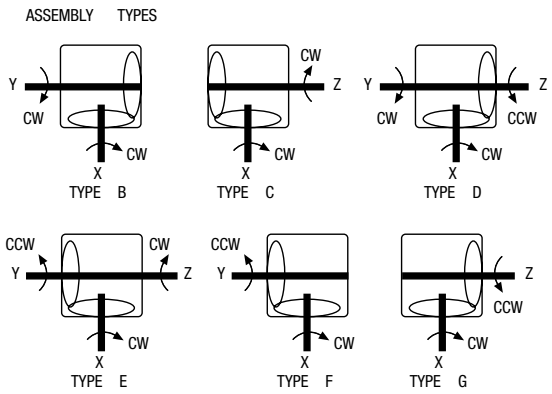
Oil Capacity – 64 ozs.

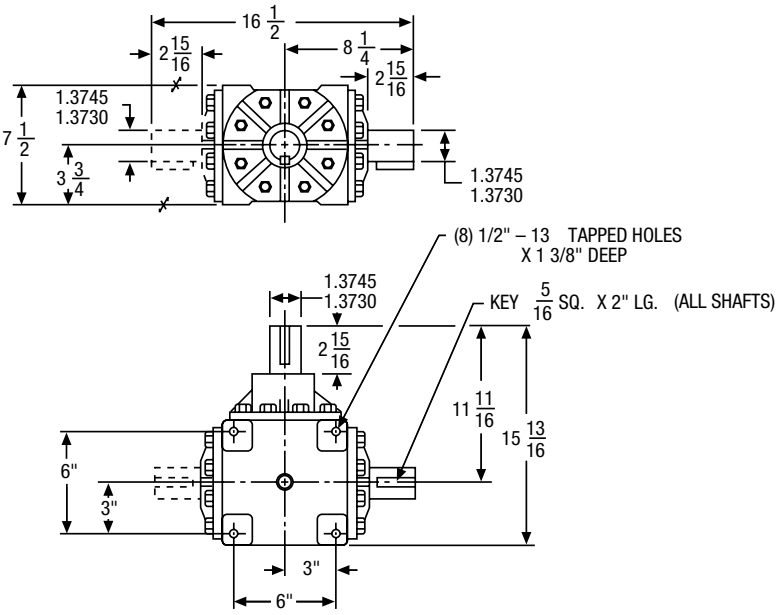
Approx. Wt. – 73 Lbs.

Note: On other than 1:1 ratio, pinion (small gear) will always be on X shaft.

R1514 Series

Dimensions





Oil Capacity – 88 ozs.

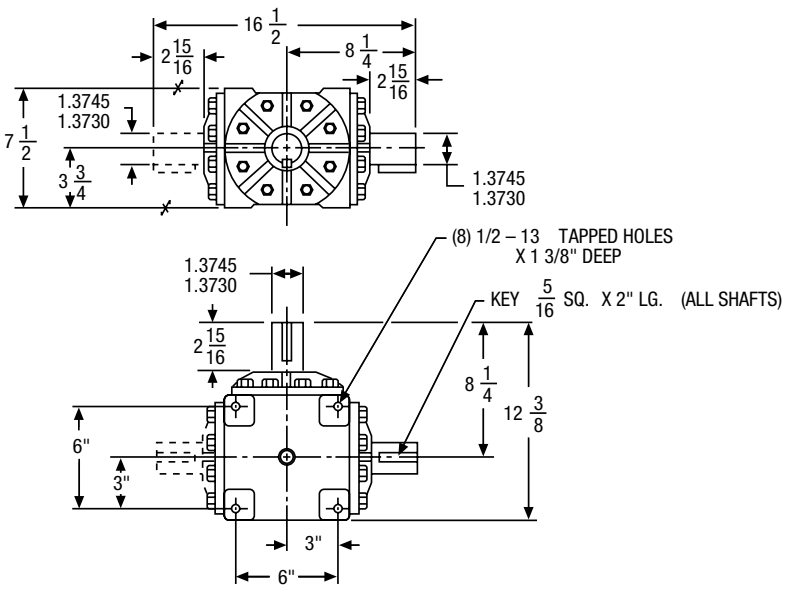
Approx. Wt. – 78 Lbs.

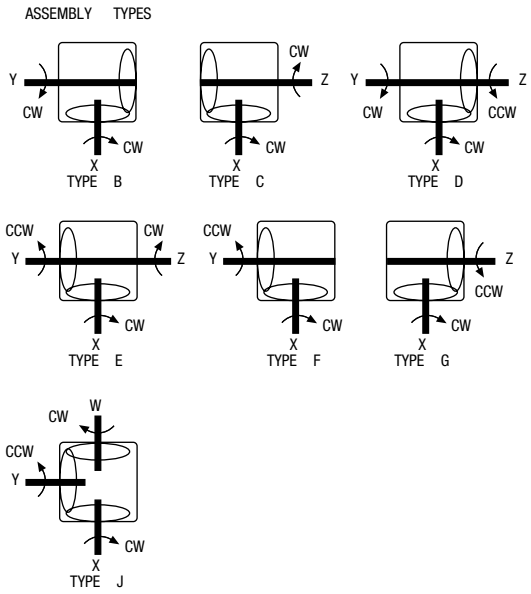
Note: On other than 1:1 ratio, pinion (small gear) will always be on X shaft.

CW and CCW notations indicate direction of shaft rotation when facing outer end of shaft extensions.
The letters W, X, Y, Z are used to designate specific shaft extensions when ordering boxes with special shafts.

R1515 Series

Dimensions





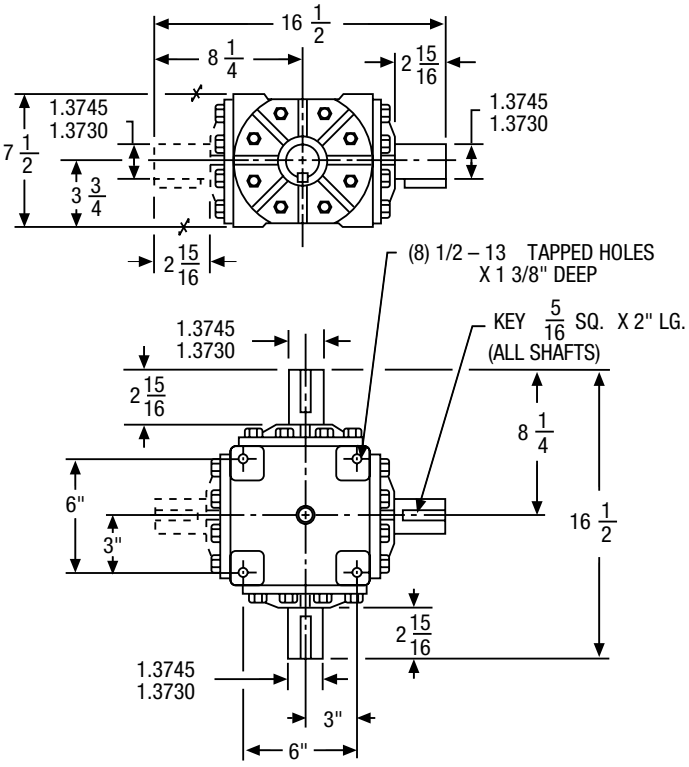
Oil Capacity – 72 ozs.

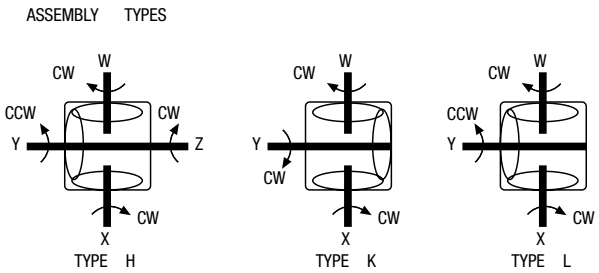
Approx. Wt. – "J" type – 85 Lbs. – All others – 72 Lbs.

Note: On other than 1:1 ratio, pinion (small gear) will always be on X shaft.

R1516 Series

Dimensions





Oil Capacity – 72 ozs.

Approx. Wt. – 87 Lbs.

Note: On other than 1:1 ratio, pinion (small gear) will always be on X shaft.

CW and CCW notations indicate direction of shaft rotation when facing outer end of shaft extensions. The letters W, X, Y, Z are used to designate specific shaft extensions when ordering boxes with special shafts.

N

Notes



N

An economical alternative to a multi-reduction Reducer

THE MOTOR MULTIPLIER®

Multiplies your gear reducer ratio 5 times
Multiplies your savings with efficient planetary gearing



Planetary Ratio Multiplier



With Optional Base Kit



With 200 Series Helical Reducer



With 700 Series Worm Gear Speed Reducer

Features

- Multiplies Motor torque
- Rugged aluminum housing
- 5/8” and 7/8” shaft sizes (output)
- 3/4 maximum input horsepower (NEMA 56c face mounted motors)
- Efficient 5 to 1 ratio
- Easy to install
- Lubricated for LIfe

Applications

- Provides additional ratios for inventory flexibility
- Use with existing Gearbox To Create Double Reduction Ratios or Alone as a 5 to 1 reducer
- Compatible with most worm or helical gear flanged reducers, NEMA 56c design

Section Contents

Features / Applications 329

Catalog Number / Ordering Information 330

Dimensions 330

Torque Selection / Ratings 331-332

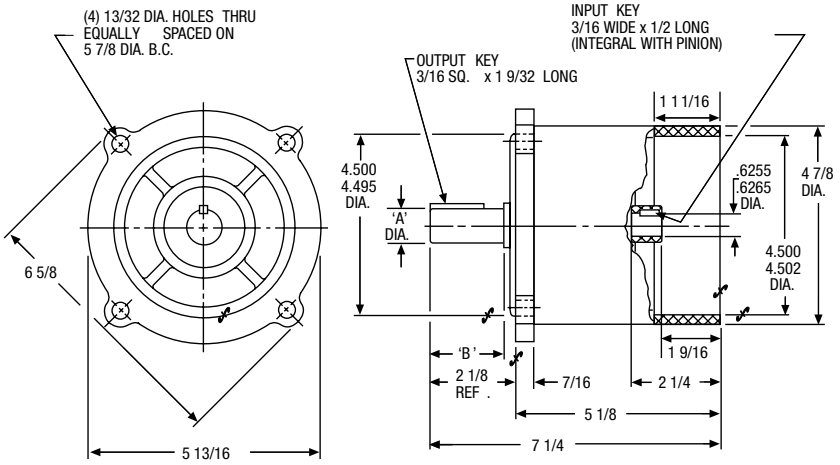
O

Planetary Ratio Multiplier

Order by catalog number

Output RPM	Ratio	Motor HP (1750 RPM Input)	OUTPUT		Multiplier Catalog Number
			HP	Torque (LB. INS)	
350	5	1/6	.14	25	FSP-5 OR FSP-5A
		1/4	.21	38	
		1/3	.29	53	
		1/2	.45	81	
		3/4	.69	124	

Dimensions

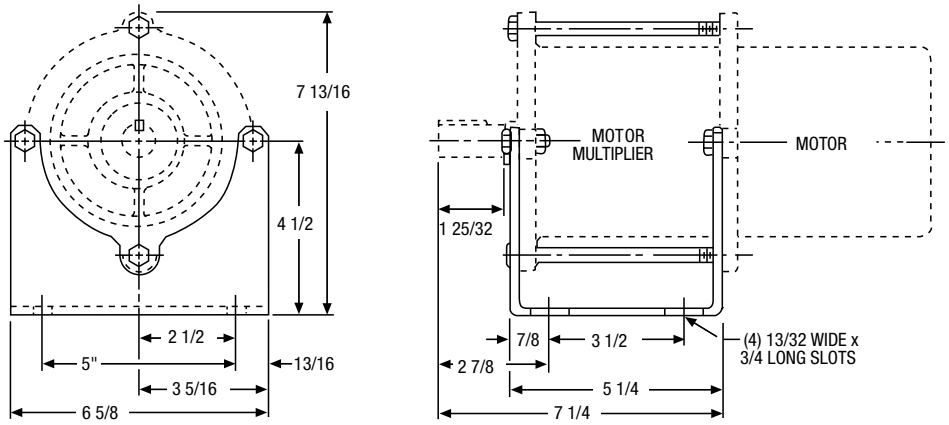


ALL DIMENSIONS IN INCHES

Item Code	Catalog Number	A Shaft Dia.	B Shaft Length
60634	FSP-5A	.6245	1-15/16
		.6240	
60632	FSP-5	.8745	2
		.8740	

Motor Multiplier Base Kit

Catalog Number - 47849



Output shaft may rotate in either direction. Rotation will be the same as the rotation of the motor shaft.

Torque Selection and Ratings for Motor Multiplier and Single Reduction Worm Gear Flanged Reducer Combinations

Output RPM	Total Ratio	Motor HP 1750 RPM	Flanged Reducer Output Rating						Motor Multiplier Catalog Number	Basic Flanged Reducer Size and Ratio
			S.F. 1.0		S. F. 1.25		S. F. 1.75			
			HP	Torque (LB. INS.)	HP	Torque (LB. INS.)	HP	Torque (LB. INS.)		
70	25	1/6	.09	78	.09	78	.09	78	FSP-5A	F713-5-B5
		1/4	.16	140	.16	140	.12	106	FSP-5A	F713-5-B5
		1/3	.23	207	.16	142	.12	106	FSP-5A	F713-5-B5
		1/3	.23	207	.23	204	.17	153	FSP-5A	F715-5-B5
		1/2	.34	306	.23	204	.17	153	FSP-5	F715-5-B7
		1/2	.34	306	.23	204	.17	153	FSP-5A	F715-5-B5
		1/2	.38	342	.29	257	.21	193	FSP-5	F718-5-B7
		1/2	.38	342	.38	342	.31	276	FSP-5	F721-5-B7
		3/4	.43	386	.29	257	.21	193	FSP-5	F718-5-B7
		3/4	.61	552	.41	368	.31	276	FSP-5	F721-5-B7
35	50	1/6	.08	152	.08	15	.07	133	FSP-5A	F713-10-B5
		1/4	.15	266	.10	177	.07	133	FSP-5A	F713-10-B5
		1/4	.15	266	.14	255	.11	192	FSP-5A	F715-10-B5
		1/3	.21	373	.14	255	.11	192	FSP-5A	F715-10-B5
		1/3	.22	396	.20	365	.15	274	FSP-5	F718-10-B7
		1/2	.30	548	.20	365	.15	274	FSP-5	F718-10-B7
		1/2	.37	662	.32	581	.24	436	FSP-5	F721-10-B7
		3/4	.48	872	.32	581	.24	436	FSP-5	F721-10-B7
		3/4	.59	1058	.39	705	.29	529	FSP-5	F724-10-B7
		3/4	.59	1058	.39	705	.29	529	FSP-5	F726-10-B7
23.3	75	1/6	.08	217	.07	183	.05	137	FSP-5A	F713-15-B5
		1/6	.08	217	.08	217	.07	198	FSP-5A	F715-15-B5
		1/4	.10	274	.07	183	.05	137	FSP-5A	F713-15-B5
		1/4	.15	395	.10	263	.07	198	FSP-5A	F715-15-B5
		1/4	.15	395	.14	376	.10	282	FSP-5A	F718-15-B5
		1/3	.21	564	.14	376	.10	282	FSP-5A	F718-15-B5
		1/3	.21	572	.22	599	.17	450	FSP-5A	F721-15-B5
		1/2	.33	898	.22	599	.17	450	FSP-5A	F721-15-B5
		1/2	.34	927	.33	889	.25	667	FSP-5	F724-15-B7
		3/4	.49	1334	.33	889	.25	667	FSP-5	F724-15-B7
		3/4	.57	1542	.38	1028	.29	771	FSP-5	F726-15-B7
17.5	100	1/6	.08	283	.06	207	.04	156	FSP-5A	F713-20-B5
		1/6	.08	283	.08	283	.06	227	FSP-5A	F715-20-B5
		1/4	.13	454	.08	303	.06	227	FSP-5A	F715-20-B5
		1/4	.14	493	.12	426	.09	320	FSP-5A	F718-20-B5
		1/3	.18	639	.12	426	.09	320	FSP-5A	F718-20-B5
		1/3	.21	748	.17	628	.13	471	FSP-5A	F721-20-B5
		1/2	.34	1238	.25	896	.19	672	FSP-5	F724-20-B7
		1/2	.34	1238	.33	1191	.25	893	FSP-5	F726-20-B7
		3/4	.56	1786	.33	1191	.25	893	FSP-5	F726-20-B7
		3/4	.59	1893	.37	1262	.28	945	FSP-5	F730-20-B7
		3/4	.56	2000	.37	1333	.28	1000	FSP-5	F732-20-B7

Planetary Ratio Multiplier

Torque Selection and Ratings for Motor Multiplier and Single Reduction Worm Gear Flanged Reducer Combinations

Output RPM	Total Ratio	Motor HP 1750 RPM	Flanged Reducer Output Rating						Motor Multiplier Catalog Number	Basic Flanged Reducer Size and Ratio
			S.F. 1.0		S. F. 1.25		S. F. 1.75			
			HP	Torque (LB. INS.)	HP	Torque (LB. INS.)	HP	Torque (LB. INS.)		
11.7	150	1/6	.06	320	.039	213	.029	160	FSP-5A	F713-30-B5
		1/6	.07	398	.06	312	.043	234	FSP-5A	F715-30-B5
		1/4	.12	660	.08	440	.06	330	FSP-5A	F718-30-B5
		1/4	.13	714	.12	628	.09	471	FSP-5A	F721-30-B5
		1/3	.18	972	.12	648	.09	486	FSP-5A	F721-30-B5
		1/3	.20	1056	.17	924	.13	693	FSP-5A	F724-30-B5
		1/2	.32	1733	.23	1227	.17	920	FSP-5	F726-30-B7
		3/4	.52	2281	.28	1520	.21	1140	FSP-5	F730-30-B7
		3/4	.52	2830	.35	1887	.26	1415	FSP-5	F732-30-B7
8.8	200	1/6	.06	454	.042	303	.031	227	FSP-5A	F715-40-B5
		1/6	.07	500	.06	426	.044	319	FSP-5A	F718-40-B5
		1/4	.12	893	.09	628	.07	471	FSP-5A	F721-40-B5
		1/4	.12	893	.12	893	.09	672	FSP-5A	F724-40-B5
		1/3	.18	1320	.12	896	.09	672	FSP-5A	F724-40-B5
		1/3	.18	1320	.17	1191	.12	893	FSP-5A	F726-40-B5
		1/2	.25	1786	.17	1191	.12	893	FSP-5	F726-40-B7
		1/2	.25	1786	.17	1191	.12	893	FSP-5A	F726-40-B5
		1/2	.28	1984	.18	1322	.14	992	FSP-5A	F730-40-B5
		1/2	.30	2183	.26	1887	.20	1415	FSP-5	F732-40-B7
		3/4	.37	2667	.25	1778	.19	1332	FSP-5	F730-40-B7
		3/4	.49	3543	.26	1887	.20	1415	FSP-5	F732-40-B7
7	250	1/6	.06	556	.041	371	.031	278	FSP-5A	F718-50-B5
		1/6	.07	590	.06	584	.05	438	FSP-5A	F721-50-B5
		1/4	.10	876	.06	584	.05	438	FSP-5A	F721-50-B5
		1/4	.12	1054	.10	865	.07	649	FSP-5A	F724-50-B5
		1/4	.12	848	.12	1054	.09	848	FSP-5A	F726-50-B5
		1/3	.14	1298	.10	865	.07	649	FSP-5A	F724-50-B5
		1/3	.17	1549	.13	1130	.09	848	FSP-5A	F726-50-B5
		1/2	.22	2060	.15	1373	.11	1030	FSP-5A	F730-50-B5
		3/4	.22	2313	.17	1542	.15	1156	FSP-5	F730-50-B7
		1/2	.28	2566	.27	2459	.20	1844	FSP-5	F732-50-B7
		3/4	.41	3688	.27	2459	.20	1844	FSP-5	F732-50-B7
		3/4	.46	4165	.31	2777	.23	2082	FSP-5	F738-50-B7
5.8	300	1/6	.049	534	.032	356	.024	267	FSP-5A	F721-60-B5
		1/6	.06	656	.05	560	.039	420	FSP-5A	F721-60-B5
		1/4	.08	841	.05	560	.039	420	FSP-5A	F721-60-B5
		1/4	.11	1177	.08	831	.06	623	FSP-5A	F724-60-B5
		1/4	.11	1177	.10	1085	.08	814	FSP-5A	F726-60-B5
		1/3	.15	1638	.10	1092	.08	819	FSP-5A	F726-60-B5
		1/2	.20	2248	.14	1500	.10	1125	FSP-5A	F730-60-B5
		1/2	.27	2858	.22	2360	.16	1770	FSP-5	F732-60-B7
		3/4	.43	4646	.29	3097	.22	2323	FSP-5	F738-60-B7



Boston Gear's application engineers are readily available to assist with the initial planning and application analysis and specification of components. Combinations of options, interfacing with equipment external to the drives and proper selection of reducers and other auxiliary components are typical of the possibilities available to satisfy the most complex applications.

NOTE: All performance specifications listed in this catalog are based on steady state operating conditions; i.e. ambient temperature, line voltage, motor frame temperature, etc.

Section Contents

Product Descriptions 333

Numbering System 334

Quick Selection Chart 335-336

AC DripProof & Totally Enclosed Motors 337

DC Totally Enclosed Motors 340

Motor Dimensions . . . . . .338-339 and 341

Bost-Kleen Speed Reducers/Motors 342

NEMA C-Face Motors

Catalog Numbering System

P

AC MOTORS

HP	VOLTAGE	ENCL	SUFFIX	MANUFACTURER
A - 1/20 **AA** - 1/12 **C** - 1/6 **D** - 1/4 **E** - 1/3 **F** - 1/2 **G** - 3/4 **H** - 1 **J** - 1-1/2 **K** - **2** **L** - 3 **M** - 5 **N** - 7-1/2 **P** - 10 **R** - 15 **S** - 20	**R** - 115/230-1-60 **S** - 115-1-60 **T** - 230-1-60 **U** - 230/460-3-60 **Y** - 575-3-60	**T** - TENV **TF** - TEFC	**B** - BRAKE **35** - 3450 RPM **11** - 1150 RPM	**B** - BALDOR **W** - WEG

PM MOTORS

SERIES DESIGNATION	VOLTAGE	HP	ENCL	MANUFACTURER
PM- Permanent Magnet	**9** - 90VDC **18** - 180VDC	**16** - 1/6 **25** - 1/4 **33** - 1/3 **50** - 1/2 **75** - 3/4 **100**- 1 **150**- 1-1/2 **200**- 2 **300**- 3 **500**- 5	**T, A** - TENV **TF, ATF** - TEFC	**B** - BALDOR **BLANK** - Boston Gear

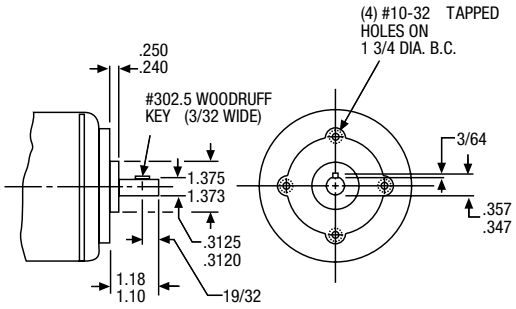
Letters after dash indicate manufacturer:
B = Baldor
W = WEG
Blank = Boston Gear

Catalog Number Example: FUTF-W
1/2 HP, 230/460-3-60, TEFC, Boston Gear

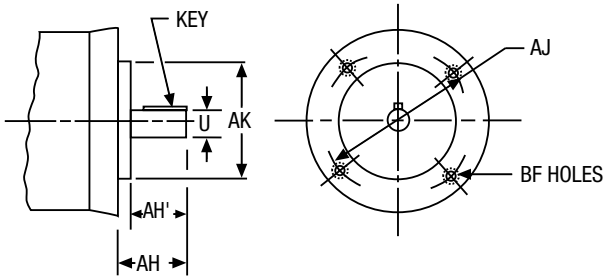
Catalog Number Example: PM916AT-B
Permanent Magnet, 90VDC, 1/6 HP, TENV, Baldor

NEMA Motor Bolt Circle Dimensions

(Special) End Mounted



All Listed NEMA Frames



All DIMENSIONS IN INCHES

Bore Code	NEMA Mounting.	U	AK	MAX. AH	MAX. AH1	KEY SQ.	KEY LG.	AJ	BF
B4	42CZ	.5000 .4995	3.000 2.997	1 5/16	—	1/8	3/4	3 3/4	1/4-20
B5	56C	.6250 .6245	4.500 4.497	2 5/32	—	3/16	1 3/8	5 7/8	3/8-16
B7	182C 184C	.8750 .8745	4.500 4.497	2 5/32	—	3/16	1 3/8	5 7/8	3/8-16
	143TC 145TC								
B9	213C 215C	1.1250 1.1245	8.500 8.497	—	2 25/32	1/4	1 3/4	7 1/4	1/2-13
	182TC 184TC								
B11	254UC 256UC	1.3750 1.3745	8.500 8.497	—	3 17/32	5/16	2 3/8	7 1/4	1/2-13
	213TC 215TC								
B13	254TC 256TC	1 .6250 1.6240	8.500 8.497	—	3 13/16	3/8	2 7/8	7 1/4	1/2-13

Flanged reducers are designed for use with motors having NEMA "C" face and shaft dimensions as shown. AH and AH' must not be exceeded.

@ 1750 RPM Input

HP (Motor)	RPM † (Range)	Torque (Maximum) (LB. IN.)	Flange Reducers**	Motors	
				AC †	DC †
1/6	350-12	27	**F710-5**	**ACUT* CUTF**	**APM916 PM916**
	175-6	53	**F710-10**		
	117-4	77	**F710-15**		
	88-3	98	**F710-20**		
	70-2.5	117	**F713-25**		
	58-2	132	**F713-30**		
		139	**F710-30**		
	44-1.5	128	**F710-40**		
		178	**F713-40**		
	35-1.2	120	**F710-50**		
		210	**F715-50**		
	29-1	223	**F718-60**		
1/4	350-12	41	**F710-5**	**ADUFT* DUFT**	**APM925 PM925**
	175-6	80	**F710-10**		
	117-4	116	**F710-15**		
	88-3	130	**F710-20**		
		148	**F713-20**		
	70-2.5	175	**F713-25**		
	58-2	208	**F713-30**		
	44-1.5	266	**F715-40**		
	35-1.2	315	**F715-50**		
	29-1	335	**F718-60**		
1/3	350-12	55	**F710-5**	**AEUTF* EUTF**	**APM933* PM933**
	175-6	107	**F710-10**		
	117-4	155	**F713-15**		
	88-3	197	**F713-20**		
	70-2.5	234	**F713-25**		
	58-2	277	**F715-30**		
	44-1.5	355	**F715-40**		
	35-1.2	420	**F718-50**		
	29-1	440	**F718-60**		
1/2	350-12	82	**F713-5**	**FUTF**	**PM950**
	175-6	160	**F713-10**		
	117-4	232	**F713-15**		
	88-3	295	**F715-20**		
	70-2.5	350	**F715-25**		
	58-2	416	**F718-30**		
	44-1.5	533	**F721-40**		
	35-1.2	630	**F721-50**		
	29-1	670	**F721-60**		
3/4	350-12	123	**F713-5**	**GUTF**	**PM975**
	175-6	240	**F715-10**		
	117-4	348	**F715-15**		
	88-3	443	**F718-20**		
	70-2.5	526	**F721-25**		

** For Flanged Reducer w/coupling specify RF Model.

† Speed range shown demonstrates a 30 to 1 speed range which is typical when using a single phase DC Controller and Permanent Magnet Motor. Consult your Boston Gear distributor for your particular application.

Adjustable Speed Control Motors **Quick Selection Chart**

HP (Motor)	RPM † (Range)	Torque (Maximum) (LB. IN.)	Flange Reducers**	Motors	
				AC †	DC †
3/4 (CONT.)	58-2	624	**F721-30**	**GUTF**	**PM975**
	44-1.5	800	**F724-40**		
	35-1.2	945	**F724-50**		
	29-1	1004	**F726-60**		
1	350-12	165	**F713-5**	**HUTF**	**PM9100**
	175-6	320	**F718-10**		
	117-4	422	**F718-15**		
	88-3	590	**F721-20**		
	70-2.5	702	**F721-25**		
	58-2	832	**F724-30**		
	44-1.5	1066	**F726-40**		
	35-1.2	1260	**F726-50**		
	29-1	1340	**F730-60**		
1-1/2	350-12	256	**F715-5**	**JUTF**	**PM18150**
	175-6	460	**F718-10**		
	117-4	646	**F721-15**		
	88-3	886	**F724-20**		
	70-2.5	1056	**F724-25**		
	58-2	1247	**F726-30**		
	44-1.5	1598	**F730-40**		
	35-1.2	1890	**F732-50**		
	29-1	2009	**F732-60**		
2	350-12	328	**F718-5**	**KUTF**	**PM18200**
	175-6	640	**F721-10**		
	117-4	929	**F724-15**		
	88-3	1180	**F726-20**		
	70-2.5	1440	**F730-25**		
	58-2	1663	**F732-30**		
	44-1.5	2131	**F732-40**		
	35-1.2	2520	**F732-50F**		
	29-1	2678	**F738-60**		
3	350-12	491	**F724-5**	**LUTF**	**PM18300**
	175-6	960	**F726-10**		
	117-4	1393	**F730-15**		
	88-3	1771	**F730-20**		
	70-2.5	2150	**F732-25F**		
	58-2	2495	**F732-30F**		
	44-1.5	3196	**F738-40**		
	35-1.2	4016	**F738-50F**		
	29-1	4020	**RF752-60**		
5	175-6	1602	**F732-10**	**MUTF**	**PM18500**
	117-4	2230	**F732-15F**		
	88-3	2952	**F738-20**		
	58-2	4180	**RF752-30**		
	44-1.5	5328	**RF752-40**		
	35-1.2	6300	**RF752-50F**		
	29-1	7392	**RF760-60F**		

** For Flanged Reducer w/coupling specify RF Model.

† Speed range shown demonstrates a 30 to 1 speed range which is typical when using a single phase DC Controller and Permanent Magnet Motor. Consult your Boston Gear distributor for your particular application.

@ 1750 RPM Input

ORDER BY CATALOG NUMBER OR ITEM CODE

HP	NEMA Mounting	Bore Code †	Totally Enclosed*						Open Dripproof			
			115/230-1-60		208-230/460-3-60		575-3-60		115/230-1-60		208-230/460-3-60	
			Catalog Number	Item Code	Catalog Number	Item Code	Catalog Number	Item Code	Catalog Number	Item Code	Catalog Number	Item Code
1/20	SP	—	**AST-B****	65403	**—**	—	**—**	—	**—**	—	**—**	—
1/12	SP	—	**AAST-B****	65402	**—**	—	**—**	—	**—**	—	**—**	—
1/6	42CZ	B4	**ACRT-W**	65320	**ACUT-W**	65368	**—**	—	**—**	—	**—**	—
	42CZ	B4	**ACRTF-B**	69725	**ACUT-B**	69728	**—**	—	**—**	—	**—**	—
	56C 56C 56C	B5 B5 B5	**CRTF-W** **CRT-B** **CRTF-B**	65316 85775 85777	**CUTF-W** **CUT-B** **CUTF-B**	65371 85776 85778	**—** **—** **—**	— — —	**—** **CR-B** **—**	— 85773 —	**—** **CU-B** **—**	— 85774 —
1/4	42CZ 42CZ	B4 B4	**ADRT-W** **ADRTF-B**	65325 69726	**ADUT-W** **ADUTF-B**	65374 69729	**—** **—**	— — — —	**—** **—**	— —	**— —**	— —
	56C	B5	**DRTF-W** **DRTF-B** **DSTF-B**** **—**	65326 66199 66202	**DUTF-W** **DUTF-B** **—** **—**	65380 66205 — —	**—** **DYTF-B** **—** **—**	— 66208 — —	**—** **DR-B** **DS-B**** **—**	— 66109 66112 —	**—** **DU-B** **—** **—**	— 66115 — —
1/3	42CZ	B4	**AERT-W** **AERTF-B**	65346 69727	**AEUT-W** **AEUTF-B**	65381 69730	**—** **—**	— —	**—** **—**	— —	**—** **—**	— —
	56C 56C	B5 B5	**ERTF-W** **ERTF-B**	65348 66211	**EUTF-W** **EUTF-B**	65383 66214	**—** **EYTF-B**	— 66217	**—** **ER-B**	— 66121	**—** **EU-B**	— 66124
1/2	56C	B5	**FRTF-W** **FRTF-B**	65350 66219	**FUTF-W** **FUTF-B**	65404 66223	**—** **FYTF-B**	— 66226	**—** **FR-B**	— 66130	**—** **FU-B**	— 66133
3/4	56C	B5	**GRTF-W** **GRTF-B**	65351 66228	**GUTF-W** **GUTF-B**	65405 66231	**—** **GYTF-B**	— 66831	**—** **GR-B**	— 66139	**—** **GU-B**	— 66142
1	56C	B5	**HRTF-5/8-W** **HRTF-5/8-B**	65354 19178	**HUTF-5/8-W** **HUTF-5/8-B**	65406 50428	**—** **HYTF-5/8-B**	— 19179	**—** **HR-5/8-B**	— 19183	**—** **HU-5/8-B**	— 50427
	143TC	B7	**—** **HRTF-B**	— 66234	**HUTF-W** **HUTF-B**	65412 66237	**—** **HYTF-B**	— 66240	**—** **HR-B**	— 66145	**HU-W** **HU-B**	65249 66148
1-1/2	56C	B5	**—** **—**	**—** **—**	**JUTF-5/8-W** **JUTF-5/8-B**	65407 19784	**—** **—**	— —	**—** **—**	— —	**—** **—**	— —
	145TC	B7	**—** **JRTF-B**	66243	**JUTF-W** **JUTF-B**	65437 66246	**—** **JYTF-B**	— 66249	**—** **JR-B**	— 66154	**JU-W** **JU-B**	65251 66157
2	56C	B5	**—** **—**	**—** **—**	**KUTF-5/8-W** **KUTF-5/8-B**	65440 19785	**—** **—**	— —	**—** **—**	— —	**—** **—**	— —
	145TC	B7	**—** **—**	— —	**KUTF-W** **KUTF-B**	65445 66252	**—** **KYTF-B**	— 66255	**—** **—**	— —	**KU-W** **KU-B**	65256 66163
3	182TC	B9	**—** **—**	— —	**LUTF-W** **LUTF-B**	65446 66258	**—** **LYTF-B**	66260	**—** **—**	— —	**LU-W** **LU-B**	65257 66166
5	184TC	B9	**—** **—**	— —	**MUTF-W** **MUTF-B**	65448 66262	**—** **MYTF-B**	— 66264	**—** **—**	— —	**MU-W** **MU-B**	65258 66170
7-1/2	213TC	B11	**—**	—	**NUTF-B**	66266	**—**	—	**—**	—	**—**	—
10	215TC	B11	**—**	—	**PUTF-B**	66270	**—**	—	**—**	—	**—**	—
15	254TC	B13	**—**	—	**RUTF-B**	66274	**—**	—	**—**	—	**—**	—
20	256TC	B13	**—**	—	**SUTF-B**	66278	**—**	—	**—**	—	**—**	—

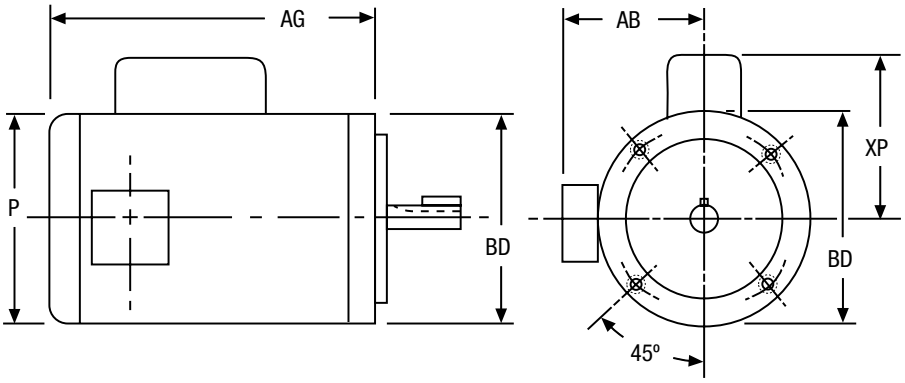
* T = TENV – Totally Enclosed, Non-ventilated.
** 115 Volt only.
TF = TEFC – Totally Enclosed, Fan Cooled.
† See Page 334 for Bore Code explanation.
Letters after dash indicate manufacturer — W = WEG.; B = Baldor

FOR DIMENSIONS OF THESE MOTORS, SEE PAGES 338 AND 339
FOR OTHER AVAILABLE MOTORS, CONSULT FACTORY OR REFER TO
BOSTON GEAR'S COMPLETE ELECTRICAL PRODUCTS CATALOG P-1525-BG.

AC Open Dripproof Motor

Dimensions

P

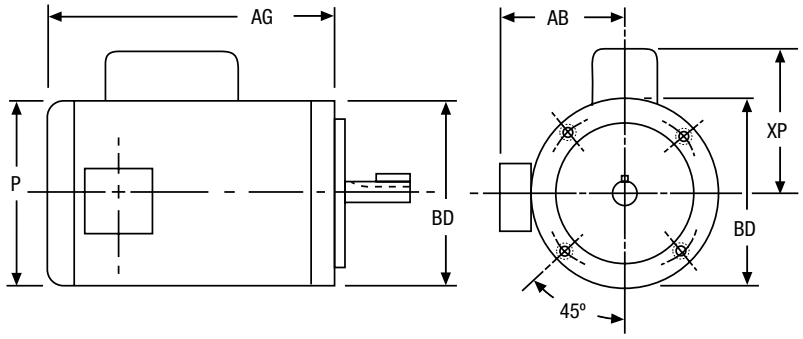


ALL DIMENSIONS IN INCHES

HP	NEMA MTG.	BORE CODE	-B (BALDOR) MOTORS						
			CATALOG NUMBER	ITEM CODE	AB	AG	BD	XP	P
1/20	SPL	SPL	**AST-B**	65403	—	6.56	4.51	—	4.62
1/12	SPL	SPL	**AAST-B**	65402	—	6.56	4.51	—	4.62
1/6	56C	B5	**CR-B**	85773	4.41	8.03	5.87	4.34	5.69
	56C	B5	**CU-B**	85774	4.41	8.03	5.87	—	5.69
1/4	56C	B5	**DR-B**	66109	4.41	8.68	5.87	4.34	5.69
	56C	B5	**DS-B**	66112	4.41	8.68	5.87	4.34	5.69
	56C	B5	**DU-B**	66115	4.41	8.68	5.87	—	5.69
1/3	56C	B5	**ER-B**	66121	4.41	8.68	5.87	4.34	5.69
	56C	B5	**EU-B**	66124	4.41	8.68	5.87	—	5.69
1/2	56C	B5	**FR-B**	66130	4.41	8.68	5.87	4.34	5.69
	56C	B5	**FU-B**	66133	4.41	8.68	5.87	—	5.69
3/4	56C	B5	**GR-B**	66139	5.62	10.00	6.50	5.02	6.62
	56C	B5	**GU-B**	66142	5.62	9.00	6.50	—	6.62
1	56C	B5	**HR-5/8-B**	19183	5.62	9.00	6.50	5.49	6.62
	56C	B5	**HU-5/8-B**	50427	5.62	9.00	6.50	—	6.62
	143TC	B7	**HR-B**	66145	5.09	9.00	6.50	5.49	6.62
	143TC	B7	**HU-B**	66148	5.12	9.00	6.50	—	6.62
1-1/2	145TC	B7	**JR-B**	66154	5.09	9.00	6.50	5.49	6.62
	145TC	B7	**JU-B**	66157	5.09	9.00	6.50	—	6.62
2	145TC	B7	**KU-B**	66163	5.09	10.00	6.50	—	6.62
3	182TC	B9	**LU-B**	66166	5.88	11.00	6.50	—	7.88

Note: See Page 334 for mounting and shaft dimensions.

Dimensions



ALL DIMENSIONS IN INCHES

HP	NEMA MTG.	BORE CODE	WEG MOTORS							-B (BALDOR) MOTORS						
			CATALOG NUMBER	ITEM CODE	AB	AG	BD	XP	P	CATALOG NUMBER	ITEM CODE	AB	AG	BD	XP	P
1/6	56C	B5	**CRTF-W**	65316	5.43	9.04	6.54	4.13	7.32	**CRTF-B**	85777	4.90	9.29	5.81	4.41	5.68
	56C	B5	**CUTF-W**	65371	5.43	9.04	6.54	—	7.32	**CUTF-B**	85778	4.90	9.29	5.81	—	5.68
1/4	56C	B5	**DRTF-W**	65326	5.43	9.04	6.54	4.13	7.32	**DRTF-B**	66199	5.18	9.29	5.81	4.41	5.68
	56C	B5	**—**	—	—	—	—	—	—	**DSTF-B**	66202	4.51	9.29	5.81	4.41	5.68
	56C	B5	**DUTF-W**	65380	5.43	9.04	6.54	—	7.32	**DUTF-B**	66205	4.51	9.29	5.81	4.41	5.68
	56C	B5	**—**	—	—	—	—	—	—	**DYTF-B**	66208	4.53	9.29	5.81	—	5.68
1/3	56C	B5	**ERTF-W**	65348	5.43	9.04	6.54	4.13	7.32	**ERTF-B**	66211	4.51	9.29	5.81	4.41	5.68
	56C	B5	**EUTF-W**	65383	5.43	9.04	6.54	—	7.32	**EUTF-B**	66214	4.51	9.29	5.81	—	5.68
	56C	B5	**EYTF-W**	65454	5.43	9.04	6.54	—	7.32	**EYTF-B**	66217	4.51	9.29	5.81	—	5.68
1/2	56C	B5	**FRTF-W**	65350	5.43	9.04	6.54	4.13	7.32	**FRTF-B**	66219	4.51	9.94	5.81	4.41	5.68
	56C	B5	**FUTF-W**	65404	5.43	9.04	6.54	—	7.32	**FUTF-B**	66223	4.51	9.32	5.81	—	5.68
	56C	B5	**FYTF-W**	65455	5.43	9.04	6.54	—	7.32	**FYTF-B**	66226	4.51	9.32	5.81	—	5.68
3/4	56C	B5	**GRTF-W**	65351	5.43	9.04	6.54	4.13	7.32	**GRTF-B**	66228	4.51	11.29	5.81	5.08	5.68
	56C	B5	**GUTF-W**	65405	5.43	9.04	6.54	—	7.32	**GUTF-B**	66231	4.51	9.32	5.81	—	5.68
	56C	B5	**GYTF-W**	65457	5.43	9.04	6.54	—	7.32	**GYTF-B**	66831	5.22	10.19	6.50	—	6.62
1	56C	B5	**HRTF-5/8-W**	65354	5.43	10.22	6.54	—	7.32	**HRTF-5/8-B**	19178	4.90	11.29	5.81	5.56	5.68
	56C	B5	**HUTF-5/8-W**	65406	5.43	10.22	6.54	—	7.32	**HUTF-5/8-B**	50428	5.22	10.82	6.50	—	5.68
	56C	B5	**—**	—	—	—	—	—	—	**HYTF-5/8-B**	19179	5.22	10.19	6.50	—	6.62
	143TC	B7	**—**	—	—	—	—	—	—	**HRTF-B**	66234	5.22	11.19	6.50	5.56	6.62
	143TC	B7	**HUTF-W**	65412	5.43	10.95	6.54	—	7.32	**HUTF-B**	66237	4.51	10.19	5.81	—	6.62
	143TC	B7	**—**	—	—	—	—	—	—	**HYTF-B**	66240	5.22	10.19	6.50	—	6.62
1-1/2	56C	B5	**JUTF-5/8-W**	65407	5.43	10.22	6.54	—	7.32	**JUTF-5/8-B**	19784	5.22	10.19	6.50	—	6.62
	145TC	B7	**—**	—	—	—	—	—	—	**JRTF-B**	66243	5.22	11.17	6.50	5.56	6.62
	145TC	B7	**JUTF-W**	65437	5.43	10.95	6.54	—	7.32	**JUTF-B**	66246	5.22	11.17	6.50	—	6.62
	145TC	B7	**JYTF-W**	65475	5.43	10.95	6.54	—	7.32	**JYTF-B**	66249	5.22	11.17	6.50	—	6.62
2	56C	B5	**KUTF-5/8-W**	65440	5.43	11.40	6.54	—	7.32	**—**	—	—	—	—	—	—
	145TC	B7	**KUTF-W**	65445	5.43	12.13	6.54	—	7.32	**KUTF-B**	66252	5.22	11.17	6.50	—	6.62
	145TC	B7	**—**	—	—	—	—	—	—	**KYTF-B**	66255	5.22	11.17	6.50	—	6.62
3	182TC	B9	**LUTF-W**	65446	6.61	13.24	8.88	—	8.75	**LUTF-B**	66258	6.00	13.93	8.86	—	7.88
			—	—	—	—	—	—	—	**LYTF-B**	66260	6.00	13.93	8.86	—	7.88
5	184TC	B9	**MUTF-W**	65448	6.61	13.24	8.88	—	8.75	**MUTF-B**	66262	6.00	15.43	8.86	—	7.88
7-1/2	213TC	B11	**—**	—	—	—	—	—	—	**NUTF-B**	66266	7.45	15.53	9.04	—	9.56
10	215TC	B11	**—**	—	—	—	—	—	—	**PUTF-B**	66270	7.45	16.67	9.04	—	9.56
15	254TC	B13	**—**	—	—	—	—	—	—	**RUTF-B**	66274	9.22	16.67	9.10	—	9.56

Note: See page 334 for mounting and shaft dimensions.
T = Totally-enclosed, non-ventilated.
TF = Totally-enclosed, fan cooled.

Permanent Magnet Totally Enclosed 1750 RPM Motors

ORDER BY CATALOG NUMBER OR ITEM CODE

HP	NEMA MTG.	BORE CODE †	CATALOG NUMBER*	ITEM CODE
1/6	56C	B5	**PM916AT-B**	19120
			PM916T	59476
1/4	56C	B5	**PM925AT-B**	19121
			PM925T	59478
1/3	56C	B5	**PM933AT-B**	19122
			PM933T	59480
1/2	56C	B5	**PM950AT-B**	19123
			PM950TF	59481
			PM1850TF-B	19186
			PM1850TF	59482

* AT, T = TENV – Totally Enclosed, Non-ventilated.
TF = TEFC – Totally Enclosed, Fan Cooled.
† See Page 334 for Bore Code explanation.
PM9-90 VDC (Armature Voltage)
PM18-180 VDC (Armature Voltage)

Letters after dash indicate manufacturer – B = Baldor
Blank = Boston Gear

ORDER BY CATALOG NUMBER OR ITEM CODE

HP	NEMA MTG.	BORE CODE †	CATALOG NUMBER*	ITEM CODE
3/4	56C	B5	**PM975TF-B**	69853
			PM975TF	59483
			PM1875TF-B	69866
			PM1875TF	59484
1	56C	B5	**PM9100TF-5/8-B**	50421
			PM9100TF-5/8	59486
			PM18100TF-5/8-B	50424
			PM18100TF-5/8	59488
	56CZ	B7	**PM9100TF-B**	69867
			PM9100TF	59485
			PM18100TF-B	69869
			PM18100TF	59487
1-1/2	56CZ	B7	**PM18150TF-B**	69870
	140TC	B7	**PM18150TF**	59489
2	56CZ	B7	**PM18200TF-B**	68783
	140TC	B7	**PM18200TF**	59490
3	184TC	B9	**PM18300TF-B**	69411
5	1810ATC	B9	**PM18500TF-B**	69412

ENCLOSURES—Most applications can utilize open dripproof motors; other enclosures are listed. For information purposes, the various enclosures are defined below.

OPEN, DRIPPROOF—Same as open, except the construction of motor prevents the entrance of drops of liquid or particles falling on the motor at any angle not greater than 15 degrees from vertical.

TOTALLY-ENCLOSED—A motor so constructed as to prevent free exchange of air between the inside and outside of the motor case, but not air-tight.

TOTALLY-ENCLOSED, NON–VENTILATED (TENV)—A totally-enclosed motor with openings closed and of sufficient size and mass to permit the necessary heat dissipation to eliminate the need for external cooling.

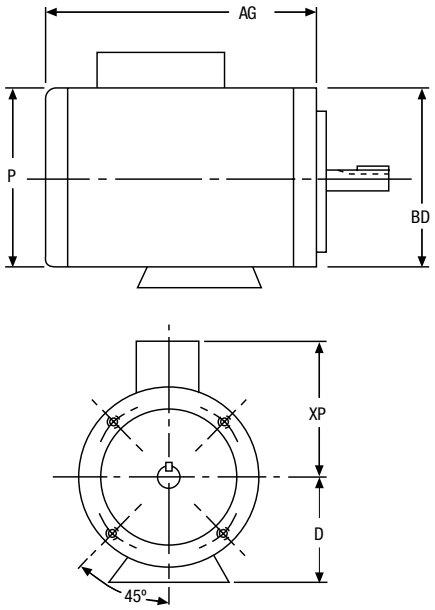
TOTALLY-ENCLOSED, FAN-COOLED (TEFC)—Basically a TENV motor which has an external fan to blow cooling air over the motor. The additional cooling eliminates the necessity of a more costly oversized TENV motor.
NOTE: TENV and TEFC construction are equal in all respects regarding application, temperature capabilities and performance.

FOR DIMENSIONS OF THESE MOTORS, SEE PAGE 346.
FOR OTHER AVAILABLE MOTORS, CONSULT FACTORY.

Dimensions

ALL DIMENSIONS IN INCHES

HP	NEMA MTG.	BORE CODE	CATALOG NUMBER	AG	BD	XP	P	D
1/6	56C	B5	**PM916T**	7.13	6.50	4.47	4.87	3.50
1/4	56C	B5	**PM925T**	7.66	6.50	4.47	4.87	3.50
1/3	56C	B5	**PM933T**	8.13	6.50	4.47	4.87	3.50
1/2	56C	B5	**PM950TF**	9.75	6.50	4.47	4.87	3.50
	56C	B5	**PM1850TF**	9.75	6.50	4.47	4.87	3.50
3/4	56C	B5	**PM975TF**	12.25	6.50	4.47	4.87	3.50
	56C	B5	**PM1875TF**	11.75	6.50	4.47	4.87	3.50
1	56CZ	B7	**PM9100TF**	14.25	6.50	4.87	5.61	3.50
	56C	B5	**PM9100TF-5/8**	14.25	6.50	4.87	5.61	3.50
	56CZ	B7	**PM18100TF**	13.25	6.50	4.87	5.61	3.50
	56C	B5	**PM18100TF-5/8**	13.25	6.50	4.87	5.61	3.50
1-1/2	140TC	B7	**PM18150TF**	16.21	6.50	5.31	6.50	3.50
2	140TC	B7	**PM18200TF**	17.21	6.50	5.31	6.50	3.50



Note: See page 334 for mounting and shaft dimensions.

ALL DIMENSIONS IN INCHES

HP	NEMA MTG.	BORE CODE	-B (BALDOR) MOTORS					
			CATALOG NUMBER	AG	BD	XP	P	D
1/6	56C	B5	**PM916AT-B**	8.25	6.50	4.56	4.69	3.50
1/4	56C	B5	**PM925AT-B**	9.19	6.50	4.56	4.69	3.50
1/3	56C	B5	**PM933AT-B**	10.13	6.50	4.56	4.69	3.50
1/2	56C	B5	**PM950AT-B**	11.88	6.50	4.56	4.69	3.50
	56C	B5	**PM1850TF-B**	10.56	6.63	4.00	4.87	3.50
3/4	56C	B5	**PM975TF-B**	11.69	6.63	4.00	5.81	3.50
	56C	B5	**PM1875TF-B**					
1	56CZ	B7	**PM9100TF-B**	12.57	6.63	4.00	5.81	3.50
	56C	B5	**PM9100TF-5/8-B**					
	56CZ	B7	**PM18100TF-B**					
	56C	B5	**PM18100TF-5/8-B**					
1-1/2	56CZ	B7	**PM18150TF-B**	15.06	6.63	4.25	6.50	3.50
2	56CZ	B7	**PM18200TF-B**	16.06	6.63	4.25	6.50	3.50
3	184TC	B9	**PM18300TF-B**	21.46	9.00	6.06	7.88	4.50
5	1810ATC	B9	**PM18500TF-B**	25.46	9.00	6.06	7.88	4.50

AC Bost-Kleen Washdown Duty Motors

P

White Bost-Kleen Motors

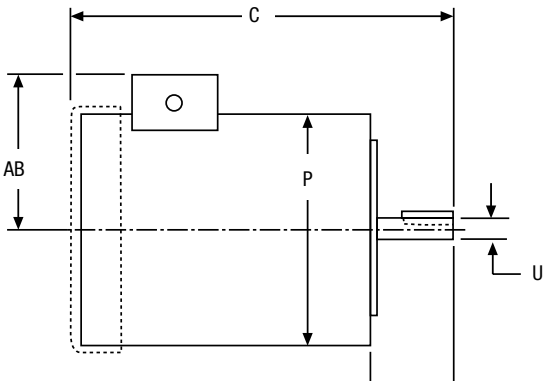
- AC Motors 1/2 - 5 HP
- DC Motors 1/4 - 3/4 HP
- Durable White Epoxy Finish
- Gasketed Thru Bolts
- Weep Holes
- NEMA C-Face Mounting
- BISSC certified



Designed for food processing and other corrosive applications where the motor is constantly exposed to an environment requiring high pressure washdown to maintain cleanliness.

WHITE BISSC CERTIFIED MOTORS	HP	Catalog Number	Item Code	NEMA Mounting	Enclosure
AC MOTORS 230/460 VAC 3 PHASE 60 HZ	1/2	**FUT-WB-B**	69105	56C	TENV
	3/4	**GUT-WB-B**	69106	56C	TENV
	1	**HUT-5/8-WB-B**	69123	56C	TENV
	1	**HUT-WB-B**	69107	143TC	TENV
	1-1/2	**JUTF-WB-B**	69110	145TC	TEFC
	2	**KUTF-WB-B**	69111	145TC	TEFC
	3	**LUTF-WB-B**	69112	182TC	TEFC
	5	**MUTF-WB-B**	69113	184TC	TEFC

Dimensions



HP	Catalog Number	U +.0000 -.0005	C	AH	P	AB
1/2	**FUT-WB-B**	.6250	11.06	2.06	6.62	5.25
3/4	**GUT-WB-B**	.6250	12.12	2.06	6.62	5.25
1	**HUT-5/8-WB-B**	.6250	12.12	2.06	6.62	5.25
1	**HUT-WB-B**	.8750	12.12	2.13	6.62	5.25
1-1/2	**JUTF-WB-B**	.8750	13.30	2.13	6.62	5.25
2	**KUTF-WB-B**	.8750	12.30	2.13	6.62	5.25
3	**LUTF-WB-B**	1.1250	16.55	2.63	7.88	5.88
5	**MUTF-WB-B**	1.1250	16.55	2.63	7.88	5.88

These double C-Face Brakes are direct acting with only one moving part. They are spring set and electro-magnetically released. Movement is limited to a spring loaded pressure plate. Release is instantaneous. If power fails, the brake will immediately set and hold.



Features

- Automatic Reset
- Compact
- Continuous Duty
- Dependable
- Full Torque Stop
- Horizontal/Vertical Mount
- Instant Magnetic Release
- One Moving Part
- Ready to Mount
- Shock Mounted Magnet
- Direct Acting
- Flange/Foot Mounting
- Splined Hub
- Standard NEMA Voltages/Frequencies
- Superior Disc Life
- Superior Thermal Capacity
- Double C-Face

Operation

Friction discs rotate with the motor shaft and are free to move axially on the hub. When the magnet coil is de-energized, a spring loaded pressure plate (magnet armature) presses against the rotating discs. Friction force stops and holds the motor shaft.

The pressure plate retracts against torque springs by magnetic force when the magnet is energized. Friction discs are then released and free to rotate with the hub and motor shaft. A manual release is also provided.

Brake coil leads connect directly to motor leads so that power is simultaneously supplied to both brake and motor. No control equipment is required. An instruction bulletin on mounting and hookup are included with each brake.

Splined Hub

These C-Face brakes use splined hubs and internally splined friction discs as standard equipment. The spline design virtually elimi nates back lash which is a delayed action effect caused by excessive clearances between hub and discs.

Splines in crease disc life because the many con tact points between hub and discs reduce the concentration of stresses encountered with non-splined hubs having only a few contact points.

ORDER BY CATALOG NUMBER OR ITEM CODE

Torque (Lb. Ft.)	NEMA Frame	Bore Code	Mounting	Coil Voltage					
				115/230 VAC, 60 Hz		208-230/460 VAC, 60 Hz 190/380 VAC, 50 Hz		575 VAC, 60 Hz	
				Catalog Number	Item Code	Catalog Number	Item Code	Catalog Number	Item Code
3	56C	B5	Horizontal/Vertical	**CMBA56R-3**	67545	**CMBA56U-3**	67546	**CMBA56Y-3**	67547
6	56C	B5	Horizontal	**CMBA56R-6**	67548	**CMBA56U-6**	67549	**CMBA56Y-6**	67550
6	140TC	B7	Horizontal	**CMBA140TR-6**	67551	**CMBA140TU-6**	67552	**CMBA140TY-6**	67553
6	140TC	B7	Vertical Shaft Up	**CMBA140TR-6U**	67554	**CMBA140TU-6U**	67556	—	—
6	140TC	B7	Vertical Shaft Down	**CMBA140TR-6D**	67555	**CMBA140TU-6D**	67557	—	—

ALL DIMENSIONS IN INCHES

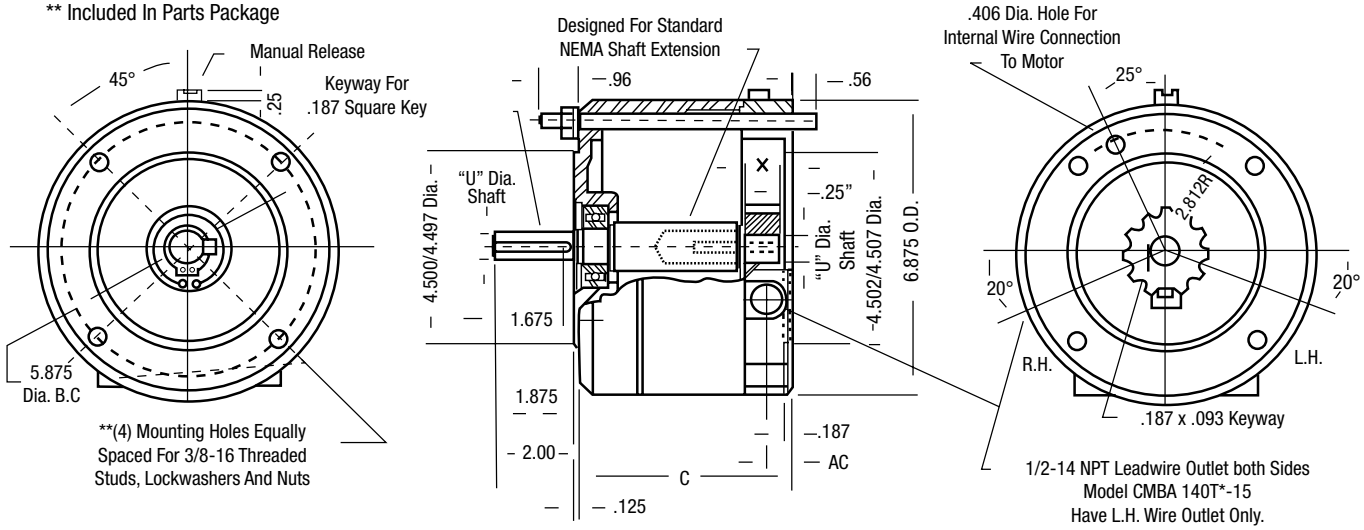
Size	AC	C	G	X	U	Housing O.D.	Approx. Weight
56-3 56-6 140T-6	9/16	4-15/16	1-3/16	7/8	**5/8 5/8 7/8**	6-7/8	12 Lbs.

PARTS (ORDER BY ITEM CODE)

Description	Item Code
Base Kit	67561
Coil–115/230 VAC 60 Hz	67558
Coil–208-200-380-440 VAC	67559
Coil–575 VAC 60 Hz	67560
Disc–Stationary	67562
Disc–Rotating	67563

Dimensions

** Included In Parts Package



Notes





Section Contents

Speed Reducer Nomenclature 346

Horsepower and Torque 347

AGMA Service Factors & Load Classifications 348-349

Application Considerations 350-352

Application Formulas 353

Speed Reducer Nomenclature

AXIAL MOVEMENT – Endwise movement of input or output shafts, sometimes called endplay, is usually expressed in thousands of an inch.

EFFICIENCY – The amount of output power of the reducer as compared to the amount of input power. It is usually stated as a percentage.

Example:

Input HP = 1

Output HP = .75

(75/100) x (100) = 75% Efficiency

BACKLASH – Rotational movement of the output shaft when holding the input shaft stationary and rotating the output shaft alternately clockwise and counter clockwise. Backlash may be expressed in thousands of an inch measured at a specific radius at the output shaft.

CENTER DISTANCE – On a single reduction reducer, this is the distance between the center lines of the input and output shafts. Shaft center lines may be parallel or at right angles to one another. The center distance of multiple stage reducers usually refers to the lowest speed stage (last reduction).

THRUST LOAD – Forces imposed on a shaft parallel to the shaft axis. Such a force is called a thrust load. It is often encountered on shafts driving mixers, fans, blowers and similar machines. When a thrust load acts on a speed reducer, you must be sure that the thrust load rating of the reducer is high enough that it's shafts and bearings can absorb the load.

MECHANICAL RATING – The maximum power or torque that a speed reducer can transmit, based on the strength and durability of its components, is it's mechanical rating. Obviously, the reducer may be rated no higher than the strength or durability of its weakest component. Reducers typically have a safety margin of two to three on their mechanical ratings. Thus, a reducer can withstand momentary overloads of 200-300% of its mechanical rating during a startup or other brief overload situations.

THERMAL RATING – The maximum power or torque that a speed reducer can transmit continuously, based on its ability to dissipate heat generated by friction, is called its thermal rating.

PRIME MOVER – The machine that provides power to a drive is its prime mover. The most frequently encountered prime movers include electric motors, internal combustion engines, hydraulic motors and air motors. The type of prime mover used can affect the speed reducer during operation. For example, an electric motor runs relatively smoothly in comparison to an internal combustion engine.

MOUNTING POSITION – The relationship of the input and output shafts relative to the floor line.

INPUT HORSEPOWER – The amount of power applied to the input shaft of a reducer by the prime mover is its input horsepower. It is often used as a selection basis for power transmission components, and it appears in the rating tables of drive manufacturer's published data. Remember that input horsepower ratings represent the maximum amount of power that the reducer can safely handle.

OUTPUT HORSEPOWER – The amount of power available at the output shaft of a reducer is its output horsepower. Due to losses caused by inefficiency, output horsepower is always less than input horsepower.

OVERHUNG LOAD – The input or the output shaft of a speed reducer can be subject to an overhung load; that is, to a force applied at right angles to the shaft, beyond its outermost bearing. Such a force is a shaft bending load resulting from a gear, pulley, sprocket or other external drive member. Besides the tendency to bend the shaft, the overhung load (that is, the radial force on the shaft) is reacted to by the shaft in it's bearings. Therefore, the overhung load creates loads that the bearings must be able to support without damage.

SERVICE FACTORS – Numbers which modify the loads which must be considered in selecting a speed reducer are called service factors. They vary with the type of service in which the reducer is to be used, the kind of prime mover involved and the duty cycle. The service factor can be a multiplier applied to the known load, which redefines the load in accordance with the conditions at which the drive will be used, or it can be a divisor applied to catalog reducer ratings, thus redefining the rating in accordance with drive conditions. The service factor is usually applied to the speed reducer, but can also be applied to the name plate rating of the prime mover.

REDUCTOR® – Boston Gear's registered trademark for a speed reducer having a projecting input shaft suitable for mounting a coupling, sprocket, pulley or gear.

FLANGED REDUCTOR – Boston Gear's name for a reductor furnished with an input flange suitable for attaching a face mounted motor.

RATIOMOTOR®– Boston Gear's registered trademark for a motorized reducer consisting of a flanged reductor and face mounted motor assembled, sometimes referred to as a gearmotor.

SELF-LOCKING ABILITY – Boston 700 Series reducers, under no conditions should be considered to hold a load when at rest.

BACK-DRIVING – This is the converse of self-locking. Depending upon ratio and many variables, it is difficult to predict the back-driving capability of a 700 Series reducer. Worm gear reducers are not intended to be used as speed increasers. Consult factory for back-driving applications.

POWER is the rate of doing work.

WORK is the exerting of a FORCE through a DISTANCE. ONE FOOT POUND is a unit of WORK. It is the WORK done in exerting a FORCE OF ONE POUND through a DISTANCE of ONE FOOT.

THE AMOUNT OF WORK done (Foot Pounds) is the FORCE (Pounds) exerted multiplied by the DISTANCE (Feet) through which the FORCE acts.

THE AMOUNT OF POWER used (Foot Pounds per Minute) is the WORK (Foot Pounds) done divided by the TIME (Minutes) required.

$$\text{POWER (Foot Pounds per Minute)} = \frac{\text{WORK (Ft. Lbs.)}}{\text{TIME (Minutes)}}$$

POWER is usually expressed in terms of HORSEPOWER.

HORSEPOWER is POWER (Foot Pounds per Minute) divided by 33,000.

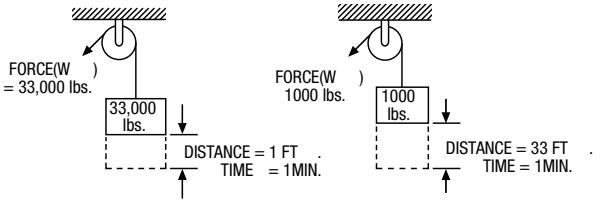
HORSEPOWER (HP)

$$= \frac{\text{POWER (Ft. Lbs. per Minute)}}{33{,}000}$$

$$= \frac{\text{WORK (Ft. Pounds)}}{33{,}000 \times \text{TIME (Min.)}}$$

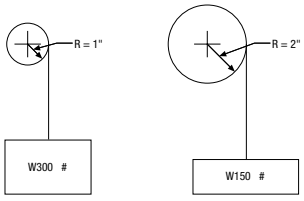
$$= \frac{\text{FORCE (Lbs.)} \times \text{DISTANCE (Feet)}}{33{,}000 \times \text{TIME (Min.)}}$$

Illustration of horsepower



$$HP = \frac{33{,}000 \times 1}{33{,}000 \times 1} = 1 \text{ HP} \qquad HP = \frac{1000 \times 33}{33{,}000 \times 1} = 1 \text{ HP}$$

TORQUE (T) is the product of a FORCE (W) in pounds, times a RADIUS (R) in inches from the center of shaft (Lever Arm) and is expressed in Inch Pounds.



T = WR
= 300 x 1 = 300 In. Lbs.

T = WR
= 150 x 2 = 300 In. Lbs.

If the shaft is revolved, the FORCE (W) is moved through a distance, and WORK is done.

$$\text{WORK (Ft. Lbs.)} = W \times \frac{2\pi R}{12} \times \text{No. of Rev. of shaft}$$

When WORK is done in a specified TIME, POWER is used.

$$\text{POWER (Ft. Pounds per Minute)} = W \times \frac{2\pi R}{12} \times \text{RPM}$$

Since (1) HORSEPOWER = 33,000 Ft. Pounds per Minute

$$\text{Horsepower (HP)} = W \times \frac{2\pi R}{12} \times \frac{\text{RPM}}{33{,}000} = \frac{W \times R \times \text{RPM}}{63{,}025}$$

but TORQUE (Inch Pounds) = FORCE (W) x RADIUS (R)

$$\text{Therefore HORSEPOWER (HP)} = \frac{\text{TORQUE (T)} \times \text{RPM}}{63{,}025}$$

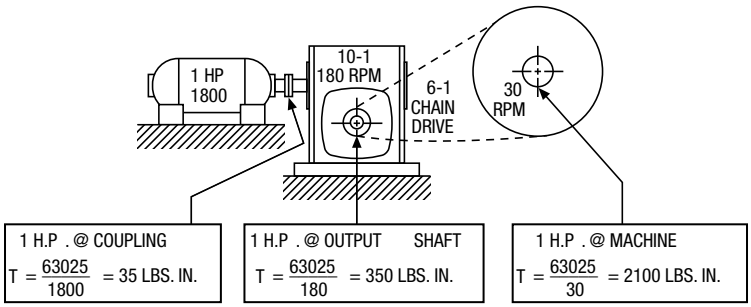
Where total reductions are small, 50 to 1 or less, HP figures are commonly used. Higher reductions require that TORQUE figures be used to select drive components, because with large reductions, a small motor can produce extremely high TORQUE at the final low speed. For example, 1/12 HP reduced to 1 RPM using the formula below and neglecting friction:

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

$$\text{TORQUE} = \frac{63{,}025 \times 1/12}{1} = 5{,}252 \text{ In. Lbs.}$$

Therefore, motors for use with large reductions should be carefully selected. Even a small motor, if stalled, can produce enough Torque to ruin the drive, unless it is protected by a shear pin or some similar device.

Neglecting frictional losses, this sketch illustrates the manner in which Torque increases as speed decreases.



AGMA Service Factors and Load Classifications

Type of Machine To Be Driven	Non-Motor Reducer (Service Factors) Hours Per Day 3 to 10	Non-Motor Reducer (Service Factors) Hours Per Day Over 10	Motorized Reducer (Class of Service) Hours Per Day 3 to 10	Motorized Reducer (Class of Service) Hours Per Day Over 10
AGITATORS				
Pure Liquid	1.00	1.25	I	II
Semi-Liquids, Variable Density	1.25	1.50	II	II
BLOWERS				
Centrifugal and Vane	1.00	1.25	—	—
Lobe	1.25	1.50	—	—
BREWING AND DISTILLING				
Bottling Machinery	1.00	1.25	I	II
Brew Kettles - Continuous Duty	—	1.25	—	II
Cookers - Continuous Duty	—	1.25	—	II
Mash Tubs - Continuous Duty	—	1.25	—	II
Scale Hopper - Frequent Starts	1.25	1.50	II	II
CAN FILLING MACHINES				
Can Knives	1.50	—	—	—
Car Dumpers	1.75	—	III	—
Car Pullers	1.25	—	*	—
Clarifiers	1.00	1.25	I	II
Classifiers	1.25	1.50	II	II
CLAY WORKING MACHINERY				
Brick Press & Briquette Machine	1.75	2.00	III	III
Extruders and Mixers	1.25	1.50	II	III
COMPRESSORS				
Centrifugal	1.00	1.25	—	—
Lobe - Reciprocating, Multi-Cycle	1.25	1.50	—	—
Reciprocating - Single Cycle	1.75	2.00	—	—
CONVEYORS - UNIFORMLY LOADED & FED				
Apron	1.00	1.25	II	III
Assembly Belt - Bucket or Pan	1.00	1.25	II	II
Chain - Flight	1.00	1.25	II	II
Oven - Live Roll - Screw	1.00	1.25	I	II
CONVEYORS - HEAVY DUTY NOT UNIFORMLY FED				
Apron	1.25	1.50	II	III
Assembly Belt - Bucket or Pan	1.25	1.50	II	II
Chain - Flight	1.25	1.50	II	II
Live Roll	—	—	*	*
Oven - Screw	1.25	1.50	I	II
Reciprocating - Shaker	1.75	2.00	III	III
CRANES AND HOISTS				
Main Hoists	1.00	1.25	I	II
Bridge and Trolley Drive	*	*	II	II
CRUSHER				
Ore, Stone	1.75	2.00	—	—
Sugar	1.50	1.50	—	—
ELEVATORS				
Bucket - Uniform Load	1.00	1.25	I	II
Bucket - Heavy Load	1.25	1.50	II	III
Centrifugal Discharge	1.25	1.50	I	II
Freight	1.25	1.50	II	II
Gravity Discharge	1.00	1.25	I	II
FANS				
Centrifugal - Light (Small Dia.)	1.00	1.25	—	—
Large Industrial	1.25	1.50	—	—

*Consult Manufacturer.

Type of Machine To Be Driven	Non-Motor Reducer (Service Factors) Hours Per Day 3 to 10	Non-Motor Reducer (Service Factors) Hours Per Day Over 10	Motorized Reducer (Class of Service) Hours Per Day 3 to 10	Motorized Reducer (Class of Service) Hours Per Day Over 10
FEEDERS				
Apron - Belt - Screw	1.25	1.50	—	—
Disc	1.00	1.25	—	—
Reciprocating	1.75	2.00	—	—
FOOD INDUSTRY				
Beet Slicer	1.25	1.50	II	II
Bottling, Can Filling Machines	1.00	1.25	—	—
Cereal Cooker	1.00	1.25	I	II
Dough Mixer - Meat Grinder	1.25	1.50	II	II
Generators (Not Welding)	1.00	1.25	—	—
Hammer Mills	1.75	2.00	—	—
Slicers	1.00	1.25	—	—
HOISTS				
Heavy Duty	1.75	2.00	—	—
Medium Duty and Skip Type	1.25	1.50	—	—
Laundry Tumblers	1.25	1.50	II	III
LINE SHAFTS				
Uniform Load	1.00	1.25	I	II
Heavy Load	1.25	1.50	II	II
MACHINE TOOLS				
Auxiliary Drive	1.00	1.25	I	II
Main Drive - Uniform Load	1.25	1.50	II	II
Main Drive - Heavy Duty	1.75	2.00	III	III
METAL MILLS				
Draw Bench Carriers & Main Drive	1.25	1.50	—	—
Slitters	1.25	1.50	—	—
TABLE CONVEYORS - NON REVERSING				
Group Drives	1.25	1.50	II	III
Individual Drives	1.75	2.00	III	III
Wire Drawing, Flattening or Winding	1.25	1.50	II	III
MILLS ROTARY TYPE BALL & ROD				
Spur Ring Gear and Direct Connected	—	2.00	—	—
Cement Kilns, Pebble	—	1.50	—	—
Dryers and Coolers	—	1.50	—	—
Plain and Wedge Bar	—	1.50	—	—
Tumbling Barrels	—	2.00	—	—
MIXERS				
Concrete - Continuous	1.25	1.50	II	III
Concrete - Intermittent	1.25	1.50	II	—
Constant Density	1.00	1.25	I	II
Semi-Liquid	1.25	1.50	II	II
OIL INDUSTRY				
Oil Well Pumping	—	*	—	—
Chillers, Paraffin Filter	1.25	1.50	—	—
Press Rotary Kilns	1.25	1.50	—	—
PAPER MILLS				
Agitator (Mixer)	1.25	1.50	II	II
Agitator - Pure Liquids	1.00	1.25	—	—
Barking Drums - Mechanical Barkers	1.75	2.00	—	—
Bleacher	1.00	1.25	I	II
Beater	1.25	1.50	—	—
Calendar - Heavy Duty	—	2.00	—	—

AGMA Service Factors and Load Classifications

Type of Machine To Be Driven	Non-Motor Reducer (Service Factors) Hours Per Day 3 to 10	Non-Motor Reducer (Service Factors) Hours Per Day Over 10	Motorized Reducer (Class of Service) Hours Per Day 3 to 10	Motorized Reducer (Class of Service) Hours Per Day Over 10
PAPER MILLS (Continued)				
Calendar - Anti-Friction Bearings	1.00	1.25	—	II
Cylinders	1.25	1.50	—	II
Chipper	—	2.00	—	III
Chip Feeder	1.25	1.50	—	—
Coating Rolls - Couch Rolls	1.00	1.25	—	—
Conveyors - Chips - Bark - Chemical	1.00	1.25	—	—
Conveyors - Log and Slab	—	2.00	—	—
Cutter	—	2.00	—	—
Cylinder Molds, Dryers - Anti-Friction	—	1.25	—	—
Felt Stretcher	1.25	1.50	—	II
Screens - Chip and Rotary	1.25	1.50	—	—
Thickener (AC)	1.25	1.50	—	—
Washer (AC)	1.25	1.50	—	—
Winder - Surface Type	—	1.25	—	II
PLASTICS INDUSTRY				
Intensive Internal Mixers				
Batch Type	—	1.75	—	—
Continuous Type	—	1.50	—	—
Batch Drop Mill - 2 Rolls	—	1.25	—	—
Compounding Mills	—	1.25	—	—
Calendars	—	1.50	—	—
Extruder - Variable Speed	—	1.50	—	—
Extruder - Fixed Speed	—	1.75	—	—
PULLERS				
Barge Haul	—	2.00	—	—
PUMPS				
Centrifugal	—	1.25	—	—
Proportioning	—	1.50	*	*
Reciprocating				
Single Acting, 3 or More Cycles	1.25	1.50	II	III
Double Acting, 2 or More Cycles	1.25	1.50	II	III
Rotary - Gear or Lube	1.00	1.25	I	II
RUBBER INDUSTRY				
Batch Mixers	—	1.75	—	—
Continuous Mixers	—	1.50	—	—

Type of Machine To Be Driven	Non-Motor Reducer (Service Factors) Hours Per Day 3 to 10	Non-Motor Reducer (Service Factors) Hours Per Day Over 10	Motorized Reducer (Class of Service) Hours Per Day 3 to 10	Motorized Reducer (Class of Service) Hours Per Day Over 10
RUBBER INDUSTRY (Continued)				
Continuous Mixers	—	1.50	—	—
Calendars	—	1.50	—	—
Extruders - Continuous	—	1.50	—	—
Extruders - Intermittent	—	1.75	—	—
Tire Building Machines	—	—	II	II
Tire and Tube Press Operators	—	—	I	I
SEWAGE DISPOSAL EQUIPMENT				
Bar Screens	1.00	1.25	I	II
Chemical Feeders	1.00	1.25	I	II
Collectors	1.00	1.25	I	II
Dewatering Screws	1.25	1.50	II	II
Scum Breakers	1.25	1.50	II	II
Slow or Rapid Mixers	1.25	1.50	II	II
Thickeners	1.25	1.50	II	II
Vacuum Filters	1.25	1.50	II	II
SCREENS				
Air Washing	1.00	1.25	I	II
Rotary - Stone or Gravel	1.25	1.50	II	II
Traveling Water Intake	1.00	1.25	I	II
Skip Hoists	—	—	II	—
Slab Pushers	1.25	1.50	—	—
Stokers	—	1.25	—	II
TEXTILE INDUSTRY				
Batchers or Calendars	1.25	1.50	II	II
Cards	1.25	1.50	I	II
Card Machines	1.75	2.00	III	III
Dry Cans and Dryers	1.25	1.50	II	II
Dyeing Machines	1.25	1.50	II	II
Looms	1.25	1.50	*	*
Mangles, Nappers and Pads	1.25	1.50	II	II
Soapers, Tenner Frames	1.25	1.50	II	II
Spinners, Washers, Winders	1.25	1.50	II	II
Tumbling Barrels	1.75	2.00	III	III
Windlass	1.25	1.50	II	III

*Consult Manufacturer.

This list is not all-inclusive and each application should be checked to determine if any unusual operating conditions will be encountered.

SERVICE FACTOR CHART

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 2.00	Heavy Shock - not more than 10 hours per day. Heavy Shock - more than 10 hours per day.

Application Considerations

Q

For most applications, select for running torque rather than starting torque. The AC motor will normally produce a 200 percent starting torque. The speed reducer is built to take at least 200% momentary overload to overcome normal starting inertia. The difference in the resulting cost can be startling.

A 20% safety factor in selection can double the life … of the speed reducer for more economy in the long run. This rule of thumb will help compensate for unexpected shock and vibration, and add substantially to wear life.

Consider "auxiliary drives" whenever possible for economy. A properly selected gear or chain drive reduction from the reducer output to the driven shaft can produce substantial savings in space and drive cost.

Avoid auxiliary drives to the input shaft … unless absolutely necessary. Auxiliary reduction from the motor to the input shaft can increase the size and cost of the drive.

Hoists

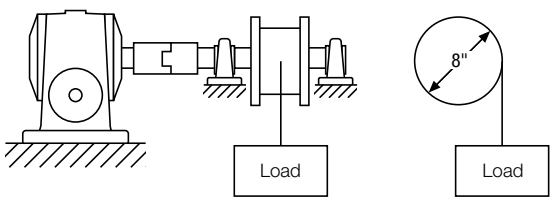
Worm gear reducers are ideal for many hoist applications. There are, however, certain precautions which should be exercised with what are thought to be self-locking characteristics of this reducer type.

A worm gear is generally said to be self-locking or irreversible when the gear cannot drive the worm – when the lead angle of the worm is less than the friction angle and hence, reverse drive efficiency is zero. This static condition can be upset by vibrations from nearby machinery or other sources. Many worm gear reducers are not self-locking, and even a particular size and ratio, which may appear to be, cannot be depended upon for this purpose. Also, a reducer which holds the load when upward movement is stopped may not when the load inertia is moving downward and the motor is stopped. For complete locking assurance, it is recommended that a fail-safe brake be used for such an application.

Finding the required torque and drum RPM…

Torque (Lb. Ins.) = (Load) x (Drum Radius)

RPM = (Velocity) ÷ .2618 x (Drum Dia.)



Belt Conveyors

Belt conveyor applications are one of those wherein the speed reducer is commonly overspecified. Proper application can, in many instances, result in substantial system economies.

To determine the torque required here, first determine the belt pull, since this is the principal force. In calculating this, the effects of sliding friction and/or angle or inclination must be considered. Table 1 shows Application Factors which may be used in determining belt pull based upon common combinations of materials and various angles.

TABLE 1. CONVEYOR APPLICATION FACTORS

Material Combinations	Angle From The Horizontal									
	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
Pivoting bucket conveyor	.025	.19	.36	.52	.66	.78	.88	.95	.99	1.00
Belt on rollers	.025	.19	.36	.52	.66	.78	.88	.95	.99	1.00
Metal on metal (finished)	.20	.37	.53	.67	.80	.89	.97	1.01	1.02	1.00
Fabric on steel	.27	.44	.60	.74	.85	.94	1.00	1.03	1.03	1.00
Fabric on wood	.32	.49	.63	.77	.88	.97	1.02	1.04	1.04	1.00
Leather on wood	.35	.52	.67	.80	.91	.99	1.04	1.06	1.05	1.00
Wood on wood	.35	.52	.67	.80	.91	.99	1.04	1.06	1.05	1.00
Plastic on steel	.35	.52	.67	.80	.91	.99	1.04	1.06	1.05	1.00
Metal on wood	.40	.57	.72	.85	.95	1.02	1.07	1.08	1.05	1.00
Rubber on wood	.45	.62	.76	.89	.99	1.05	1.09	1.09	1.06	1.00
Rubber on steel	.50	.67	.81	.93	1.03	1.09	1.12	1.11	1.07	1.00
Leather on metal	.56	.72	.87	.98	1.06	1.12	1.14	1.13	1.08	1.00

Interpolation in the table above is permissible.

The procedure involves selection of the proper Application Factor for the calculations:

Belt Pull =
(Total weight on conveyor) x (Application Factor)

Torque = (Belt Pull) x (Radius of Head Pulley)

Example:

An inclined belt conveyor is to carry cases of canned fruit. The belt is leather on a wood conveyor bed. Ten cases will be on the conveyor at a time, and each weighs 30 Lbs. The conveyor is inclined at 20° to the horizontal, and the head pulley diameter is 9".

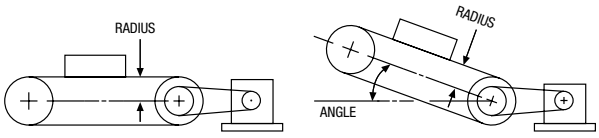
How much torque is required at the head pulley?

Select .67 as the Application Factor (Table 1)

Determine weight: 10 x 30 = 300 Lbs.

Determine belt pull: 300 x .67 = 201 Lbs.

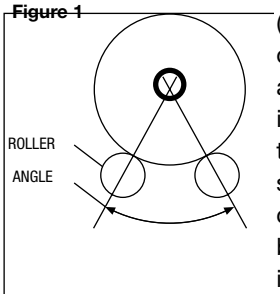
Determine Torque: 201 x 9/2 = 201 x 4.5
= 904 Lb. Ins.



Cylinders

These applications deal principally with rotation of weight about a horizontal centerline. Again, they are commonly subject to reducer overspecification. The table of Rolling Friction Factors in the section on turntables may be used, since the supporting members will be essentially the same.

Figure 1



For **Roller Supported** cylinders (Figure 1), the torque required will depend on the rolling friction factor and the angle between the rollers, in addition to the weight. Assuming that the load in the cylinder is non-solid and tends to remain essentially central (or balanced). The Table below lists angle factors to be used in the calculations.

Table 2. Angle Factors For Roller Supported Cylinders

Angle	0°	20°	40°	50°	60°	70°	80°	90°
Angle Factor	1.00	1.02	1.06	1.10	1.15	1.22	1.31	1.41

The friction force acts at the point of contact between the rollers and the cylinder, and will be:

Friction Force=(Weight)x(Friction Factor)x(Angle Factor)

Assuming the cylinder is to be driven by one of the rollers:

Torque = (Friction Force) x (Radius of Roller)

Example:

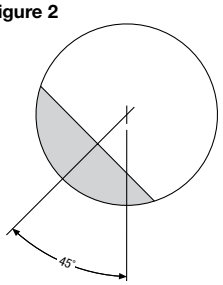
A 1200 Lb. steel cylinder is resting on two pairs of steel rollers which are 4" in diameter. The cylinder is empty. The angle between rollers is 50°. How much torque is required at the roller to turn the cylinder?

Select 1.10 as Angle Factor (Table 2), and .025 as Rolling Friction Factor (Table 3).

Determine Friction Force: 1200 x .025 x 1.10 = 33 Lbs.

Determine Torque: 33 x 2 = 66 Lb. Ins.

Figure 2



Horizontal Axis Supported cylinders (Figure 2), with unbalanced loads require a different approach. Assuming that the cylinder is not full, and that the material is rotated to a position about 45° from the vertical, the torque is equal to the Material Weight x "Effective Radius".

Effective Radius = Cylinder Diameter (D) x 0.23 (1/4 full)
0.15 (1/2 full)
0.08 (3/4 full)

Example:

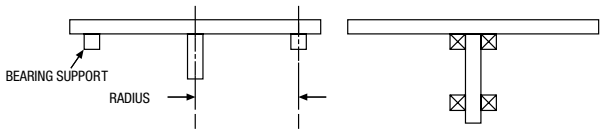
An axis supported cylinder is 3 Ft. in diameter and is half full of semi-solids mixture weighing 400 Lbs. How much torque is required (at the axis) to rotate the cylinder?

Determine the Effective Radius: .15 x (3 x 12) = 5.4 In.

Calculate Torque: 400 x 5.4 = 2160 Lb. Ins.

Q

Turntables



Here, too, turntable applications appear to lend themselves to overspecification of the speed reducer.

This type of problem involves rotation of weight in a horizontal plane, and in most cases the torque must only overcome the friction between the turntable and its supporting bearings. Assuming that the speed of rotation will be slow, the bearing loads caused by centrifugal forces (resulting from eccentric loading) may be ignored. Since in most applications, the turntable is supported by anti-friction bearings or rollers, a Table of Rolling Friction Factors is provided to be used in the following calculations.

Table 3. Rolling friction factors

Radial Ball Bearings	.001
Roller Bearings	.0015
Thrust Ball Bearings	.0034
Steel Wheels on Steel	.025
Iron Rollers on Wood	.13
Iron Rollers on Asphalt	.14

In rim supported turntables, a friction factor should be selected on the basis of the type of supporting bearings. The load on the bearings will be the sum of the weight of the turntable itself plus the load; the friction force at the bearings is the product of the total weight and the friction factor.

Force = (Total Weight x Friction Factor)

Torque = (Force) x (Radius)

Example:

A turntable 20 feet in diameter is to rotate a 4500 Lb. automobile. A ring of steel casters (riding on steel) supports the turntable, the casters are located at a radius of 8 feet. The turntable weights 1500 Lbs. How much torque is required to drive the turntable at the axis?

Select .025 as Rolling Friction Factor (Table 3).

Determine weight: 4500 + 1500 = 6000 Lbs.

Determine Friction Force: 6000 x .025 = 150 Lbs.

Determine Torque: 150 x (8 x 12) = 14,400 Lb. Ins.

Center supported turntables do not lend themselves well to calculation because the bearings are on the supporting shaft. The scale measurement of the torque will provide the most accurate value. If this is not possible, the mean radius of the bearing may be used in the above formulas with some degree of accuracy.

Application Formulas

TO OBTAIN	HAVING	FORMULA
Velocity (V) Feet Per Minute	Pitch Diameter (D) of Gear or Sprocket - Inches and Revolutions Per Minute (RPM)	$V = .2618 \times D \times RPM$
Revolutions Per Minute (RPM)	Velocity (V) Feet Per Minute and Pitch Diameter (D) of Gear or Sprocket - Inches	$RPM = \frac{V}{.2618 \times D}$
Pitch Diameter (D) of Gear or Sprocket	Velocity (V) Feet Per Minute and Revolutions Per Minute (RPM)	$D = \frac{V}{.2618 \times RPM}$
Torque (T) In. Lbs.	Force (W) Lbs. and Radius (R) Inches	$T = W \times R$
Horsepower (HP)	Force (W) Lbs. and Velocity (V) Feet Per Minute	$HP = \frac{W \times V}{33000}$
Horsepower (HP)	Torque (T) In. Lbs. and Revolutions Per Minute (RPM)	$HP = \frac{T \times RPM}{63025}$
Torque (T)	Horsepower (HP) and Revolutions Per Minute (RPM)	$T = \frac{63025 \times HP}{RPM}$
Force (W) Lbs.	Horsepower (HP) and Velocity (V) Feet Per Minute	$W = \frac{33000 \times HP}{V}$
Revolutions Per Minute (RPM)	Horsepower (HP) and Torque (T) In. Lbs.	$RPM = \frac{63025 \times HP}{T}$

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Q

1. Quotations and Their Acceptance

Unless otherwise specified, quotations on stock products are for immediate acceptance, subject to prior sales. Quotations on special products are made subject to acceptance within sixty (60) days from date thereof, but in making such quotations, the Company reserves the right to change or cancel them at any time prior to the receipt of the customers' written acceptance. All quotations for special products are based upon supplying up to plus or minus 5% of quantity ordered unless otherwise stated in the quotation. All quotations are made F.O.B. shipping point.

2. Prices

Prices are in accordance with current Company price lists, are based on quantity specified and are subject to minimum order requirements of the Company. In the event the Company consents to the cancellation or suspension of orders, it shall be entitled to charge for work done and material ordered or used up to the time of giving its written consent to such cancellation or suspension. When work is to be done on material furnished by the customer, prices are based on the quantity specified being delivered by the customer at one time within a reasonable time after acceptance of order. Quotations will be made on special products of all types or on cutting only. Prices, specifications, and terms and conditions, as well as all statements appearing in the Company's catalogs and advertisements, and made elsewhere by the Company are subject to change without notice. Changes by the customer in specifications or delivery requirements will be subject to change in price. Whenever the net price of an order amounts to less than $25.00, a minimum charge of $25.00 will be made.

3. Credit Terms

To those customer and prospective customers whose credit is satisfactory to the Company, terms are net thirty (30) days, from date of invoice, with the option of paying semi-monthly. The Company may at any time when, in its opinion, the financial condition of the customer or prospective customer warrants it, either alter or suspend credit, or discontinue deliveries, and render a charge covering the value of any partially finished special products which are then being manufactured for the customer. In those instances where credit is not established, and in cases where satisfactory references are not given, the terms are cash with order. For special products in those instances where credit is not established to the satisfaction of the Company, a deposit of at least 50% of total value of the order is required. Remittances should be made by check or money order, payable to the Boston Gear, P.O. Box 521 South Beloit, IL 61080, U.S.A. Delays in transportation shall not exceed the terms of payment.

4. Material Furnished by The Customer

Unless otherwise specified, quotations are based on material furnished by the customer being of ordinary hardness, normal allowance for finish, uniform specification, and machine work being of ordinary commercial accuracy. If material furnished by the customer involves the Company in expense not contemplated by the contract, the customer will be charged for all such additional expense. If serious defects are found in the material furnished by the customer, the customer will be charged for the actual work done. The Company assumes no responsibility for, and will not be liable for loss of or damage to samples, blueprints, diagrams, and other material of any nature submitted or furnished by the customer or prospective customer, provided the Company has exercised reasonable care in the handling of the same. The Company does not assume transportation and insurance costs on any of the foregoing items. In all cases where the customer or prospective customer makes no statement in writing, concerning the disposition of any of the foregoing material when submitted, the Company reserves the right to dispose of such material according to its best judgement.

5. Dimensions

When dimensions of rims, bores, and hubs are not clearly specified, quotations are based on ordinary dimensions. Before the customer's blanks are accepted by the Company for cutting, the diameter, holes, rims, and ends of holes must be finished; for bevel gears, hubs, must be of uniform length. There should also be an allowance of extra blanks to cover possible spoilage. Unless otherwise specified, dimensions are in inches.

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6. Samples

In no case are samples furnished free. If agreed to by the Company, a few products in advance of a regular quantity order will be furnished but only at an agreed upon price over the regular quantity price.

7. Taxes

If any tax is at any time levied or imposed by the federal or any state or local government, or any other taxing authority, upon the products covered hereby, or in respect of the production, processing, manufacture, storage, sale, use, or consumption thereof, or, in the case of goods delivered at the Company's expense, upon the transportation thereof, including freight charges thereon, the amount of such tax shall be added to the purchase price above specified and shall be borne by the customer. The Company will accept a valid exemption certificate from the customer if applicable; however, if any exemption certificate previously accepted is not recognized by the taxing authority involved and the Company is required to pay the tax covered by such exemption certificate, the customer shall be required to promptly reimburse the Company for the taxes so paid.

8. Shipments

All shipments are made F.O.B. shipping point (subject to freight allowance under conditions stated in separate price schedules). When ordering, the customer's desired method of shipment must be clearly stated. Where instructions for shipping do not appear on the order, shipment will be made according to the Company's best judgment. Full risk of loss (including transportation delays and losses) shall pass the customer upon delivery of the products to F.O.B. point. Unless otherwise instructed, all Parcel Post shipments are insured at the customers' expense. Parcel Post shipments without insurance are at the customer's risk. Deliveries by Messenger Service to a terminal are made at the customer's risk and expense. Partial shipments shall be permitted and the Company may invoice each shipment separately.

9. Refusal of Shipment

In case of the refusal or inability of the customer to accept any shipment in accordance with the terms of the order, the customer shall be liable for freight, express, storage, extra cost of handling and all other expenses incurred by the Company as a result of such refusal or inability.

10. Delay or Nonperformance

The Company shall not be liable for any delay or loss of any nature or failure in performance due to or caused by fire, flood, strike, or other differences with workmen, accidents, labor or material or transportation shortages, war (declared or undeclared), insurrection, riot, or by any governmental orders or regulations, legal interferences or prohibitions, defaults on the part of suppliers or other causes beyond the Company's reasonable control.

11. Claims and Rejected Material

Any products which have been altered or damaged are not returnable except with the Company's written consent. To reject products on inspection as defective, customer must notify the Company in writing within ten (10) days from receipt of the products. Before allowing or rejecting claim, the Company shall then have the option of reinspection at the customer's plant or its own. Defects that do not impair service shall not be a cause for rejection. The Company shall have the right to replace within a reasonable time any product or products which in its opinion do not conform to the order. No claim will be allowed for any products damaged by the customer or damaged in transit. Expenses incurred in connection with claims for which the Company is not liable, will be charged to the customer. The Company will not be responsible for any work done to correct errors unless such work is authorized by the written consent of the Company. The Company assumes no liability for any claim for infringement of any foreign or domestic patent.

12. Limited Warranty

The Company warrants that products manufactured or sold by it shall be free from defects in material and workmanship. Any products which shall within two (2) years of delivery, be proved to the Company's satisfaction to have been defective at the time of delivery in these respects will be replaced or repaired by the Company at its option. Freight is the responsibility of the customer. The Company's liability under this limited warranty is limited to such replacement or repair and it shall not be held liable in any form of action for direct or consequential damages to property or person. THE FOREGOING LIMITED WARRANTY IS EXPRESSLY MADE IN LIEU OF ALL OTHER WARRANTIES WHATSOEVER, EXPRESS, IMPLIED AND STATUTORY AND INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS.

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13. Waiver of Breach

No waiver by the Company of any breach of these provisions shall constitute a waiver of any other breach.

14. Consequential Damages

The Company shall not be liable to the customer or others claiming through the customer for special or consequential charges for any reason whatsoever.

15. Laws

To the best of the Company's knowledge and belief it is in compliance with all local, state and federal laws. All orders are subject to the condition that the Company's obligation under such local, state and federal laws and Executive Orders, Rules and Regulations issued thereunder, whether now in force or hereafter made effective, shall be no greater as a result of this agreement and no greater than required by such laws and the Company expressly disclaims assumptions of any of the customer's obligations under such laws.

16. General

Any terms and conditions of a customer's order which are inconsistent with or additional to the terms and conditions hereof shall not be binding on the Company and shall not be considered applicable to any sale or shipment of the Company's products. All such terms and conditions are hereby expressly rejected. No waiver, alteration or modification of any of the Company's terms and conditions shall be binding on the Company unless made in writing and agreed to by a duly authorized official of the Company.

17. Printers, Stenographic, and Clerical Errors

The Company is not responsible for printers' errors made in any of its publications and other forms of printed matter, or for any stenographic and clerical errors. All such errors are subject to correction.

18. Reducer Express

- Quantities of reducers covered as part of this program are a maximum of:
  6 pieces for any 710-726 or 221-231 and 832-843
  2 pieces for any 730-760 or 239-247 and 852-873
- Bost-Kleen, Stainless Bost-Kleen and modified reducers are not included as part of this program.
- Boston Gear will utilize any major courier to handle air shipments.
- Consult Boston Gear for details.

19. Guaranteed Same Day Shipment

- Products must be available from stock.
- Does not apply to WOG or scheduled release shipments.
- Same day shipment available Monday through Friday excluding U.S. holidays. For emergency service, please call 704-688-7350.
- In the event your freight carrier is unable to meet your requirements, we reserve the right to substitute a carrier of equivalent quality.
- If a shipment is missed and Boston Gear pays the freight, we'll pay for the freight charges as they were originally specified on the order.
- Brokerage and export fees still apply to shipments outside the U.S.
- Video Terminal Orders entered up to 8 p.m. Eastern Time will be shipped the same day.

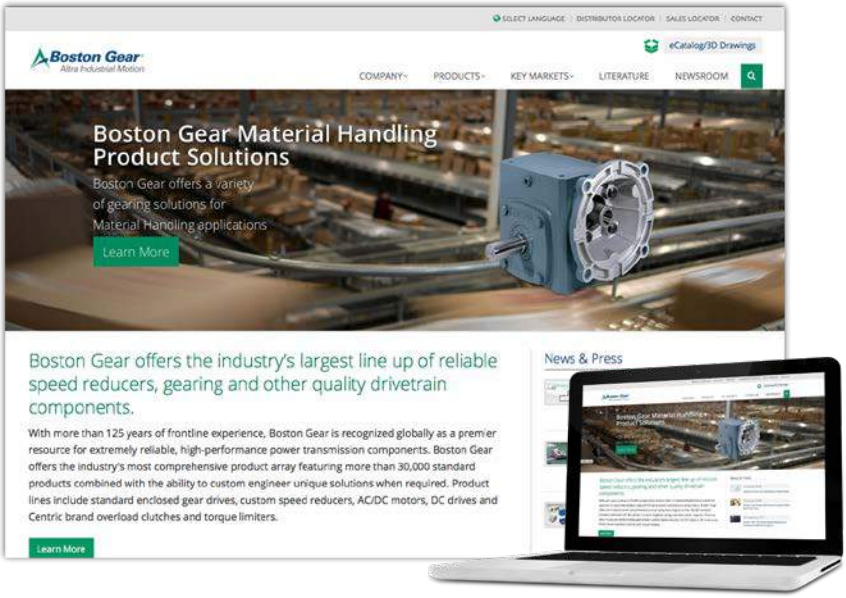
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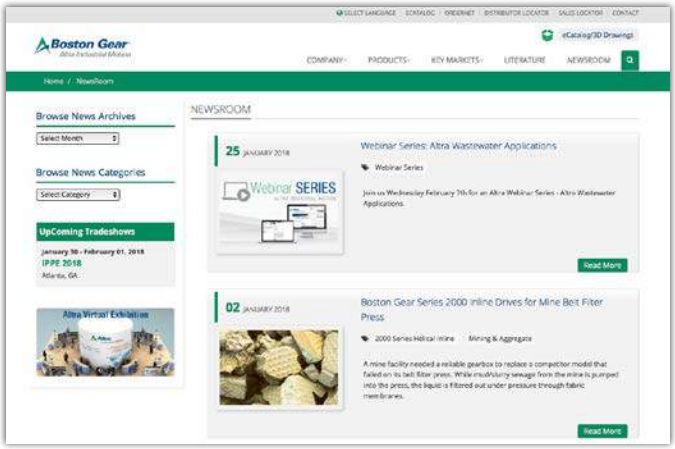
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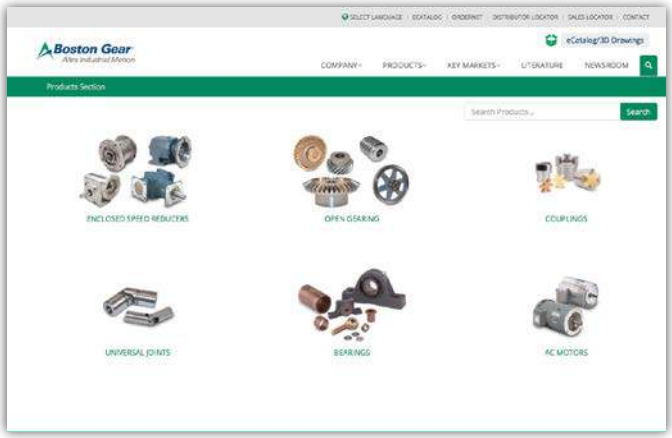
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