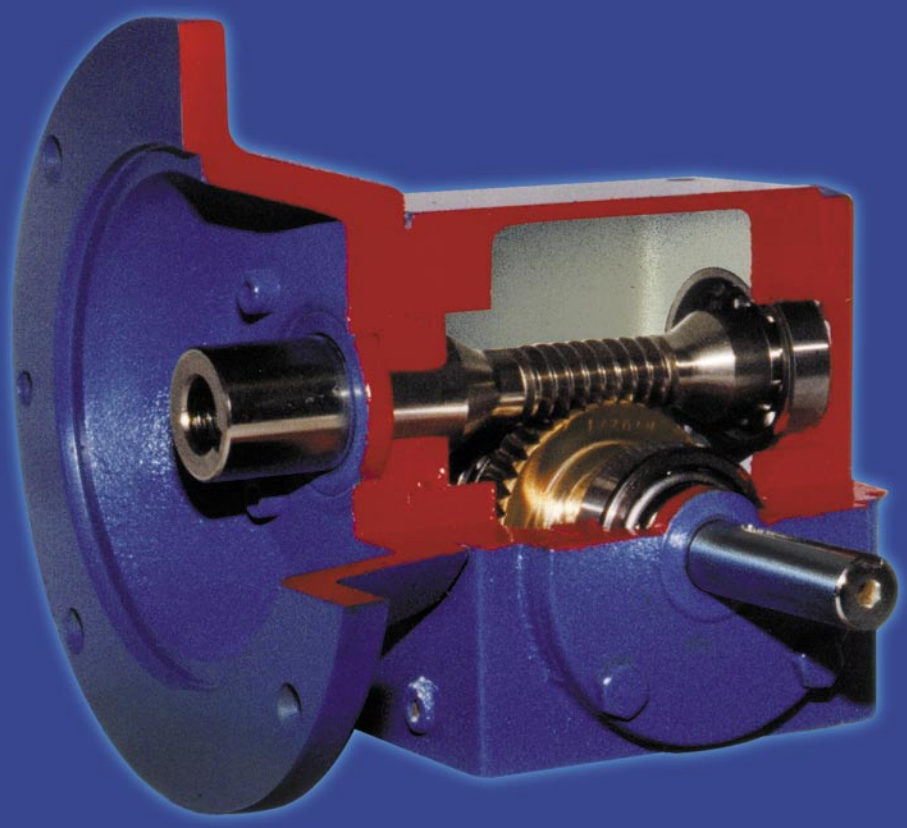
Cleveland Gear

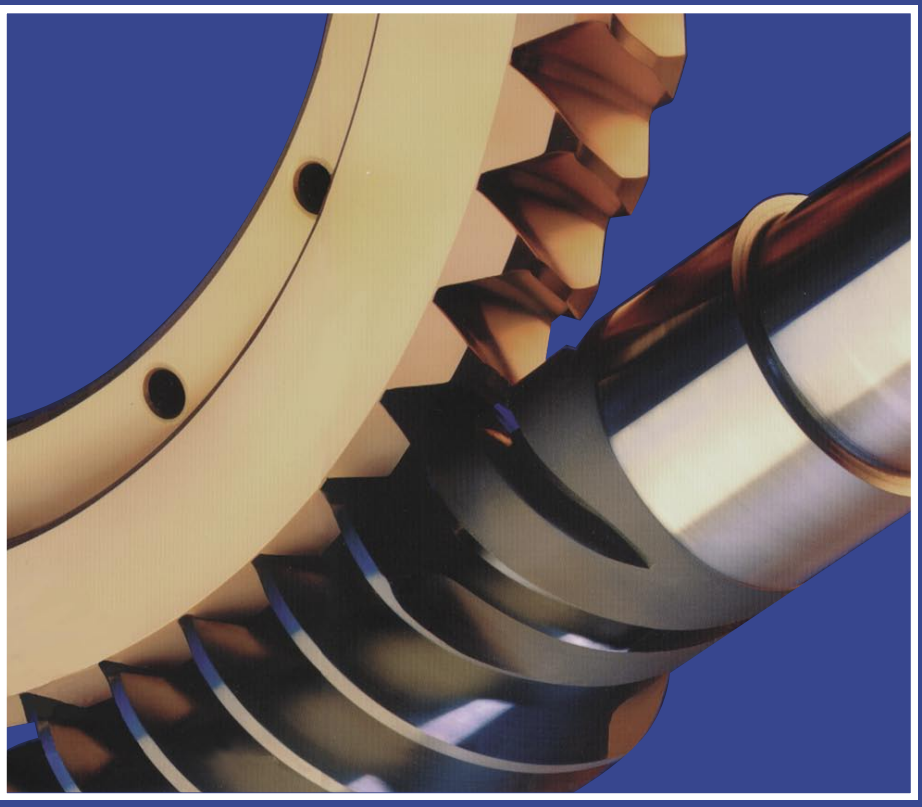
MODULAR SPEED REDUCERS



MEMBER OF AGMA

ISO-9001 DNV CERTIFICATED FIRM

MODULAR SPEED REDUCERS
Single Reduction



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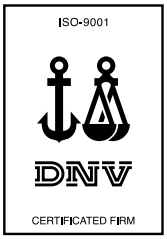
The Cleveland Gear Quality Assurance Mission

QUALITY... A CONTINUOUS PROCESS FOR IMPROVEMENT

As stated in the company's quality policy, "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." Every member of the Cleveland Gear organization recognizes 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.

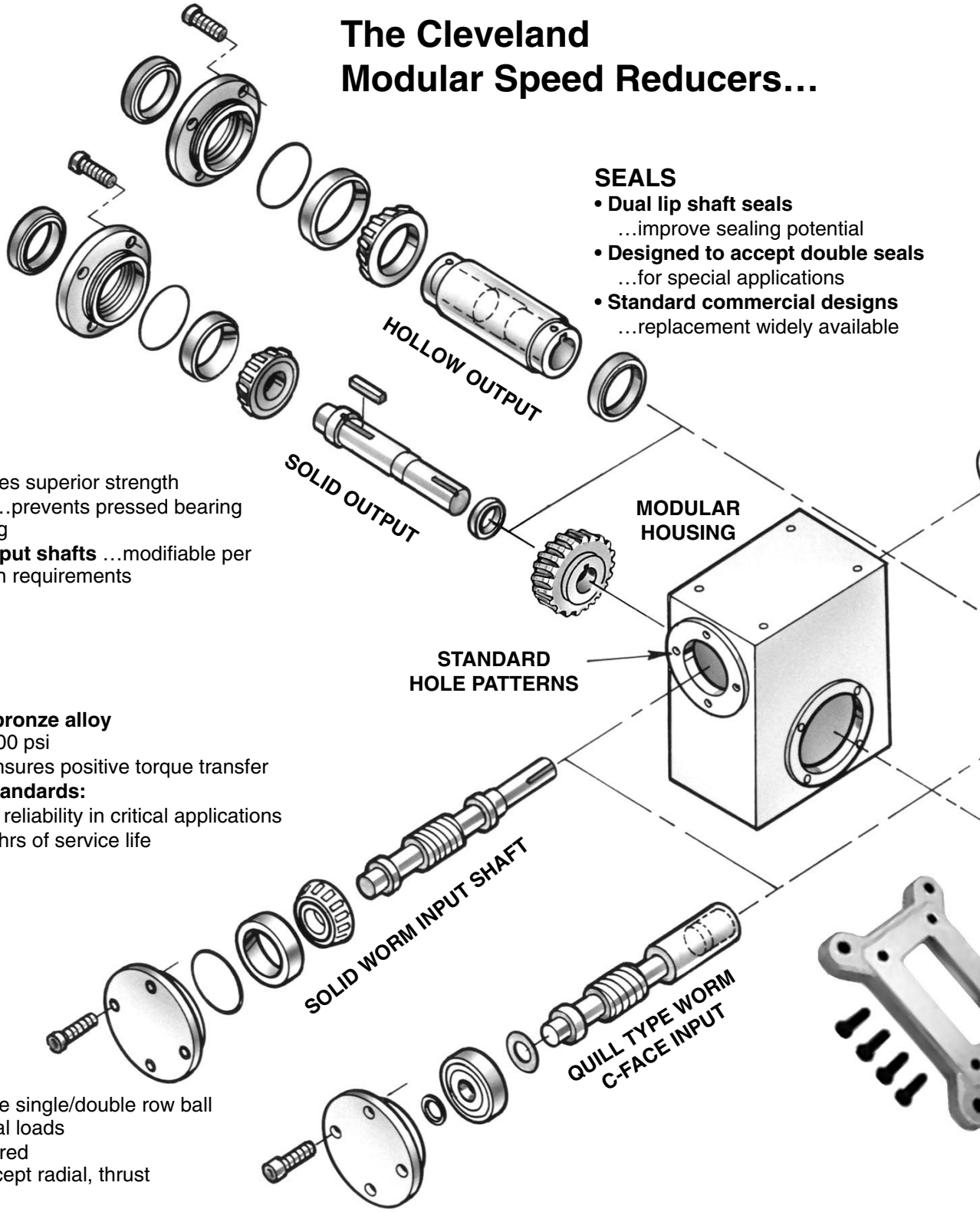


The ISO 9001 certification we achieved in 1995 was the culmination of our efforts to both record the processes we use in our quality assurance efforts and demonstrate that these processes were in fact being put into practice in our everyday operations. In order to comply with our mission's goals, we continually review our processes and make necessary revisions to continuously improve output - our products and services.

As we continue to improve our manufacturing capabilities with additional CNC machinery, we have also improved our quality assurance capabilities by installing state of the art CNC machinery to measure the accuracy of the worm and helical gearing we produce. The measurements taken not only certify the accuracy of our finished products, but also provide us with the in-process measurements from which the machine settings are revised to achieve the desired end quality. In addition to certifying our manufacturing processes, we use this capability to measure and certify the quality of the hobs used to generate the gearing for our drives or our customers' equipment.

The results of our commitment are measured by our customer satisfaction. We welcome your input on ways we can add value to your company by improving the products and services we provide. It is only by continually providing additional value to your company, that we will be able to accomplish our mission. We believe we have established a solid customer satisfaction foundation in our 85 plus years of service and are eager to identify opportunities for future improvements.

The Cleveland Modular Speed Reducers…



SEALS
- **Dual lip shaft seals** …improve sealing potential
- **Designed to accept double seals** …for special applications
- **Standard commercial designs** …replacement widely available

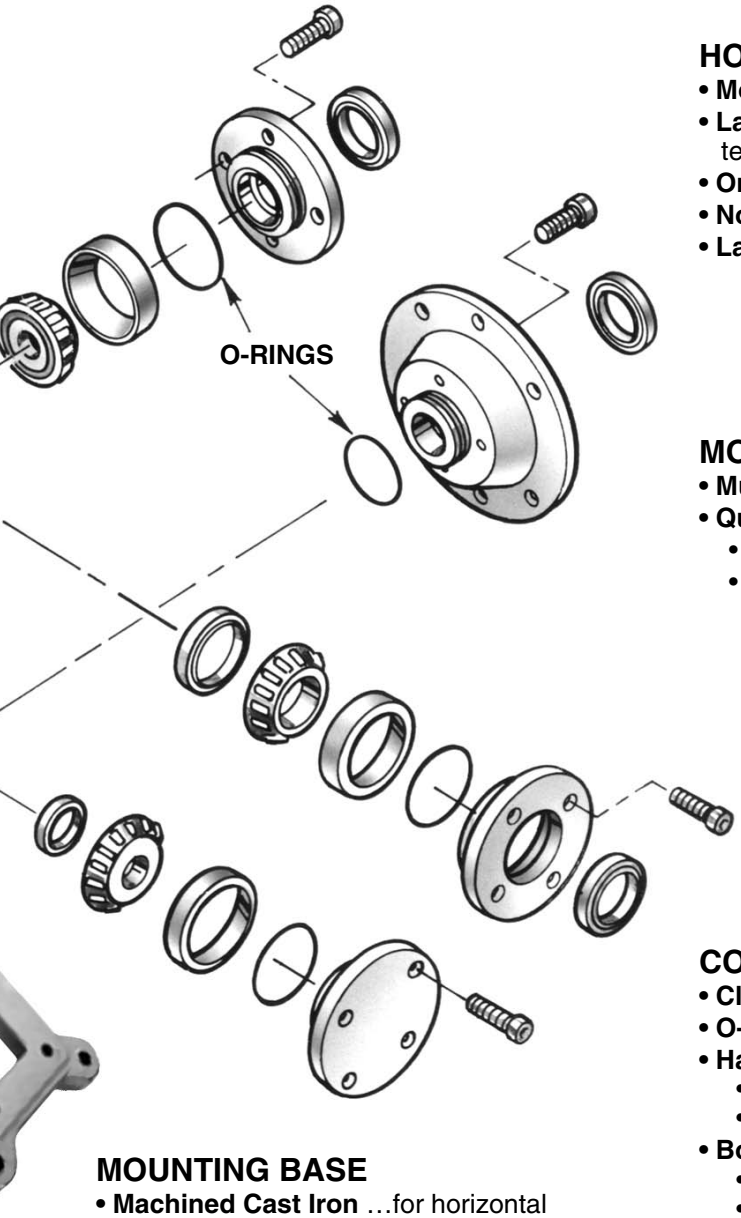
OUTPUT SHAFT
- **Alloy steel** …provides superior strength
- **Step shaft design** …prevents pressed bearing seal surface scarring
- **Solid or hollow output shafts** …modifiable per customer/application requirements

WORM GEAR
- **Centrifugally cast bronze alloy** minimal stress 71,000 psi
- **Keyed to shaft** …ensures positive torque transfer
- **Rated per AGMA standards:**
  - Designed for high reliability in critical applications
  - Based on 25,000 hrs of service life

BEARINGS
- **Worm shafts** …large single/double row ball to support high radial loads
- **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

…1.33" to 3.25" CD Available from Factory Stock



HOUSINGS

- **Modular Design** …improves cost & availability
- **Large lubrication capacity** …ensures low operating temperatures
- **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:**
  - 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 change of assembly arrangement problems

MOUNTING BASE

- **Machined Cast Iron** …for horizontal or vertical mounting
- **Can be adapted** …to match existing mounting arrangements

Selection procedure

1. Determine the service factor for the application from table 1 below. A service factor is necessary to adapt the unit to 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 5 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 and 5 on page 6 for mechanical ratings and size selection of single reduction units for ratio range from 5:1 to 100:1.

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 HP @ 1750 rpm
   Output torque method:
   Equivalent output torque =
   $\frac{\text{HP x S.F. x 63025 x eff.}}{\text{Output speed}}$ =
   $\frac{\text{1 HP x 1.25 x 63025 x .87}}{\text{120 RPM}}$ = 571 in-lbs

3. Ratio = 1750RPM ÷ 120RPM = 14.58: 1
   (Use 15:1 in rating tables)

4. ***HP method:***
   Refer to table 4 on page 6 for single reduction units. Unit size 206 with a ratio of 15:1 has a rating of 1.411 HP @ 1750 RPM which exceeds required 1.25 HP.

   Output torque method:
   Table 4 on page 6 shows output torque rating for size 206 of 643 in-lbs. which exceeds required 571 in-lbs.

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.	0.80	0.90	1.00
	Intermittent 2 hrs.	0.90	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 ≥ 10/hr.	Occasional 1/2 hr.	0.90	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.	0.90	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

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 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 - not uniformly fed
- Crushers - ore, stone
- Hammer mills - mills, rotary tube type, barrels

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						133	154	206	206	262	320	–	–
7.5	233					133	154	175	206	238	300	325	–	–
10	175				133	154	175	206	238	262	325	–	–	
15	117				133	175	206	238	238	300	–	–		
20	87.5			133	154	175	206	238	262	325	–			
25	70.0			133	175	206	238	262	300	325	–			
30	58.3			133	175	206	238	300	300	–				
40	43.8		133	154	206	238	262	300	325	–				
50	35.0	133	154	175	206	238	262	325	–					
60	29.2	133	154	206	238	262	300	325	–					
70	25.0	133	175	206	238	262	300	–						
80	21.5	133	206	238	262	300	325	–						
100	17.5	133	238	262	300	–	–							

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							
		133	154	175	206	238	262	300	325
5	350	202	275	314	542	653	887	1130	1583
7.5	233	216	309	416	594	867	1108	1521	2037
10	175	216	305	406	624	894	1105	1787	2089
15	117	228	315	403	643	953	1142	2011	2095
20	87.5	230	326	455	683	987	1288	1991	2501
25	70.0	231	323	441	672	992	1301	2096	2500
30	58.3	234	323	414	663	970	1239	2053	2403
40	43.8	242	322	442	675	984	1279	1970	2471
50	35.0	216	311	417	636	955	1257	2020	2406
60	29.2	202	323	397	627	881	1188	1849	2331
70	25.0	186	319	374	571	836	1110	1657	1954
80	21.5	186	289	353	494	747	975	1628	1903
100	17.5	147	230	281	397	583	747	1288	1510

Table 4: Mechanical Ratings at 1750 RPM input, service factor 1.0

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

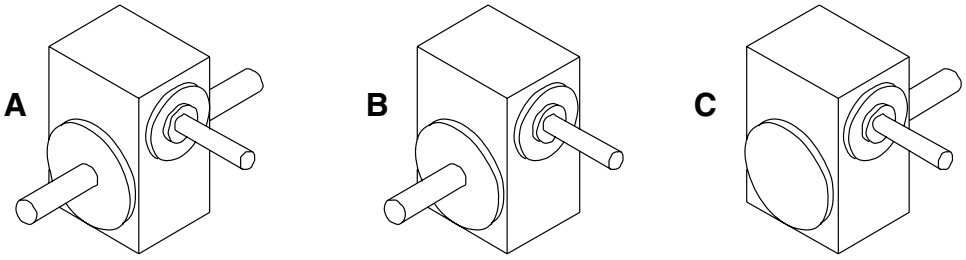
	Unit Size															
	133		154		175		206		238		262		300		325	
	1.33CD		1.54CD		1.75CD		2.06CD		2.38CD		2.62CD		3.00CD		3.25CD	
Ratio	HP	OPT	HP	OPT	HP	OPT	HP	OPT	HP	OPT	HP	OPT	HP	OPT	HP	OPT
5	1.249	202	1.706	275	1.928	314	3.296	542	3.962	653	5.371	887	6.790	1130	9.486	1583
7.5	0.910	216	1.300	309	1.750	416	2.456	594	3.646	867	4.661	1108	6.400	1521	8.567	2037
10	0.699	216	0.984	305	1.304	406	1.960	624	2.803	894	3.434	1105	4.979	1787	6.427	2089
15	0.543	228	0.725	315	0.910	403	1.411	643	2.075	953	2.431	1142	3.824	2011	4.440	2095
20	0.414	230	0.586	326	0.812	455	1.164	683	1.680	987	2.157	1288	2.936	1991	4.111	2501
25	0.350	231	0.483	323	0.662	441	0.958	672	1.401	992	1.773	1301	2.507	2096	3.425	2500
30	0.334	234	0.437	323	0.542	414	0.824	663	1.190	970	1.455	1239	2.145	2053	2.808	2403
40	0.262	242	0.349	322	0.473	442	0.670	675	0.975	984	1.231	1279	1.641	1970	2.303	2471
50	0.204	216	0.287	311	0.388	417	0.545	636	0.806	955	0.997	1257	1.378	2020	1.928	2406
60	0.180	202	0.257	323	0.302	397	0.460	627	0.629	881	0.837	1188	1.149	1849	1.537	2331
70	0.150	186	0.234	319	0.260	374	0.400	571	0.540	836	0.710	1110	1.000	1657	1.220	1954
80	0.121	186	0.180	289	0.213	353	0.293	494	0.424	747	0.535	975	0.797	1628	1.017	1903
100	0.085	147	0.121	230	0.143	281	0.204	397	0.283	583	0.344	747	0.540	1288	0.690	1510

Table 5: Mechanical Ratings at 1150 RPM input, service factor 1.0

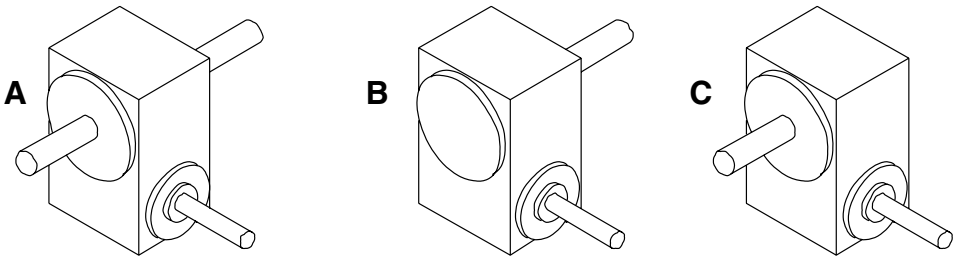
HP = Input horsepower
OPT = Output torque in inch-lbs at the low speed shaft

	Unit Size															
	133		154		175		206		238		262		300		325	
	1.33 CD		1.54CD		1.75 CD		2.06 CD		2.38 CD		2.62 CD		3.00 CD		3.25 CD	
Ratio	HP	OPT	HP	OPT	HP	OPT	HP	OPT	HP	OPT	HP	OPT	HP	OPT	HP	OPT
5	0.980	237	1.397	337	1.601	390	2.787	688	3.336	824	4.509	1117	5.668	1417	7.847	1968
7.5	0.680	243	1.058	375	1.425	504	2.000	723	2.968	1051	3.794	1343	5.184	1835	7.068	2531
10	0.533	245	0.772	355	1.049	485	1.568	744	2.336	1111	2.884	1385	4.195	2248	5.415	2632
15	0.434	367	0.582	370	0.736	480	1.144	770	1.730	1176	1.985	1386	3.210	2509	3.884	2723
20	0.320	260	0.466	379	0.662	541	0.938	808	1.411	1217	1.820	1600	2.478	2483	3.611	3243
25	0.272	260	0.383	372	0.543	525	0.781	799	1.178	1217	1.455	1569	2.048	2527	2.946	3150
30	0.274	273	0.359	380	0.447	492	0.680	792	1.009	1193	1.203	1496	1.821	2548	2.487	3107
40	0.210	277	0.284	373	0.396	525	0.551	798	0.838	1211	1.061	1585	1.410	2450	2.062	3195
50	0.163	244	0.234	357	0.328	495	0.456	756	0.694	1169	0.837	1514	1.148	2429	1.701	3032
60	0.148	231	0.206	366	0.244	453	0.377	729	0.526	1046	0.714	1440	1.006	2304	1.316	2860
70	0.130	212	0.176	312	0.220	432	0.340	681	0.460	998	0.610	1348	0.850	2013	1.09	2473
80	0.094	203	0.141	319	0.168	394	0.239	566	0.347	864	0.438	1135	0.675	1954	0.87	2311
100	0.067	161	0.094	251	0.112	310	0.166	452	0.231	668	0.274	839	0.456	1531	0.589	1816

WORM OVER / SOLID OUTPUT

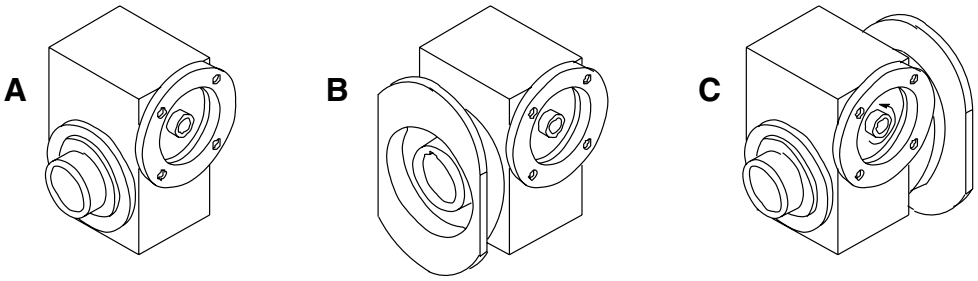


WORM UNDER / SOLID OUTPUT



All arrangements are shown from the input side. All units are shipped without oil for a worm over configuration and plugged with breather shipped loose. See lubrication page for correct oil level and breather location. For applications requiring a vertical input, contact factory for recommendations.

WORM OVER / HOLLOW OUTPUT SHAFT



Bearings, Seals, Shipping Weights

	BEARINGS			INPUT OIL SEALS				OUTPUT OIL SEALS	WEIGHT		
	INPUT		OUTPUT	I	ICHS				I	ICHS	
	I	ICHS			56C	140TC	180TC			56/140TC	180TC
133	6203	6203	30204	TC17307	TC25357			TC20357	12	13	
154	6304	6304	30204	TC20357	TC30407			TC20357	19	20	
175	6304	6304	30205	TC20357	TC30407	TC35457		TC25407	22	23	
206	6305	6305	30206	TC22407	TC30508	TC35508	SC45608	TC30508	27	29	
238	6305	6305	30206	TC22407	TC30508	TC35508	SC45608	TC30508	32	34	38
262	6306	6306	30207	TC25407	TC355511	TC355511	SC45608	TC355511	44	46	49
300	6306	6306	30207	TC25407	TC355511	TC355511	SC45608	TC355511	55	58	61
325	30306	5306	30208	TC25407	TC355511	TC355511	SC45608	TC406212	69	72	74

CLEVELAND GEAR

M _ _ _ _ _ _ _ _ **H** _ _ _ _ _ _ _

Unit Size
13 - 133
15 - 154
17 - 175
20 - 206
23 - 238
26 - 262
30 - 300
32 - 325

Note: Use size of secondary unit to designate double reduction unit size.

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
2
3
4
5
Hollow bore size select from chart on right

Factory use

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

Shaft Arrangement
Enter arrangement letter (A...C)
For double reductions, contact factory.

Ratio
Enter ratio using minimum of 2 digits (05), to maximum 4 digits (3600).

Output Shaft Hollow Bore Size

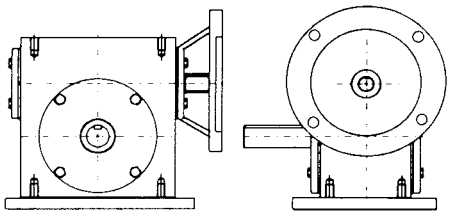
Unit Size	#1	#2	#3	#4	#5
133	5/8				
154	5/8				
175	5/8	11/16	3/4	7/8	1
206	1	1-1/8	1-3/16	1-1/4	1-7/16
238	1	1-1/8	1-3/16	1-1/4	1-7/16
262	1	1-1/8	1-3/16	1-1/4	1-7/16
300	1-1/4	1-1/2	1-5/8	1-3/4	1-15/16
325	1-1/4	1-1/2	1-5/8	1-3/4	1-15/16

Other sizes available on request

Sample Part Numbering Designations

1. Unit size 175; single reduction, with quill shaft input for 56C frame motor; solid output shaft; ratio 40; shaft arrangement B; with bolt-on base.

   M 1 7 1 3 B A H 4 0 B A



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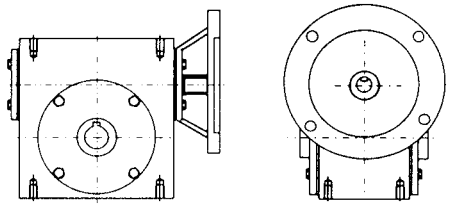
2. Unit size 175; single reduction, with quill shaft input for 56C frame motor; hollow output shaft with 1.001" bore (size #5); ratio 40; shaft arrangement A.

   M 1 7 1 4 B 5 H 4 0 A



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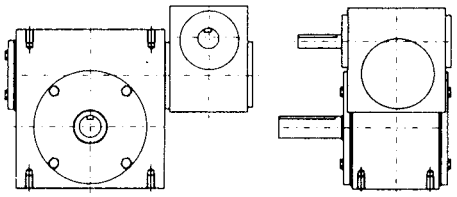
3. Unit size 133-175; double reduction, with solid input shaft; solid output shaft; ratio 1200; shaft arrangement H.

   M 1 7 2 1 A A H 1 2 0 0 H



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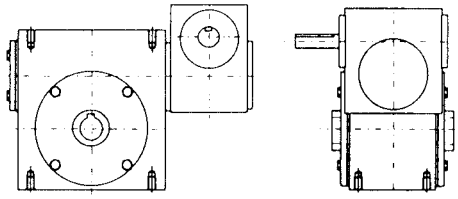
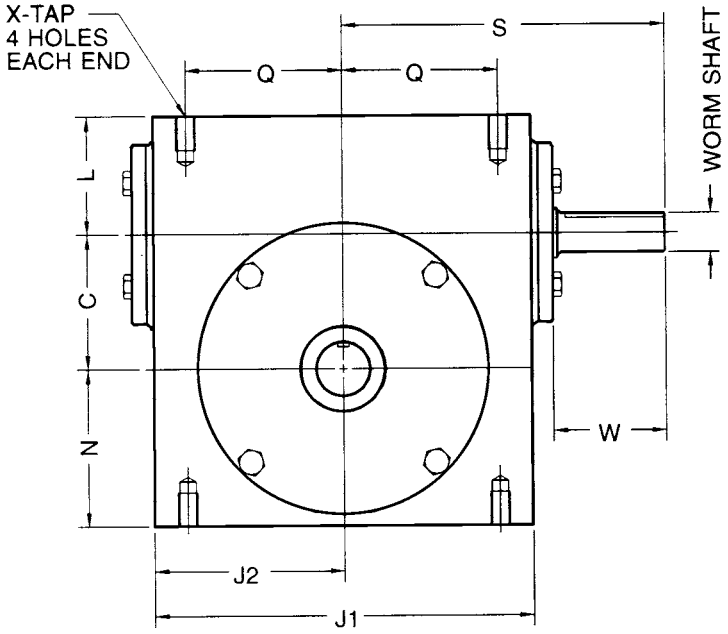
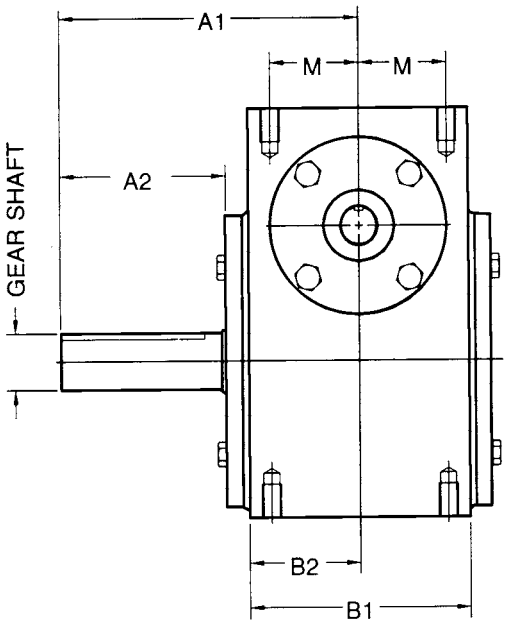
4. Unit size 133-175; double reduction, with solid input shaft; hollow output shaft with 1.001" bore (size #5); ratio 1200; shaft arrangement G.

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





FRONT VIEW



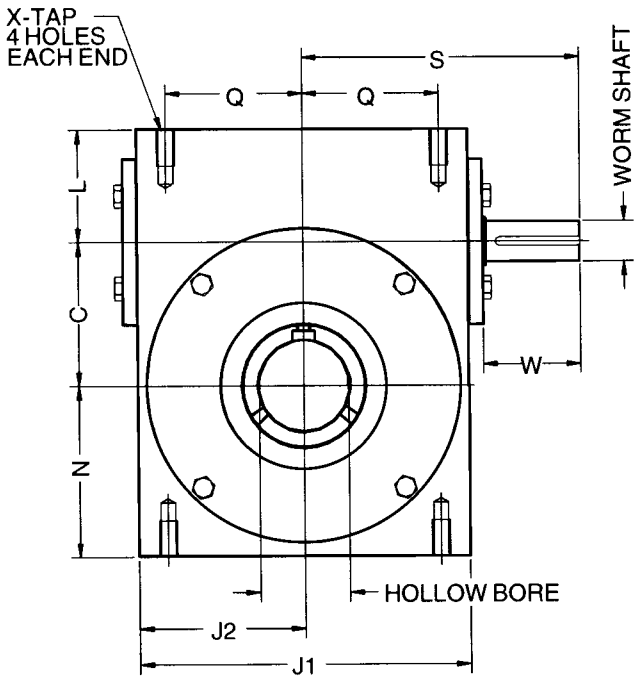
SIDE VIEW

STANDARD UNIT INFORMATION

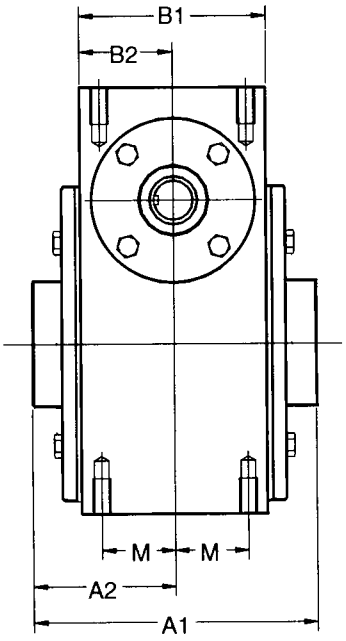
UNIT	AI	A2	B1	B2	C	L	J1	J2	M	N	Q	S	W	X-TAP
133	4.00	1.97	2.87	1.44	1.333	1.60	4.02	2.01	1.00	1.72	1.62	3.38	1.38	5/16-18
154	4.31	1.78	3.69	1.85	1.540	1.93	5.13	2.57	1.38	1.91	2.09	4.69	1.56	5/16-18
175	4.33	1.77	3.66	1.83	1.750	1.92	5.37	2.69	1.38	2.06	2.09	4.75	1.57	5/16-18
206G	4.69	2.20	4.06	2.03	2.062	2.03	6.12	3.06	1.50	2.28	2.38	5.13	1.54	5/16-18
206	4.69	2.20	4.06	2.03	2.062	2.03	6.12	3.06	1.44	2.28	2.50	5.13	1.54	3/8-16
238	5.07	2.40	4.07	2.04	2.375	2.06	6.34	3.17	1.44	2.50	2.50	5.75	2.01	3/8-16
262G	5.63	2.64	4.45	2.23	2.625	2.44	7.46	3.73	1.69	2.94	3.19	6.25	2.01	3/8-16
262	5.63	2.64	4.45	2.23	2.625	2.44	7.46	3.73	1.69	2.94	3.19	6.25	2.01	3/8-16
300	6.75	3.35	5.28	2.64	3.000	2.63	8.11	4.06	2.00	3.25	3.50	6.57	1.97	7/16-14
325G	7.07	3.35	5.75	2.88	3.250	2.63	8.50	4.25	2.00	3.50	3.75	7.00	1.97	7/16-14
325	7.07	3.35	5.75	2.88	3.250	2.63	8.50	4.25	2.00	3.50	3.75	7.00	1.97	7/16-14

STANDARD SHAFT DIAMETERS

	WORM SHAFT		GEAR SHAFT	
UNIT	DIAMETER	KEYWAY	DIAMETER	KEYWAY
133	.4995/.4985	1 /8 x 1 /16	.625/.624	3/16 x 3/32
154	.6245/.6235	3/16 x 3/32	.750/.749	3/16 x 3/32
175	.6245/.6235	3/16 x 3/32	.875/.874	3/16 x 3/32
206G	.6245/.6235	3/16 x 3/32	1.000/.999	1 /4 x 1 /8
206	.6245/.6235	3/16 x 3/32	1.000/.999	1 /4 x 1 /8
238	.7495/.7485	3/16 x 3/32	1.125/1.124	1 /4 x 1 /8
262G	.7495/.7485	3/16 x 3/32	1.250/1.249	1/4 x 1/8
262	.7495/.7485	3/16 x 3/32	1.125/1.124	1 /4 x 1 /8
300	.8745/.8735	3/16 x 3/32	1.250/1.249	1 /4 x 1 /8
325G	.8745/.8735	3/16 x 3/32	1.500/1.499	5/16 x 3/32
325	.8745/.8735	3/16 x 3/32”	1.375/1.374	5/16 x 5/32



FRONT VIEW



SIDE VIEW

STANDARD UNIT INFORMATION

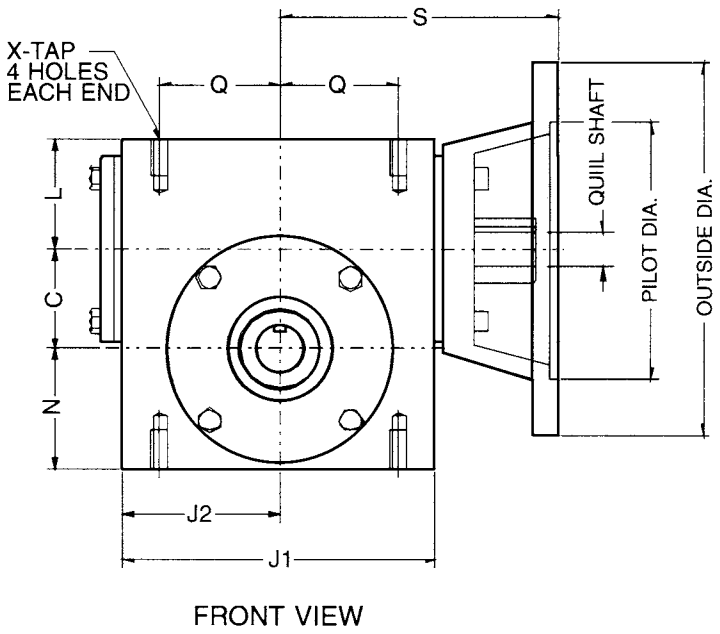
															WORM SHAFT	
UNIT	AI	A2	B1	B2	C	L	J1	J2	M	N	Q	S	W	x -TAP	DIAMETER	KEYWAY
133	4.75	2.374	2.87	1.44	1.333	1.60	4.02	2.01	1.00	1.72	1.62	3.38	1.38	5/16-18	.4995/.4985	1/8 x 1/16
154	5.42	2.71	3.69	1.85	1.540	1.93	5.13	2.57	1.38	1.91	2.09	4.69	1.56	5/16-18	.6245/.6235	3/16 x 3/32
175	5.50	2.25	3.66	1.83	1.750	1.92	5.37	2.69	1.38	2.06	2.09	4.75	1.57	5/16-18	.6245/.6235	3/16 x 3/32
206G	6.00	6.00	4.06	2.03	2.062	2.03	6.12	3.06	1.50	2.28	2.38	5.13	1.54	5/16-18	.6245/.6235	3/16 x 3/32
206	6.00	3.00	4.06	2.03	2.062	2.03	6.12	3.06	1.44	2.28	2.50	5.13	1.54	3/8-16	.6245/.6235	3/16 x 3/32
238	6.00	3.00	4.07	2.04	2.375	2.06	6.34	3.17	1.44	2.50	2.50	5.75	2.01	3/8-16	.7495/.7485	3/16 x 3/32
262	7.00	3.50	4.45	2.23	2.625	2.44	7.46	3.73	1.69	2.94	3.19	6.25	2.01	3/8-16	.7495/.7485	3/16 x 3/32
300	7.50	3.75	5.28	2.64	3.000	2.63	8.11	4.06	2.00	3.25	3.50	6.57	1.97	7/16-14	.8745/.8735	3/16 x 3/32
325	7.88	3.75	5.75	2.88	3.250	2.63	8.50	2.25	2.00	3.50	3.75	7.00	1.97	7/16-14	.8745/.8735	3/16 x 3/32

STANDARD HOLLOW BORE INFORMATION

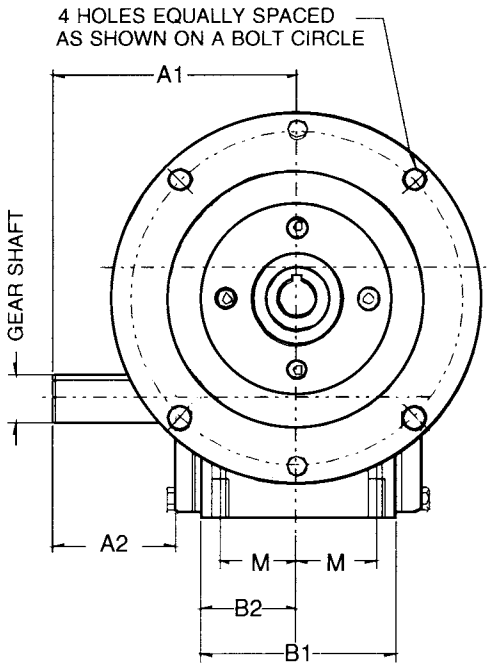
BORE SIZE	133	154	175	206	238	262	300	325
1	.626/.627	.626/.627	.626/.627	1.001/1.002	1.001/1.002	1.001/1.002	1.251/1.252	1.251/1.252
2			.688/.689	1.126/1.127	1.126/1.127	1.126/1.127	1.501/1.502	1.501/1.502
3			.751/.752	1.1885/1.1895	1.1885/1.1895	1.1885/1.1895	1.4385/1.4395	1.4385/1.4395
4			.876/.879	1.251/1.252	1.251/1.252	1.251/1.252	1.751/1.752	1.751/1.752
5			1.001/1.002	1.4385/1.4395	1.4385/1.4395	1.4385/1.4395	1.939/1.940	1.939/1.940

HOLLOW BORE KEYWAY INFORMATION

1	3/16 x 3/32	3/16 x 3/32	3/16 x 3/32	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8
2			3/16 x 3/32	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8	3/8 x 3/16	3/8 x 3/16
3			3/16 x 3/32	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8	3/8 x 3/16	3/8 x 3/16
4			3/16 x 3/32	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8	3/8 x 3/16	3/8 x 3/16
5			1/4 x 1/8	3/8 x 3/16	3/8 x 3/16	3/8 x 3/16	1/2 x 1/4	1/2 x 1/4



FRONT VIEW



SIDE VIEW

STANDARD UNIT INFORMATION

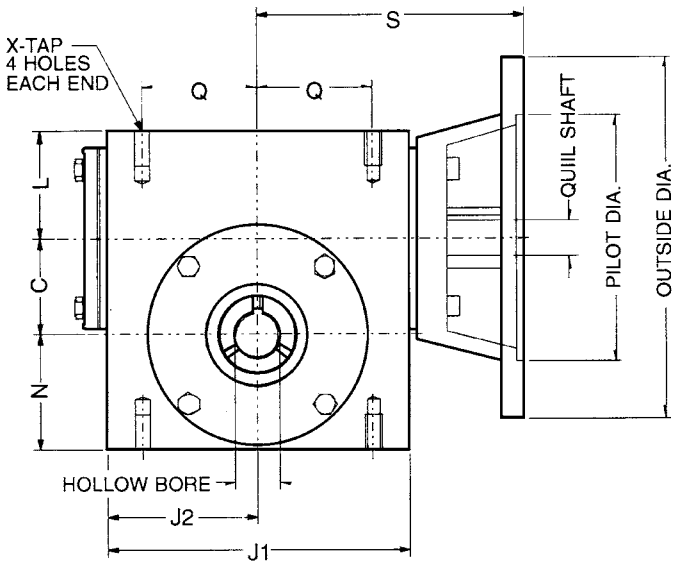
													GEAR SHAFT	
UNIT	AI	A2	B1	B2	C	L	J1	J2	M	N	Q	X-TAP	DIAMETER	KEYWAY
133	4.00	1.97	2.87	1.44	1.33	1.60	4.02	2.01	1.00	1.72	1.63	5/16-18	.625/.624	3/16 x 3/32
154	4.31	1.78	3.69	1.85	1.54	1.93	5.13	2.57	1.38	1.91	2.09	5/16-18	.750/.749	3/16 x 3/32
175	4.33	1.77	3.66	1.83	1.750	1.94	5.37	2.67	1.38	2.06	2.09	5/16-18	.875/.874	3/16 x 3/32
2.06G	4.69	2.20	3.82	1.91	2.062	2.04	6.12	3.06	1.50	2.28	2.38	5/16-18	1.000/.999	1/4 x 1/8
206	4.69	2.20	3.82	1.91	2.062	2.04	6.12	3.06	1.50	2.28	2.50	3/8-16	1.000/.999	1 /4 x 1 /8
238	5.07	2.40	4.07	2.04	2.375	2.06	6.34	3.17	1.44	2.50	2.50	3/8-16	1.125/1.124	1/4 x 1/8
262G	5.63	2.64	4.45	2.23	2.625	2.44	7.46	3.73	1.69	2.94	3.19	3/8-16	1.250/1.249	1/4 x 1/8
262	5.63	2.64	4.45	2.23	2.625	2.44	7.46	3.73	1.69	2.94	3.19	3/8-16	1.125/1.124	1 /4 x 1 /8
300	6.75	3.35	5.28	2.64	3.000	2.62	8.11	4.06	2.00	3.35	3.50	7/16-14	1.250/1.249	1/4 x 1/8
325G	7.07	3.35	5.75	2.88	3.250	2.63	8.50	4.25	2.00	3.50	3.75	7/16-14	1,500/1.499	5/16 x 5/32
325	7.07	3.35	5.75	2.88	3.250	2.63	8.50	4.25	2.00	3.50	3.75	7/16-14	1.375/1.374	5/16 x 5/32

MOTOR FLANGE INFORMATION

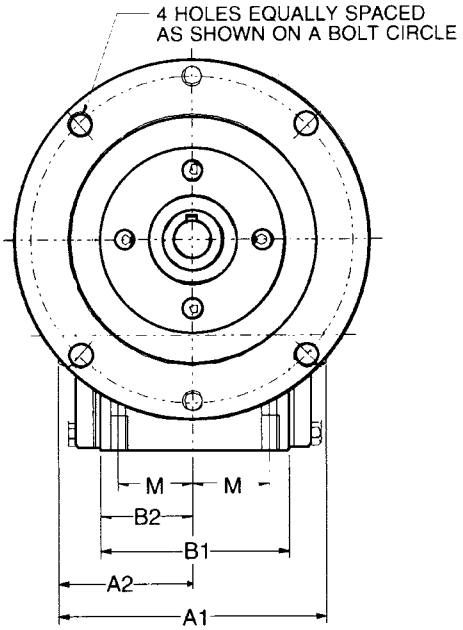
NEMAFRAME	OUTSIDE DIAMETER	PILOT DIAMETER	BOLT CIRCLE	HOLE SIZE	QUILL SIZE	KEYWAY SIZE
56C	6.50	4.501/4.503	5.875	13/32	.626/.627	3/16 x 3/32
143TC/145TC	6.50	4.501/4.503	5.875	13/32	.876/.877	
182TC/184TC	9.00	8.501 /8.503	7.250	17/32	1.126/1.127	1 /4 x 1 /8
213TC/215TC	9.00	8.501/8.503	7.250	17/32	1.376/1.377	5/16 x 5/32

MOTOR FLANGE INFORMATION

UNIT	S			
	56C	143TC 145TC	182TC 184T	213TC 215TC
133	3.60	3.60	-	-
154	4.29	4.29	-	-
175	4.37	4.37	-	-
206	4.75	4.75	-	-
238	4.86	4.86	-	-
262	5.62	5.62	5.87	5.87
300	5.94	5.94	6.26	6.26
325	6.36	6.36	6.50	6.50



FRONT VIEW



SIDE VIEW

STANDARD UNIT INFORMATION

UNIT	AI	A2	B1	B2	C	L	J1	J2	M	N	Q	S	W	x -TAP
133	4.75	2.374	2.87	1.44	1.333	1.60	4.02	2.01	1.00	1.72	1.62	3.38	1.38	5/16-18
154	5.42	2.71	3.69	1.85	1.540	1.93	5.13	2.57	1.38	1.91	2.09	4.69	1.56	5/16-18
175	5.50	2.25	3.66	1.83	1.750	1.92	5.37	2.69	1.38	2.06	2.09	4.75	1.57	5/16-18
206G	6.00	6.00	4.06	2.03	2.062	2.03	6.12	3.06	1.50	2.28	2.38	5.13	1.54	5/16-18
206	6.00	3.00	4.06	2.03	2.062	2.03	6.12	3.06	1.44	2.28	2.50	5.13	1.54	3/8-16
238	6.00	3.00	4.07	2.04	2.375	2.06	6.34	3.17	1.44	2.50	2.50	5.75	2.01	3/8-16
262	7.00	3.50	4.45	2.23	2.625	2.44	7.46	3.73	1.69	2.94	3.19	6.25	2.01	3/8-16
300	7.50	3.75	5.28	2.64	3.000	2.63	8.11	4.06	2.00	3.25	3.50	6.57	1.97	7/16-14
325	7.88	3.75	5.75	2.88	3.250	2.63	8.50	2.25	2.00	3.50	3.75	7.00	1.97	7/16-14

MOTOR FLANGE INFORMATION

NEMAFRAME	OUTSIDE DIAMETER	PILOT DIAMETER	BOLT CIRCLE	HOLE SIZE	QUILL SIZE	KEYWAY SIZE
56C	6.50	4.501/4.503	5.875	13/32	.626/.627	3/16 x 3/32
143TC/145TC	6.50	4.501/4.503	5.875	13/32	.876/.877	
182TC/184TC	9.00	8.501 /8.503	7.250	17/32	1.126/1.127	1 /4 x 1 /8
213TC/215TC	9.00	8.501/8.503	7.250	17/32	1.376/1.377	5/16 x 5/32

MOTOR FLANGE INFORMATION

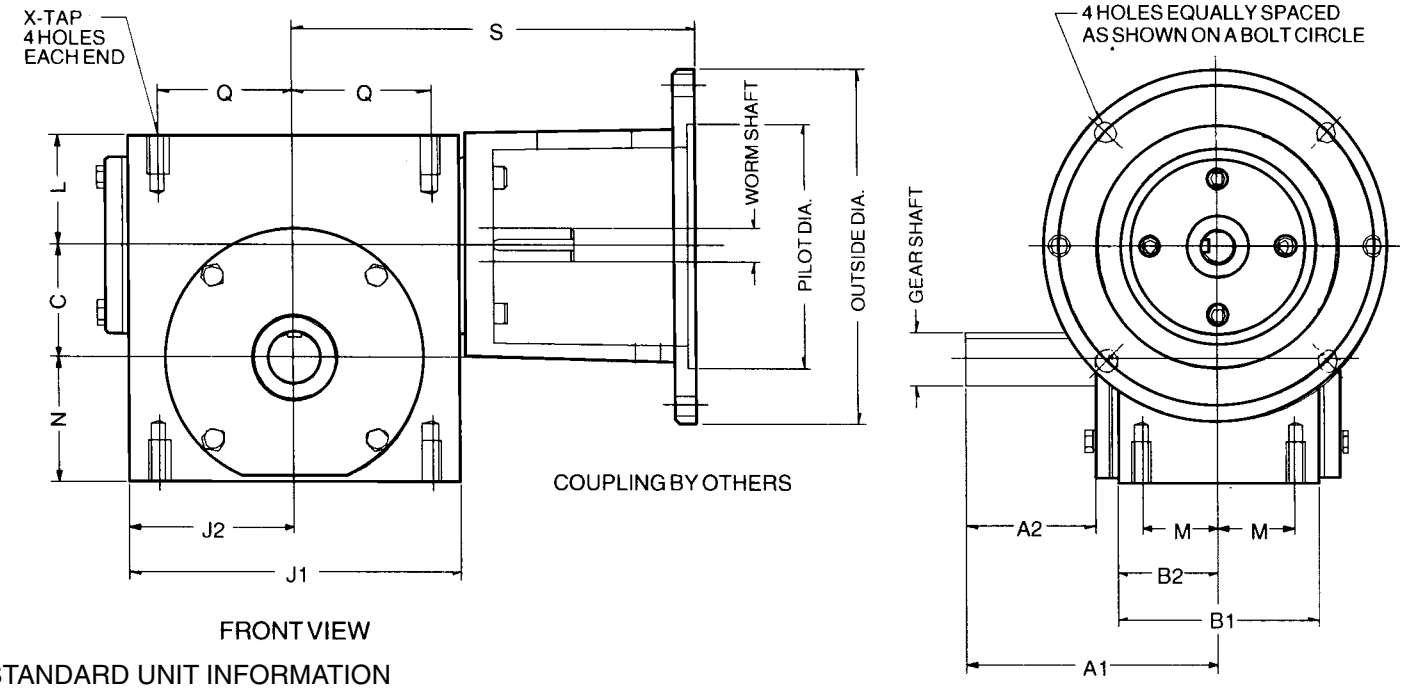
UNIT	S			
	56C	143TC 145TC	182TC 184T	213TC 215TC
133	3.60	3.60	-	-
154	4.29	4.29	-	-
175	4.37	4.37	-	-
206	4.75	4.75	-	-
238	4.86	4.86	-	-
262	5.62	5.62	5.87	5.87
300	5.94	5.94	6.26	6.26
325	6.36	6.36	6.50	6.50

STANDARD HOLLOW BORE INFORMATION

BORE SIZE	133	154	175	206	238	262	300	325
1	.626/.627	.626/.627	.626/.627	1.001/1.002	1.001/1.002	1.001/1.002	1.251/1.252	1.251/1.252
2			.688/.689	1.126/1.127	1.126/1.127	1.126/1.127	1.501/1.502	1.501/1.502
3			.751/.752	1.1885/1.1895	1.1885/1.1895	1.1885/1.1895	1.4385/1.4395	1.4385/1.4395
4			.876/.879	1.251/1.252	1.251/1.252	1.251/1.252	1.751/1.752	1.751/1.752
5			1.001/1.002	1.4385/1.4395	1.4385/1.4395	1.4385/1.4395	1.939/1.940	1.939/1.940

HOLLOW BORE KEYWAY INFORMATION

1	3/16 x 3/32	3/16 x 3/32	3/16 x 3/32	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8
2			3/16 x 3/32	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8	3/8 x 3/16	3/8 x 3/16
3			3/16 x 3/32	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8	3/8 x 3/16	3/8 x 3/16
4			3/16 x 3/32	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8	3/8 x 3/16	3/8 x 3/16
5			1/4 x 1/8	3/8 x 3/16	3/8 x 3/16	3/8 x 3/16	1/2 x 1/4	1/2 x 1/4



STANDARD UNIT INFORMATION

UNIT	AI	A2	B1	B2	C	L	J1	J2	M	N	Q	S	W	X-TAP
133	4.00	1.97	2.87	1.44	1.333	1.60	4.02	2.01	1.00	1.72	1.62	3.38	1.38	5/16/18
154	4.31	1.78	3.69	1.85	1.540	1.93	5.13	2.57	1.38	1.91	2.09	4.69	1.56	5/16/18
175	4.33	1.77	3.66	1.83	1.750	1.92	5.37	2.69	1.38	2.06	2.9	4.75	1.57	5/16/18
206G	4.69	2.20	4.06	2.03	2.062	2.03	6.12	3.06	1.50	2.28	2.38	5.13	1.54	5/16/18
206	4.69	2.20	4.06	2.03	2.062	2.03	6.12	3.06	1.44	2.28	2.50	5.13	1.54	3/8/16
238	5.07	2.40	4.07	2.04	2.375	2.06	6.34	3.17	1.44	2.50	2.50	5.75	2.01	3/8-16
262G	5.63	2.64	4.45	2.23	2.625	2.44	7.46	3.73	1.69	2.94	3.19	6.25	2.01	3/8-16
262	5.63	2.64	4.45	2.23	2.625	2.44	7.46	3.73	1.69	2.94	3.19	6.25	2.01	3/8-16
300	6.75	3.35	5.28	2.64	3.000	2.63	8.11	4.06	2.00	3.25	3.50	6.57	1.97	7/16-14
325G	7.07	3.35	5.75	2.88	3.250	2.63	8.50	4.25	2.00	3.50	3.75	7.00	1.97	7/16-14
325	7.07	3.35	5.75	2.88	3.250	2.63	8.50	4.25	2.00	3.50	3.75	7.00	1.97	7/16-14

STANDARD SHAFT DIAMETERS

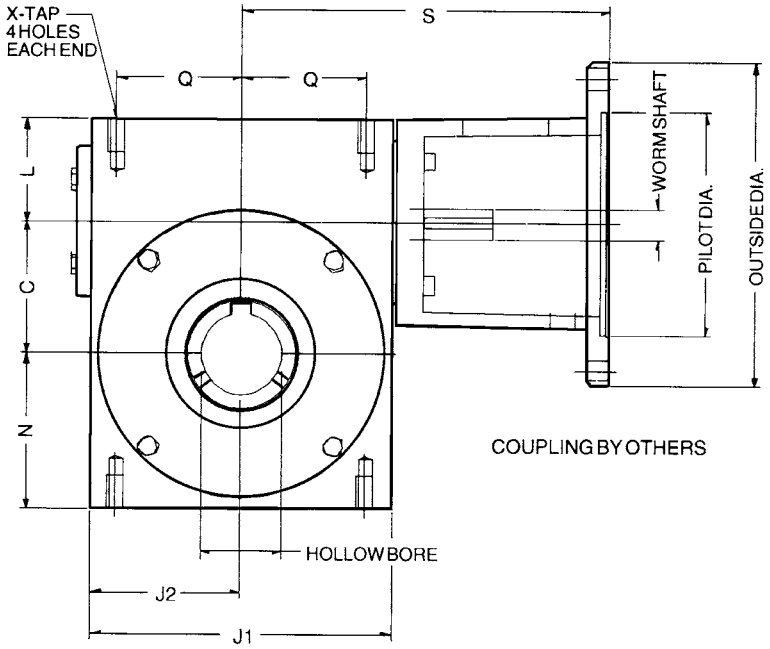
	WORM SHAFT		GEAR SHAFT	
UNIT	DIAMETER	KEYWAY	DIAMETER	KEYWAY
133	.4995/.4985	1 /8 x 1 /16	.625/.624	3/16 x 3/32
154	.6245/.6235	3/16 x 3/32	.750/.749	3/16 x 3/32
175	.6245/.6235	3/16 x 3/32	.875/.874	3/16 x 3/32
206G	.6245/.6235	3/16 x 3/32	1.000/.999	1 /4 x 1 /8
206	.6245/.6235	3/16 x 3/32	1.000/.999	1 /4 x 1 /8
238	.7495/.7485	3/16 x 3/32	1.125/1.124	1 /4 x 1 /8
262G	.7495/.7485	3/16 x 3/32	1.250/1.249	1/4 x 1/8
262	.7495/.7485	3/16 x 3/32	1.125/1.124	1 /4 x 1 /8
300	.8745/.8735	3/16 x 3/32	1.250/1.249	1 /4 x 1 /8
325G	.8745/.8735	3/16 x 3/32	1.500/1.499	5/16 x 3/32
325	.8745/.8735	3/16 x 3/32”	1.375/1.374	5/16 x 5/32

MOTOR FLANGE INFORMATION

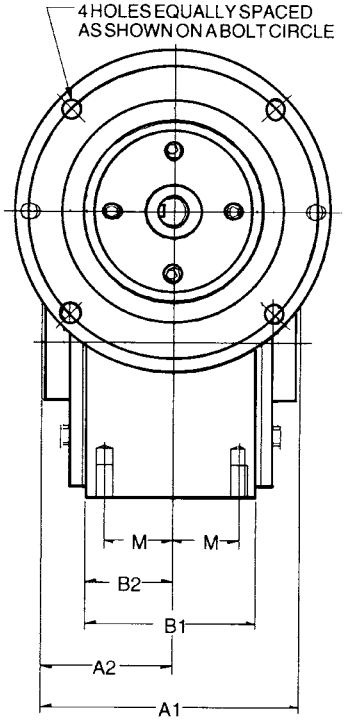
	S			
UNIT	56C	143TC 145TC	182TC 184T	213TC 215TC
133	6.70	6.70	–	–
154	6.89	6.89	–	–
175	6.97	6.97	–	–
206	7.86	7.86	–	–
238	7.97	7.97	–	–
262	8.61	8.61	9.82	–
300	8.94	8.94	10.15	10.15
325	9.25	9.25	10.46	10.46

MOTOR FLANGE INFORMATION

NEMAFRAME	OUTSIDE DIAMETER	PILOT DIAMETER	BOLT CIRCLE	HOLE SIZE	COUPLING BORE SIZE	KEYWAY SIZE
56C	6.50	4.501/4.503	5.875	13/32	.626/.627	3/16 x 3/32
143TC/145TC	6.50	4.501/4.503	5.875	13/32	.876/.877	
182TC/184TC	9.00	8.501 /8.503	7.250	17/32	1.126/1.127	1 /4 x 1 /8
213TC/215TC	9.00	8.501/8.503	7.250	17/32	1.376/1.377	5/16 x 5/32



FRONT VIEW



SIDE VIEW

STANDARD UNIT INFORMATION

UNIT	AI	A2	B1	B2	C	L	J1	J2	M	N	Q	X-TAP
133	4.75	2.38	2.87	1.44	1.33	1.60	4.02	2.01	1.00	1.72	1.63	5/16-18
154	5.42	2.71	3.69	1.85	1.54	1.93	5.13	2.57	1.38	1.91	2.09	5/16-18
175	5.50	2.75	3.66	1.83	1.750	1.94	5.37	2.67	1.38	2.06	2.09	5/16-18
2.06G	6.00	3.00	3.82	1.91	2.062	2.04	6.12	3.06	1.50	2.28	2.38	5/15-18
206	6.00	3.00	3.82	1.91	2.062	2.04	6.12	3.06	1.50	2.28	2.50	3/8-16
238	6.00	3.00	4.07	2.04	2.375	2.06	6.34	3.17	1.44	2.50	2.50	3/8-16
262G	7.00	3.50	4.45	2.23	2.625	2.44	7.46	3.73	1.69	2.94	3.19	3/8-16
262	7.00	3.50	4.45	2.23	2.625	2.44	7.46	3.73	1.69	2.94	3.19	3/8-16
300	7.50	3.75	5.28	2.64	3.000	2.62	8.11	4.06	2.00	3.35	3.50	7/16-14
325G	7.88	3.94	5.75	2.88	3.250	2.63	8.50	4.25	2.00	3.50	3.75	7/16-14
325	7.88	3.94	5.75	2.88	3.250	2.63	8.50	4.25	2.00	3.50	3.75	7/16-14

MOTOR FLANGE INFORMATION

NEMAFRAME	OUTSIDE DIAMETER	PILOT DIAMETER	BOLT CIRCLE	HOLE SIZE	COUPLING BORE SIZE	KEYWAY SIZE
56C	6.50	4.501/4.503	5.875	13/32	.626/.627	3/16 x 3/32
143TC/145TC	6.50	4.501/4.503	5.875	13/32	.876/.877	
182TC/184TC	9.00	8.501 /8.503	7.250	17/32	1.126/1.127	1 /4 x 1 /8
213TC/215TC	9.00	8.501/8.503	7.250	17/32	1.376/1.377	5/16 x 5/32

MOTOR FLANGE INFORMATION

UNIT	S			
	56C	143TC 145TC	182TC 184T	213TC 215TC
133	6.70	6.70	-	-
154	6.89	6.89	-	-
175	6.97	6.97	-	-
206	7.86	7.86	-	-
238	7.97	7.97	-	-
262	8.61	8.61	9.82	-
300	8.94	8.94	10.15	10.15
325	9.25	9.25	10.46	10.46

STANDARD HOLLOW BORE INFORMATION

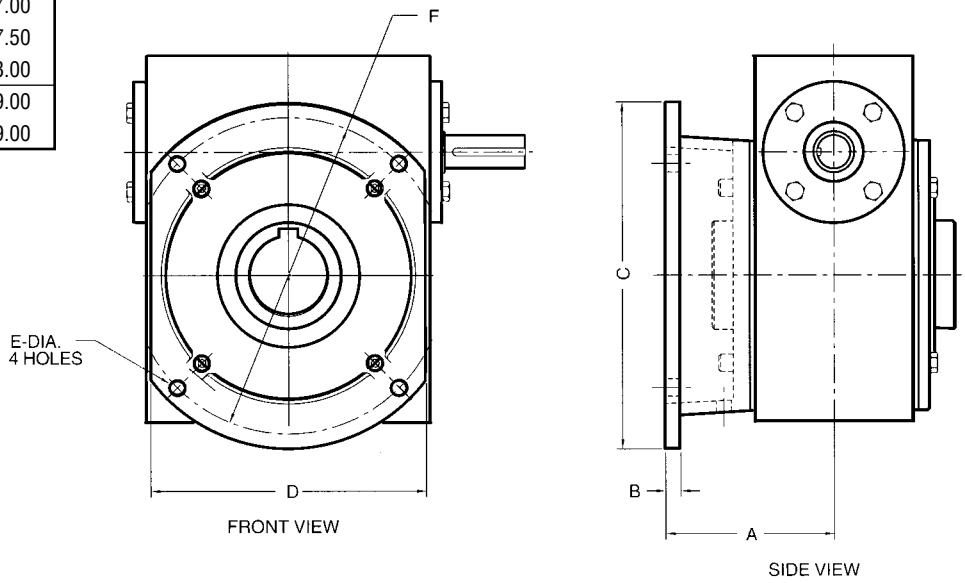
BORE SIZE	133	154	175	206	238	262	300	325
1	.626/.627	.626/.627	.626/.627	1.001/1.002	1.001/1.002	1.001/1.002	1.251/1.252	1.251/1.252
2			.688/.689	1.126/1.127	1.126/1.127	1.126/1.127	1.501/1.502	1.501/1.502
3			.751/.752	1.1885/1.1895	1.1885/1.1895	1.1885/1.1895	1.4385/1.4395	1.4385/1.4395
4			.876/.879	1.251/1.252	1.251/1.252	1.251/1.252	1.751/1.752	1.751/1.752
5			1.001/1.002	1.4385/1.4395	1.4385/1.4395	1.4385/1.4395	1.939/1.940	1.939/1.940

HOLLOW BORE KEYWAY INFORMATION

1	3/16 x 3/32	3/16 x 3/32	3/16 x 3/32	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8
2			3/16 x 3/32	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8	3/8 x 3/16	3/8 x 3/16
3			3/16 x 3/32	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8	3/8 x 3/16	3/8 x 3/16
4			3/16 x 3/32	1/4 x 1/8	1/4 x 1/8	1/4 x 1/8	3/8 x 3/16	3/8 x 3/16
5			1/4 x 1/8	3/8 x 3/16	3/8 x 3/16	3/8 x 3/16	1/2 x 1/4	1/2 x 1/4

SIDE MOUNT INFORMATION

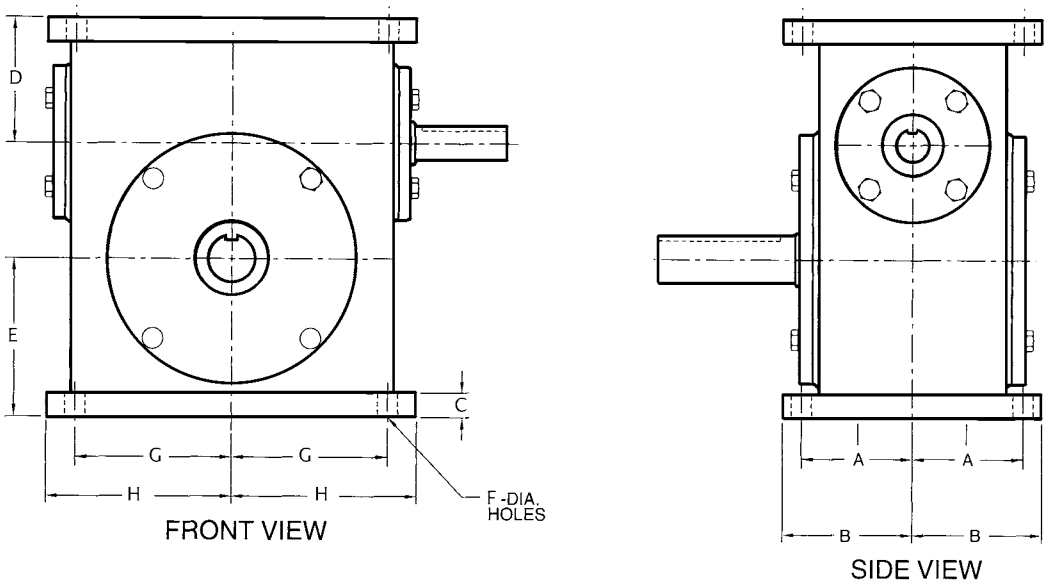
UNIT	A	B	C	D	E	F
1.33	2.57	0.35	6.69	4.96	0.35	5.00
1.54	4.01	0.35	6.69	4.96	0.35	5.00
175	3.50	0.38	6.69	5.35	0.35	5.88
206	3.74	0.47	7.95	5.98	0.41	7.00
238	3.73	0.47	8.43	6.46	0.41	7.50
262	3.70	0.50	8.94	7.32	0.41	8.00
300	3.80	0.50	9.84	8.07	0.41	9.00
325	4.28	0.50	9.84	8.07	0.41	9.00



Mounting Feet Adapters

SIDE MOUNT INFORMATION

UNIT	A	B	C	D	E	F-DIA.	G	H
133	1.66	1.66	0.53	2.14	2.25	11/32	2.19	2.69
154	2.16	2.16	0.59	2.52	2.50	13/32	2.63	3.50
175	2.25	2.25	0.69	2.63	2.75	13/32	2.88	3.50
206	2.34	2.34	0.72	2.75	3.00	15/32	3.19	3.85
238	2.44	2.44	0.75	2.81	3.25	17/32	3.53	4.19
262	2.63	2.63	0.75	3.19	3.69	17/32	4.00	4.63
300	2.94	2.94	0.75	3.38	4.00	17/32	4.22	5.00
325	3.06	3.06	0.88	3.50	4.38	17/32	4.75	5.56



Cleveland units are shipped dry. A mineral based or synthetic oil 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 compound oil is satisfactory. For low speeds, a higher viscosity, AGMA 8 compound will provide better service. Both are petroleum base, mineral oils compounded with 3% to 10% fatty oils. These are sometimes referred to as steam cylinder oils. The compounded lubricant provides a lower co-efficient of friction and better wear characteristics than a straight mineral oil. At the high temperatures and pressures prevailing in the contact area, a chemical reaction occurs on the bronze tooth surface. An unstable, copper oleate film will form a protective skin.

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. The EP oils are designed to work in steel on steel applications. When these oils are used with bronze under conditions of high temperature and pressure, the surface acting chemistry can damage the surface of the bronze.

Synthetic lubricants are very common. Synthetic lubricants are more viscosity temperature stable than mineral oils. This allows one lubricant to provide adequate service over a broader temperature range. They have a longer life in service, increasing the oil change interval. They reduce wear and friction, increasing the life of the gear box. Efficiency increases of 10% of the lost power are possible. Under severe service, properly selected synthetics are outstanding. Many companies have found that, due to the advantages of synthetic lubricants, it is actually cheaper to buy the more expensive oil, even for normal applications.

Oil Level

The oil level in a reducer can be checked only when it is at rest, and 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 Changes

Oil in a new unit should be drained out at the end of two weeks and the case thoroughly flushed with a light oil to remove any foreign substances that may be detrimental to good operation. The original oil may be reused if good filtering facilities are available; otherwise, new oil should be used to refill the housing. After this, a change of oil every six months or 2,500 hours—whichever occurs first, is recommended. Extremely severe or dirty conditions, as well as high humidity, will require more frequent oil changes. The use of synthetics can extend this 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.

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. This short run will also lubricate the shaft oil-seals and thereby prolong their life measurably.

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 COMPOUNDED	#8 COMPOUNDED
ABOVE 600*	#7 COMPOUNDED	#7 COMPOUNDED

RECOMMENDED PRODUCT

AGMA NUMBER	MINERAL	SYNTHETIC
#7 COMPOUNDED	MOBIL 600W CYLINDER OIL	MOBIL SHC 634
#8 COMPOUNDED	MOBIL 600W SUPER CYLINDER OIL	MOBIL SHC 634

Viscosity Ranges for AGMA Lubricants[a]

Rust and Oxidation Inhibited Gear Oils	Viscosity Range[b]	Equivalent ISO Grade[c]
AGMA Lubricant No.	mm^2/S (cSt) at 40°C	
7 Comp[d]	414 to 506	460
8 Comp[d]	612 to 748	680

[a] Extracted from AGMA "Specification-Lubrication of Industrial Enclosed Gear Drives" (AGMA 250.05) with the permission of the publisher, the American Gear Manufacturers Association, Suite 1000,1901 North Fort Myer Drive, Arlington, Virginia 22209.

[b] "Viscosity System for Industrial Fluid Lubricants, ASTM 2422." Also British Standards Institute, B.S. 4231.

[c] "Industrial Liquid Lubricants—ISO Viscosity Classification." International Standard, ISO 3448.

[d] Comp. (Compounded Oils) contain 3% - 10% fatty or synthetic oils.

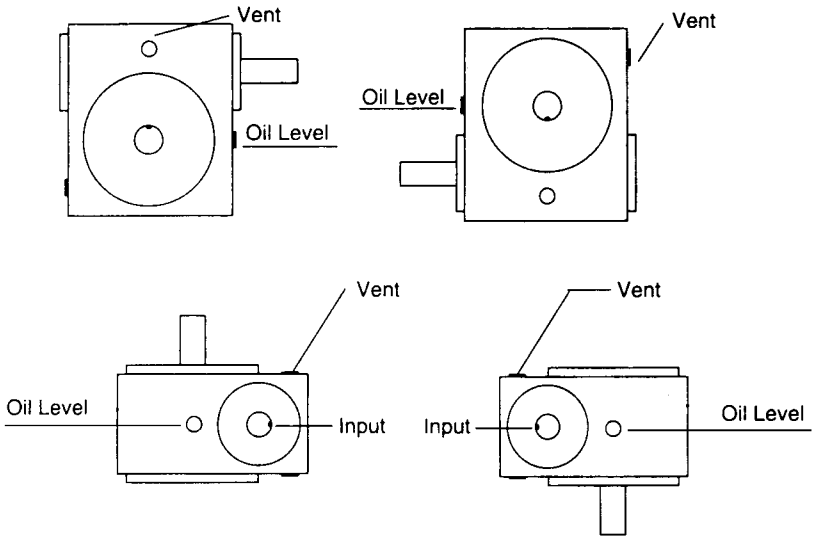
† AGMA Lubricant Number Per AGMA 250.04

‡ 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.

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

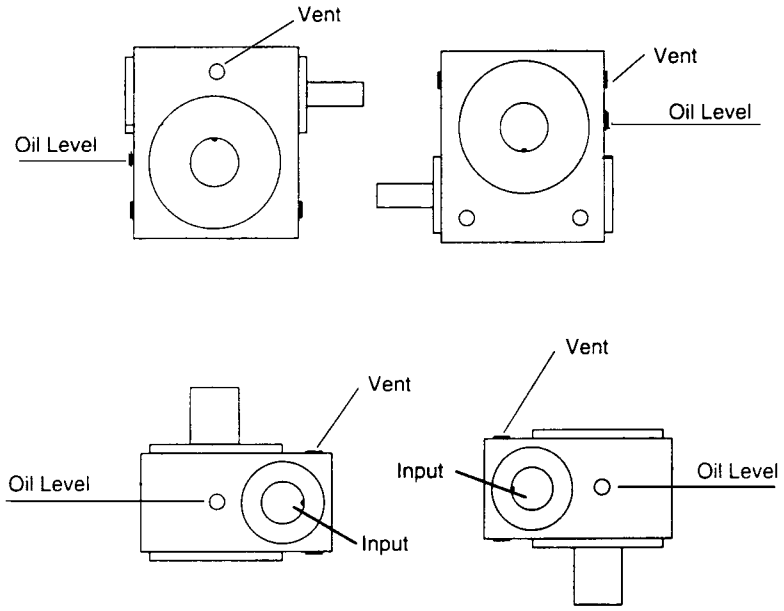
1.33", 1.54",1.75", 2.06", 2.38" & 2.62", 3.00" & 3.25" CD



Center Distance	Oil Capacity in Ounces	
	Worm Over	Worm Under
1.33	5.5	11.0
1.54	10.5	18.0
1.75	12.0	18.5
2.06	17.5	28.5
2.38	22.0	31.0

Center Distance	Oil Capacity in Ounces
1.33	9.5
1.54	16.5
1.75	17.0
2.00	26.5
2.38	28.5

3.00" & 3.25" Solid Output Shaft



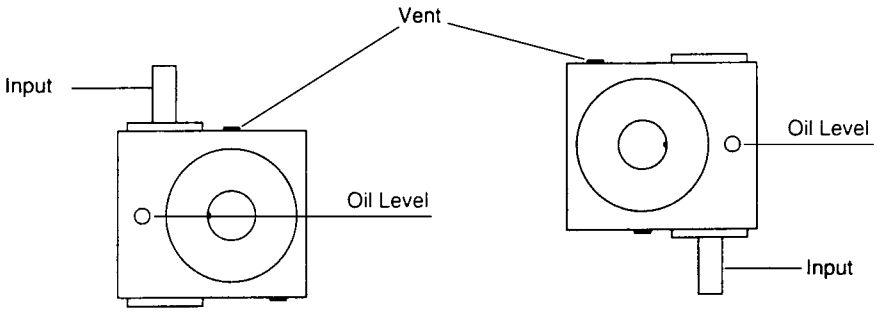
Center Distance	Oil Capacity in Ounces	
	Worm Over	Worm Under
2.62	33.0	54.0
3.00	55.0	74.0
3.25	60.0	107.0

Center Distance	Oil Capacity in Ounces
2.62	57.0
3.00	70.0
3.25	91.0

Oil capacities shown are approximate. On installation, fill to plug level indicated.

Center Distance	Oil Capacity in Ounces
1.33	7.0
1.54	13.5
1.75	14.5
2.06	22.5
2.38	25.5
2.62	44.0
3.00	60.0
3.25	64.0

Vertical Input



ALL SIZES AND TYPES

Upon receipt of a unit it should be inspected for damage in shipment and any injury 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 good alignment. A standard line of bedplates is available for all Cleveland units. All four feet of the units are machined at the same time to provide flatness, and the base they are bolted to must be flat also.

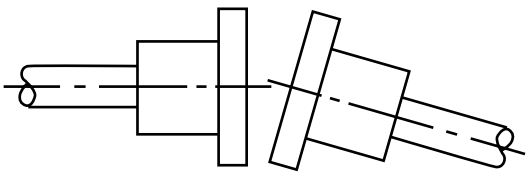
ALIGNMENT

Accurate alignment of both high and low speed shafts is a necessity. Lack of good 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 a settled foundation or movement of the connected machine.

Two forms of misalignment, or a combination of them, is 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 good alignment on both shafts cannot be overemphasized.

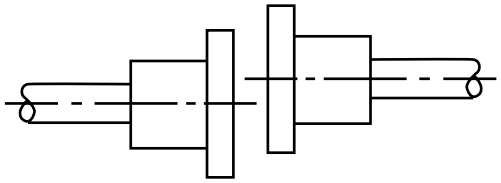
The figures shown illustrate each form of misalignment, greatly exaggerated, and a combination of both can exist as well.

Angular Misalignment



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 90° positions. 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.

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 a horizontal plane to correct this form of misalignment.

The necessity of good 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. Tighter fits for heavier loads can be obtained by heating the coupling half. They 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 blow is absorbed by an anti-friction bearing and damage to the rolls or the races may 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.

CLEVELAND GEAR'S LIBRARY OF INFORMATION

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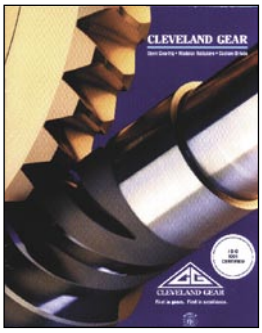
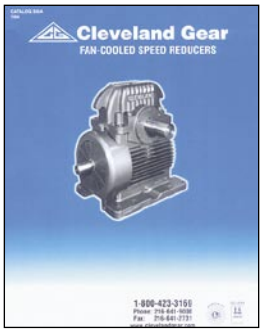


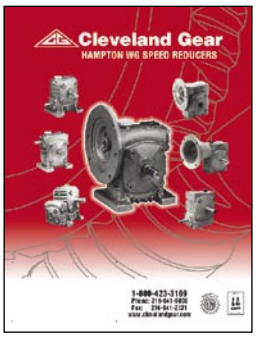
Brochure # 900 - Capabilities Brochure

Summarizes Cleveland's capabilities and 86+ year tradition of gear flexibility, innovation, reliability and service.

Catalog # 500 - Fan-Cooled Speed Reducers

Extensive data on selection, installation and maintenance, including design features, ratings and dimensions on all three types.



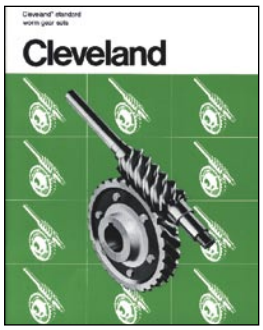


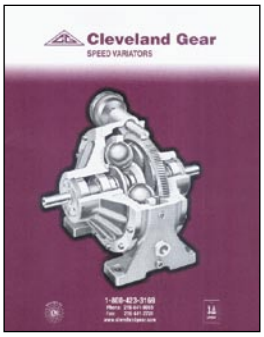
Catalog # 800 - Hampton WG Speed Reducers

Provides Horsepower, torque ratings, dimensional data and part/maintenance information on Single and Double Reduction Speed Reducers.

Catalog # 600 - Open Gearing

Includes application classifications and service factor tables, plus ratings tables, special designs, and worm and gear dimensions.





Catalog # 200 - Speed Variators

Includes detailed data on features, applications and selection procedures for Cleveland's ball-type, mechanical, variable speed drives.

Catalog # 300 - Redi II Enclosed Drives

Comprehensive reference with selection guide and rating tables – for single through quadruple reduction, helical and bevel helical speed reducers.

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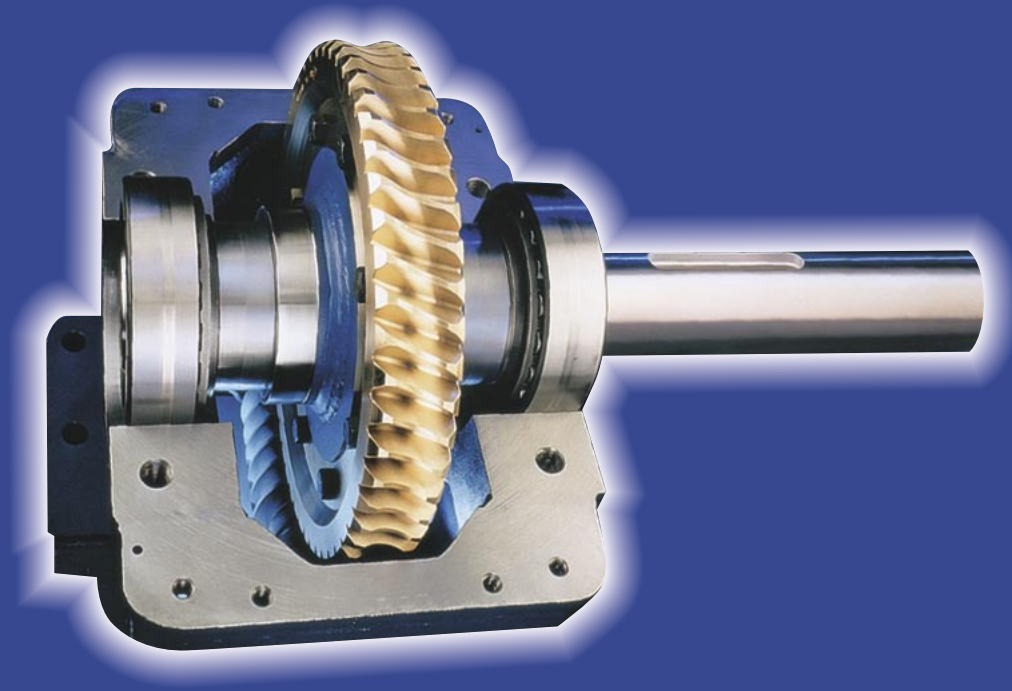

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