

**Parts Replacement Manual**

**For**

**Torque-Arm™**

**Speed Reducers**

**Straight Bore & Taper Bushed**

**T11**  
**T12**  
**SIZES: T13**  
**T14**  
**T15**

**WARNING:** Because of the possible danger to persons(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the instruction manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures as may be desirable or as may be specified in safety codes should be provided, and are neither provided by Baldor Electric Company nor are the responsibility of Baldor Electric Company. This unit and its associated equipment must be installed, adjusted and maintained by qualified personnel who are familiar with the construction and operation of all equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a holding device must be an integral part of the driven equipment beyond the speed reducer output shaft.



## INSTALLATION

1. On sizes T13, T14 and T15 replace the plastic plug that protects the threaded hole in the reducer housing with the eyebolt supplied with the reducer.

2. Determine the running positions of the reducer. (See Fig. 1) Note that the reducer is supplied with 7 plugs; 5 around the sides for horizontal installations and 1 on each face for vertical installations. These plugs must be arranged relative to the running positions as follows:

**Horizontal Installations** — Install the magnetic drain plug in the hole closest to the bottom of the reducer. Throw away the tape that covers the filler/ventilation plug in shipment and install plug in topmost hole. Of the 3 remaining plugs on the sides of the reducer, the lowest one is the minimum oil level plug.

**Vertical Installations** — Install the filler/ventilation plug in the hole provided in the top face of the reducer housing. Use the hole in the bottom face for the magnetic drain plug. Of the 5 remaining holes on the sides of the reducer, use a plug in the upper housing half for the minimum oil level plug.

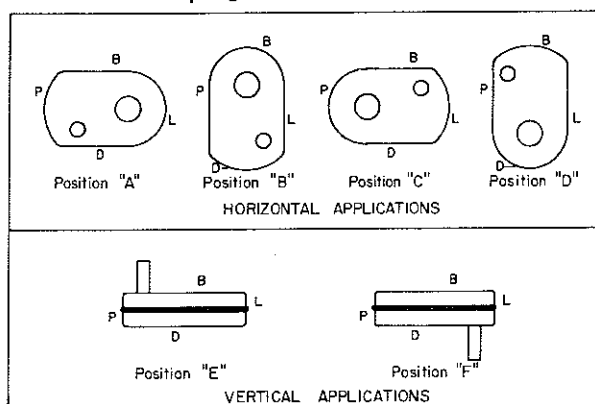


Fig. 1 — Mounting Positions

The running position of the reducer in a horizontal application is not limited to the four positions shown in Figure 1. However, if running position is over  $20^\circ$  either way from sketches, the oil level plug cannot be safely used to check the oil level, unless during the checking the torque arm is disconnected and the reducer is swung to within  $20^\circ$  of the positions shown in Figure 1. Because of the many possible positions of the reducer, it may be necessary or desirable to make special adaptations using the lubrication fitting holes furnished along with other standard pipe fittings, stand pipes and oil level gages as required.

3. Mount reducer on driven shaft as follows:

**For Straight Bore:** Mount reducer on driven shaft as close to bearing as practical. If bushings are used, assemble bushings in reducer first. A set of bushings for one reducer consists of one keyseated bushing and one plain bushing. Extra length setscrews are furnished with the reducer. Driven shaft should extend through full length of speed reducer. Tighten both setscrews in each collar.

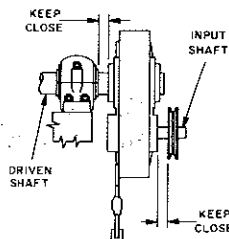


Fig. 2

**For Taper Bushed:** Mount reducer on driven shaft per instruction sheet No. 499629 packed with tapered bushings.

4. Install sheave on input shaft as close to reducer as practical. (See Fig. 2)

5. Install motor and V-belt drive so belt will approximately be at right angles to the center line between driven and input shaft. (See Fig. 3) This will permit tightening the V-belt with the torque arm.

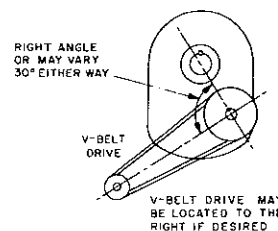


Fig. 3

6. Install torque arm and adaptor plates using the long reducer bolts. The bolts may be shifted to any of the holes on the input end of the reducer. On size T15, install the adapter plate on the opposite side from the input shaft. (See Fig. 2.)

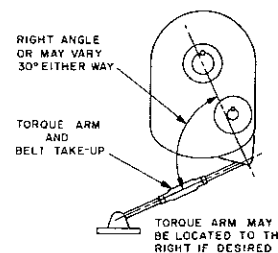


Fig. 4

7. Install torque arm fulcrum on a rigid support so that the torque arm will be approximately at right angles to the center line through the driven shaft and the torque arm anchor screw. (See Fig. 4) Make sure that there is sufficient take-up in the turnbuckle for belt tension adjustment when using V-belt drive.

## LUBRICATION

**Important:** Because reducer is shipped without oil, it is necessary to add the proper amount of oil before running. Use a high grade petroleum base, rust and oxidation inhibited (R & O) gear oil — see tables. Follow instructions on reducer nameplate, warning tags, and in the installation manual.

Under average industrial operating conditions, the lubricant should be changed every 2500 hours of operation or every 6 months, whichever occurs first. Drain re-

ducer and flush with kerosene, clean magnetic drain plug and refill to proper level with new lubricant. Caution: Too much oil will cause overheating and too little will result in gear failure. Check oil level regularly.

Under extreme operating conditions, such as rapid rise and fall of temperature, dust, dirt, chemical particles, chemical fumes, or oil sump temperatures above  $200^\circ \text{F.}$ , the oil should be changed every 1 to 3 months depending on severity of conditions.

**Table 1 – Oil Volumes**

REDUCER SIZE	Volume of Oil Required to Fill Reducer to Oil Level Plug																	
	† Position A			† Position B			† Position C			† Position D			† Position E			† Position F		
	Fluid Ounces (Approx)	Quarts <sup>▲</sup> (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts <sup>▲</sup> (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts <sup>▲</sup> (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts <sup>▲</sup> (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts <sup>▲</sup> (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts <sup>▲</sup> (Approx)	Liters (Approx)
T11	20	$\frac{5}{8}$	.59	24	$\frac{3}{4}$	.71	20	$\frac{5}{8}$	.59	24	$\frac{3}{4}$	.71	36	$1\frac{1}{8}$	1.06	44	$1\frac{3}{8}$	1.30
T12	24	$\frac{3}{4}$	.71	28	$\frac{7}{8}$	.83	28	$\frac{7}{8}$	.83	28	$\frac{7}{8}$	.83	56	$1\frac{3}{4}$	1.66	72	$2\frac{1}{4}$	2.13
T13	28	$\frac{7}{8}$	.83	48	$1\frac{1}{2}$	1.42	44	$1\frac{3}{8}$	1.30	44	$1\frac{3}{8}$	1.30	80	$2\frac{1}{2}$	2.37	100	$3\frac{1}{8}$	2.96
T14	48	$1\frac{1}{2}$	1.42	72	$2\frac{1}{4}$	2.13	68	$2\frac{1}{8}$	2.01	60	$1\frac{7}{8}$	1.77	128	4	3.79	166	$4\frac{7}{8}$	4.62
T15	108	$3\frac{3}{8}$	3.19	136	$4\frac{1}{4}$	4.02	124	$3\frac{7}{8}$	3.67	120	$3\frac{3}{4}$	3.54	248	$7\frac{3}{4}$	7.33	288	9	8.52

† Refer to Fig. 1 on page 2 for mounting positions.

▲ U. S. Measure: 1 quart = 32 fluid ounces = .94646 liters.

Note: If reducer position is to vary from those shown in Figure 1 either more or less oil may be required. Consult factory.

**Table 2 – Oil Recommendations for Average Operating Conditions**

Ratio and Output RPM	Room Temp. Fahr.	OIL		VISCOSITY	
		S. A. E. No.	AGMA Lub. No.	ASTM SUS @ 100° F.	Metric Equiv. c St @ 37.8° C.
5:1 — Up to 225 rpm	— 25° thru 60°	10W40	—	—	—
	0° thru 100°	40	4	626 to 765	135 to 165
	101° thru 180°	50	5	918 to 1122	198 to 242
5:1 — 226 rpm and Up	— 25° thru 60°	10W30	—	—	—
	0° thru 100°	30	3	417 to 510	90 to 110
	101° thru 180°	40	4	626 to 765	135 to 165

**NOTE:**

Pour point of lubricant selected should be at least 10° F. lower than expected minimum ambient starting temperature.

Extreme pressure (EP) lubricants are not recommended for average operating conditions.

Special lubricants may be required for food and drug industry applications where contact with the product being manufactured may occur. Consult a lubrication manufacturers representative for his recommendation.

Do not use oils containing slippery additives such as graphite or molybdenum disulphide in the reducer when backstop is used. These additives will destroy sprag action.

**MOTOR MOUNTS**

The motor mount must be installed on output end of reducer as shown in Figure 5. Note: The T-A motor mount is not recommended for applications requiring the use of a TRI-MATIC® Overload Release.

Remove two or three (as required) housing bolts on output end of reducer. Install back support 1 and front support 2 with new housing bolts 8. Install mounting bolts 3.

Install mounting plate 5 with adjusting studs 4 as shown in Figure 5.

Assemble one motor rail 6 by loosely bolting through the two front holes on each side of mounting plate (See Figure 5) with mounting rail bolts 7.

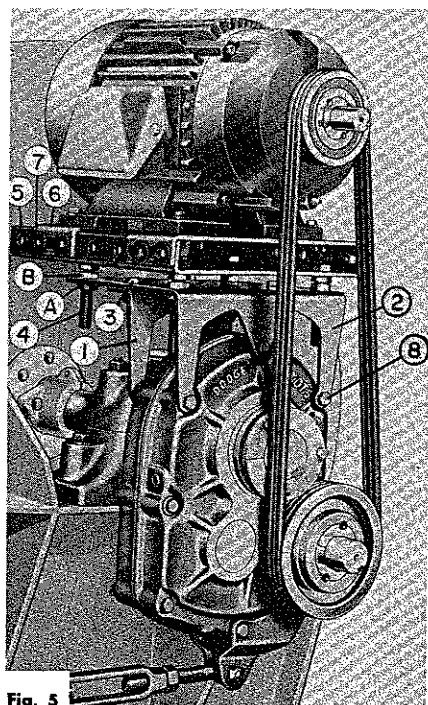
Measure the distance between front and rear mounting holes of motor. Position the rear motor rail to this distance and loosely bolt to the mounting plate.

Center the motor on the motor rails. Use a plain washer under each slot in the motor rails when the motor mounting bolts are less than  $\frac{5}{8}$ " diameter. Bolt motor snugly to motor rails.

Install motor sheave and reducer sheave on their shafts as close as possible to the motor and reducer housings. **Note:** The motor rails may be moved forward or backward from the position shown in Figure 5 to permit alignment of the V-belt sheaves. It is permissible for the front motor rail to extend beyond the mounting plate 5. Align the V-belt sheaves carefully and tighten all bolts securely.

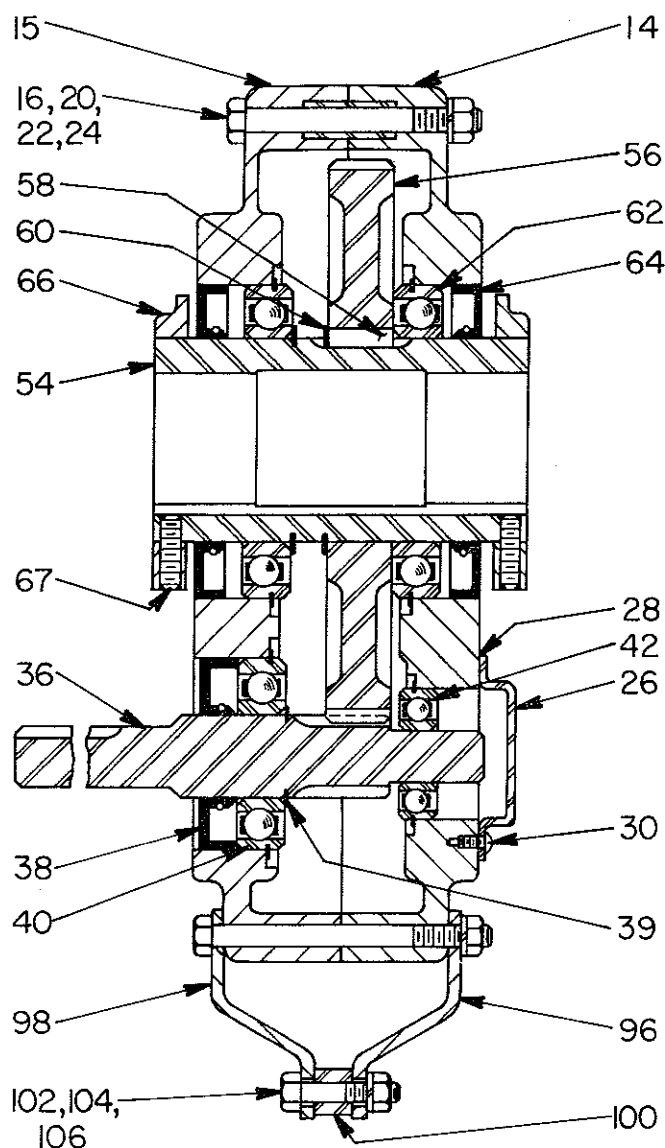
Install V-belts and adjust belt tension. Figure 5 shows the mount near the minimum belt center position. To increase the center distance, loosen the four nuts "A" on the adjusting studs and tighten the four nuts "B" alternately and evenly until the belts are properly tensioned.

Check all bolts to see that they are securely tightened.

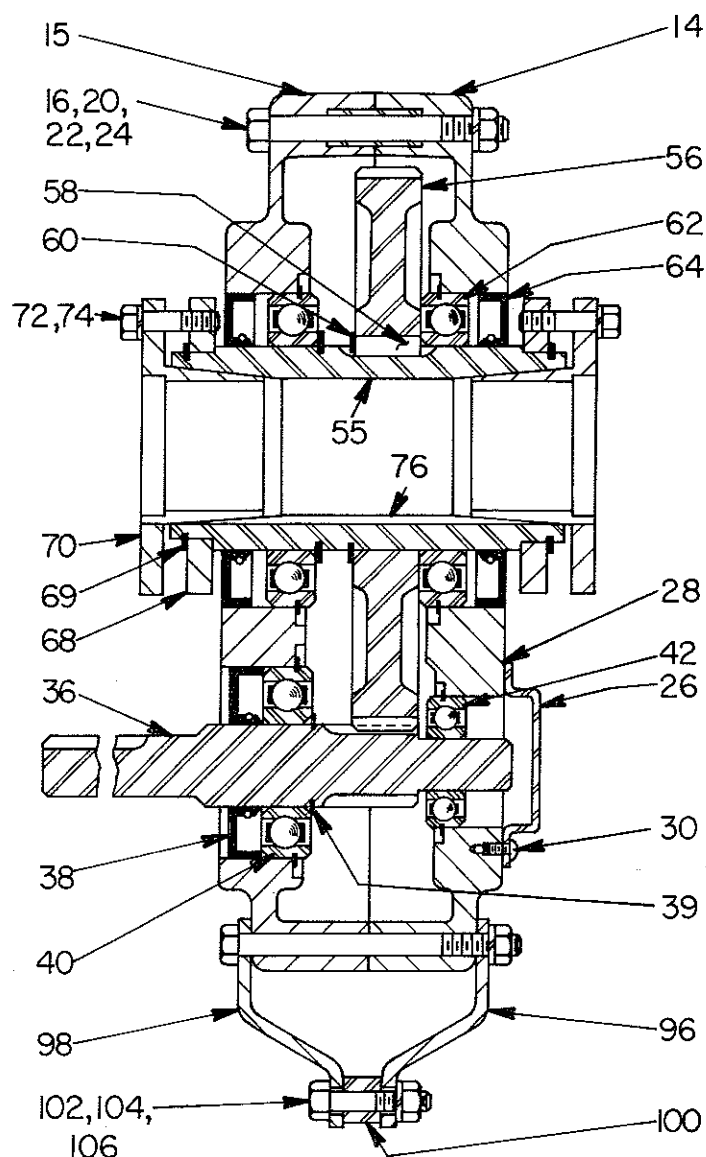
**Fig. 5**

Note: Belt guard removed for photographic purposes.

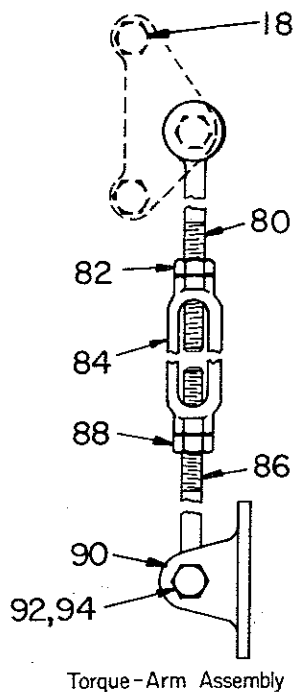
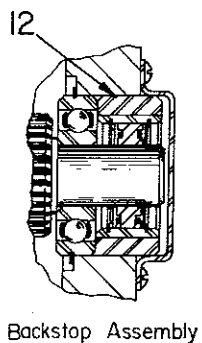
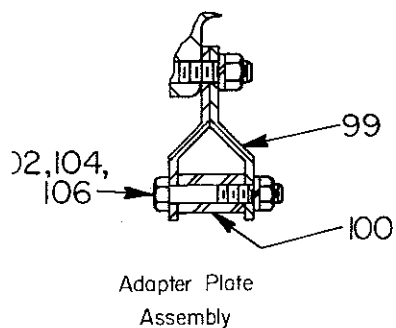
# **PARTS FOR T11 thru T15 STRAIGHT BORE & TAPER BUSHED SPEED REDUCERS**



Straight Bore



Taper - Bushed



Note: The two digit numbers are for reference only. Order parts by the six digit numbers in the Parts List. Each six digit number is a complete identification of the part or assembly:

- ★ Includes parts listed immediately below marked "▲". T11 and T15 also include two-piece housing. Bushing assembly includes 2 bushings.
- ▲ Parts marked "▲" make up the assemblies under which they are listed.
- ♣ Not shown on drawing.
- † 4 req'd. on T11; 5 req'd. on T12; 6 req'd. on T13, T14 & T15.
- ‡ 6 req'd. on T11; 7 req'd. on T12; 8 req'd. on T13, T14 & T15.
- For reducers originally supplied with gaskets only.
- ◆ Straight Bore only.
- ◇ Taper Bushed only.
- ⚙ On size — T11 for  $\frac{3}{4}$ " thru 1" bores; T12 for  $\frac{15}{16}$ " thru  $1\frac{1}{2}$ " bores; T13 for  $1\frac{1}{8}$ " thru  $1\frac{3}{4}$ " bores; T14 for  $1\frac{3}{8}$ " thru  $1\frac{7}{8}$ " bores; T15 for  $1\frac{1}{2}$ " thru  $2\frac{1}{4}$ " bores.
- ⓧ On size — T11 for  $1\frac{1}{8}$ " and  $1\frac{1}{4}$ " bores; T14 for  $1\frac{3}{8}$ " and 2" bores.
- \* Recommended spare parts.

## REPLACEMENT OF PARTS

### IMPORTANT:

Using tools normally found in a maintenance department, a Dodge Torque-Arm Speed Reducer can be disassembled and reassembled by careful attention to the instructions following.

Cleanliness is very important to prevent the introduction of dirt into the bearings and other parts of the reducer. A tank of clean solvent, an arbor press, and equipment for heating bearings and gears, should be available for shrinking these parts on shafts.

Our factory is prepared to repair reducers for customers who do not have proper facilities or who for any reason desire factory service.

The oil seals are of the rubbing type and considerable care should be used during disassembly and reassembly to avoid damage to the surface which the seals rub on.

The keyseat in the input shaft as well as any sharp edges on the output hub should be covered with scotch tape or paper before disassembly or reassembly. Also be careful to remove any burrs or nicks on surfaces of the input shaft or output hub before disassembly or reassembly.

### ORDERING PARTS:

When ordering parts for reducer specify Reducer Size No., Reducer Serial No., part name, part number and quantity.

It is strongly recommended that when a pinion or gear is replaced, the mating gear or pinion be replaced also.

If the large gear on the output hub must be replaced it is recommended that an output hub assembly of a gear assembled on a hub be ordered to secure undamaged surfaces on the output hub where the oil seals rub. However, if it is desired to use the old output hub, press the gear and bearing off and examine the rubbing surface under the oil seal carefully for possible scratching or other damage resulting from the pressing operation. To prevent oil leakage at the shaft oil seals the smooth surface of the output hub must not be damaged.

If any parts must be pressed from a shaft or from the output hub, this should be done before ordering parts to make sure that none of the bearings or other parts are damaged in removal. Do not press against outer race of any bearing.

Because old shaft oil seals may be damaged in disassembly it is advisable to order replacements for these parts.

### REMOVING REDUCER FROM SHAFT:

#### STRAIGHT BORE —

Loosen screws in both output hub collars. Remove the collar next to end of shaft. This exposes three puller holes in output hub to permit use of wheel puller. In removing reducer from shaft be careful not to damage ends of hub.

#### TAPER BUSHED —

1. Remove bushing screws.
2. Place the screws in the threaded holes provided in the bushing flanges. Tighten the screws alternately and evenly until the bushings are free on the shaft. For ease of tightening screws make sure screw threads and threaded holes in bushing flanges are clean.

3. Remove the outside bushing, the reducer and then the inboard bushing.

### DISASSEMBLY:

1. Position reducer on its side and remove all bolts. Gently tap the output hub and input shaft with a soft hammer (rawhide not a lead hammer) to separate the housing halves. Open housing evenly to prevent damage to the parts inside.
2. Lift shaft, gear, and bearing assemblies from housing.
3. Remove seals from housing.

### REASSEMBLY:

1. **Output Hub Assembly:** Heat gear to 325 to 350°F. to shrink onto hub. Heat bearings to 270 to 290°F. to shrink onto hub. Any injury to the hub surfaces where the oil seals rub will cause leakage making it necessary to use a new hub.
2. **Input Shaft Assembly:** Shaft and pinion are integral. Press bearings on shaft. Press against inner (not outer) race of bearings.
3. Drive the two dowel pins into place in the right hand housing half. Position right half of housing (as shown in drawing) on blocks to allow clearance for protruding end of output hub.
4. Place output hub assembly in housing half. Place input shaft assembly in housing half. Tap lightly with a soft hammer (rawhide not lead hammer) until bearings are properly seated in the housing. Make sure that the snap rings on the O.D. of the bearings come into contact with the housing.
5. Clean housing flange surfaces on both halves, making sure not to nick or scratch flange face. Place a new bead of gasket replacer on flange face and spread evenly over entire flange leaving no bare spots. **Note: If reducer was originally supplied with a housing gasket do not use gasket replacer. Reorder gasket per part number given in parts list.** Place other housing half into position and tap with a soft hammer until housing bolts can be used or draw housing halves together. Torque housing bolts per torque values listed below:

### Housing Bolt Torque Values

Reducer Size	Recommended Torque	Reducer Size	Recommended Torque
T11, T12 & T13	360 lb.-ins.	T14	600 lb.-ins.
		T15	900 lb.-ins.

6. Extreme care should be used in installing seals on input shaft and output hub to avoid damage to seals due to contact with sharp edges of the keyseat in the input shaft or the retaining ring groove in the output hub. This danger of damage and consequent oil leakage can be decreased by covering the keyseat and groove with scotch tape or paper which can be removed subsequently. Chamfer or burr housing bore if end of bore is sharp or rough. Fill cavity between lips of seal with grease. Seals should be pressed or tapped with a soft hammer evenly into place in the housing, applying force only on outer corner of seals. A slight oil leakage at the seals may be evident during initial running in, but will disappear unless the seals have been damaged.



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World Headquarters  
P.O. Box 2400, Fort Smith, AR 72902-2400 U.S.A., Ph: (1) 479.646.4711, Fax (1) 479.648.5792, International Fax (1) 479.648.5895  
Dodge Product Support  
6040 Ponders Court, Greenville, SC 29615-4617 U.S.A., Ph: (1) 864.297.4800, Fax: (1) 864.281.2433  
[www.baldor.com](http://www.baldor.com)

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**MN1632**  
(Replaces 499356)



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**06/30/09**