Please read and save these instructions. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

Dayton® Speed Reducers

Description

Dayton right-angle speed reducers are designed for continuous duty, high torque, slow speed applications such as packaging, food processing, etc. Units are equipped with hardened worm and bronze worm gear, Timken roller bearings on output shaft, double lip seals and cast aluminum housing.

NOTE: Speed reducers are built for direct coupling or V-belt drive with up to a 1 HP, 1725 RPM motor. Lower input speed may be used with a proportional decrease in input HP and output speed. Lower input HP may be used with a proportional reduction output torque. (Consult Specifications)

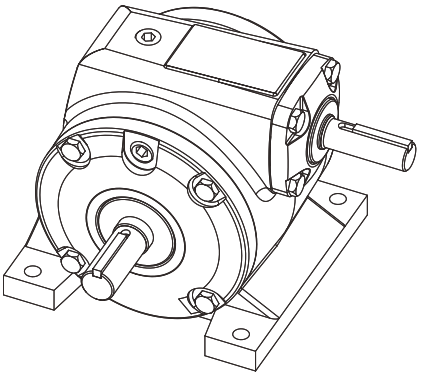

Figure 1

A	C	D	D1	E	F	H	N	N1
5 3/4	7 1/16	2 1/2	4 1/2	2 3/8	4 3/4	1 1/32	1 13/32	2
O	**U**		**U1**	**V**	**V1**	**AB**	**XL**	
5 13/16	0.7500/0.7495		0.6250/0.6245	1 5/8	1 7/16	2 7/16	8	

NOTE: All dimensions given in inches.

Dimensions

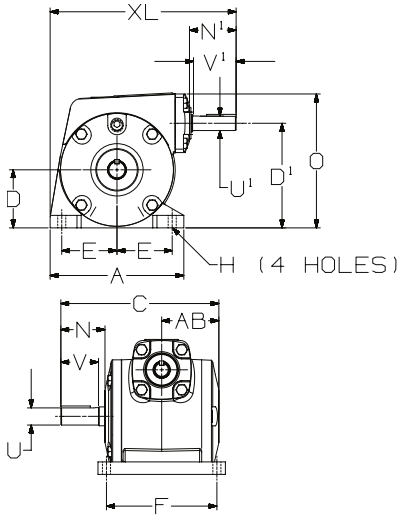

Figure 2

General Safety Information

The safety information following refers to the complete installation as well as the reducer.

⚠WARNING **Disconnect power before installing or servicing.**

1. Follow all local electrical and safety codes, the United States National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).
2. Motor (not included with this unit) must be securely and adequately grounded. This can be accomplished by wiring with a grounded, metal-clad raceway system, by using a separate ground wire connected to the bare metal of the motor frame, or other suitable means. Refer to NEC Article 250 Grounding for additional information
3. Always disconnect power source before working on or near a motor or its connected load. If the power disconnect point is out of sight, lock it in the open position and tag it to prevent unexpected application of power.
4. All moving parts should be guarded.
5. Be careful when touching the exterior of an operating motor; it may be hot enough to be painful or cause injury. Modern-design motors run hot when operated at rated load and voltage.
6. Prevent the power cable from touching sharp objects, oil, grease, hot surfaces, or chemicals
7. Do not kink the power cable.
8. Make certain that the power source conforms to the requirements of your equipment.
9. Keep cleaning rags and other flammable waste materials in a tightly closed metal container and dispose of in the proper fashion.
10. Clean electrical or electronic equipment with approved cleaning agent such as dry cleaning solvent.
11. Be sure the output shaft key is fully captive or is removed before running the reducer.

⚠CAUTION **Do not install an automatic reset motor starting device in applications where unexpected starting could harm personnel or equipment.**

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Dayton®

Dayton® Speed Reducers

Specifications and Performance

		1725 RPM Input			1160 RPM Input			875 RPM Input		
Model	Ratio	Output RPM	Output Torque In-Lb	Max. Input HP	Output RPM	Output Torque In-Lb	Max. Input HP	Output RPM	Output Torque In-Lb	Max. Input HP
2Z306F	58:1	30	285	1/3	20	416	1/3	15	495	1/3
2Z307F	39:1	45	337	1/2	30	530	1/2	22	451	1/3
2Z308F	26:1	67	385	3/4	45	392	1/2	34	498	1/2
2Z309F	18:1	96	360	1	64	409	3/4	49	342	1/2
2Z310F	11:1	157	302	1	105	403	1	79	385	3/4

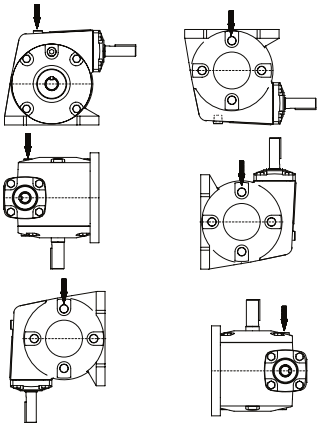


Figure 3

Figure 3 - Proper Vent Plug Location and Oil Level

NOTE: Arrow indicates vent plug location, Dotted line indicates proper oil level. Use any plug along this line to check oil level. (On near or far side).

Installation

Do not install the reducer, motor or base assembly in an explosive atmosphere unless the motor and the complete installation are qualified and approved for such use.

When an installation involves a holding or overhauling application (such as a hoist or conveyer), a separate magnetic brake or other locking device should be used. Do not depend on gear friction to hold the load.

⚠CAUTION Check the oil level (see Lubrication section). Depending on mounting position used, too little or too much lubrication will diminish life or reducer.

1. Locate the speed reducer in a clean and dry area with access to adequate motor cooling air supply. If installation is outdoors, make certain that the unit is protected from the weather.
2. Mount the motor on mounting base (steel preferred), using proper height spacers (1" thick for 56 frame motor; 1½" thick for 48 frame motor) to align motor shaft with gear reducer input shaft. Fasten motor to mounting surface, using suitable bolts. Installing coupling on motor shaft and securely tighten setscrew

NOTE: Speed reducer may be used with any NEMA 56 (preferred) or 48 frame, rigid base motor, up to 1 HP at 1725 RPM, depending upon which gear ratio is used.

3. Install coupling body on speed reducer shaft (if spider cushion-type coupling is being used). Place reducer on mounting surface, aligning motor and reducer couplings. Install spider cushions between coupling bodies. Assemble reducer to mounting surface, using four 5/16" diameter bolts. Do not tighten at this time. Align input shaft of reducer with motor shaft as best possible, shimming if necessary. Minor shaft misalignment will be compensated for by the coupling. Excessive misalignment will cause undue coupling wear, and possible bearing damage. Tighten speed reducer mounting bolts.
4. Remove solid pipe plug from uppermost location on housing, and replace it with the vent plug provided. Failure to do so may cause lubricant leakage past the shaft seals. See Figure 3 for proper vent location, depending on orientation of the reducer.
5. Before connecting load, turn coupling by hand to assure no binding or excessive misalignment has occurred.
6. Attaching (coupling) the load:

NOTE: To determine output torque capacity for operating conditions other than normal 8-hour days with shock-free operation,multiply the rated output torque for the speed reducer (from Specifications and Performance) by the applicable load factor listed in the Load Factor Chart. Avoid shock loads.

Models 2Z306F thru 2Z310F

Installation (Continued)

Load Factors

Type of Service	Loading Uniform	Moderate Shock	Heavy Shock
Applications with few (up to 10) stops and starts per day			
Occasional (1/2 hr. total/day)	1.25	1.10	1.00
Intermittent (2 hrs. total/day)	1.10	1.00	0.80
8 hrs./day	1.00	0.80	0.67
24 hrs./day	0.80	0.67	.057
Applications with frequent (over 10) stops and starts per day			
Occasional (1/2 hr. total/day)	1.10	1.00	0.80
Intermittent (2 hrs. total/day)	1.00	0.80	0.67
8 hrs./day	0.80	0.67	0.57
24 hrs./day	0.67	0.57	.050

a. Overhung Loads:
Sideward (radial) force on a motor output shaft is called overhung load. Driving a load through a gear, sprocket wheel, or belt pulley which is mounted on the speed reducer output shaft causes overhung load on the shaft. Too much overhung load can break the shaft or cause the bearings to fail prematurely. Calculate the amount of overhung load which the speed reducer will receive in your installation as follows:

$$\text{Overhung Load (Lbs)} = \frac{(2) \times (T) \times (C) \times (L)}{D}$$

The terms of the above formula are as follows:

(T) = Full Load Torque of speed reducer, in in-lbs., from Specifications and Performance

(C) = Coupling Factor from following chart, accounting for type of coupling

(D) = Pitch Diameter, in inches, of coupling being mounted on gear motor's output shaft

(L) = "Leverage" Factor from following chart, accounting for position of coupling along length of speed reducers output shaft

Coupling Factors

Coupling Type	Factor
Chain Sprocket Wheel	1.00
Gear (pinion)	1.25
V-Belt Pulley	1.50
Flat Belt Pulley	2.50

"Leverage" Factors

Coupling Type	Factor
End of shaft extension	0.80
Center of shaft extension	1.00
Next to shaft extension shoulder	1.20

After calculating the amount of overhung load expected in your installation, compare it to the overhung load rating.

⚠CAUTION **Maximum allowable overhung load is 600 lbs.**

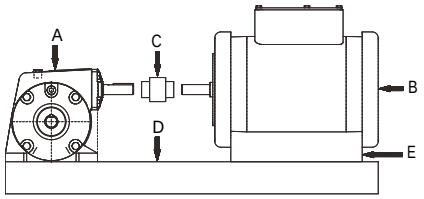
If the expected amount of overhung load is higher than the specified limit, you must change a component or the location of a component in your installation to bring the overhung load within the limit. To increase the operating life of the speed reducer bearings, design your installation to reduce overhung load as much as possible.

⚠CAUTION **Excessive static chain or belt tension (i.e. tension present when not running) will cause additional, unnecessary, overhung load; set tension no higher than recommended by chain or belt manufacturer.**

b. On direct-coupled installations, carefully check shaft and coupling alignment while bolting down speed reducer. Shim as required. Do not depend on a flexible coupling to compensate for misalignment.

7. Make final wiring connections (consult nameplate on motor).

NOTE: Output shaft may be run in either direction by changing motor connections. Per diagram or instructions by motor manufacturer.



A-Reducer, B-Motor, C-Coupling, D-Mounting Base, E-Spacers

Figure 4 - Typical Installation

Maintenance

⚠WARNING **Make certain that the power supply is disconnected before attempting to service or remove any components! If the power disconnect point is out-of sight, lock it in the open position and tag to prevent unexpected application of power to installation.**

1. If internal parts have been replaced on the output shaft assembly, new adjustment for end play will be required.
   a. Reassemble unit, beginning with the same shim stack thickness behind the bearing cup in the housing cover as before. Oil seal (Ref. Figure 5 No. 20) should be removed from cover until shimming process is completed and rotation checked to avoid damage to seal from possible repetitious disassemblies of cover.
   b. Install new gasket (Ref. Figure 5 No. 18) if required.
   c. As the capscrews (Ref. Figure 5 No. 21) holding the housing cover (Ref. Figure 5 No. 19) are being tightened, pull shaft back and

Dayton® Speed Reducers

Installation (Continued)

forth to verify end play exists. If detectable end play completely disappears before capscrews are completely tight (torqued to 10 ft. lbs.), disassemble and remove sufficient shims until, with capscrews fully tightened, shaft end play is barely detectable (0.001 to 0.004).

2. When sliding a shaft seal over a shaft extension, all sharp edges (keyways, etc.) must be protected with tape to prevent lips of oil seal from being damaged.
3. When replacing seals, they must be pressed squarely into the bore, to prevent distortion and damage.
   a. Press on metal retainer only. Lips should be towards the inside of unit.
   b. The oil seal in the bearing cap assembly (Ref. Figure 5 No. 9) is preassembled in the cap. Use bearing grease to coat seal surface on shaft for initial run and pack same grease between lips on seal and on side of seal towards inside of unit.
4. If unit has been disassembled, new gaskets may be required to prevent lubricant leakage. Both bearing cap and housing cover are assembled with a gasket. Gaskets should have shellac on one side only, due to possible repeated disassemblies to achieve the proper output shaft end play.
5. If unit has been disassembled and no parts including the gasket (Ref. Figure 5 No. 18) have been replaced, no change in the shim stack (Ref. Figure 5 No. 17) should be required unless due to wear on parts. (Check end play before disassembly).
6. When replacing bearings, care should be exercised that new bearings are pressed on straight and properly seated against the shaft shoulder or bore recess. For bearings on shafts, press on inner race only.

Cleaning

Properly selected and installed electric motors are capable of operating for long periods with minimal maintenance. Periodically clean dirt accumulations from open-type motors, especially in and around vent openings, preferably by vacuuming (avoids imbedding dirt in windings). At the same time, check that electrical connections are tight.

Lubrication

The Speed Reducer has been filled with oil at the factory. After the initial 100 hours of operation, original oil should be drained and unit refilled with new lubricant. Thereafter, drain and refill every 6 to 8 months or 2000 hours of operation, whichever occurs sooner. Lubricant should be changed more frequently for severe operating conditions. Refer to chart for proper classification of lubricant to be used at any given air temperature. Fill to level shown in Figure 3, depending on orientation.

Recommended Worm Gear Oil AGMA† Classification

Air Temp. °F	AGMA Lubricant No
15-50	7EP
50-125	8EP

(†) American Gear Manufacturer's Assoc.

Models 2Z306F thru 2Z310F

Troubleshooting Chart

Symptom	Possible Causes(s)	Corrective Action
Unit fails to operate	1. Blown fuse or open circuit breaker to motor 2. No power to motor 3. Defective motor	1. Replace fuse or reset circuit breaker 2. Contact power company 3. Repair or replace
Unit operational but no output	Defective gear(s) in reducer	Check and replace if necessary
Intermittent rotation of output shaft caused by shock load	Damaged gear assembly possibly	Replace gear and if possible, avoid shock load
Excessive noise	1. Bearings worn 2. Belt too tight 3. Overhung Load - exceeds rating and causes bearing wear 4. Cover loose due to vibration and causing excess bearing free play.	1. Replace 2. Adjust tension 3. Correct load and/or replace bearing 4. Correctly tighten cover screws to 10 ft-lbs torque

For Repair Parts, call 1-800-323-0620

24 hours a day - 365 days a year

Please provide the following information:
-Model number
-Serial number (if any)
-Part description and number as shown in parts list

Address parts correspondence to:
Grainger Parts
P. O. Box 3074
1657 Shermer Road
Northbrook, IL 60065-3074 U.S.A.

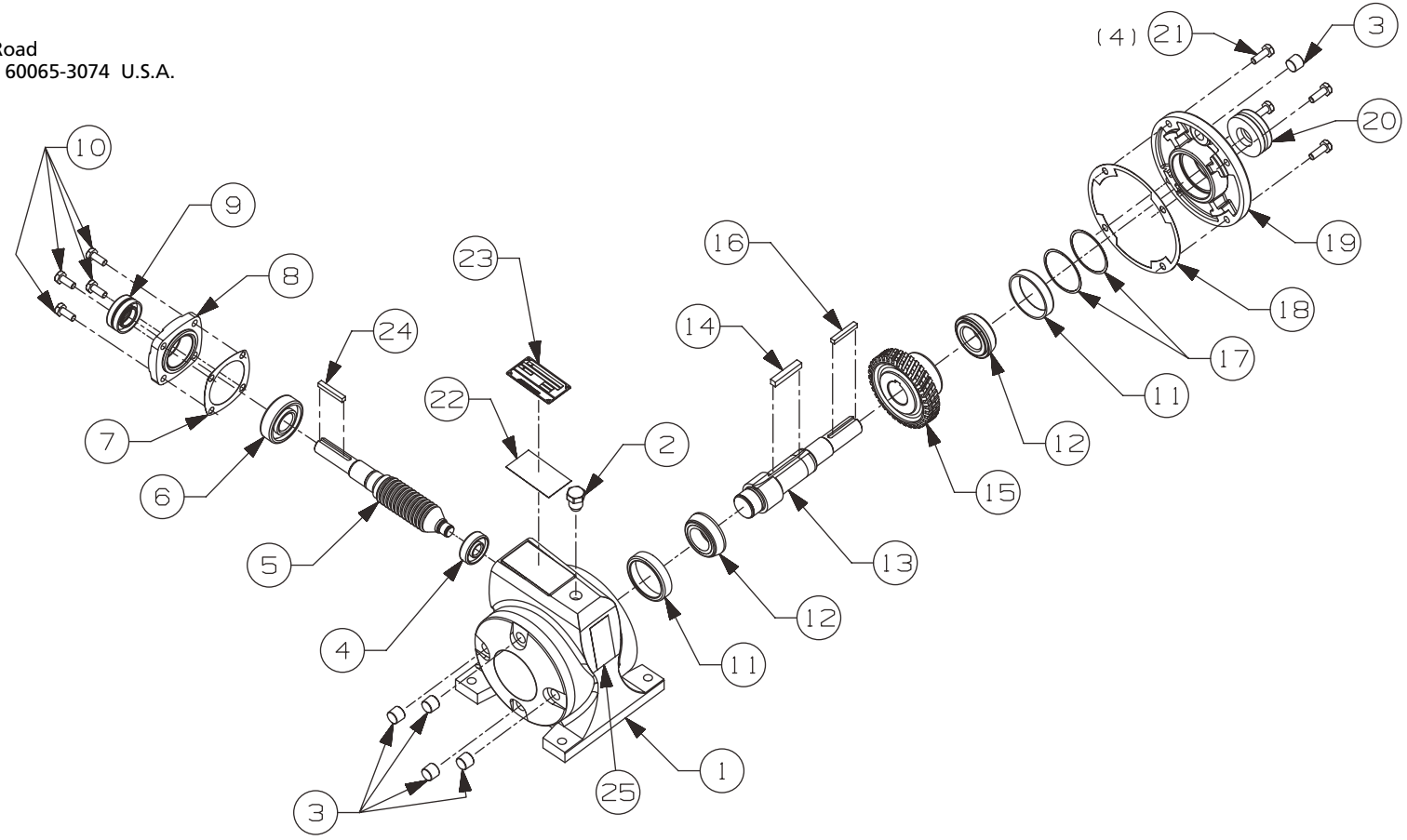


Figure 5 – Repair Parts Illustration

Repair Parts List

Reference Number	Description		Part No.	Qty
1	Gear housing		XG20-1	1
2	Vent plug		XVP-4-18M	1
3	Pipe plugs		XSHPP-4	5
4	Input ball bearing-back		XBB-12-32-10M	1
5†	Input Shaft	Model	See Kit	
	XG20-7-11 Ratio 11:1	2Z306F	84261	1
	XG20-7-18 Ratio 18:1	2Z307F	84262	1
	XG20-7-26 Ratio 26:1	2Z308F	84263	1
	XG20-7-39 Ratio 39:1	2Z309F	84264	1
	XG20-7-58 Ratio 58:1	2Z310F	84265	1
6	Input ball bearing-front		XBB-20-47-14M	1
7	Input gasket		XG20-45	1
8	Input bearing retainer		XG20-19	1
9	Oil seal-input		XOS-12-22-4	2
10	Hex head capscrew		XL420-12	4
11	Output bearing cup		L44610	2
12	Output bearing cone		L44643	2
13	Output shaft		XG20-3A	1
14	Key-worm gear		XK4-4-23.5	1
15†	Worm Gear		See Kit	
	XG20-2-11 Ratio 11:1	2Z310F	84261	1
	XG20-2-18 Ratio 18:1	2Z309F	84262	1
	XG20-2-26 Ratio 26:1	2Z308F	84263	1
	XG20-2-39 Ratio 39:1	2Z307F	84264	1
	XG20-2-58 Ratio 58:1	2Z306B	84265	1
16	Key-projecting output-XK3-3-20.5		Kit 19282	1
17	Output bearing shim		XG20-39	5
18	Cover gasket		XG20-45A	1
19	Gear housing cover		XG20-16	1
20	Oil seal-output		XOS-13-28-4	2
21	Hex head capscrews (Hsg/Cover)		XL420-12	4
22	Nameplate tape		XNP-TAPE-2	1
23	Nameplate		XNP-335	1
24	Key-projecting input-XK3-3-20.5		Kit 19282	1
25	Label-oil		XLAB-49	1
*	Anti-seize compound		XLT-1	1
*	Cover-clear 2D Label		XLAB-2D-Cover	1
*	2D Label-Blank		XLAB-2D-Blank	1

(*) Not shown

(†)Item 5 & 15 are furnished as a worm & gear kit

Dayton® Speed Reducers

LIMITED WARRANTY

DAYTON ONE-YEAR LIMITED WARRANTY*. Dayton Speed Reducers, Models covered in this manual, are warranted by Dayton Electric Mfg. Co. (Dayton) to the original user against defects in workmanship or materials under normal use for one year after date of purchase. Any part which is determined by Dayton to be defective in material or workmanship and returned to an authorized service location, as Dayton designates, shipping costs prepaid, will be, as the exclusive remedy, repaired or replaced at Dayton's option. For limited warranty claim procedures, see PROMPT DISPOSITION below. This limited warranty gives purchasers specific legal rights which vary from jurisdiction to jurisdiction.*

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PROMPT DISPOSITION*. Dayton will make a good faith effort for prompt correction or other adjustment with respect to any product which proves to be defective within limited warranty. For any product believed to be defective within limited warranty, first write or call dealer from whom the product was purchased. Dealer will give additional directions. If unable to resolve satisfactorily, write to Dayton at address below, giving dealer's name, address, date, and number of dealer's invoice, and describing the nature of the defect. Title and risk of loss pass to buyer on delivery to common carrier. If product was damaged in transit to you, file claim with carrier.*

Manufactured for Dayton Electric Mfg. Co., 5959 W. Howard St., Niles, Illinois 60714 U.S.A.