



**MODEL HVP  
(HIGH VOLUME PULSE)  
DUST COLLECTOR BAGHOUSE**

**INSTRUCTION, OPERATIONS &  
MAINTENANCE MANUAL**

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## **RECEIVING YOUR UNIT**

Prior to accepting shipment, care must be taken to inspect all equipment received both for proper count and for damage. Any and all irregularities must be noted on the carriers' copy of the shipping receipt to assist in settling any claims for damage or shortages. All equipment is shipped FOB point of origin whether on a prepaid or collect freight basis.

**ANY CLAIM FOR DAMAGE IN TRANSIT OR SHORTAGES MUST BE BROUGHT AGAINST THE CARRIER BY THE PURCHASER.**

Once your claim has been filed with the carrier contact CAMCORP to notify us of the problem(s), and then we will advise the appropriate repair procedure or recommend it to be returned to the factory depending on the extent of damage.

## **INSPECTION OF UNIT**

Housing: Particular attention should be paid to the sheet metal housing of your collector. The unit should be inspected for dents, cracks, or rips. A dented housing may seriously affect the structural integrity of the unit. If any of these signs are present, note them on the shipping receipt and notify CAMCORP immediately. The entire unit should be checked against the certified drawings for correctness and the manufacturer notified immediately if there are any discrepancies. No corrections may be made without the expressed written consent of the manufacturer.

Components: A count should be made of all pieces received and this should be verified against the carrier's manifest. Boxes should be inspected for rough handling, which may have resulted in hidden damage.

### **\*\*\* SAFETY INFORMATION \*\*\***

**WARNING!!!** - Do not attempt to operate or maintain this piece of equipment until you have read and understand all of the safety information included in the manual. This piece of equipment contains moving which can cause serious injury. If you do not understand anything in this manual seek assistance prior to operations.

**LOCKOUT-TAGOUT REQUIREMENTS** – Before installation, inspection, or servicing this equipment perform an approved lockout-tagout procedure on the electrical service, air supplies, or any other energy source. Refer to OSHA Standard 1910.147 for guidelines.

**SAFETY PRECAUTIONS** – Do not operate, inspect, or service this equipment unless all the following safety precautions are in effect:

- Guards, access doors, and covers are in place and secure.
- The equipment has been wired and grounded in accordance with all applicable codes.
- An approved lockout-tagout procedure has been followed before the equipment is inspected, disassembled, and/or serviced. The equipment is automatically controlled and may start without warning unless energy supplies are properly disconnected and locked out/tagged out.
- The control panel enclosure is closed and secured except as is necessary for service or adjustment.
- The service door is closed and secured. Do not enter filter while the system exhaust fan is operating. The airflow can pull service door closed and trap personnel inside.
- A confined space permit, if required by authorities has jurisdiction, as been obtained prior to personnel entering the unit. Check with your company's safety director for special instructions, testing prior to entry, etc. that may be required by the specific application.

**RESPONSIBILITY** – It is the owner's responsibility to maintain the safety features included with this equipment. The safety features may include, but not necessarily be limited to: guards, access doors and covers, explosions vents, warning decals, cautions decals, and advisory decals. Replacement safety features are available from the following:

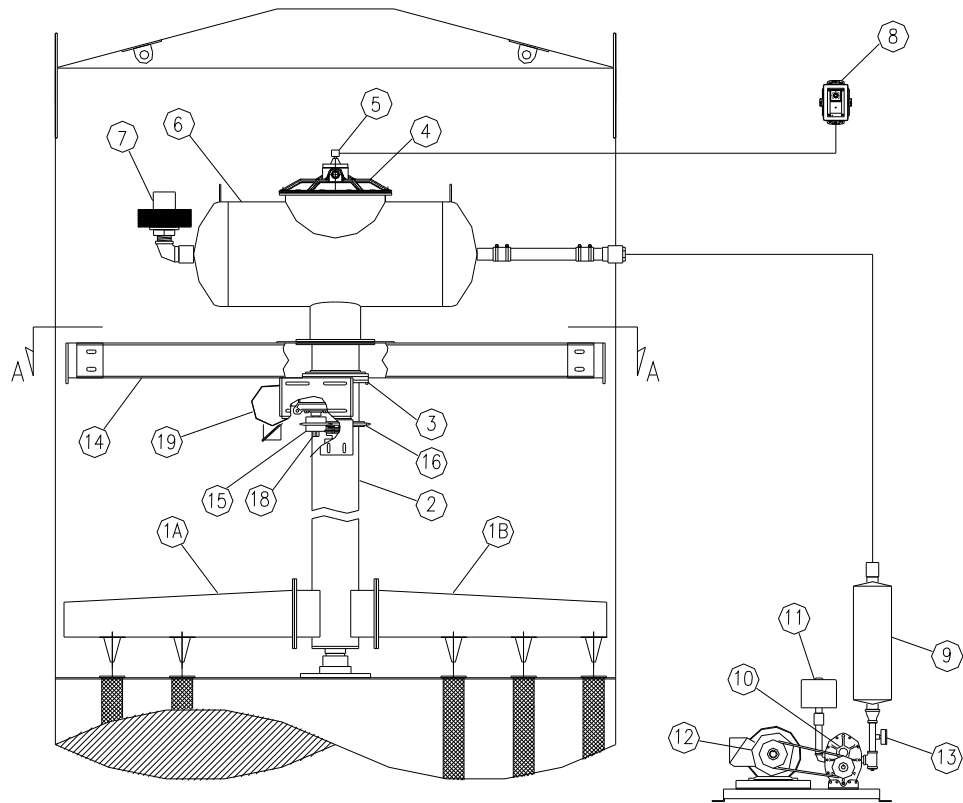
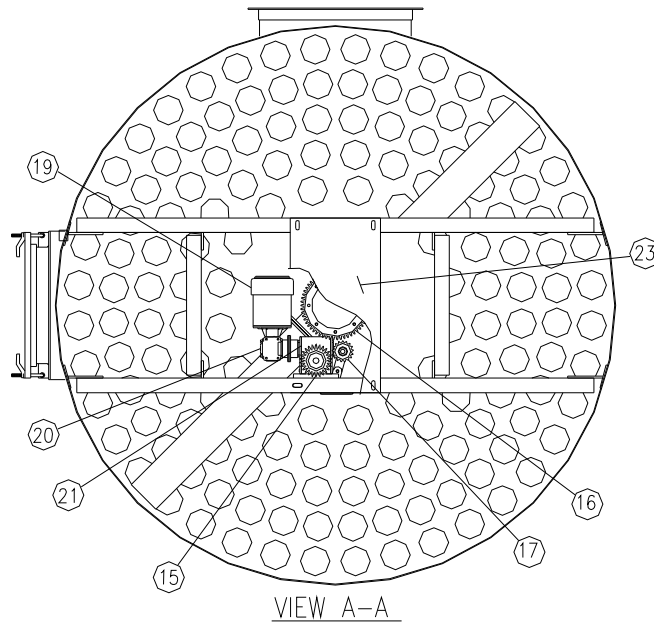
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## **OPERATION PRINCIPLE**

- A. Solids laden air or gases enter the unit at the hopper or housing inlet.
- B. Air passes through the filter media.
- C. Solids are retained on the filter media surface.
- D. Cleaning consists of a rotating pulse arm with nozzles positioned over the bags that randomly pulses 7-8" PSI air into the bags that reverses the airflow.
  - 1. This momentarily takes a row of bags off stream through pressure reversal.
  - 2. Flexing filter bags.
  - 3. Solids are released to fall towards hopper and through rotary valve or other discharge equipment.

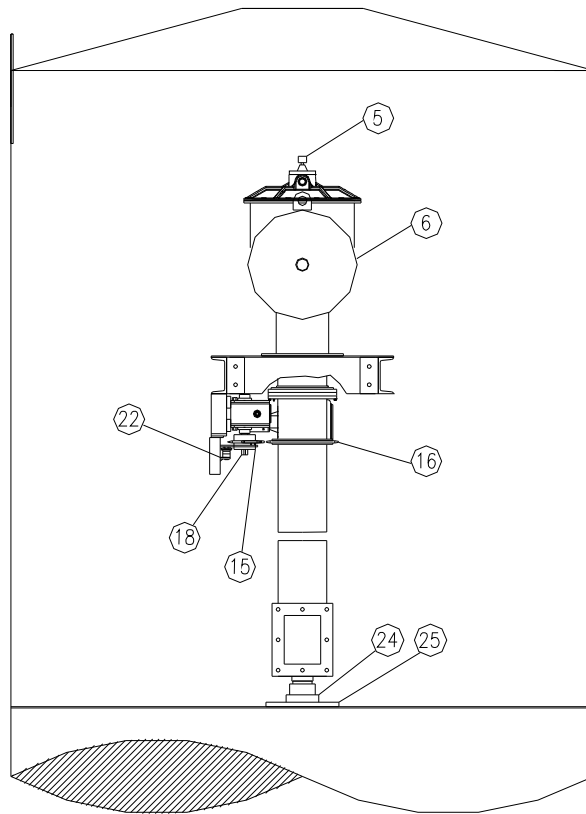
**CAMCORP HVP (High Volume Pulse) Cleaning Mechanism Components**

<b>Item</b>	<b>Quantity</b>	<b>Description</b>
1A	1	Pulse Arm (Size Determined by Model)
1B	1	Pulse Arm (Size Determined by Model)
2	1	8" OD Rotary Spool Section
3	1	8" OD Arm Rotation Support
4	1	8" Diaphragm Valve
5	1	Solenoid Valve – NEMA 4 or NEMA 9
6	1	Tank Assembly (Size Determined by Model)
7	1	2" Weighted Relief Valve
8	1	Solid State Timer
9	1	PD Pump Discharge Silencer (Size Determined by Model)
10	1	PD Pump (Size Determined by Model)
11	1	Inlet Filter (Size Determined by Model)
12	1	Motor, TEFC, 1800 RPM, 208-230/460/3/60 (Size Determined by Model)
13	1	0-15" PSI Pressure Gauge
14	2	Drive Mount Table Support Channel
15	1	50TTA2635 x 1" Sprocket & TTA35BS z 1" Torque Limiter Clutch
16	1	50A58 Drive Sprocket
17	1	Roller Chain Tensioner
18	1	206 Gearbox Drive Shaft
19	1	Motor, ½ HP, TEFC, 1800 RPM, 56C, 208-230-460/3/60
20	1	Primary Gear Reducer, 133Q56R20, 20:1 Ratio
21	1	Secondary Gear Reducer, 206Q56L40, 40:1 Ratio
22	1	Bracket Kit, 206S-BK (Secondary Reducer)
23	1	Drive Mount Support Table
24	1	4-Bolt Flange Thrust Bearing, 1 ½"
25	1	Bearing Mounting Plate



TYPICAL HVP CLEANING MECHANISM  
WITH PULSE ARM & PD PUMP PACKAGE

PD (POSITIVE DISPLACEMENT) PUMP  
\*\* SHOWN WITHOUT GUARD \*\*



## **ON SITE STORAGE RECOMMENDATIONS**

### I. Baghouse and Housing

1. Housing can be stored outside.
2. Equipment must be blocked up to keep the flanges out of the dirt.
3. Many units are supplied with a plain finish bare steel interior. If storage of more than two week is anticipated, the interior should be prime coated before storage.
4. Covering the unit with a tarp is recommended to keep the interior from rusting or corroding as well as keeping the finish in new condition. However, the tarp is not absolutely necessary.

### II. Bags & Cages

1. Bags must be stored inside a cool dry area protected from rodents and insects.
2. For extended storage the boxes for the bags should be wrapped with plastic wrap or stretch wrap to protect from moisture.
3. If the bags get wet for any reason, immediately lay them out with adequate ventilation to dry in order to prevent mold and mildew.
4. It is recommended to store the cages inside a dry area if at all possible.
5. If an inside location is not available, cages can be stored outside as long as they are covered by a tarp.
6. Cages are generally stored horizontally on pallets to keep off the ground.
7. If cages can be stored horizontally, do not stack over three boxes high.
8. If the job site is in an area that may receive a significant snow load, the cages must be stored vertically in order to prevent being crushed by the weight of the snow. Do not stack more than one box high.

### III. Accessory Parts

1. This includes all gauges, bag clamps, nylon or copper tubing, gaskets, and other ports not specifically called out.
2. These items should be stored inside a cool dry place protected from insects and rodents.

## **ON SITE STORAGE RECOMMENDATIONS (continued)**

### IV. Fan and Fan Accessories

1. Fans can be stored outside on a pallet or skid to keep out of water and dirt.
2. Equipment should be covered with a tarp to protect from the bags.
3. Fan silencers, outlet dampers, and inlet boxes should also be tarped and stored on a pallet or skid.

### V. Ducting

1. Ducting can be stored outside on a pallet or skid to keep it off the ground. It should be positioned so that water does not sit in the equipment.
2. If ducting is unpainted steel, it should be at least primed coated before storage.
3. If ducting is already finish coated, it should be tarped to protect the finish but is not absolutely necessary.

### VI. Knife Gate

1. All limit switches, solenoids, and air cylinder ports must be capped and taped to prevent any moisture or dirt from entering.
2. Equipment can sit outside provided it is covered with a tarp and is on a pallet or skid to keep it out of the water and dirt.

### VII. Isolation Dampers

1. All limit switches, solenoids, and air cylinder ports must be capped and taped to prevent any moisture or dirt from entering.
2. Equipment can sit outside provided it is covered with a tarp and is on a pallet or skid to keep it out of the water and dirt.

### VIII. Rotary Valve

1. Rotor and interior of valve should be well oiled with vegetable oil to prevent rust and to maintain compatibility with product.
2. Unit can be stored outside provided it is covered with a tarp and is on a pallet or skid to keep it out of the water and dirt.

## **ON SITE STORAGE RECOMMENDATIONS (continued)**

### IX. Butterfly (Wafer Valve)

1. All limit switches, solenoids, and air cylinder ports must be capped and taped to prevent any moisture or dirt from entering.
2. Unit can be stored outside provided it is covered with a tarp and is on a pallet or skid to keep it out of the water and dirt and sunlight.

### X. Level Indicators

- ❖ Store these items inside a cool dry area protected from rodents

### XI. AC Inverters

- ❖ Store these items and all other electrical controls inside a cool dry area protected from rodents.

## **SETTING UP YOUR UNIT**

CAMCORP dust collectors are shipped in various states of assembly depending on the size and configuration of the unit. Before attempting to move the dust collector or any of its sections, review both the certified general assembly drawing supplied with your unit and the rigging and lifting guidelines included in this manual. Become familiar with the size and number of sections to be assembled, the orientation of inlet(s), outlet(s), access door(s), and fan as well as the number and location of lifting lugs.

Dust collectors of this type are manufactured from steel sheets and are quite flexible. Therefore, even though care has been taken to maintain dimensional accuracy and squareness, some difficulty should be anticipated, and temporary bracing in the field may be required.

### **Rigging and Lifting Guidelines**

1. Do not lift the dust collector by any attachments other than the lifting lugs provided.
2. Use all of the lifting lugs provided on the dust collector, or a section of the dust collector, when making a lift.
3. If the lifting lugs are located below the roof line of the dust collector or below the top of the section of the dust collector, a vertical pull must be made to avoid crushing the top of the unit. Use spreader beams to accomplish this vertical pull.
4. Attach tag lines at several locations to be able to control the unit when lifted and to prevent spinning or swinging.
5. The dust collector should be lifted and lowered at a slow, uniform rate and not allowed to bounce or joggle since this can cause excessive impact stresses at the lift points.

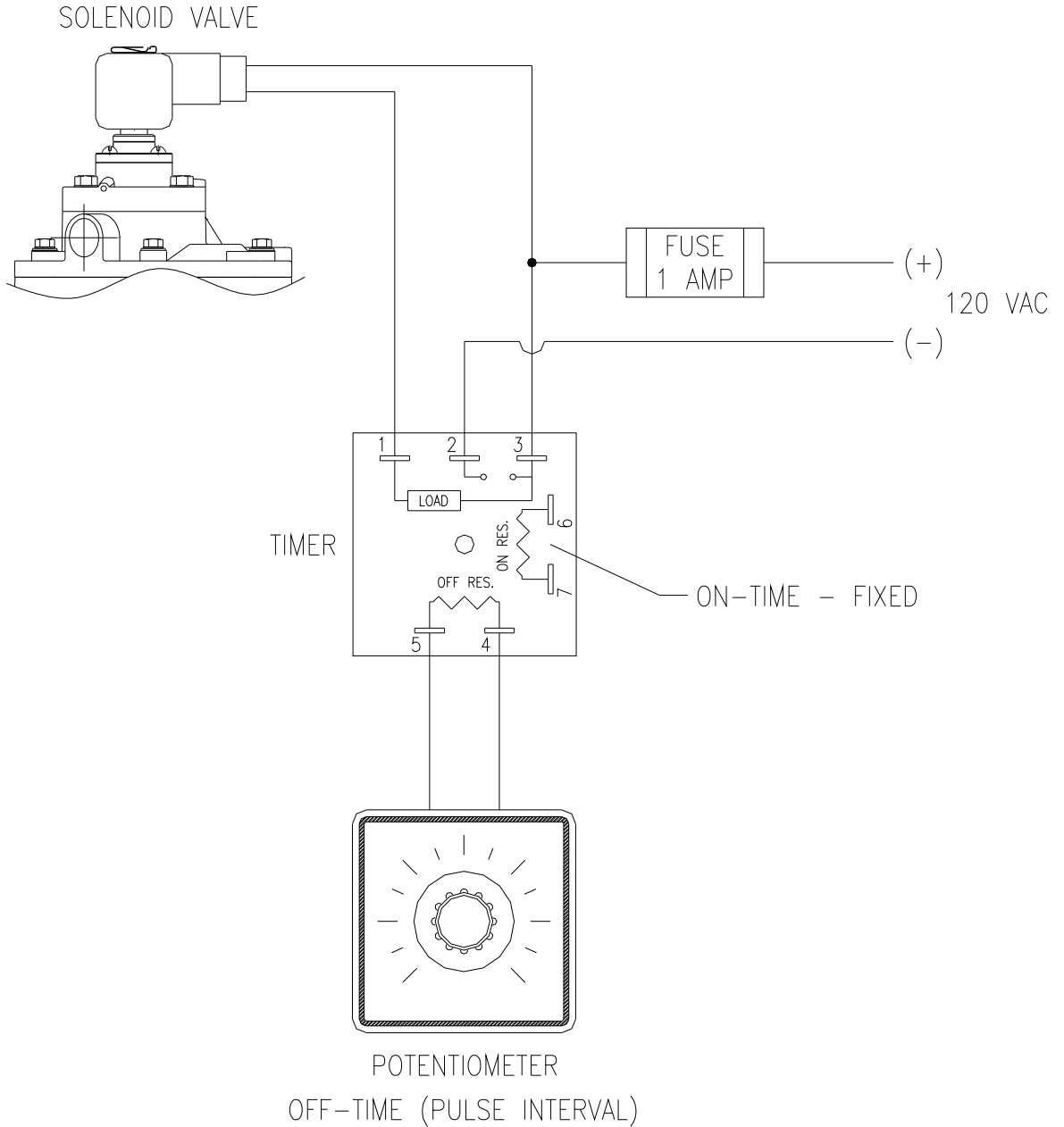
**Doors and Flanges:** Hold-downs on doors should only be hand tightened. Excessive pressure can distort the door panel itself resulting in leakage. All bolts on flanges should be tight. All holes in the dust collector must be plugged prior to start-up if not being connected.

**Platform Installation:** The platform, ladder, handrail, and bracing are to be installed as shown on the special platform detail provided. Use the part ID's to locate the parts in the proper location.

**Explosion Vents (where applicable):**

1. Figure 6 – The explosion vents are attached with a minimum of standard steel fasteners for shipment. **THESE MUST BE REMOVED** and the PVC Bolts installed that are included in the shipment. Extreme care should be exercised when installing the PVC Bolts as they are very fragile. A gasket is factory installed that will provide a seal between the vent panel and the frame. **DO NOT** use silicone sealer or any other sealer or adhesive at this joint as this will prevent the vent from operating properly.
2. The area around the vents should be clear of any personnel or obstructions to prevent injury or damage.

**Electrical:** A 120-volt, 60-Hertz, 1-Amp circuit is required to operate the dust collector's Solid State Timer. A 230/460V 3-phase circuit is required to run the Pulse Arm drive motor and the Cleaning Air PD (Positive Displacement) pump motor. **Note:** The Adjustable Timer needs to be mounting were the Pressure Gauge on the PD Pump is visible.



**Gauges:** Check the pressure differential gauge to make sure that the high-pressure tap is connected below the tube sheet and the low-pressure tap is connected above the tube sheet. Verify that the gauge have been zeroed prior to connection when it is in its permanent mounting position.

**Cleaning Air PD Pump:** The PD Pump must be install at the base of the filter to accommodate installation of the Air Supply line. Securely anchor in permanent location. Required line size as follows:

Air Supply	
Model:	Pipe Diameter
HVP48 thru 112	1"
HVP 152 thru 256	1-1/2"
HVP 312 thru 504	2"

**Auxiliary Equipment:** All auxiliary equipment must be installed according to its manufacturer's specifications and interlocked with the entire system as needed. Direction of rotation of each item must be checked prior to start-up of the entire system.

## **TOP LOAD BAG AND CAGE INSTALLATION**

1. Inspect the cage for any signs of damage, warping, bent wires, or missing welds.
2. Inspect the filter bag for any signs of mold, mildew, ripped seams, or holes.
3. Lower the closed end of the bag through the hole in the tube sheet.
4. With your hands, “kidney shape” the snap band bag top in order to fit and align it within the tube sheet hole.
5. Fit the groove of the snap band to the I.D. of the tube sheet hole and allow it to expand and audibly snap into place. If the band will not snap into place initially, do **not** push on the “dimple” as doing this will permanently damage the snap band. Instead, kidney shape the snap band from the opposite side of the band. Then you can allow the band to expand and audibly snap into place.
6. Check the fit of the snap band to the tube sheet. It should be even in height above the tube sheet around the entire circumference, which will confirm to the installer that the tube sheet is centered and well secured into the middle groove of the snap band.
7. Lower the cage into the bag and press that cage top down into the bag’s snap band I.D. When in position, the rolled flange of the cage top will rest on the tube sheet and the bag and cage assembly will be rigidly mated. The O.D. of the cage top provides a compression fit to the I.D. of the snap band.
8. Disconnect the drive chain to allow the pulse arm to rotate freely to access the holes under the arm if necessary.
9. Replace access doors and tighten accordingly. You are ready to begin start-up procedures if all other preceding tasks and hook-ups are completed.

## START-UP CHECKLIST

### 1. Installation

Make sure the unit is secured to grade. The ladder(s) and platform(s) must be tightened and set up according to OSHA requirements. Ducting and piping must be secured and routed out of the way of traffic whenever possible to avoid injury. Ducting must also be free of all debris including moisture.

### 2. Interior of the dirty air plenum

A. Make sure that the filter bag assemblies hang straight and the bottoms do **not** touch each other or any part of the collector interior. If this occurs, the bags will have holes worn in them wherever they contact and will require replacement.

B. High-level alarms should be connected sufficiently below the air inlet(s) to avoid a plugged up inlet or blinded off filter bags.

### 3. Clean air plenum

A. Properly install weights onto Weight Relief valve the end of the tank assembly.

B. All bolts on the flanges must be in place and properly tighten.

C. Verify that the pulse arm drive is properly installed.

D. Note: Gear Reducers are shipped without oil. Reference attached Manual for proper level.

### 4. Positive Displacement Pump

A. All supply air lines must be clean internally before connecting to blower.

B. Verify Inlet filter is properly installed.

C. Verify V-belt alignment and tension.

D. Note: PD pump is shipped without oil. Reference attached Manual for proper level.

E. Verify proper rotation.

5. Exterior of dust collector
  - A. Access doors, inspection ports, and relief vents should seat effectively to prevent leakage.
  - B. All bolts must be properly tightened.
  - C. Operate any equipment connected to the dust discharge of the dust collector. Check the rotation of any motor driven equipment such as rotary airlocks, horizontal unloading valves, live bottom bin activators, and screw conveyors. Check slide gates and butterfly valves for binding.
6. Explosion relief panels – shear bolt style (where applicable)
  - A. Inspect for broken or missing bolts.

## **START-UP DUST CONTROL SYSTEMS**

1. Fan or blower system
  - A. Start the fan or blower and check rotation.
  - B. Check dust pickup points for proper suction; balance airflow in individual ducts.
  - C. Check for air leakage at all flanged connections.
2. Equipment start-up sequence
  - A. Start the pulse arm drive motor (direction of rotation is not critical).
  - B. Start the PD pump motor and check rotation.
  - C. Adjust timer Off-time by watching pressure gauge on PD pump. The pressure in the tank should peak between 7-8 PSI. Increase or Decrease time to obtain the correct pressure. Note: Verify the Weighted relief valve in the clean air plenum is not activating – decrease Off-time if it is bleeding air.
  - D. Dust take away equipment such as rotary airlocks, screw conveyors, horizontal unloading valves, live bottom bin activators, and pneumatic conveying systems can now be started in their correct sequence.
  - E. Check that all access doors, hatches, ports, and other openings are closed and latched or bolted.
  - F. The main exhaust fan can now be started and brought up to speed.
  - G. Start the dust laden air through the collector. The collector should be started under partial load to allow the bags to become slowly and evenly coated with dust particles.

On pneumatic conveying systems, watch the differential pressure gauge closely for the first hour or so. If unstable, the collector discharge system may be too small for the volume it is seeing. A quick fix is to reduce the material feed until the discharge rate can be increased.

- H. Observe the manometer or magnahelic differential pressure gauge reading. As the new filter bags become coated with dust, the efficiency of the filtering action increases, and the differential pressure across the filter bags will also increase. Slowly bring the collector to full load and note the final pressure drop across the filter bags. Never allow the pressure drop across the filter bags to exceed 17" w.g. maximum or filter bags may collapse.
- I. Check the main airflow with a Pitot tube, or equivalent measuring device, to establish initial conditions. If the main airflow must be adjusted up or down to suit the process, repeat step 2-H above.

## **SHUT-DOWN PROCEDURES**

1. Dust control systems

Reverse start-up procedure, shut down fan, then after 5 or 10 minute delay, shut down the PD pump and pulse arm drive motor.

2. Pneumatic systems

Reverse start-up procedure, shut down fan, then after 5 or 10 minute delay, shut down the reverse air fan and sweep arm drive motor.

# **TROUBLESHOOTING THE DUST COLLECTOR**

## I. Excessive pressure drop across filter bags

The differential pressure gauge or manometer on your dust collector should read 6" w.g. or less. Higher readings and/or steadily increasing readings are an indication that the main airflow through the dust collector may be restricted, and a potential process problem such as poor suction at duct pickup points may exist. In extreme cases (over 17" w.g.) filter bags will be damaged. Check the following:

### A. Pressure Gauge

Check the differential pressure gauge or manometer and the tubing leading to the dust collector for proper operation. Disconnect the lines at the gauge or manometer and clear with compressed air. Look for loose fittings, cracked, broken, or pinched tubing. Make sure the gauge is zeroed or that the manometer is level, zeroed and contains the correct fluid.

### B. Bags Loaded with Dust

If the cleaning system is not operating properly refer to the section titled "Troubleshooting the Cleaning System".

A condition known as blinding. If the dust is dry, see paragraph 1-4; if the dust is wet, see paragraphs 5 and 6.

#### 1. Dust Not Discharging from the Hopper

Check hopper for over-loading or bridging across the dust discharge. Correct by repairing dust discharge equipment, replacing with higher capacity equipment, or installing hopper vibrators, etc. as required to keep the hopper clear.

#### 2. Air Flow too High

If the main airflow is too high to allow dust to drop off of the filter bags, an excessive pressure drop across the dust collector will result and dust will build up in the system. In many cases this high pressure drop in turn leads to a reduction in the main air flow so that it is necessary to remove the dust accumulation from the filter bags (and the rest of the system) before measuring the main air flow volume.

## **TROUBLESHOOTING THE DUST COLLECTOR (continued)**

Visually inspect the bags for heavy caking; if caking is evident, see the note below and take the necessary action to clean the bags. Next, measure the main airflow with a pitot tube or equivalent device and compare with the original volume for which the unit was designed. If the flow is too high, cut back the main fan to prevent a recurrence of the problem.

### 3. Particle Size and Dust Load

If possible, compare the dust particle size and loading with the original design specifications. Finer dust may cause a higher pressure drop. Do not hesitate to call the factory; we have experience with many kinds of dust.

### 4. Bags Too Tight

Bags that have shrunk on their cages may not flex sufficiently during the compressed air pulse to loosen caked dust. If the bags were cleaned or laundered, pull a bag tight around its cage; you should be able to “gather” a small fold of material between your fingers.

### 5. Water Leaks

Inspect the dust collector housing and ductwork for holes, cracks, or loose gasketing where water could enter the collector.

### 6. Condensation

If moisture has been condensing inside the collector, check the dew point temperature of the incoming air stream. It may be necessary to insulate the collector and/or the ductwork leading to the collector to keep surface temperatures above the dew point and prevent condensation of the filter bags.

**NOTE:** Collectors that have had blinded or caked bags can possibly be put into service by running the pulsing air system for 15 to 30 minutes without the main fan or blower. If the pressure drop is not lower when the main fan is started again, take the bags out of the collector and remove the caked dust by special dry-cleaning. Information pertaining to filter bag cleaning may be obtained by calling your CAMCORP sales representative.

## **TROUBLESHOOTING THE DUST COLLECTOR (continued)**

### II. Extremely Low Pressure Drop

#### A. Pressure Gauge

Check the differential pressure gauge or manometer and the tubing leading to the dust collector as in I-A of this section.

#### B. Holes in Filter Bags or Bags Incorrectly Installed.

Inspect the filter bags for holes, rips, tears, or excessive wear. Make sure that the filter bags were installed correctly according to the “Bag & Cage Installation” section.

#### C. Ductwork and Dampers

Inspect the ductwork to and from the dust collector for air leaks or blockage. Make sure that any dampers in the system are correctly positioned to allow air to flow through the dust collector.

#### D. Leaks in the Housing

Check the tube sheets (flat steel sheets from which the filter bags are suspended) and the dust collector housing for holes, cracks or loose gasketing that would permit air to bypass the dust collector or filter bags.

### III. Continuous Flow of Dust in the Clean Air Exhaust (Primary Dusting)

#### A. Holes in the Filter Bags or Bags Incorrectly Installed

Inspect the filter bags as in II-B this section.

#### B. Holes in the Tube Sheets

Check the tube sheets for holes, cracks, or loose bolts that would permit dusty air to bypass the filter bags.

### IV. Puff of dust in the clean air exhaust after each pulse (secondary dusting)

#### A. Worn filter bags

Inspect the filter bags for wear. Thin bags may not stop fine dust when flexed by a compressed air pulse.

## **TROUBLESHOOTING THE DUST COLLECTOR (continued)**

### B. Residual Dust

If dust has gotten into the clean air plenum because of a dropped or torn bag, hole in tube sheet, etc., the pulse air may stir up the dust and allow it to escape into the clean air exhaust. Residual dust may also be driven down inside the filter bags by the pulse air; if the filter bags are filled with several inches of dust, clean both the clean air plenum and the filter bags to avoid further problems.

### V. Short Filter Bag Life

This is often a complicated problem to diagnose and we recommend calling the factory for advice. The following list may be helpful in performing some preliminary check:

#### A. Temperature

Operating Temperature above the recommended limit of the filter bag material.

#### B. Chemical Attack

Bag material degrades due to attack from certain chemicals in the dust or gasses in the air stream.

#### C. High Moisture

High moisture content in the collector may cause certain filter bag material to shrink or degrade (more rapidly at elevated temperatures).

#### D. Localized abrasion

Abrasion of the bags at the dusty air inlet; a dust impingement baffle may be required.

#### E. Internal Bag Supports Gone Bad

Corroded, rusted or broken filter cages can cause excessive bag wear. Stainless steel or coated cages are available.

## **TROUBLESHOOTING THE CLEANING MECHANISM**

1. Diaphragm Valve – Pulsing Failure. The Diaphragm assembly consists of (3) components. The main diaphragm valve, the secondary diaphragm valve, and the solenoid valve. Troubleshooting recommendations as follows:
  - A. Main Diaphragm and Secondary Diaphragm:
    1. Diaphragm Valve Bleeding Air – Disassemble and inspect both diaphragms for ruptured valves or air bleed holes are restricted. (Reference attached manual) Replace with a repair kit if necessary.
    2. Verify Positive Displacement Pump is operating correctly and producing compressed air.
    3. Verify weighted relief valve is weighted correctly allowing tank to build 7-8 PSI pressure.
  - B. Solenoid Valve:
    1. Open or short circuit in wiring between timer and solenoid – Check continuity with ohmmeter or suitable tester and repair as required.
    2. Plastic plug in solenoid exhaust port - Remove and discard plug.
2. Timer – Not Operating
  - A. Check for mechanical damage.
  - B. Check the wiring from the timer to the solenoids for open or short circuits.
  - C. Replace Timer.

3. Positive Displacement (PD) Pump - Following is a list of possible Symptoms and Troubleshooting Solutions.

Symptom	Possible Causes	Possible Sources
Noisiness	Rotor-to-Rotor Contact	Rust Build up or Rotors Rotors Out of Time Excessive Pressure Ratio Failed Bearings (s) Failed Gears
	Failing Bearing (s)	Faulty Installation Non-spec Oil Contaminated Oil Insufficient Oil Improperly Mounted Sheave Over-tightened Belts
	Failing Gears	Insufficient Backlash Non-spec Oil Contaminated Oil Insufficient Oil Sever Torsional Vibration
	Failing Lubricated Coupling or Joint	Non-spec Grease Contaminated Grease Insufficient Grease
	Loose Attached Hardware	Belt Guard Pump Mounting Bracket Frame Members In/Out Piping Supports
	Air Leakage	Improper Relief Valve Setting Blown Gaskets Loose Piping Joints
	Belt Flutter	Insufficient Static Tension Sheave Misalignment Sever Torsional Vibration

Symptom	Possible Causes	Possible Sources
Poor Performance	Restricted Inlet	Clogged Filter Element Collapsed Inlet Hose
	Erroneous Pressure	Loose Gauge Connection Gauge Movement Damaged Gauge Inaccurately Calibrated
	Air Leakage	Improper Relief Valve Setting Blown Gaskets Loose Piping Joints
	Insufficient Rotor Speed	Wrong Sheave Set Wrong Motor Speed Slipping Belts
	Excessive Rotor Clearances	Abrasive Wear of Rotor Surfaces Rotor “Lag” Timed
Leaking Oil	Failed Oil Seals	Foreign Material in Seal Bores Faulty Installation Non-spec Oil Contaminated Oil Overheated Rotor Shafts
	End Cover Seams Not Tight	Bolts Loose Gaskets Torn
	Oil Foaming	Non-spec Oil Oil Cavities Overfilled
Chronic Fuse Blowing or Circuit Breaking	Excessive Motor Amperage	Excessive Pump Speed Line Voltage Drop Air Density Increase Loose Electrical Connections Foreign Material in Air Box
	Underrated Fuses  Premature Heater Strip Actuation	Unusually High Ambient Temperature Underrated Heater Strips

Symptom	Possible Causes	Possible Sources
Overheating	Excessive Pressure Ratio	Clogged Filter Element Collapsed Inlet Hose Clogged Dust Vent Filter Undersized Dust Vent Filter Clogged Diffusion Pads
	Insufficient Rotor Speed	Wrong Sheave Set Wrong Motor Speed Slipping Belts

4. Pulse Arm Drive – Motor not rotating.
  - A. Remove the motor from the gear drive and check for proper operation. If the motor does not rotate, repair or replace.
  - B. If the motor does rotate properly check for binding or roughness in the gear drive. Repair or replace one or both gear boxes as necessary.
  
5. Pulse Arm Drive – Motor rotating and sweep arm not rotating or rotating intermittently.
  - A. Enter the clean air plenum and check for obstructions in the path of the rotating pulse arm. Remove any obstructions
  - B. Verify that the pulse arm is rotating parallel to the tubesheet and that the nozzles do not strike the cage tops and cause the sweep arm to stop. If this is not the case call the factory.
  - C. Verify that the torque-limiting clutch on the small sprocket is slipping.
  - D. Verify that the chain is not binding. If it is then check the sprocket alignment.
  - E. Disconnect the drive chain. The pulse arm should rotate freely and with no binding or roughness. If binding is experienced grease the rotary union. If the binding or roughness continues inspect the bearing and replace if necessary.

## **SAFETY RECOMMENDATIONS**

Because this unit may be under pressure, do not attempt to open any device doors or panels while fans or blowers are running.

If your unit is equipped with a discharge auger or an airlock, be sure chain guards are installed before start-up and servicing is attempted only after electrical power is locked out.

While servicing the filter, it is very important that there are no open flames, welding or grinding sparks. Dust laden air could be highly explosive and extreme care must be taken.

### **Before entering any dust collector:**

1. Run cleaning mechanism 20 minutes with the fan off to clean filter bags.
2. Discharge solids from hopper.
3. Lock out electrical power on all rotating equipment.
4. On toxic operation, purge collector housing and install a blank in the inlet duct.
5. Install catwalks and safety cables.
6. Secure access doors in an open position or remove doors.
7. Use buddy system.
8. Wear a respirator.
9. Use common sense.

## **ROUTINE MAINTENANCE**

### A. Inspection

Frequency will vary as widely as there are operating conditions. In general proceed as follows:

1. Daily – Check unit differential pressure.
2. Weekly – Verify that the pulse arm drive and PD Pump are operating properly.
3. Monthly – Lubricate fan, rotary valve and screw conveyor. Check seals on latter two for dust loss.
4. Quarterly – On Top Access Units, check for dust accumulation in clean air plenum.

### B. Repairs

1. Filter bags – Generally replacement, although some applications can be laundered.
2. Rotary Valves – Usually a matter of periodic seal and blade replacement. More detailed information is supplied with the valve.
3. Screw Conveyors – Periodic replacement of “V” belts and shaft seals. Inspect hanger bearings during filter bag change. Failure will be detected by the squeal.
4. PD Pump – “V” belt tension if running rough. Make sure rotor balance is maintained.

## COMPONENT IOM MANUALS

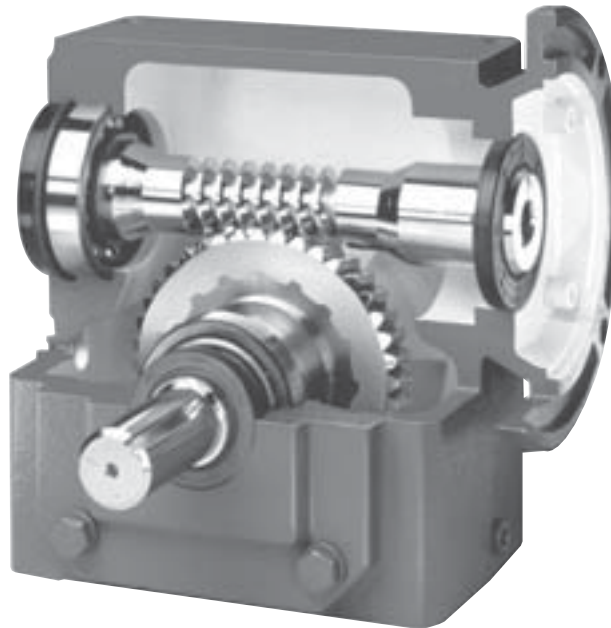
MORSE RAIDER WORM GEAR SPEED REDUCER (Maintenance).....	1-8
MARTIN TORQUE LIMITER CLUTCH .....	7-10
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**FORM**  
**8721**  
**March 2003**

**MAINTENANCE INSTRUCTIONS  
FOR WORM GEAR  
SPEED REDUCERS**



**Center Distances**

**1.33, 1.54, 1.75, 2.06, 2.37, 2.62, 3.00, 3.25  
3.75, 4.50, 5.16 and 6.00**

## INTRODUCTION

The following instructions apply to RAIDER® Worm Gear Speed Reducers. When ordering parts or requesting information be sure to provide all the data stamped on the reducer nameplate.

### EQUIPMENT REQUIRED

In addition to standard Mechanic's tools, the following equipment is required: arbor press, wheel puller, torque wrench, dial indicator, seal driver, bluing, adhesive sealant, snap ring pliers for internal and external rings.

### GENERAL INSTRUCTIONS

**Housings** - Clean external surfaces of reducer before removing seal cages and end covers to prevent dirt from falling into the unit. Record mounting dimensions of accessories for reference when reassembling. If it is necessary to remove the reducer from its operating area, disconnect all connected equipment and lift reducer from its foundation.

**Seals** - Replacement of all seals is recommended when a unit is disassembled. However, if seals are not to be replaced, protect seal lips by wrapping shaft with plastic tape coated with oil or grease before removing or replacing seal cage assembly. Clean the shaft but do not use any abrasive material on the shaft surface polished by the seal.

**CAUTION** If the reducer is painted, extreme care should be taken to mask the shaft extensions and rubber surface of the seals. Paint on the shaft adjacent to the seal or on the seal lip will cause oil leakage.

### CAPSCREW TIGHTENING TORQUES

Capscrew Size	Torque (Ft. Lbs)
1/4 - 20	6.25
5/16 - 18	13
3/8 - 16	20
7/16 - 14	35
1/2 - 13	50
5/8 - 11	90

**Table 1**

### TO CHANGE OUTPUT SHAFT DIRECTION

To change the hand of a unit from left hand to right hand, or vice versa, the following instructions apply:

1. Remove drain plug and drain oil from unit.
2. Remove end cover and seal cage capscrews; then while supporting output shaft remove end cover and shims from the unit. (The shims may be between the seal cage/end cover and housing, or between the bearing outer race and seal cage/end cover - do not remove the bearing race unless it is to be replaced).



3. Remove output shaft and seal cage together from extension side.

NOTE: Keep all shims with their respective seal cage and end cover.

4. Reassemble unit per instructions later in this manual.

### UNIT DISASSEMBLY

1. Remove **drain plug** and drain oil from unit.
2. **Low speed shaft** (gear shaft) removal:
  - A. Remove end cover and seal cage capscrews.
  - B. With a firm hold on the output extension remove end cover and shims (The shims may be between the seal cage/end cover and housing, or between the bearing outer race and seal cage/end cover - do not remove the bearing race unless it is to be replaced).
  - C. Carefully slide output shaft assembly and seal cage out extension side.
  - D. Slide seal cage off low speed shaft using caution to prevent damage to seal lips.
  - E. Wire or tie the shims to their mating end cover and seal cages. (This only applied if the shims are between the seal cage/end cover and housing). They will be available for reference when assembling the unit. Some units are factory assembled with internal shims so this note may not apply.

	<p><b>WARNING</b></p> <p>High voltage and rotating parts may cause serious or fatal injury.</p> <p>Turn off power to install or service.</p> <p>Operate with guards in place.</p> <p>Read and follow all instructions in this manual.</p>	
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**WARNING** Disconnect all before adjusting units

### 3. High speed shaft (worm shaft) removal:

#### C-Flange units **1.33 C.D. through 3.25 C.D.:**

Use a small chisel to make a groove in the stamped steel cover opposite the motor flange. Pry off the cover. Remove internal snap ring from housing bore. Remove motor flange. Using a plastic hammer, gently tap on the motor end of the shaft to feed worm shaft assembly through housing and out.

#### **3.75 C.D. through 6.00 C.D.:**

Remove motor flange. Remove seal cage opposite motor face. Keep shims with seal cage for reassembly. Remove bearing nut and washers from end opposite motor. Using a plastic hammer, gently tap the shaft on the motor end. Push shaft assembly through housing until rear bearing outer race is free. Slide bearing inner-races off the shaft and remove worm through front of housing. If a press is available, pressing the shaft out is preferable.

#### Basic units **1.33 C.D. through 3.25 C.D.:**

Use a small chisel to make a groove in the stamped steel cover opposite the motor flange. Pry off the cover. Remove internal snap ring from housing bore. Remove motor flange. Using a plastic hammer, gently tap on the extension end of the shaft, to feed worm shaft assembly through housing and out. On units with C.D. of 1.33, 1.54, 2.63, and 3.00, front bearing will remain in housing bore. Use soft tool and plastic hammer to tap bearing out extension end of housing from rear. Be sure to tap on outer-race of bearing. If a press is available, pressing this bearing out is preferable.

#### **3.75 C.D. through 6.00 C.D.:**

Remove front and rear seal cages. Keep shims with seal cages for reassembly. Remove bearing nut and washers from end opposite extension. Using a plastic hammer, gently tap the shaft on extension end. Push shaft assembly through housing until rear bearing outer-race is free. Slide bearing inner-races off shaft. Reverse direction and push shaft through extension end of housing and out. If a press is available, pressing the shaft out is preferable.

## PARTS SERVICE

1. **Housing** – Clean inside of housing with kerosene or solvent and then dry.
2. **Seal cages and end cover** – Remove dirt from joint faces, wipe clean and dry.
3. **Air vent** – Wash in kerosene, blow clean and dry.
4. **Seals** – To replace seals without dismantling reducer refer to steps C through F below. To replace seals when the entire reducer is dismantled and coupling hubs, sprockets, pulleys, pinions, keys, etc. have been removed the following instructions apply:

**Note: Replacement of all seals is recommended when a unit is disassembled.** New seals will leak if the seal lips are damaged or if seal's rubbing surface on the shaft has been altered. Protect seal lips at all times. Clean the shaft but do not use any abrasive material on the shaft surface polished by the seal.

- A. Block up seal cages and press or drive out seal.
- B. Remove old sealing compound from seal seat in cage if it is present. If a seal with rubber coating on the outside diameter is used, no sealant is necessary. If no rubber coating is on seal outside diameter, coat seal cage bore with adhesive sealant immediately before assembly.  
To prevent possible damage to seal lips, do not reassemble seals until high speed and low speed shafts have been reassembled to the housing. Then see steps E and F below.
- C. See Figures 1 through 4 – To replace seals without dismantling reducer, proceed as follows:  
Do not damage shaft; new seals will leak if seal contacting surface is marred. Use punch and place two or more holes in steel casing of seal, Figure 1. (The steel casing may be rubber coated) Insert sheet metal screws, leaving the heads sufficiently exposed so they can be pried up or grasped with pliers, Figure 2. Do not drill holes because chips may get into the unit.

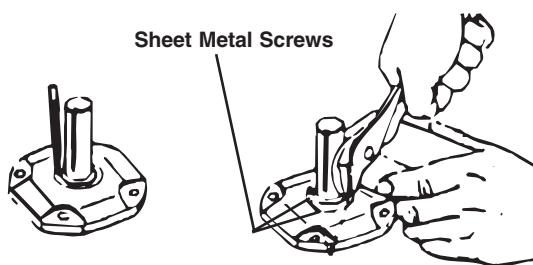


Figure 1

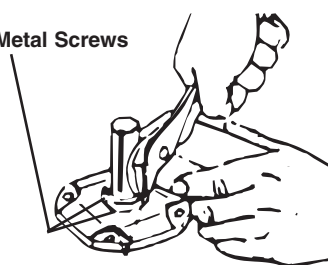


Figure 2

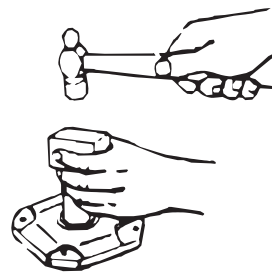


Figure 3

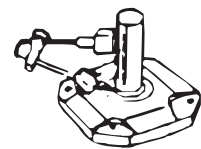


Figure 4

**⚠ WARNING** Disconnect all power before adjusting units

- D. Work seal loose. Be careful to keep all metal or dirt particles from entering unit. Remove old sealing compound from seal seat if it is present. Also remove burrs and sharp edges from shaft. Clean with rag moistened with solvent. Do not use abrasive material on shaft seal contacting surface.
- E. Protect seal lips when handling; seal leakage will result if these are damaged. If a seal with rubber coating on the outside diameter (O.D.) is used, no sealant is necessary. If no rubber coating is on seal O.D., coat seal cage bore with adhesive sealant. Coat seal lips with oil and carefully work seal into position. Before sliding seal into position, protect seal lips from shaft keyway edges by wrapping shaft with plastic tape coated with oil. Position garter spring toward the inside of the unit. Place a square faced pipe or tube against the seal O.D. and drive or press seal until fully seated as shown in Figure 3. Do not strike seal directly.
- F. For best performance, seat the seal square with shaft within .005" at 180°. Check with dial indicator as shown in Figure 4, Page 3, or with a straight edge and feelers, or square and feelers. To straighten a cocked seal, place tubing over the seal and tap the tube lightly at a point diametrically opposite the low point on the seal. Do Not strike seal directly.

5. **Bearings –**

- A. Wash all bearings per bearing manufacturers recommendations and then dry.
- B. Inspect bearings carefully and replace those that are worn or questionable.  
**Note: Replacement of all bearings is recommended.**
- C. Use a wheel puller or press to remove worm shaft bearings. Apply force to inner race only – not to cage or outer race.
- D. Use a wheel puller or press to remove taper bearing inner races.
- E. To replace tapered bearing inner races and all ball bearings, heat bearings in an oil bath or oven to maximum of 290° F (143° C). Slide high speed shaft bearings onto the oiled shaft until seated against the shoulder or snap ring of the shaft. Slide low speed shaft bearing onto the oiled shaft against the gear spacer.
- F. Thoroughly coat all bearings with lubrication oil.

6. **Worm, gear and shafts**

- A. Worm and high speed shaft – since all worms are integral with the high speed shaft, any wear or damage to the worm will necessitate replacing both.
- B. Press shaft out of bronze worm gear. To reassemble gear and low speed shaft, freeze shaft or heat gear. Do not exceed 200° F (93° C). Insert key into the shaft keyway and press shaft into oiled gear bore.  
**Note: It is advisable to replace both the worm and worm gear should either of the assemblies require replacement.**

**UNIT REASSEMBLY**

1. **Preliminary**

- A. Check to see that all worn parts have been replaced, gear and bearings coated with oil and all parts cleaned. Remove all foreign matter from unit feet. The feet must be flat and square with each other.
- B. Before starting to reassemble reducer, clean old shims or replace with new shims of equal thickness.

2. **High Speed Shaft (Worm Shaft) Assembly**

**C-Flange units**                    *1.33 C.D. through 3.25 C.D.:*

Lubricate Bearing Bores of Housing. Press bearing onto end of worm shaft flush to shoulder (or snap ring). Lock bearing onto shaft with external snap ring. Insert shaft assembly from opposite motor end into housing until seated against shoulder in bore. Lock shaft assembly into housing bore with internal snap ring. Coat outside diameter of stamped steel end cover with adhesive sealant (except, if end cover is rubber coated DO NOT use sealant) and press into input bore opposite motor flange until flush with housing.

**C-Flange units**                    *3.75 C.D. through 6.00 C.D.:*

Apply adhesive sealant to both housing input faces. Sub-assemble the two bearing inner-races onto rear of worm shaft and secure with lock nut and washers. Insert shaft assembly into rear bore of housing along with the first bearing outer-race. With plastic hammer gently tap end of shaft until bearing outer-race is seated against shoulder in housing bore. If a press is available, pressing the assemble in is preferable. Press the final bearing outer race in and install the rear seal cage. Adjust end play per instructions below (Item 3C). Install motor flange.

**Basic units**                        *1.75 , 2.06, 2.37 and 3.25 C.D.:*



Lubricate Bearing Bores of Housing. Sub-assemble the rear bearing onto worm shaft. Lock rear bearing onto shaft with external snap ring. Insert shaft assembly from opposite extension end into housing until bearing is seated against shoulder in bore. Lock shaft assembly in housing bore with internal snap ring. Coat outside diameter of stamped steel endcover with adhesive sealant (except, if end cover is rubber coated DO NOT use sealant) and press into input bore opposite extension, until flush with housing.

**1.33 , 1.54, 2.62 and 3.00 C.D.:**

Lubricate Bearing Bores of Housing. Sub-assemble the rear bearing onto worm shaft. Lock rear bearing onto shaft with external snap ring. Insert shaft assembly from opposite extension end into housing until bearing is seated against shoulder in bore. Lock shaft assembly in housing bore with internal snap ring. Press front bearing into extension side of housing until seated against shoulder or snap ring on the worm shaft. Coat outside diameter of stamped steel endcover with adhesive sealant (except, if end cover is rubber coated DO NOT use sealant) and press into input bore opposite extension, until flush with housing.

**3.75 through 6.00 C.D.:**

Apply adhesive sealant to both housing input faces. Press extension side bearing inner-race onto worm shaft. Insert worm shaft into extension side bore of housing. Hold worm shaft in place and slip bearing inner-race onto shaft until seated against shoulder. Press rear bearing outer-race into housing bore opposite extension until seal cage can be installed. Install seal cage. Adjust end play per instructions below (Item 3C).

**3. Low Speed Shaft (Gear Shaft) Assembly**

- A. Determine output shaft direction.
- B. Assemble low speed shaft assembly, seal cage, and end cover with shims on both seal cage and end cover. Torque capscrews to torques listed in Table 1. Rotate the input shaft to seat output bearings.
- C. Moving the shaft back and forth by hand, check axial float with dial indicator as shown in Figure 5. Axial float must be .0005 - .003" with .0005 being the absolute minimum. Do not preload bearings. If the axial float is not as specified, add or subtract required shims under end cover or behind bearing outer race, inside the cover, depending on the unit.
- D. Remove output shaft with seal cage and apply bluing to several teeth on the gear. Worm thread and gear teeth must be clean of oil. Reassemble output shaft and seal cage with output key facing up.
- E. Use a rag to apply hand pressure to the output shaft and rotate the high speed shaft both directions until the gear teeth with bluing have gone through gear mesh several times. Return output shaft to original position. Remove output shaft and seal cage to inspect contact. Compare with Figure 6. If contact is not correct, move assembly in the direction shown in Figure 6 by adjusting the shims. Maintain the same total shim thickness so the bearing end play is not affected. Repeat Steps D a E until contact pattern is acceptable.
- F. Recheck axial float with dial indicator.
- G. When contact pattern is correct, tighten seal cage and end cover capscrews to torques listed in Table 1.

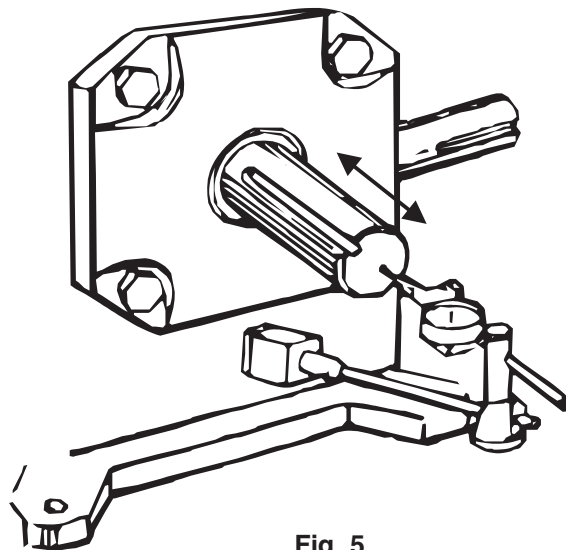
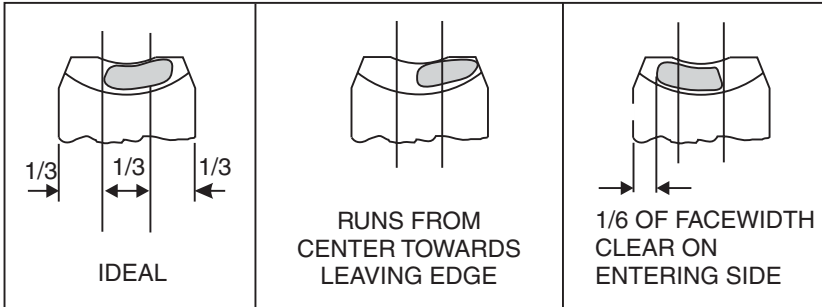


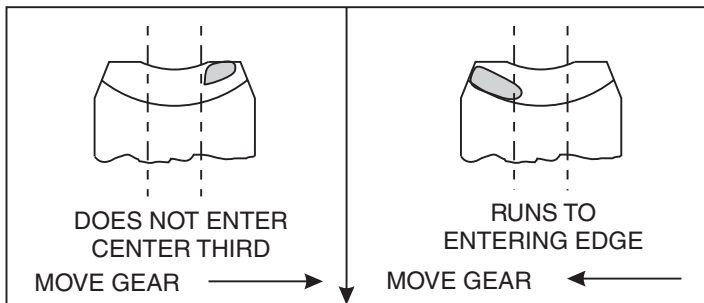
Fig. 5

**▲WARNING** Disconnect all power before adjusting units

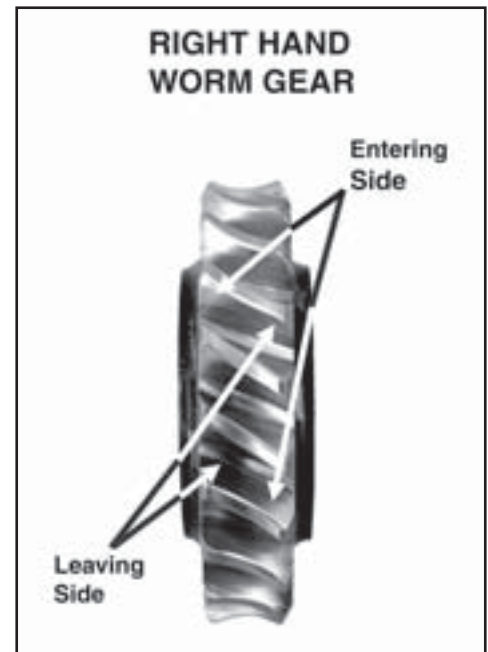
4. **Seals** - To reassemble seals to unit, see Parts Service Steps on Page 3.
5. **Motorized Coupling Adapter**  
Reassemble using the original dimensions determined under "General Instructions" on Page 2.
6. **Final Inspection**
  - A. Turn the gear train by hand as a final check.
  - B. Re-install reducer and accessories.
  - C. Fill reducer with the recommended oil to the appropriate level. See the installation instructions supplied with the reducer.
  - D. Spin test for three minutes and check for noise, leakage or rapid temperature rise.



**Fig. 6b: ACCEPTABLE**



**Fig. 6c: UNACCEPTABLE**



**Fig. 6a: Entering and Leaving Sides**

### PREVENTATIVE MAINTENANCE

1. After first week, check all external capscrews and plugs for tightness.
2. Periodically, check oil level when gears are at rest. Add oil if needed. Do not fill above the recommended level because leakage and overheating may result.

Emerson Power Transmission  
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# Martin

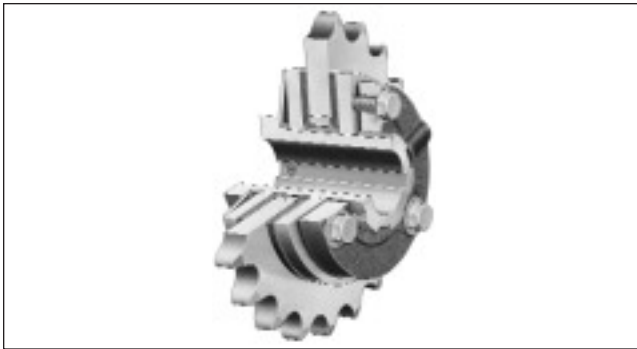
SPROCKET & GEAR, INC.

## TORQUE LIMITER CLUTCH DRIVE OVERLOAD PROTECTION



Now in Stock at All **Martin** Facilities  
Also Stock Plate Sprockets Bored to  
Size and Face Ground for Torque Limiters

**Martin TORQUE-LIMITER clutch offers thrifty overload protection that's easy to adjust.**



Here is low cost protection for your machinery . . . a torque limiting clutch that is easy to install.

Torque-Limiter clutches feature an exclusive "Easy-Set Adjustment." With "Easy-Set," torque adjustment is accomplished quickly! The need for hammer and block, brute strength and spanner wrenches is eliminated.

These simple steps and the job is done:

1. Snug up the adjusting nut, finger tight, locate set screw over nearest spline notch and tighten. See table at right.
2. Tighten three cap screws until heads bottom — with a small wrench; this gives maximum torque.
3. For less torque — back off the cap screws, loosen the set screw, back off adjusting nut to one of the six spline notches as required, and retighten set screw and cap screws.

"Easy-Set Adjustment" not only simplifies installation, it provides solid support for pressure plates by compression at their peripheries.

The Torque-Limiter clutch gives machinery permanent protection against overloads during starting, reversing or driving — by slipping at any desired load. It resumes driving without resetting when the overload is relieved. It is simple in design, compact, efficient and built for long life. It provides low cost torque limiting service for a wide variety of applications. No lubrication . . . minimum maintenance.

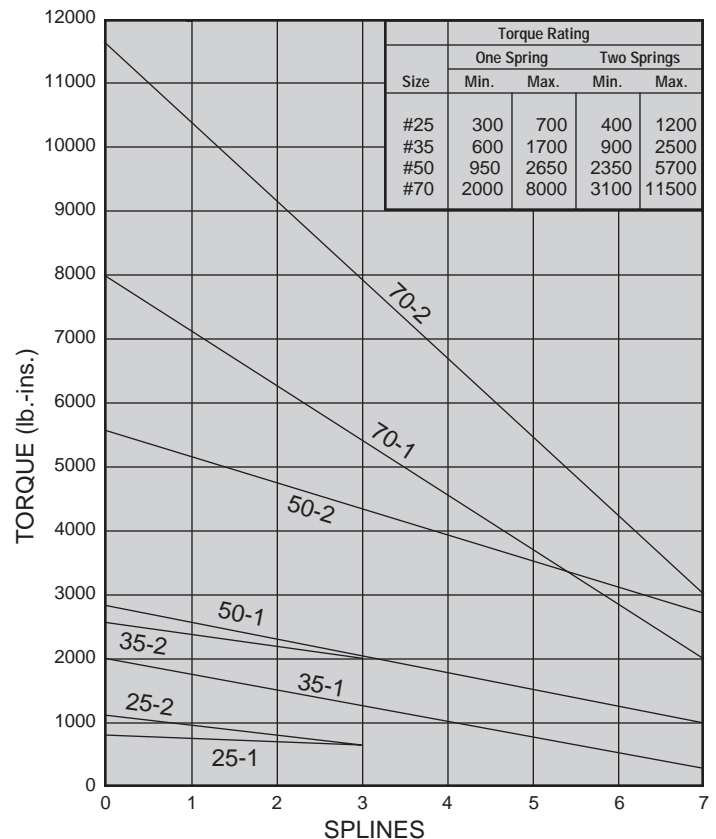
Starting shock from electric motors is a major cause of maintenance of moving parts. Torque-Limiter clutches provide a cushion by slipping until the torque drops to a pre-set level. They can be set to reduce shock loads on motors and driven equipment during reversing or inching. They provide mechanical protection against breakage due to sudden overload — by slipping when the pre-set torque limit is reached.

Torque-Limiter clutches may be used with a sprocket, gear, sheave, flange or other driven member. It is recommended that the rubbing sides of the driven member be ground to provide a smooth rubbing surface of 65 to 125 micro-inches. See torque rating table on following page.

The driven member is mounted on an oil-impregnated bushing and clamped between two, high quality friction discs by spring pressure. Each Torque-Limiter unit, completely assembled, contains one spring. Higher torque ratings can be obtained by the use of a second spring nested within the original spring. See rating table on following page.

When an overload occurs, the driven member slips between long-life, clutch-type friction discs. After slipping has started, it will continue at approximately 90% of the torque setting, due to the lower coefficient of friction when slipping, until the overload condition has been corrected.

### TORQUE-LIMITER CLUTCH CALIBRATION



**Note:**

Graph indicates approximate rated torque vs number of splines adjusting nut is backed off from finger tight.

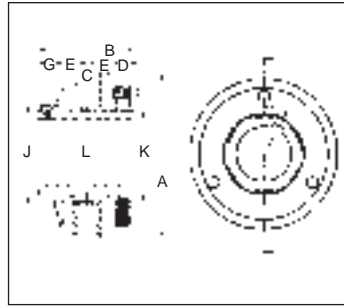
# Torque-Limiter Clutches



## TORQUE-LIMITER CLUTCHES

Each assembled unit contains one spring. Higher ratings can be obtained by ordering a second spring to nest in the original one. Bushings need to be ordered separately if required.

The rubbing sides of the center member should be ground parallel — 65 to 125 micro-inches.



Stock Plate Sprockets with Ground Face and Bored to Fit the **Martin** Torque Limiter

### UNIT TT25

Sprocket Size
35TTA25-25
35TTA26-25
40TTA20-25
40TTA22-25
40TTA24-25
40TTA28-25
40TTA30-25
50TTA17-25
50TTA21-25
50TTA22-25

### UNIT TT35

Sprocket Size
35TTA35-35
35TTA40-35
40TTA28-35
40TTA30-35
40TTA32-35
50TTA22-35
50TTA24-35
50TTA25-35
50TTA26-35
60TTA18-35
60TTA20-35

## Torque-Limiter Clutch Ratings

Size No.	Avg. Wt.	Torque Rating ▲ (Pound-Inches)				A		B		C		D	E	G	H	J	K + .000 - .002 Spline O. D.	L + .003 - .000 Spkt. Bore
		With One Spring		With Two Springs**		Min.	Max.	Min.	Max.	Min.	Max.							
		Min.	Max.	Min.	Max.													
TT25	1	300	700	400	1200	2½	1¾	¾	1½	2/16	3/16	3/16	2/16	1½	1¾	1.368	1.631/1.628	
TT35	2.5	600	1700	900	2500	3½	2½	¾	¾	3/16	3/16	3/16	3/16	3/16	1½	1.675	2.006/2.003	
TT50	6	950	2650	2350	5700	5	2½	¾	¾	5/16	5/16	5/16	5/16	4	2½	2.625	3.008/3.005	
TT70	18	2100	8000	3100	11500	7	3½	¾	1½	5/8	3/4	3/4	3/4	6	4	3.811	4.197/4.194	

▲ Using a center member with rubbing sides ground parallel — 65 to 125 micro-inches. Center member must be clean and free from oil, rust, etc.

\*\* Second spring may be nested in one originally furnished. Order if required.

◆ Nominal for maximum torque setting. For minimum torque setting, add ¼ for No. 25; ¼ for No. 35; ½ for Nos. 50 and 70. When two springs are used this dimension is increased approximately ¼" on Nos. 25, 35 and 50 — ½" on No. 70.

## Stock Bores — Torque Limiters (No KW I-SS†)

Size No.	Stock Bore	Max. Bore	
		Std. KW*	Shallow KW*
TT25	½	¾	1
TT35	¾	1¾	1¾
TT50	1	1¾	2
TT70	1¾	2¾	3

† Additional SS See List Price Alterations

\* KW To Be Cut Central w/Threaded Spline

## Standard Keyways

Torque-Limiter Bore	Keyway	Torque-Limiter Bore	Keyway
½-¾	¼ × ¼	1½-1¾	¾ × ¾
¾-1	¾ × ¾	1¾-2¼	1½ × 1½
1-1¼	1 × 1	2½-2¾	¾ × ¾
1¼-1½	¾ × ¾	3-3½	1 × 1

## Bored to Size Torque Limiters w/Std. KW & I-SS†

Size No.	Finished Bores											
	½	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½
TT25												
TT35			1									
TT50				1	1½	1¾	1¾	1¾	1¾	1¾		
TT70								1¾	1½		1¾	1¾

† KW Same as Std. Listed in Tables Above. Additional S.S. See List Price

Unit Size	Min. Allowable Sprocket Teeth and Length of Bushing Req'd for Chain Number											
	Sprocket Pitch	35	41	40	50	60	80	100	120	140	160	
TT25	Min. Teeth	STK. >	25	19	19	16	..	..	..	..	..	
	Bush. Lght. Req'd.	MTO ψ	25	19	19	16	..	..	..	..	..	
TT35	Min. Teeth	STK. >	35	25	26	21	18	15	..	..	..	
	Bush. Lght. Req'd.	MTO ψ	33	25	26	21	18	15	..	..	..	
TT50	Min. Teeth	STK. >	48	35	35	29	25	19	..	..	..	
	Bush. Lght. Req'd.	MTO ψ	46	35	35	29	25	19	..	..	..	
TT70	Min. Teeth	STK. >	..	..	48	38	33	26	21	18	16	
	Bush. Lght. Req'd.	MTO ψ	..	..	48	38	33	26	21	18	16	

★ Min. number of teeth on sprocket stocked by factory which can be used w/Torque-Limiter clutch.

ψ Min. number of teeth on made-to-order sprocket which will permit chain to clear friction disc.

\* Use one ¾" long bushing and one ½" long.

◆ Use two ½" long bushings.

### UNIT TT50

Sprocket Size
40TTA35-50
50TTA30-50
50TTA32-50
60TTA25-50
60TTA26-50
60TTA28-50
60TTA30-50
80TTA20-50
80TTA22-50
80TTA24-50

### UNIT TT70

Sprocket Size
60TTA36-70
80TTA26-70
80TTA28-70
80TTA30-70
80TTA36-70
100TTA22-70
100TTA24-70

## SPARE PARTS


TT25 TT50 TT35 TT70	QTY. REG.*
PRESSURE PLATE	2
FRICTION DISC	2
ADJ. NUT ASSY. & S.S.	1
ADJ. TENSION NUT	3
HUB	1

\* PER UNIT



## WARNING & SAFETY REMINDER

Safety must be considered a basic factor in machinery operation at all times. Most accidents are the result of carelessness or negligence. All rotating power transmission products are potentially dangerous and must be guarded by the contractor, installer, purchaser, owner, and user as required by applicable laws, regulations, standards, and good safety practice. Additional specific information must be obtained from other sources including the latest editions of American Society of Mechanical Engineers; Standard A.N.S.I. B15.1. A copy of this standard may be obtained from the American Society of Mechanical Engineers at 345 East 47th Street, New York, NY 10017 (212-705-7722).

It is the responsibility of the contractor, installer, purchaser, owner, and user to install, maintain, and operate the parts or components manufactured and supplied by  Sprocket & Gear, Inc., in such a manner as to comply with the Williams-Steiger Occupational Safety Act and with all state and local laws, ordinances, regulations, and the American National Standard Institute Safety Code.

## CAUTION

Guards, access doors, and covers must be securely fastened before operating any equipment.

If parts are to be inspected, cleaned, observed, or general maintenance performed, **the motor driving the part or components is to be locked out electrically in such a manner that it cannot be started by anyone**, however remote from the area. Failure to follow these instructions may result in personal injury or property damage.

## WARNING

### NOTE: CATALOG DIMENSIONS

Every effort is made to keep all catalog dimensions and styles current in the catalog, however from time to time, it is necessary because of manufacturing changes to alter stock products dimensionally.

If any stock product dimension or style shown in this catalog is critical to your application please consult factory for certification.

# Made-to-Order and Stock Products



## Screw Conveyor Components and Accessories



ANGLE FLANGED "U" TROUGH  
MILD STEEL AND GALVANIZED



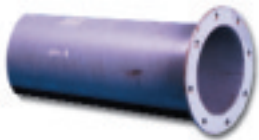
FORM FLANGED "U" TROUGH  
MILD STEEL AND GALVANIZED



SCREWS  
HOT DIPPED GALVANIZED



SPECIALS



TUBULAR HOUSING  
MILD STEEL AND GALVANIZED



TROUGH ENDS  
DISCHARGE GATE  
FLAT RACK AND PINION



WITH AND WITHOUT FEET  
MILD STEEL AND GALVANIZED



SECTIONAL FLIGHTS  
MILD STEEL



TAIL COUPLING  
AND DRIVE SHAFTS



ELEVATOR BUCKETS



HANGER STYLE 220  
HANGER STYLE 226  
MILD STEEL AND  
GALVANIZED



HANGER  
MILD STEEL AND  
GALVANIZED



STYLE 216



THRUST ASSEMBLY  
TYPE E  
WITH DRIVE SHAFT



INLETS AND DISCHARGE SPOUTS  
MILD STEEL AND GALVANIZED



SHAFT SEAL  
SPLIT GLAND



HANGER  
STYLE 70



HANGER  
STYLE 19B



TROUGH END BEARINGS  
BALL AND ROLLER



SHAFT SEAL  
COMPRESSION TYPE  
PACKING GLAND



SHAFT SEAL  
WASTE PACK



SHAFT SEAL  
PLATE



SHAFT SEAL  
FLANGED PRODUCT  
DROP-OUT



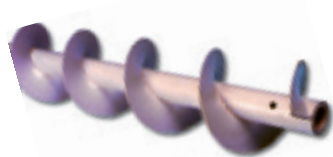
HANGER BEARINGS  
STYLE 220/226  
Martin HARD IRON  
Martin BRONZE  
NYLATRON  
WOOD - GATKE



HANGER BEARINGS  
HARD IRON  
UHMW  
WOOD  
GATKE



SADDLES AND FEET



HELICOID SCREWS  
RIGHT HAND AND LEFT HAND  
MILD STEEL AND GALVANIZED



HELICOID FLIGHTING  
RIGHT HAND AND LEFT HAND  
MILD STEEL AND GALVANIZED.

For more information about

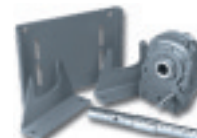
# Martin

and our other quality products,  
join us at our web site

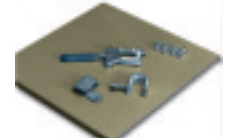
[www.martinsprocket.com](http://www.martinsprocket.com)



SCREW CONVEYOR DRIVE  
WITH ACCESSORIES

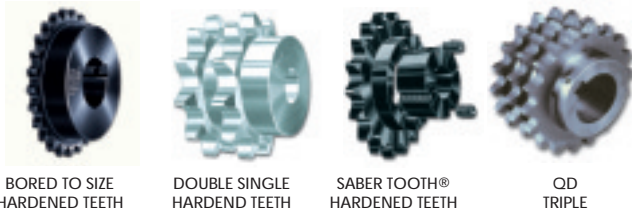


SPEED REDUCER  
SHAFT MOUNTED  
WITH ACCESSORIES.



FLANGED COVER  
WITH ACCESSORIES

### All Steel Stock Sprockets



BORED TO SIZE  
HARDENED TEETH

DOUBLE SINGLE  
HARDENED TEETH

SABER TOOTH®  
HARDENED TEETH

QD  
TRIPLE

### Stock Bushings/Hubs



BUSHINGS TYPE QD  
STEEL WITH KEYSEAT  
SIZE SF-N

TAPERED  
BUSHING

QD IDLER  
BUSHING

### Stock Gears/Steel and Cast

Spur Gears - Stocked in both 14-1/2° & 20° Pressure Angles



SPUR TYPE B

SPUR 3 DP

GEAR RACK

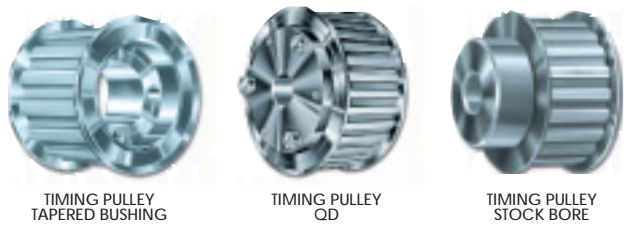
BEVEL

MITER

WORM GEAR

WORM

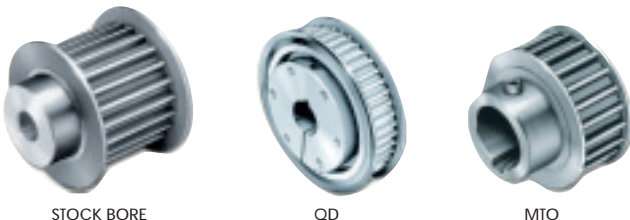
### Stock Timing Pulleys



TIMING PULLEY  
TAPERED BUSHING

TIMING PULLEY  
QD

TIMING PULLEY  
STOCK BORE



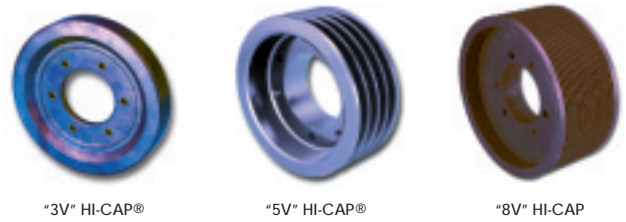
STOCK BORE

QD

MTO

Martin's NEW HTS (HIGH TORQUE SPROCKETS)

### Stock QD V-Belt Sheaves



"3V" HI-CAP®

"5V" HI-CAP®

"8V" HI-CAP

### Stock Tapered Bushed V-Belt Sheaves



CONVENTIONAL C SECTION  
TAPER BUSHED

"3V" HI-CAP®  
TAPER BUSHED

CONVENTIONAL B SECTION  
TAPER BUSHED

### Stock Couplings/Covers



RUBBER ELEMENT  
Martin-FLEX®  
STOCK BORE

ROLLER CHAIN  
STOCK BORE

JAW

COUPLING  
COVERS

FINISHED BORE

"QD"

SC SPACER

TPR ELEMENT

Martin's NEW QUADRA-FLEX® COUPLING

### Stock Sintered Metal and Sintered Steel Products.



HANGER BEARINGS.



Extensive stockyards of screws are available for quick shipment.



A broad inventory of equipment ensures prompt worldwide delivery.



Quality material and an experienced staff means a rapid turnaround for you, our customer.

## SERVICE CENTERS WORLDWIDE

### USA

#### General Offices Sales and Manufacturing

**Arlington, TX**  
3100 Sprocket Drive 76015-2898  
P.O. Box 91588 • Arlington, Texas 76015-0088  
817-258-3000 (FAX 817-258-3333)

#### Sales and Manufacturing

**Danielsville, PA**  
3376 Delps Road 18038  
P.O. Box 267 • Danielsville, PA 18038-0267  
610-837-1841 (FAX 610-837-7337)

#### Ft. Worth, TX (Conveyor Division)

3600 McCart Street (76110-4692)  
P.O. Box 1038 • Ft. Worth, TX 76101-1038  
817-258-3000 (FAX 817-258-3173)

#### Mansfield, TX

811 4th Avenue 76063  
P.O. Box 193 • Mansfield, TX 76063-0193  
817-473-1520 (FAX 817-473-0465)

#### Montpelier, OH

350 Airport Road 43543  
P.O. Box 29 • Montpelier, OH 43543-0029  
419-485-5515 (FAX 419-485-3565)

#### Sacramento, CA

1199 Vine Street 95814-0426  
P.O. Box 13856 • Sacramento, CA 95853-3856  
916-441-7172 (FAX 916-441-4600)

#### Scottdale, GA

3303 Church Street 30079-1395  
P.O. Box 886 • Scottdale, GA 30079-0886  
404-292-8744 (FAX 404-292-7771)

#### Ft. Worth, TX (Tool & Forge Division)

3600 McCart Street 76110-4692  
P.O. Box 1038 • Ft. Worth, TX 76101-1038  
817-258-3000 (FAX 817-258-3173)

#### Mini Manufacturing Centers

**Boston, MA**  
357 Fortune Boulevard  
Milford, MA 01757  
508-634-3990 (FAX 508-634-3998)

**Charlotte, NC**  
3901 South I-85 Service Road 28208  
Box 19447 • Charlotte, NC 28219-0447  
704-394-9111 (FAX 704-394-9122)

**Chicago, IL**  
1505 Birchwood Avenue 60018-3001  
P.O. Box 1307 • Des Plaines, IL 60017-1307  
847-298-8844 (FAX 847-298-2967)

**Denver, CO**  
10800 East 54th Avenue 80239  
P.O. Box 39208 • Denver CO 80239-0208  
303-371-8466 (FAX 303-371-7116)

**Houston, TX**  
9910 Bent Oak Drive 77040  
P.O. Box 41209 • Houston, TX 77241-1209  
713-849-4330 (FAX 713-849-4807)

**Kansas City, MO**  
1520 N. Commerce Avenue 64120  
P.O. Box 4961 • Kansas City, MO 64120-4961  
816-231-5575 (FAX 816-231-1959)

**Los Angeles, CA**  
5920 S. Triangle Dive  
Commerce, CA 90040-3688  
323-728-8117 (FAX 323-722-7526)

**Minneapolis, MN**  
10601 Hampshire Avenue South  
Bloomington, MN 55438-2395  
952-829-0623 (FAX 952-944-9385)

**Portland, OR**  
3030 N.W. Industrial  
Portland, OR 97210-0046  
503-223-7261 (FAX 503-221-0203)

**Tampa, FL**

3201 Queen Palm Drive Tampa FL 33619  
813-623-1705 (FAX 813-626-8953)

#### Wayne, NJ

7 High Point Drive 07470-7432  
P.O. Box 527 • Wayne, NJ 07474-0527  
973-633-5700 (FAX 973-633-7196)

#### Manufacturing Only

**Abilene, TX**  
**Clarksville, TX**  
**San Angelo, TX**  
**Paragould, AR (Includes the Plastics Div.)**

### CANADA

#### Sales and Manufacturing

**Martin Sprocket & Gear Canada Inc.**  
896 Meyerside Drive  
Mississauga, Ontario, Canada L5T 1R9  
905-670-1991 (FAX 905-670-2110)

**Martin Sprocket & Gear Canada Inc. (Conveyor Division)**  
Box C3, RR #1  
Ayr. Ontario, Canada NOB IEO  
519-621-0546 (FAX 519-621-4413)

### CHINA

**Hong Kong**  
**Shanghai**  
**Fuzhou**  
**Chengdo**

### MEXICO

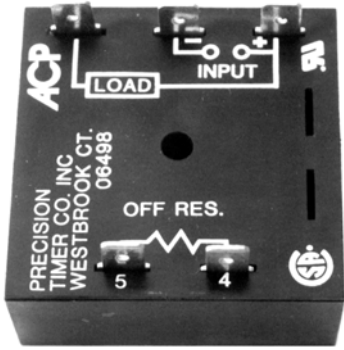
#### Sales and Manufacturing

**Martin Sprocket & Gear de Mexico, S.A. de C.V.**  
Km 52.8 Carretera, Naucalpan-Toluca  
Parque Industrial, Toluca 2000  
Calle 3, Manzana VII, Lote 11  
Toluca Edo. de Mexico, C.P. 50200  
011-52-72-790023 (FAX 011-52-72-790024)

*Sold by the World's Greatest Sales People. Our Distributors.*

**Martin SPROCKET & GEAR, INC.** 3100 SPROCKET DR. • ARLINGTON, TX 76015 • 817-258-3000

**Martin** Products are made in North America. For more information, contact your nearest **Martin** Distributor or Service Center.



# TIMING MODULE



FULLY SOLID STATE ENCAPSULATED  
ONE AMPERE LOAD RATING

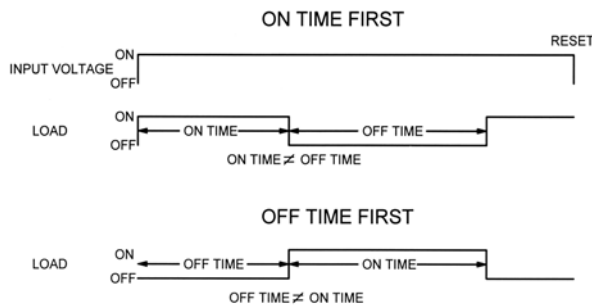
## Series 606 - PROGRAMMABLE RECYCLE CMOS DIGITAL CIRCUITRY

- Life Expectancy –unlimited
- Environment Protected
- Tamper Proof
- No False Operate
- Small Size – 2"x 2" x 53/64"
- Lightweight – approximately 2.5 oz.
- Rugged

Application of power simultaneously initiates timing and turns the load ON. The load remains ON for the preset ON time period after which it turns OFF for the preset OFF time period. The ON/OFF cycling continues until power is removed. Removal of power at any point in the cycle will cause reset to T = To. The unit is available with the OFF time first, see the TIMING DIAGRAM and the table below.

Control the timing of valves, SFHP motors, lamps, relays, magnetic line starters, and actuators rated less than 1 ampere (10 amps inrush). CMOS digital circuitry, with solid state output switching. P/C boards and internal components are encapsulated in a flame retardant molded housing, fitted with quick connect wiring terminals. Available in all standard voltages and frequencies. Fixed or adjustable timing from .1 seconds to 24 hours.

### TIMING DIAGRAM



### SPECIFICATIONS

1. Repeat Accuracy:  $\pm 0.1\%$  or 16 ms. Whichever is greater
2. Combined Effect of Temperature and Voltage upon Repeat Accuracy: 1%
3. Reset Time: 150 ms.
4. Operating Voltage Tolerance:  $\pm 20\%$
5. Load Current: Steady State – 8 ma. Min., 1 Ampere Max., 10 A Inrush
6. Voltage Drop: 1.5V Typical at 1 Ampere
7. Leakage Current: 5 ma.
8. Dielectric Strength: 1500 VRMS
9. Insulation Resistance: 100 Megohms Min.
10. Input Transient Protection: 3000V 120V UNITS, 6000V 240V units
11. Temperature Ambients: Operating -40°C to +70°C, Storage -55°C to +70°C
12. Humidity-Operating: 95% Relative
13. Linearity (Option A or D):  $\pm 5\%$  Minimum from 10% to 90% of range
14. Timing Tolerance:  $\pm 9\%$  + Tolerance of Rt Std.,  $\pm 5\%$  Special (Fixed)

### HOW TO ORDER

606 – (T1) (T2) (V) (P1) (P2)

606R (T1) (T2) (V) (P1) (P2)

SERIES	(T1) = ON TIME	(T2) = OFF TIME	(V)=VOLTAGE	OPTIONS (P1) = ON TIME, (P2) = OFF TIME
<b>606</b> ON FIRST	P = 0.1 - 5 SEC.	P = 0.1 - 5 SEC.	1 = 12VDC	O - CUSTOMER SUPPLIES OWN POTENTIOMETER OR RESISTOR A - POTENTIOMETER SUPPLIED AS LOOSE PART *B - EXTERNALLY INSTALLED RESISTOR *C - FACTORY FIXED INTERNAL D - TRIMMER POTENTIOMETER INSTALLED ON TERMINALS R - INTERNAL POTENTIOMETER WITH THRU SHAFT S - INTERNAL POTENTIOMETER WITH SCREWDRIVER SLOT
	1 = 0.1 - 10 SEC.	1 = 0.1 - 10 SEC.	2 = 24VDC	
L = 0.2 - 20 SEC.	L = 0.2 - 20 SEC.	3 = 48VDC		
J = 0.3 - 30 SEC.	J = 0.3 - 30 SEC.	4 = 24VAC		
M = 0.6 - 60 SEC.	M = 0.6 - 60 SEC.	5 = 120VAC		
2 = 1 - 100 SEC.	2 = 1 - 100 SEC.	6 = 240VAC		
K = 1.2 - 120 SEC.	K = 1.2 - 120 SEC.			
F = 2 - 180 SEC.	F = 2 - 180 SEC.			
E = 3 - 300 SEC.	E = 3 - 300 SEC.			
3 = 10 - 1000 SEC.	3 = 10 - 1000 SEC.			
4 = 0.1 - 10 MIN.	4 = 0.1 - 10 MIN.			
G = 0.3 - 30 MIN.	G = 0.3 - 30 MIN.			
H = 0.6 - 60 MIN.	H = 0.6 - 60 MIN.			
5 = 1 - 100 MIN.	5 = 1 - 100 MIN.			
V = 3 - 300 MIN.	V = 3 - 300 MIN.			
6 = 10 - 1000 MIN.	6 = 10 - 1000 MIN.			
D = 1 - 24 HRS.	D = 1 - 24 HRS.			
<b>606R</b> OFF FIRST				

*\* For Fixed Time Specify The Value In Seconds, Minutes, Or Hours*

**MADE IN USA**

**EXAMPLE P/N: 606-3250C/240S** This is an PROGRAMMABLE RECYCLE 1A Rated Solid State Timer with a 10-1000 second ADJUSTABLE ON TIME and a fixed 240 second OFF TIME. The INPUT VOLTAGE of 120 VAC. The OFF TIME is FACTORY FIXED INTERNAL calibration. The customer will supply the ON TIME adjust potentiometer or resistor

### AMERICAN CONTROL PRODUCTS

A DIV. OF PRECISION TIMER CO., INC.  
47 WESTBROOK INDUSTRIAL PARK ROAD  
WESTBROOK, CT. 06498

PHONE: (860)399-6253  
EMAIL: info@precisiontimer.com

FAX: (860)399-5619  
Web Site: precisiontimer.com

### TECHNICAL BULLETIN

### SOLID STATE TIMING MODULE

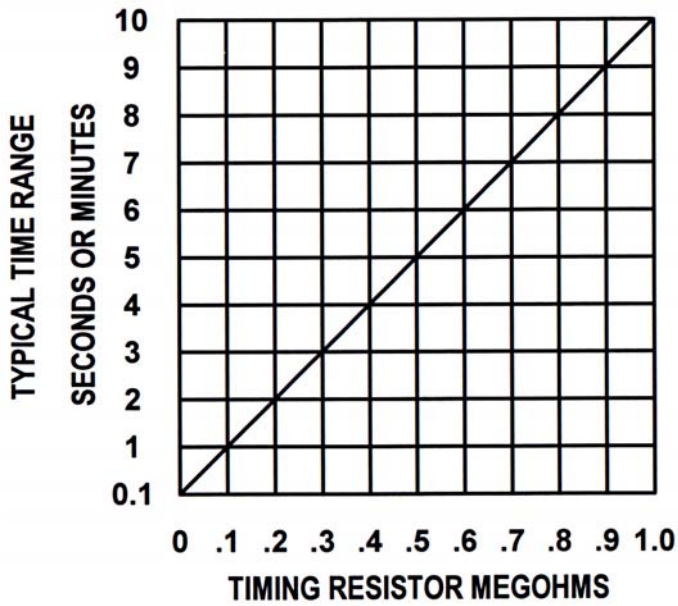
PAGE 1  
OF 2

DATE  
6-4-01

**606**

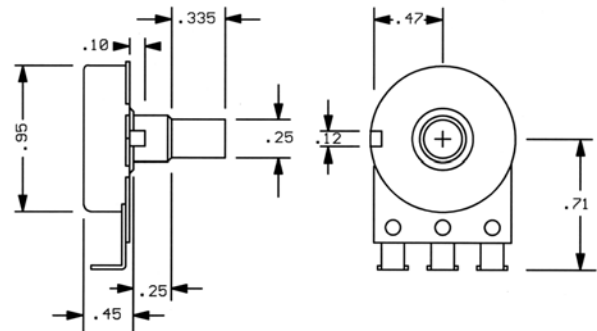
REV  
B

## CALIBRATION RESISTANCE VS TIME

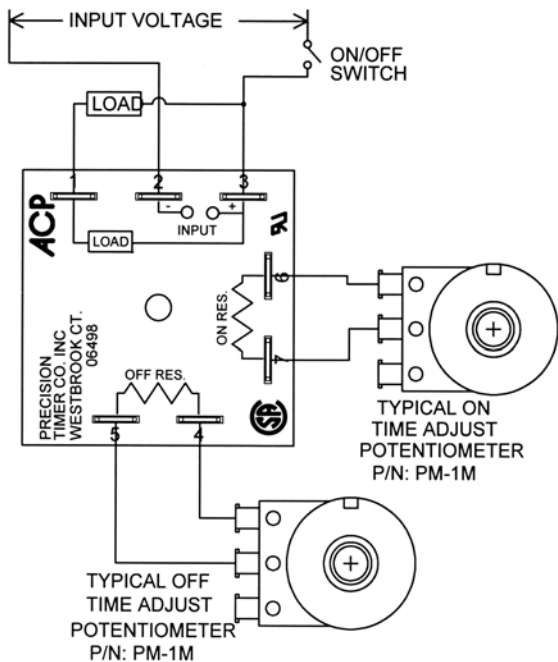


## ACCESSORIES – AVAILABLE FROM STOCK

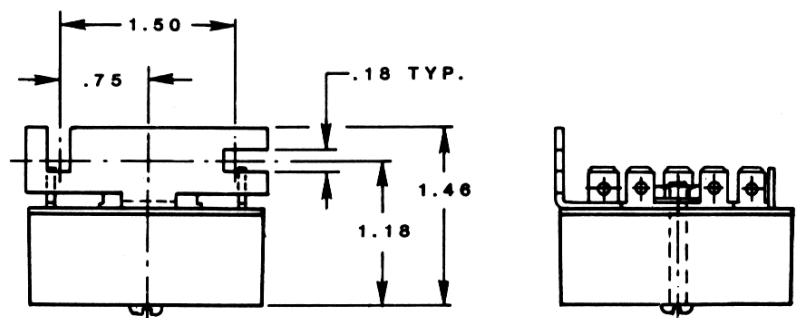
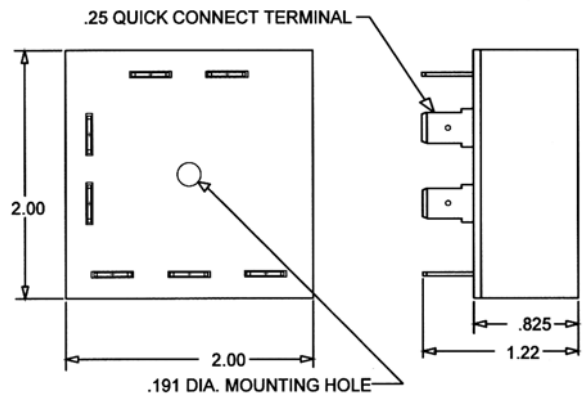
ORDER P/N: **PM – 1M 1 MEGOHM ± 20%**  
**PM – 100K 100 KOHM ± 20%**



## TYPICAL WIRING



## OUTLINE DRAWING



Order bracket mount model as: **606BM – (T1) (T2) (V) (P1) (P2)**  
**606RBM (T1) (T2) (V) (P1) (P2)**

**MADE IN USA**

## AMERICAN CONTROL PRODUCTS

A DIV. OF PRECISION TIMER CO., INC.  
 47 WESTBROOK INDUSTRIAL PARK ROAD  
 WESTBROOK, CT. 06498

PHONE: (860)399-6253  
 EMAIL: info@precisiontimer.com

FAX: (860)399-5619  
 Web Site: precisiontimer.com

## TECHNICAL BULLETIN

## SOLID STATE TIMING MODULE

PAGE 2  
 OF 2

DATE  
 6-4-01

**606**

REV  
 B



**PARTS LIST  
OPERATING AND  
SERVICE MANUAL**



**SERIES: 30 & 70  
BLOWERS**

Models:  
GGB\_\_B  
GGG\_\_C\_

**D-9-610  
Version 10  
November, 2005**

**MAINTAIN BLOWER RELIABILITY AND PERFORMANCE  
WITH GENUINE DUROFLOW PARTS AND SUPPORT SERVICES  
FROM GARDNER DENVER**

Factory genuine parts, manufactured to design tolerances, are developed for optimum dependability --- specifically for your blower. Design and material innovations are born from years of experience with hundreds of different blower applications. When you specify factory genuine parts you are assured of receiving parts that incorporate the most current design advancements . . . manufactured in our state-of-the-art blower factory under exacting quality standards.

Your **AUTHORIZED DISTRIBUTOR** offers all the backup you require. A worldwide network of authorized distributors provides the finest product support in the blower industry.

Your **AUTHORIZED DISTRIBUTOR** can support your blower investment with these services:

1. Trained parts technical representatives to assist you in selecting the correct replacement parts.
2. Complete inventory of new machines and new, genuine factory parts.
3. A full line of factory tested AEON™ PD Synthetic Blower Lubricants specifically formulated for optimum performance in all blowers.
4. Authorized Distributor service technicians are factory-trained and skilled in blower maintenance and repair. They are ready to respond and assist you by providing fast, expert maintenance and repair services.

**For the location of your local authorized DuroFlow blower distributor refer to the yellow pages of your phone directory, check the Web site at [www.gardnerdenver.com](http://www.gardnerdenver.com) or contact:**

**Gardner Denver  
1800 Gardner Expressway  
Quincy, IL 62305  
Phone: (217) 222-5400  
Fax: (217) 221-8780**

**REMANUFACTURED BLOWERS**

Whenever a DuroFlow blower requires replacement or repair, Gardner Denver offers an industry unique, factory remanufactured blower exchange program. From its modern Remanufacturing Center in Indianapolis, IN, Gardner Denver is committed to supplying you with the highest quality, factory remanufactured DuroFlow blowers that are guaranteed to save you time, aggravation and money.

**Immediately Available**

Repair downtime costs you money, which is why Gardner Denver maintains a large inventory of remanufactured blowers at all times, ready for immediate delivery.

**Skilled Craftsmen**

Our Remanufacturing assembly technicians average over 20 years experience with air compression products.

**Precision Remanufacturing**

All potentially usable parts are thoroughly cleaned, inspected and analyzed. Only those parts that can be brought back to original factory specifications are

remanufactured. Every remanufactured DuroFlow blower receives a new overhaul kit: bearings, seals, sleeves and gaskets.

**Extensive Testing**

Gardner Denver performs testing that repair houses just don't do. Magnaflux and ultrasonic inspection spot cracked or stressed castings, monochromatic light analysis exposes oil leaks, coordinate measurement machine inspects to +/- .0001", and slip and hot run testing insure that all remanufactured DuroFlow blowers meet factory performance specifications.

**Latest Technology**

Factory remanufactured DuroFlow blowers incorporate all of the latest new blower design improvements.

**Warranty**

Gardner Denver backs up every remanufactured blower with a new warranty . . . 18 months from purchase, 12 months from service.

Gardner Denver remanufactured air ends deliver *quality without question . . . year in and year out.*

## **GARDNER DENVER LUBRICANT ORDER INFORMATION**

Re-order Part Numbers for Factory-Recommended Lubricants.

### **AEON PD Synthetic Lubricant or AEON PD-Food Grade Synthetic Lubricant**

#### **AEON PD Synthetic Lubricant**

<b>Description</b>	<b>Part Number</b>
1 Quart	28G23
Case/12Quarts	28G24
5 Gallon Pail	28G25
55 Gallon Drum	28G28

#### **AEON PD-Food Grade Synthetic Lubricant**

<b>Description</b>	<b>Part Number</b>
1 Quart	28H97
Case/12Quarts	28H98
5 Gallon Pail	28H99
55 Gallon Drum	28H100

**Call your local DuroFlow Distributor to place your order for Gardner Denver lubricants. Your Authorized Gardner Denver Distributor is:**

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## FOREWORD

Duroflow<sup>®</sup> blowers are the result of advanced engineering and skilled manufacturing. To be assured of receiving maximum service from this machine, the owner must exercise care in its operation and maintenance. This book is written to give the operator and maintenance department essential information for day-to-day operation, maintenance and adjustment. Careful adherence to these instructions will result in economical operation and minimum downtime.

### **DANGER**

**Danger is used to indicate the presence of a hazard which will cause severe personal injury, death, or substantial property damage if the warning is ignored.**

### **WARNING**

**Warning is used to indicate the presence of a hazard which can cause severe personal injury, death, or substantial property damage if the warning is ignored.**

### **CAUTION**

**Caution is used to indicate the presence of a hazard which will or can cause minor personal injury or property damage if the warning is ignored.**

### **NOTICE**

**Notice is used to notify people of installation, operation or maintenance information which is important but not hazard-related.**

## SAFETY PRECAUTIONS

Safety is everybody's business and is based on your use of good common sense. All situations or circumstances cannot always be predicted and covered by established rules. Therefore, use your past experience, watch out for safety hazards and be cautious. Some general safety precautions are given below:

### **DANGER**

Failure to observe these notices could result in injury to or death of personnel.

- **Keep fingers and clothing away** from blower inlet and discharge ports, revolving belts, sheaves, drive coupling, etc.
- **Do not use the air discharge** from this unit for breathing - not suitable for human consumption.
- **Do not loosen or remove** the oil filler plug, drain plugs, covers, or break any connections, etc., in the blower air or oil system until the unit is shut down and the air pressure has been relieved.
- **Electrical shock** can and may be fatal.
- **Blower unit must be grounded** in accordance with the National Electrical Code. A ground jumper equal to the size of the equipment ground conductor must be used to connect the blower motor base to the unit base.
- **Open main disconnect switch**, tag and lockout before working on the control.
- **Disconnect the blower** unit from its power source, tag and lockout before working on the unit - the machine may be automatically controlled and may start at any time.

### **WARNING**

Failure to observe these notices could result in damage to equipment.

- **Stop the unit** if any repairs or adjustments on or around the blower are required.
- **Disconnect the blower** unit from its power source, tag and lockout before working on the unit - the machine may be automatically controlled and may start at any time.
- **Do not exceed** the rated maximum speed shown on the nameplate.
- **Do not operate unit** if safety devices are not operating properly. Check periodically. Never bypass safety devices.

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## DUROFLOW BLOWERS - 30 & 70 SERIES MATRIX/MENU

NOTICE TO CUSTOMER - To find the construction options for your blower unit, FILL IN THE BALANCE OF LETTERS OR NUMBERS FROM YOUR UNIT NAMEPLATE  
COLUMN NUMBER:

	G	G									
	1	2	3	4	5	6	7	8	9	10	11

FOLLOW THE LINE DOWN AND OVER FROM EACH SPACE THUS FILLED IN TO FIND THE APPROPRIATE CONSTRUCTION OPTION WITH WHICH YOUR MACHINE IS EQUIPPED.

COLUMN 1 - BASIC DESIGNATOR \_\_\_\_\_

COLUMN 2 - PRODUCT FAMILY \_\_\_\_\_  
G. INDUSTRIAL BLOWER

COLUMN 3 - GEAR DIAMETER \_\_\_\_\_  
B. 3" - 30 Series      G. 7" - 70 Series

COLUMN 4 - CASE LENGTH \_\_\_\_\_

	30 Series	70 Series
A.	4"	9"
B.	6"	12"
C.		15"
D.		18"
E.		23"
F.		28"

COLUMN 5 - CONSTRUCTION \_\_\_\_\_

- A. VERTICAL-TOP HAND-CENTRAL TIMED
- B. VERTICAL-BOTTOM HAND-CENTRAL TIMED
- C. HORIZONTAL-LEFT HAND-CENTRAL TIMED
- D. HORIZONTAL-RIGHT HAND-CENTRAL TIMED
- \* E. SCHRAMM: VERTICAL-TOP HAND-CENTRAL TIMED

COLUMN 6 - DESIGN VERSION \_\_\_\_\_

- B. 30 SERIES
- C. 70 SERIES

COLUMN 7 - ADDITIONAL DESCRIPTION \_\_\_\_\_

- A. STANDARD, NO MODIFICATION

COLUMNS 8 THRU 11 - MODIFICATION NUMBER \* \_\_\_\_\_

\* NOT INCLUDED IN THIS PUBLICATION, CONSULT FACTORY.

## **INTRODUCTION**

### **YOUR KEY TO TROUBLE FREE SERVICE**

---

Thank you for investing in DuroFlow quality. The DuroFlow reputation for rugged dependability has been earned by over 70 years of service in demanding, industrial operations where downtime cannot be tolerated and efficient blower performance is expected.

Your DuroFlow blower is a precision engineered blower that has been carefully manufactured and thoroughly tested at the state-of-the-art Gardner Denver Blower Factory in Sedalia, Missouri.

As with other precision machinery, there are several relatively simple installation, operation and maintenance

procedures that you must observe to assure optimum blower performance. There is no guesswork in the manufacture of your highly advanced DuroFlow blower and there must be none in preparing the blower to get the job done in the field.

The purpose of this manual is to help you properly install, operate and maintain your DuroFlow blower. It is essential that you review all sections of this manual in preparation for installing your blower. Follow the instructions carefully and you will be rewarded with trouble-free DuroFlow service . . . year in and year out.

# SECTION 1 GENERAL INFORMATION

---

## INSPECTION

Before uncrating, check the packing slip carefully to be sure all the parts have been received. All accessories are listed as separate items on the packing slip, and small important accessories such as relief valves can be overlooked or lost. After every item on the packing slip has been checked off, uncrate carefully. Register a claim with the carrier for lost or damaged equipment.

The inlet and discharge openings are fitted with protective covers to prevent dirt and moisture from entering the blower during shipping and installation.

### NOTICE

**Do not remove and dispose of the covers until final checking and installation.**

Covers are lined with a "Corrosion Inhibitor" which will inhibit rust for a period of six months. Retain covers for use in reshipment or relocation of the unit.

Temporarily remove the protective covers and inspect interior of air chamber for foreign material or heavy rusting. Turn driveshaft to assure that lobes rotate smoothly without binding. New blowers may be difficult to turn by hand due to friction of the air seals. Once in motion however, there should be no indication of interference between the rotors and the housing or end-plates. Report any suspected mechanical problems immediately to your authorized DuroFlow distributor.

## REMOVING PROTECTIVE MATERIALS AT START-UP

Blower inlet and discharge are temporarily capped to keep out dirt and other contaminants during shipment. These covers must be removed before start-up.

### WARNING

**Failure to remove covers from blower inlet and discharge prior to start-up will cause machine damage.**

## STORAGE

Your DuroFlow blower was packaged at the factory with adequate protection to permit normal storage for up to six (6) months. Under the best of storage conditions there is still a potential for damage to occur. Extended storage preparation is available from the factory, prior to shipment, at a small additional charge. If the unit is to be stored under adverse conditions or for extended periods of time, additional measures should be taken to prevent unwarrantable damage.

1. Store the blower in a clean, dry area.
2. Make certain inlet and discharge air ports are tightly covered to prevent foreign material from entering the air chamber.
3. All exposed, non-painted surfaces should be protected against rust and corrosion.
4. Make sure all vent breathers are in place.
5. Provide adequate protection to avoid accidental mechanical damage.
6. In high humidity or corrosive environments, additional measures may be required to prevent rusting of the internal surfaces. Mist spraying the impellers and air chamber with a rust preventative will protect these surfaces from rusting. To prevent rusting of gears and bearings, add one pint of VCI oil in each oil reservoir. (Ref. Part Number 28H280 per quart)
7. Rotate shaft by hand weekly to prevent bearings from taking a set and to keep seals soft.

### CAUTION

**Before running the blower, drain the oil and replace to the proper operating level with clean, fresh lubricant.**

### WARNING

**Rotating components will cause severe injury in case of personal contact. Keep hands away from blower inlet and discharge ports.**



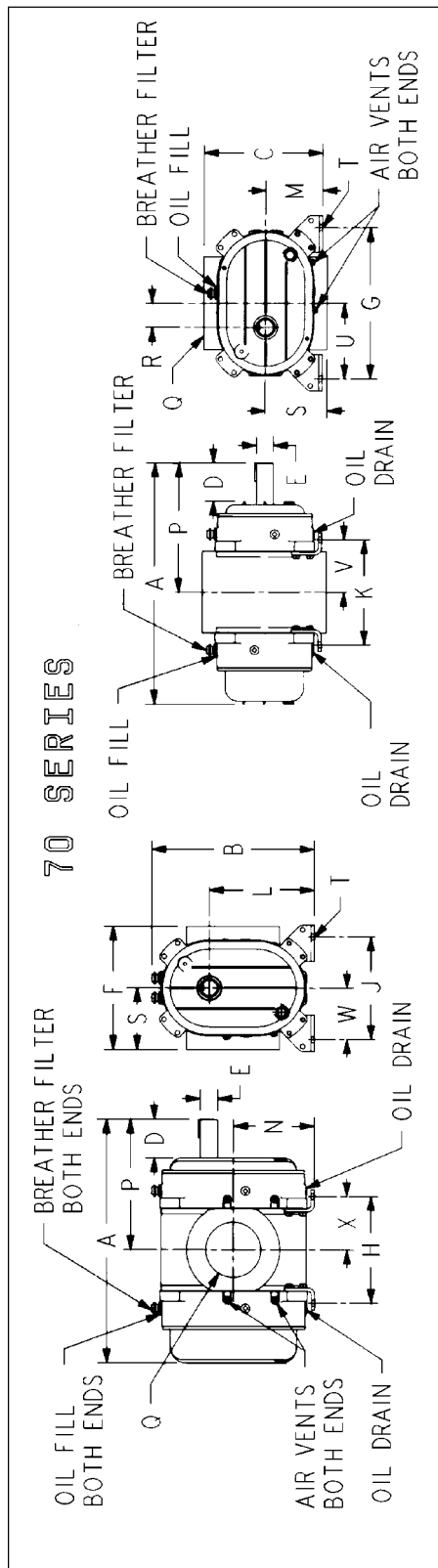
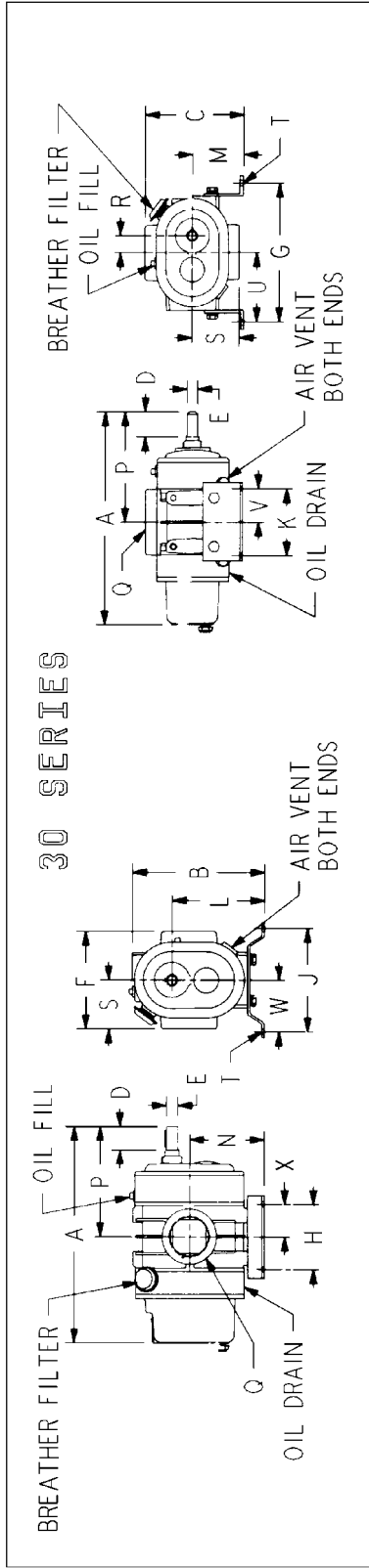


FIGURE 1-2 - OUTLINE

BLOWER OUTLINE DIMENSION CHART										
Dimensions	Models									
	3004	3006	7009	7012	7015	7018	7023	7028		
A	16.64	18.64	32.42	35.43	38.44	41.44	46.44	51.44		
B	11.62	11.62	23.62	23.62	23.62	23.62	23.62	23.62		
C	8.81	8.81	17.25	17.25	17.25	17.25	17.25	17.25		
D	2.06	2.06	5.68	5.68	5.64	5.64	5.62	5.62		
E DIA.	1.000	1.000	2.500	2.500	2.500	2.500	2.500	2.500		
F	8.82	8.62	18.00	18.00	18.00	18.00	18.00	18.00		
G	12.50	12.50	22.00	22.00	22.00	22.00	22.00	22.00		
H	4.00	5.50	12.50	15.50	18.50	21.50	26.50	31.50		
J	9.00	9.00	15.00	15.00	15.00	15.00	15.00	15.00		
K	4.00	5.50	12.50	15.50	18.50	21.50	26.50	31.50		
L	8.06	8.06	15.25	15.25	15.25	15.25	15.25	15.25		
M	4.50	4.50	8.25	8.25	8.25	8.25	8.25	8.25		
N	6.56	6.56	11.75	11.75	11.75	11.75	11.75	11.75		
P	8.36	9.36	17.49	18.99	20.47	21.97	24.47	26.97		
Q	2-1/2" NPT	3" NPT	6" NPT	8" FLG	8" FLG	10" FLG	12" FLG	12" FLG		
R	1.50	1.50	3.50	3.50	3.50	3.50	3.50	3.50		
S	4.41	4.31	9.00	9.00	9.00	9.00	9.00	9.00		
T DIA.	.53	.53	.88	.88	.88	.88	.88	.88		
U	6.25	6.25	11.00	11.00	11.00	11.00	11.00	11.00		
V	2.00	2.75	6.25	7.75	9.25	10.75	13.25	15.75		
W	4.50	4.50	7.50	7.50	7.50	7.50	7.50	7.50		
X	2.00	2.75	6.25	7.75	9.25	10.75	13.25	15.75		
* See Figure 2-5, Page 9, for available connectors.										
APPROXIMATE WEIGHT										
MODEL	3004	3006	7009	7012	7015	7018	7023	7028		
LBS.	120	135	820	920	1000	1080	1160	1260		

FIGURE 1-3 - BLOWER OUTLINE DIMENSION CHART

## SECTION 2 INSTALLATION

### LOCATION

Whenever possible, install the blower in a clean and dry place that is both well lighted and well ventilated. Provide plenty of room for easy inspection and maintenance.

### FOUNDATION AND BASE

For permanent installations we recommend concrete foundations be provided, and the equipment should be grouted to the concrete. Use non-shrinking grout only. It is necessary that a suitable base be used, such as steel combination base under the blower and motor, or a separate sole plate under each. The blower feet must be 100% supported. Before grouting, equipment must be leveled, free of all strains, and anchored so no movement will occur during curing of grout. After grout has completely hardened, a recheck is necessary to compensate for shrinkage. If required, add shims under blower feet after final tightening of foundation anchor bolts to remove strain from the blower housing.

Where jack screws or wedges are used during grouting, they must be backed off or removed before final tightening of anchor bolts.

Where a concrete foundation is not feasible, care must be taken to insure that equipment is firmly anchored to adequate structural members. The blower must be installed on a flat, level surface and bolted down evenly to prevent warping or strain. Internal clearances are very critical and serious damage or failure can result from housing distortion.

### NOTICE

**If the unit is not flat within .002 of an inch, it will be necessary to shim the blower feet at installation.**

### MOUNTING CONFIGURATIONS

All DuroFlow blowers are center timed allowing rotation in either direction.

DuroFlow blowers are shipped in the vertical configuration (horizontal airflow.) If a horizontal configuration is desired, the blower can be laid on its side after repositioning breathers, oil filler drain plugs and mounting feet as indicated in the installation drawing, FIGURE 1-2, page 5. **To assure proper lubrication, the blower must be laid over in the direction that places the oil sight glass(es) below the horizontal centerline of the blower.** See FIGURE 1- 1, page 4, for additional configuration information.

When converting 30 series blowers from vertical to horizontal configurations, the horizontal mounting feet are required. Order horizontal mounting feet from your DuroFlow Distributor. The 70 series blowers can be converted from vertical to horizontal configurations utilizing the same four (4) feet originally shipped with the blower.

The blower must be mounted level with the driveshaft in the horizontal position. Some models have interconnected oil sumps and operation in an out-of-level condition will result in inadequate lubricant distribution and subsequent premature blower failure.

### DRIVE INSTALLATION

When selecting a V-belt drive, check to be sure the shaft overhung load limitation is not exceeded.

**Overhung Load Calculations and Limitations** – An excessive overhung condition exists when the belt pull on the blower shaft exceeds the maximum allowable moment listed in “Maximum Allowable Moment” chart in FIGURE 2-1, page 8. Excessive overhung load conditions must be avoided or bearing failure and shaft breakage will result.

### WARNING

**Exceeding overhung load limitations leads to unwarrantable premature bearing failure and shaft breakage.**

The location of the sheave on the blower shaft greatly affects the stress in the shaft. The optimum blower sheave positioning is as close as possible to the blower drive cover, not to exceed dimension “C” shown in maximum allowable moment chart, FIGURE 2-1, page 8.

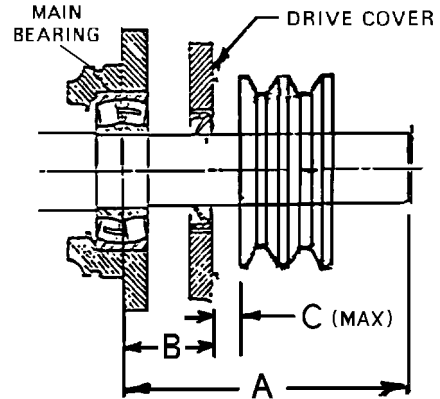
To calculate the shaft moment for a given V-belt drive arrangement, first calculate the belt pull using the formula for belt pull in FIGURE 2-1, page 8. Insert the calculated belt pull into the formula for calculation of shaft moment in FIGURE 2-1, page 8, to arrive at the calculated shaft moment.

The calculated shaft moment must not exceed the maximum allowable moment listed in the chart, FIGURE 2-1, page 8. If the calculated shaft moment exceeds the maximum allowable moment:

- Increase Sheave Diameters to Reduce Belt Pull
- Use Jackshaft Drive
- Use Direct Coupled or Gearbox Drive

Series	Gear Diameter (Inches)	Dimensions (Inches)			Maximum Allowable Moment (LB-IN)
		A	B	C	
30	3	4.75	1.87	.94	1449
70	7	9.45	3.82	.63	14469

**MAXIMUM ALLOWABLE MOMENT**



**DRIVE SHAFT ILLUSTRATION**

Z	Ac	Z	Ac	Z	Ac	Z	Ac	Z	Ac	Z	Ac
0.000	1.000	0.250	0.966	0.500	0.926	0.750	0.879	1.000	0.823	1.250	0.751
0.025	0.997	0.275	0.962	0.525	0.922	0.775	0.874	1.025	0.816	1.275	0.742
0.050	0.994	0.300	0.958	0.550	0.917	0.800	0.869	1.050	0.810	1.300	0.734
0.075	0.990	0.325	0.954	0.575	0.913	0.825	0.864	1.075	0.803	1.325	0.725
0.100	0.987	0.350	0.951	0.600	0.908	0.850	0.858	1.100	0.796	1.350	0.716
0.125	0.983	0.375	0.947	0.625	0.904	0.875	0.852	1.125	0.789	1.375	0.706
0.150	0.980	0.400	0.943	0.650	0.899	0.900	0.847	1.150	0.782	1.400	0.697
0.175	0.977	0.425	0.939	0.675	0.894	0.925	0.841	1.175	0.774	1.425	0.687
0.200	0.973	0.450	0.935	0.700	0.889	0.950	0.835	1.200	0.767		
0.225	0.969	0.475	0.930	0.725	0.884	0.975	0.829	1.225	0.759		

**ARC OF CONTACT FACTORS**

$$\text{Belt Pull} = \left[ \frac{2.5 - A_c}{A_c} \right] \left[ \frac{125954 \times \text{HP} \times \text{S.F.}}{D \times \text{RPM}} \right]$$

- Key:
- A<sub>c</sub> = Arc of Contact Factor (Refer to Arc of Contact Factors Chart above)
  - H<sub>p</sub> = Blower Horsepower for Operating Conditions
  - S.F. = Actual Drive Service Factor
  - D = Blower Sheave Pitch Diameter in Inches
  - RPM = Blower Sheave Speed
  - Z =  $\frac{\text{Large Sheave Pitch Diameter (in)} - \text{Small Sheave Pitch Diameter (in)}}{\text{Sheave Center Distance (in)}}$

**CALCULATION OF BELT PULL**

$$\text{Shaft Moment (LB-IN)} = \text{Belt Pull} \times \left[ B + C + \left( \frac{\text{Sheave Width}}{2} \right) \right]$$

**CALCULATION OF SHAFT MOMENT**

**FIGURE 2-1 - BELT DRIVE OVERHUNG LOAD CALCULATIONS**

**Driver Location** - To properly balance the air load stress on the blower drive shaft, locate the driver on the inlet side for a vertical mounted blower and on the shaft side for a horizontal mounted blower.

**Belt Drive Alignment** - Belt drives must be carefully aligned, with the motor and blower sheaves parallel to each other and in the same plane. Belt tension should be carefully adjusted according to the belt manufacturer's recommendations using a Tension Tester.

 **WARNING**

**Overtightening belts produces heavy bearing loads and leads to unwarrantable premature failure.**

On direct drive blowers, align the couplings so that the offset and angular misalignment does not exceed .003" total indicator reading (TIR). Lubricate coupling according to manufacturer's specification. With factory installed drives, proper alignment has been established before shipment. During shipping, handling and installation, it is likely that the alignment has been disturbed and final adjustment must be made before start-up.

**PIPING**

All 30 Series DuroFlow blowers have female threaded inlet and discharge connections. The connections are large enough to handle maximum volume with

minimum friction loss. Reducing the pipe diameter on either inlet or discharge will create unwanted restrictions that increase the overall pressure differential and discharge temperature of the blower.

The 70 Series DuroFlow blowers have flat face inlet and discharge flanges with ANSI 125 lb. bolt patterns.

When installing the blower, avoid subjecting the inlet and discharge connections to strains caused by misalignment of the connecting pipes. Never allow the blower to carry the weight of the pipe.

Piping strain and misalignment stress will distort the blower during operation, resulting in loss of critical internal clearances. Loss of internal clearances will result in serious machine damage and premature, unwarrantable blower failure.

Whenever possible, install a spool or sleeve-type expansion joint between the blower and the piping. Where a flexible connection is not possible, the weight of the rigid connection and piping must be separately supported, and thermal pipe growth must be accommodated.

 **WARNING**

**Thoroughly clean all system piping internally before connecting to the blower.**

## SECTION 3 LUBRICATION

All DuroFlow blowers are splash oil lubricated at both the gear and drive ends. Oil is distributed around the gear housing and drive end chamber by the gears and specially designed oil flingers.

Approximate oil sump capacities are listed in FIGURE 3-1 below.

Series	Oil Fill Ports	Vertical Mounting	Horizontal Mounting
30	One Port - Shaft & Gear Ends Interconnected	16 oz.	28 oz.
70	One Port - Shaft End	48 oz.	123 oz.
	One Port - Gear Ends	64 oz.	160 oz.

FIGURE 3-1 - APPROXIMATE OIL SUMP CAPACITIES

### RECOMMENDED LUBRICANT

**The factory recommended lubricant is AEON PD Synthetic Lubricant.** AEON PD is formulated especially for positive displacement blowers to provide maximum protection at any temperature. One filling of AEON PD will last a minimum of 4 times longer than a premium mineral oil, depending on actual operating conditions.

AEON PD contains a special additive package designed for greater rust and corrosion protection.

### AEON PD Lubricant

Description	Part Number
1 Quart	28G23
Case/12Quarts	28G24
5 Gallon Pail	28G25
55 Gallon Drum	28G28

### AEON PD Food Grade Lubricant

Description	Part Number
1 Quart	28H97
Case/12Quarts	28H98
5 Gallon Pail	28H99
55 Gallon Drum	28H100

FIGURE 3-2 - AEON PD SYNTHETIC LUBRICANT

### NOTICE

**Machines are shipped without oil in the sumps. Do not operate before adding lubricant.**

### LUBRICATION INSTRUCTIONS

For 30 series models, the oil fill port is located on the top of the blower at the driveshaft end (see FIGURE 1-2, page 5). The two oil sumps are connected by a passageway through the housing.

Add oil until the level stabilizes at the center of the sight-glass(es). Oil level at the sight glass must be established when the blower is not operating.

Add fresh oil as required to maintain proper level.

On 70 series models (units with two oil sight glasses), each end of the blower has a separate oil sump. Oil must be added to **each end** of the blower through the oil breather ports (see FIGURE 1-2, page 5).

**⚠ WARNING**

**Failure to add oil to each end of the blower on 70 series models will result in damage to the blower.**

**⚠ WARNING**

**Do not overfill as this will tend to cause excessive heating of the gears and may damage the unit.**

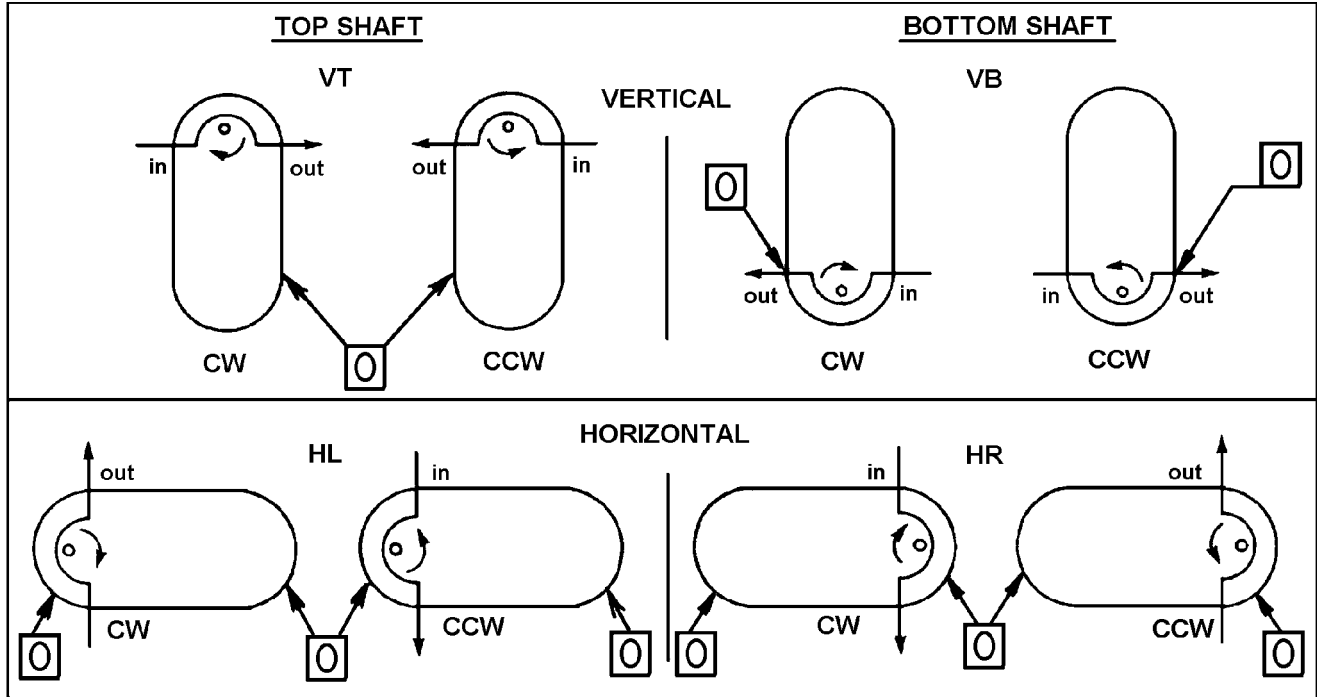
The 70 series "C" design version with a column gauge indicates the actual oil level during operation. The column gauge before start-up should be filled to the middle of the glass.

The oil level should be maintained at the center of the glass while the blower is not operating. Add fresh oil as required to maintain proper level.

The 70 series column sight glass needs to be assembled at the position shown in FIGURE 3-3 below. The 70 series is generally built to vertical configuration. When converting to horizontal configuration, the 1/4" tube needs to be trimmed to suit. Horizontal configurations are built at the factory upon request

AEON PD Synthetic Lubricant should be drained after 6000 hours of operation. Re-fill with fresh AEON PD oil. If mineral oil is used, perform the above oil-change maintenance every 1500 hours. Recommended service intervals are for normal blower operating conditions. Severe operating conditions may warrant more frequent oil changes. Laboratory analysis of lubricant should be used to help determine the optimum oil change interval.

For best performance and equipment protection, use AEON PD Synthetic Lubricant, which has been specifically formulated for positive displacement blowers. If you choose not to use AEON PD Synthetic Blower Lubricant, select an oil with rust and oxidation inhibitors, anti-foam additives, and the viscosities listed in FIGURE 3-4, page 13. Do not use an oil that contains EP additives.



**⓪ SIGHT GLASS**

**FIGURE 3-3 - 70 SERIES - COLUMN TYPE SIGHT GLASS LOCATION**

## NOTICE

**Flush the oil whenever a change is made from one type of oil to another.**

Flush the oil whenever a change is made from one type of oil to another. Drain the current lubricant as thoroughly as possible. Refill with the new lubricant. Fill to normal level of the blower, which is at the middle of the sight glass when the machine is not operating. Run the blower for one hour. Shut off the blower and drain the lubricant completely. Refill the blower again with the new lubricant.

### **Air Seal Vent Systems**

All DuroFlow blowers are designed with a vent opening between the air chamber seal and the oil sump seal that vents to atmosphere any air which escapes from the air chamber.

The vent prevents pressurization of the oil sump and must be left open to atmosphere. The vent holes are tapped 3/8" NPT to permit installation of a venting line. Do not plug these vent holes (see FIGURE 1-2, page 5).



## WARNING

**Do not plug vent holes or oil sumps may pressurize causing loss of oil, excessive heat and serious damage to the machine.**

### **Oil Sump Breathing System**

All DuroFlow blowers are designed to permit their oil systems to breathe freely to prevent pressurization of the oil sumps. Breather filters are required to keep contaminants from entering the oil sumps (see Figure 1-1, page 4). Series 30 models require only one breather filter due to their interconnected shaft and gear end oil sumps. In these models, breathers equalize the pressure between the interconnected oil sumps and permit the equal distribution of oil between the gear and drive oil sumps. Series 70 models do not have interconnected oil sumps and require two breather filters, one on each sump.

Breather filters are easily cleaned by washing in commercial solvent and drying with compressed air. Clean at every oil change to assure proper venting.

Blower Discharge Temperature	Ambient Temperature			
	Less than 10° F *	10° F to 32° F **	32° F to 90° F	Greater than 90° F
Less than 32° F (0° C)	ISO 100 ‡	ISO 100 ‡		
32° F to 100° F (0° C to 38° C)	ISO 100 ‡	ISO 100 ‡	ISO 150 ‡	
100° F to 225° F (38° C to 105° C)	ISO 100 ‡	ISO 100 ‡	ISO 150 ‡	ISO 220 ‡
225° F to 300° F (105° C to 149° C)	ISO 150 ‡	ISO 150 ‡	ISO 220 ‡	ISO 220 ‡
Greater than 300° F (149° C)			*** ‡	*** ‡

\* For ambient temperatures less than 10° F, but not less than -20° F, the use of oil sump heaters, heated enclosures or synthetic lubricant is required.

\*\* For ambient temperatures 10° F to 32° F, the use of oil sump heaters, heated enclosures or synthetic lubricant is recommended.

\*\*\* The lubricant viscosity must be 70 SUS minimum at the lubricant operating temperature.

The pour point of the lubricant should be at least 5° to 10° F below the minimum expected ambient temperature.

For continuous operation, where the lubricant temperature exceeds 200° F, synthetic lubricant is recommended.

‡ The recommended operating range for AEON PD Synthetic Lubricant.

**FIGURE 3-4 - VISCOSITY RECOMMENDATION**

## SECTION 4 OPERATION

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Future operating problems can be avoided if proper precautions are observed when the equipment is first put into service.

Before starting under power, the blower should be turned over by hand to make certain there is no binding, or internal contact.

### LIMITATIONS

Each size blower has limits on pressure differential, running speed, and discharge temperature which must not be exceeded. These limits are shown in FIGURE 4-1, page 15.



### WARNING

**Operating beyond the specified operating limitations will result in damage to the unit.**

To accurately determine actual blower operating conditions, it is important that all pressure and temperature recordings are made directly at the ports of the blower where these conditions are at their maximum.

Relief valves **MUST** be used to protect the blower against excessive pressure or vacuum conditions. These valves should be tested at initial start up to be sure they are adjusted to relieve at 2 psi above the maximum allowable pressure or at 2" HG below the maximum allowable vacuum for the blower. Periodic testing of relief valves is suggested to assure that they are functioning.

### NOTICE

**Relief valves should be placed as close as possible to the blower inlet on vacuum systems or discharge on pressure systems.**

Check valves must be installed on the discharge side of the blower on a pressure system and on the inlet side of the blower on a vacuum system to eliminate product ingestion resulting from autorotation and blow back during equipment shutdown.

### SAFETY PRECAUTIONS

1. Do not operate the blower with an open inlet or discharge port.
2. Do not exceed specified vacuum or pressure limitations.
3. Do not operate above or below recommended blower speed range.
4. The blower is not to be used where non-sparking equipment is specified. Contact your DuroFlow Distributor for non-sparking requirements.
5. Do not operate the blower without belt guard or coupling shield properly installed.
6. Do not exceed the manufacturer's specified rim speed limit for sheaves or couplings.
7. The blower and blower discharge piping may be extremely hot and can cause skin burns on contact.
8. Do not exceed the manufacturer's certification levels for vacuum or pressure vessels.

**MAXIMUM OPERATING LIMITATIONS**

<b>Size</b>	<b>RPM</b>	<b>Differential Pressure PSI</b>	<b>Dry * Vacuum In HG</b>	<b>Discharge Temperature °F</b>
3004	4000	15	15	350
3006	4000	15	15	350
7009	2650	15	15	350
7012	2650	15	15	350
7015	2650	15	15	350
7018	2650	15	15	350
7023	2600	12	16	325
7028	2600	10	16	325

**DO NOT EXCEED THESE LIMITS**

\* Increased vacuum levels are attainable with water injection. Contact your DuroFlow Distributor.

**NOTICE**

**Blower speed, line losses, elevation, and increased inlet temperatures affect actual blower performance. Care must be taken to consider these factors when designing your system so that blower limitations are not exceeded.**

**FIGURE 4-1 - MAXIMUM OPERATING LIMITATIONS**

## BLOWER STARTUP CHECKLIST

This startup procedure should be followed during the initial installation and after any shutdown periods or after the blower has been worked on or moved to a new location. It is suggested that the steps be followed in sequence and checked off ( ✓ ) in the boxes provided.

1. Check to make certain that the blower has been properly lubricated with AEON PD Synthetic Blower Lubricant. Proper oil level cannot be overemphasized. Too little oil will ruin bearings and gears. Too much oil will overheat the lubricant and lead to serious blower damage.
2. Check to make sure all oil sump breather filters are installed in their proper location. Oil leakage will occur if they are improperly located.
3. Check the unit and all piping for foreign material and clean if required.
4. Check the inlet or inline filter to make sure it is not plugged causing dangerous inlet restriction.
5. Check the preload of the feet and the alignment of the drive. Feet that are bolted down in a bind can cause case distortion and internal rubbing. A misaligned V-belt drive will reduce belt life. Misaligned couplings place heavy loads on bearings which leads to their premature failure.
6. If blower is V-belt driven, check the belt tension. Over-tensioned belts create heavy bearing loads which lead to premature bearing failure.
7. If blower is V-belt driven, check for excessive overhung load condition. Loads in excess of maximum allowable overhung load limitations will lead to premature bearing failure and shaft breakage.
8. Be sure adequate drive guards are in place to protect the operator from SEVERE PERSONAL INJURY from contact with rotating components.
9. Turn the unit over by hand to be sure there is no binding or rotor contact. Special wear-in seals on the 30 and 70 series are utilized in DuroFlow blowers. When units are new, some resistance to turning the driveshaft by hand will be encountered. After several hours of running, this seal pressure will relieve itself and the blower will be somewhat easier to turn.
10. Jog the blower with the motor to check for proper rotation and airflow direction. Listen for unusual noise coming from the blower or motor and make sure the blower coasts smoothly to a stop.
11. Start unit and operate for 15 minutes with no load. Check for hot spots on housing or end plates, noise and other indications of interference. Allow the blower to cool to room temperature and re-check oil level. Add oil if necessary. DO NOT OVERFILL.
12. Check to be certain that actual blower speed is within allowable limits.
13. Apply load and observe operation for the first hour, checking pressure and air discharge temperature:
  - (a) Do not operate blower over manufacturer's specified pressure or vacuum rating.
  - (b) Discharge air temperature should not exceed the maximum allowable temperature.
14. Check and retension belts after the first few hours of operation to minimize slippage and belt wear. DO NOT OVERTENSION.
15. If mechanical problems are encountered during installation or start-up, notify your nearest DuroFlow Distributor. Never continue to operate your DuroFlow blower if you detect a malfunction, as serious damage can occur. **Do not attempt any internal investigation without factory authorization since this will void the warranty.**

## SECTION 5 MAINTENANCE AND TROUBLESHOOTING

Your DuroFlow blower has been designed, manufactured and tested to precise specifications. Every DuroFlow blower is backed by over 70 years of proven performance in the most demanding applications that modern industry can produce. DuroFlow blowers have been designed specifically for long, trouble-free service. Minimal maintenance is required to keep your DuroFlow blower in top operating condition. Your attention to the following key points will insure years of dependable DuroFlow blower performance.

### Key Points for Long Blower Life

1. Use AEON PD Synthetic Blower Lubricant to assure maximum blower protection.
2. The oil level must be checked periodically.
3. Drain and refill the blower with fresh AEON PD Lubricant every 6000 hours of operation, 1500 hours if using mineral based lubricant.
4. Clean the breather filters at every oil change or more often if dust conditions are severe.
5. Service the intake and in-line filters regularly to make sure that air flow restriction does not occur and that foreign material does not enter the blower.
6. If the blower is taken out of service for any reason, be sure to protect all interior surfaces from rusting.

### TROUBLE SHOOTING

No matter how well the equipment is designed and manufactured, there may be times when servicing will be required due to normal wear, the need for adjustment, or various external causes. Whenever

equipment needs attention, the operator or service technician should be able to locate the cause and correct the trouble quickly by following the Troubleshooting Chart given below:

PROBLEM	POSSIBLE CAUSES	SOLUTION
Knocking and excessive mechanical noise.	<ol style="list-style-type: none"> <li>1. Unit out of time.</li> <li>2. Distortion due to improper mounting or pipe strains.</li> <li>3. Excessive pressure differential.</li> <li>4. Worn gears.</li> <li>5. Worn bearings.</li> </ol>	<ol style="list-style-type: none"> <li>1. Retime rotors. (See page 19.)</li> <li>2. Check mounting alignment and relieve pipe strains.</li> <li>3. Reduce to manufacturer's recommended pressure or vacuum. Examine relief valve, re-set if necessary.</li> <li>4. Replace timing gears. (See page 19.)</li> <li>5. Replace bearings. (See page 19.)</li> </ol>
Excessive blower temperature.	<ol style="list-style-type: none"> <li>1. Too much oil in gear case.</li> <li>2. Too low operating speed.</li> <li>3. Plugged filter or silencer.</li> <li>4. Excessive pressure differential.</li> <li>5. Worn rotors clearances.</li> <li>6. Internal contact.</li> <li>7. Excessive inlet temperature.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce oil level.</li> <li>2. Increase blower speed. Check sheave set</li> <li>3. Remove cause of obstruction.</li> <li>4. Reduce pressure differential across the blower.</li> <li>5. Replace rotors. (See page 19.)</li> <li>6. Correct clearances. (See page 19.)</li> <li>7. Relocate intake to cooler area.</li> </ol>

<b>PROBLEM</b>	<b>POSSIBLE CAUSES</b>	<b>SOLUTION</b>
Rotor contact with housing or endplate.	<ol style="list-style-type: none"> <li>1. Insufficient assembled clearances.</li> <li>2. Case or frame distortion.</li> <li>3. Excessive operating pressure.</li> <li>4. Excessive operating temperature.</li> <li>5. Material ingestion through the blower.</li> </ol>	<ol style="list-style-type: none"> <li>1. Return for Warranty. (See page 19.)</li> <li>2. Remove all mounting and pipe strains.</li> <li>3. Remove cause.</li> <li>4. Remove cause.</li> <li>5. Replace worn inlet and inline filters. Install check valve between blower and first material load point to eliminate blow-back when blower is stopped.</li> </ol>
Lack of CFM delivery.	<ol style="list-style-type: none"> <li>1. Slipping belts.</li> <li>2. Worn clearances.</li> <li>3. Blower RPM too slow.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten belts.</li> <li>2. Replace rotors. (See page 19.)</li> <li>3. Increase Blower speed. Check sheave set.</li> </ol>
Excessive bearing or gear wear.	<ol style="list-style-type: none"> <li>1. Improper lubrication.</li> <li>2. Oversized belt drive, over-tightened belts.</li> </ol>	<ol style="list-style-type: none"> <li>1. Correct lubrication level. Replace dirty oil with AEON PD Synthetic Blower Lubricant.</li> <li>2. Re-tension belts to proper tightness. Check drive to eliminate possible overhung load condition.</li> </ol>
Loss of oil from seal vents.	<ol style="list-style-type: none"> <li>1. Worn oil seal.</li> <li>2. Damaged seal sleeve.</li> <li>3. Gear case or drive cover breathers plugged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace seals. (See page 19.)</li> <li>2. Replace sleeve. (See page 19.)</li> <li>3. Clean breather filters.</li> </ol>
Loss of oil from breather filters.	<ol style="list-style-type: none"> <li>1. Endplate seal vents plugged.</li> <li>2. Worn oil seal.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean vents of obstruction. Do not plug seal vents.</li> <li>2. Replace seals. (See page 19.)</li> </ol>
Loss of oil from driveshaft seal.	<ol style="list-style-type: none"> <li>1. Worn oil seal.</li> <li>2. Damaged seal sleeve.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace seal. (See page 19.)</li> <li>2. Replace sleeve. (See page 19.)</li> </ol>
Excessive vibration.	<ol style="list-style-type: none"> <li>1. Inadequate package design.</li> <li>2. Soft foot.</li> <li>3. Material build-up inside rotors.</li> <li>4. Bearing failure.</li> <li>5. Excessive gear wear.</li> <li>6. Bent shaft.</li> <li>7. Internal mechanical contact.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reinstall base - fill with concrete.</li> <li>2. Shim to eliminate condition.</li> <li>3. Replace worn inlet and inline filters. Install check valve between blower and first material load point to eliminate blow-back when blower is stopped</li> <li>4. Replace bearings.</li> <li>5. Replace gears.</li> <li>6. Replace rotor set.</li> <li>7. See "Rotor Contact" above.</li> </ol>

If you are unable to resolve the problem, contact your DuroFlow Distributor for immediate assistance.

## SECTION 6 SERVICE OPTIONS

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### Factory Remanufactured Blower Program

## STOP

You have turned to the service section because you have a blower problem that requires the blower to be mechanically adjusted or repaired. First determine if the blower is still under warranty. Contact your DuroFlow Distributor and provide them with the blower SERIAL NUMBER located on the blower name plate. DuroFlow will promptly handle all warranty claims according to the warranty policy on page 26.

If the blower is out of warranty: The DuroFlow blower is a precision machine that requires special tools and experience to be properly repaired. Before you attempt any in-house repairs on a DuroFlow blower, we recommend that you first contact your authorized DuroFlow Distributor who is factory-trained and certified to perform the following services utilizing DuroFlow parts:

- Bearing and seal replacement
- Re-time rotors and set clearances
- Clean-up following massive product ingestion

If your repair is more serious than the above procedures and involves the repair or replacement of a major blower component, you will benefit greatly by using the **DUROFLOW FACTORY REMANUFACTURED BLOWER EXCHANGE PROGRAM**. See page i for additional information.

## LOOK

Look how easy it is to use the DuroFlow factory remanufactured blower program:

1. The moment you detect a major problem, simply contact your DuroFlow Distributor to order your factory remanufactured DuroFlow blower. You only need to supply the blower serial number and model number which are listed on the blower nameplate.
2. Your distributor will immediately ship a factory remanufactured blower from its inventory directly to your attention. Factory remanufactured DuroFlow blowers are backed by a full, new blower warranty . . . 18 months from the date of shipment or 12 months in service, whichever occurs first, and each remanufactured blower

incorporates all of the latest design technology and enhancements.

3. When you install your remanufactured DuroFlow unit, simply return the failed blower . . . freight collect . . . to our Indianapolis, IN Remanufacturing Center for a core credit. Your total cost for a factory remanufactured blower, after core credit, is significantly less than a new machine.

## NOTICE

**Inlet and discharge connectors are reusable. Remove connectors from the failed blower before returning the core to the Indianapolis, IN Remanufacturing Center.**

## LISTEN

Listen to the sound of your well running plant, not the complaints of your exasperated mechanics when they realize that properly repairing a DuroFlow blower is a much more delicate and difficult process than it originally appeared to be. Listen to the experience of thousands of plant operators who depend upon the DuroFlow remanufactured blower program to save them time, money and frustration. Remember, every DuroFlow factory remanufactured blower is backed with a full new blower warranty - 18 months from the date of shipment or 12 months from the date of start-up, whichever occurs first.

### Repair Parts

If you elect to attempt a repair on your DuroFlow blower make certain you **use genuine DuroFlow original equipment parts** to retain the performance and dependability of your DuroFlow blower.

Factory genuine parts, engineered to original tolerances, are designed for optimum dependability . . . specifically for your blower. Design and material innovations are born from years of experience with hundreds of different blower applications. When you specify factory genuine parts you are assured of receiving parts that incorporate the most current design

advancements . . . manufactured in our state-of-the-art blower factory under exacting quality standards.

Prepackaged overhaul kits are available for immediate shipment for all DuroFlow blowers. Kits include all the normal wearing parts needed to overhaul your DuroFlow blower: Oil seals, air seals, bearings, spacers, gaskets, and Belleville timing spring. Part numbers for overhaul kits are given below.

Refer to Section 7 for additional part numbers as required.

**Parts Ordering Instructions**

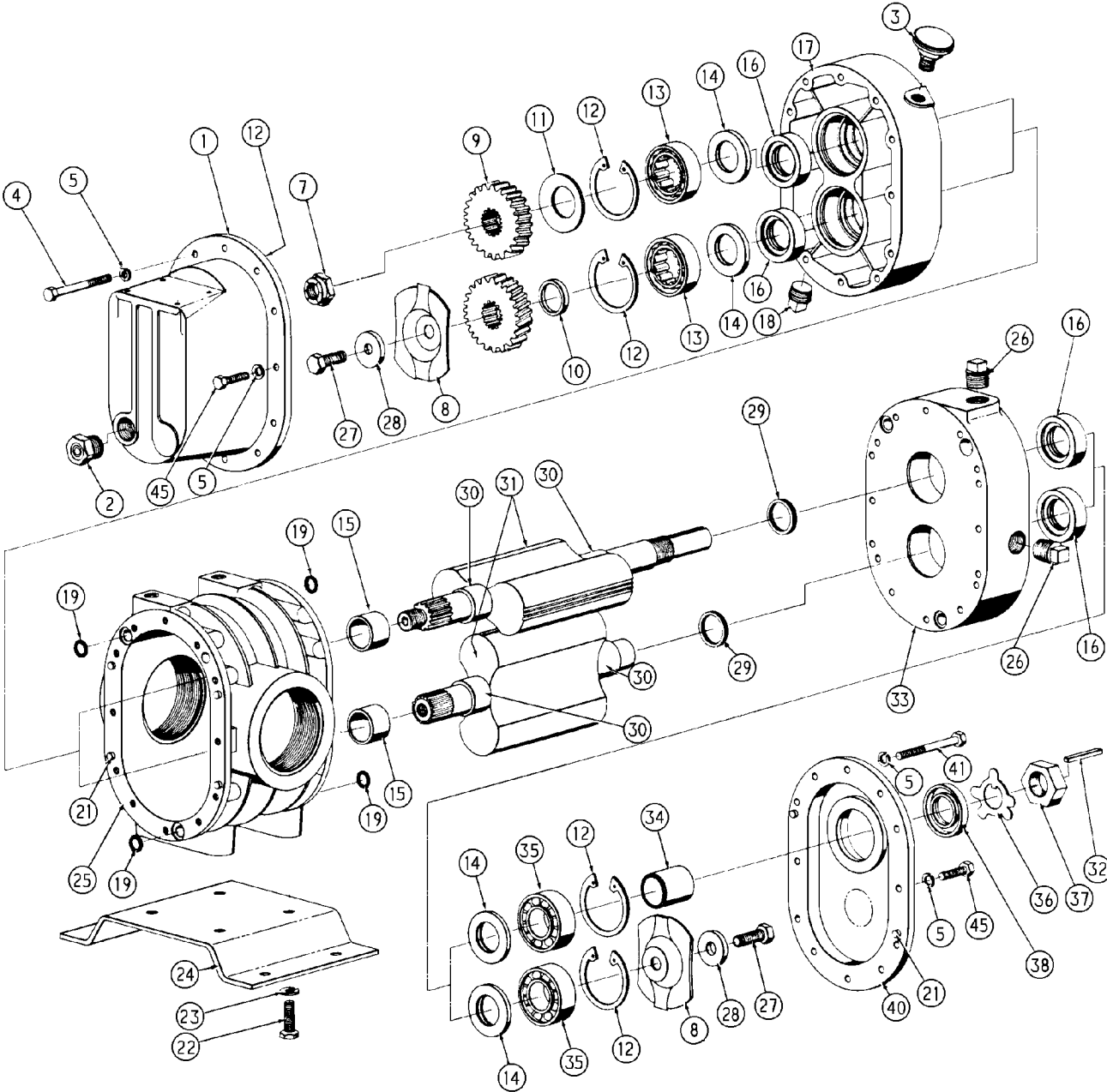
When ordering parts, indicate the model and serial number from the blower nameplate and identify the blower configuration by referring to Figure 1-3, page 6.

For prompt, professional assistance in selecting the correct repair parts for your DuroFlow blower, contact your Duroflow Distributor who maintains a large inventory of genuine DuroFlow parts.

<b>OVERHAUL KITS</b>	
<b>Model</b>	<b>Part Number</b>
30 Series Overhaul Kit	
All Models with 1-Piece Housing .....	200GGB6010
All Models with 2-Piece Housing .....	DF147400
70 Series Overhaul Kit	
All Models .....	200GGG6010

# SECTION 7 PARTS LISTS AND EXPLODED VIEWS

## 30 SERIES DUROFLOW BLOWER EXPLODED VIEW



**200GGB810  
(Ref. Drawing)**

**Order by Part Number and Description. Reference Numbers are for your convenience only.**

Ref. No.	Name of Part	Qty.	Size 3004 GGBA_B_ Part No.	Size 3006 GGBB_B_ Part No.
1	COVER-GEAR .....	1	DF145949	DF145949
2	GAUGE-SIGHT .....	1	40P11	40P11
3	BREATHER .....	1	DF140867	DF140867
4	SCREW .....	10	75A200	75A200
5	LOCKWASHER .....	24	95B2	95B2
*	6 GASKET .....	2	DF146038	DF146038
7	LOCKNUT .....	1	50V51	50V51
**	8 FLINGER .....	2	DF181216	DF181216
9	KIT-GEAR .....	1	200GGB6008	200GGB6008
10	SPACER-BEARING .....	1	DF182629	DF182629
*	11 SPRING-BELLEVILLE .....	1	DF181206	DF181206
12	RING RETAINER .....	4	74D68	74D68
*	13 BEARING-ROLLER .....	2	DF127253	DF127253
*	14 SEAL-OIL .....	4	DF181201	DF181201
15	BEARING SLEEVE .....	2	DF139787	DF139787
*	16 SEAL-LABYRINTH .....	4	DF184836	DF184836
17	END PLATE-GEAR END .....	1	DF184563	DF184563
18	PLUG .....	2	64AA4	64AA4
*	19 SEAL RING .....	4	DF185304	DF185304
***	20 BREATHER VENT .....	2	DF186545	DF186545
21	DOWEL .....	6	DF119279	DF119279
22	SCREW .....	4	655EE040	655EE040
23	LOCKWASHER .....	4	95B5	95B5
24	PLATE-VERTICAL MOUNTING .....	1	DF140824	200GGB247
***	BRACKET-HORIZONTAL MOUNTING .....	2	DF193167	DF193167
25	CYLINDER .....	1	DF184565	DF184593
26	PLUG .....	2	64A24	64A24
27	SCREW .....	2	655EE04N	655EE04N
28	WASHER (SPECIAL) .....	2	DF181207	DF181207
*	29 SHIM SET .....	2	200GGB732	200GGB732
30	SLEEVE .....	4	DF184679	DF184679
31	ROTOR GROUP .....	1	203GGB4028	204GGB4028
32	KEY .....	1	900639910305	900639910305
33	END PLATE-DRIVE END .....	1	DF184564	DF184564
34	SPACER-BEARING .....	1	DF135837	DF135837
*	35 BEARING-BALL .....	2	8500398	8500398
*	36 LOCKWASHERING .....	1	DF140892	DF140892
*	37 JAM NUT-SPECIAL .....	1	DF140891	DF140891
*	38 SEAL-OIL .....	1	60DD796	60DD796
40	COVER-DRIVE END .....	1	DF135807	DF135807
41	SCREW .....	10	75A248	75A248
46	SCREW .....	4	75A10	75A10
***	47 LUG-LIFTING .....	2	200GAA451	200GAA451
**	KIT-OVERHAUL .....	0	200GGB6010	200GGB6010

\* Included in Overhaul Kit

\*\* No. Req'd. and Part No. for Vertical Top and Horizontal Right hand shaft locations, for optional Vertical Bottom and Horizontal Left hand shaft locations No. Req'd. becomes (1) DF182820 and qty (1) DF143399 Flinger is added to drive end.

\*\*\* Not shown on illustration.



**Order by Part Number and Description. Reference Numbers are for your convenience only.**

Ref. No.	Name of Part	Qty.	Size 7009 GGGA_C_ Part No.	Size 7012 GGGB_C_ Part No.	Size 7015 GGGC_C_ Part No.
1	COVER-GEAR .....	1	300GGD602	300GGD602	300GGD602
2	GLASS-SIGHT .....	2	40P55	40P55	40P55
3	SCREW .....	30	655ED250	655ED250	655ED250
4	LOCKWASHER .....	32	95B3	95B3	95B3
* 5	GASKET .....	2	DF184031	DF184031	DF184031
6	LOCKNUT .....	2	DF184086	DF184086	DF184086
7	FLINGER .....	1	DF184024	DF184024	DF184024
8	KIT-GEAR .....	1	200GGG6008	200GGG6008	200GGG6008
9	SPACER .....	1	DF184028	DF184028	DF184028
* 10	SPRING-BELLVILLE .....	1	DF184030	DF184030	DF184030
11	RETAINER-BEARING .....	2	DF184019	DF184019	DF184019
12	SCREW .....	12	75LM214	75LM214	75LM214
* 13	SHIM SET .....	2	200GGG732	200GGG732	200GGG732
* 14	BEARING .....	2	DF184085	DF184085	DF184085
15	WASHER-WAVY SPRING .....	4	8508481	8508481	8508481
16	SPACER-BEARING .....	2	DF185556	DF185556	DF185556
* 17	SEAL-OIL .....	4	DF184084	DF184084	DF184084
* 18	SEAL-LABYRINTH .....	4	DF184838	DF184838	DF184838
+ 19	SPACER (GEAR END) .....	2	DF189049	DF189049	DF189049
20	HOUSING-BEARING .....	1	301GGG006	301GGG006	301GGG006
21	PLUG .....	4	64AC4	64AC4	64AC4
22	PLATE-MOUNTING .....	4	DF184949	DF184949	DF184949
23	LOCKWASHER .....	8	95B7	95B7	95B7
24	SCREW .....	8	655EF080	655EF080	655EF080
25	PLUG-MAGNETIC .....	2	64BJ3	64BJ3	64BJ3
27	PIN-DOWEL .....	6	62M82	62M82	62M82
29	BREATHER .....	2	5L223	5L223	5L223
30	CYLINDER .....	1	DF189510	DF189511	DF189512
31	ROTOR GROUP .....	1	206GGG4028	207GGG4028	208GGG4028
32	KEY-SQUARE .....	1	2800T17	2800T17	2800T17
33	HOUSING-BEARING .....	1	300GGG006	300GGG006	300GGG006
+ 34	SPACER (DRIVE END) .....	2	DF189050	DF189050	DF189050
*+ 35	BEARING-INNER RACE .....	2	DF194012	DF194012	DF194012
* 36	BEARING-ROLLER .....	1	DF194014	DF194014	DF194014
* 37	BEARING-ROLLER .....	1	DF194011	DF194011	DF194011
38	RING-RETAINING .....	2	74D83	74D83	74D83
*++ 39	SLEEVE-WEAR .....	1	80L6	80L6	80L6
40	FLINGER ASSEMBLY .....	1	DF189541	DF189541	DF189541
** 41	COVER-DRIVE .....	1	300GGD477	300GGD477	300GGD477
* 42	SEAL-OIL .....	1	60DD709	60DD709	60DD709
45	SCREW .....	2	655ED25D	655ED25D	655ED25D
66	NIPPLE .....	2	63C4G	63C4G	63C4G
67	PLUG .....	14	64B14	64B14	64B14
69	ELBOW-TUBE - 90° .....	2	86E59	86E59	86E59
70	TUBE .....	3.0 FT.	85E4A	85E4A	85E4A
* 71	KIT-OVERHAUL .....	0	200GGG6010	200GGG6010	200GGG6010

\* Included in Overhaul Kit.

\*\* For Vertical Top and Horizontal Left hand shaft locations, for optional Vertical Bottom and Horizontal Right hand shaft locations use Part No. DF191446.

+ Included with Group-Rotor - Ref. No. 31.

++ Install with Loctite 620 Compound.

**Order by Part Number and Description. Reference Numbers are for your convenience only.**

Ref. No.	Name of Part	Qty.	Size 7018 GGGD_C_ Part No.	Size 7023 GGGE_C_ Part No.	Size 7028 GGGF_C_ Part No.
1	COVER-GEAR .....	1	300GGG602	300GGG602	300GGG602
2	GLASS-SIGHT .....	2	40P55	40P55	40P55
3	SCREW .....	30	655ED250	655ED250	655ED250
4	LOCKWASHER .....	32	95B3	95B3	95B3
* 5	GASKET .....	2	DF184031	DF184031	DF184031
6	LOCKNUT .....	2	DF184086	DF184086	DF184086
7	FLINGER .....	1	DF184024	DF184024	DF184024
8	KIT-GEAR .....	1	200GGG6008	200GGG6008	200GGG6008
9	SPACER .....	1	DF184028	DF184028	DF184028
* 10	SPRING-BELLVILLE .....	1	DF184030	DF184030	DF184030
11	RETAINER-BEARING .....	2	DF184019	DF184019	DF184019
12	SCREW .....	12	75LM214	75LM214	75LM214
* 13	SHIM SET .....	2	200GGG732	200GGG732	200GGG732
* 14	BEARING .....	2	DF184085	DF184085	DF184085
15	WASHER-WAVY SPRING .....	4	8508481	8508481	8508481
16	SPACER-BEARING .....	2	DF185556	DF185556	DF185556
* 17	SEAL-OIL .....	4	DF184084	DF184084	DF184084
* 18	SEAL-LABYRINTH .....	4	DF184838	DF184838	DF184838
+ 19	SPACER (GEAR END) .....	2	DF189049	DF189049	DF189049
20	HOUSING-BEARING .....	1	301GGG006	301GGG006	301GGG006
21	PLUG .....	4	64AC4	64AC4	64AC4
22	PLATE-MOUNTING .....	4	DF184949	DF184949	DF184949
23	LOCKWASHER .....	8	95B7	95B7	95B7
24	SCREW .....	8	655EF080	655EF080	655EF080
25	PLUG-MAGNETIC .....	2	64BJ3	64BJ3	64BJ3
27	PIN-DOWEL .....	6	62M82	62M82	62M82
29	BREATHER .....	2	5L223	5L223	5L223
30	CYLINDER .....	1	DF189513	201GGG002	200GGG002
31	ROTOR GROUP .....	1	209GGG4028	210GGG4028	211GGG4028
32	KEY-SQUARE .....	1	2800T17	2800T17	2800T17
33	HOUSING-BEARING .....	1	300GGG006	300GGG006	300GGG006
+ 34	SPACER (DRIVE END) .....	2	DF189050	DF189050	DF189050
*+ 35	BEARING-INNER RACE .....	2	DF194012	DF194012	DF194012
* 36	BEARING-ROLLER .....	1	DF194014	DF194014	DF194014
* 37	BEARING-ROLLER .....	1	DF194011	DF194011	DF194011
38	RING-RETAINING .....	2	74D83	74D83	74D83
*++ 39	SLEEVE-WEAR .....	1	80L6	80L6	80L6
40	FLINGER ASSEMBLY .....	1	DF189541	DF189541	DF189541
** 41	COVER-DRIVE .....	1	300GGD477	300GGD477	300GGD477
* 42	SEAL-OIL .....	1	60DD709	60DD709	60DD709
45	SCREW .....	2	655ED25D	655ED25D	655ED25D
66	NIPPLE .....	2	63C4G	63C4G	63C4G
67	PLUG .....	14	64B14	64B14	64B14
69	ELBOW-TUBE - 90° .....	2	86E59	86E59	86E59
70	TUBE .....	3.0 FT.	85E4A	85E4A	85E4A
* 71	KIT-OVERHAUL .....	0	200GGG6010	200GGG6010	200GGG6010

\* Included in Overhaul Kit.

\*\* For Vertical Top and Horizontal Left hand shaft locations, for optional Vertical Bottom and Horizontal Right hand shaft locations use Part No. DF191446.

+ Included with Group-Rotor - Ref. No. 31.

++ Install with Loctite 620 Compound.

**DUROFLOW BLOWERS****30 SERIES****70 SERIES****GENERAL PROVISIONS AND LIMITATIONS**

Gardner Denver (the "Company") warrants to each original retail purchaser ("Purchaser") of its new products from the Company or its authorized distributor that such products are, at the time of delivery to the Purchaser, made with good material and workmanship. No warranty is made with respect to:

1. Any product which has been repaired or altered in such a way, in the Company's judgment, as to affect the product adversely.
2. Any product which has, in the Company's judgment been subject to negligence, accident, improper storage, or improper installation or application.
3. Any product which has not been operated or maintained in accordance with normal practice and with the recommendations of the Company.
4. Components or accessories manufactured, warranted and serviced by others.
5. Any reconditioned or prior owned product.

Claims for items described in (4) above should be submitted directly to the manufacturer.

**WARRANTY PERIOD**

The Company's obligation under this warranty is limited to repairing or, at its option, replacing, during normal business hours at an authorized service facility of the Company, any part which in its judgment proved not to be as warranted within the applicable Warranty Period as follows.

**BARE BLOWERS**

Basic bare blowers, consisting of all parts within, are warranted for 12 months from date of initial use or 18 months from date of shipment to the first purchaser, whichever occurs first.

Any disassembly or partial disassembly of the blower, or failure to return the "unopened" blower per Company instructions, will be cause for denial of warranty.

**OTHER COMPONENTS**

All other components are warranted for 12 months from date of initial use or 18 months from date of shipment to first purchaser, whichever comes first.

**LABOR TRANSPORTATION AND INSPECTION**

The Company will provide labor, by Company representative or authorized service personnel, for repair or replacement of any product or part thereof which in the

Company's judgment is proved not to be as warranted. Labor shall be limited to the amount specified in the Company's labor rate schedule.

Labor costs in excess of the Company rate schedule amounts or labor provided by unauthorized service personnel is not provided for by this warranty.

All costs of transportation of product, labor or parts claimed not to be as warranted and, of repaired or replacement parts to or from such service facilities shall be borne by the Purchaser. The Company may require the return of any part claimed not to be as warranted to one of its facilities as designated by Company, transportation prepaid by Purchaser, to establish a claim under this warranty.

Replacement parts provided under the terms of the warranty are warranted for the remainder of the Warranty Period of the product upon which installed to the same extent as if such parts were original components thereof.

**DISCLAIMER**

THE FOREGOING WARRANTY IS EXCLUSIVE AND IT IS EXPRESSLY AGREED THAT, EXCEPT AS TO TITLE, THE COMPANY MAKES NO OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY.

THE REMEDY PROVIDED UNDER THIS WARRANTY SHALL BE THE SOLE, EXCLUSIVE AND ONLY REMEDY AVAILABLE TO PURCHASER AND IN NO CASE SHALL THE COMPANY BE SUBJECT TO ANY OTHER OBLIGATIONS OR LIABILITIES. UNDER NO CIRCUMSTANCES SHALL THE COMPANY BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, EXPENSES, LOSSES OR DELAYS HOWSOEVER CAUSED.

No statement, representation, agreement, or understanding, oral or written, made by any agent, distributor, representative, or employee of the Company which is not contained in this Warranty will be binding upon the Company unless made in writing and executed by an officer of the Company.

This warranty shall not be effective as to any claim which is not presented within 30 days after the date upon which the product is claimed not to have been as warranted. Any action for breach of this warranty must be commenced within one year after the date upon which the cause of action occurred.

Any adjustment made pursuant to this warranty shall not be construed as an admission by the Company that any product was not as warranted.

## Warranty Registration

Your DuroFlow blower has been designed and manufactured to provide continuous, trouble-free service, year in and year out.

Follow the simple maintenance procedures outlined in this manual and you will be assured of superior blower performance and years of dependable blower life.

Please register your DuroFlow Blower with our Factory Service & Warranty Department. Complete the warranty registration information below and fax it to Gardner Denver.

**Thanks again for the privilege of serving you with quality from DuroFlow.**

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**Date:**

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**Your Name:**

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**Your Title:**

---

**Your Company:**

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**Address:**

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**City, State, Zip:**

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**Telephone:**

---

**Blower Serial Number:**

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**Date of Blower Start-up:**

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**What is your application:**

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**Gardner**  
**Denver**

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For additional information, contact your local representative or

## **Gardner Denver Compressor Division**

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Sales and Service in all major cities

