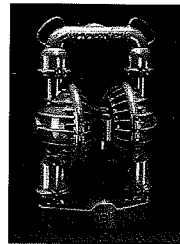


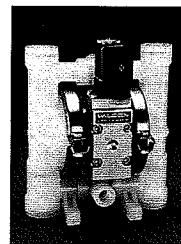
## WILDEN'S SPECIALTY PUMPS

### M8 STALLION



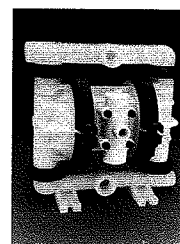
2" inlet. Solids clearance up to 3/4". Built to handle rough treatment: cast-in handles for easy portability, reinforced shaft and high impact polyurethane base.

### SOLENOID-OPERATED



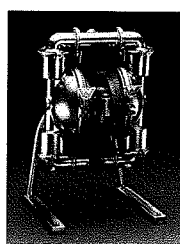
Each stroke of this pump is controlled by electrical impulses making it ideal for batching, metering, and other electrically controlled dispensing applications.

### M1 ULTRAPURE III



1/2" inlet. Teflon® PFA construction, temperatures to 300°F. Up to 14 GPM. Materials of construction have been selected to reduce contamination while providing a safer work environment.

### FOOD PROCESSING



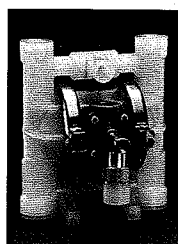
Constructed with FDA approved materials: bead blasted 316 Stainless Steel construction with tri-clamp porting and wing-nut fasteners. Foodmaster™ (pictured) is USDA accepted.



# WILDEN

AIR OPERATED DOUBLE DIAPHRAGM PUMPS

## THE WILDEN PUMP LINE



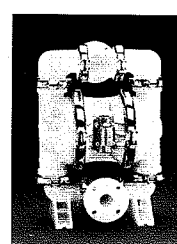
M.025 (CHAMP SERIES)

### MODEL M.025

- 1/4" Inlet
- Up To 4.5 GPM
- 125 Max. PSIG
- Max. Particle Size: 1/4"

Materials of Construction: PVDF, Acetal, Polypropylene, Carbon-filled Acetal

Suction Lift: (Rubber) Dry: 4.5' Wet: 25' (Teflon®) Dry: 4.5' Wet: 25'



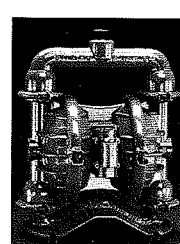
M4 PLASTIC (CHAMP SERIES)

### MODEL M4

- 1 1/2" Inlet
- Up To 73 GPM
- 125 Max. PSIG
- Max. Particle Size: 3/4"

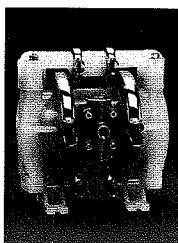
Materials of Construction: Aluminum, Cast Iron, Stainless Steel, Hastelloy, Polypropylene, PVDF, Teflon® PFA

Suction Lift: (Rubber) Plastic Dry: 17' Metal Dry: 21' Wet: 25' 25' (Teflon®) Dry: 7' 7' Wet: 25' 25'



M4 METAL

### LUBE-FREE AVAILABLE



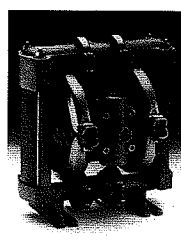
M1 PLASTIC (CHAMP SERIES)

### MODEL M1

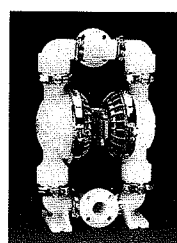
- 1/2" Inlet
- Up To 14 GPM
- 110 Max. PSIG
- Max. Particle Size: 1/4"

Materials of Construction: Polypropylene, PVDF, Teflon®, Graphite-filled Polypropylene, Aluminum, Stainless Steel

Suction Lift: (Rubber) Plastic Dry: 10' Metal Dry: 10' Wet: 25' 25' (Teflon®) Dry: 7' 8' Wet: 25' 25'



M1 METAL



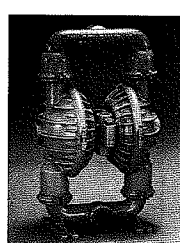
M8 PLASTIC (CHAMP SERIES)

### MODEL M8

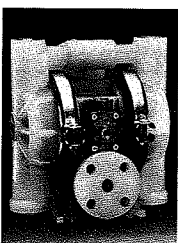
- 2" Inlet
- Up To 155 GPM
- 125 Max. PSIG
- Max. Particle Size: 1/2"

Materials of Construction: Aluminum, Cast Iron, Stainless Steel, Hastelloy, PVDF, Polypropylene

Suction Lift: (Rubber) Plastic Dry: 17' Metal Dry: 20' Wet: 25' 25' (Teflon®) Dry: 8' 8' Wet: 25' 25'



M8 METAL



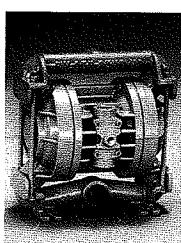
M2R PLASTIC (CHAMP SERIES)

### MODEL M2

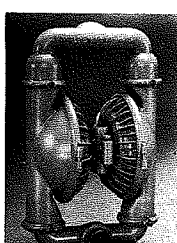
- 1" Inlet
- Up To 37 GPM
- 125 Max. PSIG
- Max. Particle Size: 1/2"

Materials of Construction: Aluminum, Stainless Steel, Hastelloy, Polypropylene, PVDF

Suction Lift: (Rubber) Plastic Dry: 17' Metal Dry: 19' Wet: 25' 25' (Teflon®) Dry: 7' 8' Wet: 25' 25'



M2 METAL



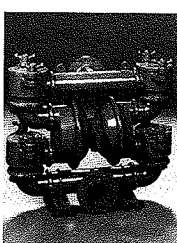
M15

### MODEL M15

- 3" Inlet
- Up To 230 GPM
- 125 Max. PSIG
- Max. Particle Size: 3/4"

Materials of Construction: Aluminum, Cast Iron, Stainless Steel, Hastelloy

Suction Lift: (Rubber) Dry: 17' Wet: 25' (Teflon®) Dry: 14' Wet: 25'



M20

### MODEL M20

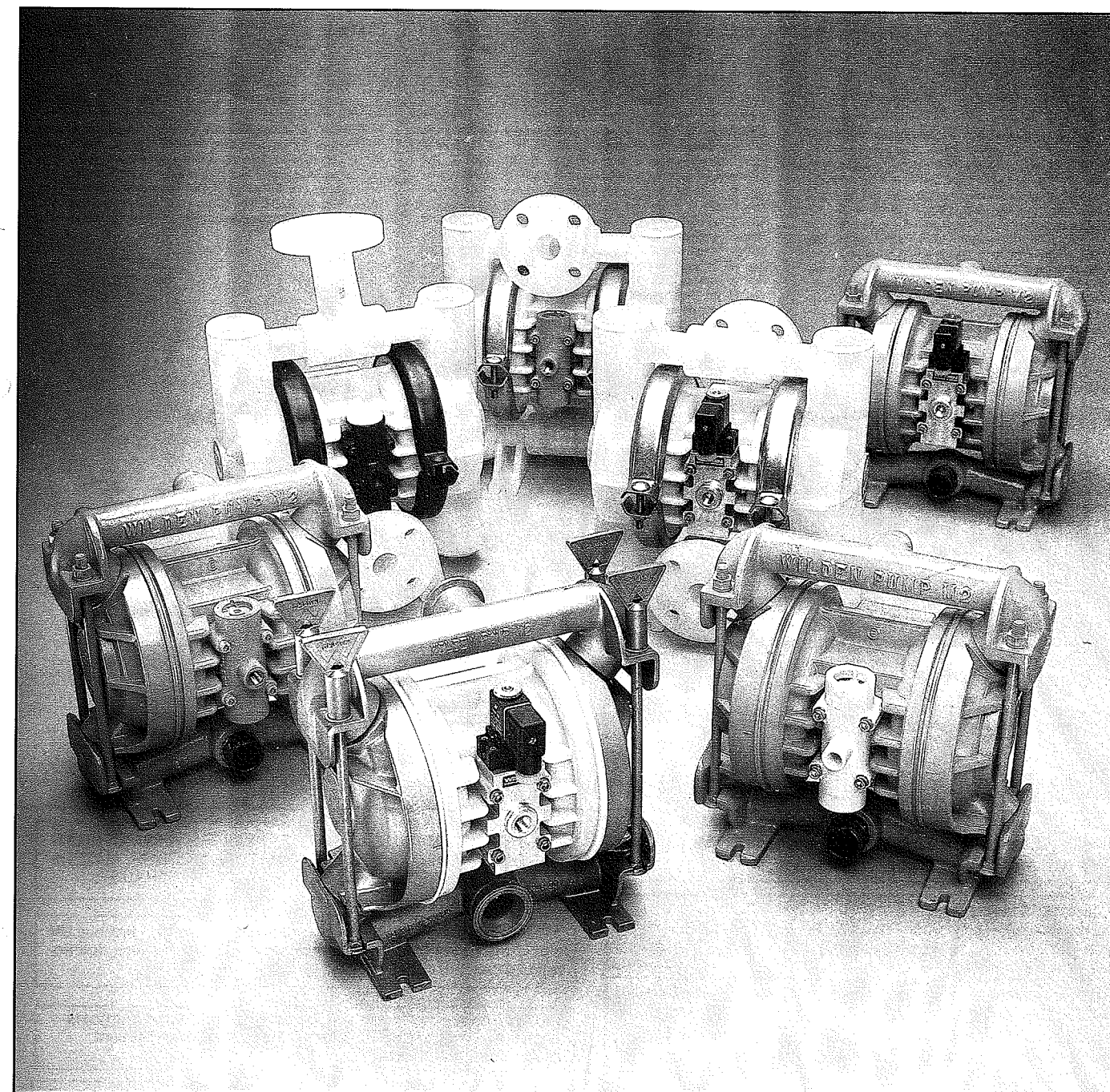
- 4" Inlet
- Up To 304 GPM
- 125 Max. PSIG
- Max. Particle Size: 1 1/4"

Materials of Construction: Cast Iron

Suction Lift: Dry: 13' Wet: 25'

# M2 Engineering Operation and Maintenance

MODEL M2 METAL  
MODEL M2 CHAMP  
MODEL M2 FOOD PROCESSING  
MODEL M2 SOLENOID-OPERATED



For further information contact your local Wilden distributor:

**WILDEN PUMP & ENGINEERING COMPANY**

22069 Van Buren St., Grand Terrace, CA 92313-5651  
(909) 422-1730 • FAX (909) 783-3440



## SECTION 8

# ELASTOMER OPTIONS / TORQUE SPECIFICATIONS

### ELASTOMER OPTIONS FOR MODEL M2 CHAMP PUMPS

MATERIAL	VALVE SEAT O-RING (4)	RETAINER O-RING (4)	VALVE BALL (4)	DIAPHRAGM (2)	TEE SECTION O-RING (4)
Polyurethane	02-1200-50-400	02-1260-50	02-1080-50	02-1010-50	02-1300-50-400
Buna	02-1200-52-400	02-1260-52	02-1080-52	02-1010-52	02-1300-52-400
Teflon® Encapsulated Silicone	02-1200-59-400	02-1260-59	NA	NA	02-1300-59-400
Teflon® Encapsulated Viton	02-1200-60-400	02-1260-60	NA	NA	02-1300-60-400
Neoprene	NA	NA	02-1080-51	02-1010-51	NA
Viton	NA	NA	02-1080-53	02-1010-53	NA
Nordel	NA	NA	02-1080-54	02-1010-54	NA
Teflon®	NA	NA	02-1080-55	02-1010-55	NA
Saniflex™	NA	NA	02-1080-56	02-1010-56	NA
Wil-Flex™	02-1200-58-400	02-1260-58	02-1080-58	02-1010-58	02-1300-58-400
Saniflex™ Backup	NA	NA	NA	02-1060-56 <sup>1</sup>	NA

1. Neoprene back-up diaphragms, P/N 02-1060-51, are available upon request. Please consult your local distributor.

### ELASTOMER OPTIONS FOR MODEL M2 METAL PUMPS

MATERIAL	DIAPHRAGM (2)	VALVE BALLS (4)	VALVE SEAT O-RINGS (4)
Neoprene	02-1010-51	02-1080-51	N/A
Buna-N	02-1010-52	02-1080-52	02-1200-52
Saniflex™	02-1010-56	02-1080-56	02-1200-56
Wil-Flex™	02-1010-58	02-1080-58	02-1200-58
Nordel (EPDM)	02-1010-54	02-1080-54	02-1200-54
Polyurethane	02-1010-50	02-1080-50	02-1200-50
Teflon® PTFE	02-1010-55	02-1080-55	02-1200-55
Viton	02-1010-53	02-1080-53	N/A
Saniflex™ Back-up <sup>2</sup>	02-1060-56 <sup>1</sup>	N/A	N/A

NOTE: This elastomer chart is in reference to M2 Metal Pumps, Section 6A.

<sup>1</sup> Use Saniflex™ back-up diaphragms with Teflon® PTFE, P/N 02-1010-55, diaphragms only.

<sup>2</sup> Neoprene back-up diaphragms, P/N 02-1060-51, are available upon request. Please consult your local distributor.

### TORQUE SPECIFICATIONS FOR MODEL M2 METAL & M2R PLASTIC PUMPS

ITEM #	DESCRIPTION OF PART	MAXIMUM TORQUE	
		METAL	PLASTIC
1	Air Valve — Lubed	30 in.-lbs. [3.4 m-N]	35 in.-lbs. [3.9 m-N]
2	Air Valve — Lube-free	20 in.-lbs. [2.3 m-N]	20 in.-lbs. [2.3 m-N]
3	Outer Piston — Rubber and Teflon Fitted	28 ft.-lbs. [38 m-N]	25 ft.-lbs. [33.9 m-N]
4	Top and Bottom Retainers	N/A	125 in.-lbs. [14.1 m-N]
5	Large Clamp Band — Rubber Fitted	N/A	95 in.-lbs. [10.7 m-N]
6	Large Clamp Band — Teflon Fitted	N/A	125 in.-lbs. [14.1 m-N]
7	Vertical Bolts	115 in.-lbs. [13.0 m-N]	N/A

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**CAUTION: DO NOT EXCEED 125 PSIG AIR SUPPLY PRESSURE. (50 PSI ON UL MODELS.)**

**ALUMINUM PUMPS ARE FUNCTION TESTED WITH WATER AND SODIUM SILICATE. PUMPS SHOULD BE THOROUGHLY FLUSHED WITH WATER BEFORE INSTALLING INTO PROCESS LINES. FDA APPROVED PUMPS SHOULD BE CLEANED AND/OR SANITIZED BEFORE BEING USED ON EDIBLE PRODUCTS. USE AN IN-LINE AIR FILTER.**

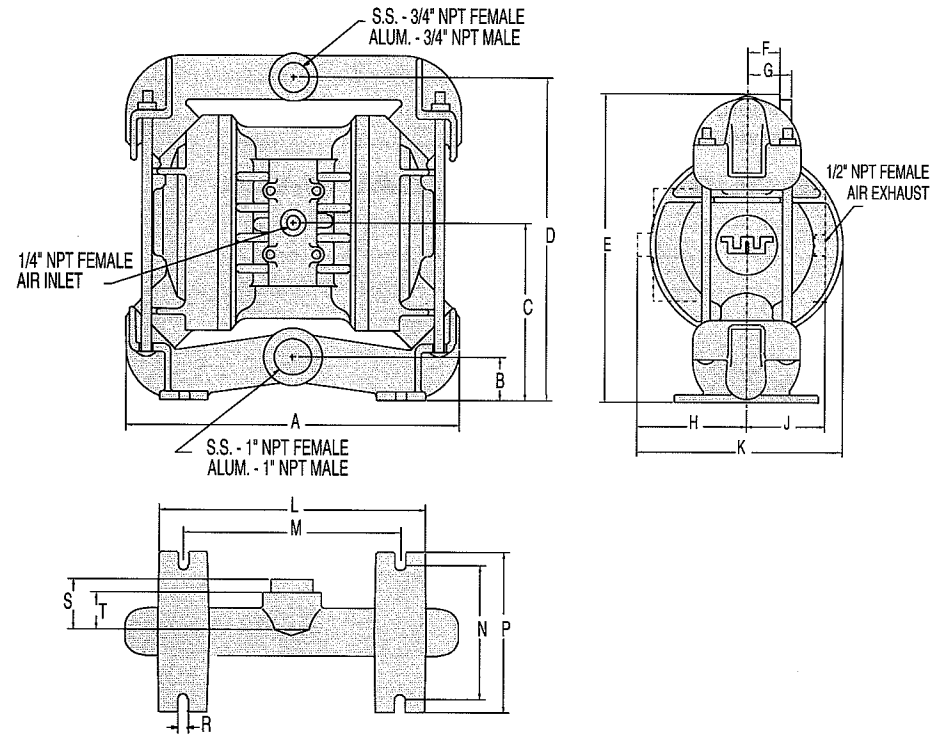
**CAUTION: DO NOT EXCEED 125 PSIG AIR SUPPLY PRESSURE. BLOW OUT AIR LINE FOR 10 TO 20 SECONDS BEFORE ATTACHING TO PUMP TO MAKE SURE ALL PIPE LINE DEBRIS IS CLEAR. USE AN IN-LINE AIR FILTER.**

**WARNING: Only the Nema 7 solenoid valve can be used in an area where explosion proof equipment is required. Nema 4 solenoid valves are not suitable.**

**CAUTION: Before any maintenance or repair is attempted, the compressed air line to the pump should be disconnected and all air pressure allowed to bleed from pump. Disconnect all intake, discharge, and air lines. Drain the pump by turning it upside down and allowing any fluid to flow into a suitable container.**

**CAUTION: When removing the end cap using compressed air, the air valve end cap may come out with considerable force. Hand protection such as a padded glove or a rag should be used to capture the end cap.**

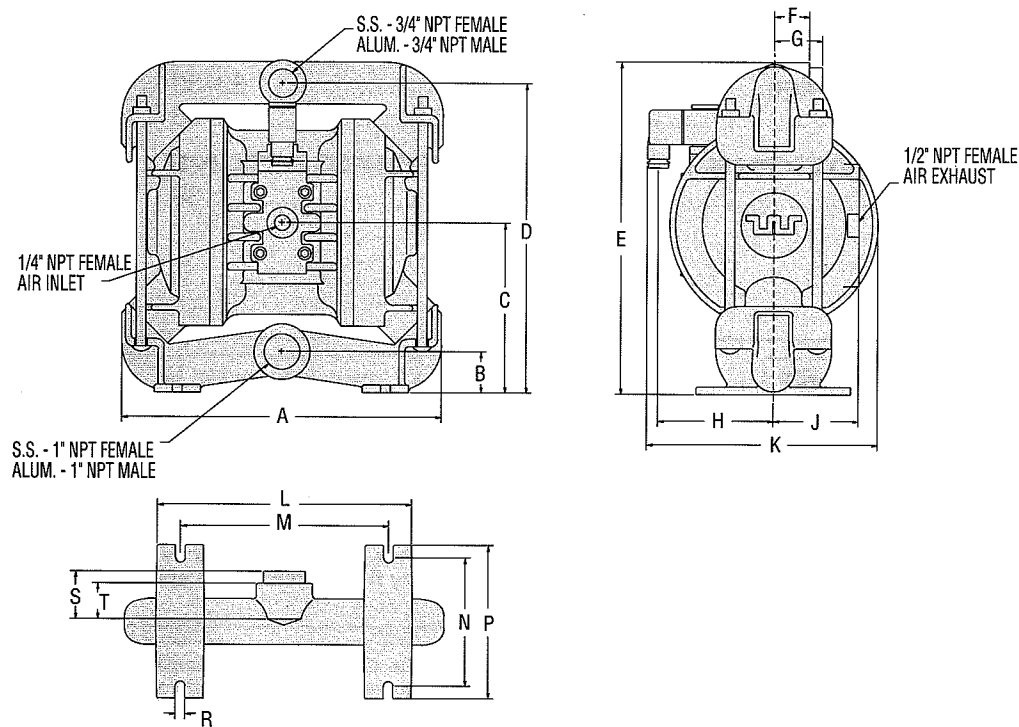
# SECTION 1A DIMENSIONAL DRAWING MODEL M2 METAL



DIMENSIONS - M2 (METAL)		
ITEM	STANDARD (inch)	METRIC (mm)
A	10 17/32	267.5
B	1 7/16	36.5
C	5 7/16	138.0
D	10	254.0
E	11	279.4
F	1 1/8	28.6
G	1 7/8	47.6
H	3 3/4	95.3
J	3 1/32	77.0
K	7 1/4	184.2
L	8 1/4	209.6
M	6 3/4	171.5
N	4 3/16	106.4
P	5	127.0
R	5/16	7.9
S	2 1/32	51.6
T	1 1/4	31.8

BSP threads available.  
Aluminum pumps are manufactured with mild steel nipples. Stainless steel nipples are available.

# SECTION 1B DIMENSIONAL DRAWING MODEL M2 METAL SOLENOID-OPERATED



DIMENSIONS - M2 (METAL) SOLENOID-OPERATED		
ITEM	STANDARD (inch)	METRIC (mm)
A	10 17/32	267.5
B	1 7/16	36.5
C	5 7/16	138.0
D	10	254.0
E	11	279.4
F	1 1/8	28.6
G	1 7/8	47.6
H	3 25/32	96.0
J	3 1/32	77.0
K	7 1/2	190.5
L	8 1/4	209.6
M	6 3/4	171.5
N	4 3/16	106.4
P	5	127.0
R	5/16	7.94
S	2 1/32	51.6
T	1 1/4	31.8

BSP threads available.  
Aluminum pumps are manufactured with mild steel nipples. Stainless steel nipples are available.

# WILDEN MODEL M2 CHAMP — SOLENOID-OPERATED

Item No.	Part Description	Qty. Per Pump	TEFLON			
			M2-150/PPPE P/N	M2-150/KPPE P/N	M2-150/PPPE P/N	M2-150/KPPE P/N
1	Solenoid Valve Assembly	1	02-2000-99-150	02-2000-99-150	02-2000-99-150	02-2000-99-150
1	Main Valve Body	1	02-2000-01-150	02-2000-01-150	02-2000-01-150	02-2000-01-150
2	Coil	1	00-2110-99-150	00-2110-99-150	00-2110-99-150	00-2110-99-150
3	Terminal Connector	1	00-2130-99	00-2130-99	00-2130-99	00-2130-99
4	Air Valve Gasket — Buna	1	02-2600-52	02-2600-52	02-2600-52	02-2600-52
5	Air Valve Bolt	4	02-6000-03-200	02-6000-03-200	02-6000-03-200	02-6000-03-200
6	Air Valve Nut	4	04-6400-03	04-6400-03	04-6400-03	04-6400-03
7	Muffler Plate	1	02-3180-20	02-3180-20	02-3180-20	02-3180-20
8	Muffler Plate Gasket — Buna	1	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500
9	Center Section	1	02-3151-20	02-3151-20	02-3151-20	02-3151-20
10	Center Section O-Ring	4	02-3200-52	02-3200-52	02-3200-52	02-3200-52
11	Shaft	1	02-3800-09-07 <sup>1</sup>	02-3800-09-07 <sup>1</sup>	02-3800-09-07 <sup>1</sup>	02-3800-09-07 <sup>1</sup>
12	Inner Piston	2	02-3710-01-150	02-3710-01-150	02-3710-01-150	02-3710-01-150
13	Outer Piston	2	02-4550-20-500	02-4550-21-500	02-4600-20-500	02-4600-21-500
14	Liquid Chamber	2	02-5000-20-400	02-5000-21-400	02-5000-20-400	02-5000-21-400
15	Manifold Tee Section <sup>2</sup>	2	02-5160-20-400	02-5160-21-400	02-5160-20-400	02-5160-21-400
16	Top Retainer	2	02-5410-20-400	02-5410-21-400	02-5410-20-400	02-5410-21-400
17	Bottom Retainer	2	02-5420-20-400	02-5420-21-400	02-5420-20-400	02-5420-21-400
18	Valve Seat	4	02-1120-20-400	02-1120-21-400	02-1120-20-400	02-1120-21-400
19	Valve Seat O-Ring*	4	—	—	02-1200-59-400	02-1200-60-400
20	Retainer O-Ring*	4	—	—	02-1260-59	02-1260-60
21	Valve Ball*	4	—	—	02-1080-55	02-1080-55
22	Diaphragm*	2	—	—	02-1010-55	02-1010-55
23	Back-up Diaphragm	2	N/R	N/R	02-1060-56	02-1060-56
24	Tee Section O-Ring*	4	—	—	02-1300-59-400	02-1300-60-400
25	Clamp Band Assembly	2	02-7300-03-400	02-7300-03-400	02-7300-03-400	02-7300-03-400
26	Clamp Band Bolt	4	08-6050-03-500	08-6050-03-500	08-6050-03-500	08-6050-03-500
27	Clamp Band Nut	4	08-6400-03	08-6400-03	08-6400-03	08-6400-03
28	Muffler	1	02-3510-99	02-3510-99	02-3510-99	02-3510-99
29	Expanded Teflon® Gasket Kit (Not Shown)	1	N/R	N/R	02-9500-99	02-9500-99

<sup>1</sup>Refer to Section 6C and 6D prior to ordering these parts.

<sup>2</sup>DIN Flange: Polypropylene = 02-5160-20-404, PVDF = 02-5160-21-404

\*Refer to corresponding elastomer chart in Section 8 for correct part number.

## SOLENOID-OPERATED VALVE ASSEMBLY OPTIONS (CONSISTS OF VALVE BODY, COIL AND CONNECTOR)

Pump Models Designating Specialty Code #	Part Number	Description
151	02-2000-99-151	24V AC / 12V DC Valve Assembly
153	02-2000-99-153	24V AC / 12V DC Valve Assembly (Nema 7)
150	02-2000-99-150	24V DC Valve Assembly
154	02-2000-99-154	24V DC Valve Assembly (Nema 7)
157	02-2000-99-157	24V DC Valve Assembly <sup>1</sup>
155	02-2000-99-155	110V AC Valve Assembly
156	02-2000-99-156	110V AC Valve Assembly (Nema 7)

## ITEM 1 MAIN VALVE BODY OPTIONS

Part Number	Description
02-2040-01	Main Valve Body
02-2040-01-154	Main Valve Body (Nema 7)

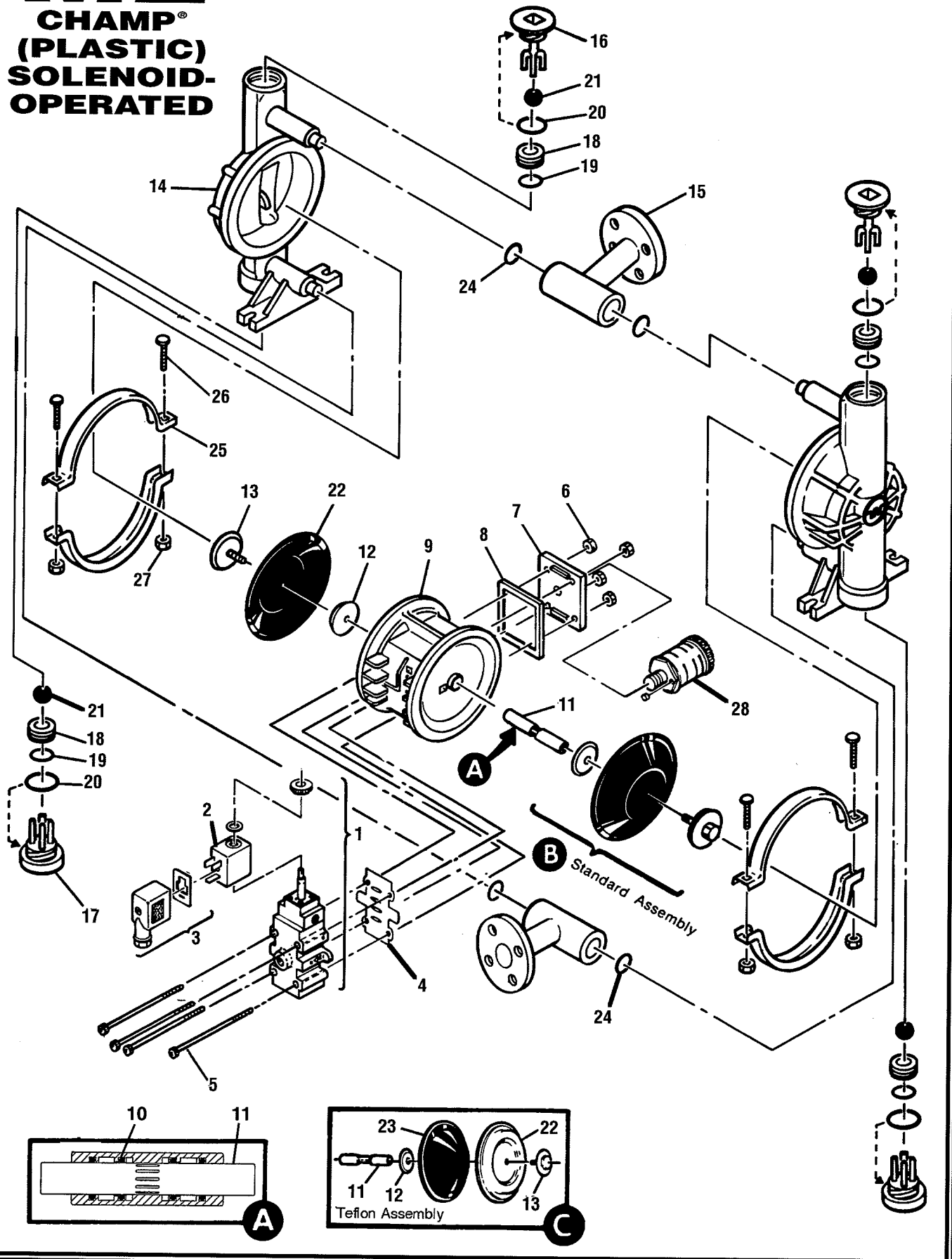
## ITEM 2 COIL OPTIONS

Pump Models Designating Specialty Code #	Part Number	Description
151	00-2110-99-151	24V AC / 12V DC Coil
153	00-2110-99-153	24V AC / 12V DC Coil (Nema 7)
150	00-2110-99-150	24V DC Coil
154	00-2110-99-154	24V DC Coil (Nema 7)
155	00-2110-99-155	110V AC Coil
156	00-2110-99-156	110V AC Coil (Nema 7)

<sup>1</sup>Meets European standards and regulations; CENELEC/PTB File #EX-91.C.2027.

# M2

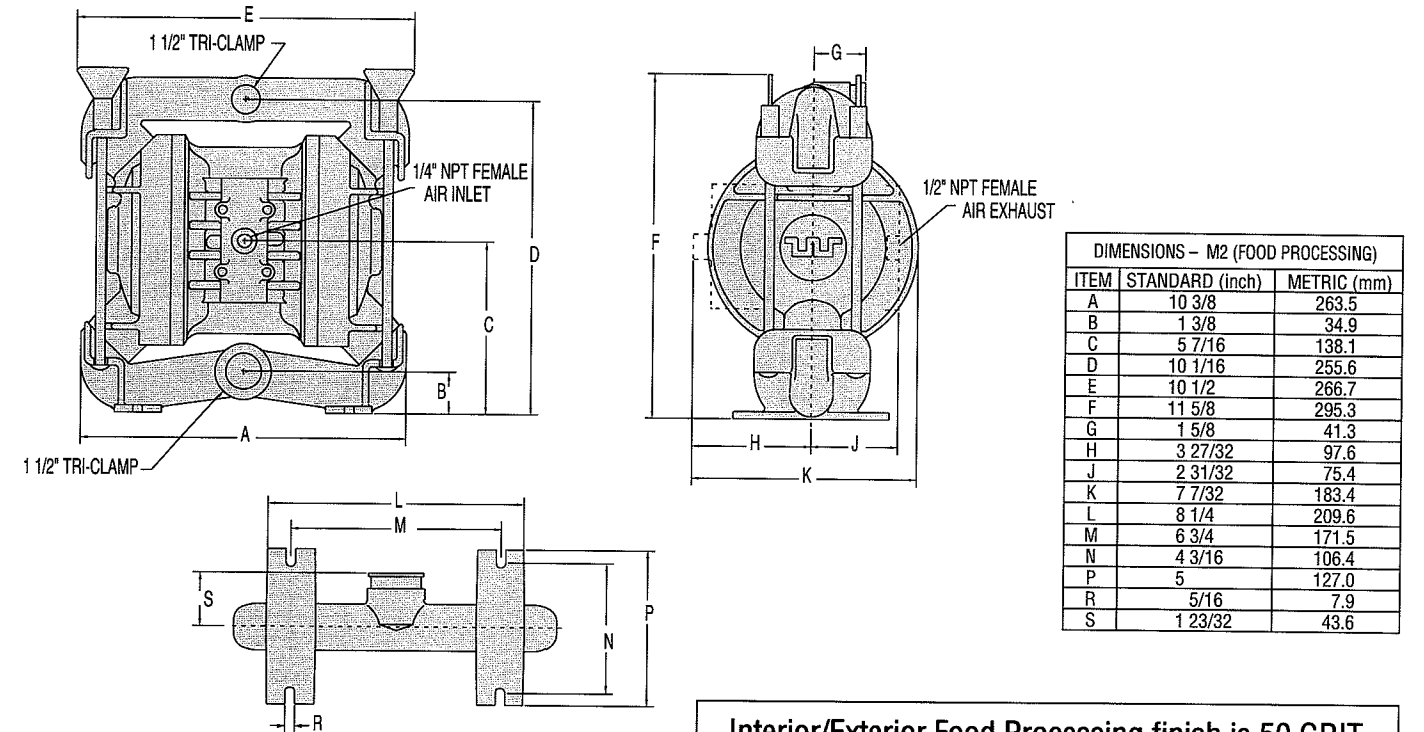
CHAMP®  
(PLASTIC)  
SOLENOID-OPERATED



## SECTION 1C

### DIMENSIONAL DRAWING

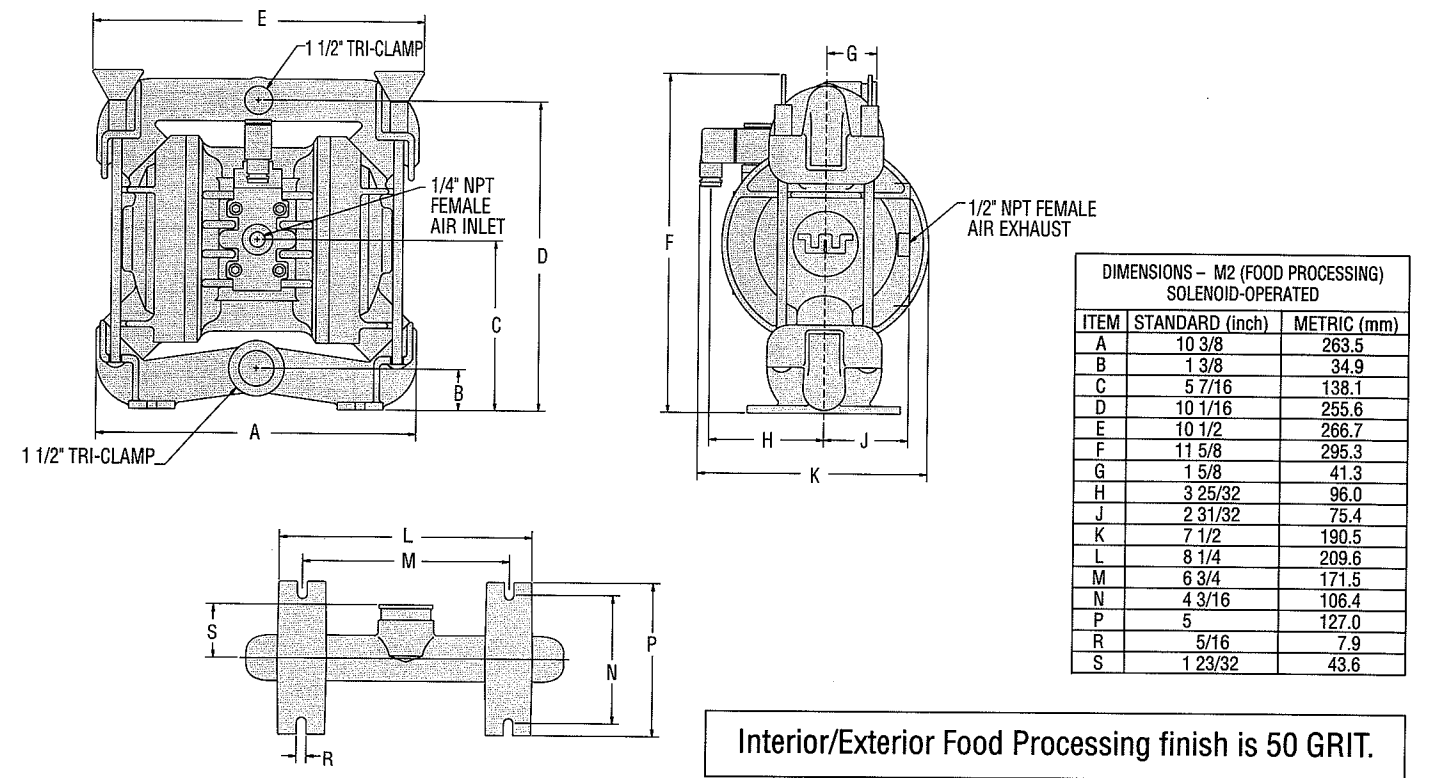
#### MODEL M2 FOOD PROCESSING



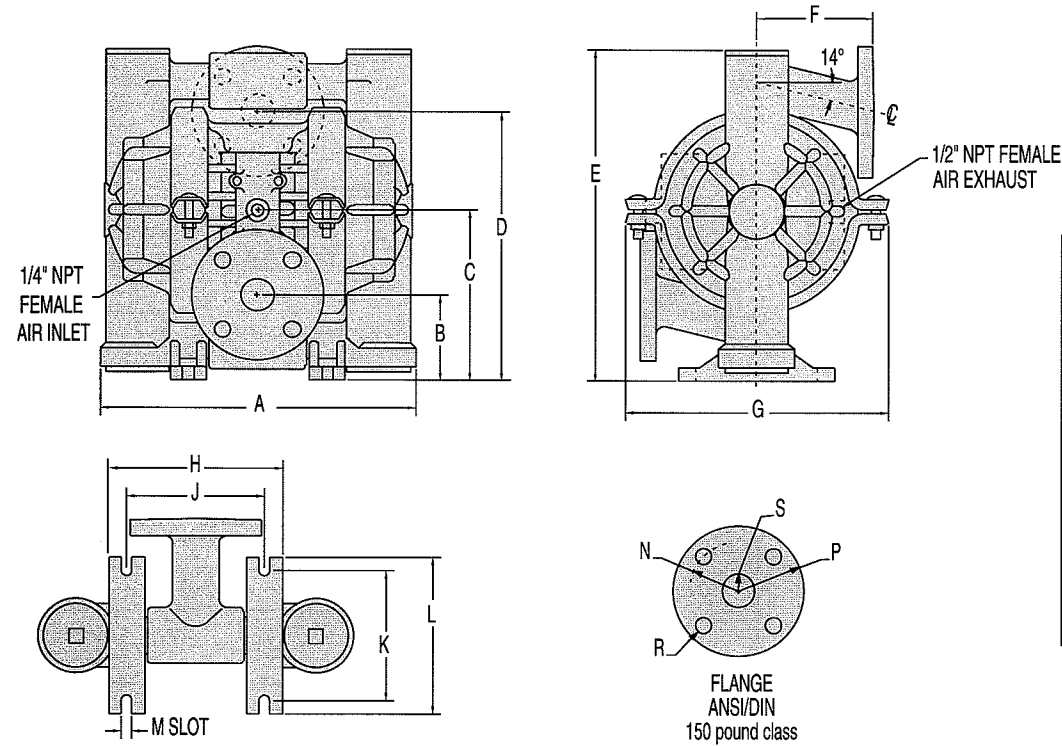
## SECTION 1D

### DIMENSIONAL DRAWING

#### MODEL M2 FOOD PROCESSING SOLENOID-OPERATED



# SECTION 1E DIMENSIONAL DRAWING MODEL M2 CHAMP



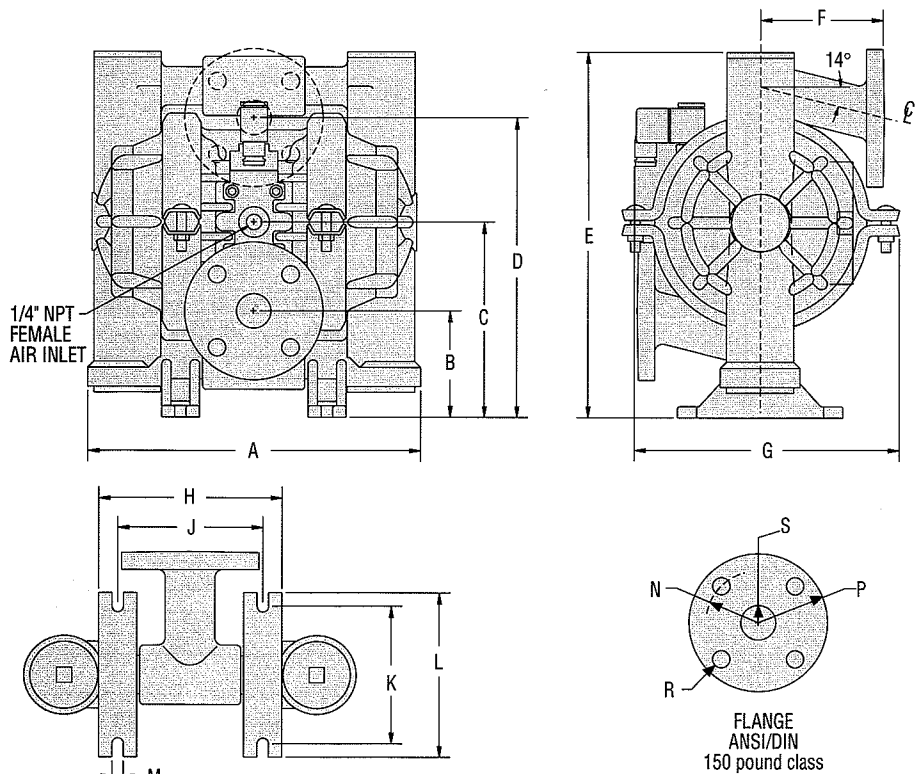
DIMENSIONS - M2 (PLASTIC)		
ITEM	STANDARD (inch)	METRIC (mm)
A	11	279.0
B	2 29/32	73.8
C	6 3/8	161.8
D	9 15/16	252.2
E	12	304.8
F	4 3/16	106.3
G	9 3/8	238.1
H	6 3/16	157.2
J	4 29/32	124.5
K	4 17/32	115.1
L	5 7/16	138.1
M	3/8	9.5
ANSI FLANGE		DIN FLANGE
N	1 9/16 RAD.	42.4 RAD.
P	2 1/4 RAD.	57.2 RAD.
R	5/8 DIA.	14.3 DIA.
S	1	25.4

DIN flanges available.

# MODEL M2 CHAMP — AIR-OPERATED

Item No.	Part Description	Qty. Per Pump	TEFLON®-FITTED PUMPS							
			M2-400/PPPB	M2-402/PPPC	M2-400/KPPB	M2-402/KPPC	M2-400/PPPB	M2-402/PPPC	M2-400/KPPB	M2-402/KPPC
1	Air Valve Assembly*	1	02-2000-07	02-2000-05	02-2000-07	02-2000-05	02-2000-07	02-2000-05	02-2000-07	02-2000-05
2	End Cap w/Guide	1	02-2300-23	02-2300-23	02-2300-23	02-2300-23	02-2300-23	02-2300-23	02-2300-23	02-2300-23
3	End Cap w/o Guide	1	02-2330-23	02-2330-23	02-2330-23	02-2330-23	02-2330-23	02-2330-23	02-2330-23	02-2330-23
4	End Cap O-Ring	2	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52
5	Snap Ring	2	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03
6	End Cap Cover	2	N/R	02-2420-55	N/R	02-2420-55	N/R	02-2420-55	N/R	02-2420-55
7	End Cap Bolt	2	N/R	02-2450-22	N/R	02-2450-22	N/R	02-2450-22	N/R	02-2450-22
8	Air Valve Gasket — Buna	1	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52
9	Air Valve Bolt	4	02-6000-03	02-6000-05	02-6000-03	02-6000-05	02-6000-03	02-6000-05	02-6000-03	02-6000-05
10	Air Valve Nut	4	04-6400-03	04-6400-05	04-6400-03	04-6400-05	04-6400-03	04-6400-05	04-6400-03	04-6400-05
11	Muffler Plate	1	02-3180-20	02-3180-20	02-3180-20	02-3180-20	02-3180-20	02-3180-20	02-3180-20	02-3180-20
12	Muffler Plate Gasket — Buna	1	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500
13	Center Section¹	1	02-3151-20	02-3151-20	02-3151-20	02-3151-20	02-3151-20	02-3151-20	02-3151-20	02-3151-20
14	Center Section O-Ring	4	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52
15	Shaft¹	1	02-3800-09-07¹	02-3800-09-07¹	02-3800-09-07¹	02-3800-09-07¹	02-3820-09-07¹	02-3820-09-07¹	02-3820-09-07¹	02-3820-09-07¹
16	Inner Piston	2	02-3700-08	02-3700-08	02-3700-08	02-3700-08	02-3750-01	02-3750-01	02-3750-01	02-3750-01
17	Outer Piston	2	02-4550-20-500	02-4550-20-500	02-4550-21-500	02-4550-21-500	02-4600-20-500	02-4600-20-500	02-4600-21-500	02-4600-21-500
18	Liquid Chamber	2	02-5000-20-400	02-5000-20-400	02-5000-21-400	02-5000-21-400	02-5000-20-400	02-5000-20-400	02-5000-21-400	02-5000-21-400
19	Manifold Tee Section¹	2	02-5160-20-400	02-5160-20-400	02-5160-21-400	02-5160-21-400	02-5160-20-400	02-5160-20-400	02-5160-21-400	02-5160-21-400
20	Top Retainer	2	02-5410-20-400	02-5410-20-400	02-5410-21-400	02-5410-21-400	02-5410-20-400	02-5410-20-400	02-5410-21-400	02-5410-21-400
21	Bottom Retainer	2	02-5420-20-400	02-5420-20-400	02-5420-21-400	02-5420-21-400	02-5420-20-400	02-5420-20-400	02-5420-21-400	02-5420-21-400
22	Valve Seat	4	02-1120-20-400	02-1120-20-400	02-1120-21-400	02-1120-21-400	02-1120-20-400	02-1120-20-400	02-1120-21-400	02-1120-21-400
23	Valve Seat O-Ring**	4	—	—	—	—	—	—	—	—
24	Retainer O-Ring**	4	—	—	—	—	—	—	—	—
25	Valve Ball**	4	—	—	—	—	—	—	—	—
26	Diaphragm**	2	—	—	—	—	02-1010-55	02-1010-55	02-1010-55	02-1010-55
27	Back-up Diaphragm	2	N/R	N/R	N/R	N/R	02-1060-56	02-1060-56	02-1060-56	02-1060-56
28	Tee Section O-Ring**	4	—	—	—	—	—	—	—	—
29	Clamp Band Assembly	2	02-7300-03-400	02-7300-05-402	02-7300-03-400	02-7300-05-402	02-7300-03-400	02-7300-05-402	02-7300-03-400	02-7300-05-402
30	Clamp Band Bolt	4	08-6050-03-500	08-6050-05-502	08-6050-03-500	08-6050-05-502	08-6050-03-500	08-6050-05-502	08-6050-03-500	08-6050-05-502
31	Clamp Band Nut	4	08-6400-03	08-6400-05	08-6400-03	08-6400-05	08-6400-03	08-6400-05	08-6400-03	08-6400-05
32	Muffler	1	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99
33	Expanded Teflon® Gasket Kit (Not Shown)	1	N/R	N/R	N/R	N/R	02-9500-99	02-9500-99	02-9500-99	02-9500-99

# SECTION 1F DIMENSIONAL DRAWING MODEL M2 SOLENOID-OPERATED CHAMP



DIMENSIONS - M2 (PLASTIC) SOLENOID-OPERATED		
ITEM	STANDARD (inch)	METRIC (mm)
A	11	279.0
B	2 29/32	73.8
C	6 3/8	161.8
D	9 15/16	252.2
E	12	304.8
F	4 3/16	106.3
G	8 41/64	219.5
H	6 3/16	157.2
J	4 29/32	124.5
K	4 17/32	115.1
L	5 7/16	138.1
M	3/8	9.5
ANSI FLANGE		DIN FLANGE
N	1 9/16 RAD.	42.4 RAD.
P	2 1/4 RAD.	57.2 RAD.
R	5/8 DIA.	14.3 DIA.
S	1	25.4

DIN flanges available.

# LUBE-FREE MODEL M2 CHAMP — AIR-OPERATED

Item No.	Part Description	Qty. Per Pump	M2-418/PPPZ	M2-401/PPPZ	M2-418/KPPZ	M2-401/KPPZ	M2-418/PPPZ	M2-401/PPPZ	M2-418/KPPZ	M2-401/KPPZ
			LF P/N	LF P/N	LF P/N	LF P/N	LF P/N	LF P/N	LF P/N	LF P/N
1	Air Valve Assembly — Lube-free*	1	02-2000-65-200	02-2000-65-201	02-2000-65-200	02-2000-65-201	02-2000-65-200	02-2000-65-201	02-2000-65-200	02-2000-65-201
2	End Cap w/Plastic Guide	1	02-2301-23-200	02-2301-23-200	02-2301-23-200	02-2301-23-200	02-2301-23-200	02-2301-23-200	02-2301-23-200	02-2301-23-200
3	End Cap w/o Guide	1	02-2331-23	02-2331-23	02-2331-23	02-2331-23	02-2331-23	02-2331-23	02-2331-23	02-2331-23
4	End Cap O-Ring	2	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200
5	Snap Ring	2	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03
6	End Cap Cover	2	N/R	02-2420-55	N/R	02-2420-55	N/R	02-2420-55	N/R	02-2420-55
7	End Cap Bolt	2	N/R	02-2450-22-201	N/R	02-2450-22-201	N/R	02-2450-22-201	N/R	02-2450-22-201
8	Air Valve Gasket — Buna	1	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52
9	Air Valve Bolt	4	02-6000-03-200	02-6000-05-201	02-6000-03-200	02-6000-05-201	02-6000-03-200	02-6000-05-201	02-6000-03-200	02-6000-05-201
10	Air Valve Nut	4	04-6400-03	04-6400-05	04-6400-03	04-6400-05	04-6400-03	04-6400-05	04-6400-03	04-6400-05
11	Muffler Plate	1	02-3180-20	02-3180-20	02-3180-20	02-3180-20	02-3180-20	02-3180-20	02-3180-20	02-3180-20
12	Muffler Plate Gasket — Buna	1	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500
13	Center Section — Lube-free¹	1	02-3151-20-200	02-3151-20-200	02-3151-20-200	02-3151-20-200	02-3151-20-200	02-3151-20-200	02-3151-20-200	02-3151-20-200
14	Center Section 115 70 Shore O-Ring — Buna	4	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200
15	Slipper Seal (See page 24)	4	02-3210-55-200	02-3210-55-200	02-3210-55-200	02-3210-55-200	02-3210-55-200	02-3210-55-200	02-3210-55-200	02-3210-55-200
16	Shaft¹	1	02-3800-09-07¹	02-3800-09-07¹	02-3800-09-07¹	02-3800-09-07¹	02-3820-09-07¹	02-3820-09-07¹	02-3820-09-07¹	02-3820-09-07¹
17	Inner Piston	2	02-3700-08	02-3700-08	02-3700-08	02-3700-08	02-3750-01	02-3750-01	02-3750-01	02-3750-01
18	Outer Piston	2	02-4550-20-500	02-4550-20-500	02-4550-21-500	02-4550-21-500	02-4600-20-500	02-4600-20-500	02-4600-21-500	02-4600-21-500
19	Liquid Chamber	2	02-5000-20-400	02-5000-20-400	02-5000-21-400	02-5000-21-400	02-5000-20-400	02-5000-20-400	02-5000-21-400	02-5000-21-400
20	Manifold Tee Section¹	2	02-5160-20-400	02-5160-20-400	02-5160-21-400	02-5160-21-400	02-5160-20-400	02-5160-20-400	02-5160-21-400	02-5160-21-400
21	Top Retainer	2	02-5410-20-400	02-5410-20-400	02-5410-21-400	02-5410-21-400	02-5410-20-400	02-5410-20-400	02-5410-21-400	02-5410-21-400
22	Bottom Retainer	2	02-5420-20-400	02-5420-20-400	02-5420-21-400	02-5420-21-400	02-5420-20-400	02-5420-20-400	02-5420-21-400	02-5420-21-400
23	Valve Seat	4	02-1120-20-400	02-1120-20-400	02-1120-21-400	02-1120-21-400	02-1120-20-400	02-1120-20-400	02-1120-21-400	02-1120-21-400
24	Valve Seat O-Ring**	4	—	—	—	—	—	—	—	—
25	Retainer O-Ring**	4	—	—	—	—	—	—	—	—
26	Valve Ball**	4	—	—	—	—	—	—	—	—
27	Diaphragm**	2	—	—	—	—	02-1010-55	02-1010-55	02-1010-55	02-1010-55
28	Back-up Diaphragm	2	N/R	N/R	N/R	N/R	02-1060-56	02-1060-56	02-1060-56	02-1060-56
29	Tee Section O-Ring**	4	—	—	—	—	—	—	—	—
30	Clamp Band Assembly	2	02-7300-03-400	02-7300-05-402	02-7300-03-400	02-7300-05-402	02-7300-03-400	02-7300-05-402	02-7300-03-400	02-7300-05-402
31	Clamp Band Bolt	4	08-6050-03-500	08-6050-05-502	08-6050-03-500	08-6050-05-502	08-6050-03-500	08-6050-05-502	08-6050-03-500	08-6050-05-502
32	Clamp Band Nut	4	08-6400-03	08-6400-05	08-6400-03	08-6400-05	08-6400-03	08-6400-05	08-6400-03	08-6400-05
33	Muffler	1	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99
33	Expanded Teflon® Gasket Kit (Not Shown)	1	N/R	N/R	N/R	N/R	02-9500-99	02-9500-99	02-9500-99	02-9500-99

\*Refer to Section 6C and 6D prior to ordering these parts.

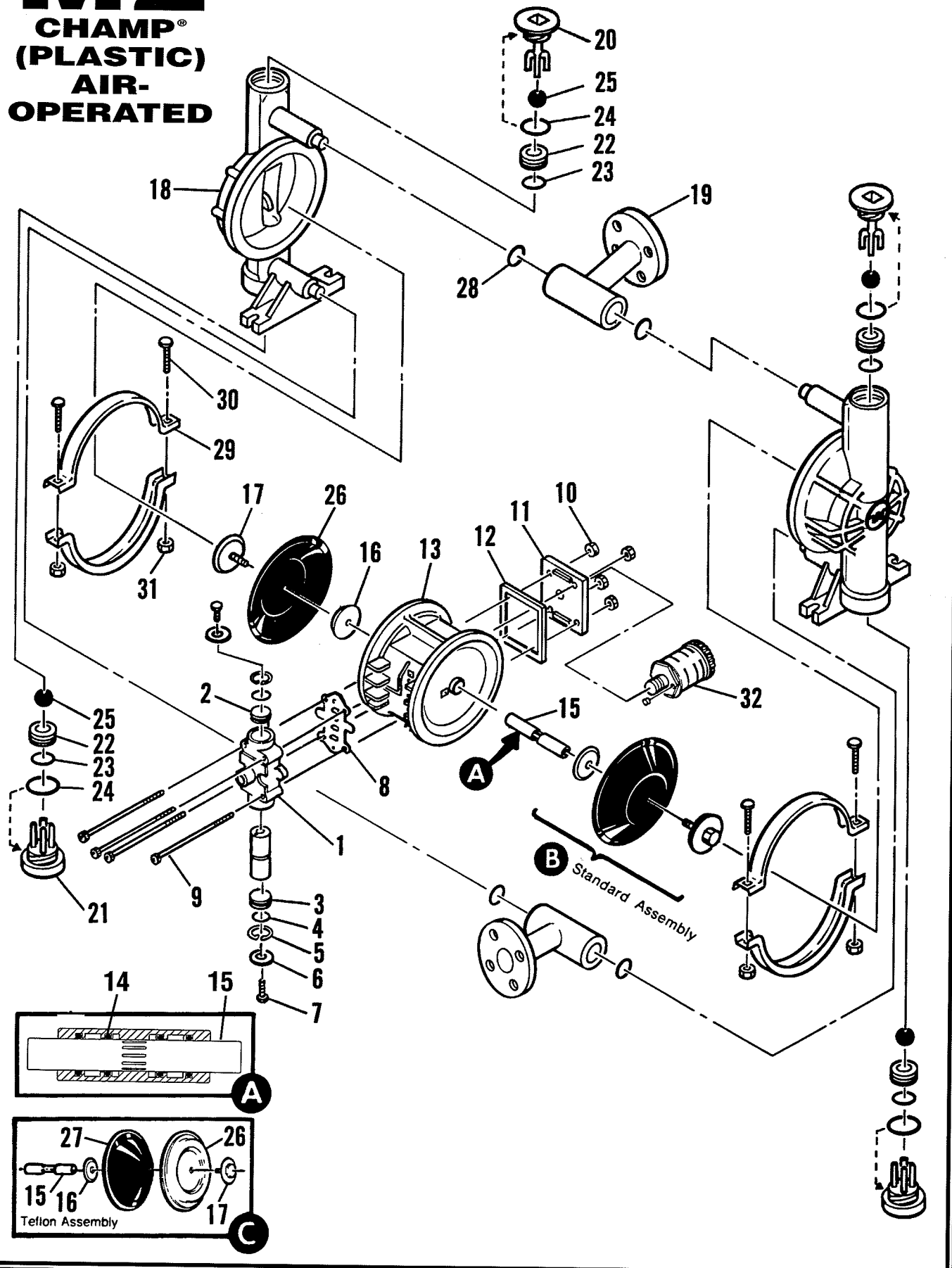
¹DIN Flange: Polypropylene = 02-5160-20-404, PVDF = 02-5160-21-404

\*\*Air valve assembly includes items 2-7.

\*\*Refer to corresponding elastomer chart in Section 8 for correct part number.

# M2

CHAMP®  
(PLASTIC)  
AIR-OPERATED



## SECTION 2A

# PUMP PERFORMANCE CURVES AIR-OPERATED PUMPS

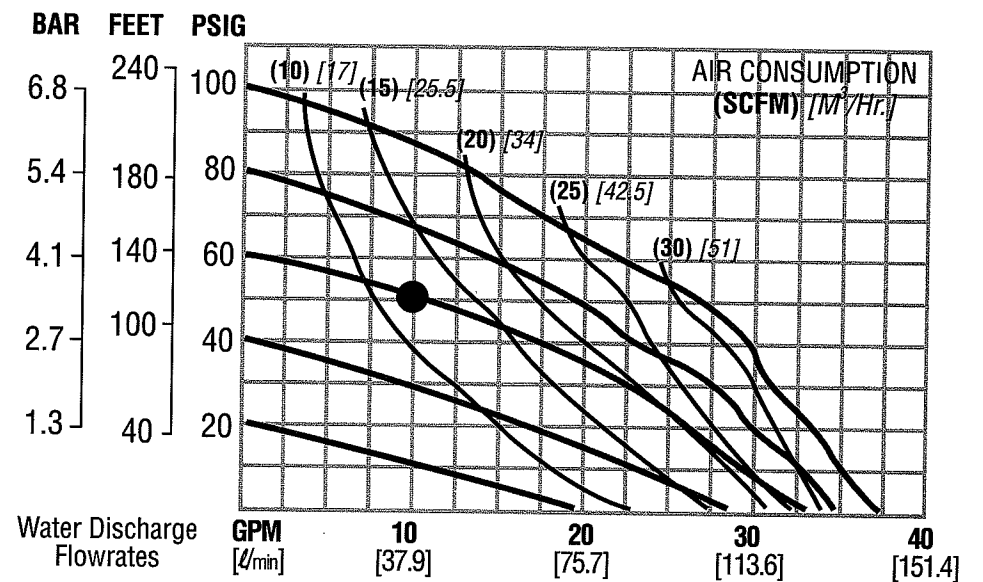
## MODEL M2 METAL (Rubber/TPE-Fitted)

Height .....11"  
Width .....10<sup>17</sup>/<sub>32</sub>"  
Depth .....7<sup>1</sup>/<sub>4</sub>"  
Weight.....Aluminum 22 lbs.  
316 S.S. 31 lbs.  
Hastelloy C 42 lbs.  
Air Inlet .....1/4" Female NPT  
Inlet .....1" Male NPT<sup>1</sup>  
Outlet.....3/4" Male NPT<sup>1</sup>  
Suction Lift.....**Rubber 18' Dry**  
25' Wet  
**TPE 13' Dry**  
25' Wet  
Displacement per Stroke ..... .09 gal.<sup>2</sup>  
Solenoid .117 gal.  
Max. Size Solids .....1/8" Dia.

**Example:** To pump 10 gpm against a discharge head of 50 psig requires 60 psig and 12 scfm air consumption. (See dot on chart.)

<sup>1</sup>BSP threads available.

<sup>2</sup>Displacement per stroke was calculated at 70 psig air inlet pressure against a 30 psig head pressure.



Volumes indicated on chart were determined by actually pumping water in calibrated tanks.

## SECTION 2B

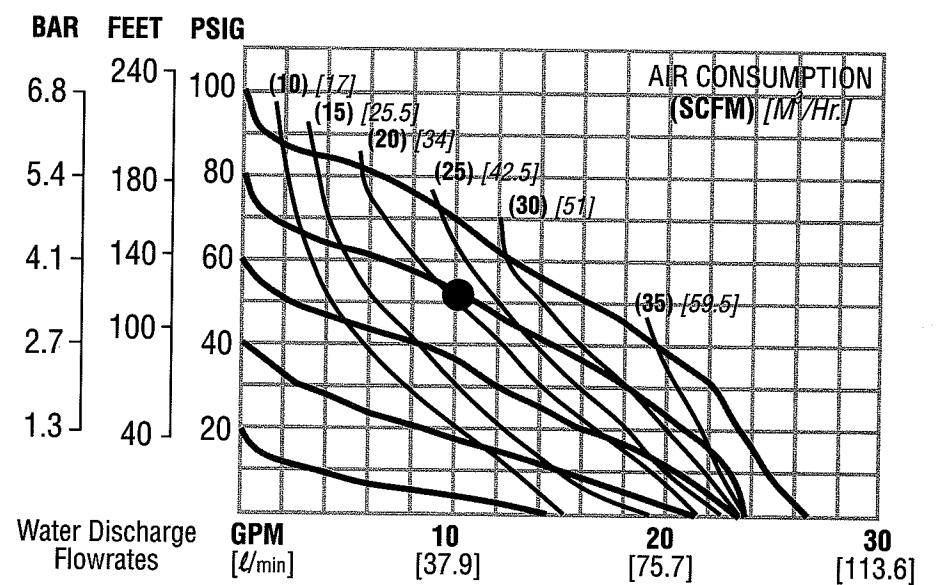
## MODEL M2 METAL (Teflon®-Fitted)

Height .....11"  
Width .....10<sup>17</sup>/<sub>32</sub>"  
Depth .....7<sup>1</sup>/<sub>4</sub>"  
Weight.....Aluminum 22 lbs.  
316 S.S. 31 lbs.  
Hastelloy C 42 lbs.  
Air Inlet .....1/4" Female NPT  
Inlet .....1" Male NPT<sup>1</sup>  
Outlet.....3/4" Male NPT<sup>1</sup>  
Suction Lift.....**8' Dry**  
25' Wet  
Displacement per Stroke ..... .045 gal.<sup>2</sup>  
Solenoid .052 gal.  
Max. Size Solids .....1/8" Dia.

**Example:** To pump 10 gpm against a discharge head of 50 psig requires 77psig and 20 scfm air consumption. (See dot on chart.)

<sup>1</sup>BSP threads available.

<sup>2</sup>Displacement per stroke was calculated at 70 psig air inlet pressure against a 30 psig head pressure.



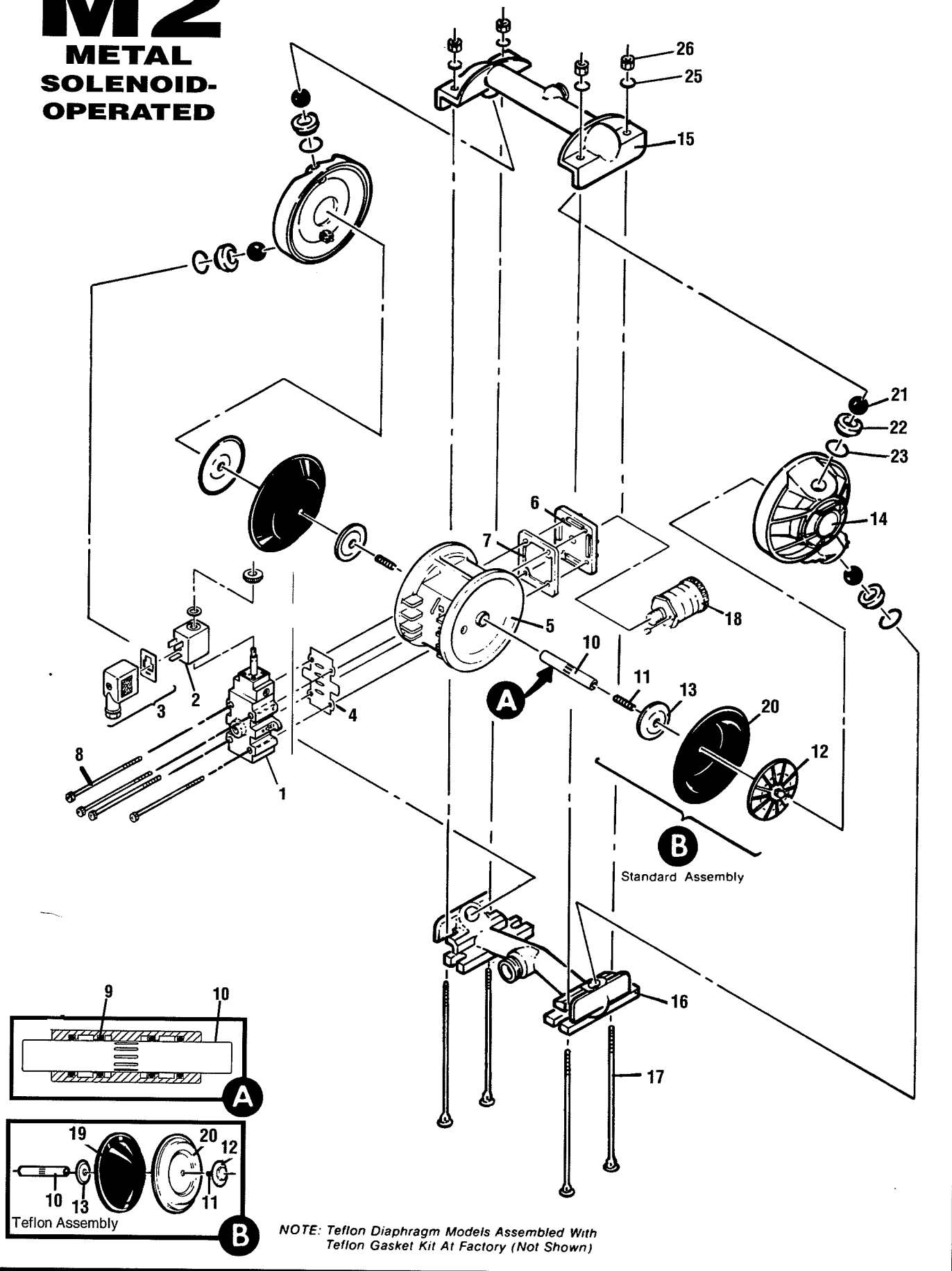
Volumes indicated on chart were determined by actually pumping water in calibrated tanks.





# M2

METAL  
SOLENOID-  
OPERATED



## SECTION 3A

### INSTALLATION

#### M2 & M2 CHAMP AIR-OPERATED PUMPS

The Model **M2 Metal** has a 1" inlet and 3/4" outlet and is designed for flows to 37 gpm. The **M2 Metal** pump is manufactured with wetted parts of aluminum, 316 Stainless Steel, or Hastelloy. The Model **M2 Champ** has a 1" inlet and 1" outlet and is manufactured with wetted parts of pure, unpigmented Polypropylene or PVDF. The center section of the **M2** and **M2 Champ** is constructed of glass-filled polypropylene. Three types of air distribution systems are available: LUBED, LUBE-FREE and TURBO. The Lube air distribution system consists of a brass air valve body, aluminum air valve piston, Buna-N O-rings and a bronze center section bushing. The LUBE-FREE air distribution system is constructed solely of high-tech, engineered thermoplastics which function together without lubrication. The encircled letters "LF" stamped on the top of the pump's center section denotes that the pump is LUBE-FREE. The lube-free air valve body is off-white in color and also has "LF" molded into the valve body. The Turbo air distribution system consists of a brass air valve body, turcite air valve piston, Teflon® laminated O-rings and a bronze center section bushing. A variety of diaphragms, valve balls, and O-rings are available to satisfy temperature, chemical compatibility, abrasion and flex concerns.

The suction pipe size should be at least 1" diameter or larger if highly viscous material is being pumped. The suction hose must be non-collapsible, reinforced type as the M2 is capable of pulling a high vacuum. Discharge piping should be at least 1"; larger diameter can be used to reduce friction losses. It is critical that all fittings and connections are airtight or a reduction or loss of pump suction capability will result.

For M2 Champ models, Wilden offers 150 lb. ANSI and DIN flanges. The following details should be noted when mating these to pipe works:

- A 60-80 shore gasket that covers the entire flange face should be used.

- The gasket should be between .075" and .175" thickness.
- Mating flanges with flat as opposed to raised surfaces should be used for proper mechanical sealing.
- The flanges should be tightened to a minimum of 5 ft.-lbs. (6.8 m-N) but no more than 10 ft.-lbs. (13.5 m-N).

The M2 can be used in submersible applications only when both wetted and non-wetted portions are compatible with the material being pumped. If the pump is to be used in a submersible application, a hose should be attached to the pump's air exhaust and the exhaust air piped above the liquid level.

If the pump is to be used in a self-priming application, be sure that all connections are airtight and that the suction lift is within the pump's ability. Note: Materials of construction and elastomer material have an effect on suction lift parameters. See performance curve data.

Pumps in service with a positive suction head are most efficient when inlet pressure is limited to 7-10 psig. Premature diaphragm failure may occur if positive suction is 11 psig and higher.

THE MODEL M2 AND M2 CHAMP WILL PASS 1/8" SOLIDS. WHENEVER THE POSSIBILITY EXISTS THAT LARGER SOLID OBJECTS MAY BE SUCKED INTO THE PUMP, A STRAINER SHOULD BE USED ON THE SUCTION LINE.

**CAUTION: DO NOT EXCEED 125 PSIG AIR SUPPLY PRESSURE. (50 PSI ON UL MODELS.)**

**ALUMINUM PUMPS ARE FUNCTION TESTED WITH WATER AND SODIUM SILICATE. PUMPS SHOULD BE THOROUGHLY FLUSHED WITH WATER BEFORE INSTALLING INTO PROCESS LINES. FDA APPROVED PUMPS SHOULD BE CLEANED AND/OR SANITIZED BEFORE BEING USED ON EDIBLE PRODUCTS. USE AN IN-LINE AIR FILTER.**

## SECTION 3B

### INSTALLATION

#### M2 & M2 CHAMP SOLENOID-OPERATED PUMPS

The solenoid-operated **Models M2 and M2 Champ** are designed for flows to 24.5 gpm. This maximum flow rate was calculated at 300 strokes per minute with 100 psig air inlet against 0 psig discharge head. The **M2 Champ** pump is manufactured with wetted parts of pure, unpigmented PVDF or polypropylene. The **M2 Metal** pump is manufactured with wetted parts of aluminum, 316 stainless steel, or Hastelloy. The center section of the **M2 Metal** and **M2 Champ** pump is of polypropylene construction. A variety of diaphragms, valve balls, and O-rings are available to satisfy temperature, chemical compatibility, abrasion and flex concerns.

In the solenoid-operated pump models, the standard air valve is replaced with a two position, four-way solenoid valve that has a single operator and spring return.

When the solenoid is unpowered, one air chamber is pressurized with air, while the opposite chamber is exhausted. When electric power is applied, the solenoid shifts, and the pressurized air chamber is exhausted while the opposite chamber is pressurized. By alternately applying and removing power, the solenoid-operated pump runs like a standard Wilden pump.

The speed of the pump is controlled electrically. Since each stroke is controlled by an electrical signal, the pump is ideal for batching and other electrically controlled dispensing applications.

Although the speed of the pump is controlled electrically, the air pressure is important. Air pressure displaces the fluid, and if the pressure is insufficient to complete the physical stroke before an electronic impulse signals the pump to shift, the stroke will not be completed, and the displacement per stroke will be reduced. This does not harm the unit in any way, but it may cause inaccuracy when attempting to batch specific quantities with high precision.

The suction pipe size should be at least 1" diameter or larger if highly viscous material is being pumped. The suction hose must be non-collapsible, reinforced type as the M2 is capable of pulling a high vacuum. Discharge piping should be at least 1"; larger diameter can be used to reduce friction losses. It is critical that all fittings and connections are airtight or a reduction or loss of pump suction capability will result.

All wiring used to operate the pump should be placed and connected according to the proper electrical codes. It is important that the wiring is of adequate gauge to carry the current required to operate the pump. In addition, it is necessary that the electrical power supply is large enough to supply the current required to operate the pump. Wiring should be above ground level if possible (in case of fluid spill or leakage), and all wiring and connections which could become wet or damp should be made watertight.

If the pump is to be used in a self-priming application, be sure that all connections are airtight and that the suction lift is within the pump's ability. Note: Materials of construction and elastomer material have an effect on suction lift parameters. See performance curve data.

Pumps in service with a positive suction head are most efficient when inlet pressure is limited to 7–10 psig. Premature diaphragm failure may occur if positive suction head is 11 psig and higher.

The solenoid valve is rated for continuous duty; however, stopping on an even number stroke count will ensure that the electrical power is off when pump is stopped. This practice is safer and also eliminates unwanted strokes when the system is shut down and electrical power is off.

NOTE: The rubber-fitted shaft is utilized on all M2 and M2 Champ solenoid pumps regardless of the diaphragm installed.

THE MODEL M2 AND M2 CHAMP WILL PASS 1/8" SOLIDS. WHENEVER THE POSSIBILITY EXISTS THAT LARGER SOLID OBJECTS MAY BE SUCKED INTO THE PUMP, A STRAINER SHOULD BE USED ON THE SUCTION LINE.

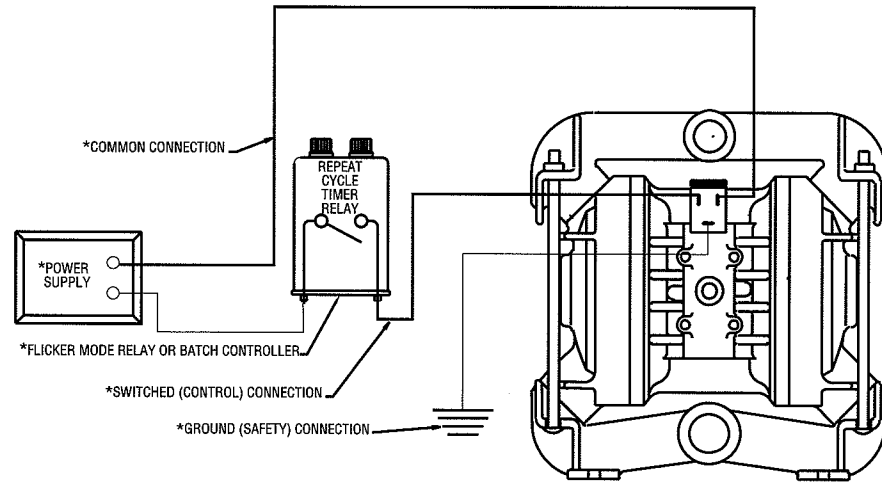
**CAUTION: DO NOT EXCEED 125 PSIG AIR SUPPLY PRESSURE.**

**BLOW OUT AIR LINE FOR 10 TO 20 SECONDS BEFORE ATTACHING TO PUMP TO MAKE SURE ALL PIPE LINE DEBRIS IS CLEAR. USE AN IN-LINE AIR FILTER.**

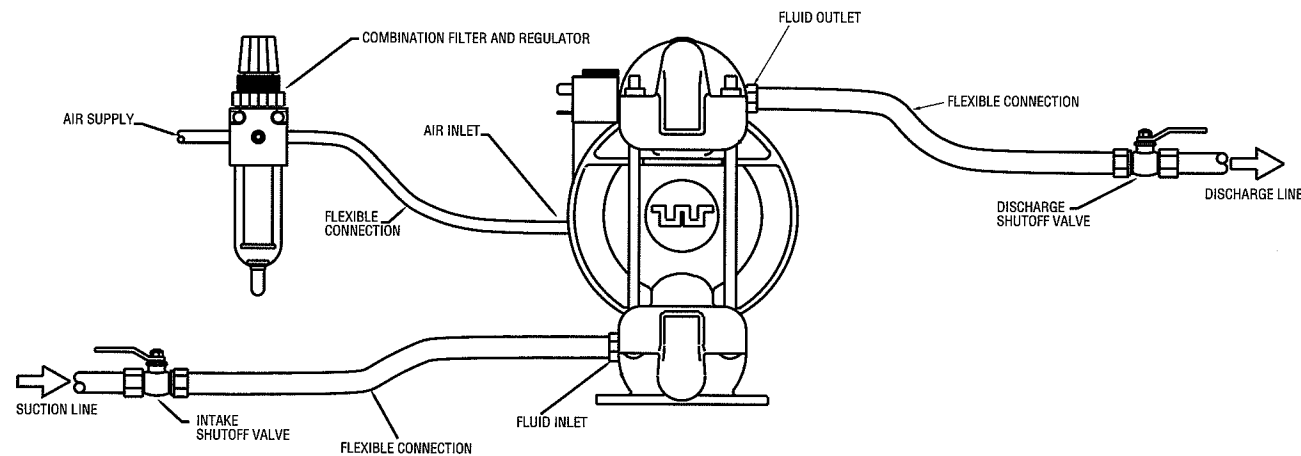
**WARNING: Only the Nema 7 solenoid valve can be used in an area where explosion proof equipment is required. Nema 4 solenoid valves are not suitable.**

There are three coil options available in both Nema 4 and Nema 7 ratings. One coil allows for 110V AC operation, one allows for 24V DC operation, and the third allows for either 24V AC or 12V DC operation.

## ELECTRICAL CONNECTIONS — SOLENOID-OPERATED



## PLUMBING CONNECTIONS — SOLENOID-OPERATED



## MODEL M2 METAL AIR-OPERATED TEFLON®-FITTED PUMPS

Item	Description	Qty. Per Pump	M2/	M2-03	M2/	M2/	M2-70/	M2/	M2-03/	M2/	M2/
			APPB	APPB	SPPB	HPPB	SPPN	AAAB	AAAB	SAAB	HAAB
			P/N	P/N	P/N	P/N	P/N	P/N	P/N	P/N	P/N
1	Air Valve (Body & Piston)	1	02-2000-07	02-2000-07	02-2000-07	02-2000-07	02-2000-06	02-2000-07	02-2000-07	02-2000-07	02-2000-07
2	Air Valve Cap w/Guide (Bottom)	1	02-2330-23	02-2330-23	02-2330-23	02-2330-23	02-2330-23	02-2330-23	02-2330-23	02-2330-23	02-2330-23
3	Air Valve Cap w/Guide (Top)	1	02-2300-23	02-2300-23	02-2300-23	02-2300-23	02-2300-23	02-2300-23	02-2300-23	02-2300-23	02-2300-23
4	Snap Ring	2	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03
5	Air Valve Cap O-Ring	2	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52
6	Air Valve Gasket — Buna	1	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52
7	Center Section <sup>1</sup>	1	02-3151-20	02-3151-20	02-3151-20	02-3151-20	02-3151-20	02-3151-01	02-3151-01	02-3151-01	02-3151-01
8	Muffler Plate	1	02-3180-20	02-3180-20	02-3180-20	02-3180-20	02-3180-20	02-3180-01	02-3180-01	02-3180-01	02-3180-01
9	Muffler Plate Gasket — Buna	1	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-110	02-3500-52-110	02-3500-52-110	02-3500-52-110
10	Air Valve Screws	4	02-6000-08	02-6000-03	02-6000-03	02-6000-03	02-6000-03	02-6000-08	02-6000-03	02-6000-03	02-6000-03
11	Center Section O-Ring	4	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52
12	Shaft <sup>1</sup>	1	02-3820-09-07 <sup>1</sup>	02-3820-09-07 <sup>1</sup>	02-3820-09-07 <sup>1</sup>	02-3820-09-07 <sup>1</sup>	02-3820-09-07 <sup>1</sup>	02-3820-09-07 <sup>1</sup>	02-3820-09-07 <sup>1</sup>	02-3820-09-07 <sup>1</sup>	02-3820-09-07 <sup>1</sup>
13	Stud/Bolt	2	02-6090-08	02-6150-08	02-6150-08	02-6150-08	02-6150-08	02-6090-08	02-6150-08	02-6150-08	02-6150-08
14	Pistons — Outer	2	02-4600-01	02-4600-03	02-4600-03	02-4600-04	02-4600-03	02-4600-01	02-4600-03	02-4600-03	02-4600-04
15	Pistons — Inner	2	02-3750-01	02-3750-01	02-3750-01	02-3750-01	02-3750-01	02-3750-01	02-3750-01	02-3750-01	02-3750-01
16	Water Chamber	2	02-5000-01	02-5000-01	02-5000-03	02-5000-04	02-5000-03	02-5000-01	02-5000-01	02-5000-03	02-5000-04
17	Discharge Manifold	1	02-5020-01	02-5020-01-03	02-5020-03	02-5020-04	02-5020-03-70	02-5020-01	02-5020-01-03	02-5020-03	02-5020-04
18	Inlet Housing	1	02-5080-01	02-5080-01-03	02-5080-03	02-5080-04	02-5080-03-70	02-5080-01	02-5080-01-03	02-5080-03	02-5080-04
19	Manifold Bolt	4	02-6080-03	02-6080-03	02-6080-03	02-6080-03	02-6080-03	02-6080-03	02-6080-03	02-6080-03	02-6080-03
20	Muffler	1	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99
21	Back-up Diaphragm*	2	02-1060-56	02-1060-56	02-1060-56	02-1060-56	02-1060-56	02-1060-56	02-1060-56	02-1060-56	02-1060-56
22	Diaphragm	2	02-1010-55	02-1010-55	02-1010-55	02-1010-55	02-1010-55	02-1010-55	02-1010-55	02-1010-55	02-1010-55
23	Valve Balls	4	02-1080-55	02-1080-55	02-1080-55	02-1080-55	02-1080-55	02-1080-55	02-1080-55	02-1080-55	02-1080-55
24	Valve Seat	4	02-1120-01	02-1120-01	02-1120-03	02-1120-04	02-1120-03	02-1120-01	02-1120-01	02-1120-03	02-1120-04
25	Valve Seat O-Ring	4	02-1200-55	02-1200-55	02-1200-55	02-1200-55	02-1200-55	02-1200-55	02-1200-55	02-1200-55	02-1200-55
26	Hex Nut 1/4-20, S.S.** (Not Shown)	4	04-6400-03	04-6400-03	04-6400-03	04-6400-03	04-6400-03	NA	NA	NA	NA
27	Manifold Bolt Washer	4	02-6730-03	02-6730-03	02-6730-03	02-6730-03	08-6720-07-70	02-6730-03	02-6730-03	02-6730-03	02-6730-03
28	Manifold Bolt Nut	4	02-6430-03	02-6430-03	02-6430-03	02-6430-03	02-6680-03-70	02-6430-03	02-6430-03	02-6430-03	02-6430-03

## LUBE-FREE MODEL M2 METAL AIR-OPERATED TEFLON®-FITTED

Item	Description	Qty. Per Pump	M2-200/	M2-05	M2-200/	M2-200/	M2-70
			APPZ	APPZ	SPPZ	HPPZ	SPPZ
			LF	LF	LF	LF	LF
			P/N	P/N	P/N	P/N	P/N
1	Air Valve Assembly — Lube-free <sup>2</sup>	1	02-2000-65-200	02-2000-65-200	02-2000-65-200	02-2000-65-200	02-2000-65-200
2	Air Valve Cap w/o Guide (Bottom)	1	02-2331-23	02-2331-23	02-2331-23	02-2331-23	02-2331-23
3	Air Valve Cap w/Plastic Guide (Top)	1	02-2301-23-200	02-2301-23-200	02-2301-23-200	02-2301-23-200	02-2301-23-200
4	Snap Ring	2	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03
5	Air Valve Cap O-Ring	2	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200
6	Air Valve Gasket — Buna	1	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52
7	Center Section — Lube-free <sup>3</sup>	1	02-3151-20-200 <sup>3</sup>	02-3151-20-200 <sup>3</sup>	02-3151-20-200 <sup>3</sup>	02-3151-20-200 <sup>3</sup>	02-3151-20-200 <sup>3</sup>
8	Muffler Plate	1	02-3180-20	02-3180-20	02-3180-20	02-3180-20	02-3180-20
9	Muffler Plate Gasket — Buna	1	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500
10	Air Valve Bolts	4	02-6000-03-200	02-6000-03-200	02-6000-03-200	02-6000-03-200	02-6000-03-200
11	Center Section 115 70 Shore O-Ring — Buna	4	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200
	Slipper Seal (See page 24)	4	02-3210-55-200	02-3210-55-200	02-3210-55-200	02-3210-55-200	02-3210-55-200
12	Shaft <sup>1</sup>	1	02-3820-09-07 <sup>1</sup>	02-3820-09-07 <sup>1</sup>	02-3820-09-07 <sup>1</sup>	02-3820-09-07 <sup>1</sup>	02-3820-09-07 <sup>1</sup>
13	Stud/Bolt	2	02-6090-08	02-6150-08	02-6150-08	02-6150-08	02-6150-08
14	Pistons — Outer	2	02-4600-01	02-4600-03	02-4600-03	02-4600-04	02-4600-03
15	Pistons — Inner	2	02-3750-01	02-3750-01	02-3750-01	02-3750-01	02-3750-01
16	Water Chamber	2	02-5000-01	02-5000-01	02-5000-03	02-5000-04	02-5000-03
17	Discharge Manifold	1	02-5020-01	02-5020-01-03	02-5020-03	02-5020-04	02-5020-03-70
18	Inlet Housing	1	02-5080-01	02-5080-01-03	02-5080-03	02-5080-04	02-5080-03-70
19	Manifold Bolt	4	02-6080-03	02-6080-03	02-6080-03	02-6080-03	02-6080-03
20	Muffler	1	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99
21	Back-up Diaphragm*	2	02-1060-56	02-1060-56	02-1060-56	02-1060-56	02-1060-56
22	Diaphragm	2	02-1010-55	02-1010-55	02-1010-55	02-1010-55	02-1010-55
23	Valve Balls	4	02-1080-55	02-1080-55	02-1080-55	02-1080-55	02-1080-55
24	Valve Seat	4	02-1120-01	02-1120-01	02-1120-03	02-1120-04	02-1120-03
25	Valve Seat O-Ring	4	02-1200-55	02-1200-55	02-1200-55	02-1200-55	02-1200-55
26	Hex Nut 1/4-20, S.S.** (Not Shown)	4	04-6400-03	04-6400-03	04-6400-03	04-6400-03	04-6400-03
27	Manifold Bolt Washer	4	02-6730-03	02-6730-03	02-6730-03	02-6730-03	08-6720-07-70
28	Manifold Bolt Nut	4	02-6430-03	02-6430-03	02-6430-03	02-6430-03	02-6680-03-70

<sup>1</sup>Refer to Sections 6C and 6D prior to ordering these parts.

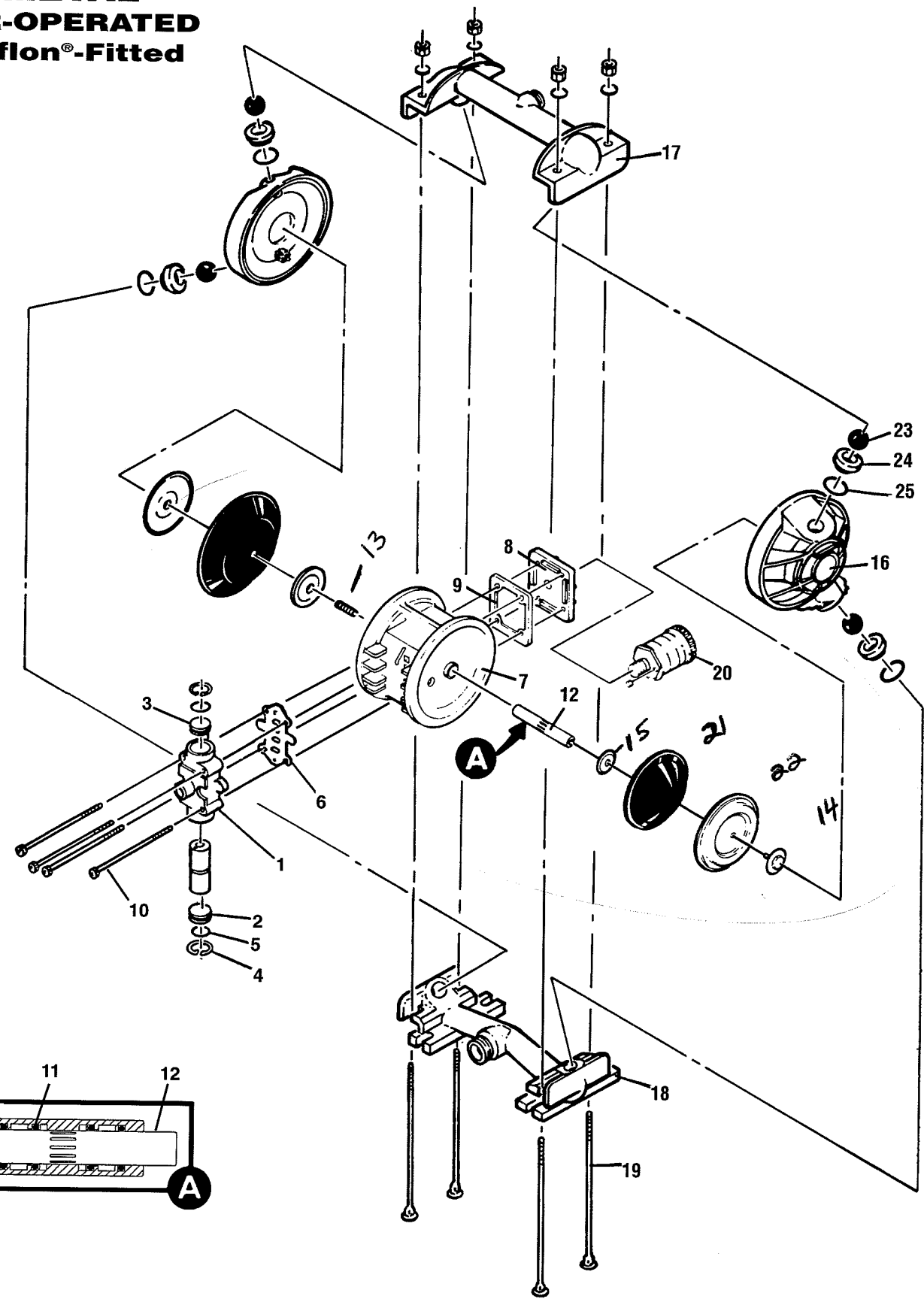
<sup>2</sup>Required only for Teflon® fitted pumps. Neoprene back-up diaphragms, P/N 02-1060-51, are available upon request. Please consult your local distributor.

<sup>3</sup>Part to be used with P/N 02-6000-03 to secure air valve and muffler plate.

NOTE: Models M2-70/SPPZ and M2-70/SPPN have 1.5" cast tri-clamp inlet and outlet ports and use wing nut type fasteners on manifold bolts.

# M2

METAL  
AIR-OPERATED  
Teflon®-Fitted



## SECTION 3C

# WILDEN SOLENOID-OPERATED PUMPS

### QUICK REFERENCE

SPECIFICATIONS	M2R PLASTIC		M2 METAL	
	RUBBER	TEFLON	RUBBER	TEFLON
Maximum Flow Rate at 0 Head	24.5 gpm	15 gpm	24.5 gpm	14.5 gpm
# of Strokes per Minute @ Maximum Flow <sup>1</sup>	300	300	300	300
Maximum Air Pressure	125 psi	125 psi	125 psi	125 psi
Minimum Air Pressure Required	45 psi	45 psi	45 psi	45 psi
Displacement per Stroke	.125 gal.	.057 gal.	.117 gal.	.052 gal.
Air Inlet Size (Female NPT)	1/4"	1/4"	1/4"	1/4"
Dry Suction Lift	16'	11'	16'	7'
Wet Suction Lift	25'	25'	25'	25'
Lubrication (Pre-Lube)	Buna Compatible NLGI Grade 2 Grease			
Inner Piston P/N	02-3710-01-150	02-3710-01-150	02-3710-01-150	02-3710-01-150
Terminal Connector P/N	00-2130-99	00-2130-99	00-2130-99	00-2130-99

<sup>1</sup>Maximum flow based on full stroke completion.

<sup>2</sup>Displacement per stroke is dynamic. Above figures were calculated with 70 psi air pressure against 30 psi discharge head at 80 strokes per minute.

### ELECTRICAL INFORMATION

VOLTAGE	PART NUMBER	RATING	AMPS (INRUSH)	AMPS (HOLDING)	RESISTIVITY (OHMS)
24V DC	00-2110-99-150	NEMA 4	.25	.25	96
24V DC	00-2110-99-154	NEMA 7	.25	.25	25
24V DC <sup>5</sup>	00-2110-99-157	—	.135	.135	177
12V DC	00-2110-99-151	NEMA 4	.445	.445	26
12V DC	00-2110-99-153	NEMA 7	.445	.445	26
24V AC <sup>3</sup>	00-2110-99-151	NEMA 4	.445	.34	26
24V AC <sup>3</sup>	00-2110-99-153	NEMA 7	.445	.34	26
110V AC <sup>4</sup>	00-2110-99-155	NEMA 4	.25	.166	156
110V AC <sup>4</sup>	00-2110-99-156	NEMA 7	.25	.166	156

<sup>3</sup>24 Volts @ 60 Hz., 22 Volts @ 50 Hz.

<sup>4</sup>120 Volts @ 60 Hz., 110 Volts @ 50 Hz.

<sup>5</sup>Meets European standards and regulations, Cenelec/PTB file # EX-91.C.2027

## SECTION 4A

# SUGGESTED OPERATION AND MAINTENANCE INSTRUCTIONS M2 & M2 CHAMP AIR-OPERATED PUMPS

INSTALLATION: Months of careful planning, study, and selection efforts can result in unsatisfactory pump performance if installation details are left to chance.

Premature failure and long term dissatisfaction can be avoided if reasonable care is exercised throughout the installation process.

LOCATION: Noise, safety, and other logistical factors usually dictate that "utility" equipment be situated away from the production floor. Multiple installations with conflicting requirements can result in congestion of utility areas, leaving few choices for siting of additional pumps.

Within the framework of these and other existing conditions, every pump should be located in such a way that four key factors are balanced against each other to maximum advantage.

1. ACCESS: First of all, the location should be accessible. If it's easy to reach the pump, maintenance personnel will have an easier time carrying out routine inspections and adjustments. Should major repairs become necessary, ease of access can play a key role in speeding the repair process and reducing total downtime.

2. AIR SUPPLY: Every pump location should have an air line large enough to supply the volume of air necessary to achieve the desired pumping rate (see pump performance chart). Use air pressure up to a maximum of 125 psi depending upon pumping requirements. (50 psi for UL pumps.)

**FOR LUBED PUMPS:** For best results, the pump should use an air filter, regulator, and lubricator system. The use of an air filter before the pump will ensure that the majority of any pipeline contaminants will be eliminated. The use of a lubricant, suitable for the application, helps perform a number of functions. Lubricants reduce friction to minimize required shifting forces and reduce wear. Lubricants provide a protective coating against some forms of corrosion and contaminants. **Wilden suggests an oil with arctic characteristics (ISO 15-5Wt.) This oil is chemically compatible with the center block O-rings and has a low pour point to guard against problems associated with low temperatures.** The amount of lubrication required is directly related to the amount of oil introduced from the factory air system. We therefore suggest that the lowest setting on the lubricator be utilized and then increased as necessary.

**FOR LUBE-FREE PUMPS:** For best results, the pump should use an air filter and regulator. The use of an air filter before the pump will ensure that the majority of any pipeline contaminants will be eliminated. Lube-free pump models do not require lubrication during assembly or while in operation. Pump discharge rate can be controlled by limiting the volume and/or pressure of the air supply to the pump. The use of a needle valve installed at the air inlet to the pump is suggested for this purpose. Pump discharge rate can also be controlled by throttling the pump discharge by installing a valve in the discharge line of the pump when the need to control the pump from a remote location exists. When the pump discharge pressure equals or exceeds the air supply pressure,

the pump will stop; no bypass or pressure relief valve is needed, and pump damage will not occur. When standard pump operation is controlled by a solenoid valve in the air line, a three-way valve should be used. Pumping volume can be set by counting the number of strokes per minute.

A muffler installed on the pump's air exhaust will give quiet exhaust. Sound levels are reduced below OSHA specifications using a Wilden muffler.

3. ELEVATION: Selecting a site that is well within the pump's suction lift capability will assure that loss-of-prime troubles will be eliminated. In addition, pump efficiency can be adversely affected if proper attention is not given to elevation (see pump performance chart).

4. PIPING: Final determination of the pump site should not be made until the piping problems of each possible location have been evaluated. The impact of current and future installations should be considered ahead of time to make sure that inadvertent restrictions are not created for any remaining sites.

The best choice possible will be a site involving the shortest and the straightest hook-up of suction and discharge piping. Unnecessary elbows, bends, and fittings should be avoided. Pipe sizes should be selected so as to keep friction losses within practical limits. All piping should be supported independently of the pump. In addition, it should line up without placing stress on the pump fittings.

Expansion joints can be installed to aid in absorbing the forces created by the natural reciprocating action of the pump. If the pump is to be bolted down to a solid foundation, a mounting pad placed between the pump and foundation will assist in minimizing pump vibration. Flexible connections between the pump and rigid piping will also assist in minimizing pump vibration. If quick-closing valves are installed at any point in the discharge system, or if pulsation within a system becomes a problem, a surge suppressor should be installed to protect the pump, piping and gauges from surges and water hammer.

When pumps are installed in applications involving flooded suction or suction head pressures, a gate valve should be installed in the suction line to permit closing of the line for pump service.

INSPECTIONS: Periodic inspections have been found to offer the best means for preventing unscheduled pump downtime.

Individuals responsible for checking and maintaining lubrication levels in the pumps should also check for any abnormal noise or leakage. Personnel familiar with the pumps' construction and service should be informed of any abnormalities that are detected.

RECORDS: When service is required, a record should be made of all necessary repairs and replacements. Over a period of time, such records can become a valuable tool for predicting and preventing future maintenance problems and unscheduled downtime. In addition, accurate records make it possible to identify pumps that are poorly suited to their applications.

## MODEL M2 METAL AIR-OPERATED RUBBER/TPE-FITTED PUMPS

Item	Description	Qty. Per Pump	M2/APPB P/N	M2-03/APPB P/N	M2/SPPB P/N	M2/HPPB P/N	M2-70 SPPN P/N	M2/AAAB P/N	M2-03/AAAB P/N	M2/SAAB P/N	M2/HAAB P/N
1	Air Valve (Body & Piston)	1	02-2000-07	02-2000-07	02-2000-07	02-2000-07	02-2000-06	02-2000-07	02-2000-07	02-2000-07	02-2000-07
2	Air Valve Cap w/Guide (Bottom)	1	02-2330-23	02-2330-23	02-2330-23	02-2330-23	02-2330-23	02-2330-23	02-2330-23	02-2330-23	02-2330-23
3	Air Valve Cap w/Guide (Top)	1	02-2300-23	02-2300-23	02-2300-23	02-2300-23	02-2300-23	02-2300-23	02-2300-23	02-2300-23	02-2300-23
4	Snap Ring	2	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03
5	Air Valve Cap O-Ring	2	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52
6	Air Valve Gasket — Buna	1	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52
7	Center Section <sup>1</sup>	1	02-3151-20	02-3151-20	02-3151-20	02-3151-20	02-3150-20	02-3150-01	02-3150-01	02-3150-01	02-3150-01
8	Muffler Plate	1	02-3180-20	02-3180-20	02-3180-20	02-3180-20	02-3180-20	02-3180-01	02-3180-01	02-3180-01	02-3180-01
9	Muffler Plate Gasket — Buna	1	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-110	02-3500-52-110	02-3500-52-110	02-3500-52-110
10	Air Valve Screws	4	02-6000-08	02-6000-03	02-6000-03	02-6000-03	02-6000-03	02-6000-08	02-6000-03	02-6000-03	02-6000-03
11	Center Section O-Ring	4	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52	02-3200-52
12	Shaft <sup>2</sup>	1	02-3800-09-07 <sup>3</sup>	02-3800-09-07 <sup>3</sup>	02-3800-09-07 <sup>3</sup>	02-3800-09-07 <sup>3</sup>	02-3800-09-07 <sup>3</sup>	02-3800-09-07 <sup>3</sup>	02-3800-09-07 <sup>3</sup>	02-3800-09-07 <sup>3</sup>	02-3800-09-07 <sup>3</sup>
13	Stud	2	02-6150-08	02-6150-08	02-6150-08	02-6150-08	02-6150-08	02-6150-08	02-6150-08	02-6150-08	02-6150-08
14	Pistons — Outer	2	02-4550-01	02-4550-01	02-4550-03	02-4550-04	02-4550-03	02-4550-01	02-4550-01	02-4550-03	02-4550-04
15	Pistons — Inner	2	02-3700-08	02-3700-08	02-3700-08	02-3700-08	02-3700-08	02-3700-08	02-3700-08	02-3700-08	02-3700-08
16	Water Chamber	2	02-5000-01	02-5000-01	02-5000-01	02-5000-04	02-5000-03	02-5000-01	02-5000-01	02-5000-03	02-5000-04
17	Discharge Manifold	1	02-5020-01	02-5020-01-03	02-5020-03	02-5020-04	02-5020-03-70	02-5020-01	02-5020-01-03	02-5020-03	02-5020-04
18	Inlet Housing	1	02-5080-01	02-5080-01-03	02-5080-03	02-5080-04	02-5080-03-70	02-5080-01	02-5080-01-03	02-5080-03	02-5080-04
19	Manifold Bolt	4	02-6080-08	02-6080-03	02-6080-03	02-6080-03	02-6080-03	02-6080-08	02-6080-03	02-6080-03	02-6080-03
20	Muffler	1	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99
21	Back-up Diaphragm**	2	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
22	Diaphragm*	2	*	*	*	*	02-1010-56	*	*	*	*
23	Valve Balls*	4	*	*	*	*	02-1080-56	*	*	*	*
24	Valve Seat	4	02-1120-01	02-1120-01	02-1120-03	02-1120-04	02-1120-03	02-1120-01	02-1120-01	02-1120-03	02-1120-04
25	Valve Seat O-Ring*	4	*	*	*	*	02-1200-56	*	*	*	*
26	Hex Nut 1/4-20, S.S.*** (Not Shown)	4	04-6400-03	04-6400-03	04-6400-03	04-6400-03	04-6400-03	NA	NA	NA	NA
27	Manifold Bolt Washer	4	15-6720-08	02-6730-03	02-6730-03	02-6730-03	08-6720-07-70	15-6720-08	02-6730-03	02-6730-03	02-6730-03
28	Manifold Bolt Nut	4	02-6430-08	02-6430-03	02-6430-03	02-6430-03	02-6680-03-70	02-6430-08	02-6430-03	02-6430-03	02-6430-03

## LUBE-FREE MODEL M2 METAL AIR-OPERATED RUBBER/TPE-FITTED

Item	Description	Qty. Per Pump	M2/200 APPZ LF P/N	M2-05/APPZ LF P/N	M2/200 SPPZ LF P/N	M2/200 HPPZ LF P/N	M2-73/SPPZ LF P/N
1	Air Valve Assembly — Lube-free <sup>1</sup>	1	02-2000-65-200	02-2000-65-200	02-2000-65-200	02-2000-65-200	02-2000-65-200
2	Air Valve Cap w/o Guide (Bottom)	1	02-2331-23	02-2331-23	02-2331-23	02-2331-23	02-2331-23
3	Air Valve Cap w/Plastic Guide (Top)	1	02-2301-23-200	02-2301-23-200	02-2301-23-200	02-2301-23-200	02-2301-23-200
4	Snap Ring	2	02-2650-03	02-2650-03	02-2650-03	02-2650-03	02-2650-03
5	Air Valve Cap O-Ring	2	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200
6	Air Valve Gasket — Buna	1	02-2600-52	02-2600-52	02-2600-52	02-2600-52	02-2600-52
7	Center Section — Lube-free <sup>1</sup>	1	02-3151-20-200	02-3151-20-200	02-3151-20-200	02-3151-20-200	02-3151-20-200
8	Muffler Plate	1	02-3180-20	02-3180-20	02-3180-20	02-3180-20	02-3180-20
9	Muffler Plate Gasket — Buna	1	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500	02-3500-52-500
10	Air Valve Bolts	4	02-6000-03-200	02-6000-03-200	02-6000-03-200	02-6000-03-200	02-6000-03-200
11	Center Section 115 70 Shore O-Ring — Buna	4	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200	02-3200-52-200
	Slipper Seal (See page 24)	4	02-3210-55-200	02-3210-55-200	02-3210-55-200	02-3210-55-200	02-3210-55-200
12	Shaft <sup>2</sup>	1	02-3800-09-07 <sup>3</sup>	02-3800-09-07 <sup>3</sup>	02-3800-09-07 <sup>3</sup>	02-3800-09-07 <sup>3</sup>	02-3800-09-07 <sup>3</sup>
13	Stud	2	02-6150-08	02-6150-08	02-6150-08	02-6150-08	02-6150-08
14	Pistons — Outer	2	02-4550-01	02-4550-01	02-4550-03	02-4550-04	02-4550-03
15	Pistons — Inner	2	02-3700-08	02-3700-08	02-3700-08	02-3700-08	02-3700-08
16	Water Chamber	2	02-5000-01	02-5000-01	02-5000-03	02-5000-04	02-5000-03
17	Discharge Manifold	1	02-5020-01	02-5020-01-03	02-5020-03	02-5020-04	02-5020-03-70
18	Inlet Housing	1	02-5080-01	02-5080-01-03	02-5080-03	02-5080-04	02-5080-03-70
19	Manifold Bolt	4	02-6080-08	02-6080-03	02-6080-03	02-6080-03	02-6080-03
20	Muffler	1	02-3510-99	02-3510-99	02-3510-99	02-3510-99	02-3510-99
21	Back-up Diaphragm**	2	N/R	N/R	N/R	N/R	N/R
22	Diaphragm*	2	*	*	*	*	02-1010-56
23	Valve Balls*	4	*	*	*	*	02-1080-56
24	Valve Seat	4	02-1120-01	02-1120-01	02-1120-03	02-1120-04	02-1120-03
25	Valve Seat O-Ring*	4	*	*	*	*	02-1200-56
26	Hex Nut 1/4-20, S.S.*** (Not Shown)	4	04-6400-03	04-6400-03	04-6400-03	04-6400-03	04-6400-03
27	Manifold Bolt Washer	4	15-6720-08	02-6730-03	02-6730-03	02-6730-03	08-6720-07-70
28	Manifold Bolt Nut	4	02-6430-08	02-6430-03	02-6430-03	02-6430-03	02-6680-03-70

<sup>1</sup>Refer to Sections 6C and 6D prior to ordering these parts.

<sup>2</sup>Air Valve Assembly includes items 2, 3, 4 and 5.

<sup>3</sup>Refer to corresponding elastomer chart for metal pumps in Section 8.

\*\*Required only for Teflon® fitted pumps.

\*\*\*Part to be used with P/N 02-6000-03 to secure air valve and muffler plate.

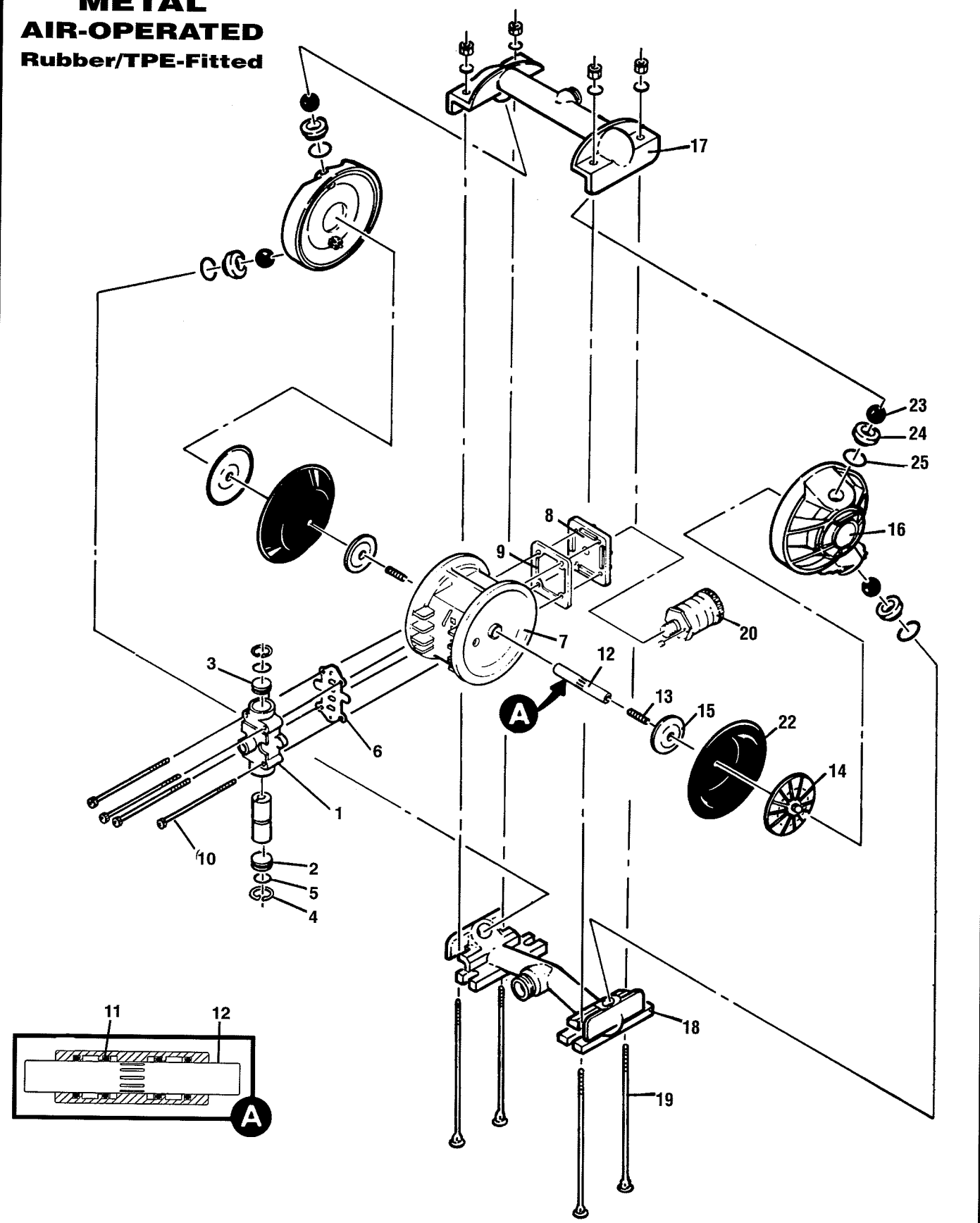
NOTE: Models M2-70/SPPN and M2-73/SPPZ have 1.5" cast tri-clamp inlet and outlet ports and use wing nut type fasteners on manifold bolts.

SEE BOM FOR CORRECT P/N'S

P. 57  
Bill of Materials

**M2**

**METAL**  
**AIR-OPERATED**  
**Rubber/TPE-Fitted**

**SECTION 4B**

## **SUGGESTED OPERATION AND MAINTENANCE INSTRUCTIONS**

### **M2 & M2 CHAMP SOLENOID-OPERATED PUMPS**

**INSTALLATION:** Months of careful planning, study, and selection efforts can result in unsatisfactory pump performance if installation details are left to chance.

Premature failure and long term dissatisfaction can be avoided if reasonable care is exercised throughout the installation process.

**LOCATION:** Noise, safety, and other logistical factors usually dictate that "utility" equipment be situated away from the production floor. Multiple installations with conflicting requirements can result in congestion of utility areas, leaving few choices for siting of additional pumps.

Within the framework of these and other existing conditions, every pump should be located in such a way that five key factors are balanced against each other to maximum advantage.

**1. ACCESS:** First of all, the location should be accessible. If it's easier to reach the pump, maintenance personnel will have an easier time carrying out routine inspections and adjustments. Should major repairs become necessary, ease of access can play a key role in speeding the repair process and reducing total downtime.

**2. AIR SUPPLY:** Every pump location should have an air line large enough to supply the volume of air necessary to achieve the desired pumping rate (see pump performance chart). Use air pressure up to a maximum of 125 psi depending upon pumping requirements.

For best results, the pumps should use an air filter and a regulator. The use of an air filter before the pump inlet will ensure that the majority of pipeline contaminants will be eliminated. The solenoid operated pump is permanently lubricated during assembly, and requires no additional lubrication under normal operation. If the unit runs under extreme conditions (continuous operation at high speeds), it may be necessary to relubricate the center block with a **buna compatible NLGI Grade 2 grease** every 50 million cycles. Continuous lubrication with a compatible oil is not harmful, and will provide longer seal life, but it may flush all grease out of the unit.

Pump discharge rate is controlled electrically by varying the rate of alternation of the stroke signal. The pump will continue to shift if the liquid discharge line is closed, however no media will be pumped. This will not harm the pump in any way. The pump will not shift until the air inlet pressure exceeds the minimum supply pressure requirement of approximately 40 psig. A minimum of 45 psi is recommended to ensure reliable operation.

A muffler can be installed to reduce the amount of noise generated by the pump. Use of the specified Wilden muffler will reduce noise levels below OSHA specifications.

**3. ELEVATION:** Selecting a site that is well within the pump's suction lift capability will assure that loss-of-prime troubles will be eliminated. In addition, pump efficiency can be adversely affected if proper attention is not given to elevation (see pump performance chart).

**4. PIPING:** Final determination of the pump site should not be made until the piping problems of each possible location have been evaluated. The impact of current and future installations should be considered ahead of time to make sure that inadvertent restrictions are not created for any remaining sites.

The best choice possible will be a site involving the shortest and the straightest hook-up of suction and discharge piping. Unnecessary elbows, bends, and fittings should be avoided. Pipe sizes should be selected so as to keep friction losses within practical limits. All piping should be supported independently of the pump. In addition, it should line up without placing stress on the pump fittings.

Expansion joints can be installed to aid in absorbing the forces created by the natural reciprocating action of the pump. If the pump is to be bolted down to a solid foundation, a mounting pad placed between the pump and foundation will assist in minimizing pump vibration. Flexible connections between the pump and rigid piping will also assist in minimizing pump vibration. If quick-closing valves are installed at any point in the discharge system, or if pulsation within a system becomes a problem, a surge suppressor should be installed to protect the pump, piping and gauges from surges and water hammer.

When pumps are installed in applications involving flooded suction or suction head pressures, a gate valve should be installed in the suction line to permit closing of the line for pump service.

**INSPECTIONS:** Periodic inspections have been found to offer the best means for preventing unscheduled pump downtime.

Individuals responsible for checking and maintaining lubrication levels in the pumps should also check for any abnormal noise or leakage. Personnel familiar with the pumps' construction and service should be informed of any abnormalities that are detected.

**RECORDS:** When service is required, a record should be made of all necessary repairs and replacements. Over a period of time, such records can become a valuable tool for predicting and preventing future maintenance problems and unscheduled downtime. In addition, accurate records make it possible to identify pumps that are poorly suited to their applications.

## SECTION 5A

# TROUBLESHOOTING M2 & M2 CHAMP AIR-OPERATED PUMPS

### **Pump will not run or runs slowly.**

1. Check air inlet screen and air filter for debris.
2. Check for sticking air valve, flush air valve in solvent.
3. Check for worn out air valve. If piston face in air valve is shiny instead of dull, air valve is probably worn beyond working tolerances and must be replaced.
4. Check center block O-rings. If worn excessively, they will not seal and air will simply flow through pump and out air exhaust. Use only Wilden O-rings as they are of special construction.
5. Check for rotating piston in air valve.
6. Check type of lubricant being used. A higher viscosity oil than suggested may cause the piston to stick or run erratically. Wilden suggests the use of an oil with arctic characteristics (ISO 15-5 wt.).

### **Pump runs but little or no product flows.**

1. Check for pump cavitation; slow pump speed down to match thickness of material being pumped.

2. Check for sticking ball checks. If material being pumped is not compatible with pump elastomers, swelling may occur. Replace ball checks and O-rings with the proper elastomers.
3. Check to make sure all suction connections are air tight, especially clamp bands around intake balls.

### **Pump air valve freezes.**

Check for excessive moisture in compressed air. Either install dryer or hot air generator for compressed air.

### **Air bubbles in pump discharge.**

1. Check for ruptured diaphragm.
2. Check tightness of clamp bands, especially at intake manifold.

### **Product comes out air exhaust.**

1. Check for diaphragm rupture.
2. Check tightness of piston plates to shaft.

## SECTION 5B

# TROUBLESHOOTING M2 & M2 CHAMP SOLENOID-OPERATED PUMPS

### **Pump will not run.**

1. Check for pressurized air at the inlet. (Min. 45 psig.)
2. Check air inlet and filter for debris.
3. Connect a test lamp to the two wires which run to pump and ensure that the lamp cycles on and off.
4. Make sure that the air valve manual override (small red knob on front of valve) is switched to the "0" position.
5. Check pilot pressure vent at the top of the operator/coil assembly to ensure that it is not clogged.
6. Check for a worn out air valve. If air continually blows out the exhaust in very large quantities, the air valve seals may be worn beyond their ability to function. In this case, the valve must be replaced.

NOTE: Before the valve is scrapped, it is possible that it may be saved by completely disassembling the valve, cleaning all components and relubricating the valve.

### **Pump runs but little or no fluid comes out.**

1. Check that the discharge isolation valve is not closed.
2. Check that the electronic signal is slow enough that the pump is able to complete each physical stroke before it is signaled to change direction. The time required to complete the stroke is determined by a variety of factors which include fluid viscosity and head pressure. The shaft can be viewed if the muffler is removed to verify that the pump is stroking.
3. Check for pump cavitation; slow pump speed down to match the thickness of the material being pumped.

4. Check for sticking ball check valves. If the material being pumped is not compatible with the pump elastomers, swelling may occur. Replace ball check valves and O-ring with the proper elastomers.
5. Check to make sure that all suction connections are air tight, and that the clamp bands are properly tightened.

### **Pump air passages blocked with ice.**

Check for excessive moisture in compressed air line. As the air expands out the exhaust during the operation of the pump, water vapor entrapped in the compressed air can freeze and block the air passageways in the pump. If this occurs, it may be necessary to install a coalescing filter, an air dryer, or a hot air generator for the compressed air.

### **Air bubbles in pump discharge.**

1. Check for ruptured diaphragm.
2. Check tightness of clamp bands, and the integrity of the O-rings, especially at intake manifold.

### **Product comes out air exhaust.**

1. Check for diaphragm rupture.
2. Check tightness of piston plates to shaft.

## SECTION 6E — TURBO PUMPS

### TURBO 225 AIR DISTRIBUTION SYSTEM

The patent pending "TURBO 225" air distribution system is designed to combat the effect of "freezing." This condition can occur when air-operated, double-diaphragm pumps are operated on a moisture-laden air supply. Moisture held in suspension can crystallize to ice when the compressed air expands, pressure decreases, and temperature drops. The "TURBO 225" is designed to control the internal expansion of air, minimizing pressure and temperature reduction. By controlling the internal expansion of air and thus the crystallization of water to ice, the Wilden pump operates reliably without loss in performance.

The use of proprietary engineered thermoplastics decreases the coefficient of friction between mating parts enabling the pump to operate lubrication free intermittently. The solid piston with milled exhaust slots allows for efficient exhausting through the center section of the pump, reducing the "chilling effect" on the air valve piston. The thermoplastic air valve piston decreases the transfer of cold temperatures from the air exhaust to the main air supply further inhibiting "freezing" conditions.

In addition to the air valve changes, the center block O-rings have been replaced by a proprietary composite glide ring. This glide ring exhibits much longer life (5x the life of standard O-rings) and less susceptibility to chemical attack (hardening, shrinking, and/or cracking). No changes to center block grooves have been made, allowing these glide rings complete retrofittability to existing center blocks (see *Figure B*).

A straight shaft (non D-dented) must be utilized with the glide rings (see *Figure B*). This straight shaft reduces the coefficient of friction between it and the center block glide rings, extending the life of these seals.

Air Valve Assembly  
P/N 02-2000-07-225

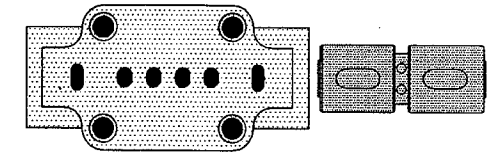
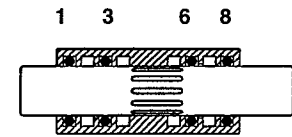


Figure A



ENHANCED CONFIGURATION

Figure B

## SECTION 6D — LUBE-FREE PUMPS

# AIR VALVE/CENTER SECTION REPAIR/MAINTENANCE

### AIR VALVE/CENTER SECTION REPAIR/MAINTENANCE

The center section assembly consists of both the air valve body and piston, and the center section. The lube-free design utilizes high-tech, engineered thermoplastics in place of the brass air valve, aluminum piston, and bronze bushing. This new system also includes slipper seals to reduce the coefficient of friction between the shaft and center section. This lube-free design includes the straight shaft and altered exhaust port configuration utilized in the enhanced M2 air distribution system. Low start-up pressure, on/off reliability, and increased sealing in a dead-head condition are a few of the advantages of the lube-free air distribution system. The selected thermoplastics have the ability to function together without lubrication making the M2 Wilden pump truly lube-free. **The M2 lube-free pumps are not pre-lubed with oil or grease.**

### AIR VALVE BODY AND PISTON ASSEMBLY AND DISASSEMBLY

The air valve body and piston (P/N 02-2000-65-200) is externally serviceable by removing the four socket-head cap screws which attach it to the center section. The lube-free air valve body is off-white in color and has an encircled "LF" molded into the exterior. The thermoplastic air valve piston is gray in color like the aluminum lubed style, but is differentiated by a "D-shaped hole" in the top of the piston, and two small holes in the annular groove. (See Figure B.)

The piston should move freely and the ports in the piston must line-up with the ports on the face of the air valve body (see Figure B). If the piston does not move freely in the valve body, the entire air valve assembly should be immersed in a mild soap solution to remove any accumulation of sludge and/or grit. If the air valve does not move freely after the above cleaning, the air valve should be disassembled as follows: Remove the snap ring from the top of the air valve cylinder and apply an air jet to the 1/8" hole on the opposite end of the air valve face. Caution: The end cap may come out with considerable force. Verify that the guide pin molded into one of the end caps (P/N 02-2340-23-200) is straight and smooth to allow the piston to shift properly. Inspect the piston and cylinder bore for nicks and scoring. Small nicks can be dressed with fine sandpaper and the piston returned to service. Clean and reassemble. **Install air valve to center section and tighten to the required torque specifications\* (Item #2).**

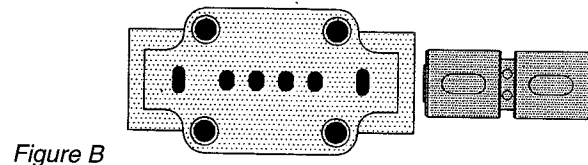


Figure B

### O-RING REPLACEMENT/CENTER SECTION

The M2 lube-free Champ series pumps are constructed with a polypropylene center section with a thermoplastic bushing. The M2 lube-free Metal pumps are constructed with a polypropylene center section with a thermoplastic bushing. (Lube-free aluminum center sections are not available.) These center sections are easily distinguished by the encircled letter "LF" stamped on the top of the center section. These bushings are not removable. The bushing has grooves cut into the inside diameter where back-up O-rings and slipper seals are installed. It is important that the correct O-ring is utilized. The back-up O-ring for the lube-free model has a bigger diameter and smaller cross-section in comparison to the "Lubed" model. The straight shaft (P/N 02-3800-09-07) must be utilized in the lube-free pump.

The back-up O-ring is installed first. This is most easily accomplished by using a tool called an O-ring pick, available through most industrial supply companies. The O-rings must be installed in the appropriate grooves as shown in Figure C (1, 3, 6, 8). Upon completion of the O-ring installation, the slipper seals (P/N 02-3210-55-200) must be installed in the same grooves (1, 3, 6, 8). This task is accomplished by utilizing long nose pliers and a flat head screw driver. Please see Figures D, E, and F.

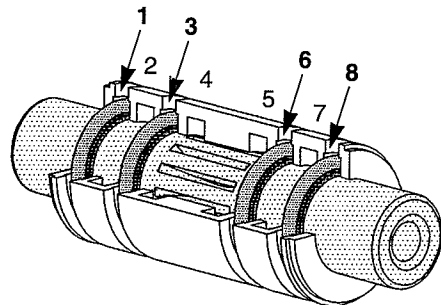


Figure C

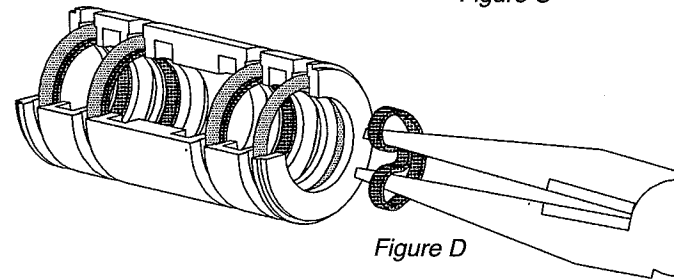


Figure D

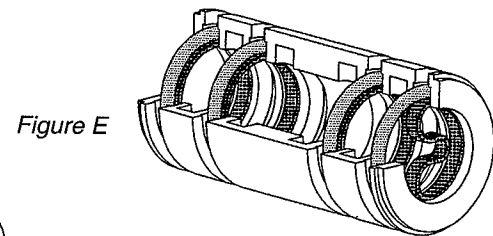


Figure E

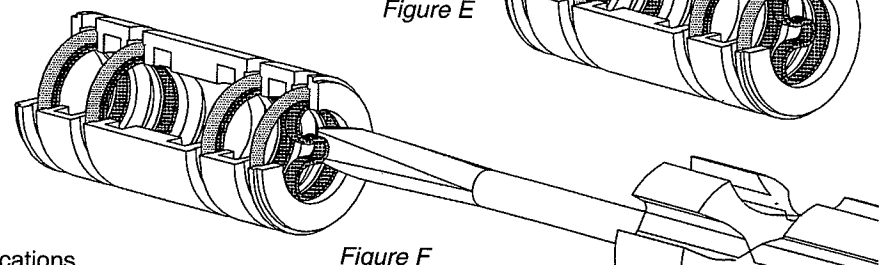


Figure F

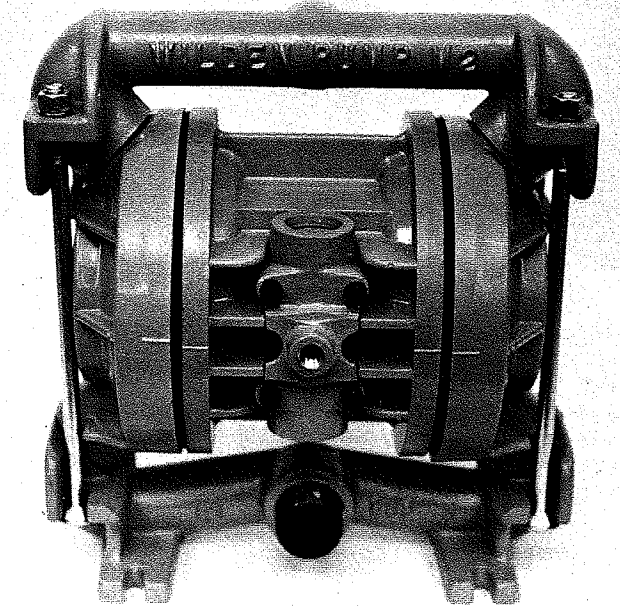
\*Refer to Section 8 for the required torque specifications.  
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## SECTION 6A

# DIRECTIONS FOR DISASSEMBLY/REASSEMBLY AIR-OPERATED AND SOLENOID-OPERATED MODEL M2 METAL PUMPS

**CAUTION:** Before any maintenance or repair is attempted, the compressed air line to the pump should be disconnected and all air pressure allowed to bleed from pump. Disconnect all intake, discharge, and air lines. Drain the pump by turning it upside down and allowing any fluid to flow into a suitable container.

The Wilden M2 has a 1" inlet and 3/4" outlet and is designed for flows up to 37 GPM. Its one-piece polypropylene center section with vertical piston is based on design simplicity and proven efficiency. To aid in assembly of pump, alignment marks have been cast into the air chambers and the water chambers.



**DISASSEMBLY:** NOTE: Model used for these instructions incorporate rubber diaphragms and balls. Models with Teflon® diaphragms and balls are the same except where noted.

### STEP 1

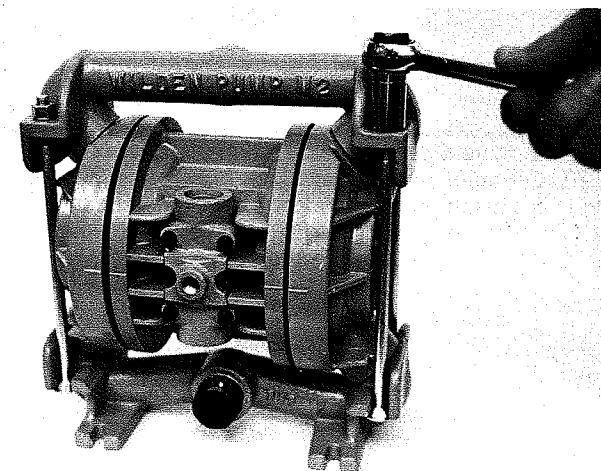


Figure 1A

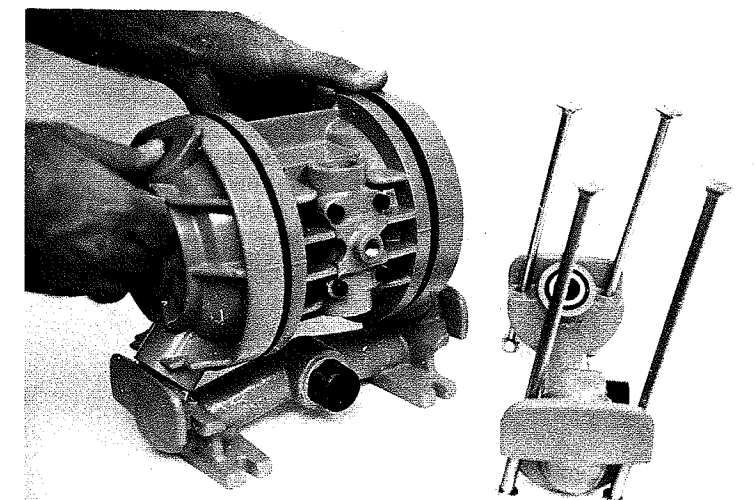


Figure 1B

Start disassembly using a 9/16" wrench, loosen the four bolts and slide the long manifold bolts out from under the slots in the inlet manifold. It is not necessary to remove the nuts from the bolts. Lift off discharge manifold; the two discharge valve balls, seats and O-rings can be removed for inspection. Next, place both hands on the water chambers and lift entire center section, including chambers, from inlet manifold. The water chambers can now be removed from the center section. The inlet valve balls, seats and seat O-rings are now available for inspection. (Models fitted with Teflon® O-rings should always be reassembled with new Wilden Teflon® O-rings.) See figures 1A and 1B.



Figure 2A



Figure 2B

To remove the diaphragms, turn the center assembly on end (see *Figure 2A*) and with a 3/4" wrench, remove the outer piston and the diaphragm. Remove the shaft and attached diaphragm from the center block (*Figure 2B*). To remove the diaphragm from the shaft, hold the outer rim of the diaphragm and loosen the diaphragm piston plate with the adjustable wrench. If the plate will not loosen, the shaft must be placed in a vise. **Protect the shaft from damage by using wood blocks or soft jaws in the vise.** The plate can now be easily removed with the adjustable wrench.

At this point of disassembly, all wetted parts of the pump are available for inspection or repair. If inspection, and/or servicing, of the non-wetted air section is necessary, please see Section 3.

### ASSEMBLY:

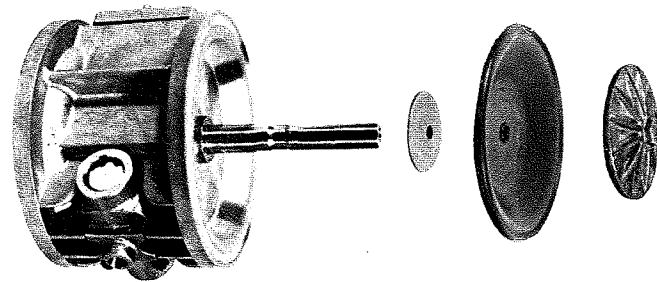


Figure 3A

### STEP 1 (Rubber Diaphragms)

First, install diaphragm and inner and outer piston plates on shaft. Observe the "this side out" marking on the convex side of the diaphragm. Hand-tighten only at this time the outer piston to the shaft. Lubricate the center block bushing with a light oil (ISO 15-5 wt) and insert the shaft through the bushing until the outer bead of the diaphragm just touches the circumferential groove of the air chamber (*Figure 4A*). Install the opposite outer piston, diaphragm(s) and inner piston and tighten securely. Note: Pumps equipped with Teflon® diaphragms require that backup diaphragm (P/N 02-1060-56) be used. See *Figure 3B*.

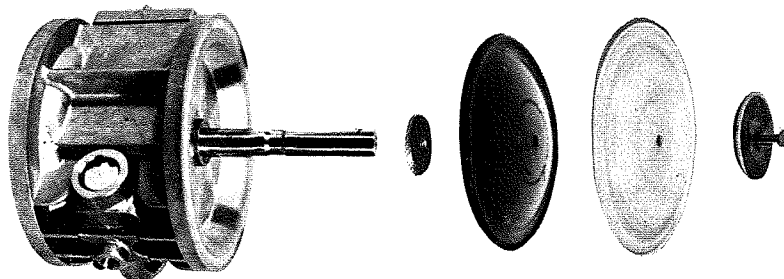


Figure 3B

### (Teflon® Diaphragms)

## SECTION 6C — LUBED PUMPS AIR VALVE/CENTER SECTION REPAIR/MAINTENANCE

The air valve assembly consists of the air valve body and piston. The unique design of the air valve relies only on differential pressure to cause the air valve to shift. It is reliable and simple to maintain. The bushing in the center block, along with the diaphragm shaft, provides the "trigger" to tell the air valve to shift. The following procedure will ensure that the air valve on your Wilden pump will provide long trouble-free service.

### AIR VALVE BODY AND PISTON ASSEMBLY AND DISASSEMBLY

The air valve body and piston can be disconnected from the pump by removing the four socket-head cap screws which attach it to the center section. The piston in the air valve is aluminum with a dark anodized coating (see *Figure A*). The piston should move freely and the ports in the piston should line up with the ports on the face of the air valve body. The piston should also appear to be dull black in color. If the piston appears to be a shiny aluminum color, the air valve is probably worn beyond working tolerances and should be replaced.

If the piston does not move freely in the air valve, the entire air valve should be immersed in a cleaning solution. (NOTE: Do not force the piston by inserting a metal object.) This soaking should remove any accumulation of sludge and grit which is preventing the air valve piston from moving freely. If the air valve piston does not move freely after the above cleaning, the air valve should be disassembled as follows: Remove the snap ring from the top end of the air valve and apply an air jet alternately to the two holes located in the face of the air valve until the end cap is blown out. (See *Figure B*, next page) [CAUTION: The air valve end cap may come out with considerable force. Hand protection such as a padded glove or a rag should be used to capture the end cap.] Inspect the piston and cylinder bore for nicks and scoring.

Small nicks can usually be dressed out and the piston returned to service. Inspect the cylinder end caps. Make sure that the guide pin is straight and smooth or the piston will not move freely in the cylinder. New O-rings should be installed on the end caps. Lubricate the O-rings and install the end caps, assuring that proper alignment of the piston and cylinder ports is maintained. Use an oil with arctic characteristics (ISO 15-5wt).

### O-RING REPLACEMENT/ CENTER SECTION

The pump's center section consists of a molded housing with a bronze bushing. (Bushing is not removable.) This bushing has grooves cut into the inside diameter. O-rings are installed in these grooves. When the O-rings become worn or flat, they will no longer seal and must be replaced. This is most easily accomplished by using a tool called an O-ring pick, available through most industrial supply companies.

There are two versions of center sections: PRE-ENHANCED and ENHANCED. An encircled letter "E" stamped on the top of the center section denotes the ENHANCED type center section (*Figure C*).

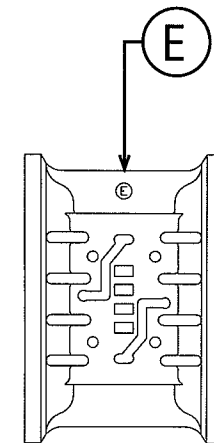
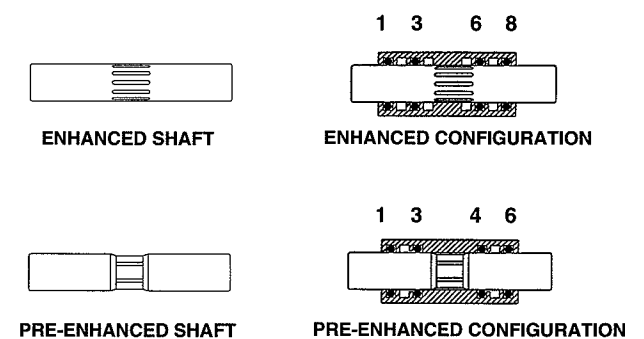


Figure C

Please contact your local authorized distributor for enhanced air distribution retrofit packages.

If the encircled "E" is present, an enhanced (02-3800-09-07) shaft should be utilized to maximize performance. The center section O-rings (02-3200-52) must be installed in the appropriate grooves as shown (1, 3, 6, 8).

If the encircled "E" is not present, a pre-enhanced shaft (02-3800-09 or 02-3820-09) must be utilized. An enhanced (non-dented) shaft will not function correctly. The center section O-rings (02-3200-52) must be installed in the appropriate grooves as shown (1, 3, 4, 6).





**STEP 7**

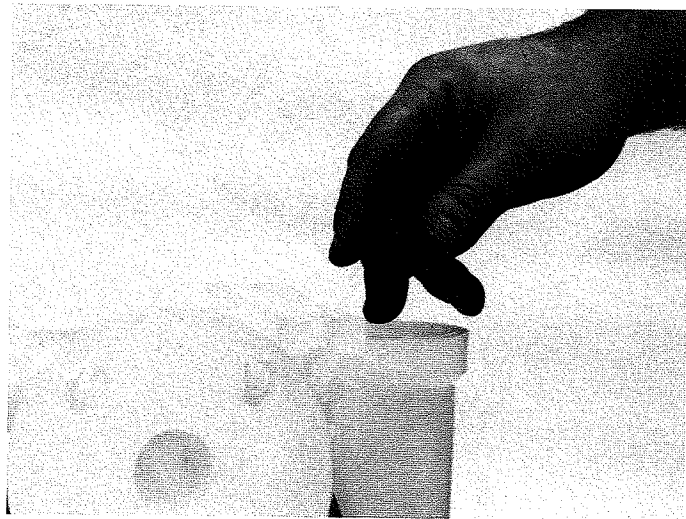


Figure 23



Figure 24

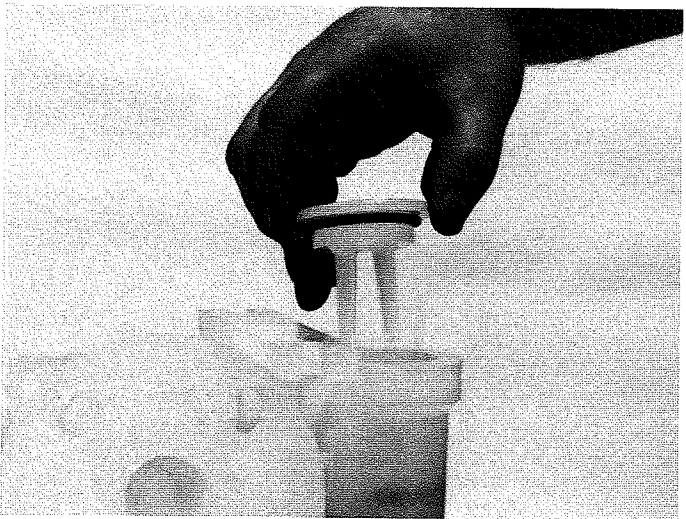


Figure 25

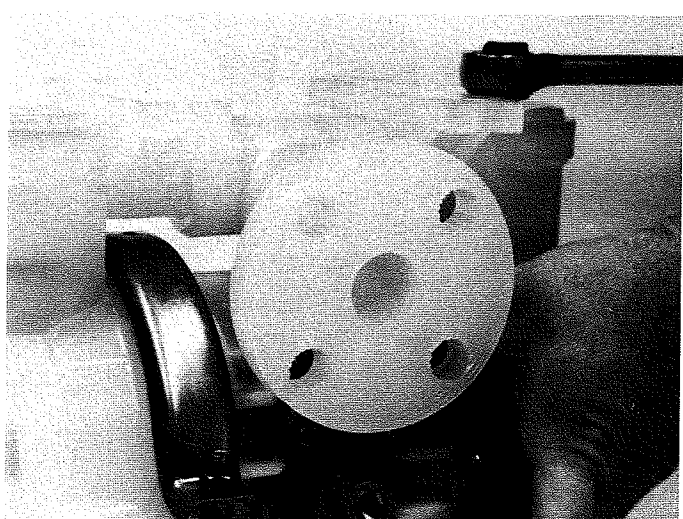


Figure 26

Turn pump upside down and insert valve ball (Figure 23), valve seat (note the O-ring placement in Figure 24), and retainer (Figure 25). Tighten retainer per the torque specifications\* (Item #4) (Figure 26). Blow out air line for 10 to 20 seconds to make sure all pipeline debris is clear. Connect air line and run pump dry. Good suction should be observed at inlet.

\*Refer to Section 8 for torque specifications.



Figure 4A

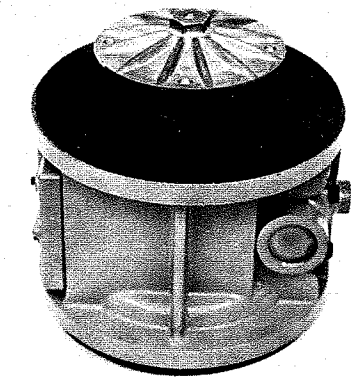


Figure 4B

**STEP 2**

Turn center section on its side. The diaphragm should be in full stroke position (Figure 4B). Place outer chamber over diaphragm, being careful to align cast-in assembly marks. Press the diaphragm assembly down and install the other outer chamber in the same fashion. Tighten outer piston per the torque specifications\* (Item #3/Metal).

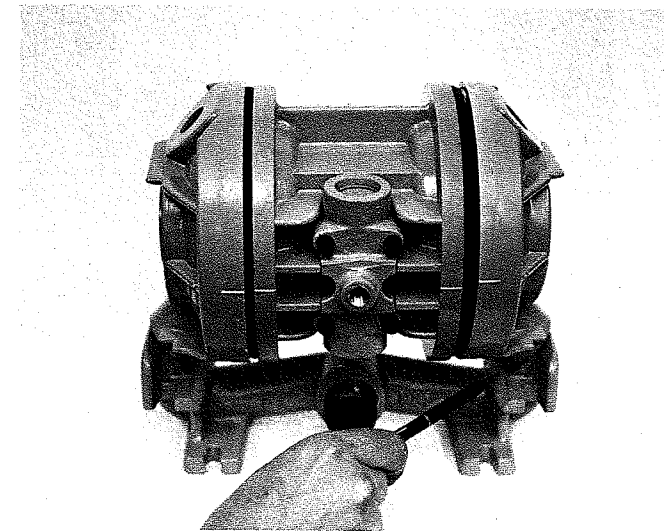


Figure 5A

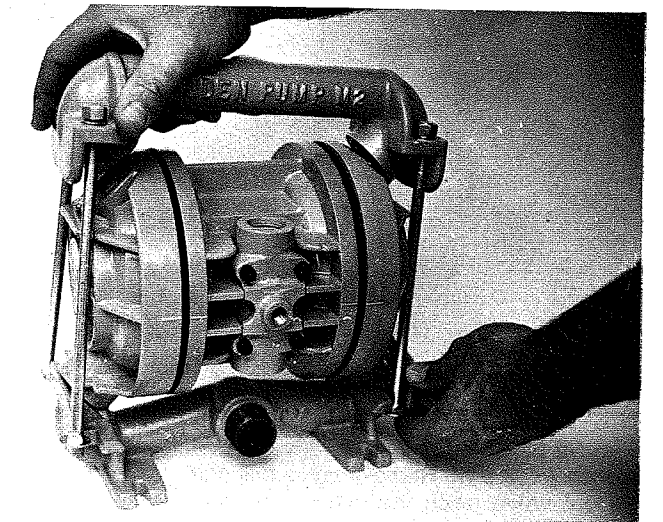


Figure 5B

Be sure to align outer chamber to inlet manifold very carefully to prevent leakage (both side to side and front to back, see Figure 5A).

Next, install the four manifold bolts in the discharge manifold from the bottom side up and thread the nuts two or three turns.

When all four bolts have been installed, press down firmly on the discharge manifold with one hand and use the other hand to pull the two bolts on one side into their slots on the inlet housing, making sure the bolts snap over their guides on the water chamber. Next, fit the other two manifold bolts in the same manner.

Tighten down the bolts in a criss cross pattern, making sure that the alignment between the inlet housing and the water chambers and between the discharge manifold and water chambers is maintained. Tighten vertical manifold bolts per the torque specifications\* (Item #7). Blow out air line for 10 to 20 seconds to make sure all pipeline debris is clear. Connect the air line and run pump dry. Good suction should be observed at inlet. Refer to Sections 2A and 2B for proper suction lift figures.

\*Refer to Section 8 for torque specifications.

## SECTION 6B

# DIRECTIONS FOR DISASSEMBLY/REASSEMBLY AIR-OPERATED AND SOLENOID-OPERATED MODEL M2-400 CHAMP SERIES (Plastic)

**CAUTION:** Before any maintenance or repair is attempted, the compressed air line to the pump should be disconnected and all air pressure allowed to bleed from pump. Disconnect all intake, discharge, and air lines. Drain the pump by turning it upside down and allowing any fluid to flow into a suitable container.

The Wilden model M2-400 Champ is an air-operated, double-diaphragm pump with all wetted parts of polypropylene or

PVDF. The single-piece center section, consisting of center block and air chambers, is molded from polypropylene. All fasteners and hardware are stainless steel. The air valve is brass or high tech, engineered thermoplastics. All O-rings used in the pump are of special materials and should only be replaced with factory-supplied parts.

PLEASE read all directions before starting disassembly.

### DISASSEMBLY

Before actual disassembly is started, turn pump upside down and drain all liquid trapped in the pump into a suitable container. Be sure to use proper caution if liquid is corrosive or toxic. Mark each liquid chamber to its respective air chamber for easy alignment during reassembly.

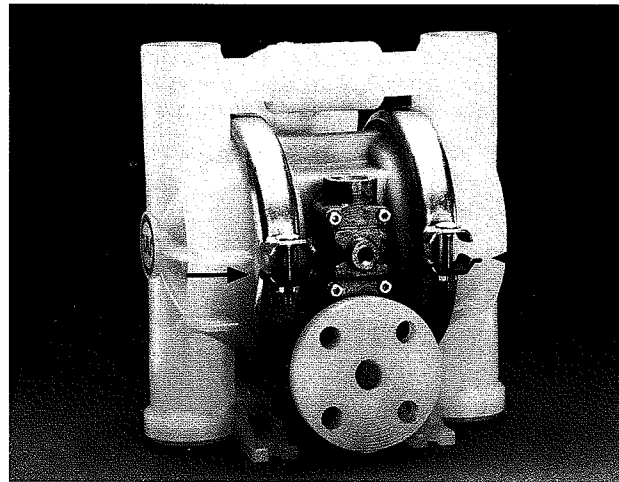


Figure 1

### STEP 1

Remove top retainer with 1/2" drive socket wrench (Figure 2). Remove valve ball and pry out valve seat. Inspect valve seat, valve ball, retainer, and O-rings (Figure 3). If swelling, cracking or other damage is apparent, these parts must be replaced.

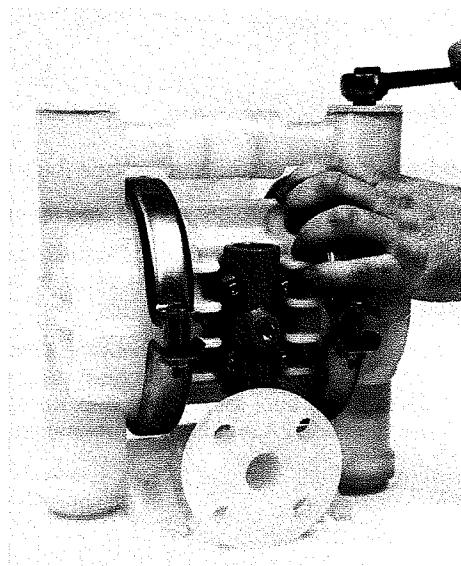


Figure 2

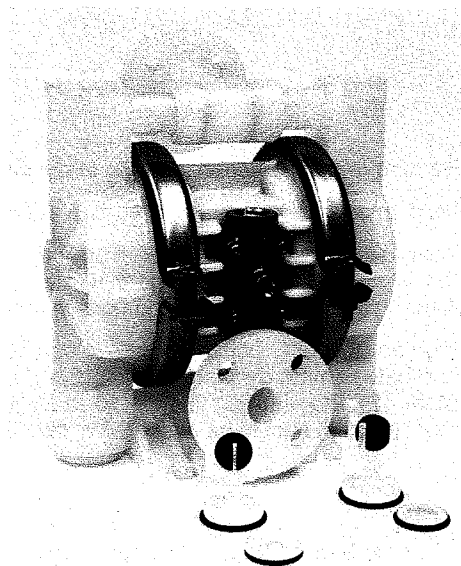


Figure 3

### STEP 6

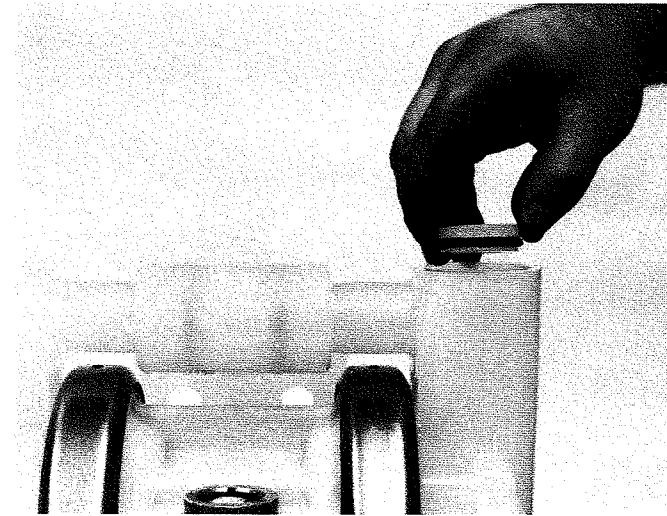


Figure 19

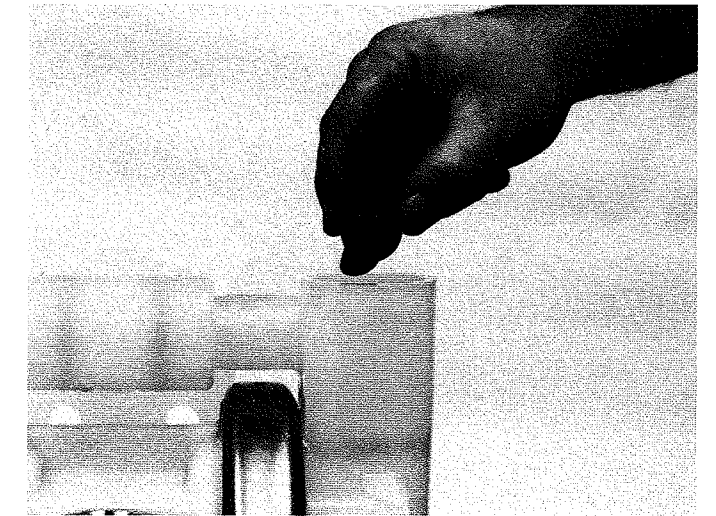


Figure 20

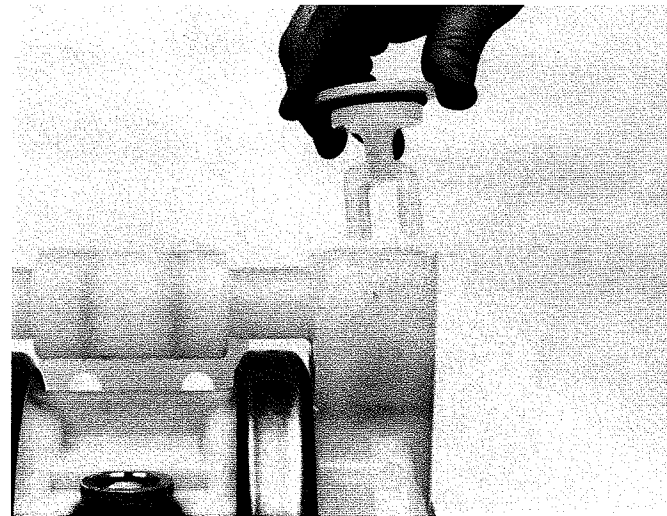


Figure 21

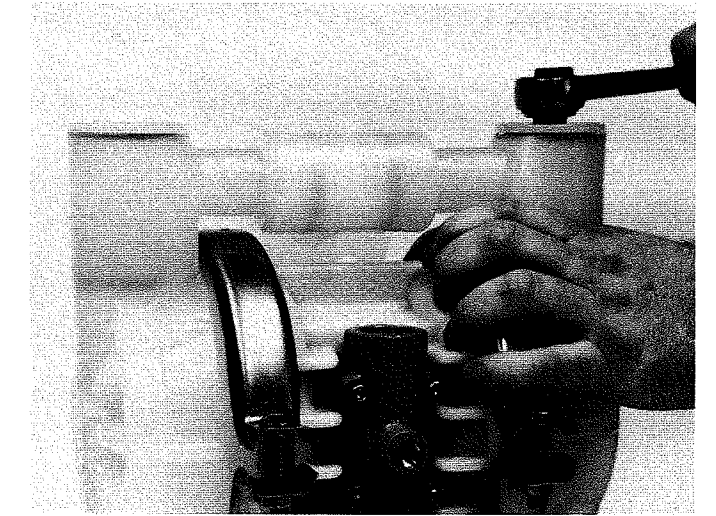


Figure 22

Insert valve seat, (note the O-ring placement in Figure 19), valve ball (Figure 20), and retainer (Figure 21) in the top of liquid chamber. Tighten top retainer per the torque specifications\* (Item #4) (Figure 22).

\*Refer to Section 8 for torque specifications.

#### STEP 4

Place O-ring, then tee section on liquid chamber (Figure 16).

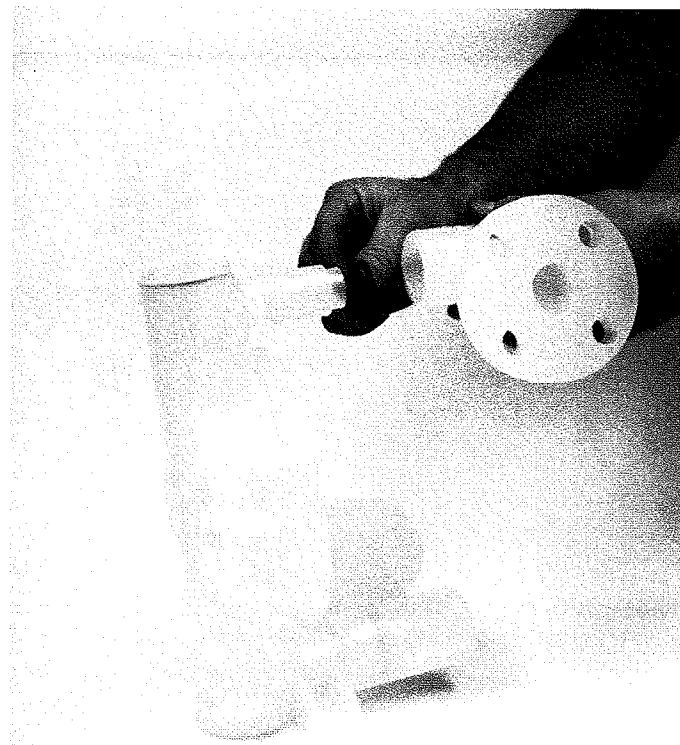


Figure 16

#### STEP 2

Turn pump upside down, loosen and remove bottom retainer (Figure 4). Pry out valve seat and remove along with valve ball, retainer and O-rings (Figure 5). If swelling, cracking or other damage is apparent, these parts must be replaced.

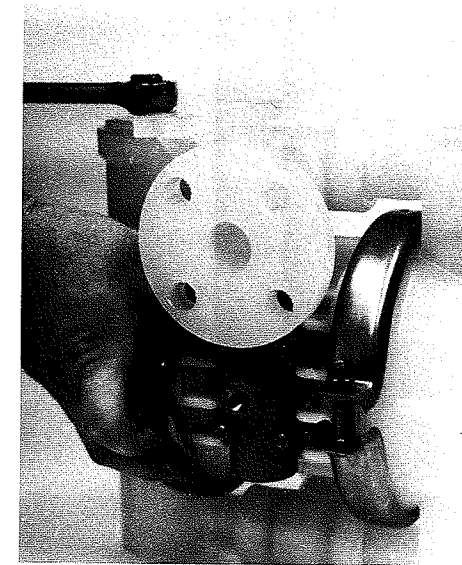


Figure 4

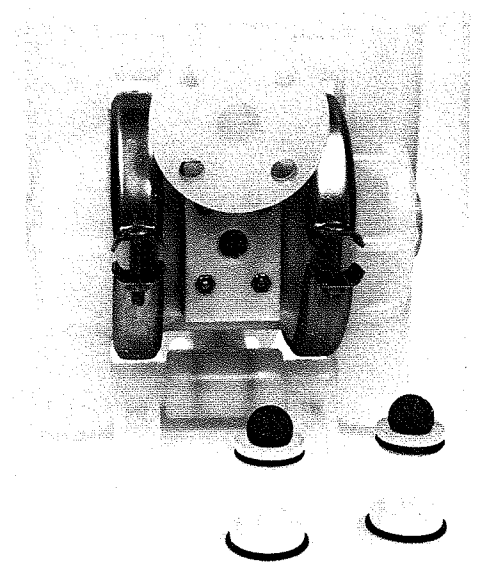


Figure 5

#### STEP 5

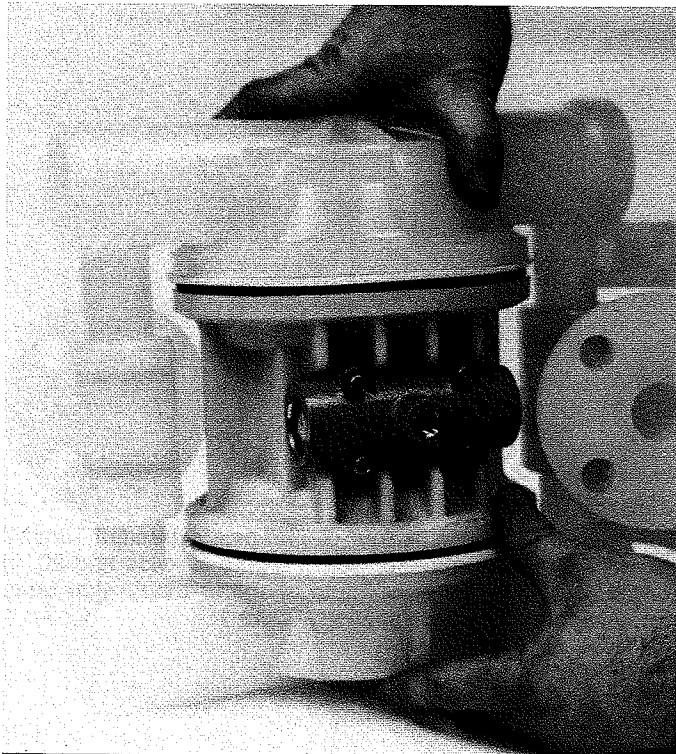


Figure 17

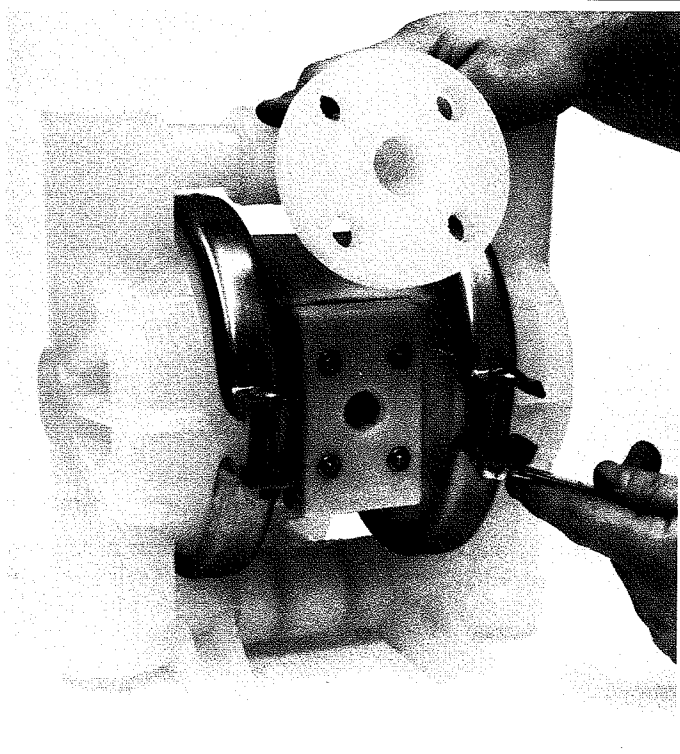


Figure 18

Attach liquid chambers to center section (Figure 17). **A C-CLAMP CAN BE UTILIZED TO EXPEDITE ASSEMBLY.** Put clamp bands in place and tighten per the torque specifications\* (Item #6 Plastic) (Figure 18).

\*Refer to Section 8 for torque specifications.

#### STEP 3

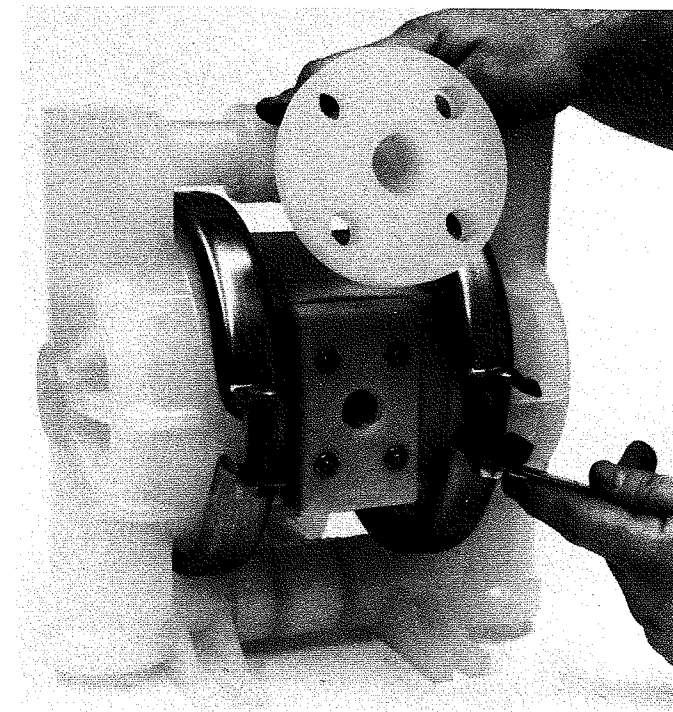


Figure 6

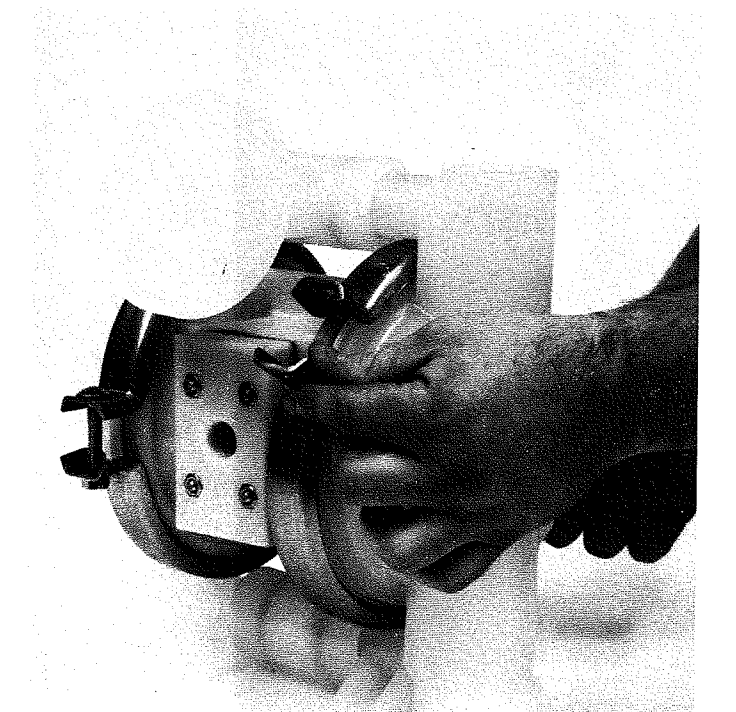


Figure 7

Loosen clamp band with 1/2" box end wrench (Figure 6). Rotate clamp bands and remove (Figure 7).

#### STEP 4

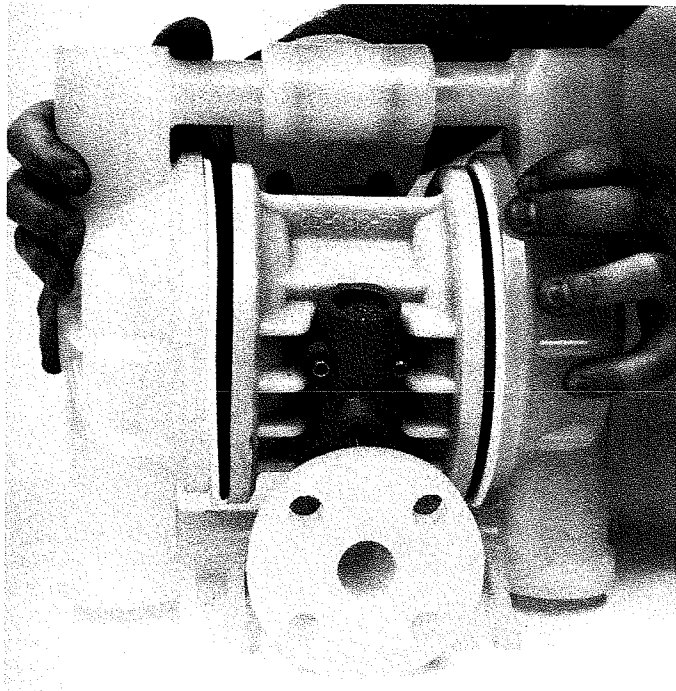


Figure 8

After clamp bands are removed pull chambers apart (Figure 8).

#### STEP 5

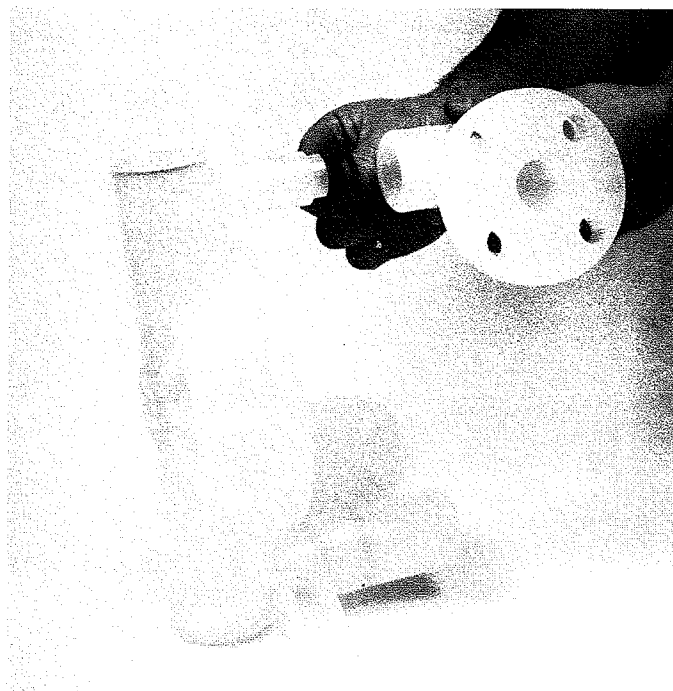


Figure 9

Pull tee section from liquid chamber and inspect O-ring (Figure 9).

#### STEP 6

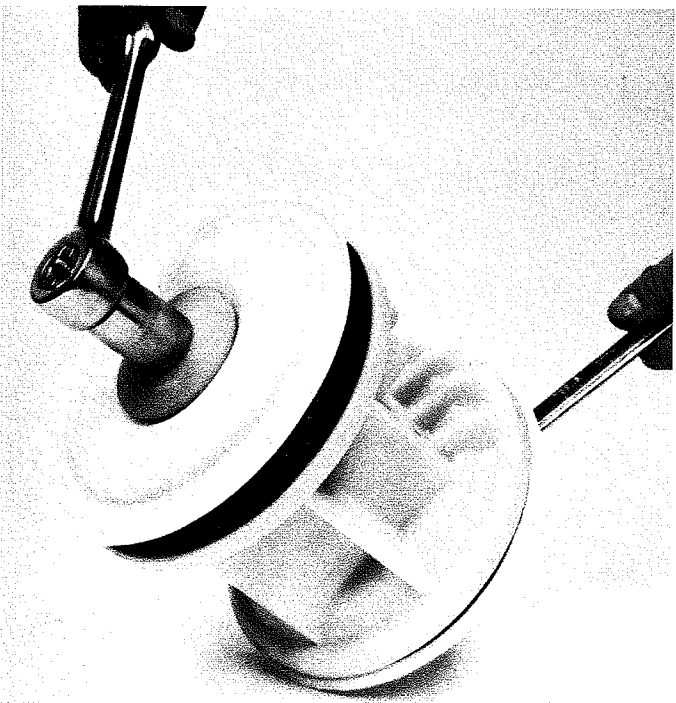


Figure 10



Figure 11

Loosen outer piston (Figure 10) and remove. Use 1" socket for rubber diaphragms and 3/8" socket for Teflon® diaphragms. Remove the shaft and attached diaphragm from center section. Hold shaft and remove outer piston (Figure 11). Inspection of diaphragms, inner pistons and outer pistons is now possible.

NOTE: IF UNABLE TO REMOVE OUTER PISTON BY HOLDING SHAFT, PLACE SHAFT IN A VISE, PROTECT THE SHAFT FROM DAMAGE BY USING WOOD BLOCKS OR SOFT JAWS IN THE VISE.

#### REASSEMBLY

#### STEP 1

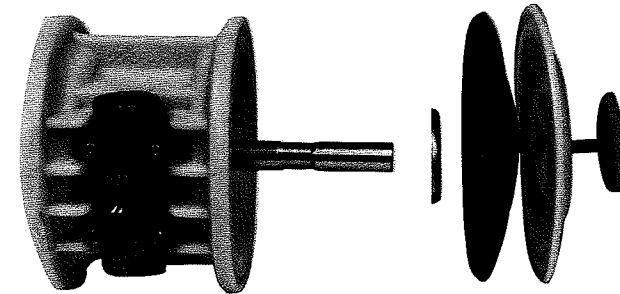


Figure 12

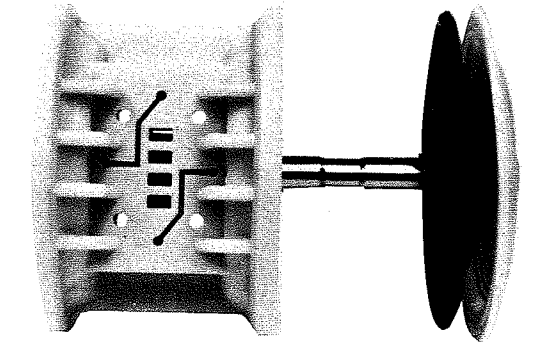


Figure 13

Insert outer piston through diaphragm, back-up diaphragm<sup>1</sup>, and inner piston (Figure 12). Tighten this assembly to shaft. Lubricate bushing with ISO 15-5 wt. oil and push shaft through bushing (Figure 13).

<sup>1</sup>Note: Back-up diaphragm included on models with Teflon® diaphragms only.

#### STEP 2

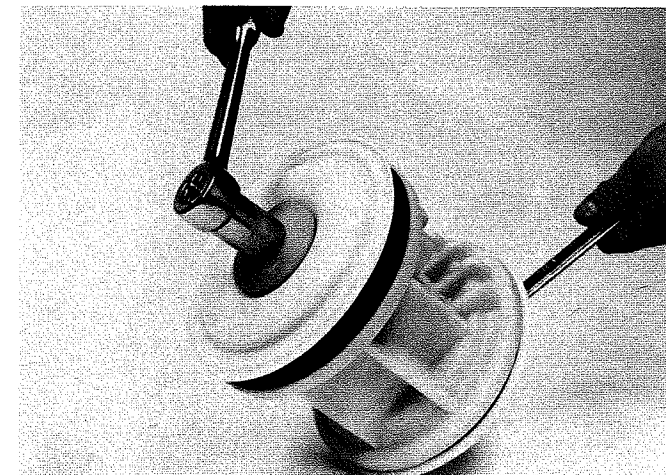


Figure 14

Install opposite outer piston, diaphragms, and inner piston and tighten per the torque specifications\* (Item #3 Plastic) (Figure 14).

\*Refer to Section 8 for torque specifications.

#### STEP 3

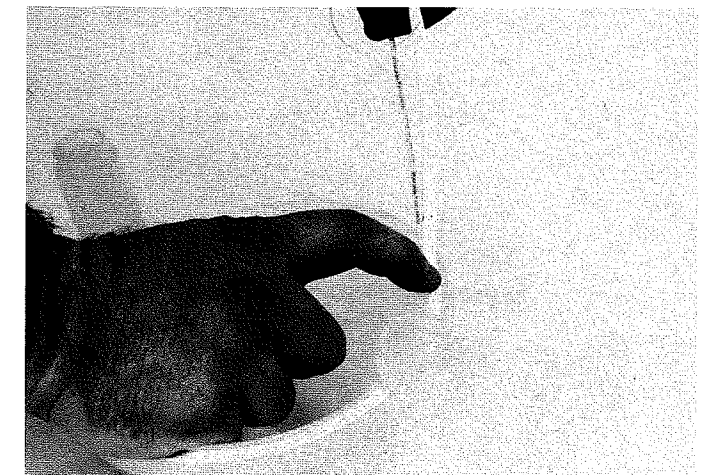


Figure 15

For models fitted with Teflon® diaphragms expanded Teflon® gasket material is required. Select a strip 1/4" wide and 20" in length. Install material in liquid chamber diaphragm bead groove to ensure positive sealing (Figure 15).