APV
AN SPX BRAND

Instruction Manual

Gaulin Colloid Mills

2F4D8D

Read and understand this manual prior to operating or servicing this product.

SPX

SECTION V

PRESSURE FEEDER ASSEMBLY

The stainless-steel assembly utilizes a simple plunger design, which is actuated by operator controlled air pressure and should be used where viscosity of the product results in a decrease in capacity to less than 12 pumping when operating with gravity feed also indicates the need to use a pressure feeder. It is quickly installed and used, and it can be readily removed for disassembly and cleaning.

INSTALLATION AND OPERATION

1. Remove the standard tank and replace it with the pressure feed tank.
2. Fill the tank with product to be processed to approximately 2-I/2" from the top.
3. Place piston assembly in tank and install cap gasket, cap and cap nut. Tighten cap nut securely to tank.
4. Connect air to the air inlet connection. The air pressure required will depend on viscosity of the product and can range from 10 to the maximum allowable pressure of 100 psi.
5. Start the homogenizer and build up air pressure, until the machine operates smoothly.
6. Adjust the homogenizer pressure to the desired point by turning the handwheel.
7. Take samples.

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SECTION I

GENERAL INFORMATION

Introduction

Complete familiarity with your APV Gaulin colloid mill and its working parts will give you an increased awareness of its superior construction and wide range of capabilities. Study this manual carefully. It will help you to install the machine correctly, operate it safely and efficiently and maintain it properly.

Damage in Transit

Occasionally, a machine inadvertently suffers damage during transit or unloading procedures. Inspect the exterior of the unit carefully. If any damage is evident, file a claim with the carrier immediately and notify APV Gaulin.

Movement to Installation Location

The machine is mounted on skids to facilitate movement to your installation location. In order to prevent damage to the unit when moved, be sure to see that forklifts or slings are positioned under the skids.

Delayed Start-Up

Often APV Gaulin colloid mills are not installed and placed in operation immediately after their arrival at the job-site. The machine has been shipped in a suitable crate to prevent damage while in transit. As soon as possible after its arrival at the plant, the unit should be uncrated per instructions. After spare parts and tools have been checked against the packing list, we suggest that they be stored in a suitable place to prevent loss or damage.

If the mill is to be stored under sub-freezing conditions, be sure to drain the water jacket by removing the plug (Item #18 - page 2).

Returned Goods

Materials or equipment cannot be returned without first obtaining an RGA number. Materials and/or equipment accepted for credit are subject to a service charge plus all transportation charges. Materials or equipment built to order are not subject to return for credit under any circumstances. Any materials or equipment authorized for return must be securely packed to reach the Factory without damage.

How to Order Parts

Help us to help you by providing:

a. the **MODEL** and **SERIAL NUMBER;**
b. correct **PART NAME** identified from drawings/part lists in this manual

SECTION II

INSTALLATION

Uncrating Instructions

Instructions for uncrating your machine are attached to the shipping crate. The top and sides of the crate can be removed either at the area selected for installation or other convenient place, prior to moving the machine to the installation area skids provided. Uncrating at the installation area is preferable. Reasonable care must be exercised to avoid damage the unit during the removal of the case.

Removal from Skids

The machine must be lifted off the bolts passing through the shipping skids. Do not lift the machine by the ends or edges, as permanent damage may result. Lifting or blocking should be done on the reinforced area under the sub-base.

Location

Your APV Gaulin machine is an integral part of your processing system, and its location as a system component should be carefully planned and selected. Ease and efficiency of operation and proper maintenance depends largely upon the prior thought given to the final location.

The unit should be approximately level for best operation. It does not have to be bolted to a supporting area, unless desired. The unit can be installed on the floor, a bench or portable bench or table using casters. Consideration should be given to the weight of your mill when mounting on a bench or table. We have found that the most convenient position for operation is installation of the unit with the adjusting dial handle (45) at a height between 40 and 48" from the floor.

Water Supply

For continuous operation it is essential that cooling water be used to keep oil and mill body from reaching excessive temperatures. Therefore, provisions should be made to connect the cooling water supply to the tubing nipple (4) on the mill body. (Rubber tubing is satisfactory.) Standard pipe fittings may be substituted for tubing nipple for permanent installation. Circulation of water may be in either direction depending on supply source. Tubing nipples (4) are identical. If heating is desired, hot water can be used in place of cold water.

Note: Maximum water temperature is 160 F. Light oil or other liquids may be substituted for water. Cooling jacket is made of bronze, and coolant should be non-corrosive to this material.

> **CAUTION**: If the mill has been in operation long enough for the body to become warm, do not turn on the cooling water with the mill in operation. The cooling water comes down one side of the throat area, between the working area and the oil reservoir and would cause an uneven contraction in the throat area where the bearings are located. This would cause temporary misalignment of the rotor and stator, possibly causing them to contact and seize during this cooling operation. Therefore, it is essential that water be turned on prior to start-up of the mill.

Lubricating Oil

DO NOT USE OIL OTHER THAN THAT SPECIFIED FOR YOUR PARTICULAR MACHINE. Correct crankcase oil may be purchased from APV Gaulin, and the initial quantity is furnished with a new machine.

The oil required is a light oil with rust and oxidation inhibitors. API gravity is 31, viscosity of 145 to 155 SUS at 100 F and 43.4 SUS at 210 F with a viscosity index of 95 minimum, pour point 20 F and flash point of 395 F minimum.

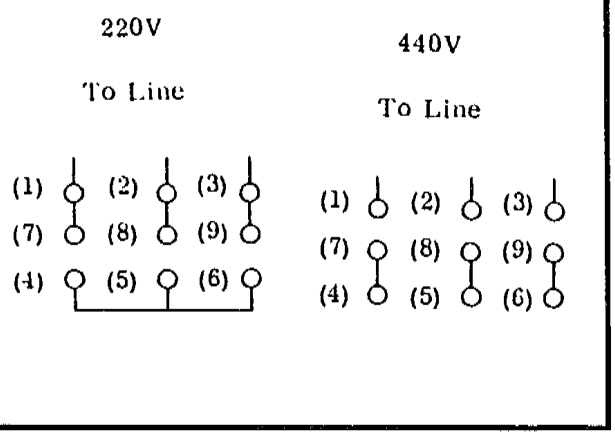
Remove the oil filler pipe plug (17) at the top of the mill body. Fill gear case with oil to the middle of the oil level gauge (59). After the initial 25 hours of operation, oil should be drained [oil drain plug (19)] and case flushed out with kerosene and then refilled with oil. This should be done after every 250 hours of operation.

Electrical

It is suggested that a licensed electrician be employed to properly wire in accordance with local codes. Wiring should be installed per motor directions, and rotation checked as indicated by arrow on mill body. (Facing front of mill, rotor shaft should turn counter-clockwise.)

CAUTION: NEVER OPERATE MILL WITHOUT FRONT COVER (2) OR MILL SETTING DISC IN PLACE.

Figure 1
MOTOR WIRING DIAGRAMS



Motor Warranty

The motors provided with the machine have been selected to meet load requirements and are covered by a warranty issued by the motor manufacturer. The motors should be lubricated in accordance with the manufacturer's recommendations. Although unlikely, should difficulty arise, contact the local representative of the motor manufacturer, our representative or APV Gaulin. If any modification or repair not authorized by the manufacturer is undertaken, the warranty is automatically voided.

Pre-Operation Cleaning

Flush and clean all connecting pipe and supply tanks of foreign material before operation. Thoroughly clean colloid mill. This is done by diassembling, cleaning and drying removable components of the mill body: front cover (2), rotor nut (6), impeller (5), rotor (4), rotor bushing (31), seal shell and components (31, 32, 33, 34, 35, 36), stator and holder assembly (12 and 13). [Note: stator (13) is shrunk-fit into stator holder and should not be removed for cleaning.] Be sure O-rings (34, 35, 58 and 64) are removed for cleaning. If accessory components are furnished, consisting of a three-way valve, bypass tubing and stainless-steel tank, disconnect, flush clean, then dry.

Removable seal shell components are:

a. seal shell (32;
b. seal spring (33);
c. seal shell gasket (34);
d. seal ring gasket (35); and,
e. seal ring assembly (36) consisting of a seal ring pressed and bonded into the seal ring holder (available only as a complete assembly):
f. rotor bushing (31).

Assembling Procedure

When parts are completely cleaned and dried, they are reassembled in reverse of the above procedure with the exception of replacing the mill body front cover (2) with the mill setting disc (D).

IMPORTANT: An arrow is stamped into the mill body and a corresponding mark on the stator holder (12). This indicates that the stator and holder (12 and 13) were installed in this position when the rotor (4) and stator were lapped together. Parts should be reassembled in this position for best results.

When assembling rotor nut (6) to rotor shaft (11), tighten only until nut contacts rotor. This nut is self-tightening, due to direction of rotation. If too much force is used in tightening nut, a bent shaft will result, especially on the small 2F mill.

After above parts are assembled, the micrometer gap setting between the rotor and stator must be checked. Before the mill left the Factory, the rotor was adjusted so that it had .001" gap between the rotor and stator when the dial reads zero. However, in transit the adjustment sometimes change.

CAUTION: We would suggest adjusting the rotor and stator in the same manner to prevent any possible contact of rotor and stator. The gap setting should be made when the parts are at room temperature.

Recalibrating Zero Micrometer Gap Setting

Follow the above assembly procedure, using mill setting disc (D). Set the arrow of the adjusting dial to zero on scale 57 and turn rotor (4) by hand. Zero setting is indicated when the rotor ceases to rub against the stator.

On inspection, if there is no contact felt between rotor and stator at the zero setting, turn the adjusting dial to .020", remove the adjusting dial stud nut (61) and adjusting dial stud (46). Reset adjusting dial (25) in teeth of adjusting shell (23), one or two teeth to the right (looking at the front of the mill), to compensate for the amount of adjustment required. Replace adjusting dial stud (46) and adjusting dial stud nut (61) and repeat procedure of checking gap setting as previously described. If checking of the gap setting indicated that when the arrow on the adjusting dial (25) is on zero the rotor cannot be turned, it is too close. Reset adjusting dial as explained above, until the correct setting is secured.

Note: On 8" colloid mills the zero gap setting is achieved in a slightly different manner, in order to compensate for the deflection of the large diameter rotor. The procedure for determining the zero setting is started the same as explained above. The exception is that, once the zero gap setting has been determined, an additional .005" must be allowed. This new, compensated adjustment is essential and must be used as the zero setting during all operations of the colloid mill.

Reset stop adjustment (80). Remove the mill setting disc and replace with the mill body cover (2).

SECTION III

OPERATION

The micrometer gap setting can be adjusted either when machine is stopped or in operation.

Turn on cooling water. The use of a valve is recommended on the water supply line to adjust the flow, which is determined by processing needs. Normal flow of two to four gallons per minute is recommended.

Open the micrometer gap setting to approximately .005", the minimum allowable gap setting for starting the mill. Always loosen the dial adjusting nut (6l) when gap setting is being made and retighten after setting has been accomplished.

If accessory components (three-way valve, bypass tubing, stainless-steel tank) are utilized, set the three-way valve to the bypass position, so that the material will recirculate back to the supply tank.

Start-Up

1. Start the flow of product to the mill.
2. Start motor.
3. Adjust micrometer gap setting, as desired.
4. Turn three-way valve to the discharge position and take a sample. Before removing the sample container, turn the three-way valve to bypass back to the tank.
5. Stop machine and test sample.

The minimum gap setting is controlled by the viscosity of the product and should never be set to a point where the flow of product is less than the following:

2" mill	10 gph
4" mill	25 gph
8" mill	75 gph

When milling a product at high temperature or at an extremely close gap setting, it is possible that the actual gap setting is greater than indicated on the micrometer scale. This is caused from expansion of the rotor shaft and can be compensated for by slightly closing the gap setting. The temperature rise of the product should be checked during the first few minutes of operation, and the gap setting readjusted to keep the temperature constant.

> **CAUTION**: The mill must never be run dry! It is recommended that the setting be increased when approaching the end of the product run, so damage will not be done to the working surfaces of the rotor and the stator.

Cleaning After Operation

The mill should be thoroughly rinsed with a suitable flushing agent immediately after each product run. All sanitary codes should be observed, when food products are processed. If there is a possibility of contamination, the machine should be completely disassembled and hand-washed. While all of the internal parts are stainless steel, intelligent cleaning procedures should be followed to avoid the possibility of corrosion or electrolytic action.

Pressure Feeder

If you have specified the pressure feeder option for use with viscous products, refer to Section V, Pressure Feeder Assembly , for complete installation and operation instructions.

SECTION IV

MAINTENANCE

Rotor

Both working surfaces of the standard rotor are Rokide coated (approximately .010" thick). When a surface is worn to the stainless-steel base, reverse the rotor and use the other surface. When both working surfaces become worn, the rotor may be returned for reconditioning, provided it is not otherwise damaged.

The stainless-steel rotor can tolerate .020" wear on each working surface for a total of .040" wear, before it should be replaced. To remove minor score marks, lap rotor to stator by recirculating one quart of water mixed with one tablespoon of Household Cleanser or equivalent.

Stator

The standard stator is ceramic. This material approaches sapphire in hardness and is non-porous. In the event of scoring or cracking, it must be replaced.

The stainless-steel stator may be worn to a depth of .040" before replacing.

Lapping Rotor and Stator

To remove minor score marks from stainless rotors and stators, recirculate a mixture of one quart of water containing one tablespoon of Household Cleanser or equivalent. Reset zero adjustment, as given in Installation section; however, after removing adjusting dial (which was at .020"), replace it so that it reads .025". True zero is now indicated as .005" on the scale.

Now move the adjusting dial to .020". Start mill and recirculate lapping mixture. Carefully decrease gap setting, until flow starts to decrease, then immediately open gap to full flow. This permits the rotor and stator surface to be flushed free of metal and lapping compound.

Repeat procedure three or four times or until surfaces are lapped smooth. Flush with water and detergent. Disassemble and clean all parts. Reassemble and recalibrate for zero adjustment.

Seal Assembly

Remove the seal assembly from the mill body, per instructions under Installation section. Inspect carbon seal ring (36) for surface imperfections.

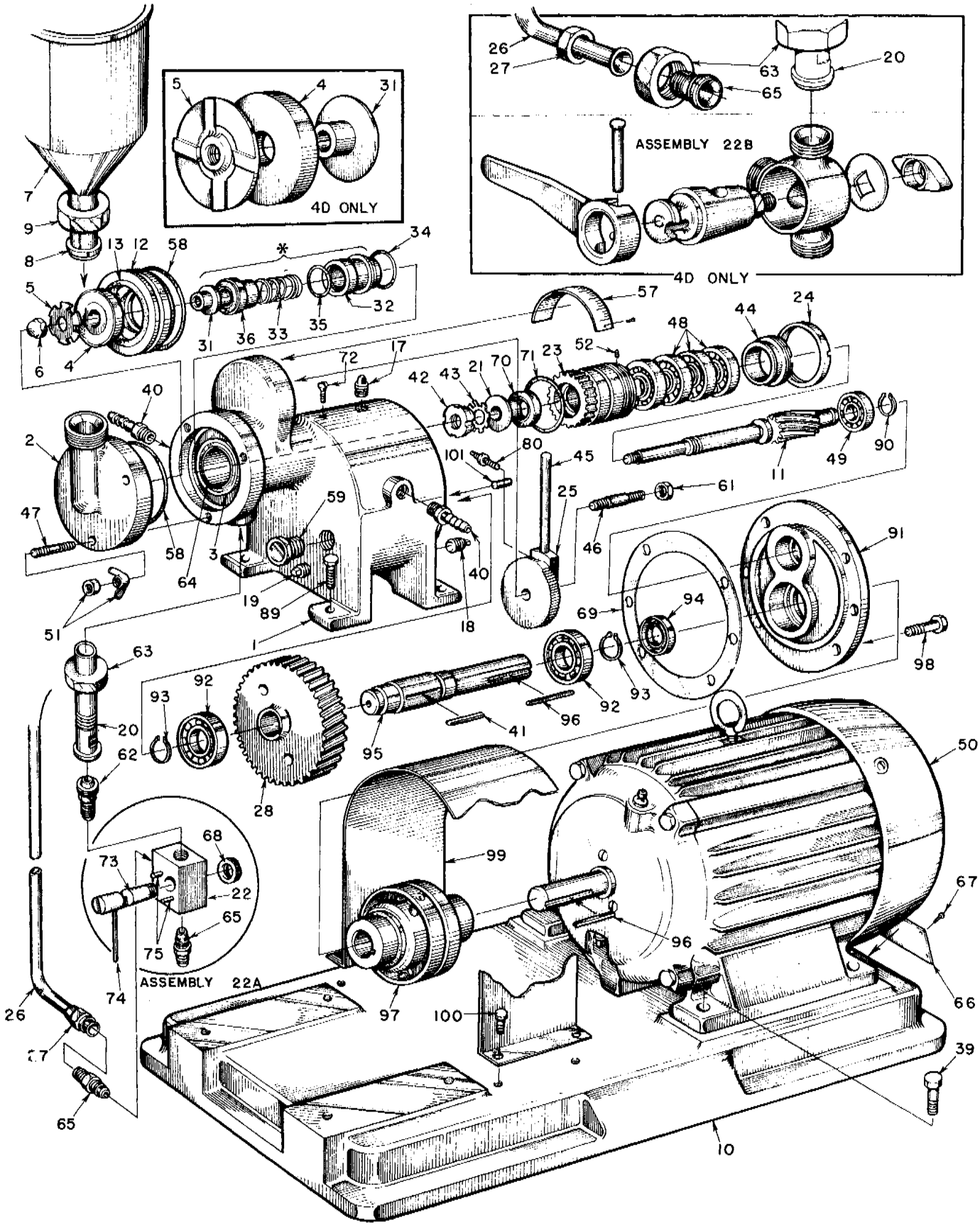
Note: If the carbon surface is worn flush with the stainless holder, the carbon seal ring must be replaced. Examine the mating surface of the rotor bushing (31). If badly worn or scored, replace. The mirror finish on the mating surfaces of the bushing and seal ring may be maintained by lapping these surfaces to a glass plate, using Diamond compound. If seal leakage is occurring and mating surface of the bushing and seal ring are in good condition, check O-rings (34 and 35) for surface imperfections.

Tension of the seal ring assembly against the rotor bushing is self-adjusting and requires that the seal spring (33) is assembled into the seal ring assembly and seal shell (32) as follows. Assemble spring into seal ring assembly by turning spring clockwise (with right hand) into seal ring assembly until it bottoms inside. Then take this assembly and install it into the seal shell in the same manner until the spring bottoms. The seal ring assembly must move freely against the seal ring gasket (35) to be completely effective. If the seal ring assembly does not move freely, lubricate the O-ring .

PARTS LIST
2F and 4D MILL

1	Mill Body	1
2	Mill Body Front Cover	1
3	Mil Body Sleeve	1
4	Rotor	1
5	Rotor Impeller	1
6	Rotor Nut	1
7	Tank	1
8	Tank Connection	1
9	Inlet Nut	1
10	Motor Base	1
11	Rotor Shaft and Pinion	1
12	Stator Holder	1
13	Stator	1
17	Air Vent	1
18	Water Drain Plug	1
29	Oil Drain Plug	1
20	Discharge Nipple	1
21	Front Flinger	1
•A	Three-Way Bypass Assembly (2F) (Parts 22, 68, 73, 74, 75)	
*B	Three-Way Bypass Assembly (4D) (Parts 22, 68, 73, 74, 75 & washer)	
22	Three-Way Valve Body	
23	Adjusting Shell	1
24	Thread Take-Up Ring	1
25	Adjusting Dial	1
26	Bypass Tube	1
27	Tubing Nut	1
28	Gear	1
*C	Seal Assembly (Parts 31, 32, 33, 34, 35, 36)	
31	Rotor Bushing	
32	Seal Shell	1
33	Seal Spring	1
34	Seal Shell Gasket	1
35	Seal Ring Gasket	1
36	Seal Ring Assembly (Parts 37 and 38)	
37	Seal Ring	1
38	Seal Ring Holder	1
39	Motor Base Cap Screw	4
40	Water Hose Nipple	2
41	Gear Key	1
42	Front Bearing Lock Nut	1
43	Front Bearing Lock Washer	1
44	Adjusting Shell Bearing Lock Nut	1
45	Adjusting Dial Handle	1
46	Adjusting Dial Stud	1
47	Mill Body Front Cover Studs	3
48	Front Bearing	2 pr
49	Back Bearings	1
50	Motor	1
51	Mill Body Front Cover Stud Nuts	3
52	Bearing Lock Nut Screw	1
57	Adjusting Dial Plate	1
58	Stator Gasket	2
59	Oil Level Gauge	1
61	Adjusting Dial Stud Nut	1
62	Discharge Union	1
63	2F - Discharge Union Nut	1
	4D - Bypass Nut	1
64	Sleeve Gasket	1
65	2F - Tubing Unions	2
	4D - Bypass Adapter	1
66	Nameplate	1
67	Nameplate Pins	1
68	Three-Way Valve Nut	1
69	Mill Body Back Cover Gasket	1
70	Bearing Seal	1
71	Adjusting Shell Seal	1
72	Thread Take-Up Ring Screw	1
73	Three-Way Valve Core	1
74	Three-Way Valve Handle	1
75	Three-Way Valve Core Pin	2
80	Adjusting Dial Stop Assembly (Set Screw and Check Nut)	1
89	Mill Body Mounting Screw	4
90	Rotor Shaft Retaining Ring	1
91	Mill Body Back Cover	1
92	Driveshaft Bearing	2
93	Driveshaft Retaining Ring	2
94	Driveshaft Seal	1
95	Driveshaft	1
96	Driveshaft Coupling Key	2
97	Driveshaft Coupling	1
98	Mill Body Back Cover Cap Screw	4
99	Driveshaft Coupling Guard	1
100	Driveshaft Coupling Guard Cap Screw	1
101	Mill Body Back Cover Dowel	2

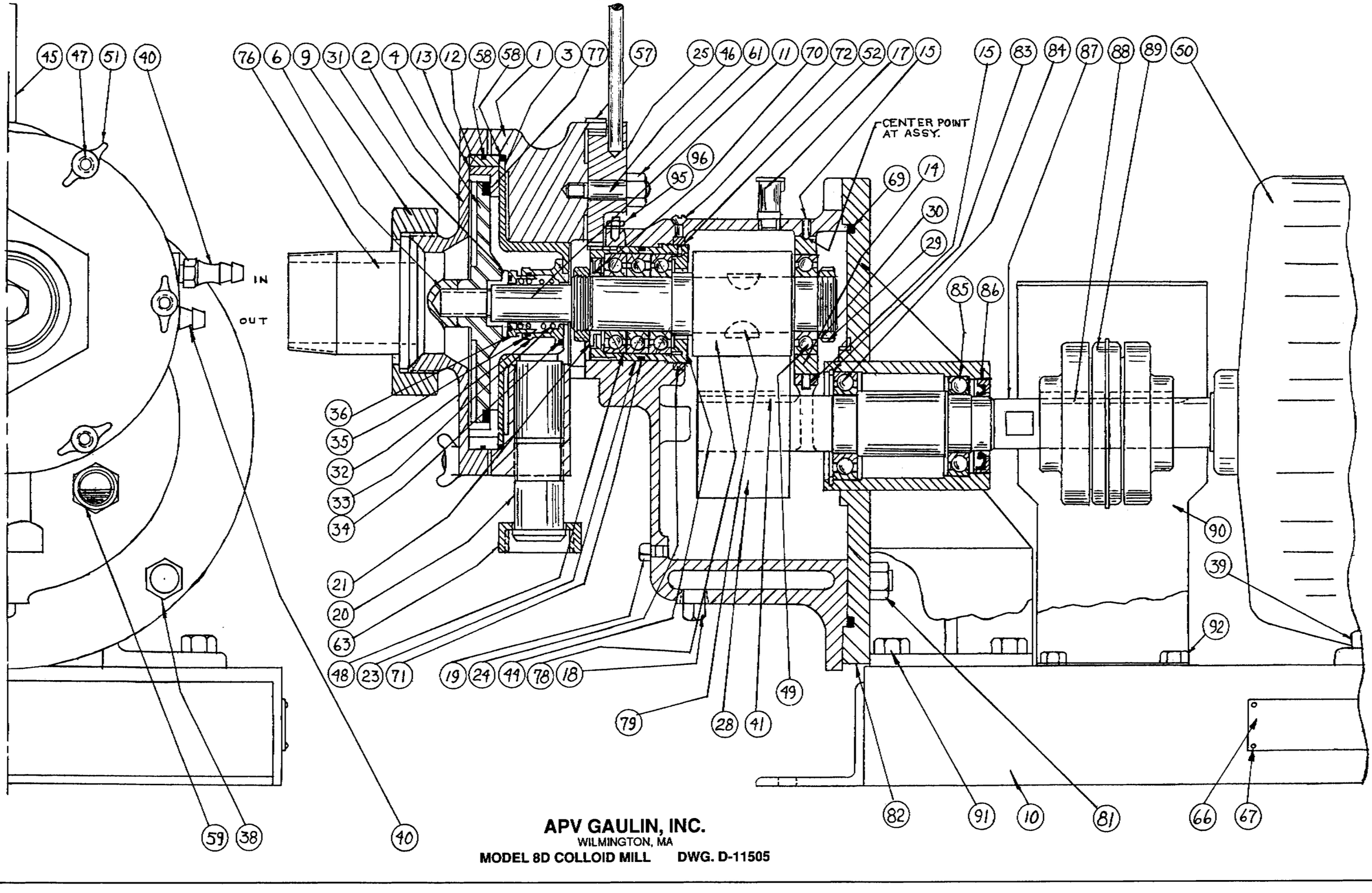
2F AND 4D COLLOID MILLS



PARTS LIST
8D MILL

1	Mill Body	1
2	Mill Body Cover	1
3	Mill Body Sleeve	1
4	Rotor	1
6	Rotor Cap Nut	1
9	Inlet Nut	1
10	Motor Base	1
11	Rotor Shaft	1
12	Stator Holder*	1
13	Stator	1
14	Back Bearing Sleeve	1
15	Back Bearing Sleeve Set Screw	1
17	Air Vent	1
18	Water Drain Plug	1
19	Oil Drain Plug	1
20	Stator Nipple	1
21	Flinger	1
23	Adjusting Shell	1
24	Thread Take-Up Ring	1
25	Adjusting Dial	1
28	Driving Gear	1
29	Bearing Lock Nut	2
30	Bearing Lock Washer	2
31	Rotor Bushing	1
32	Seal Shell	1
33	Seal Spring	1
34	Seal Shell Gasket	1
35	Seal Ring Gasket	1
36	Seal Ring Assembly (Seal Ring and Holder)	1
38	Support Flange Bolt	4
39	Motor Base Cap Screw	4
40	Water Hose Connection	2
41	Driving Gear Key	1
44	Bearing Lock Screw	1
45	Adjusting Dial Handle	1
46	Adjusting Dial Stud	2
47	Cover Stud	6
48	Front Bearing	3
49	Back Bearing	1
50	Motor	1
51	Cover Stud Wing Nut	6
52	Bearing Lock Nut Screw	1
57	Adjusting Dial Plate	1
58	Stator Gasket	2
59	Oil Level Gauge	1
61	Adjusting Dial Stud Nut	1
63	Discharge Nut	1
66	Nameplate	1
67	Nameplate Pin	7
69	Mill Body Gasket	1
70	Bearing Seal	1
71	Adjusting Shell Seal	1
72	Thread Take-Up Ring Screw	1
76	Inlet Ferrule	1
77	Rotor Insert*	1
78	Driven Gear	1
79	Driven Gear Key	2
80	Adjusting Dial Stop Assembly (Set Screw and Nut)	1
81	Driveshaft Support Flange Nut	4
82	Driveshaft Support Flange	1
83	Driveshaft Retaining Ring	1
84	Driveshaft Front Bearing	2
85	Driveshaft Rear Bearing	1
86	Driveshaft Seal	1
87	Driveshaft	1
88	Driveshaft Coupling Key	1
89	Driveshaft Coupling	1
90	Driveshaft Coupling Guard	1
91	Support Flange Mounting Screw	4
92	Guard Mounting Screw	4

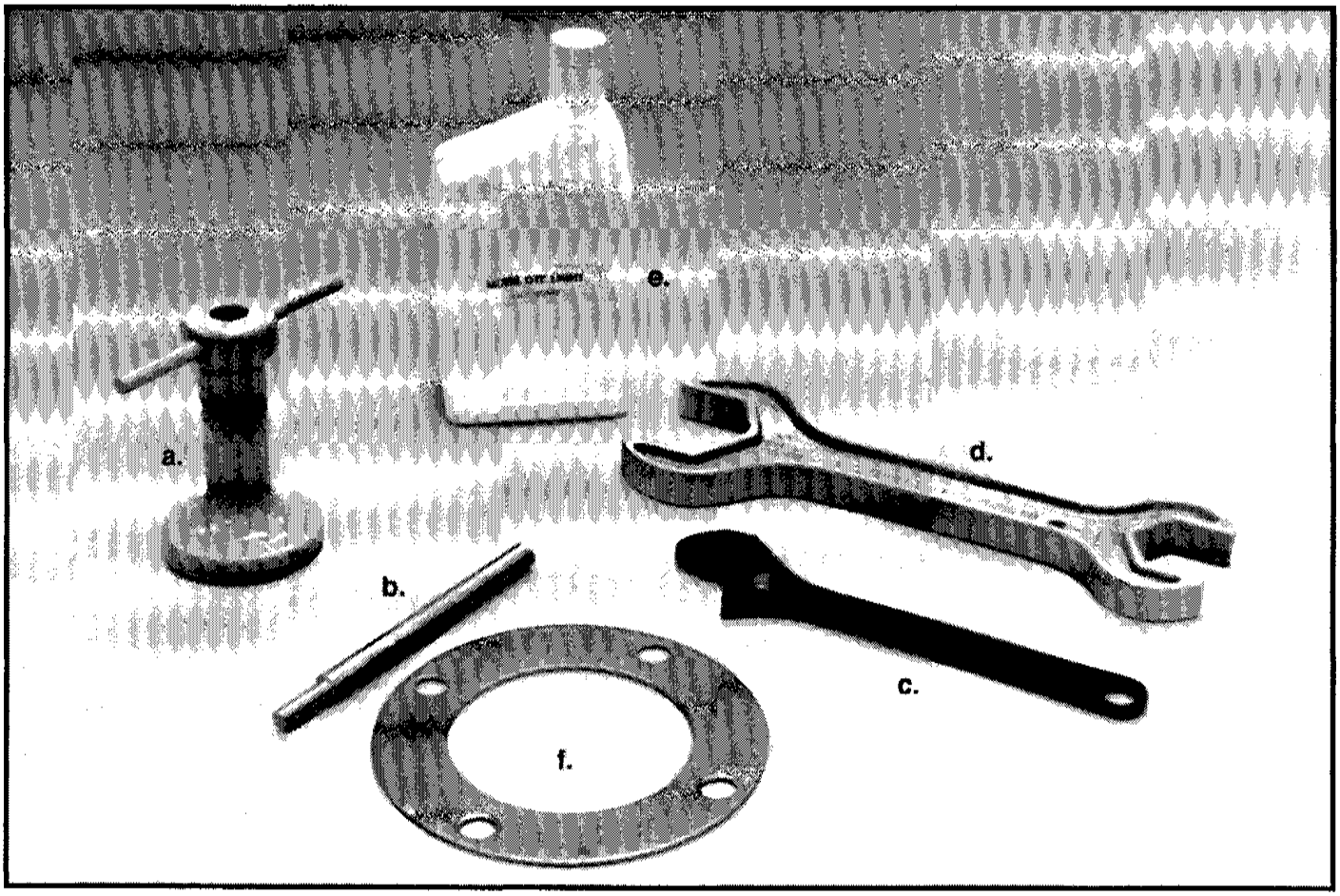
Note: Some mills may have a single-piece rotor and a single-piece stator, depending on materials. These mills will not have part #12 or #77.



APV GAULIN, INC.
WILMINGTON, MA
MODEL 8D COLLOID MILL DWG. D-11505

COLLOID MILL TOOLS

Figure 2



a.	Rotor Wrench Assembly	d.	Tank Nut Wrench
b.	Adjusting Dial Handle	e.	Oil
c.	Rotor Cap Nut Wrench or Adjusting Dial Wrench	f.	Mill Setting Disc

SECTION V

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1. Remove the standard tank and replace it with the pressure feed tank.
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