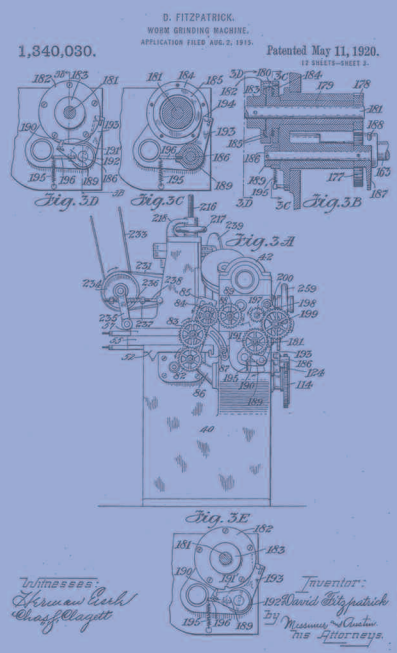
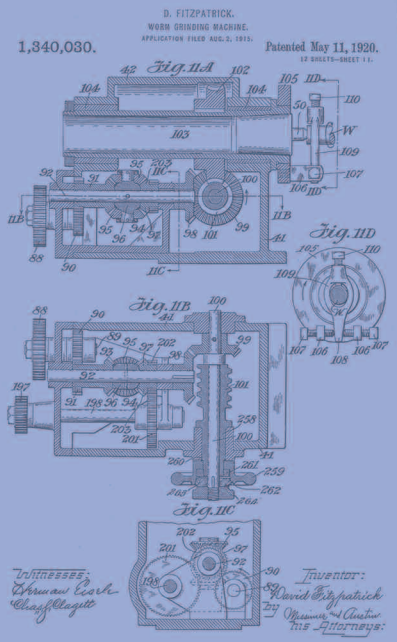

D. FITZPATRICK.
WORM GRINDING MACHINE.
APPLICATION FILED AUG. 2, 1915.
1,340,030. Patented May 11, 1920.
12 SHEETS—SHEET 3.
Fig. 3D
Fig. 3C
Fig. 3B
Fig. 3A
Fig. 3E
Witnesses:
Inventor:
David Fitzpatrick
by Masons & Austin
his Attorneys.


D. FITZPATRICK.
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1,340,030. Patented May 11, 1920.
12 SHEETS—SHEET 11.
Fig. 11A
Fig. 11D
Fig. 11B
Fig. 11C
Witnesses:
Inventor:
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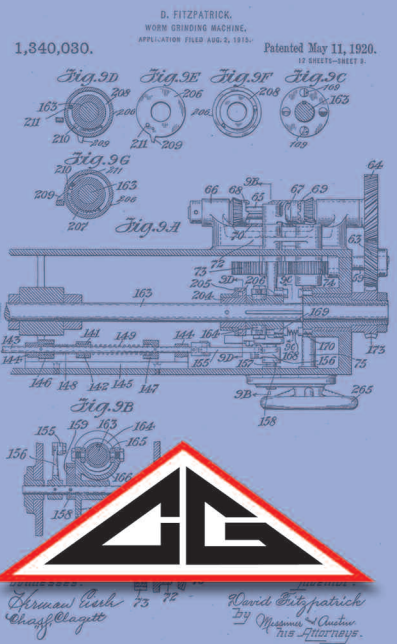
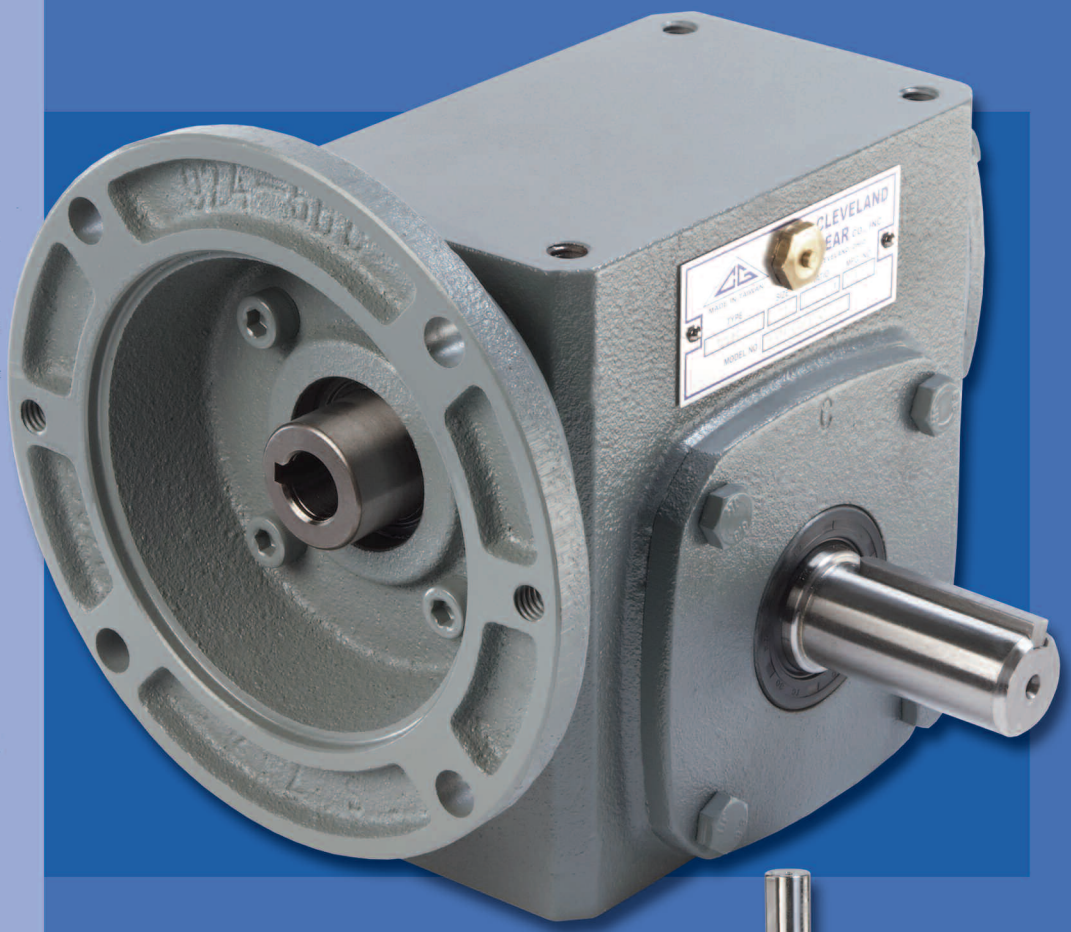
his Attorneys.

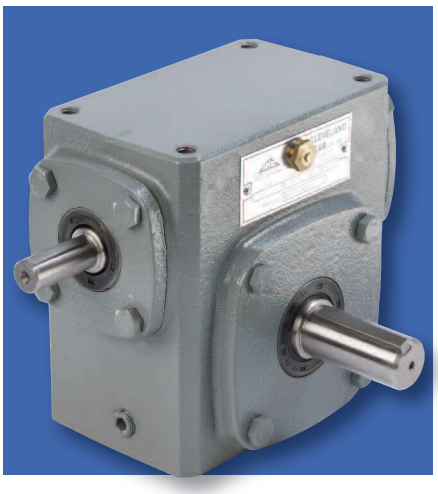

D. FITZPATRICK.
WORM GRINDING MACHINE.
APPLICATION FILED AUG. 2, 1915.
1,340,030. Patented May 11, 1920.
12 SHEETS—SHEET 9.
Fig. 9D
Fig. 9E
Fig. 9F
Fig. 9C
Fig. 9G
Fig. 9A
Fig. 9B
Witnesses:
Inventor:
David Fitzpatrick
by Masons & Austin
his Attorneys.



MODULAR SPEED REDUCERS

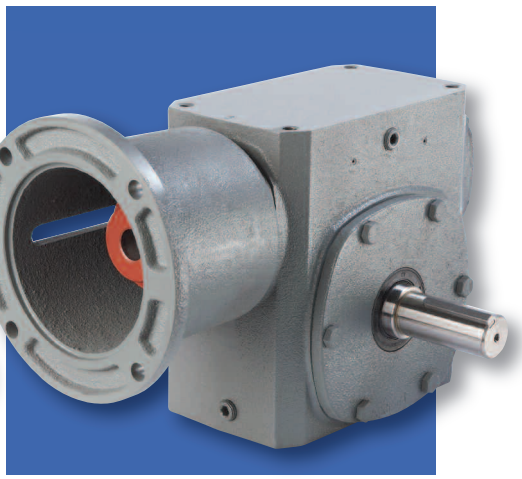
Cleveland

MODULAR SPEED REDUCERS

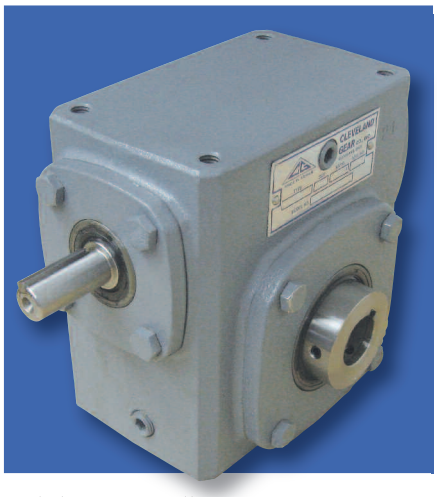


Solid Input/Solid Output

Quill Input/Solid Output



Coupling Style Input-
Flower Pot /Solid Output

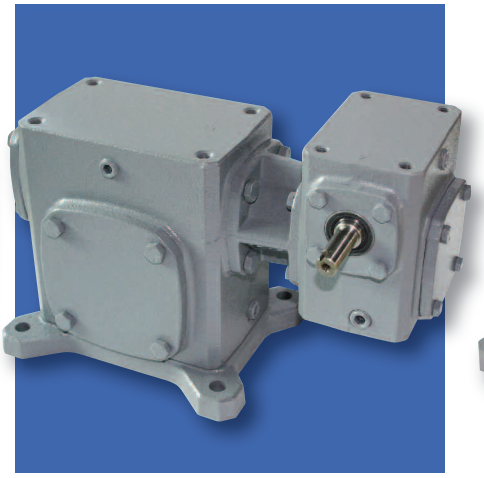


Solid Input/Hollow Output

Quill Input/Hollow Output

Coupling Style Input-
Flower Pot /Hollow Output

Quill Input, Hollow Output w/
Mounting Flange



Double Reduction Worm/Worm
Solid Input/Solid Output with
Horizontal Mounting Base

Double Reduction Worm/Worm
Quill Input/Vertical Solid Output

THE CLEVELAND GEAR QUALITY ASSURANCE MISSION

FIRST IN GEARS, FIRST IN EXCELLENCE

Cleveland Gear has been producing open gearing and enclosed drives for over 100 years. We were the first company in the U.S. to manufacturer worm gearing for mass production. Today Cleveland Gear is recognized as the industry leader in gearing and enclosed drives. Our solutions cover a wide variety of critical applications in the most demanding operating conditions. Every member of the Cleveland Gear organization recognizes that they play an important role in delivering the product and service that our customers believe are the best available in the industry. "Our mission is to continually improve our processes, products and services to ensure value, company growth and prosperity for our customers,employees and business owners." Everyone in the Cleveland Gear organization is fully aware that they play an important role in achieving this mission and thereby achieving the highest standards of quality in all facets of our company operations. We are committed to providing the products and services that our customers believe are the best available in the industry.

ISO-9001 DNV CERTIFICATED FIRM

The ISO 9001 certification was achieved several years ago and this was a culmination of our effort to both record the processes we use in our quality assurance efforts and demonstrates that these processes were in fact being put into practice in our every day operations. Our processes are continually reviewed and we make necessary revisions to continuously improve output, our products and service.

Cleveland Gear reducer line includes:

Modular Speed Reducer
M Series 1.33 C.D. to 5.25 C.D., Single reduction, Double reduction, Helical-worm and worm-worm.

Modular Speed Reducers
WG Series 40MM C.D. to 200 MM C.D., Integral worm and input shaft, Four bearing design standard, Alloy bronze gear, Internally cast chevron and Cast iron housing.

Modular-Helical Ratio Multipliers
RM Series, Helical Ratio Multiplier, 3 case sizes, 5 ratios, Rugged cast iron housing, Helical surface hardened and finished steel gears.

Millenium Gear Drives
Millenium Series 5.0"C.D. to 12.0"C.D. , Single and Double reduction, Helical worm version, Bronze gear rims, Flame hardened worms, Rugged housings, Large gear shaft diameters, Generously sized bearings.

500AF/RF/DF Enclosed Drives
3.0"C.D. to 12.0"C.D. Fan cooled, Rugged housing, Increased oil capacity, Centrifugally cast bronze gears, Flame hardened worms, Large gear shaft diameters, Generously sized bearings.

Helical Shaft - Mount and Screw Conveyor Drives
CGUSM Series. Suitable for Class I,II or III applications, Helical gearing, Alloy steel shafts, Double lip spring loaded shaft seals, Oversized bearings, High strength cast iron housings. Available in sizes 2-9.

Cleveland Gear has earned its reputation as first in gears, first in excellence. We are committed to the continuos improvement of our product.

TABLE OF CONTENTS

MODULAR SPEED REDUCER

CLEVELAND GEAR REDUCERS 1.33" to 5.25"
AVAILABLE FROM FACTORY STOCK

SEALS

- **Duel lip shaft seals** improve sealing potential
- **Standard commercial designs** replacements widely available

OUTPUT SHAFT

- **Medium Carbon steel** provides superior strength
- **Step shaft design** prevents pressed bearing seal surface scarring
- **Solid or hollow output shafts** modifiable per customer/application requirements

WORM GEAR

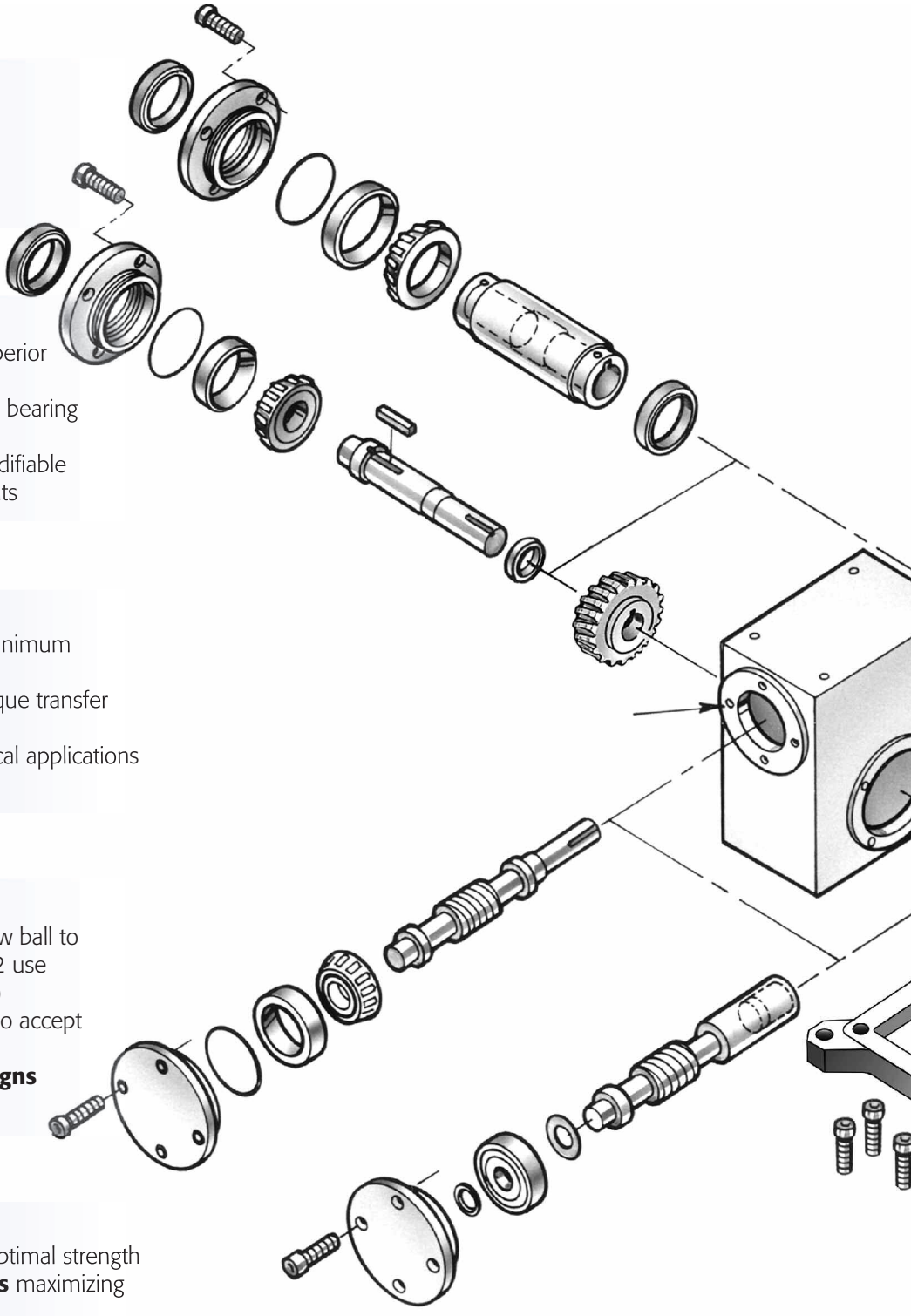
- **Centrifugally cast bronze alloy** minimum stress 71,00 psi
- **Keyed to shaft** ensures positive torque transfer
- **Rated per AGMA standards:**
  - Designed for high reliability in critical applications
  - Based on 25,000 hours of service

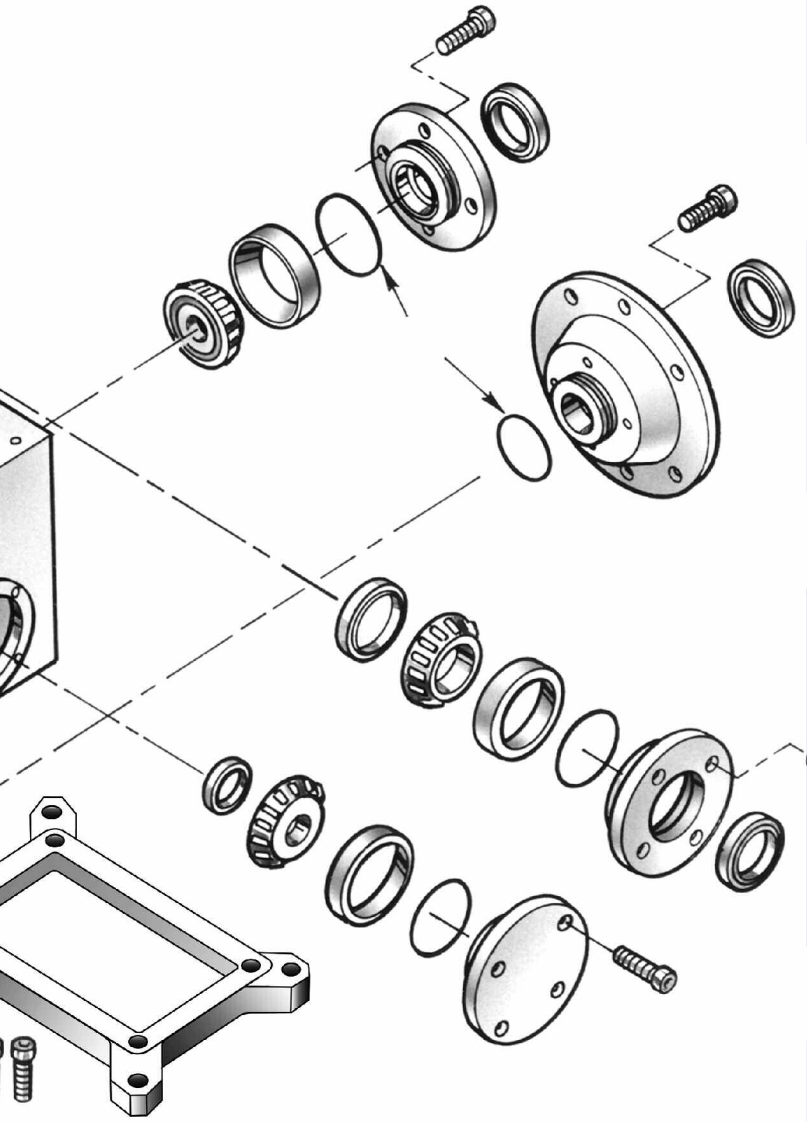
BEARINGS

- **Worm shafts** large single/double row ball to support the radial loads. Size 42 & 52 use tapered roller bearings (back-to-back)
- **Gear shafts** tapered roller bearings to accept radial, thrust and overhung loads
- **All are standard commercial designs** replacements widely available

WORM

- **Integral worm shaft/quill** yields optimal strength
- **Optimized pressure & lead angles** maximizing efficiency and tooth strength
- **Case hardened teeth** optimizing service life
- **Ductile core** maximizes shear capacity
- **Ground thread** ensures accuracy for proper contact & torque transmission





HOUSINGS

- **Modular design** improves cost & availability
- **Large lubrication capacity** ensures low operating temperatues
- **One piece close grain cast iron** improves quality
- **No cover drill thru holes** eliminates leakage opportunities
- **Large surface area** improves heat dissipation

MOTOR ADAPTER

- **Multiple sizes** to accept all NEMA frame motors
- **Quill motor adapters:**
  - External surface cast without cavities for food industry service
  - Designed with "jacking holes" for ease of motor removal

COVERS

- **Close grain cast iron** improves quality
- **O-ring cover seals** insures positive sealing
- **Hard shims:**
  - eliminates gasket creep relaxation
  - easily measured and replaced when changing assembly
- **Bolt-on designs:**
  - provides accurate gear mesh shimming
  - Minimizes changes of assembly problems

MOUNTING BASE

- **Machined cast iron** for horizontal or vertical mounting
- **Can be adapted** to match existing mounting arrangements

All weights, dimensions and ratings in this catalog are subject to change.
For construction use certified prints, weights and ratings only, available from factory.

M-SERIES PART NUMBER BREAKDOWN

M H

UNIT SIZE
13 - 133
15 - 154
17 - 175
20 - 206
23 - 238
26 - 262
30 - 300
32 - 325
42 - 425
52 - 525

NOTE: Use size of secondary unit to designate double reduction unit sizes.

Reductions
1 - Single
2 - Double

Style

Input	Output
1 - Solid	Solid
2 - Solid	Hollow
3 - Quill	Solid
4 - Quill	Hollow
5 - Fl. Pot	Solid
6 - Fl. Pot	Hollow

Input Options
A - Solid SHAFT
B - 56C
C - 143TC/145TC
D - 182TC/184TC
E - 213TC/215TC

Output Options
A - Solid SHAFT
1 - See chart
2 - See chart
3 - See chart
4 - See chart
5 - See chart

Model
H - Standard
G - Grove

Lubrication
Blank - No Oil
- M = Mineral Oil
- S = Synthetic (PAO)
- P = PAG Oil
- F = H1 Oil

Mounting Options
A - Bolt-on base
B - Side mount
C - Torque arm

Output Shaft Arrangement
A - Double
B - Left Hand
C - Right Hand
Double Reduction-
See page 9

Ratio
Use minimum of 2 digits (05), to maximum 4 digits (3600)

Factory Use

OUTPUT SHAFT HOLLOW BORE SIZE

UNIT SIZE	#1	#2	#3	#4	#5
13	5/8				
15	5/8				
17	5/8	11/16	3/4	7/8	1
20	1	1 1/8	1 3/16	1 1/4	1 7/16
23	1	1 1/8	1 3/16	1 1/4	1 7/16
26	1	1 1/8	1 3/16	1 1/4	1 7/16
30	1 1/4	1 1/2	1 5/8	1 3/4	1 15/16
32	1 1/4	1 1/2	1 5/8	1 3/4	1 15/16
42	1 3/4	1 7/8	1 15/16	2	2 3/16
52	2	2 7/16	2 15/16	3	3 7/16

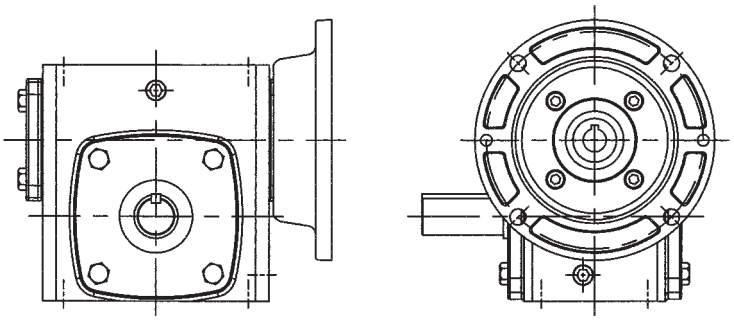
Other sizes available on request–
Consult factory

PART NUMBERING SYSTEM

SAMPLE PART NUMBERING DESIGNATIONS

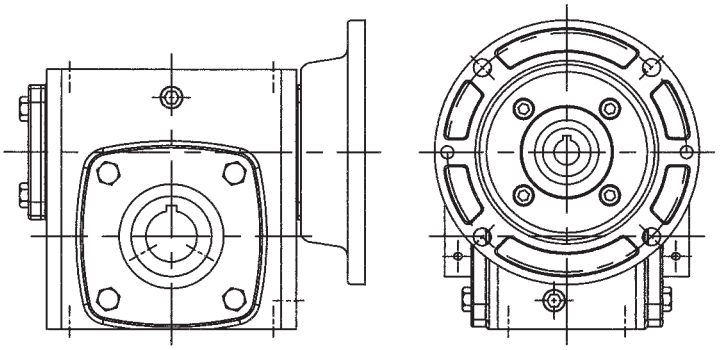
1. Unit size 17; single reduction, with quill shaft input for 56C frame motor; solid output shaft, ratio 20:1; shaft arrangement B.

M 1 7 1 3 B A H 2 0 B



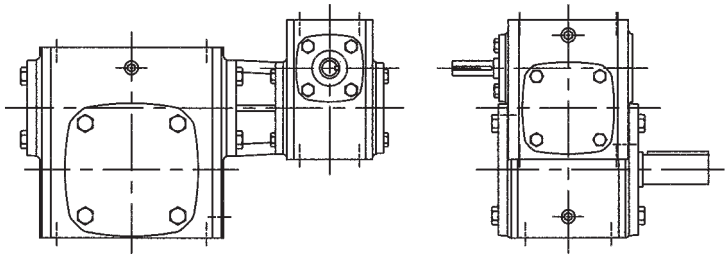
2. Unit size 17; single reduction, with quill shaft input for 56C frame motor; hollow output shaft with 1.000" bore (size #5); ratio 40:1; shaft arrangement A.

M 1 7 1 4 B 5 H 4 0 A



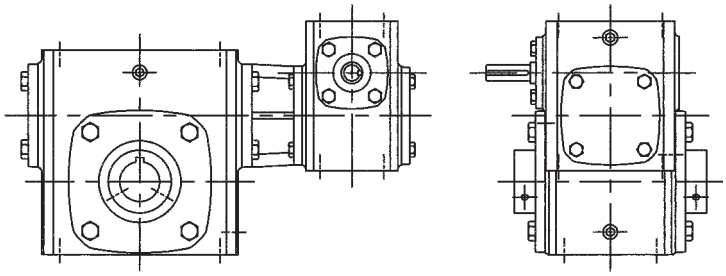
3. Unit size 13-17; double reduction, with solid input shaft; solid output shaft; ratio 375:1; shaft arrangement I; with ISO 460 Synthetic Oil.

M 1 7 2 1 A A H 3 7 5 I - S



4. Unit size 13-17; double reduction, with solid input shaft; hollow output shaft with 1.000" bore (size #5); ratio 1200:1; shaft arrangement G.

M 1 7 2 2 A 5 H 1 2 0 0 G



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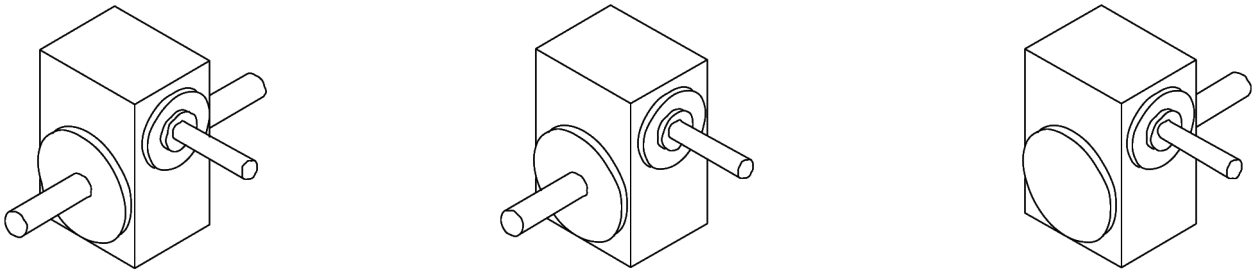
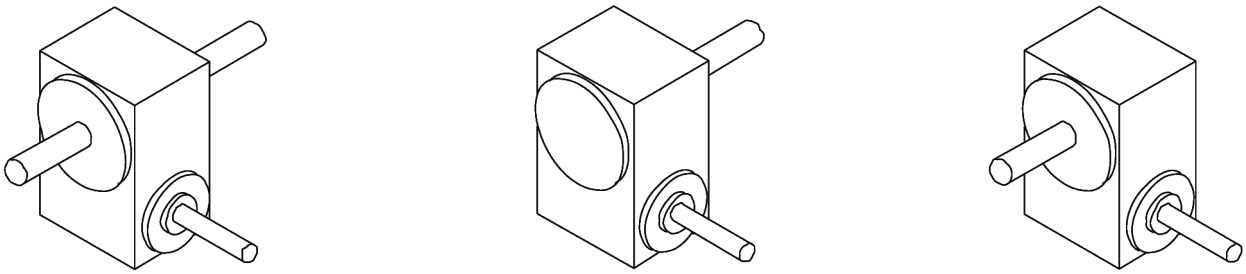
STANDARD SINGLE REDUCTION ARRANGEMENTS

WORM OVER / SOLID OUTPUT



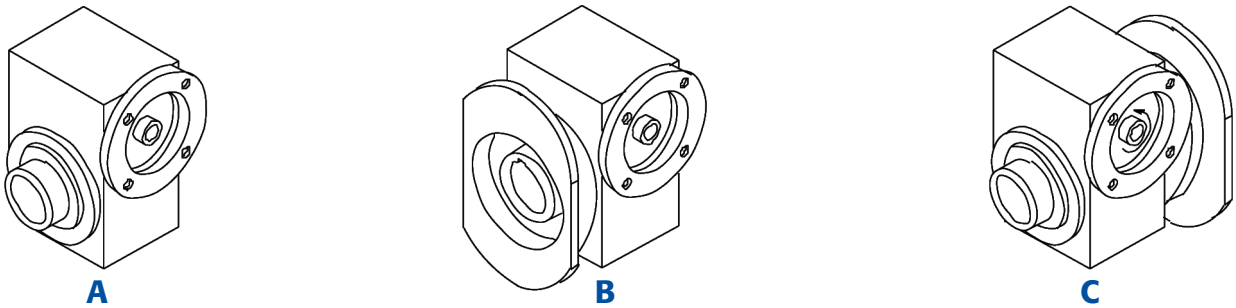
A B C

WORM UNDER / SOLID OUTPUT



A B C

WORM OVER / HOLLOW OUTPUT SHAFT



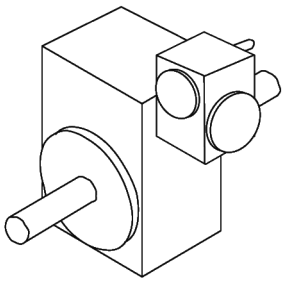
A B C

Note:
All arrangements are shown from the input side. All units are shipped as standard, without oil, and the breather is shipped loose. See lubrication page 38 & 39 for correct oil level and breather location.

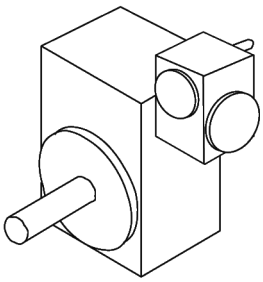
All weights, dimensions and ratings in this catalog are subject to change.
For construction use certified prints, weights and ratings only, available from factory.

STANDARD DOUBLE REDUCTION ARRANGEMENTS

PRIMARY WORM OVER / SECONDARY WORM OVER



A



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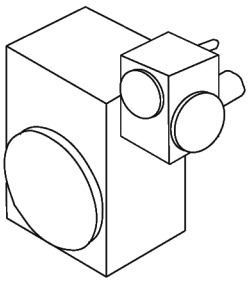
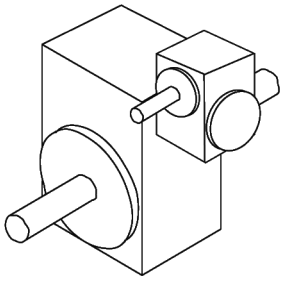
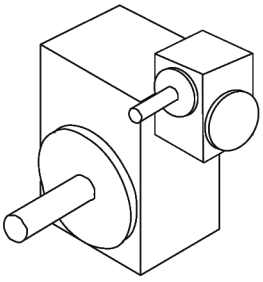


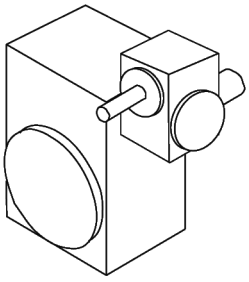
C



G

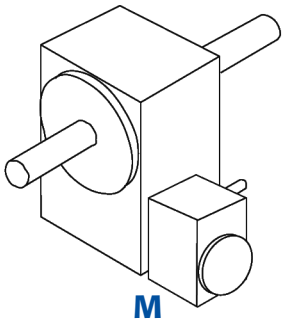


H



I

PRIMARY WORM OVER / SECONDARY WORM UNDER



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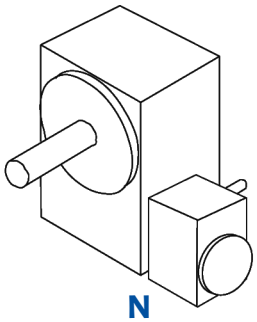
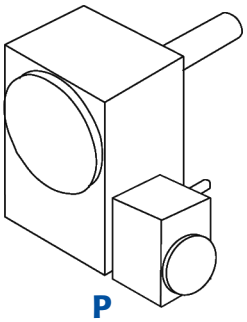


N



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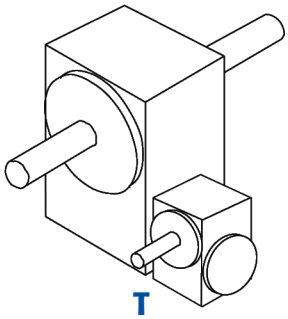
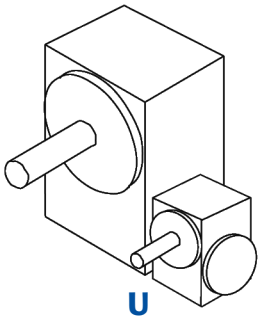
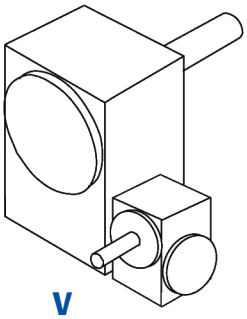


T



U



V

For hollow output, use double output designation, eg. M or T. If equipped with side mount, use output designation to specify side of unit for side mount assembly, eg. N, P, U or V. Consult factory for other assembly variations.

SELECTION PROCEDURE

SELECTION PROCEDURE

1. Determine the service factor for the application from Table 1 below. A service factor is necessary to adapt the unit to the various operating conditions as shown in the list of common applications.

2. Calculate the Equivalent Input HP by multiplying the specified or prime mover nameplate power by the service factor determined in step 1. In the event the unit selection is to be based on output torque, apply the service factor to the required torque. If an expected peak load is more than 2 times the equivalent HP/torque, then calculate a second equivalent HP/torque by dividing the peak power by 2 and use this value for size selection.

3. Calculate the ratio required by dividing the input speed by the output speed. Single reduction for ratios 5:1 to 100:1. Double reduction for ratios 50:1 to 3600:1.

4. Refer to the rating tables and select a unit size that has an input HP or nominal torque rating equal to or greater than the equivalent rating calculated in step 2. Refer to the following tables for selections.

- Table 2 or 3 on page 11 for a quick selection of unit size by motor input HP or output torque. These tables apply to single reduction units only at service factor 1.0.

- Table 4 on pages 12-14 for mechanical ratings and size selection of single reduction units for ratio range from 5:1 to 100:1. (PAO oil selection chart).

Table 1: Service factors

PRIME MOVER	DURATION OF SERVICE PER DAY	DRIVEN MACHINE LOAD CLASS		
		UNIFORM	MEDIUM SHOCK	HEAVY SHOCK
Electric motor	Occasional 1/2 hr.	.80	.90	1.00
	Intermittent 2 hrs.	.90	1.00	1.25
	10 hrs.	1.00	1.25	1.50
	24 hrs.	1.25	1.75	1.75
Electric motor with frequent starts & stops ≥ 10hrs.	Occasional 1/2 hr.	.90	1.00	1.00
	Intermittent 2 hrs.	1.00	1.25	1.25
	10 hrs.	1.25	1.50	1.50
	24 hrs.	1.50	1.75	1.75
Multi-cylinder internal combustion engine	Occasional 1/2 hr.	.90	1.00	1.00
	Intermittent 2 hrs.	1.00	1.25	1.25
	10 hrs.	1.25	1.50	1.50
	24 hrs.	1.50	1.75	1.75
Single cylinder internal combustion engine	Occasional 1/2 hr.	1.00	1.25	1.25
	Intermittent 2 hrs.	1.25	1.50	1.50
	10 hrs.	1.50	1.75	1.75
	24 hrs.	1.75	2.00	2.00

EXAMPLE

Driver: 1 HP @ 1750 RPM electric motor.
Driven machine: heavy duty not uniformly fed belt conveyor, operating 10 hours/day at pulley speed of 120 rpm.

1. Service factor = 1.25 from Table 1.

2. **HP method:**
   Equivalent input HP =
   1 HP (motor) x 1.25 = 1.25 Design HP @ 1750 rpm
   Output torque method:
   Equivalent output torque =
   $\frac{\text{HP x S.F. x 63025 x eff.}}{\text{Output speed}} =$

   $\frac{1 \text{ HP x } 1.25 \text{ x } 63025 \text{ x } .87}{120 \text{ RPM}} = 571 \text{ in lbs.}$
3. Ratio = 1750 RPM ÷ 120 RPM = 14.58: 1
   (Use 15:1 in rating tables)

4. **HP method:**
   Refer to tables on pages 12 -14 for single reduction units. Unit size 206 with a ratio of 15:1 has a rating of 1.68 HP @ 1750 RPM which exceeds required 1.25 HP.

   Output torque method:
   Tables on pages 12 -14 shows output torque rating for size 206 of 785 in-lbs. which exceeds required 571in-lbs.

Typical load classifications for some common applications.
See Table 1 for more detailed listing of applications.

UNIFORM LOAD
Agitators and mixers - pure liquid constant density
Blowers and compressors - centrifugal vane type
Pumps - centrifugal, rotary, gear type
Elevators and conveyors - uniformly loaded or fed

MEDIUM AND OCCASIONAL SHOCK LOAD
Agitators and mixers - Variable density liquids
Compressors - reciprocating mult-cylinder
Elevators and conveyors - heavy duty not uniformly fed
Pumps - reciprocating

HEAVY CONSTANTLY RECURRING SHOCK LOAD
Compressors - reciprocating single cylinder
Conveyors, heavy-duty - heavy duty not uniformly fed
Crushers - ore, stone
Hammer mills - mills, rotary tube type, barrels

QUICK SELECTION TABLES*

Table 2

Quick Selection of single reduction unit size using standard motor HP @ 1750 rpm input.
To be used for service factor 1.0 applications only.

RATIO	OUTPUT RPM	MOTOR HP												
		1/6	1/4	1/3	1/2	3/4	1	1 1/2	2	3	5	7 1/2	10	15
5	350.0						13	15	17	20	26	32	32	42
7.5	233.3					13	15	17	20	23	26	32	42	42
10	175.0					13	15	17	20	23	30	32	42	52
15	116.7				13	15	17	20	23	30	32	42	42	52
20	87.5			13	15	17	20	23	26	30	42	42	52	
25	70.0			13	15	17	20	23	26	32	42	52	52	
30	58.3			13	15	20	23	26	30	32	42	52		
40	43.8		13	15	17	20	23	30	32	42	52			
50	35.0	13	15	17	20	23	26	30	32	42	52			
60	29.2	13	15	17	20	26	30	32	42	52				
80	21.9	15	20	23	26	30	32	42	52					
100	17.5	20	23	26	30	42	42	52	52					

Table 3

Quick Selection of single reduction unit size using output torque with 1750 rpm input.
To be used for service factor 1.0 applications only.

RATIO	OUTPUT RPM	UNIT SIZE									
		13	15	17	20	23	26	30	32	42	52
5	350.0	222	303	345	597	718	976	1243	1741	2997	5236
7.5	233.3	238	340	458	653	954	1219	1673	2241	3755	6184
10	175.0	264	372	496	763	1093	1350	1965	2554	4541	7087
15	116.7	279	385	493	785	1165	1396	2212	2561	4853	7294
20	87.5	281	399	556	834	1206	1574	2190	3057	4994	7970
25	70.0	282	395	540	821	1212	1590	2306	3055	5069	8033
30	58.3	286	395	506	810	1186	1514	2258	2938	4976	7905
40	43.8	296	393	540	825	1203	1563	2167	3020	4885	7947
50	35.0	264	380	510	778	1167	1536	2222	2941	4717	7728
60	29.2	246	395	485	766	1077	1452	2034	2849	4363	7487
80	21.9	204	318	388	603	913	1192	1790	2093	3652	6056
100	17.5	161	253	310	485	712	913	1417	1661	2931	5085

* Based upon using PAO Synthetic Oil.

All weights, dimensions and ratings in this catalog are subject to change.
For construction use certified prints, weights and ratings only, available from factory.

SINGLE REDUCTION RATINGS (PAO Synthetic Oil)

Table 4

Mechanical ratings at specified input rpm; service factor 1.0.
HP=Horsepower OPT=Output torque in inch-lbs at the low speed shaft

		C.D.	1.33 INCH			1.54 INCH			1.75 INCH			2.06 INCH		
RATIO	INPUT RPM	OUTPUT RPM	INPUT HP	OUTPUT HP	OPT	INPUT HP	OUTPUT HP	OPT	INPUT HP	OUTPUT HP	OPT	INPUT HP	OUTPUT HP	OPT
5	1750	350.0	1.35	1.23	222	1.84	1.68	303	2.09	1.92	345	3.57	3.31	597
	1150	230.0	1.06	.95	260	1.51	1.35	371	1.73	1.57	429	3.02	2.76	756
	850	170.0	.86	.76	282	1.25	1.11	410	1.44	1.29	479	2.53	2.30	852
7.5	1750	233.3	.98	.88	238	1.41	1.26	340	1.89	1.69	458	2.66	2.42	653
	1150	153.3	.73	.65	267	1.14	1.00	413	1.53	1.35	555	2.16	1.93	795
	850	113.3	.58	.51	286	.94	.82	454	1.26	1.10	611	1.78	1.58	881
10	1750	175.0	.83	.73	264	1.17	1.03	372	1.56	1.38	496	2.35	2.12	763
	1150	115.0	.63	.55	299	.92	.79	434	1.25	1.08	592	1.87	1.66	910
	850	85.0	.51	.43	318	.74	.63	468	1.02	.87	648	1.53	1.34	994
15	1750	116.7	.64	.52	279	.85	.71	385	1.08	.91	493	1.68	1.45	785
	1150	76.7	.51	.40	326	.68	.55	453	.87	.71	586	1.35	1.14	941
	850	56.7	.41	.32	352	.56	.44	491	.71	.58	640	1.12	.93	1030
20	1750	87.5	.48	.39	281	.69	.55	399	.95	.77	556	1.38	1.16	834
	1150	57.5	.37	.29	317	.54	.42	463	.77	.60	662	1.10	.90	988
	850	42.5	.30	.23	337	.44	.34	499	.64	.49	722	.90	.73	1075
25	1750	70.0	.41	.31	282	.56	.44	395	.77	.60	540	1.12	.91	821
	1150	46.0	.31	.23	318	.44	.33	455	.62	.47	642	.91	.71	976
	850	34.0	.25	.18	338	.36	.26	488	.52	.38	700	.75	.57	1065
30	1750	58.3	.38	.26	286	.50	.37	395	.62	.47	506	.96	.75	810
	1150	38.3	.31	.20	334	.40	.28	464	.51	.37	601	.78	.59	968
	850	28.3	.25	.16	361	.34	.23	503	.42	.29	655	.65	.48	1058
40	1750	43.8	.30	.21	296	.39	.27	393	.54	.37	540	.77	.57	825
	1150	28.8	.23	.15	338	.32	.21	456	.44	.29	642	.63	.44	975
	850	21.3	.19	.12	364	.26	.17	491	.37	.24	699	.52	.36	1061
50	1750	35.0	.23	.15	264	.32	.21	380	.43	.28	510	.62	.43	778
	1150	23.0	.18	.11	298	.26	.16	437	.36	.22	605	.51	.34	924
	850	17.0	.14	.09	316	.21	.13	468	.30	.18	660	.42	.27	1007
60	1750	29.2	.19	.11	246	.28	.18	395	.34	.22	485	.52	.35	766
	1150	19.2	.15	.09	282	.22	.14	447	.27	.17	554	.42	.27	891
	850	14.2	.13	.07	301	.18	.11	476	.22	.13	592	.35	.22	961
80	1750	21.9	.12	.07	204	.18	.11	318	.21	.13	388	.32	.21	603
	1150	14.4	.09	.05	224	.14	.08	351	.16	.10	433	.26	.16	691
	850	10.6	.07	.04	234	.11	.06	369	.13	.08	458	.21	.12	740
100	1750	17.5	.08	.04	161	.12	.07	253	.14	.09	310	.22	.13	485
	1150	11.5	.06	.03	177	.09	.05	276	.11	.06	341	.18	.10	552
	850	8.5	.05	.02	185	.07	.04	289	.09	.05	358	.15	.08	589
O.H.L. (overhung load)			300 LBS			500 LBS			700 LBS			700 LBS		

Note:
All torque values listed in inch-pounds, all overhung load values listed in pounds. The point of application of the overhung load is considered to be one shaft diameter measured outward from the gear case housing.

SINGLE REDUCTION RATINGS (PAO Synthetic Oil)

Table 4 cont.

Mechanical ratings at specified input rpm; service factor 1.0.
HP=Horsepower OPT=Output torque in inch-lbs at the low speed shaft

		C.D.	2.38 INCH			2.62 INCH			3.00 INCH		
RATIO	INPUT RPM	OUTPUT RPM	INPUT HP	OUTPUT HP	OPT	INPUT HP	OUTPUT HP	OPT	INPUT HP	OUTPUT HP	OPT
5	1750	350.0	4.30	3.99	718	5.83	5.42	976	7.38	6.90	1243
	1150	230.0	3.61	3.31	906	4.88	4.48	1229	6.15	5.69	1559
	850	170.0	3.12	2.83	1049	4.29	3.90	1447	5.45	5.00	1853
7.5	1750	233.3	3.93	3.53	954	5.02	4.51	1219	6.90	6.19	1673
	1150	153.3	3.19	2.81	1156	4.07	3.59	1477	5.57	4.91	2019
	850	113.3	2.64	2.32	1290	3.36	2.92	1627	4.64	4.03	2243
10	1750	175.0	3.36	3.04	1093	4.12	3.75	1350	5.98	5.46	1965
	1150	115.0	2.79	2.48	1357	3.45	3.09	1693	5.02	4.51	2473
	850	85.0	2.33	2.04	1513	2.89	2.56	1895	4.30	3.81	2826
15	1750	116.7	2.47	2.16	1165	2.91	2.58	1396	4.58	4.09	2212
	1150	76.7	2.05	1.75	1437	2.36	2.06	1694	3.83	3.36	2760
	850	56.7	1.71	1.43	1596	1.95	1.68	1866	3.21	2.77	3084
20	1750	87.5	1.99	1.67	1206	2.56	2.19	1574	3.49	3.04	2190
	1150	57.5	1.66	1.36	1487	2.14	1.78	1955	2.93	2.49	2732
	850	42.5	1.39	1.11	1651	1.80	1.47	2179	2.47	2.06	3051
25	1750	70.0	1.65	1.35	1212	2.10	1.77	1590	2.98	2.56	2306
	1150	46.0	1.37	1.09	1487	1.71	1.40	1917	2.42	2.03	2780
	850	34.0	1.15	.89	1647	1.42	1.14	2105	2.00	1.65	3052
30	1750	58.3	1.39	1.10	1186	1.71	1.40	1514	2.52	2.09	2258
	1150	38.3	1.17	.89	1458	1.40	1.11	1828	2.13	1.70	2803
	850	28.3	.98	.73	1617	1.17	.90	2009	1.80	1.40	3122
40	1750	43.8	1.12	.84	1203	1.42	1.08	1563	1.91	1.50	2167
	1150	28.8	.95	.68	1481	1.21	.88	1937	1.63	1.23	2695
	850	21.3	.81	.55	1642	1.03	.73	2156	1.38	1.01	3005
50	1750	35.0	.91	.65	1167	1.15	.85	1536	1.60	1.23	2222
	1150	23.0	.78	.52	1429	.95	.68	1850	1.32	.97	2672
	850	17.0	.66	.43	1582	.80	.55	2030	1.10	.79	2930
60	1750	29.2	.71	.50	1077	.95	.67	1452	1.31	.94	2034
	1150	19.2	.59	.39	1279	.80	.54	1760	1.13	.77	2534
	850	14.2	.49	.31	1393	.67	.44	1937	.97	.64	2828
80	1750	21.9	.47	.32	913	.60	.41	1192	.90	.62	1790
	1150	14.4	.38	.24	1057	.48	.32	1387	.75	.49	2150
	850	10.6	.32	.19	1137	.40	.25	1496	.63	.40	2355
100	1750	17.5	.31	.20	712	.38	.25	913	.60	.39	1417
	1150	11.5	.25	.15	816	.30	.19	1025	.50	.31	1684
	850	8.5	.21	.12	874	.25	.15	1116	.42	.25	1836
O.H.L. (overhung load)			920 LBS			1030 LBS			1300 LBS		

Note:
All torque values listed in inch-pounds, all overhung load values listed in pounds. The point of application of the overhung load is considered to be one shaft diameter measured outward from the gear case housing.

SINGLE REDUCTION RATINGS (PAO Synthetic Oil)

Table 4 cont.

Mechanical ratings at specified input rpm; service factor 1.0.
HP=Horsepower OPT=Output torque in inch-lbs at the low speed shaft

		C.D.	3.25 INCH			4.25 INCH			5.25 INCH		
RATIO	INPUT RPM	OUTPUT RPM	INPUT HP	OUTPUT HP	OPT	INPUT HP	OUTPUT HP	OPT	INPUT HP	OUTPUT HP	OPT
★ 5	1750	350.0	10.31	9.67	1741	17.69	16.64	2997	31.84	30.08	5236
	1150	230.0	8.51	7.90	2165	14.91	13.90	3809	26.79	25.12	6655
	850	170.0	7.64	7.03	2607	12.88	11.91	4416	23.70	22.07	7908
7.5	1750	233.3	9.24	8.29	2241	15.48	13.90	3755	25.49	22.89	6184
	1150	153.3	7.61	6.77	2784	12.57	11.12	4573	21.10	18.94	7787
	850	113.3	6.38	5.65	3143	10.90	9.60	5342	18.45	16.41	9128
10	1750	175.0	7.73	7.09	2554	13.71	12.61	4541	21.25	19.68	7087
	1150	115.0	6.49	5.87	3217	11.23	10.19	5584	17.97	16.43	9007
	850	85.0	5.56	4.97	3685	10.25	9.19	6812	15.69	14.20	10525
15	1750	116.7	5.31	4.74	2561	9.98	8.98	4853	14.99	13.50	7294
	1150	76.7	4.63	4.05	3328	8.35	7.38	6069	12.74	11.28	9270
	850	56.7	3.96	3.41	3793	7.49	6.52	7249	11.16	9.72	10813
20	1750	87.5	4.89	4.24	3057	7.97	6.93	4994	12.56	11.06	7970
	1150	57.5	4.27	3.62	3964	6.64	5.64	6178	10.72	9.24	10129
	850	42.5	3.67	3.04	4514	6.07	5.05	7489	9.47	8.01	11878
25	1750	70.0	4.04	3.39	3055	6.61	5.63	5069	10.36	8.92	8033
	1150	46.0	3.45	2.81	3850	5.57	4.61	6316	8.88	7.45	10210
	850	34.0	3.00	2.38	4416	5.06	4.09	7587	7.88	6.47	11992
30	1750	58.3	3.30	2.72	2938	5.51	4.61	4976	8.76	7.32	7905
	1150	38.3	2.90	2.31	3798	4.68	3.79	6235	7.54	6.11	10046
	850	28.3	2.50	1.94	4318	4.23	3.34	7424	6.69	5.28	11737
40	1750	43.8	2.68	2.10	3020	4.31	3.39	4885	6.87	5.52	7947
	1150	28.8	2.37	1.78	3905	3.66	2.76	6051	5.96	4.61	10100
	850	21.3	2.06	1.50	4441	3.38	2.47	7324	5.33	4.00	11853
50	1750	35.0	2.21	1.63	2941	3.46	2.62	4717	5.56	4.29	7728
	1150	23.0	1.92	1.35	3705	2.97	2.15	5882	4.85	3.58	9822
	850	17.0	1.69	1.15	4246	2.73	1.90	7058	4.37	3.11	11541
60	1750	29.2	1.77	1.32	2849	2.76	2.02	4363	4.55	3.47	7487
	1150	19.2	1.49	1.06	3496	2.39	1.66	5464	3.85	2.80	9218
	850	14.2	1.27	.87	3872	2.19	1.46	6512	3.60	2.52	11233
★★ 80	1750	21.9	1.03	.73	2093	1.77	1.27	3652	2.94	2.13	6056
	1150	14.4	.87	.58	2542	1.55	1.05	4604	2.54	1.74	7533
	850	10.6	.74	.47	2802	1.37	.89	5285	2.35	1.55	9070
★★★ 100	1750	17.5	.69	.46	1661	1.18	.81	2931	2.08	1.44	5085
	1150	11.5	.58	.36	1998	1.05	.68	3742	1.82	1.19	6371
	850	8.5	.49	.30	2191	.92	.57	4228	1.67	1.04	7588
O.H.L. (overhung load)			1350 LBS			2250 LBS			2500 LBS		

★ For 5.25" Center Distance, the actual speed ratio Is 4.833:1.
★★ For 5.25" Center Distance, the actual speed ratio Is 79:1.
★★★ For 5.25" Center Distance, the actual speed ratio Is 98:1.

Note:
All torque values listed in inch-pounds, all overhung load values listed in pounds. The point of application of the overhung load is considered to be one shaft diameter measured outward from the gear case housing.

SINGLE REDUCTION RATINGS (PAG Synthetic Oil)

Table 5

Mechanical ratings at specified input rpm; service factor 1.0.
HP=Horsepower OPT=Output torque in inch-lbs at the low speed shaft

		C.D.	1.33 INCH			1.54 INCH			1.75 INCH			2.06 INCH		
RATIO	INPUT RPM	OUTPUT RPM	INPUT HP	OUTPUT HP	OPT	INPUT HP	OUTPUT HP	OPT	INPUT HP	OUTPUT HP	OPT	INPUT HP	OUTPUT HP	OPT
5	1750	350.0	1.45	1.36	244	1.98	1.85	333	2.25	2.11	380	3.86	3.64	656
	1150	230.0	1.13	1.04	286	1.61	1.49	408	1.86	1.72	472	3.25	3.04	832
	850	170.0	.91	.84	310	1.33	1.22	451	1.54	1.42	526	2.72	2.53	937
7.5	1750	233.3	1.05	.97	261	1.50	1.38	374	2.02	1.86	503	2.86	2.66	719
	1150	153.3	.78	.72	294	1.21	1.10	454	1.63	1.48	610	2.31	2.13	875
	850	113.3	.62	.57	315	1.00	.90	500	1.34	1.21	672	1.90	1.74	969
10	1750	175.0	.89	.81	290	1.25	1.14	410	1.66	1.52	546	2.52	2.33	839
	1150	115.0	.67	.60	329	.97	.87	477	1.32	1.19	652	2.00	1.83	1001
	850	85.0	.53	.47	350	.78	.69	515	1.08	.96	712	1.63	1.47	1093
15	1750	116.7	.66	.57	307	.90	.78	423	1.14	1.00	542	1.78	1.60	864
	1150	76.7	.52	.44	359	.71	.61	498	.91	.78	645	1.43	1.26	1035
	850	56.7	.42	.35	388	.58	.49	540	.74	.63	704	1.17	1.02	1133
20	1750	87.5	.50	.43	309	.71	.61	439	.99	.85	612	1.45	1.27	918
	1150	57.5	.38	.32	349	.56	.46	509	.80	.66	728	1.15	.99	1087
	850	42.5	.31	.25	371	.45	.37	549	.65	.54	794	.94	.80	1183
25	1750	70.0	.42	.34	310	.58	.48	434	.79	.66	594	1.17	1.00	903
	1150	46.0	.32	.26	350	.45	.37	500	.64	.52	706	.94	.78	1074
	850	34.0	.25	.20	372	.36	.29	537	.52	.42	770	.77	.63	1171
30	1750	58.3	.38	.29	315	.51	.40	434	.64	.52	557	.99	.82	891
	1150	38.3	.30	.22	367	.40	.31	510	.51	.40	662	.80	.65	1064
	850	28.3	.25	.18	397	.33	.25	553	.42	.32	721	.66	.52	1163
40	1750	43.8	.29	.23	325	.39	.30	432	.53	.41	594	.78	.63	908
	1150	28.8	.23	.17	372	.31	.23	501	.43	.32	706	.63	.49	1073
	850	21.3	.19	.14	401	.25	.18	540	.36	.26	769	.52	.39	1167
50	1750	35.0	.22	.16	291	.31	.23	418	.42	.31	560	.62	.48	856
	1150	23.0	.17	.12	328	.25	.18	480	.34	.24	666	.50	.37	1016
	850	17.0	.14	.09	348	.20	.14	515	.28	.20	726	.41	.30	1108
60	1750	29.2	.18	.13	271	.28	.20	434	.33	.25	533	.51	.39	843
	1150	19.2	.14	.09	310	.21	.15	492	.26	.19	609	.41	.30	981
	850	14.2	.12	.07	331	.17	.12	523	.21	.15	651	.33	.24	1058
80	1750	21.9	.11	.08	225	.17	.12	350	.20	.15	427	.32	.23	664
	1150	14.4	.08	.06	246	.13	.09	386	.16	.11	476	.25	.17	761
	850	10.6	.07	.04	258	.10	.07	406	.12	.08	503	.20	.14	814
100	1750	17.5	.07	.05	178	.11	.08	278	.13	.09	341	.21	.15	534
	1150	11.5	.06	.04	194	.08	.06	304	.10	.07	375	.16	.11	608
	850	8.5	.04	.03	203	.07	.04	318	.08	.05	393	.13	.09	648
O.H.L. (overhung load)			300 LBS			500 LBS			700 LBS			700 LBS		

Note:
All torque values listed in inch-pounds, all overhung load values listed in pounds. The point of application of the overhung load is considered to be one shaft diameter measured outward from the gear case housing.

SINGLE REDUCTION RATINGS (PAG Synthetic Oil)

Table 5 cont.

Mechanical ratings at specified input rpm; service factor 1.0.
HP=Horsepower OPT=Output torque in inch-lbs at the low speed shaft

		C.D.	2.38 INCH			2.62 INCH			3.00 INCH		
RATIO	INPUT RPM	OUTPUT RPM	INPUT HP	OUTPUT HP	OPT	INPUT HP	OUTPUT HP	OPT	INPUT HP	OUTPUT HP	OPT
5	1750	350.0	4.64	4.39	790	6.30	5.96	1073	7.99	7.59	1367
	1150	230.0	3.89	3.64	997	5.26	4.93	1352	6.64	6.26	1715
	850	170.0	3.35	3.11	1153	4.61	4.29	1591	5.87	5.50	2038
7.5	1750	233.3	4.21	3.88	1049	5.38	4.96	1341	7.39	6.81	1840
	1150	153.3	3.40	3.09	1272	4.34	3.95	1625	5.94	5.40	2220
	850	113.3	2.81	2.55	1419	3.57	3.22	1790	4.93	4.44	2467
10	1750	175.0	3.61	3.34	1202	4.43	4.12	1485	6.43	6.00	2162
	1150	115.0	2.98	2.72	1493	3.69	3.40	1862	5.38	4.96	2720
	850	85.0	2.48	2.24	1664	3.09	2.81	2084	4.59	4.19	3109
15	1750	116.7	2.63	2.37	1282	3.11	2.84	1536	4.90	4.50	2433
	1150	76.7	2.17	1.92	1581	2.51	2.27	1864	4.08	3.69	3036
	850	56.7	1.80	1.58	1755	2.07	1.85	2053	3.40	3.05	3392
20	1750	87.5	2.09	1.84	1327	2.70	2.40	1732	3.71	3.34	2409
	1150	57.5	1.73	1.49	1636	2.25	1.96	2150	3.10	2.74	3005
	850	42.5	1.44	1.22	1816	1.88	1.62	2396	2.59	2.26	3356
25	1750	70.0	1.72	1.48	1334	2.21	1.94	1749	3.15	2.82	2537
	1150	46.0	1.42	1.19	1636	1.79	1.54	2109	2.55	2.23	3058
	850	34.0	1.18	.98	1811	1.47	1.25	2316	2.09	1.81	3358
30	1750	58.3	1.44	1.21	1305	1.79	1.54	1666	2.65	2.30	2484
	1150	38.3	1.19	.98	1604	1.45	1.22	2011	2.21	1.88	3083
	850	28.3	1.00	.80	1778	1.20	.99	2210	1.85	1.54	3435
40	1750	43.8	1.14	.92	1324	1.46	1.19	1719	1.98	1.65	2384
	1150	28.8	.95	.74	1629	1.23	.97	2131	1.66	1.35	2965
	850	21.3	.80	.61	1807	1.03	.80	2372	1.40	1.11	3306
50	1750	35.0	.92	.71	1283	1.17	.94	1690	1.64	1.36	2444
	1150	23.0	.77	.57	1572	.95	.74	2035	1.34	1.07	2939
	850	17.0	.64	.47	1740	.79	.60	2233	1.11	.87	3223
60	1750	29.2	.71	.55	1184	.95	.74	1598	1.32	1.04	2237
	1150	19.2	.58	.43	1407	.79	.59	1936	1.12	.85	2787
	850	14.2	.48	.34	1533	.66	.48	2131	.95	.70	3111
80	1750	21.9	.47	.35	1004	.60	.46	1311	.89	.68	1969
	1150	14.4	.37	.27	1162	.47	.35	1525	.73	.54	2365
	850	10.6	.30	.21	1251	.39	.28	1645	.61	.44	2591
100	1750	17.5	.30	.22	783	.38	.28	1004	.59	.43	1558
	1150	11.5	.24	.16	898	.29	.21	1128	.48	.34	1852
	850	8.5	.19	.13	961	.24	.17	1228	.40	.27	2020
O.H.L. (overhung load)			920 LBS			1030 LBS			1300 LBS		

Note:
All torque values listed in inch-pounds, all overhung load values listed in pounds. The point of application of the overhung load is considered to be one shaft diameter measured outward from the gear case housing.

SINGLE REDUCTION RATINGS (PAG Synthetic Oil)

Table 5 cont.

Mechanical ratings at specified input rpm; service factor 1.0.
HP=Horsepower OPT=Output torque in inch-lbs at the low speed shaft

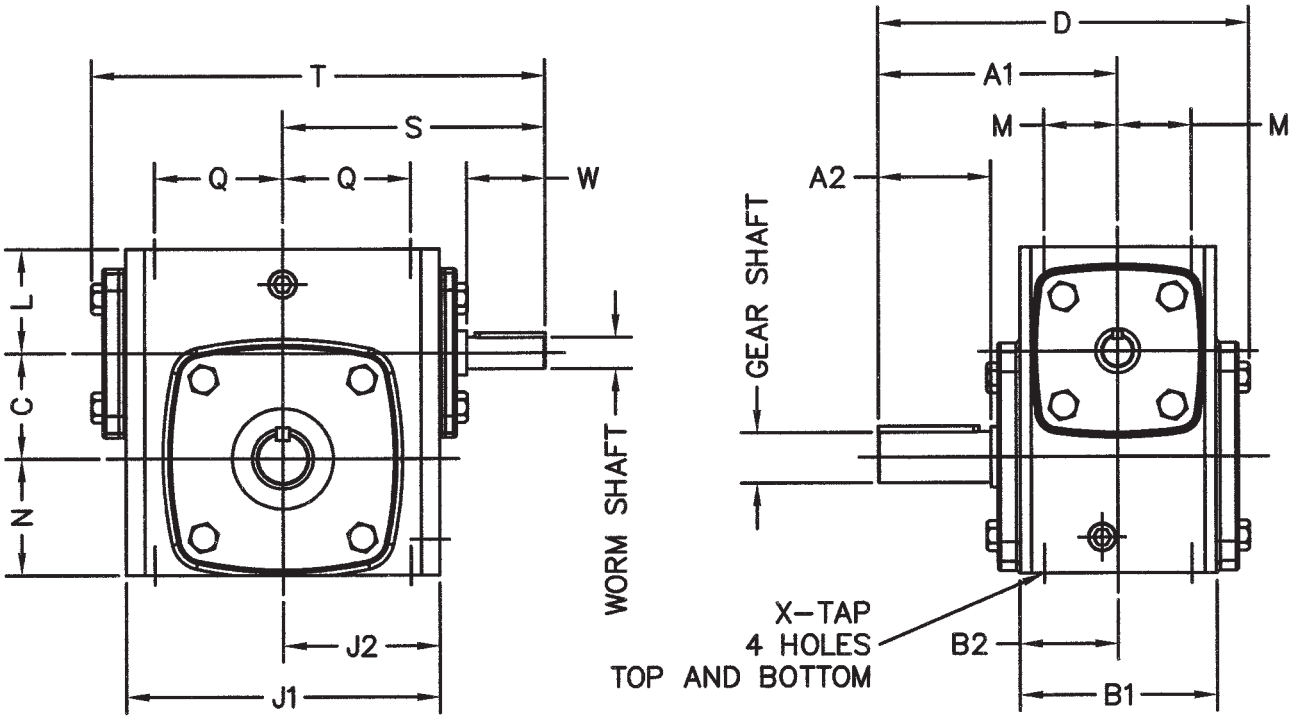
		C.D.	3.25 INCH			4.25 INCH			5.25 INCH		
RATIO	INPUT RPM	OUTPUT RPM	INPUT HP	OUTPUT HP	OPT	INPUT HP	OUTPUT HP	OPT	INPUT HP	OUTPUT HP	OPT
★ 5	1750	350.0	11.17	10.63	1915	19.18	18.31	3297	34.55	33.09	5760
	1150	230.0	9.20	8.69	2381	16.12	15.29	4190	29.02	27.64	7320
	850	170.0	8.24	7.74	2868	13.90	13.10	4858	25.63	24.28	8699
7.5	1750	233.3	9.90	9.12	2465	16.58	15.29	4131	27.31	25.18	6803
	1150	153.3	8.13	7.45	3063	13.41	12.23	5030	22.60	20.83	8566
	850	113.3	6.81	6.21	3457	11.62	10.56	5876	19.72	18.05	10041
10	1750	175.0	8.33	7.80	2809	14.77	13.87	4995	22.95	21.65	7795
	1150	115.0	6.97	6.46	3538	12.07	11.21	6143	19.34	18.08	9907
	850	85.0	5.95	5.47	4054	10.98	10.11	7494	16.84	15.61	11578
15	1750	116.7	5.68	5.21	2817	10.70	9.88	5338	16.08	14.85	8023
	1150	76.7	4.92	4.45	3660	8.91	8.12	6676	13.60	12.40	10197
	850	56.7	4.20	3.75	4173	7.96	7.17	7974	11.86	10.69	11894
20	1750	87.5	5.19	4.67	3362	8.47	7.63	5494	13.39	12.17	8766
	1150	57.5	4.51	3.98	4360	7.01	6.20	6795	11.36	10.16	11141
	850	42.5	3.85	3.35	4965	6.37	5.55	8238	9.99	8.81	13066
25	1750	70.0	4.26	3.73	3361	6.98	6.19	5576	10.98	9.81	8837
	1150	46.0	3.61	3.09	4235	5.84	5.07	6947	9.35	8.20	11230
	850	34.0	3.11	2.62	4858	5.27	4.50	8345	8.25	7.12	13191
30	1750	58.3	3.46	2.99	3231	5.79	5.07	5473	9.21	8.05	8695
	1150	38.3	3.01	2.54	4177	4.88	4.17	6858	7.86	6.72	11051
	850	28.3	2.58	2.14	4750	4.38	3.67	8166	6.92	5.80	12911
40	1750	43.8	2.76	2.31	3322	4.46	3.73	5374	7.15	6.07	8741
	1150	28.8	2.42	1.96	4296	3.74	3.04	6656	6.13	5.07	11110
	850	21.3	2.08	1.65	4885	3.42	2.72	8056	5.44	4.40	13038
50	1750	35.0	2.24	1.80	3235	3.54	2.88	5189	5.72	4.72	8501
	1150	23.0	1.92	1.49	4076	3.00	2.36	6470	4.93	3.94	10804
	850	17.0	1.67	1.26	4671	2.73	2.09	7764	4.39	3.42	12695
60	1750	29.2	1.80	1.45	3133	2.79	2.22	4799	4.66	3.81	8236
	1150	19.2	1.50	1.17	3845	2.38	1.83	6010	3.89	3.08	10140
	850	14.2	1.26	.96	4260	2.16	1.61	7163	3.60	2.78	12356
★★ 80	1750	21.9	1.04	.80	2303	1.78	1.39	4018	2.97	2.34	6662
	1150	14.4	.86	.64	2796	1.53	1.16	5064	2.52	1.91	8286
	850	10.6	.72	.52	3082	1.34	.98	5813	2.31	1.70	9977
★★★ 100	1750	17.5	.68	.51	1827	1.17	.90	3224	2.07	1.58	5594
	1150	11.5	.56	.40	2197	1.02	.75	4116	1.78	1.30	7008
	850	8.5	.47	.33	2410	.88	.63	4651	1.61	1.15	8347
O.H.L. (overhung load)			1350 LBS			2250 LBS			2500 LBS		

★ For 5.25" Center Distance, the actual speed ratio Is 4.833:1.
★★ For 5.25" Center Distance, the actual speed ratio Is 79:1.
★★★ For 5.25" Center Distance, the actual speed ratio Is 98:1.

Note:
All torque values listed in inch-pounds, all overhung load values listed in pounds. The point of application of the overhung load is considered to be one shaft diameter measured outward from the gear case housing.

MODULAR - TYPE 11 (I STYLE)

SINGLE REDUCTION – SOLID INPUT – SOLID OUTPUT

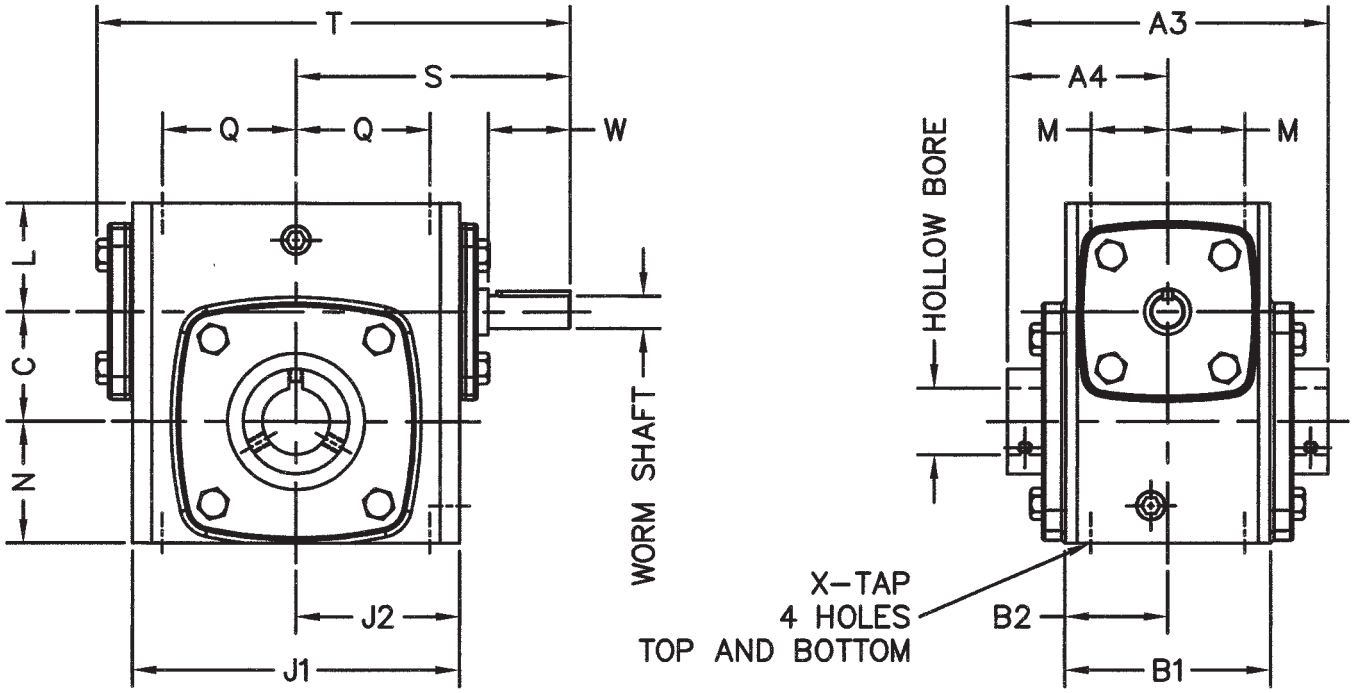


SIZE	A1	A2	B1	B2	D	C	L	J1	J2	M	N	Q	S	T
13	4.00	1.97	2.87	1.44	5.97	1.333	1.61	4.02	2.01	1.000	1.72	1.625	3.88	5.98
15	4.31	1.97	3.50	1.75	6.71	1.540	1.93	5.12	2.56	1.375	1.91	2.095	4.50	6.71
17	4.33	1.77	3.66	1.83	6.83	1.750	1.94	5.37	2.69	1.375	2.06	2.095	4.75	8.04
20	4.69	2.20	3.82	1.91	7.25	2.062	2.04	6.12	3.06	1.438	2.28	2.500	5.13	8.84
20G	4.69	2.20	3.82	1.91	7.25	2.062	2.04	6.12	3.06	1.500	2.28	2.375	5.13	8.84
23	5.07	2.40	4.07	2.04	7.76	2.375	2.07	6.34	3.17	1.438	2.50	2.500	5.75	9.57
26	5.63	2.64	4.45	2.23	8.50	2.625	2.44	7.46	3.73	1.688	2.94	3.188	6.31	10.69
26G	5.63	2.64	4.45	2.23	8.50	2.625	2.44	7.46	3.73	1.688	2.94	3.188	6.31	10.69
30	6.75	3.35	5.28	2.64	10.04	3.000	2.63	8.11	4.06	2.000	3.25	3.500	6.57	11.28
32	7.06	3.35	5.75	2.88	10.61	3.250	2.63	8.50	4.25	2.000	3.50	3.750	7.00	12.02
32G	7.06	3.35	5.75	2.88	10.61	3.250	2.63	8.50	4.25	2.000	3.50	3.750	7.00	12.02
42	8.12	4.13	6.13	3.06	11.98	4.250	2.69	10.25	5.13	2.500	4.44	4.250	9.57	15.48
52	9.06	4.13	7.19	3.60	13.75	5.250	3.63	13.00	6.50	2.906	5.12	5.500	10.87	18.28

			WORM SHAFT		GEAR SHAFT	
SIZE	W	X-TAP	DIAMETER	KEYWAY	DIAMETER	KEYWAY
13	1.38	5/16-18 X 0.50	.5000 / .4996	1/8 X 1/16	.6250 / .6246	3/16 X 3/32
15	1.38	5/16-18 X 0.50	.6250 / .6246	3/16 X 3/32	.7500 / .7495	3/16 X 3/32
17	1.57	5/16-18 X 0.60	.6250 / .6246	3/16 X 3/32	.8750 / .8745	3/16 X 3/32
20	1.54	3/8-16 X 0.59	.6250 / .6246	3/16 X 3/32	1.0000 / .9995	1/4 X 1/8
20G	1.54	5/16-18 X 0.59	.6250 / .6246	3/16 X 3/32	1.0000 / .9995	1/4 X 1/8
23	2.01	3/8-16 X 0.60	.7500 / .7495	3/16 X 3/32	1.1250 / 1.1245	1/4 X 1/8
26	2.01	3/8-16 X 0.60	.7500 / .7495	3/16 X 3/32	1.1250 / 1.1245	1/4 X 1/8
26G	2.01	3/8-16 X 0.60	.7500 / .7495	3/16 X 3/32	1.2500 / 1.2494	1/4 X 1/8
30	1.97	7/16-14 X 0.70	.8750 / .8745	3/16 X 3/32	1.2500 / 1.2494	1/4 X 1/8
32	1.97	7/16-14 X 0.67	.8750 / .8745	3/16 X 3/32	1.3750 / 1.3744	5/16 X 5/32
32G	1.97	7/16-14 X 0.67	.8750 / .8745	3/16 X 3/32	1.5000 / 1.4994	3/8 X 3/16
42	3.35	5/8-11 X 1.00	1.2500 / 1.2494	1/4 X 1/8	1.8750 / 1.8744	1/2 X 1/4
52	3.35	5/8-11 X 1.25	1.2500 / 1.2494	1/4 X 1/8	2.0000 / 1.9993	1/2 X 1/4

MODULAR - TYPE 12 (IHO STYLE)

SINGLE REDUCTION – SOLID INPUT – HOLLOW OUTPUT

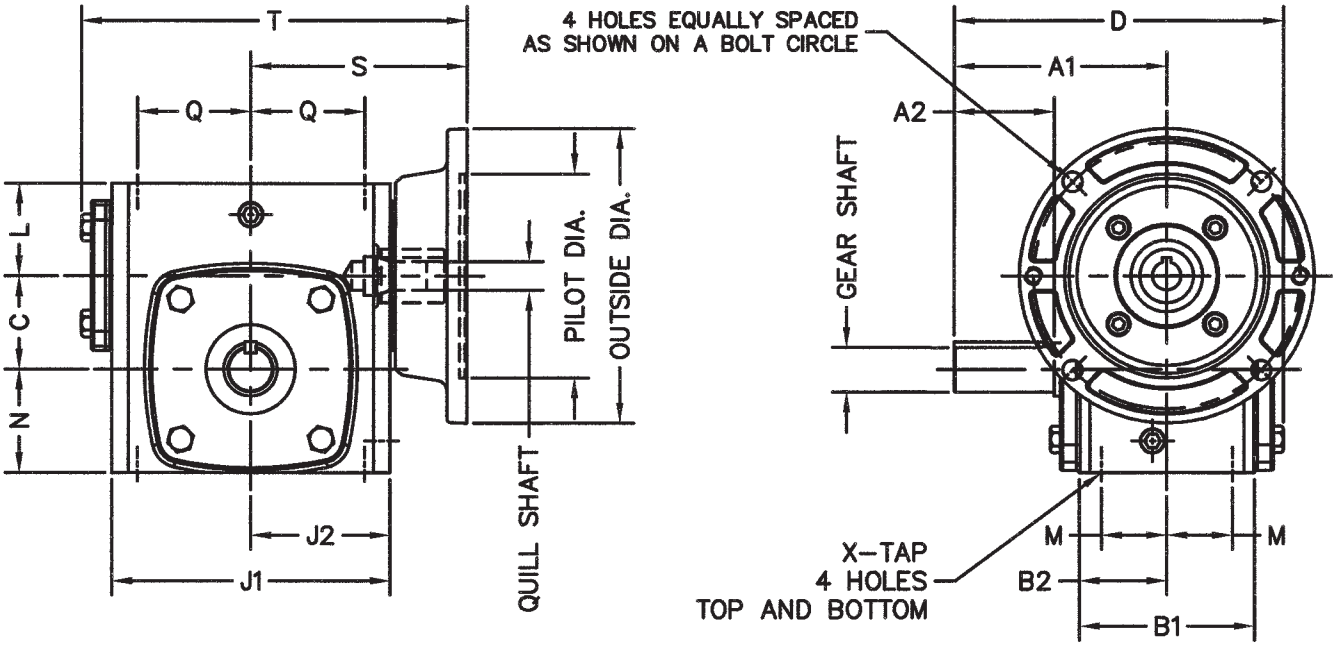


																WORM SHAFT	
SIZE	A3	A4	B1	B2	C	L	J1	J2	M	N	Q	S	T	W	X-TAP	DIAMETER	KEYWAY
13	4.75	2.38	2.87	1.44	1.333	1.61	4.02	2.01	1.000	1.72	1.625	3.88	5.98	1.38	5/16-18 X .50	.5000 / .4996	1/8 X 1/16
15	5.42	2.71	3.50	1.75	1.540	1.93	5.12	2.56	1.375	1.91	2.095	4.50	6.71	1.38	5/16-18 X .50	.6250 / .6246	3/16 X 3/32
17	5.50	2.75	3.66	1.83	1.750	1.94	5.37	2.69	1.375	2.06	2.095	4.75	8.04	1.57	5/16-18 X .60	.6250 / .6246	3/16 X 3/32
20	6.00	3.00	3.82	1.91	2.062	2.04	6.12	3.06	1.438	2.28	2.500	5.13	8.84	1.54	3/8-16 X .59	.6250 / .6246	3/16 X 3/32
20G	6.00	3.00	3.82	1.91	2.062	2.04	6.12	3.06	1.500	2.28	2.375	5.13	8.84	1.54	5/16-18 X .59	.6250 / .6246	3/16 X 3/32
23	6.00	3.00	4.07	2.04	2.375	2.07	6.34	3.17	1.438	2.50	2.500	5.75	9.57	2.01	3/8-16 X .60	.7500 / .7495	3/16 X 3/32
26	7.00	3.50	4.45	2.23	2.625	2.44	7.46	3.73	1.688	2.94	3.188	6.31	10.69	2.01	3/8-16 X .60	.7500 / .7495	3/16 X 3/32
30	7.50	3.75	5.28	2.64	3.000	2.63	8.11	4.06	2.000	3.25	3.500	6.57	11.28	1.97	7/16-14 X .70	.8750 / .8745	3/16 X 3/32
32	7.87	3.94	5.75	2.88	3.250	2.63	8.50	4.25	2.000	3.50	3.750	7.00	12.02	1.97	7/16-14 X .67	.8750 / .8745	3/16 X 3/32
42	9.00	4.50	6.13	3.06	4.250	2.69	10.25	5.13	2.500	4.44	4.250	9.57	15.48	3.35	5/8-11 X 1.00	1.2500 / 1.2494	1/4 X 1/8
52	11.09	5.55	7.19	3.60	5.250	3.63	13.00	6.50	2.906	5.12	5.500	10.87	18.28	3.35	5/8-11 X 1.25	1.2500 / 1.2494	1/4 X 1/8

	BORE DESIGNATION									
	1		2		3		4		5	
SIZE	BORE DIA.	KEYWAY	BORE DIA.	KEYWAY	BORE DIA.	KEYWAY	BORE DIA.	KEYWAY	BORE DIA.	KEYWAY
13	.6252 / .6259	3/16 X 3/32								
15	.6252 / .6259	3/16 X 3/32								
17	.6252 / .6259	3/16 X 3/32	.6877 / .6884	3/16 X 3/32	.7503 / .7511	3/16 X 3/32	.8753 / .8761	3/16 X 3/32	1.0003 / 1.0011	1/4 X 1/8
20	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
20G	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
23	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
26	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
30	1.2504 / 1.2513	1/4 X 1/8	1.5004 / 1.5013	3/8 X 3/16	1.6254 / 1.6263	3/8 X 3/16	1.7504 / 1.7513	3/8 X 3/16	1.9379 / 1.9388	1/2 X 1/4
32	1.2504 / 1.2513	1/4 X 1/8	1.5004 / 1.5013	3/8 X 3/16	1.6254 / 1.6263	3/8 X 3/16	1.7504 / 1.7513	3/8 X 3/16	1.9379 / 1.9388	1/2 X 1/4
42	1.7504 / 1.7513	3/8 X 3/16	1.8754 / 1.8763	1/2 X 1/4	1.9379 / 1.9388	1/2 X 1/4	2.0004 / 2.0016	1/2 X 1/4	2.1879 / 2.1891	1/2 X 1/4
52	2.0004 / 2.0016	1/2 X 1/4	2.4379 / 2.4391	5/8 X 5/16	2.9379 / 2.9391	3/4 X 3/8	3.0004 / 3.0016	3/4 X 3/8	3.4380 / 3.4394	7/8 X 7/16

MODULAR - TYPE 13 (ICHS STYLE)

SINGLE REDUCTION – QUILL INPUT – SOLID OUTPUT



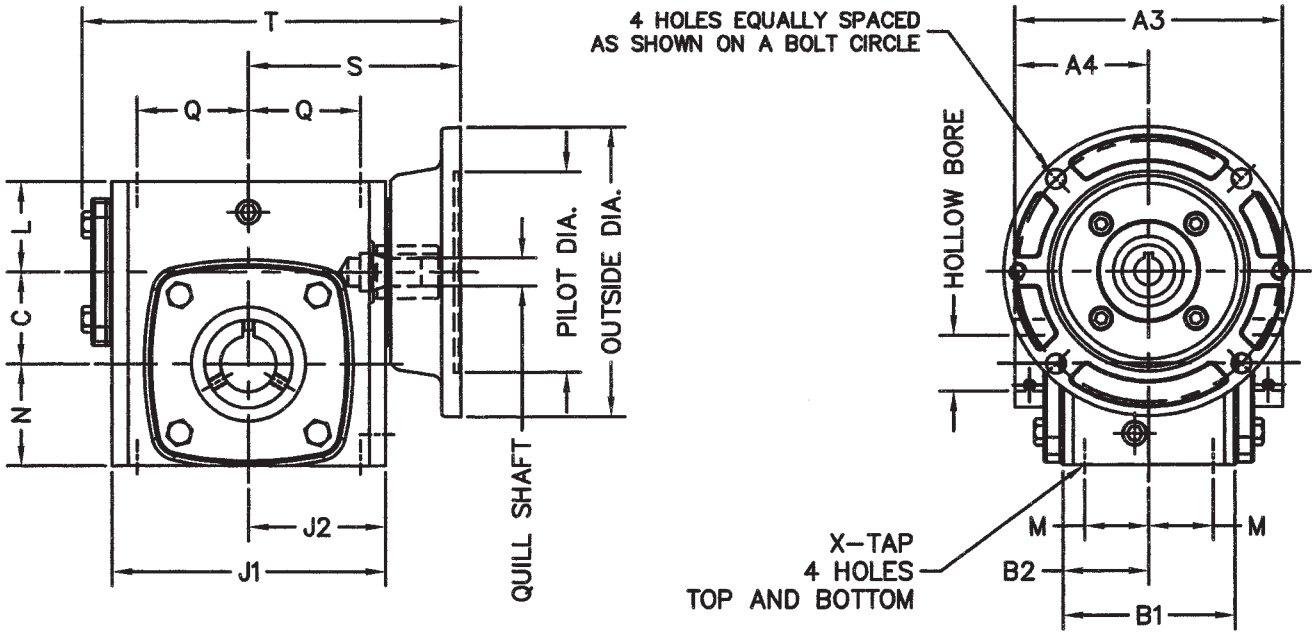
SIZE	A1	A2	B1	B2	D	C	L	J1	J2	M	N	Q	X-TAP
13	4.00	1.97	2.87	1.44	5.97	1.333	1.61	4.02	2.01	1.000	1.72	1.625	5/16-18 X 0.50
15	4.31	1.97	3.50	1.75	6.71	1.540	1.93	5.12	2.56	1.375	1.91	2.095	5/16-18 X 0.50
17	4.33	1.77	3.66	1.83	6.83	1.750	1.94	5.37	2.69	1.375	2.06	2.095	5/16-18 X 0.60
20	4.69	2.20	3.82	1.91	7.25	2.062	2.04	6.12	3.06	1.438	2.28	2.500	3/8-16 X 0.59
20G	4.69	2.20	3.82	1.91	7.25	2.062	2.04	6.12	3.06	1.500	2.28	2.375	5/16-18 X 0.59
23	5.07	2.40	4.07	2.04	7.76	2.375	2.07	6.34	3.17	1.438	2.50	2.500	3/8-16 X 0.60
26	5.63	2.64	4.45	2.23	8.50	2.625	2.44	7.46	3.73	1.688	2.94	3.188	3/8-16 X 0.60
26G	5.63	2.64	4.45	2.23	8.50	2.625	2.44	7.46	3.73	1.688	2.94	3.188	3/8-16 X 0.60
30	6.75	3.35	5.28	2.64	10.04	3.000	2.63	8.11	4.06	2.000	3.25	3.500	7/16-14 X 0.70
32	7.06	3.35	5.75	2.88	10.61	3.250	2.63	8.50	4.25	2.000	3.50	3.750	7/16-14 X 0.67
32G	7.06	3.35	5.75	2.88	10.61	3.250	2.63	8.50	4.25	2.000	3.50	3.750	7/16-14 X 0.67
42	8.12	4.13	6.13	3.06	11.98	4.250	2.69	10.25	5.13	2.500	4.44	4.250	5/8-11 X 1.00
52	9.06	4.13	7.19	3.60	13.75	5.250	3.63	13.00	6.50	2.906	5.12	5.500	5/8-11 X 1.25

	56C		143TC/145TC		182TC/184TC		213TC/215TC		GEAR SHAFT	
SIZE	S	T	S	T	S	T	S	T	DIAMETER	KEYWAY
13	3.61	5.72							.6250 / .6246	3/16 X 3/32
15	4.29	7.54	4.29	7.54					.7500 / .7495	3/16 X 3/32
17	4.37	7.66	4.37	7.66					.8750 / .8745	3/16 X 3/32
20	4.75	8.46	4.75	8.46					1.0000 / .9995	1/4 X 1/8
20G	4.75	8.46	4.75	8.46					1.0000 / .9995	1/4 X 1/8
23	4.86	8.68	4.86	8.68					1.1250 / 1.1245	1/4 X 1/8
26	5.62	10.00	5.62	10.00	6.41	10.79			1.1250 / 1.1245	1/4 X 1/8
26G	5.62	10.00	5.62	10.00	6.41	10.79			1.2500 / 1.2494	1/4 X 1/8
30	5.94	10.64	5.94	10.64	6.73	11.43			1.2500 / 1.2494	1/4 X 1/8
32	6.26	11.28	6.26	11.28	7.05	12.07	7.05	12.07	1.3750 / 1.3744	5/16 X 5/32
32G	6.26	11.28	6.26	11.28	7.05	12.07	7.05	12.07	1.5000 / 1.4994	3/8 X 3/16
42			6.54	12.45	7.21	13.12	7.21	13.12	1.8750 / 1.8744	1/2 X 1/4
52			8.06	15.47	8.83	16.24	8.83	16.24	2.0000 / 1.9993	1/2 X 1/4

NEMA FRAME	OUTSIDE DIAMETER	PILOT DIAMETER	BOLT CIRCLE	HOLE SIZE	QUILL SHAFT	
					BORE DIAMETER	KEYWAY
56C	6.50	4.5005 / 4.5019	5.875	.413	.6256 / .6267	3/16 X 3/32
143TC / 145TC	6.50	4.5005 / 4.5019	5.875	.413	.8758 / .8771	3/16 X 3/32
182TC / 184TC	9.00	8.5006 / 8.5024	7.250	.591	1.1258 / 1.1271	1/4 X 1/8
213TC / 215TC	9.00	8.5006 / 8.5024	7.250	.591	1.3760 / 1.3775	5/16 X 5/32

MODULAR - TYPE 14 (ICHSHO STYLE)

SINGLE REDUCTION – QUILL INPUT – HOLLOW OUTPUT



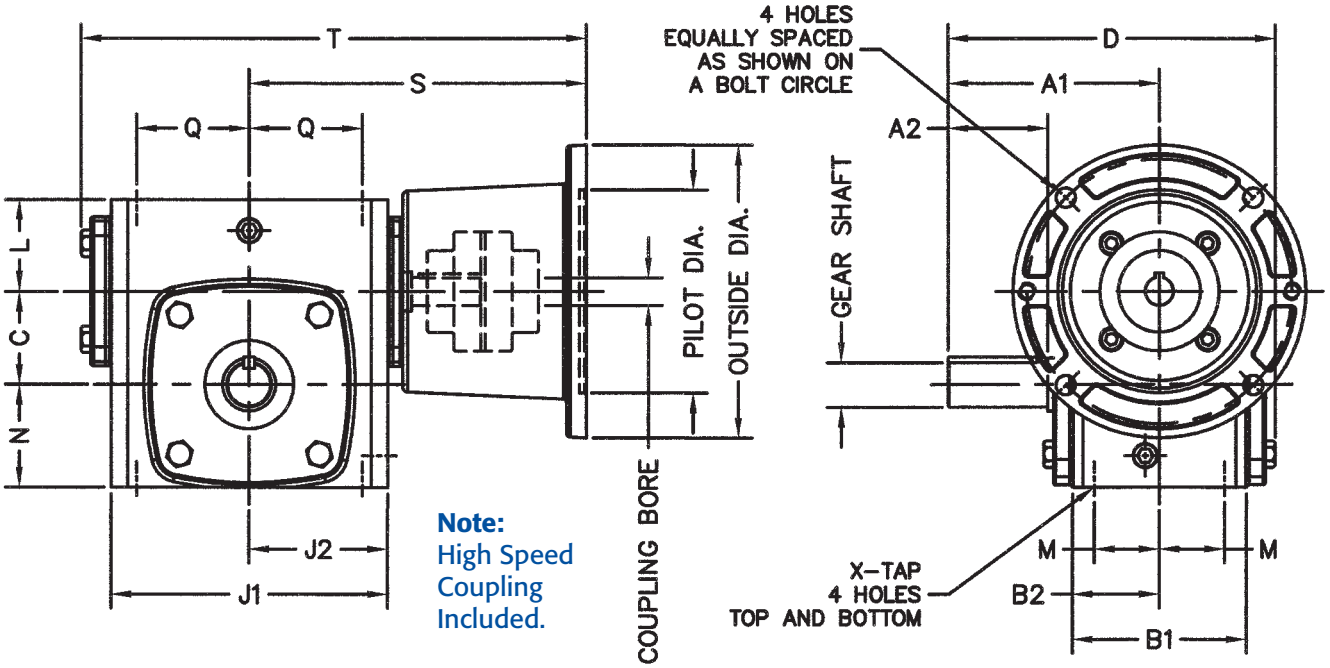
													56C		143TC / 145TC		182TC / 184TC		213TC / 215TC	
SIZE	A3	A4	B1	B2	C	L	J1	J2	M	N	Q	X-TAP	S	T	S	T	S	T	S	T
13	4.75	2.38	2.87	1.44	1.333	1.61	4.02	2.01	1.000	1.72	1.625	5/16-18 X .50	3.61	5.72						
15	5.42	2.71	3.50	1.75	1.540	1.93	5.12	2.56	1.375	1.91	2.095	5/16-18 X .50	4.29	7.54	4.29	7.54				
17	5.50	2.75	3.66	1.83	1.750	1.94	5.37	2.69	1.375	2.06	2.095	5/16-18 X .60	4.37	7.66	4.37	7.66				
20	6.00	3.00	3.82	1.91	2.062	2.04	6.12	3.06	1.438	2.28	2.500	3/8-16 X .59	4.75	8.46	4.75	8.46				
20G	6.00	3.00	3.82	1.91	2.062	2.04	6.12	3.06	1.500	2.28	2.375	5/16-18 X .59	4.75	8.46	4.75	8.46				
23	6.00	3.00	4.07	2.04	2.375	2.07	6.34	3.17	1.438	2.50	2.500	3/8-16 X .60	4.86	8.68	4.86	8.68				
26	7.00	3.50	4.45	2.23	2.625	2.44	7.46	3.73	1.688	2.94	3.188	3/8-16 X .60	5.62	10.00	5.62	10.00	6.41	10.79		
30	7.50	3.75	5.28	2.64	3.000	2.63	8.11	4.06	2.000	3.25	3.500	7/16-14 X .70	5.94	10.64	5.94	10.64	6.73	11.43		
32	7.87	3.94	5.75	2.88	3.250	2.63	8.50	4.25	2.000	3.50	3.750	7/16-14 X .67	6.26	11.28	6.26	11.28	7.05	12.07	7.05	12.07
42	9.00	4.50	6.13	3.06	4.250	2.69	10.25	5.13	2.500	4.44	4.250	5/8-11 X 1.00			6.54	12.45	7.21	13.12	7.21	13.12
52	11.09	5.55	7.19	3.60	5.250	3.63	13.00	6.50	2.906	5.12	5.500	5/8-11 X 1.25			8.06	15.47	8.83	16.24	8.83	16.24

	BORE DESIGNATION									
	1		2		3		4		5	
SIZE	BORE DIA.	KEYWAY	BORE DIA.	KEYWAY	BORE DIA.	KEYWAY	BORE DIA.	KEYWAY	BORE DIA.	KEYWAY
13	.6252 / .6259	3/16 X 3/32								
15	.6252 / .6259	3/16 X 3/32								
17	.6252 / .6259	3/16 X 3/32	.6877 / .6884	3/16 X 3/32	.7503 / .7511	3/16 X 3/32	.8753 / .8761	3/16 X 3/32	1.0003 / 1.0011	1/4 X 1/8
20	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
20G	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
23	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
26	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
30	1.2504 / 1.2513	1/4 X 1/8	1.5004 / 1.5013	3/8 X 3/16	1.6254 / 1.6263	3/8 X 3/16	1.7504 / 1.7513	3/8 X 3/16	1.9379 / 1.9388	1/2 X 1/4
32	1.2504 / 1.2513	1/4 X 1/8	1.5004 / 1.5013	3/8 X 3/16	1.6254 / 1.6263	3/8 X 3/16	1.7504 / 1.7513	3/8 X 3/16	1.9379 / 1.9388	1/2 X 1/4
42	1.7504 / 1.7513	3/8 X 3/16	1.8754 / 1.8763	1/2 X 1/4	1.9379 / 1.9388	1/2 X 1/4	2.0004 / 2.0016	1/2 X 1/4	2.1879 / 2.1891	1/2 X 1/4
52	2.0004 / 2.0016	1/2 X 1/4	2.4379 / 2.4391	5/8 X 5/16	2.9379 / 2.9391	3/4 X 3/8	3.0004 / 3.0016	3/4 X 3/8	3.4380 / 3.4394	7/8 X 7/16

NEMA FRAME	OUTSIDE DIAMETER	PILOT DIAMETER	BOLT CIRCLE	HOLE SIZE	QUILL SHAFT	
					BORE DIAMETER	KEYWAY
56C	6.50	4.5005 / 4.5019	5.875	.413	.6256 / .6267	3/16 X 3/32
143TC / 145TC	6.50	4.5005 / 4.5019	5.875	.413	.8758 / .8771	3/16 X 3/32
182TC / 184TC	9.00	8.5006 / 8.5024	7.250	.591	1.1258 / 1.1271	1/4 X 1/8
213TC / 215TC	9.00	8.5006 / 8.5024	7.250	.591	1.3760 / 1.3775	5/16 X 5/32

MODULAR - TYPE 15 (IC STYLE)

SINGLE REDUCTION – FLOWER POT INPUT – SOLID OUTPUT



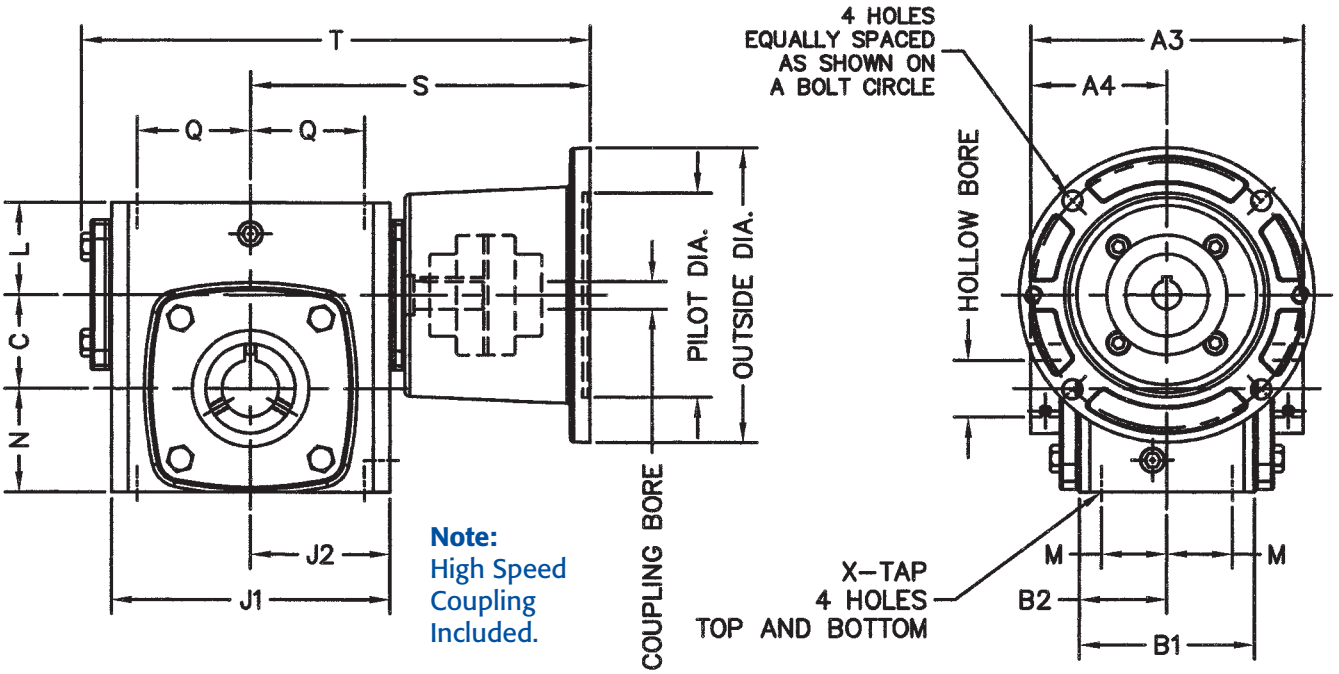
SIZE	A1	A2	B1	B2	D	C	L	J1	J2	M	N	Q	X-TAP
13	4.00	1.97	2.87	1.44	5.97	1.333	1.61	4.02	2.01	1.000	1.72	1.625	5/16-18 X 0.50
15	4.31	1.97	3.50	1.75	6.71	1.540	1.93	5.12	2.56	1.375	1.91	2.095	5/16-18 X 0.50
17	4.33	1.77	3.66	1.83	6.83	1.750	1.94	5.37	2.69	1.375	2.06	2.095	5/16-18 X 0.60
20	4.69	2.20	3.82	1.91	7.25	2.062	2.04	6.12	3.06	1.438	2.28	2.500	3/8-16 X 0.59
20G	4.69	2.20	3.82	1.91	7.25	2.062	2.04	6.12	3.06	1.500	2.28	2.375	5/16-18 X 0.59
23	5.07	2.40	4.07	2.04	7.76	2.375	2.07	6.34	3.17	1.438	2.50	2.500	3/8-16 X 0.60
26	5.63	2.64	4.45	2.23	8.50	2.625	2.44	7.46	3.73	1.688	2.94	3.188	3/8-16 X 0.60
26G	5.63	2.64	4.45	2.23	8.50	2.625	2.44	7.46	3.73	1.688	2.94	3.188	3/8-16 X 0.60
30	6.75	3.35	5.28	2.64	10.04	3.000	2.63	8.11	4.06	2.000	3.25	3.500	7/16-14 X 0.70
32	7.06	3.35	5.75	2.88	10.61	3.250	2.63	8.50	4.25	2.000	3.50	3.750	7/16-14 X 0.67
32G	7.06	3.35	5.75	2.88	10.61	3.250	2.63	8.50	4.25	2.000	3.50	3.750	7/16-14 X 0.67
42	8.12	4.13	6.13	3.06	11.98	4.250	2.69	10.25	5.13	2.500	4.44	4.250	5/8-11 X 1.00
52	9.06	4.13	7.19	3.60	13.75	5.250	3.63	13.00	6.50	2.906	5.12	5.500	5/8-11 X 1.25

	56C		143TC/145TC		182TC/184TC		213TC/215TC		GEAR SHAFT	
SIZE	S	T	S	T	S	T	S	T	DIAMETER	KEYWAY
13	6.39	8.50							.6250 / .6246	3/16 X 3/32
15	6.87	10.12	6.87	10.12					.7500 / .7495	3/16 X 3/32
17	6.95	10.24	6.95	10.24					.8750 / .8745	3/16 X 3/32
20	7.82	11.53	7.82	11.53					1.0000 / .9995	1/4 X 1/8
20G	7.82	11.53	7.82	11.53					1.0000 / .9995	1/4 X 1/8
23	7.93	11.75	7.93	11.75					1.1250 / 1.1245	1/4 X 1/8
26	8.60	12.98	8.60	12.98	9.81	14.19			1.1250 / 1.1245	1/4 X 1/8
26G	8.60	12.98	8.60	12.98	9.81	14.19			1.2500 / 1.2494	1/4 X 1/8
30	8.92	13.62	8.92	13.62	10.13	14.83			1.2500 / 1.2494	1/4 X 1/8
32	9.24	14.26	9.24	14.26	10.45	15.47	10.45	15.47	1.3750 / 1.3744	5/16 X 5/32
32G	9.24	14.26	9.24	14.26	10.45	15.47	10.45	15.47	1.5000 / 1.4994	3/8 X 3/16
42			CONSULT FACTORY						1.8750 / 1.8744	1/2 X 1/4
52			CONSULT FACTORY						2.0000 / 1.9993	1/2 X 1/4

NEMA FRAME	OUTSIDE DIAMETER	PILOT DIAMETER	BOLT CIRCLE	HOLE SIZE	COUPLING BORE	
					BORE DIAMETER	KEYWAY
56C	6.50	4.5005 / 4.5019	5.875	.413	.6256 / .6267	3/16 X 3/32
143TC / 145TC	6.50	4.5005 / 4.5019	5.875	.413	.8758 / .8771	3/16 X 3/32
182TC / 184TC	9.00	8.5006 / 8.5024	7.250	.591	1.1258 / 1.1271	1/4 X 1/8
213TC / 215TC	9.00	8.5006 / 8.5024	7.250	.591	1.3760 / 1.3775	5/16 X 5/32

MODULAR - TYPE 16 (ICHO STYLE)

SINGLE REDUCTION – FLOWER POT INPUT – HOLLOW OUTPUT



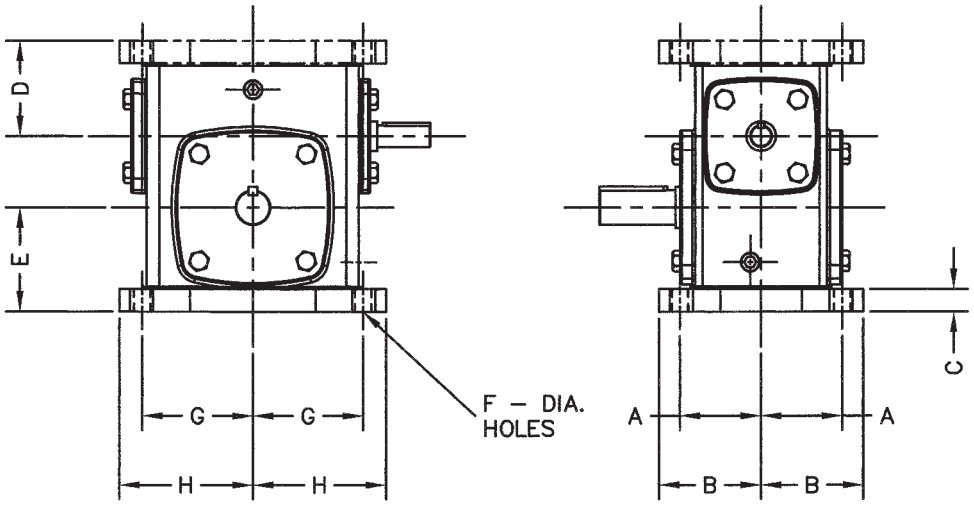
													56C		143TC / 145TC		182TC / 184TC		213TC / 215TC	
SIZE	A3	A4	B1	B2	C	L	J1	J2	M	N	Q	X-TAP	S	T	S	T	S	T	S	T
13	4.75	2.38	2.87	1.44	1.333	1.61	4.02	2.01	1.000	1.72	1.625	5/16-18 X .50	6.39	8.50						
15	5.42	2.71	3.50	1.75	1.540	1.93	5.12	2.56	1.375	1.91	2.095	5/16-18 X .50	6.87	10.12	6.87	10.12				
17	5.50	2.75	3.66	1.83	1.750	1.94	5.37	2.69	1.375	2.06	2.095	5/16-18 X .60	6.95	10.24	6.95	10.24				
20	6.00	3.00	3.82	1.91	2.062	2.04	6.12	3.06	1.438	2.28	2.500	3/8-16 X .59	7.82	11.53	7.82	11.53				
20G	6.00	3.00	3.82	1.91	2.062	2.04	6.12	3.06	1.500	2.28	2.375	5/16-18 X .59	7.82	11.53	7.82	11.53				
23	6.00	3.00	4.07	2.04	2.375	2.07	6.34	3.17	1.438	2.50	2.500	3/8-16 X .60	7.93	11.75	7.93	11.75				
26	7.00	3.50	4.45	2.23	2.625	2.44	7.46	3.73	1.688	2.94	3.188	3/8-16 X .60	8.60	12.98	8.60	12.98	9.81	14.19		
30	7.50	3.75	5.28	2.64	3.000	2.63	8.11	4.06	2.000	3.25	3.500	7/16-14 X .70	8.92	13.62	8.92	13.62	10.13	14.83		
32	7.87	3.94	5.75	2.88	3.250	2.63	8.50	4.25	2.000	3.50	3.750	7/16-14 X .67	9.24	14.26	9.24	14.26	10.45	15.47	10.45	15.47
42	9.00	4.50	6.13	3.06	4.250	2.69	10.25	5.13	2.500	4.44	4.250	5/8-11 X 1.00			CONSULT FACTORY					
52	11.09	5.55	7.19	3.60	5.250	3.63	13.00	6.50	2.906	5.12	5.500	5/8-11 X 1.25			CONSULT FACTORY					

	BORE DESIGNATION									
	1		2		3		4		5	
SIZE	BORE DIA.	KEYWAY	BORE DIA.	KEYWAY	BORE DIA.	KEYWAY	BORE DIA.	KEYWAY	BORE DIA.	KEYWAY
13	.6252 / .6259	3/16 X 3/32								
15	.6252 / .6259	3/16 X 3/32								
17	.6252 / .6259	3/16 X 3/32	.6877 / .6884	3/16 X 3/32	.7503 / .7511	3/16 X 3/32	.8753 / .8761	3/16 X 3/32	1.0003 / 1.0011	1/4 X 1/8
20	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
20G	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
23	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
26	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
30	1.2504 / 1.2513	1/4 X 1/8	1.5004 / 1.5013	3/8 X 3/16	1.6254 / 1.6263	3/8 X 3/16	1.7504 / 1.7513	3/8 X 3/16	1.9379 / 1.9388	1/2 X 1/4
32	1.2504 / 1.2513	1/4 X 1/8	1.5004 / 1.5013	3/8 X 3/16	1.6254 / 1.6263	3/8 X 3/16	1.7504 / 1.7513	3/8 X 3/16	1.9379 / 1.9388	1/2 X 1/4
42	1.7504 / 1.7513	3/8 X 3/16	1.8754 / 1.8763	1/2 X 1/4	1.9379 / 1.9388	1/2 X 1/4	2.0004 / 2.0016	1/2 X 1/4	2.1879 / 2.1891	1/2 X 1/4
52	2.0004 / 2.0016	1/2 X 1/4	2.4379 / 2.4391	5/8 X 5/16	2.9379 / 2.9391	3/4 X 3/8	3.0004 / 3.0016	3/4 X 3/8	3.4380 / 3.4394	7/8 X 7/16

NEMA FRAME	OUTSIDE DIAMETER	PILOT DIAMETER	BOLT CIRCLE	HOLE SIZE	COUPLING BORE	
					BORE DIAMETER	KEYWAY
56C	6.50	4.5005 / 4.5019	5.875	.413	.6256 / .6267	3/16 X 3/32
143TC / 145TC	6.50	4.5005 / 4.5019	5.875	.413	.8758 / .8771	3/16 X 3/32
182TC / 184TC	9.00	8.5006 / 8.5024	7.250	.591	1.1258 / 1.1271	1/4 X 1/8
213TC / 215TC	9.00	8.5006 / 8.5024	7.250	.591	1.3760 / 1.3775	5/16 X 5/32

MODULAR UNIT ACCESSORIES

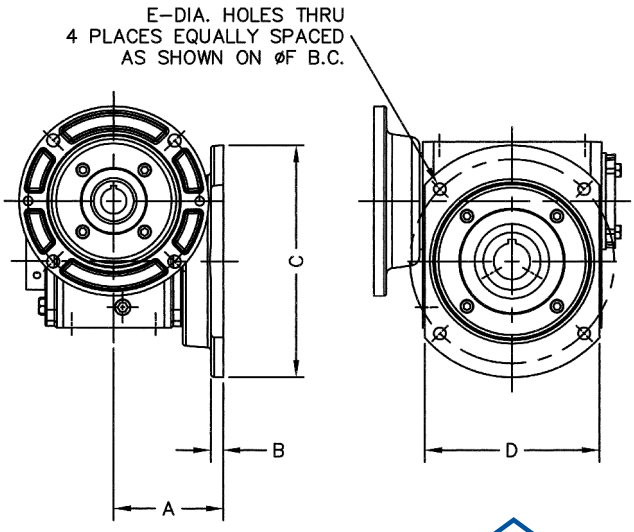
HORIZONTAL BASE KIT



SIZE	PART NO.	A	B	C	D	E	F-DIAM.	G	H
13	H073130A	1.655	2.69	.49	2.138	2.250	.354	2.188	2.69
15	H073150A	2.156	2.78	.55	2.520	2.500	.413	2.625	3.25
17	H073180A	2.250	2.88	.65	2.629	2.749	.413	2.875	3.50
20	H073210A	2.344	3.00	.67	2.760	2.998	.472	3.188	3.85
20G	H073210GA	2.344	3.00	.67	2.760	2.998	.472	3.188	3.85
23	H073240A	2.438	3.09	.71	2.818	3.243	.472	3.530	4.19
26	H073260A	2.625	3.25	.71	3.188	3.688	.531	4.000	4.63
26G	H073260A	2.625	3.25	.71	3.188	3.688	.531	4.000	4.63
30	H073300A	2.938	3.75	.71	3.378	3.998	.531	4.219	5.00
32	H073320A	3.063	3.88	.84	3.510	4.380	.531	4.750	5.56
32G	H073320A	3.063	3.88	.84	3.510	4.380	.531	4.750	5.56
42	H073420A	3.813	4.88	.93	3.698	5.448	.659	5.563	6.62
52	H073520A	4.188	5.25	1.10	4.765	6.255	.778	7.063	8.12

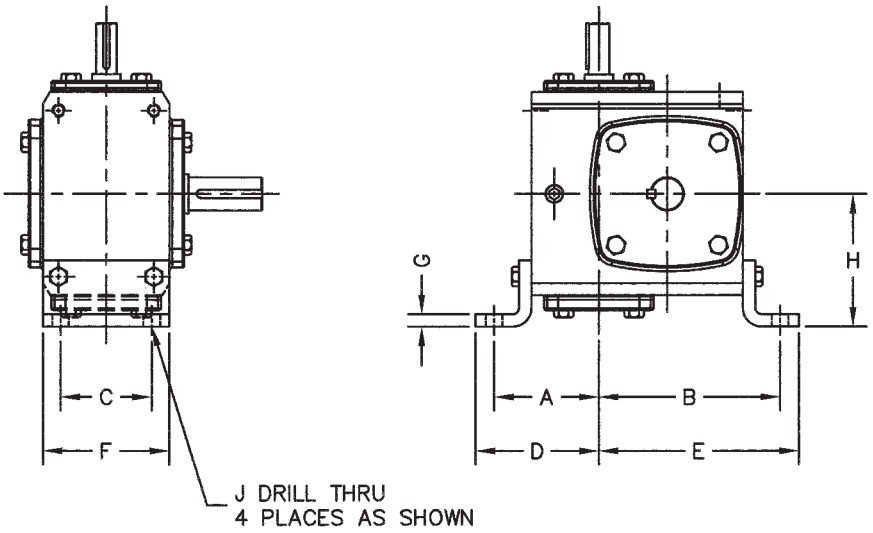
OUTPUT FLANGE KIT
(Cast Iron)

SIZE	PART NO.	A	B	C	D	E-Dia	F
13	H073134A	2.567	.38	5.79	4.53	.354	5.000
15	H073154A	4.071	.35	6.69	4.96	.354	5.882
17	H073184A	3.549	.38	6.69	5.35	.354	5.882
20	H073214A	3.744	.43	7.95	5.98	.413	7.000
20G	H073214A	3.744	.43	7.95	5.98	.413	7.000
23	H073244A	3.730	.43	8.43	6.46	.413	7.500
26	H073264A	3.698	.50	8.94	7.32	.413	8.000
26G	H073264A	3.698	.50	8.94	7.32	.413	8.000
30	H073304A	3.798	.50	9.84	8.07	.413	9.000
32	H073324A	4.005	.50	9.84	8.07	.413	9.000
32G	H073324A	4.005	.50	9.84	8.07	.413	9.000
42	H073424A	4.461	.62	10.24	10.24	.563	11.500
52	H073524A	5.589	.75	11.73	11.73	.709	14.000

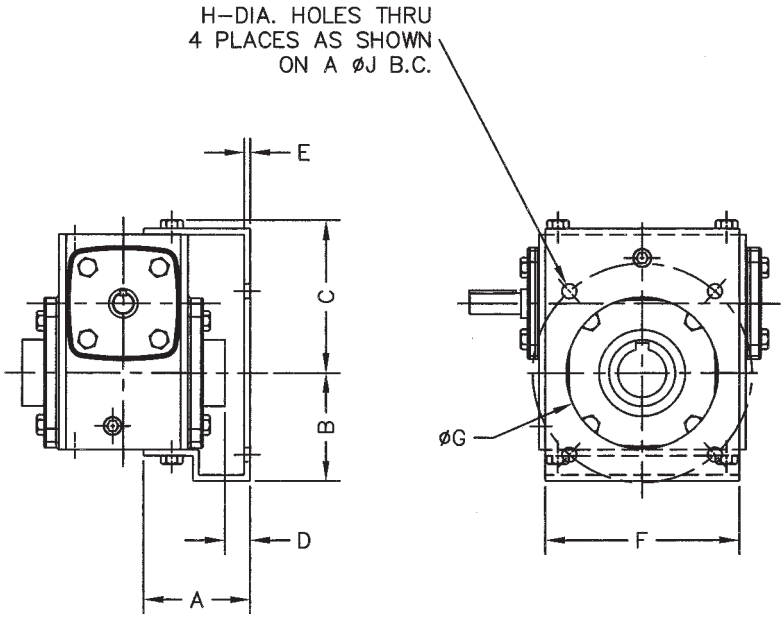


MODULAR UNIT ACCESSORIES

J-BRACKET KIT
(Vertical Input)



SIZE	PART NO.	A	B	C	D	E	F	G	H	J-DIAM.
13	H073132A	2.488	3.934	2.000	2.99	4.43	2.88	.25	2.940	3/8
15	H073182A	2.789	4.309	2.750	3.31	4.83	3.66	.25	3.500	7/16
17	H073182A	2.800	4.670	2.750	3.32	5.19	3.66	.25	3.500	7/16
20	H073212A	3.160	5.466	2.750	3.72	6.03	3.81	.38	4.010	1/2
20G	H073212GA	3.160	5.466	2.750	3.72	6.03	3.81	.38	4.010	1/2
23	H073242A	3.189	5.998	2.875	3.75	6.56	4.06	.38	4.060	1/2
26	H073262A	3.628	6.747	3.375	4.25	7.37	4.45	.38	5.000	9/16
26G	H073262A	3.628	6.747	3.375	4.25	7.37	4.45	.38	5.000	9/16
30	H073302A	3.877	7.498	3.875	4.51	8.13	5.28	.38	5.625	9/16
32	H073322A	3.878	7.998	3.875	4.51	8.63	5.75	.38	5.625	9/16
32G	H073322A	3.878	7.998	3.875	4.51	8.63	5.75	.38	5.625	9/16
42	H073422A	4.437	10.438	5.000	5.19	11.19	6.38	.50	6.500	11/16

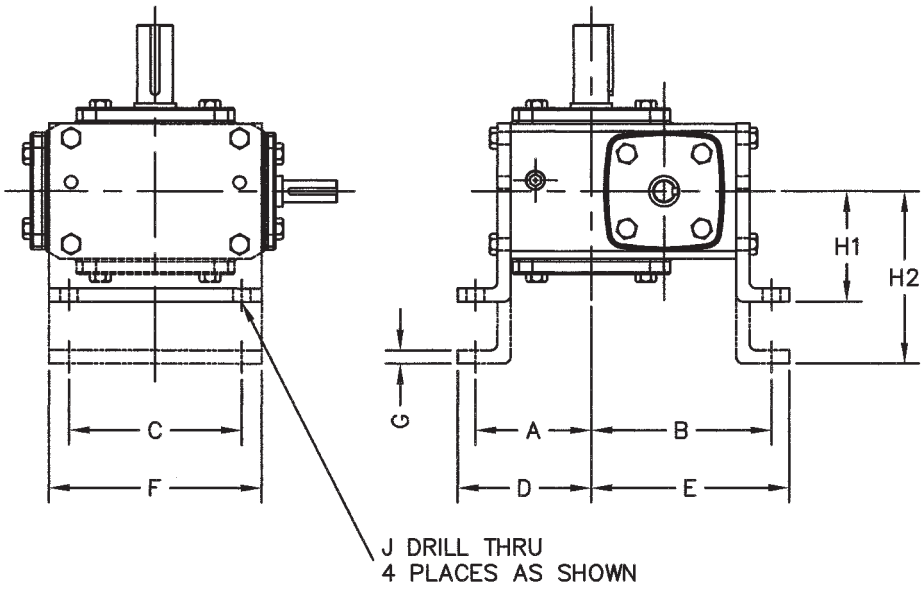


OUTPUT FLANGE KIT
(Formed Steel)

SIZE	PART NO.	A	B	C	D	E	F	G	H-DIAM.	J
17	H073185A	3.65	3.13	4.15	.90	.24	4.88	4.25	.35	5.875
20	H073215A	3.15	3.20	4.53	.75	.18	5.75	4.50	.43	6.500

MODULAR UNIT ACCESSORIES

VERTICAL OUTPUT
(High/Low Mounting Kit)



SIZE	PART NO.	A	B	C	D	E	F	G	H1	H2	J-DIAM.
13	H073138A	2.642	3.862	3.000	3.02	4.24	4.00	.24	2.626	3.559	3/8
15	H073158A	2.724	4.284	4.000	3.16	4.72	5.00	.25	3.000	4.378	7/16
17	H073188A	2.875	4.505	4.000	3.31	4.94	5.00	.25	3.000	4.378	7/16
20	H073218A	3.280	5.098	4.874	3.78	5.60	6.00	.38	3.130	4.878	1/2
20G	H073218GA	3.280	5.098	4.874	3.78	5.60	6.00	.38	3.130	4.878	1/2
23	H073248A	3.433	5.374	4.874	4.00	5.94	6.00	.38	3.382	5.248	1/2
26	H073268A	3.997	6.128	5.750	4.55	6.69	7.00	.38	3.630	5.567	9/16
26G	H073268A	3.997	6.128	5.750	4.55	6.69	7.00	.38	3.630	5.567	9/16
30	H073308A	4.375	6.755	6.000	5.06	7.44	8.00	.38	3.941	5.878	9/16
32	H073328A	4.748	7.128	6.125	5.31	7.69	8.50	.38	4.689	6.252	9/16
32G	H073328A	4.748	7.128	6.125	5.31	7.69	8.50	.38	4.689	6.252	9/16
42	H073428A	6.189	8.689	7.874	6.88	9.38	10.00	.50	5.000	7.500	11/16
52	H073528A	7.120	10.880	10.000	7.93	11.69	13.00	.50	5.157	9.157	25/32

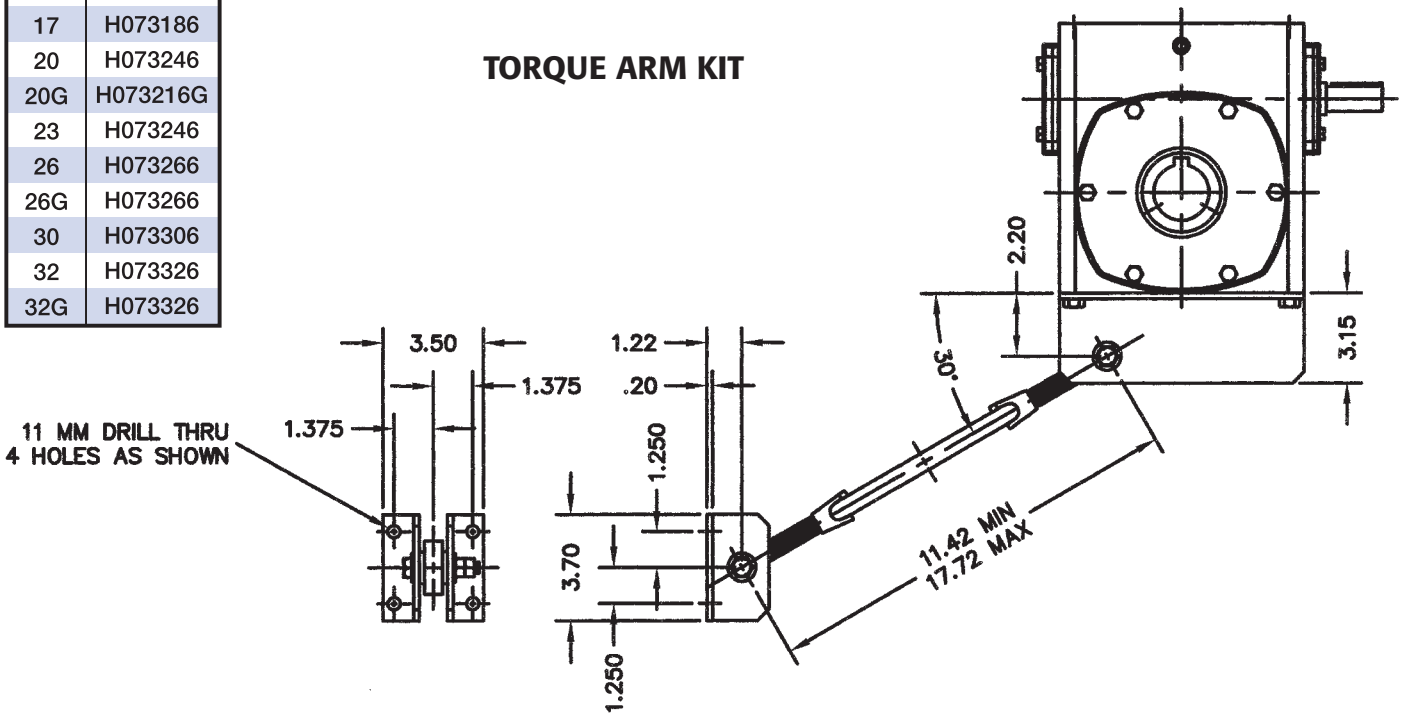
FLEXIBLE HIGH SPEED COUPLINGS

SIZE	56C	140TC	180TC	210TC	250TC
13	H038051				
15	H038151	H038251			
17	H038151	H038251			
20	H038151	H038251			
20G	H038151	H038251			
23	H038201	H038203	H038205		
26	H038201	H038203	H038205		
26G	H038201	H038203	H038205		
30	H038251	H038253	H038303		
32	H038251	H038253	H038303	H038353	H038453
32G	H038251	H038253	H038303	H038353	H038453
42		H038333	H038335	H038337	
52		H038303	H038305	H038355	

MODULAR UNIT ACCESSORIES

SIZE	PART NO.
13	H073136
15	H073186
17	H073186
20	H073246
20G	H073216G
23	H073246
26	H073266
26G	H073266
30	H073306
32	H073326
32G	H073326

TORQUE ARM KIT



M SERIES

BEARINGS & SEALS CHART

	BEARINGS				INPUT OIL SEALS				OUTPUT OIL SEALS	
	INPUT		OUTPUT		SOLID	QUILL			SOLID	HOLLOW
	SOLID	QUILL	SOLID	HOLLOW		56C	140TC	180TC		
13	6203	6203	30204	32005	TC-17307	TC-25357			TC-20357	TC-25357
15	6304	6304	30204	32006	TC-20357	TC-30407			TC-20357	TC-30407
17	6304	6304	30205	32008	TC-20357	TC-30407	SC-35457		TC-25407	TC-406212
20	6305	6305	30206	32010	TC-22407	TC-30508	TC-35508		TC-30508	TC-50659
23	6305	6305	30206	32011	TC-22407	TC-30508	TC-35508	SC-45607	TC-30508	TC-55808
26	6306	6306	30207	32011	TC-25407	TC-355511	TC-355511	SC-45607	TC-355511	TC-55808
30	6306	6306	30207	32014	TC-25407	TC-355511	TC-355511	SC-45607	TC-355511	TC-7010012
32	30306	5306	30208	32014	TC-25407	TC-355511	TC-355511	SC-45607	TC-406212	TC-7010012
42	30208	30208 *	32210	32014	TC-355511		SC-45607	TC-558012	TC-50659	TC-7010012
52	30309	30209 *	32211	32022	TC-406212		TC-45607	TC-558012	TC-558012	TC-11013013

***Note:** Two pieces required

DOUBLE REDUCTION MECHANICAL RATINGS (PAO Synthetic Oil)

Table 6

Mechanical ratings at 1750 rpm input, service factor 1.0.

HP=Input Horsepower OPT=Output torque in inch-lbs at the low speed shaft

RATIO	COMB.*	UNIT SIZE														
		13-13			13-15			13-17			13-20			13-23		
		IN. HP	OUT HP	OPT	IN. HP	OUT HP	OPT	IN. HP	OUT HP	OPT	IN. HP	OUT HP	OPT	IN. HP	OUT HP	OPT
75	5:1 X 15:1	.224	.147	396	.287	.192	520	.388	.270	730	.608	.438	1182	.955	.693	1872
100	5:1 X 20:1	.1433	.0956	344	.222	.146	527	.351	.229	823	.492	.339	1222	.784	.537	1935
125	5:1 X 25:1	.1194	.0765	344	.185	.117	527	.289	.177	798	.414	.270	1214	.653	.427	1923
150	10:1 X 15:1	.1264	.0766	414	.1699	.0976	527	.234	.148	799	.342	.230	1243	.543	.367	1984
225	15:1 X 15:1	.0960	.0522	423	.1295	.0735	595	.1664	.0969	785	.259	.157	1276	.414	.252	2044
250	10:1 X 25:1	.0711	.0382	344	.1101	.0586	527	.1649	.0930	837	.235	.142	1274	.375	.226	2035
300	15:1 X 20:1	.0743	.0396	428	.1003	.0557	602	.1520	.0819	885	.210	.121	1313	.343	.196	2113
375	15:1 X 25:1	.0620	.0317	428	.0836	.0446	602	.1262	.0635	858	.1793	.0967	1306	.287	.155	2095
400	20:1 X 20:1	.0508	.0272	392	.0788	.0417	601	.1180	.0622	896	.1630	.0922	1328	.267	.149	2144
500	25:1 X 20:1	.0436	.0218	393	.0657	.0334	601	.0983	.0498	896	.1359	.0738	1328	.222	.119	2144
600	30:1 X 20:1	.0482	.0202	437	.0640	.0285	616	.0904	.0415	896	.1248	.0615	1328	.2044	.0992	2144
750	30:1 X 25:1	.0402	.0162	437	.0533	.0228	616	.0752	.0322	869	.1066	.0489	1322	.1714	.0787	2125
1000	50:1 X 20:1	.0276	.0112	404	.0398	.0161	582	.0586	.0249	896	.0809	.0369	1328	.1325	.0595	2144
1250	50:1 X 25:1	.0216	.0087	393	.0318	.0129	582	.0487	.0193	869	.0691	.0294	1322	.1110	.0472	2125
1500	50:1 X 30:1	.0239	.0081	437	.0318	.0114	616	.0446	.0161	869	.0616	.0245	1321	.1016	.0393	2125
1800	60:1 X 30:1	.0219	.0067	437	.0291	.0095	616	.0369	.0125	812	.0564	.0204	1321	.0887	.0323	2093
2000	50:1 X 40:1	.0164	.0056	404	.0245	.0082	590	.0361	.0120	867	.0493	.0181	1307	.0820	.0296	2129
2400	60:1 X 40:1	.0150	.0047	404	.0224	.0068	590	.0330	.0100	867	.0452	.0151	1307	.0751	.0246	2129
3000	60:1 X 50:1	.0120	.0034	368	.0183	.0051	556	.0273	.0076	819	.0380	.0116	1249	.0621	.0189	2039
3600	60:1 X 60:1	.0111	.0027	356	.0153	.0043	556	.0185	.0054	699	.0299	.0089	1160	.0438	.0133	1727

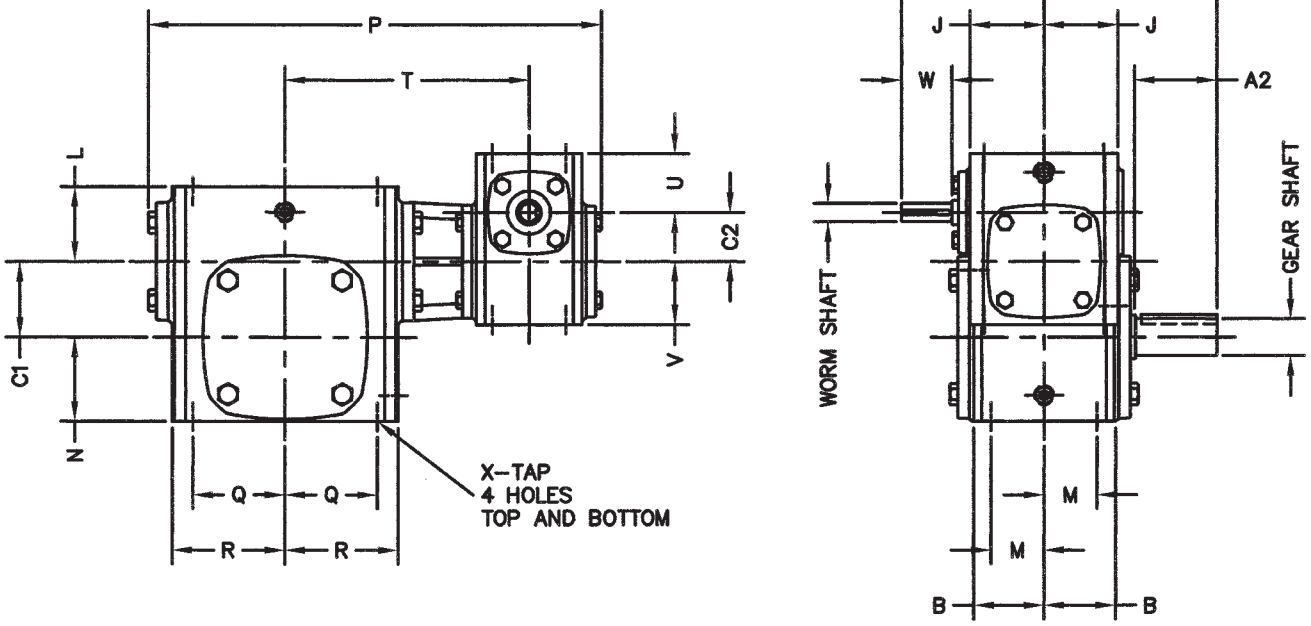
RATIO	COMB.*	UNIT SIZE														
		17-26			17-30			17-32			23-42			26-52		
		IN. HP	OUT HP	OPT	IN. HP	OUT HP	OPT	IN. HP	OUT HP	OPT	IN. HP	OUT HP	OPT	IN. HP	OUT HP	OPT
75	5:1 X 15:1	1.059	.800	2162	1.777	1.351	3650	2.087	1.575	4254	4.298	3.305	8928	5.829	4.476	12089
100	5:1 X 20:1	1.012	.713	2569	1.407	1.035	3729	2.087	1.501	5406	3.865	2.794	10061	5.829	4.300	15487
125	5:1 X 25:1	.778	.539	2427	1.090	.782	3518	1.905	1.292	5815	3.203	2.232	10049	5.353	3.793	17076
150	10:1 x 15:1	.662	.458	2474	1.010	.719	3882	1.474	.972	5252	2.683	1.942	10492	4.701	3.158	17058
225	15:1 X 15:1	.436	.289	2345	.740	.494	4006	.968	.638	5168	1.995	1.362	11033	2.906	1.998	16187
250	10:1 X 25:1	.442	.284	2557	.694	.438	3945	1.101	.688	6192	1.910	1.234	11111	3.260	2.149	19346
300	15:1 X 20:1	.428	.260	2814	.594	.377	4068	.915	.568	6135	1.735	1.092	11804	2.909	1.801	19457
375	15:1 X 25:1	.325	.194	2626	.495	.301	4068	.795	.460	6213	1.439	.867	11703	2.461	1.528	20640
400	20:1 X 20:1	.344	.198	2856	.467	.279	4022	.738	.434	6246	1.404	.841	12116	2.392	1.480	21313
500	25:1 X 20:1	.287	.159	2856	.389	.223	4022	.615	.347	6246	1.157	.673	12116	1.940	1.184	21313
600	30:1 X 20:1	.248	.132	2856	.350	.189	4091	.531	.289	6246	.997	.561	12116	1.822	.996	21522
750	30:1 X 25:1	.1879	.0985	2661	.292	.151	4091	.456	.230	6223	.826	.444	11998	1.400	.788	21288
1000	50:1 X 20:1	.1700	.0793	2856	.231	.112	4022	.365	.173	6246	.667	.336	12116	1.128	.591	21288
1250	50:1 X 25:1	.1289	.0591	2661	.1791	.0857	3856	.313	.138	6223	.553	.267	11998	.924	.473	21288
1500	50:1 X 30:1	.1060	.0493	2661	.1729	.0757	4091	.257	.115	6223	.467	.222	11998	.836	.398	21522
1800	60:1 X 30:1	.0890	.0392	2543	.1422	.0631	4091	.2120	.0918	5953	.387	.177	11484	.733	.332	21522
2000	50:1 X 40:1	.1036	.0391	2819	.1374	.0548	3947	.2187	.0850	6124	.402	.164	11806	.668	.294	21167
2400	60:1 X 40:1	.0851	.0326	2819	.1130	.0457	3947	.1798	.0709	6124	.339	.137	11806	.586	.245	21167
3000	60:1 X 50:1	.0634	.0237	2560	.1006	.0344	3722	.1559	.0553	5971	.273	.103	11134	.487	.189	20424
3600	60:1 X 60:1	.0552	.0190	2462	.0827	.0287	3722	.1039	.0386	5002	.2176	.0779	10097	.371	.142	18412

Note: Consult factory for other input RPM requirements and ratio offerings.

* These are the most common ratio combinations. In some cases, to maximize HP/Torque rating, a different combination may be used. Consult factory for more information.

MODULAR - TYPE 21 (ID STYLE)

DOUBLE REDUCTION – SOLID INPUT – SOLID OUTPUT

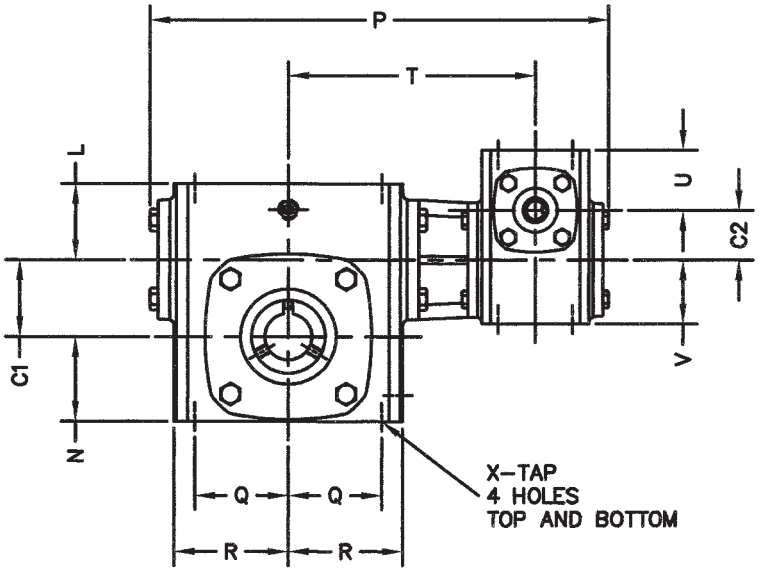


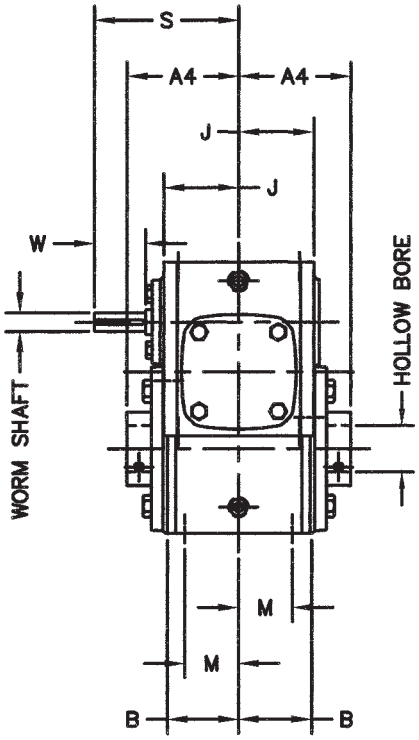
SIZE	A1	A2	B	C1	C2	J	L	M	N	P	Q	R	S	T	U	V
13-13	4.00	1.97	1.44	1.333	1.333	2.01	1.61	1.000	1.72	9.67	1.625	2.01	3.88	5.579	1.61	1.72
13-15	4.31	1.97	1.75	1.540	1.333	2.01	1.93	1.375	1.91	11.39	2.095	2.56	3.88	6.161	1.61	1.72
13-17	4.33	1.77	1.83	1.750	1.333	2.01	1.94	1.375	2.06	11.54	2.095	2.69	3.88	6.240	1.61	1.72
13-20	4.69	2.20	1.91	2.062	1.333	2.01	2.04	1.438	2.28	12.30	2.500	3.06	3.88	6.624	1.61	1.72
13-20G	4.69	2.20	1.91	2.062	1.333	2.01	2.04	1.500	2.28	12.30	2.375	3.06	3.88	6.624	1.61	1.72
13-23	5.07	2.40	2.04	2.375	1.333	2.01	2.07	1.438	2.50	12.53	2.500	3.17	3.88	6.732	1.61	1.72
17-26	5.63	2.64	2.23	2.625	1.750	2.69	2.44	1.688	2.94	14.74	3.188	3.73	4.75	7.860	1.94	2.06
17-26G	5.63	2.64	2.23	2.625	1.750	2.69	2.44	1.688	2.94	14.74	3.188	3.73	4.75	7.860	1.94	2.06
17-30	6.75	3.35	2.64	3.000	1.750	2.69	2.63	2.000	3.25	15.39	3.500	4.06	4.75	8.109	1.94	2.06
17-32	7.06	3.35	2.88	3.250	1.750	2.69	2.63	2.000	3.50	16.02	3.750	4.25	4.75	8.500	1.94	2.06
17-32G	7.06	3.35	2.88	3.250	1.750	2.69	2.63	2.000	3.50	16.02	3.750	4.25	4.75	8.500	1.94	2.06
23-42	8.12	4.13	3.06	4.250	2.375	3.17	2.69	2.500	4.44	18.04	4.250	5.13	5.75	9.450	2.07	2.50
26-52	9.06	4.13	3.60	5.250	2.625	3.73	3.63	2.906	5.12	21.78	5.500	6.50	6.31	11.500	2.44	2.94

			WORM SHAFT		GEAR SHAFT	
SIZE	W	X-TAP	DIAMETER	KEYWAY	DIAMETER	KEYWAY
13-13	1.38	5/16-18 X .50	.5000 / .4996	1/8 X 1/16	.6250 / .6246	3/16 X 3/32
13-15	1.38	5/16-18 X .50	.5000 / .4996	1/8 X 1/16	.7500 / .7495	3/16 X 3/32
13-17	1.38	5/16-18 X .60	.5000 / .4996	1/8 X 1/16	.8750 / .8745	3/16 X 3/32
13-20	1.38	3/8-16 X .59	.5000 / .4996	1/8 X 1/16	1.0000 / .9995	1/4 X 1/8
13-20G	1.38	5/16-18 X .59	.5000 / .4996	1/8 X 1/16	1.0000 / .9995	1/4 X 1/8
13-23	1.38	3/8-16 X .60	.5000 / .4996	1/8 X 1/16	1.1250 / 1.1245	1/4 X 1/8
17-26	1.57	3/8-16 X .60	.6250 / .6246	3/16 X 3/32	1.1250 / 1.1245	1/4 X 1/8
17-26G	1.57	3/8-16 X .60	.6250 / .6246	3/16 X 3/32	1.2500 / 1.2494	1/4 X 1/8
17-30	1.57	7/16-14 X .70	.6250 / .6246	3/16 X 3/32	1.2500 / 1.2494	1/4 X 1/8
17-32	1.57	7/16-14 X .67	.6250 / .6246	3/16 X 3/32	1.3750 / 1.3744	5/16 X 5/32
17-32G	1.57	7/16-14 X .67	.6250 / .6246	3/16 X 3/32	1.5000 / 1.4994	3/8 X 3/16
23-42	2.01	5/8-11 X 1.00	.7500 / .7495	3/16 X 3/32	1.8750 / 1.8744	1/2 X 1/4
26-52	2.01	5/8-11 X 1.25	.7500 / .7495	3/16 X 3/32	2.0000 / 1.9993	1/2 X 1/4

MODULAR - TYPE 22 (IDHO STYLE)

DOUBLE REDUCTION – SOLID INPUT – HOLLOW OUTPUT



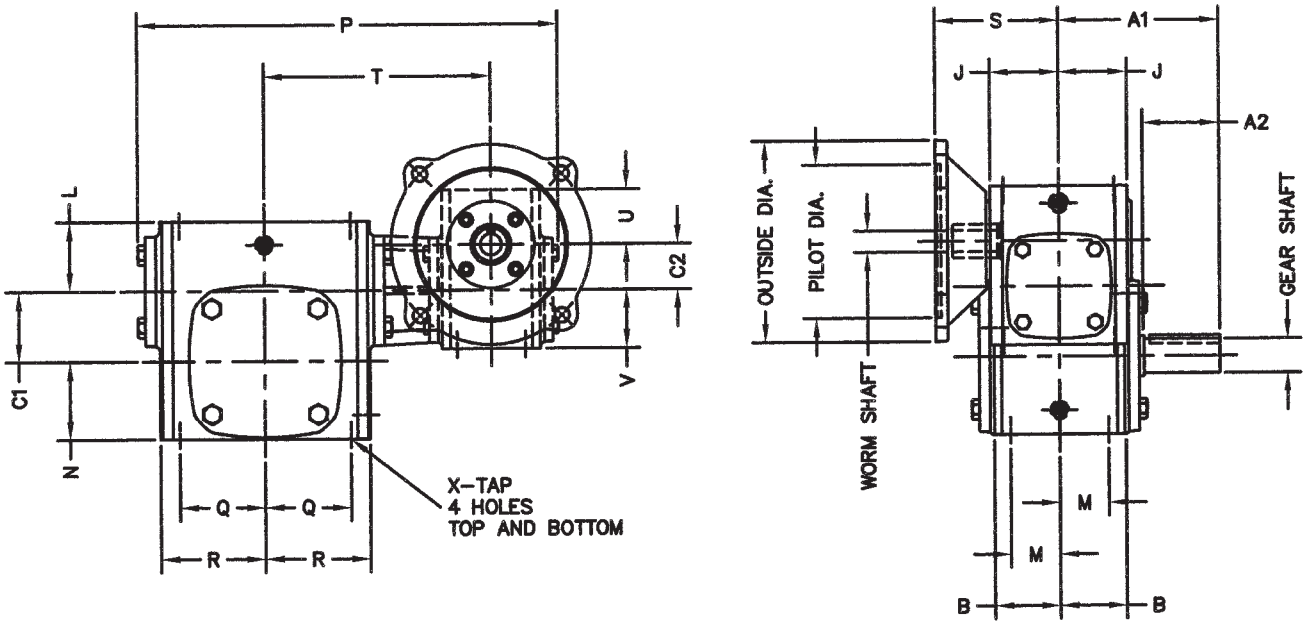


SIZE																		WORM SHAFT	
	A4	B	C1	C2	J	L	M	N	P	Q	R	S	T	U	V	W	X-TAP	DIAMETER	KEYWAY
13-13	2.38	1.44	1.333	1.333	2.01	1.61	1.000	1.72	9.67	1.625	2.01	3.88	5.579	1.61	1.72	1.38	5/16-18 X .50	.5000 / .4996	1/8 X 1/16
13-15	2.71	1.75	1.540	1.333	2.01	1.93	1.375	1.91	11.39	2.095	2.56	3.88	6.161	1.61	1.72	1.38	5/16-18 X .50	.5000 / .4996	1/8 X 1/16
13-17	2.75	1.83	1.750	1.333	2.01	1.94	1.375	2.06	11.54	2.095	2.69	3.88	6.240	1.61	1.72	1.38	5/16-18 X .60	.5000 / .4996	1/8 X 1/16
13-20	3.00	1.91	2.062	1.333	2.01	2.04	1.438	2.28	12.30	2.500	3.06	3.88	6.624	1.61	1.72	1.38	3/8-16 X .59	.5000 / .4996	1/8 X 1/16
13-20G	3.00	1.91	2.062	1.333	2.01	2.04	1.500	2.28	12.30	2.375	3.06	3.88	6.624	1.61	1.72	1.38	5/16-18 X .59	.5000 / .4996	1/8 X 1/16
13-23	3.00	2.04	2.375	1.333	2.01	2.07	1.438	2.50	12.53	2.500	3.17	3.88	6.732	1.61	1.72	1.38	3/8-16 X .60	.5000 / .4996	1/8 X 1/16
17-26	3.50	2.23	2.625	1.750	2.69	2.44	1.688	2.94	14.74	3.188	3.73	4.75	7.860	1.94	2.06	1.57	3/8-16 X .60	.6250 / .6246	3/16 X 3/32
17-30	3.75	2.64	3.000	1.750	2.69	2.63	2.000	3.25	15.39	3.500	4.06	4.75	8.190	1.94	2.06	1.57	7/16-14 X .70	.6250 / .6246	3/16 X 3/32
17-32	3.94	2.88	3.250	1.750	2.69	2.63	2.000	3.50	16.02	3.750	4.25	4.75	8.500	1.94	2.06	1.57	7/16-14 X .67	.6250 / .6246	3/16 X 3/32
23-42	4.50	3.06	4.250	2.375	3.17	2.69	2.500	4.44	18.04	4.250	5.13	5.75	9.450	2.07	2.50	2.01	5/8-11 X 1.00	.7500 / .7495	3/16 X 3/32
26-52	5.55	3.60	5.250	2.625	3.73	3.63	2.906	5.12	21.78	5.500	6.50	6.31	11.500	2.44	2.94	2.01	5/8-11 X 1.25	.7500 / .7495	3/16 X 3/32

SIZE	BORE DESIGNATION									
	1		2		3		4		5	
	BORE DIA.	KEYWAY	BORE DIA.	KEYWAY	BORE DIA.	KEYWAY	BORE DIA.	KEYWAY	BORE DIA.	KEYWAY
13-13	.6252 / .6259	3/16 X 3/32								
13-15	.6252 / .6259	3/16 X 3/32								
13-17	.6252 / .6259	3/16 X 3/32	.6877 / .6884	3/16 X 3/32	.7503 / .7511	3/16 X 3/32	.8753 / .8761	3/16 X 3/32	1.0003 / 1.0011	1/4 X 1/8
13-20	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
13-20G	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
13-23	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
17-26	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
17-30	1.2504 / 1.2513	1/4 X 1/8	1.5004 / 1.5013	3/8 X 3/16	1.6254 / 1.6263	3/8 X 3/16	1.7504 / 1.7513	3/8 X 3/16	1.9379 / 1.9388	1/2 X 1/4
17-32	1.2504 / 1.2513	1/4 X 1/8	1.5004 / 1.5013	3/8 X 3/16	1.6254 / 1.6263	3/8 X 3/16	1.7504 / 1.7513	3/8 X 3/16	1.9379 / 1.9388	1/2 X 1/4
23-42	1.7504 / 1.7513	3/8 X 3/16	1.8754 / 1.8763	1/2 X 1/4	1.9379 / 1.9388	1/2 X 1/4	2.0004 / 2.0016	1/2 X 1/4	2.1879 / 2.1891	1/2 X 1/4
26-52	2.0004 / 2.0016	1/2 X 1/4	2.4379 / 2.4391	5/8 X 5/16	2.9379 / 2.9391	3/4 X 3/8	3.0004 / 3.0016	3/4 X 3/8	3.4380 / 3.4394	7/8 X 7/16

MODULAR - TYPE 23 (IDCHS STYLE)

DOUBLE REDUCTION – QUILL INPUT – SOLID OUTPUT



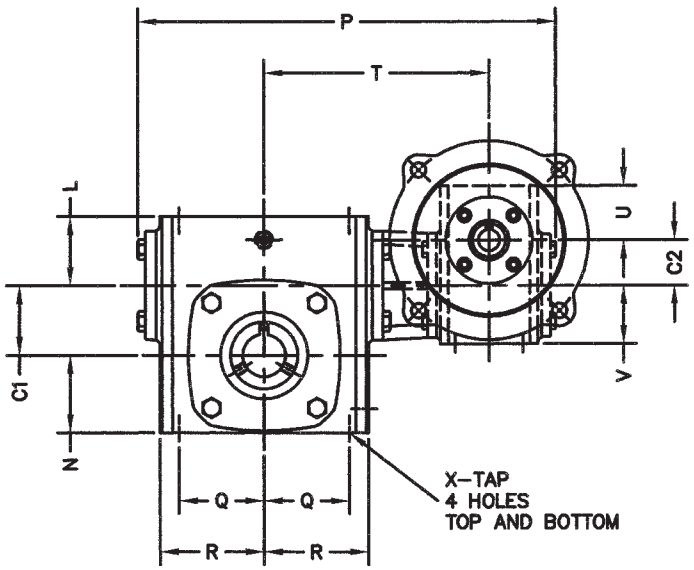
SIZE	A1	A2	B	C1	C2	J	L	M	N	P	Q	R	S	T	U	V
13-13	4.00	1.97	1.44	1.333	1.333	2.01	1.61	1.000	1.72	9.67	1.625	2.01	3.88	5.579	1.61	1.72
13-15	4.31	1.97	1.75	1.540	1.333	2.01	1.93	1.375	1.91	11.39	2.095	2.56	3.88	6.161	1.61	1.72
13-17	4.33	1.77	1.83	1.750	1.333	2.01	1.94	1.375	2.06	11.54	2.095	2.69	3.88	6.240	1.61	1.72
13-20	4.69	2.20	1.91	2.062	1.333	2.01	2.04	1.438	2.28	12.30	2.500	3.06	3.88	6.624	1.61	1.72
13-20G	4.69	2.20	1.91	2.062	1.333	2.01	2.04	1.500	2.28	12.30	2.375	3.06	3.88	6.624	1.61	1.72
13-23	5.07	2.40	2.04	2.375	1.333	2.01	2.07	1.438	2.50	12.53	2.500	3.17	3.88	6.732	1.61	1.72
17-26	5.63	2.64	2.23	2.625	1.750	2.69	2.44	1.688	2.94	14.74	3.188	3.73	4.75	7.860	1.94	2.06
17-26G	5.63	2.64	2.23	2.625	1.750	2.69	2.44	1.688	2.94	14.74	3.188	3.73	4.75	7.860	1.94	2.06
17-30	6.75	3.35	2.64	3.000	1.750	2.69	2.63	2.000	3.25	15.39	3.500	4.06	4.75	8.190	1.94	2.06
17-32	7.06	3.35	2.88	3.250	1.750	2.69	2.63	2.000	3.50	16.02	3.750	4.25	4.75	8.500	1.94	2.06
17-32G	7.06	3.35	2.88	3.250	1.750	2.69	2.63	2.000	3.50	16.02	3.750	4.25	4.75	8.500	1.94	2.06
23-42	8.12	4.13	3.06	4.250	2.375	3.17	2.69	2.500	4.44	18.04	4.250	5.13	5.75	9.450	2.07	2.50
26-52	9.06	4.13	3.60	5.250	2.625	3.73	3.63	2.906	5.12	21.78	5.500	6.50	6.31	11.500	2.44	2.94

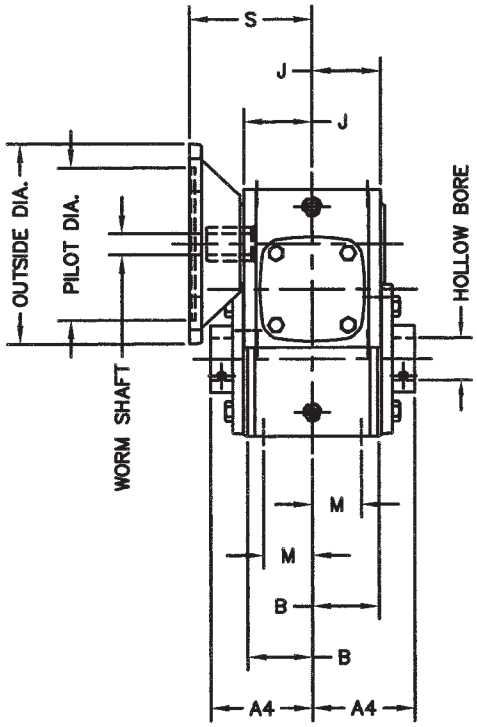
		S			GEAR SHAFT	
SIZE	X-TAP	56C	143TC/ 145TC	182TC/ 184TC	DIAMETER	KEYWAY
13-13	5/16-18 X .50	3.61			.6250 / .6246	3/16 X 3/32
13-15	5/16-18 X .50	3.61			.7500 / .7495	3/16 X 3/32
13-17	5/16-18 X .60	3.61			.8750 / .8745	3/16 X 3/32
13-20	3/8-16 X .59	3.61			1.0000 / .9995	1/4 X 1/8
13-20G	5/16-18 X .59	3.61			1.0000 / .9995	1/4 X 1/8
13-23	3/8-16 X .60	3.61			1.1250 / 1.1245	1/4 X 1/8
17-26	3/8-16 X .60	4.37	4.37		1.1250 / 1.1245	1/4 X 1/8
17-26G	3/8-16 X .60	4.37	4.37		1.2500 / 1.2494	1/4 X 1/8
17-30	7/16-14 X .70	4.37	4.37		1.2500 / 1.2494	1/4 X 1/8
17-32	7/16-14 X .67	4.37	4.37		1.3750 / 1.3744	5/16 X 5/32
17-32G	7/16-14 X .67	4.37	4.37		1.5000 / 1.4994	3/8 X 3/16
23-42	5/8-11 X 1.00		4.86		1.8750 / 1.8744	1/2 X 1/4
26-52	5/8-11 X 1.25		5.62	6.41	2.0000 / 1.9993	1/2 X 1/4

NEMA FRAME	OUTSIDE DIAMETER	PILOT DIAMETER	BOLT CIRCLE	HOLE SIZE	QUILL SHAFT	
					BORE DIAMETER	KEYWAY
56C	6.50	4.5005 / 4.5019	5.875	.413	.6256 / .6267	3/16 X 3/32
143TC / 145TC	6.50	4.5005 / 4.5019	5.875	.413	.8758 / .8771	3/16 X 3/32
182TC / 184TC	9.00	8.5006 / 8.5024	7.250	.591	1.1258 / 1.1271	1/4 X 1/8

MODULAR - TYPE 24 (IDCHSHO STYLE)

DOUBLE REDUCTION – QUILL INPUT – HOLLOW OUTPUT





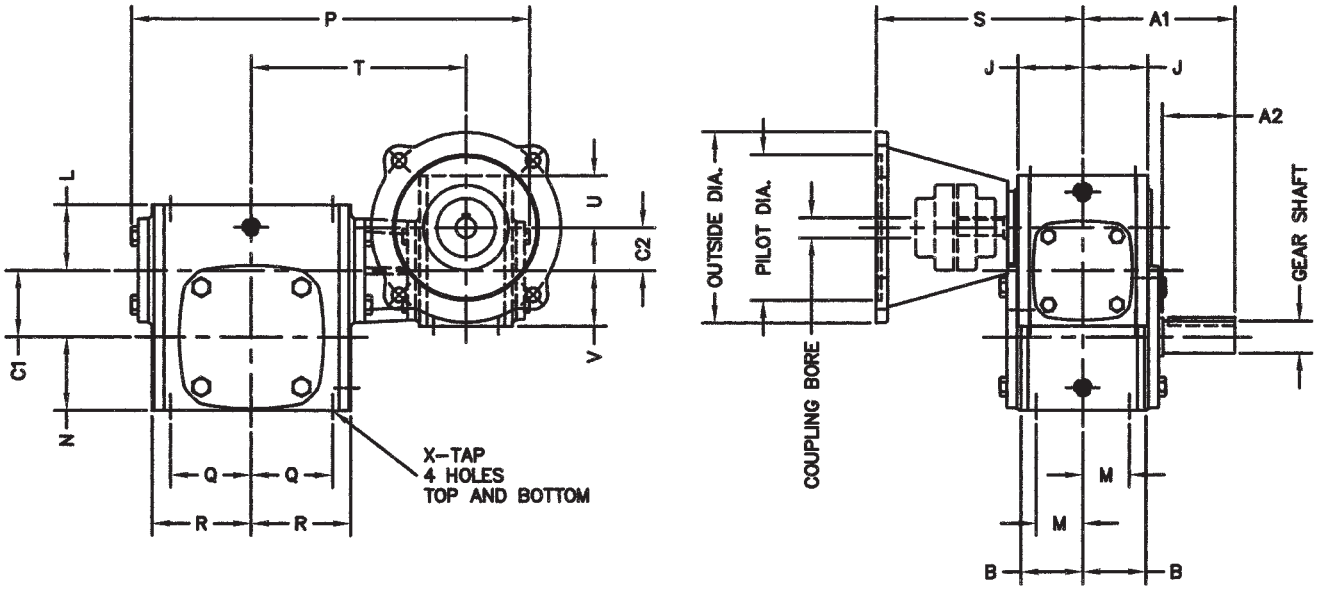
SIZE	A4	B	C1	C2	J	L	M	N	P	Q	R	S	T	U	V	X-TAP	S 56C	S 143TC/145TC	S 182TC/184TC
13-13	2.38	1.44	1.333	1.333	2.01	1.61	1.000	1.72	9.67	1.625	2.01	3.88	5.579	1.61	1.72	5/16-18 X .50	3.61		
13-15	2.71	1.75	1.540	1.333	2.01	1.93	1.375	1.91	11.39	2.095	2.56	3.88	6.161	1.61	1.72	5/16-18 X .50	3.61		
13-17	2.75	1.83	1.750	1.333	2.01	1.94	1.375	2.06	11.54	2.095	2.69	3.88	6.240	1.61	1.72	5/16-18 X .60	3.61		
13-20	3.00	1.91	2.062	1.333	2.01	2.04	1.438	2.28	12.30	2.500	3.06	3.88	6.624	1.61	1.72	3/8-16 X .59	3.61		
13-20G	3.00	1.91	2.062	1.333	2.01	2.04	1.500	2.28	12.30	2.375	3.06	3.88	6.624	1.61	1.72	5/16-18 X .59	3.61		
13-23	3.00	2.04	2.375	1.333	2.01	2.07	1.438	2.50	12.53	2.500	3.17	3.88	6.732	1.61	1.72	3/8-16 X .60	3.61		
17-26	3.50	2.23	2.625	1.750	2.69	2.44	1.688	2.94	14.74	3.188	3.73	4.75	7.860	1.94	2.06	3/8-16 X .60	4.37	4.37	
17-30	3.75	2.64	3.000	1.750	2.69	2.63	2.000	3.25	15.39	3.500	4.06	4.75	8.190	1.94	2.06	7/16-14 X .70	4.37	4.37	
17-32	3.94	2.88	3.250	1.750	2.69	2.63	2.000	3.50	16.02	3.750	4.25	4.75	8.500	1.94	2.06	7/16-14 X .67	4.37	4.37	
23-42	4.50	3.06	4.250	2.375	3.17	2.69	2.500	4.44	18.04	4.250	5.13	5.75	9.450	2.07	2.50	5/8-11 X 1.00		4.86	
26-52	5.55	3.60	5.250	2.625	3.73	3.63	2.906	5.12	21.78	5.500	6.50	6.31	11.500	2.44	2.94	5/8-11 X 1.25		5.62	6.41

SIZE	BORE DESIGNATION 1 BORE DIA.	1 KEYWAY	2 BORE DIA.	2 KEYWAY	3 BORE DIA.	3 KEYWAY	4 BORE DIA.	4 KEYWAY	5 BORE DIA.	5 KEYWAY
13-13	.6252 / .6259	3/16 X 3/32								
13-15	.6252 / .6259	3/16 X 3/32								
13-17	.6252 / .6259	3/16 X 3/32	.6877 / .6884	3/16 X 3/32	.7503 / .7511	3/16 X 3/32	.8753 / .8761	3/16 X 3/32	1.0003 / 1.0011	1/4 X 1/8
13-20	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
13-20G	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
13-23	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
17-26	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
17-30	1.2504 / 1.2513	1/4 X 1/8	1.5004 / 1.5013	3/8 X 3/16	1.6254 / 1.6263	3/8 X 3/16	1.7504 / 1.7513	3/8 X 3/16	1.9379 / 1.9388	1/2 X 1/4
17-32	1.2504 / 1.2513	1/4 X 1/8	1.5004 / 1.5013	3/8 X 3/16	1.6254 / 1.6263	3/8 X 3/16	1.7504 / 1.7513	3/8 X 3/16	1.9379 / 1.9388	1/2 X 1/4
23-42	1.7504 / 1.7513	3/8 X 3/16	1.8754 / 1.8763	1/2 X 1/4	1.9379 / 1.9388	1/2 X 1/4	2.0004 / 2.0016	1/2 X 1/4	2.1879 / 2.1891	1/2 X 1/4
26-52	2.0004 / 2.0016	1/2 X 1/4	2.4379 / 2.4391	5/8 X 5/16	2.9379 / 2.9391	3/4 X 3/8	3.0004 / 3.0016	3/4 X 3/8	3.4380 / 3.4394	7/8 X 7/16

NEMA FRAME	OUTSIDE DIAMETER	PILOT DIAMETER	BOLT CIRCLE	HOLE SIZE	QUILL SHAFT BORE DIAMETER	QUILL SHAFT KEYWAY
56C	6.50	4.5005 / 4.5019	5.875	.413	.6256 / .6267	3/16 X 3/32
143TC / 145TC	6.50	4.5005 / 4.5019	5.875	.413	.8758 / .8771	3/16 X 3/32
182TC / 184TC	9.00	8.5006 / 8.5024	7.250	.591	1.1258 / 1.1271	1/4 X 1/8

MODULAR - TYPE 25 (IDC STYLE)

DOUBLE REDUCTION – FLOWER POT INPUT – SOLID OUTPUT



SIZE	A1	A2	B	C1	C2	J	L	M	N	P	Q	R	S	T	U	V
13-13	4.00	1.97	1.44	1.333	1.333	2.01	1.61	1.000	1.72	9.67	1.625	2.01	3.88	5.579	1.61	1.72
13-15	4.31	1.97	1.75	1.540	1.333	2.01	1.93	1.375	1.91	11.39	2.095	2.56	3.88	6.161	1.61	1.72
13-17	4.33	1.77	1.83	1.750	1.333	2.01	1.94	1.375	2.06	11.54	2.095	2.69	3.88	6.240	1.61	1.72
13-20	4.69	2.20	1.91	2.062	1.333	2.01	2.04	1.438	2.28	12.30	2.500	3.06	3.88	6.624	1.61	1.72
13-20G	4.69	2.20	1.91	2.062	1.333	2.01	2.04	1.500	2.28	12.30	2.375	3.06	3.88	6.624	1.61	1.72
13-23	5.07	2.40	2.04	2.375	1.333	2.01	2.07	1.438	2.50	12.53	2.500	3.17	3.88	6.732	1.61	1.72
17-26	5.63	2.64	2.23	2.625	1.750	2.69	2.44	1.688	2.94	14.74	3.188	3.73	4.75	7.860	1.94	2.06
17-26G	5.63	2.64	2.23	2.625	1.750	2.69	2.44	1.688	2.94	14.74	3.188	3.73	4.75	7.860	1.94	2.06
17-30	6.75	3.35	2.64	3.000	1.750	2.69	2.63	2.000	3.25	15.39	3.500	4.06	4.75	8.190	1.94	2.06
17-32	7.06	3.35	2.88	3.250	1.750	2.69	2.63	2.000	3.50	16.02	3.750	4.25	4.75	8.500	1.94	2.06
17-32G	7.06	3.35	2.88	3.250	1.750	2.69	2.63	2.000	3.50	16.02	3.750	4.25	4.75	8.500	1.94	2.06
23-42	8.12	4.13	3.06	4.250	2.375	3.17	2.69	2.500	4.44	18.04	4.250	5.13	5.75	9.450	2.07	2.50
26-52	9.06	4.13	3.60	5.250	2.625	3.73	3.63	2.906	5.12	21.78	5.500	6.50	6.31	11.500	2.44	2.94

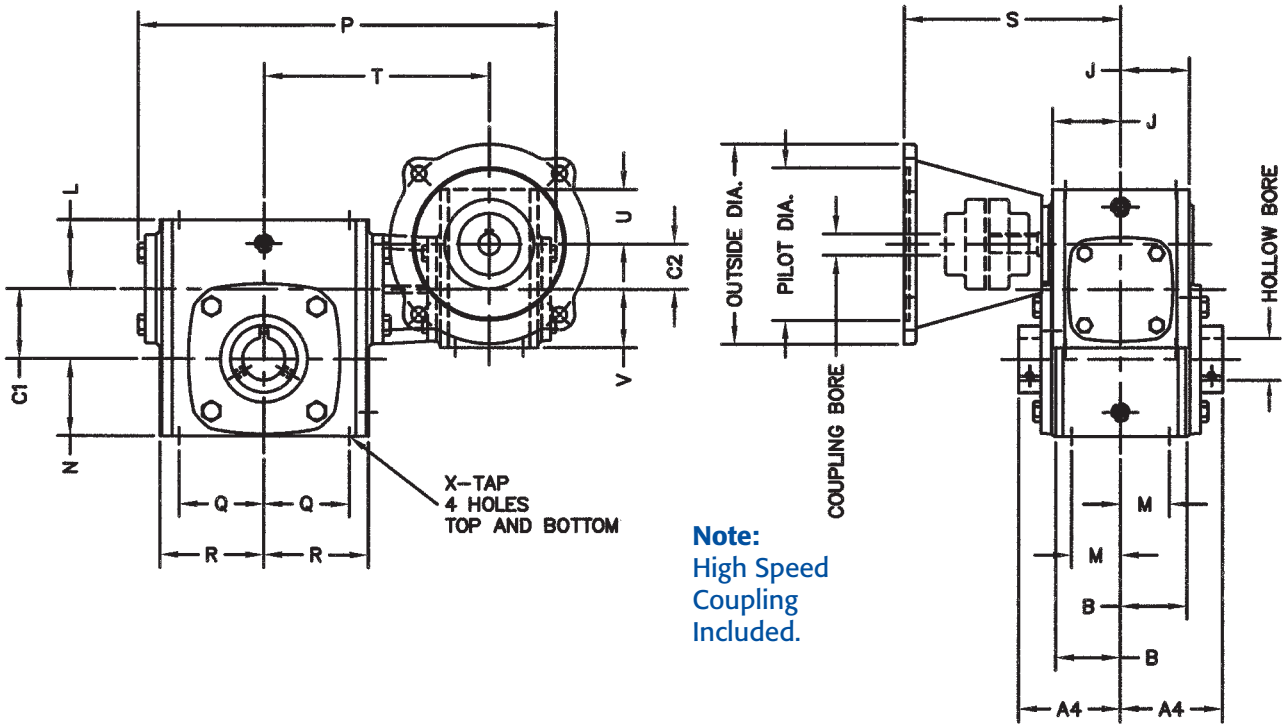
SIZE	X-TAP	S			GEAR SHAFT	
		56C	143TC/ 145TC	182TC/ 184TC	DIAMETER	KEYWAY
13-13	5/16-18 X .50	6.39			.6250 / .6246	3/16 X 3/32
13-15	5/16-18 X .50	6.39			.7500 / .7495	3/16 X 3/32
13-17	5/16-18 X .60	6.39			.8750 / .8745	3/16 X 3/32
13-20	3/8-16 X .59	6.39			1.0000 / .9995	1/4 X 1/8
13-20G	5/16-18 X .59	6.39			1.0000 / .9995	1/4 X 1/8
13-23	3/8-16 X .60	6.39			1.1250 / 1.1245	1/4 X 1/8
17-26	3/8-16 X .60	6.95	6.95		1.1250 / 1.1245	1/4 X 1/8
17-26G	3/8-16 X .60	6.95	6.95		1.2500 / 1.2494	1/4 X 1/8
17-30	7/16-14 X .70	6.95	6.95		1.2500 / 1.2494	1/4 X 1/8
17-32	7/16-14 X .67	6.95	6.95		1.3750 / 1.3744	5/16 X 5/32
17-32G	7/16-14 X .67	6.95	6.95		1.5000 / 1.4994	3/8 X 3/16
23-42	5/8-11 X 1.00		7.93		1.8750 / 1.8744	1/2 X 1/4
26-52	5/8-11 X 1.25		8.60	9.81	2.0000 / 1.9993	1/2 X 1/4

Note:
High Speed Coupling Included.

NEMA FRAME	OUTSIDE DIAMETER	PILOT DIAMETER	BOLT CIRCLE	HOLE SIZE	COUPLING BORE	
					BORE DIAMETER	KEYWAY
56C	6.50	4.5005 / 4.5019	5.875	.413	.6256 / .6267	3/16 X 3/32
143TC / 145TC	6.50	4.5005 / 4.5019	5.875	.413	.8758 / .8771	3/16 X 3/32
182TC / 184TC	9.00	8.5006 / 8.5024	7.250	.591	1.1258 / 1.1271	1/4 X 1/8

MODULAR - TYPE 26 (IDCHO STYLE)

DOUBLE REDUCTION – FLOWER POT INPUT – HOLLOW OUTPUT



Note:
High Speed Coupling Included.

SIZE	A4	B	C1	C2	J	L	M	N	P	Q	R	S	T	U	V	X-TAP	S 56C	S 143TC/145TC	S 182TC/184TC
13-13	2.38	1.44	1.333	1.333	2.01	1.61	1.000	1.72	9.67	1.625	2.01	3.88	5.579	1.61	1.72	5/16-18 X .50	6.39		
13-15	2.71	1.75	1.540	1.333	2.01	1.93	1.375	1.91	11.39	2.095	2.56	3.88	6.161	1.61	1.72	5/16-18 X .50	6.39		
13-17	2.75	1.83	1.750	1.333	2.01	1.94	1.375	2.06	11.54	2.095	2.69	3.88	6.240	1.61	1.72	5/16-18 X .60	6.39		
13-20	3.00	1.91	2.062	1.333	2.01	2.04	1.438	2.28	12.30	2.500	3.06	3.88	6.624	1.61	1.72	3/8-16 X .59	6.39		
13-20G	3.00	1.91	2.062	1.333	2.01	2.04	1.500	2.28	12.30	2.375	3.06	3.88	6.624	1.61	1.72	5/16-18 X .59	6.39		
13-23	3.00	2.04	2.375	1.333	2.01	2.07	1.438	2.50	12.53	2.500	3.17	3.88	6.732	1.61	1.72	3/8-16 X .60	6.39		
17-26	3.50	2.23	2.625	1.750	2.69	2.44	1.688	2.94	14.74	3.188	3.73	4.75	7.860	1.94	2.06	3/8-16 X .60	6.95	6.95	
17-30	3.75	2.64	3.000	1.750	2.69	2.63	2.000	3.25	15.39	3.500	4.06	4.75	8.190	1.94	2.06	7/16-14 X .70	6.95	6.95	
17-32	3.94	2.88	3.250	1.750	2.69	2.63	2.000	3.50	16.02	3.750	4.25	4.75	8.500	1.94	2.06	7/16-14 X .67	6.95	6.95	
23-42	4.50	3.06	4.250	2.375	3.17	2.69	2.500	4.44	18.04	4.250	5.13	5.75	9.450	2.07	2.50	5/8-11 X 1.00		7.93	
26-52	5.55	3.60	5.250	2.625	3.73	3.63	2.906	5.12	21.78	5.500	6.50	6.31	11.500	2.44	2.94	5/8-11 X 1.25		8.60	9.81

SIZE	BORE DESIGNATION 1 BORE DIA.	1 KEYWAY	2 BORE DIA.	2 KEYWAY	3 BORE DIA.	3 KEYWAY	4 BORE DIA.	4 KEYWAY	5 BORE DIA.	5 KEYWAY
13-13	.6252 / .6259	3/16 X 3/32								
13-15	.6252 / .6259	3/16 X 3/32								
13-17	.6252 / .6259	3/16 X 3/32	.6877 / .6884	3/16 X 3/32	.7503 / .7511	3/16 X 3/32	.8753 / .8761	3/16 X 3/32	1.0003 / 1.0011	1/4 X 1/8
13-20	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
13-20G	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
13-23	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
17-26	1.0003 / 1.0011	1/4 X 1/8	1.1253 / 1.1261	1/4 X 1/8	1.1879 / 1.1888	1/4 X 1/8	1.2504 / 1.2513	1/4 X 1/8	1.4379 / 1.4388	3/8 X 3/16
17-30	1.2504 / 1.2513	1/4 X 1/8	1.5004 / 1.5013	3/8 X 3/16	1.6254 / 1.6263	3/8 X 3/16	1.7504 / 1.7513	3/8 X 3/16	1.9379 / 1.9388	1/2 X 1/4
17-32	1.2504 / 1.2513	1/4 X 1/8	1.5004 / 1.5013	3/8 X 3/16	1.6254 / 1.6263	3/8 X 3/16	1.7504 / 1.7513	3/8 X 3/16	1.9379 / 1.9388	1/2 X 1/4
23-42	1.7504 / 1.7513	3/8 X 3/16	1.8754 / 1.8763	1/2 X 1/4	1.9379 / 1.9388	1/2 X 1/4	2.0004 / 2.0016	1/2 X 1/4	2.1879 / 2.1891	1/2 X 1/4
26-52	2.0004 / 2.0016	1/2 X 1/4	2.4379 / 2.4391	5/8 X 5/16	2.9379 / 2.9391	3/4 X 3/8	3.0004 / 3.0016	3/4 X 3/8	3.4380 / 3.4394	7/8 X 7/16

NEMA FRAME	OUTSIDE DIAMETER	PILOT DIAMETER	BOLT CIRCLE	HOLE SIZE	COUPLING BORE BORE DIAMETER	COUPLING BORE KEYWAY
56C	6.50	4.5005 / 4.5019	5.875	.413	.6256 / .6267	3/16 X 3/32
143TC / 145TC	6.50	4.5005 / 4.5019	5.875	.413	.8758 / .8771	3/16 X 3/32
182TC / 184TC	9.00	8.5006 / 8.5024	7.250	.591	1.1258 / 1.1271	1/4 X 1/8

M-SERIES – MODIFIED STANDARD UNIT CAPABILITY

Cleveland Gear can often modify standard units to meet customer requirements. Below are various options we have done for customers. Please consult factory if you have a need.*

INPUT

- **Extended Worm Shaft (opposite motor)**
- **Spline Input**
- **Drilled & Tapped End**
- **IEC Input**
- **SAE Input**
- **Servo Input**

OUTPUT SHAFT OPTIONS

- **Drilled Perpendicular Thru Hole**
- **Snap Ring Groove (s)**
- **Extended or Shortened Shaft**
- **Shaft Turndowns**
- **External Shaft Spline**
- **End Milled Keyways**
- **Shaft Flats**
- **Special Hollow Output Bores**

Gearing

- **Reduced Backlash**
- **Special Ratios**
- **Left Hand Gearing**
- **Built-in Torque Limiter**

Seals

- **Viton® Seals**
- **V-ring/Flinger Shaft Seals**

Optional Shaft Materials/Platings

- **4140 Alloy Steel**
- **Stainless Steel**
- **Chrome Plating**
- **Electroless Nickle Plate**

*** Please Note:** Minimum Quanties may apply.

PAO and PAG Oil Discussion

Polyalphaolefins (PAO's) Oils

PAO's often called synthetic hydrocarbons (SHC), are the most common type of synthetic based oil used today. They are moderately priced, provide excellent performance and have few negative attributes.

PAO base oil is fairly similar to mineral oil. The advantage comes from the fact that it is built, rather than extracted and modified, so it is more pure. Practically all of the oil molecules are the same shape and size and are completely saturated.

The benefits of PAO's are improved oxidative and thermal stability, excellent demulsibility and hydrolytic stability, a high viscosity index, and very low pour point. Most of the properties make PAO oils a good selection for temperature extremes – both high operating temperatures and low start-up temperatures. PAO does also have a lower fluid friction than mineral oil, resulting in improved efficiency.

The negative attributes of PAO's are they cost more than mineral oil and have poor solubility.

Polyalkaline Glycols (PAG's) Oils

PAG base oils have several unique properties. They have excellent oxidative and thermal stability, very high viscosity index, excellent film strength and an extremely low tendency to leave deposits on machine surfaces. PAG's also have significantly lower fluid friction, which provides even greater efficiency than the PAO oils. Testing has shown efficiency losses using PAG oil will be decreased over 15% compared to PAO oils. PAG's oils also result in even cooler sump temperatures than the PAO type. This results in extended oil and seal life. Another unique property of PAG's is the ability to absorb water and maintain lubricity.

The negatives of PAG's are their very high cost and they can never be mixed with other types of oil, even within the same brand. As a result extra care is required when using PAG oil.

SHIPPING WEIGHTS

SINGLE REDUCTION SHIPPING WEIGHTS (Dry Weights)[1][2]

SHIPPING WEIGHT IN POUNDS (WITHOUT OIL) - SINGLE REDUCTION						
SIZE	TYPE 11	TYPE 12	TYPE 13	TYPE 14	TYPE 15	TYPE 16
13	10	10	12	10	16	16
15	17	17	20	17	23	23
17	18	19	23	19	25	26
20	24	26	30	26	32	33
23	31	30	36	30	38	37
26	41	41	47	42	48	48
30	53	56	64	57	60	63
32	64	63	71	64	71	70
42	101	107	114	106	*	*
52	166	167	178	167	*	*

* Consult Factory

DOUBLE REDUCTION SHIPPING WEIGHTS (Dry Weights)[1][2]

SHIPPING WEIGHT IN POUNDS (WITHOUT OIL) - DOUBLE REDUCTION						
SIZE	TYPE 21	TYPE 22	TYPE 23	TYPE 24	TYPE 25	TYPE 26
13-13	23	22	25	23	29	28
13-15	32	29	33	30	38	35
13-17	35	31	36	33	40	37
13-20	42	38	43	40	48	44
13-23	48	42	49	44	54	48
17-26	68	63	73	68	76	70
17-30	85	78	90	83	93	85
17-32	92	85	97	90	100	92
23-42	149	142	154	147	156	149
26-52	226	215	231	221	233	222

[1] All weights are shown in pounds and are dry weights.

[2] All weights, dimensions and ratings in this catalog are subject to change.
For construction use certified prints, weights and ratings only, available from factory.

INSTALLATION & OPERATING INSTRUCTIONS

ALL SIZES AND TYPES
Upon receipt of a unit it should be inspected for damage in shipment. Any damage found should be reported to the carrier and a claim made to them at once.

FOUNDATIONS
The importance of a solid foundation for a speed reducer to rest upon cannot be overemphasized. The alignment of both its high and low speed shaft is jeopardized if the unit does not have a firm foundation. The alignment of both high and low speed shafts should be checked after a few weeks operation to be sure the foundation has not settled and thrown them out of line.

Rigid cast iron or welded steel bedplates are of great help in maintaining proper alignment. All four feet of the unit are machined at the same time to provide flatness, and the base they are bolted to must be flat also.

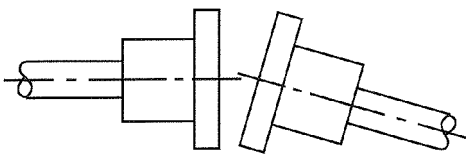
ALIGNMENT
Accurate alignment of both high and low speed shafts is a necessity. Lack of proper alignment may cause excessive shaft stresses, overloaded bearings, noise and leaking oil seals. The initial setting of the reducer is, therefore, important and its alignment with the motor and connected machine must be checked **after** it is securely bolted down. Misalignment can be caused later by settled foundation or movement of the connected machine.

Two forms of misalignment, or a combination of them, are possible on each shaft. The effects resulting from the shaft misalignment are evident on the high speed shaft or coupling before they show up on the low speed end of the drive, but the need for accurate alignment on both shafts cannot be overemphasized.

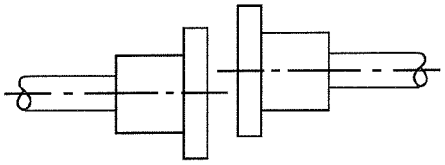
The figures shown illustrate each form of misalignment, greatly exaggerated, and a combination of both can exist as well.

When correcting coupling misalignment by placing metal shims under a reducer, the angular misalignment should be corrected first. It can be checked by inserting a tapered gauge at four places, 90° apart. When a tapered gauge enters the space between the coupling halves an equal distance at four places 90° apart, the angular misalignment has been removed.

ANGULAR MISALIGNMENT



PARALLEL MISALIGNMENT



Parallel misalignment is corrected by placing a straight edge on the outside diameter of the coupling halves. Either the reducer, or the driven machine, must then be moved in a vertical and/or horizontal plane to correct this form of misalignment.

The necessity of proper alignment cannot be overemphasized. When possible, dowels should be used to preserve alignment once it is obtained,

MOUNTING COUPLINGS OR SPROCKETS
Most installations can be made with a light driving fit. Any nicks or burrs present should be carefully removed, but no attempt to actually change a diameter by hand filing should be made. Installation of couplings with tighter fits for heavier loads can be obtained by heating the coupling half. The coupling must not be pounded into place without properly backing up the opposite end of the shaft. This can be done on a single shaft extension by removing the plate on the opposite side of the reducer. If this plate is not removed and the shaft properly backed up, the effect of the hammer blows are absorbed by the anti-friction bearing and damage to the rollers or the races will likely result. However, care must be used to reassemble the plate shims in exactly the same manner to avoid disturbing the setting of the gear and the adjustment of the bearing.

LUBRICANTS AND OIL CAPACITIES

CLEVELAND UNITS ARE SHIPPED DRY AS STANDARD. A mineral based oil, synthetic oil, or foodgrade oil (H1), is available upon customer request. When shipped dry, before starting the unit, it must be filled to the level indicated and with the grade of oil called for by the application. Any supplier of industrial oil can meet these specifications with a standard product.

Worm gearing has a high slide to roll ratio when compared with other types of gearing. With a high sliding component, it relies heavily on the generation of an oil wedge between the worm and gear.

For most worm gear applications, an AGMA 7 oil is satisfactory. For low speeds, a higher viscosity, AGMA 8 will provide better service. Synthetic lubricants provide a lower co-efficient of friction and better wear characteristics than a straight mineral oil.

NOTE: Viscosity ranges for AGMA Lubricant numbers are identical to those of ASTM 2422.

Extreme pressure oils, (EP oils) are another type of lubricant that uses a surface acting chemistry. Most EP oils use sulfur, phosphorus and/or chlorine additives. When these oils are used with bronze under conditions of high temperature and pressure, the surface acting chemistry can cause damage to the surface of the bronze. EP oils should ***not*** be used with worm gears.

Synthetic lubricants are very common today. Synthetic lubricants provide adequate service over a broader temperature range. They normally have a longer life in service, thereby increasing the oil change interval. They also can reduce wear and friction, increasing the oil change interval, and increasing the life of the gear box.

With the use of synthetic oils, efficiency increases of 10% are often possible. Many companies have found that, due to the advantages of synthetic lubricants, it is actually more cost effective to buy the more expensive oil, even for normal applications.

IDLE TIME

Cleveland units which are to stand idle for a long period of time before being used should be completely filled with oil to prevent corrosion due to internal condensation. Units in intermittent service should be operated for brief periods of time at least once a month to redistribute the oil and thereby protect the bearings and ground parts from rusting.

SPEED

High speeds above 1800 RPM usually require a change in oil level. **Contact Cleveland Gear for information on input speeds in excess of 1800 RPM.**

The following tables are Cleveland Gear's recommendations for worm gear lubricants. A general table such as this cannot cover all possible applications. If your application seems out of the ordinary, please contact the factory.

WORM SPEED R.P.M.	AGMA LUBRICANT NUMBER AMBIENT TEMPERATURE 15° TO 50°F‡	50° TO 125°F
BELOW 600	#7	#8
ABOVE 600*	#7	#7
RECOMMENDED PRODUCT		
AGMA NUMBER	**MINERAL**	**SYNTHETIC**
#7	MOBIL 600W SUPER CYLINDER OIL	MOBIL SHC 634
#8	MOBIL 600W EXTRA HECLA SUPER CYLINDER OIL	MOBIL SHC 636
Viscosity Ranges for AGMA Lubricants[a]		
Rust and Oxidation Inhibited Gear Oils	Viscosity Range	Equivalent ISO Grade
AGMA Lubricant No.	mm^2/S (cSt) at 40° C	ISO Number
#7	414 to 506	460
#8	612 to 748	680

[a] Extracted from AGMA "Specification-Lubrication of Industrial Enclosed Gear Drives" with the permission of the publisher, The American Gear Manufacturers Association, 1001 N. Fairfax St., Ste 500 Arlington, Virginia 22314.

‡ For ease of start up, heaters or use of synthetic oil may be required at low temperatures.

* At rubbing speeds over 2,500 fpm, a spray lubrication system and/or synthetic lubricants may be required. Contact the factory for specific recommendations.

OIL LEVEL

The oil level in a reducer can be checked only when it is at rest. It must be maintained at the proper level. Overfilling is to be avoided, as it causes excessive churning losses and may result in overheating.

OIL CAPACITIES.

When units are installed in standard mounting positions, the user needs simply to add lubricant until oil comes out of the oil level plug hole location before operation–while the unit is not rotating. These units must be operated with the vented spring loaded plug provided.

Oil capacities will vary when units are placed in special mounting positions. For planning purposes, use the following table to find approximate capacities.

LUBRICATION Cont.

LUBRICATING PROCEDURES: We recommend the following procedures:

1. FILL. The unit should be filled with appropriate lubricant until oil comes out of the oil level plug hole BEFORE OPERATING. DO NOT OVERFILL. Excessive oil levels are as undesirable as using too little oil. If a fitting is present, grease it before operation.

2. 100 HOUR FLUSH. After approximately 100 hours of operation, the reducer must be drained, flushed thoroughly with a light oil, and refilled with fresh recommended oil.

3. 2500 HOUR FLUSH. This flushing and refilling should be repeated every 2500 hours.

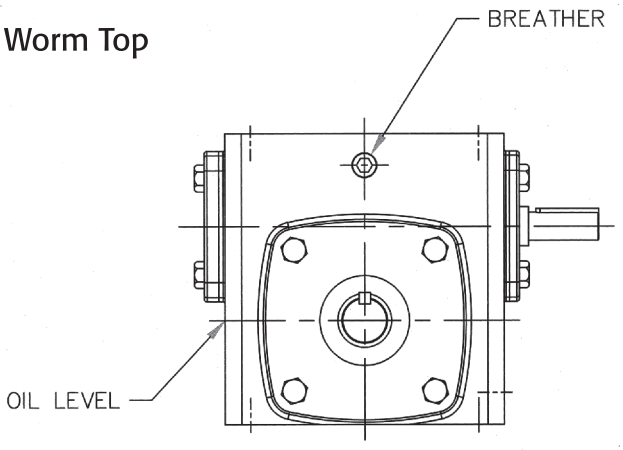
Extremely severe or dirty conditions, as well as high humidity, will require more frequent oil changes. The use of synthetics can extend the period. At least one filling of the grease fittings between oil changes is recommended on all units equipped with grease fittings. In general, grease fittings are found on units having a vertical shaft, and either one or two fittings are required, depending upon the internal construction.

SIZE	WORM TOP	WORM BOTTOM	VERTICAL OUTPUT	VERTICAL INPUT
13	4	7.5	6.5	5.5
15	8	16	13.5	11.5
17	9.5	18.5	16.5	13.5
20	14	24	22	18.5
20G	14	24	22	18.5
23	16.5	29	26	22
26	29.5	46	41.5	35.5
26G	29.5	46	41.5	35.5
30	43	70	62	55
32	51	92	80	73.5
32G	51	92	80	73.5
42	89	119	111.5	107.5
52	168	282.5	242	232

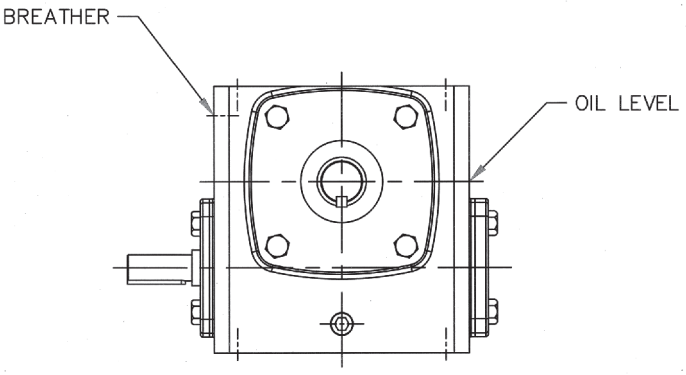
Note: All figures are shown in ounces

	Recommended lubricants must meet or exceed these standards:		
Ambient Temperature	15° to 50° F (-9° to 10° C)	AGMA **7**	cSt@104F (40C): **414-506**
	50° to 125° F (10° to 52° C)	AGMA **8**	cSt@104F (40C): **612-748**

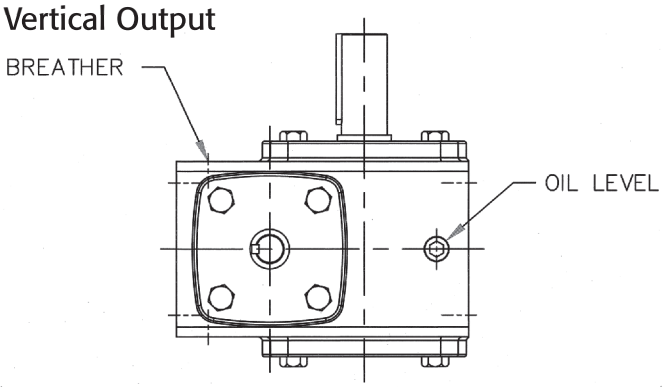
Worm Top



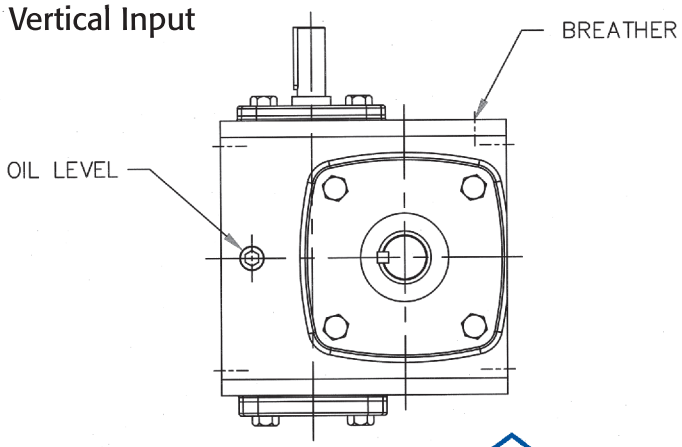
Worm Bottom



Vertical Output



Vertical Input



CLEVELAND GEAR'S LIBRARY OF INFORMATION

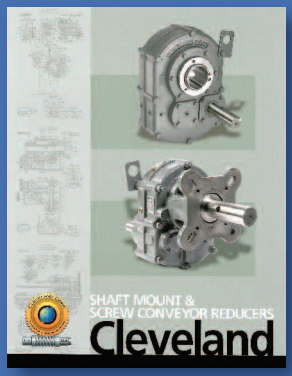
"MUSTS" FOR YOUR ENGINEERING DEPARTMENT

Catalog #810–
"WG" Series Speed Reducers

Ratings, selection and dimensional information for 40mm to 200mm center distance drives in rugged cast iron housings. Includes single reduction and double reduction models.

Catalog #412–
Inline Helical Ratio Mulitpliers

Create Double reduction Helical Worm gear units from stock components. Available in three case sizes, NEMA flange sizes 56C to 210TC. Offered & stocked in 5 ratios.



Catalog #SMCG–
Helical Shaft Mount and Screw Conveyor Reducers

Shaft mount reducers available in sizes 2-9. Size 2-6 designed for Screw Conveyor applications with CEMA adapter kits/shafts. Suitable for AGMA Class I, II or III applications.

Catalog #700–
Millennium Gear Drives

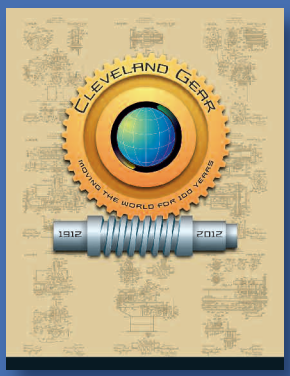
Catalog provides data on ratings, dimensions, and design configurations for 5"-12" C.D. drives. Universal mounting with motor adapters & helical attachments.

Catalog #900–
General Capabilities Brochure

Information on CGC history, current design services, production capabilities and products.

100th Anniversary Brochure

Provides a pictorial history of Cleveland Gear's first 100 years designing and producing worm gearing, worm gear reducers and the development of its design and production capabilities for helical gearing/custom drives.



MODULAR WORM REDUCER

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