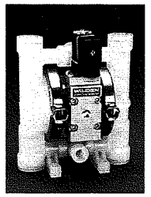
WILDEN'S SPECIALTY PUMPS

M8 STALLION

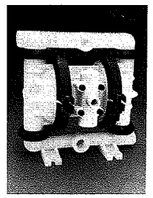
2" inlet. Solids clearance up to ¾". Built to handle rough treatment: cast-in handles for easy portability, reinforced shaft and high impact polyurethane base.

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

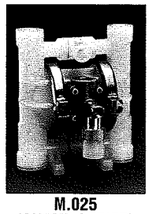


½" inlet. Teflon® PFA construction, temperatures to 300°F. Up to 14 GPM. Materials of construction have been selected to reduce contamination while providing a safer work environment.

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.

THE WILDEN PUMP LINE



M.025 (CHAMP SERIES)

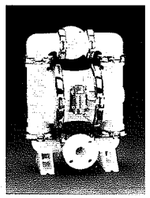
MODEL M.025

- ¼" Inlet
- 125 Max. PSIG
- Up To 4.5 GPM
- Max. Particle Size: ⅛"

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

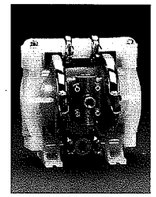
- 1½" Inlet
- 125 Max. PSIG
- Up To 73 GPM
- Max. Particle Size: ⅜"

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

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

M4 METAL

LUBE-FREE AVAILABLE



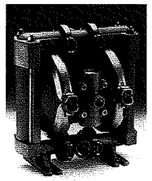
M1 PLASTIC (CHAMP SERIES)

MODEL M1

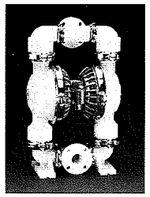
- ½" Inlet
- 110 Max. PSIG
- Up To 14 GPM
- Max. Particle Size: 1/16"

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

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



M1 METAL



M8 PLASTIC (CHAMP SERIES)

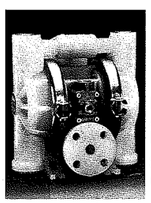
MODEL M8

- 2" Inlet
- 125 Max. PSIG
- Up To 155 GPM
- Max. Particle Size: ¼"

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

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

M8 METAL



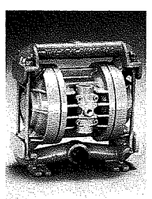
M2R PLASTIC (CHAMP SERIES)

MODEL M2

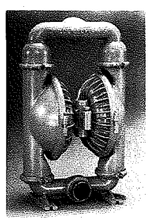
- 1" Inlet
- 125 Max. PSIG
- Up To 37 GPM
- Max. Particle Size: ⅛"

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

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



M2 METAL



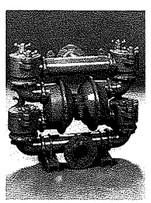
M15

MODEL M15

- 3" Inlet
- 125 Max. PSIG
- Up To 230 GPM
- Max. Particle Size: ⅜"

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
- 125 Max. PSIG
- Up To 304 GPM
- Max. Particle Size: 1⅜"

Materials of Construction:
Cast Iron

Suction Lift:
Dry: 13'
Wet: 25'

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

ISO 9001 Est. 1955 QUALITY SYSTEM

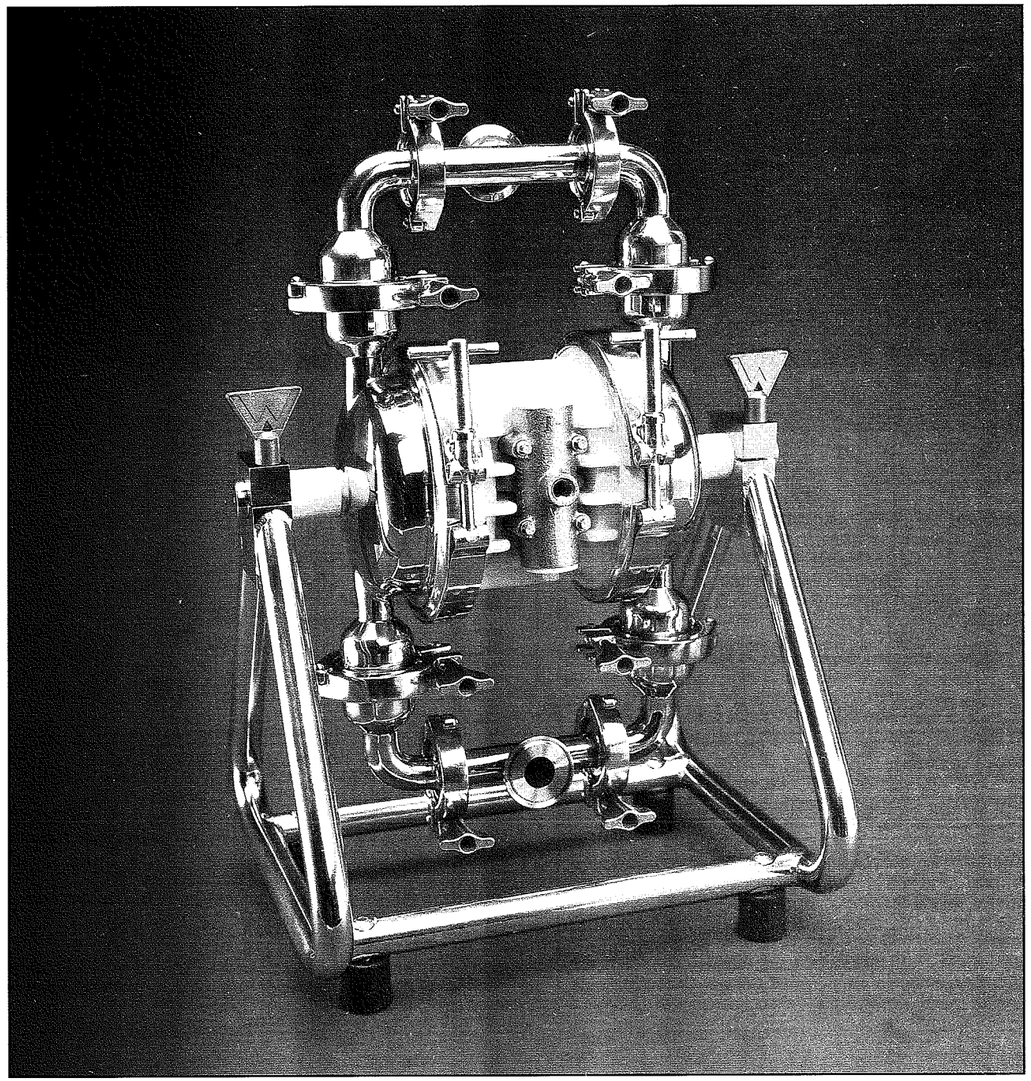
WILDEN®

AIR OPERATED DOUBLE DIAPHRAGM PUMPS

M2 SANIFLO™ 3A 44-01

SANITARY PUMP TECHNOLOGY

Engineering Operation and Maintenance



RBG P/S-3A
4/96

THE SANIFLO[3A] PUMP — HOW IT WORKS

The Wilden diaphragm pump is an air-operated, positive displacement, self-priming pump. These drawings show flow pattern through the pump upon its initial stroke. It is assumed the pump has no fluid in it prior to its initial stroke.

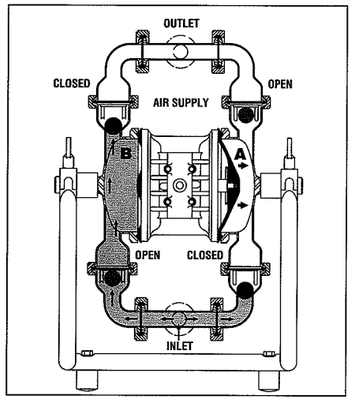


FIGURE 1 The air valve directs pressurized air to the back side of diaphragm A. The compressed air is applied directly to the liquid column separated by elastomer diaphragms. The diaphragm acts as a separation membrane between the compressed air and liquid, balancing the load and removing mechanical stress from the diaphragm which allows for millions of flex cycles. The compressed air moves the diaphragm away from the center block of the pump. The opposite diaphragm is pulled in by the shaft connected to the pressurized diaphragm. Diaphragm B is now on its suction stroke; air behind the diaphragm has been forced out to the atmosphere through the exhaust port of the pump. Diaphragm A is working against atmospheric air pressure. The movement of diaphragm B toward the center block of the pump creates a vacuum within chamber B. Atmospheric pressure forces fluid into the inlet manifold forcing the inlet valve ball off its seat. Liquid is free to move past the inlet valve ball and fill the liquid chamber.

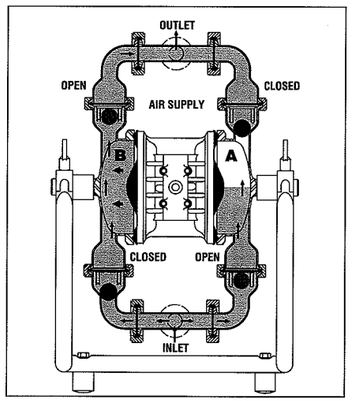


FIGURE 2 When the pressurized diaphragm, diaphragm A, reaches the limit of its discharge stroke, the air valve redirects pressurized air to the back side of diaphragm B. The pressurized air forces diaphragm B away from the center block while pulling diaphragm A to the center block. Diaphragm B is now on its discharge stroke. Diaphragm B forces the inlet valve ball onto its seat due to the hydraulic forces developed in the liquid chamber and manifold of the pump. These same hydraulic forces lift the discharge valve ball off its seat, while the opposite discharge valve ball is forced onto its seat, forcing fluid to flow through the pump discharge. The movement of diaphragm A to the center block of the pump creates a vacuum within liquid chamber A. Atmospheric pressure forces fluid into the inlet manifold of the pump. The inlet valve ball is forced off its seat allowing the fluid being pumped to fill the liquid chamber.

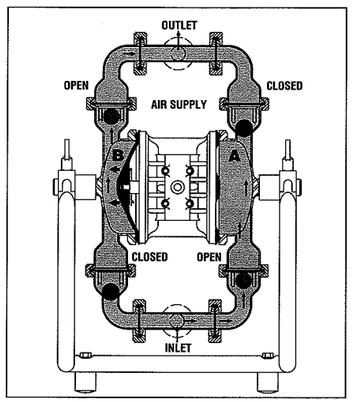


FIGURE 3 At completion of the stroke, the air valve again redirects air to the back side of diaphragm A, which starts diaphragm B on its exhaust stroke. As the pump reaches its original starting point, each diaphragm has gone through one exhaust and one discharge stroke. This constitutes one complete pumping cycle. The pump may take several cycles to completely prime depending on the conditions of the application.

Class I & II Ozone NON USE Depleting Substances (U.S. Clean Air Act Amendments of 1990)

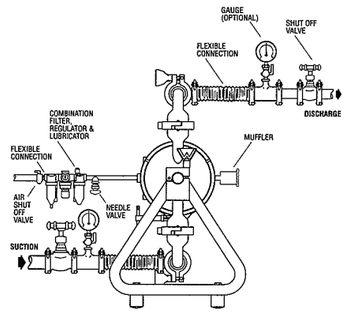
WILDEN PUMP DESIGNATION SYSTEM

M XXX-*xxx* / XXXX / XX / XX / XXX

- O-RINGS
- VALVE SEAT
- VALVE BALLS
- DIAPHRAGMS
- AIR VALVE
- CENTER BLOCK OR CENTER SECTION
- AIR CHAMBERS OR CENTER SECTION
- WETTED CONSTRUCTION
- SPECIALTY CODE (IF APPLICABLE)
- MODEL

In the case where a center section is used instead of a center block and air chambers, the designation will be as follows: Aluminum = AA, Polypropylene = PP, Carbon-filled Acetal = GG, Nylon = YY, Acetal = LL

SUGGESTED INSTALLATION



CAUTIONS! READ FIRST

Temperature Limitation:
225°F (107°C) Operating Temperature
225°F (107°C) Cleaning Temperature

CAUTION: Maximum temperature limits are based upon mechanical stress only. Certain chemicals will significantly reduce maximum safe operating temperatures.

CAUTION: Verify that process fluid and cleaning chemicals are compatible with all pump components. Consult Chemical Guide (RBG E-4) for chemical compatibility and temperature limitations.

CAUTION: ALWAYS WEAR SAFETY GLASSES WHEN PERFORMING INSPECTION, CLEANING, OR MAINTENANCE. READ ALL INSTRUCTIONS PRIOR TO INSTALLATION.

CAUTION: Always drain and flush pump prior to performing maintenance.

CAUTION: 125 psig maximum air inlet pressure. Do not exceed 125 psig.

CAUTION: All piping, valves, gauges and other components installed on the liquid discharge must have a minimum pressure rating of 125 psig.

®TEFLON IS A REGISTERED TRADEMARK OF E.I. DUPONT CORP.

MODEL M2 SANIFLO[3A]

ITEM	DESCRIPTION	QTY.	STAINLESS STEEL M2-85/SPPN P/N	STAINLESS STEEL M2-86/SPPN P/N
1	Air Valve Assembly[1]	1	02-2000-06-225	02-2000-06-225
2	End Cap w/o Guide Pin	1	02-2331-23	02-2331-23
3	End Cap w/Guide Pin	1	02-2301-23	02-2301-23
4	End Cap O-Ring[2]	2	02-3200-52-200	02-3200-52-200
5	Retaining Ring	2	02-2650-03	02-2650-03
6	Air Valve End Cap Cover	2	02-2420-55	02-2420-55
7	Gasket, Air Valve	1	02-2600-52	02-2600-52
8	Air Valve Bolt	4	02-6000-03-85	02-6000-03-85
9	Hex Nut	4	04-6400-03	04-6400-03
10	Muffler Plate	1	02-3180-20	02-3180-20
11	Gasket, Muffler Plate, Plastic	1	02-3500-52-500	02-3500-52-500
12	Center Section	1	02-3151-20-200	02-3151-20-200
13	Slipper Seal	4	02-3210-55-200	02-3210-55-200
14	Back-up O-Ring[2]	4	02-3200-52-200	02-3200-52-200
15	Stand, Assembly	1	02-7650-10-85	02-7650-10-85
16	Shaft	1	02-3820-09-07	02-3820-09-07
17	Stud, Threaded	2	02-6150-03-85	02-6150-03-85
18	Back-up Diaphragm	2	02-1060-55-85	02-1060-55-85
19	Diaphragm	2	02-1010-72-85	02-1010-72-85
20	Liquid Chamber	2	02-5000-10-85	02-5000-10-85
21	Large Clamp Band	2	02-7300-03-85	02-7300-03-85
22	Elbow, Combo	4	02-5220-10-85	02-5220-10-85
23	Gasket, Elbow/Liquid Chamber	4	02-1400-68-85	02-1400-68-85
24	Ball Cage	4	02-5350-10-85	02-5350-10-85
25	Valve Ball	4	—	—
26	Medium Clamp Band	4	02-7200-03-85	02-7200-03-85
27	Small Clamp Band	4	02-7100-03-85	02-7100-03-85
28	Tee-Section Gasket	4	02-1320-68-85	02-1320-68-85
29	Manifold Tee-Section	2	02-5160-10-85	02-5160-10-85
30	Bushing	2	02-6940-23-85	02-6940-23-85
31	Muffler	1	02-3510-99	02-3510-99
32	Leak Detector Sensor Cable	1	65-8020-99	65-8020-99
33	Wil-Gard™ Control Module	1	65-8000-99	65-8000-99-14
34	End Cap Bolt	2	02-2450-22	02-2450-22
35	Piston, Inner	2	02-3710-03-85	02-3710-03-85
36	Wil-Gard™ Mounting Bracket (Not shown)	1	02-7410-10-85	02-7410-10-85
37	Screw (Not shown)	4	02-6320-03-85	02-6320-03-85

[1]Air Valve Assembly includes item numbers 2, 3, 4, 5, and 6.
[2]End cap O-ring and back-up O-ring are the same part.

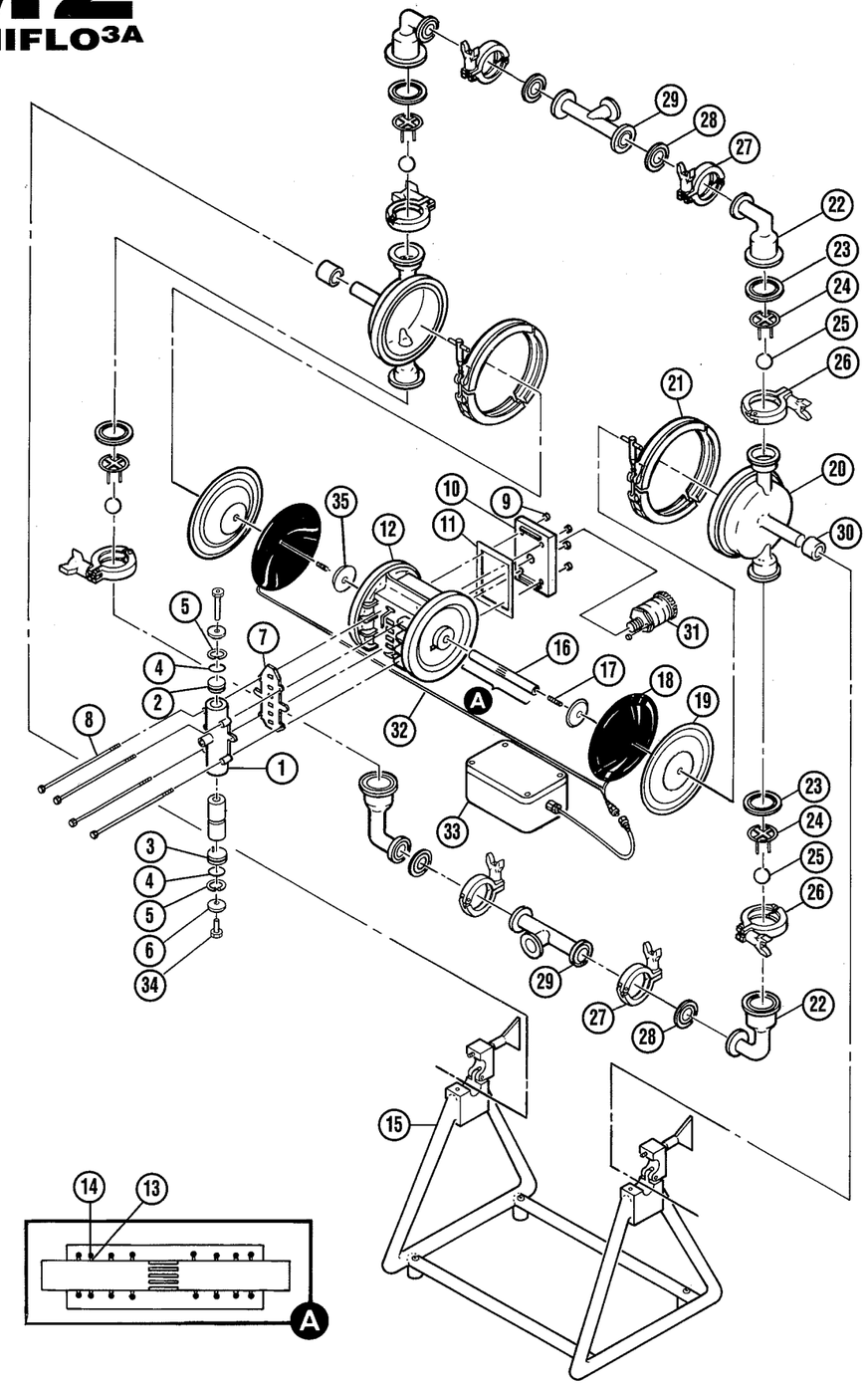
VALVE BALL OPTIONS FOR MODEL M2 SANIFLO[3A]

MATERIAL	VALVE BALL
Teflon®	02-1080-55
Food Grade Viton	02-1080-68-85
Stainless Steel	02-1080-03-85

TORQUE SPECIFICATIONS FOR MODEL M2 SANIFLO[3A]

Small Wing Nuts	Finger-tight
Large Wing Nuts	Finger-tight
Large Clamp Bands	Finger-tight
Air Valve Bolts	20 in. lbs.

M2
SANIFLO3A



SANITARY PUMPING SOLUTIONS

The SANIFLO pump line is specifically designed to meet the strict guidelines established for sanitary process applications. SANIFLO incorporates a straight flow-through design assuring that product will not stagnate or become trapped. Two pumping chambers reduce velocity within the pump resulting in high shear sensitivity. The pump does not utilize close fitting parts which allows solids to pass without harm. Abrasive and viscous product is also pumped easily without damaging the fluid's characteristics or the pump itself.

The SANIFLO3A pump meets the requirements of applicable 3-A Sanitary Standard (air or hydraulically driven diaphragm pumps for milk and milk products). It is constructed of 316 Stainless Steel (meets or exceeds 32 Ra exterior finish and 8 Ra interior finish) and utilizes 304 Stainless Steel hardware.

The wetted parts and Teflon® diaphragms with integral SANIFLO3A piston plates are designed to allow CIP (clean-in-place) operations. Design features include: removable ball cage, no valve seat or O-ring, straight manifold and flow-through design. Lubrication-free operation decreases the chance of contamination while reducing cleaning time. Inspection stand, tri-clamp style inlet and discharge ports, wing nut fasteners, and clamp bands offer quick, easy disconnect to expedite the cleaning and inspection process. The Wil-Gard™ diaphragm monitoring device lowers down time and maintenance costs with 24 hour pump surveillance.

Inherent features include: *intrinsic safety, deadhead capability, dry running and self-priming capability, speed and pressure variability, and ease of operation and maintenance.*

Initially issued June 28, 1995 — Authorization No. 833 AMENDED

This Is To Certify That

Wilden Pump and Engineering Company

22069 Van Buren Street, Grand Terrace, CA 92313-5651

is hereby authorized to continue to apply the 3-A symbol to the models of equipment, conforming to the 3-A Sanitary Standards for Air or Hydraulically Driven Diaphragm Pump for Milk and Milk Products (44-01), set forth below:

Model Designations M2-85/SPPZ/TF/S (SS Ball), M2-85/SPPZ/TF/VT (FDA Viton Ball) and M2-85/SPPZ/TF/TF (Teflon Ball): Plus M2-SPPN/TF/S (SSBall), M2-85/SPPN/TF/VT (FDA Viton Ball) and M2-85/SPPN/TF/TF (Teflon Ball) for the twelve months ending June 27, 1996

Date of issuance: Dec 6, 1995 — Earl O. Wright, Secretary.
3-A SANITARY STANDARDS SYMBOL ADMINISTRATIVE COUNCIL

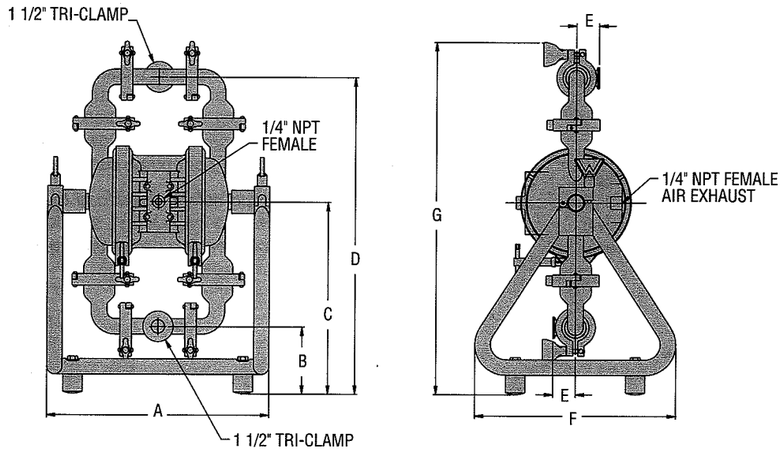
• • • • •

The issuance of this authorization for the use of the 3-A symbol is based upon the voluntary certification, by the applicant for it, that the equipment listed above complies fully with the 3-A Sanitary Standards designated. Legal responsibility for compliance is solely that of the holder of this Certificate of Authorization, and the 3-A Sanitary Standards Symbol Administrative Council does not warrant that the holder of an authorization at all times complies with the provisions of the said 3-A Sanitary Standards. This in no way affects the responsibility of the 3-A Sanitary Standards Symbol Administrative Council to take appropriate action in cases in which evidence of non-compliance has been established.

NOTE: The model designations listed above are currently being amended by the Sanitary Standards Symbol Administrative Council. Use correct model designations listed on page 13.

SECTION 1

DIMENSIONAL DRAWING
MODEL M2 SANIFLO^{3A}



DIMENSIONS – M2 SANIFLO^{3A} (SANITARY)		
ITEM	STANDARD (inch)	METRIC (mm)
A	14 3/8	365.1
B	4 11/32	110.3
C	12 3/8	314.3
D	20 13/32	518.3
E	1 15/32	37.3
F	12 7/8	327.0
G	22 11/16	576.2
H	11	279.4
J	7 3/4	196.9

SECTION 2

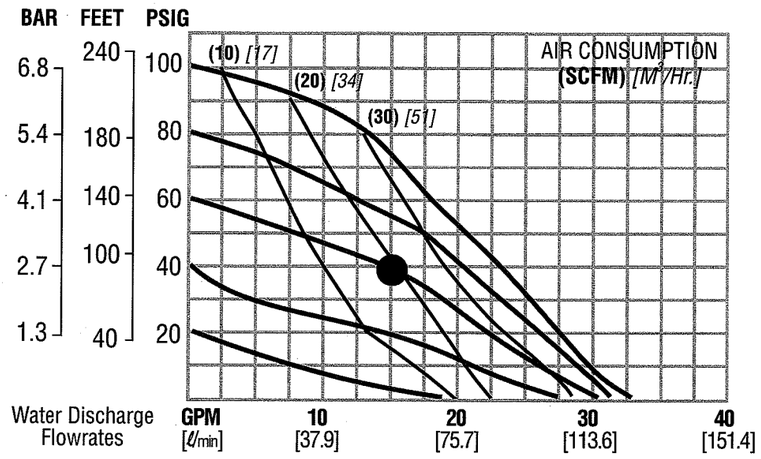
PUMP PERFORMANCE CURVE

MODEL M2 SANIFLO^{3A} (Teflon® Elastomers)

Height .....22 1/16"
Width .....14 3/4"
Depth .....12 7/8"
Weight.....51 lbs.
Air Inlet .....¼" Female NPT
Inlet .....1½" Tri-clamp
Outlet.....1½" Tri-clamp
Suction Lift.....**Viton Balls:** 5 In. Hg. Dry
24 In. Hg. Wet
Teflon® Balls: 2.5 In. Hg. Dry
24 In. Hg. Wet
S.S. Balls: 2.5 In. Hg. Dry
24 In. Hg. Wet
Displacement per Stroke ..... .068 gal.[1]
Start-up Pressure .....10 psig
Max. Size Solids .....¼" Dia.

Example: To pump 15 gpm against a discharge head of 40 psig requires 60 psig and 19 scfm air consumption. (See dot on chart.)

[1]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.

For optimum life and performance, pumps should be specified so that daily operation parameters will fall in the center of the pump performance curve.

SECTION 7B

AIR VALVE / CENTER SECTION REPAIR / MAINTENANCE

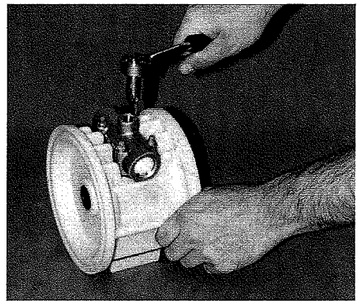


Figure A

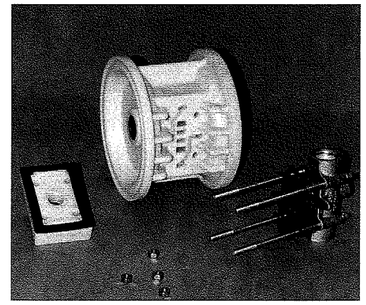


Figure B

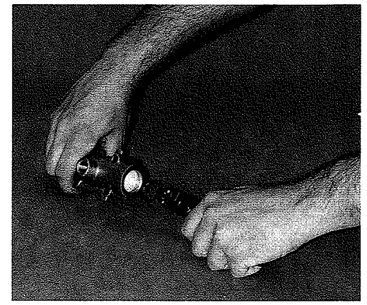


Figure C

The air valve body and piston is externally serviceable by removing the four screws which attach it to the center section. (Refer to *Figure A.)* The air valve is nickel plated brass and houses a thermoplastic piston (turquoise in color). The piston should move freely and the ports in the piston should line up with the ports of the air valve body. If the piston does not move freely, the piston can be immersed in a cleaning solution to remove any accumulation of sludge and grit which may prevent proper operation. The piston can be inspected by removing the snap ring on one side of the air valve body and by applying 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. Use a padded glove or rag 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 operate correctly. When reassembling the end caps, make sure that the end cap guide pin is positioned in such a way that the piston ports are lined up with the air valve port. A milled groove on the ID of the cylinder will assist in proper placement of end cap.

O-RING REPLACEMENT/CENTER SECTION

The M2 SANIFLO^{3A} pump is constructed with a polypropylene center section with a thermoplastic bushing. These center sections are easily distinguished by the encircled letters "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 seals are utilized. The straight shaft must be utilized in the SANIFLO^{3A}.

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 D* (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 screwdriver. Please see *Figures E, F* and *G.*

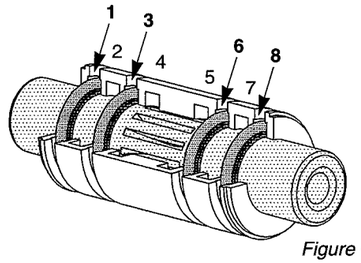


Figure D

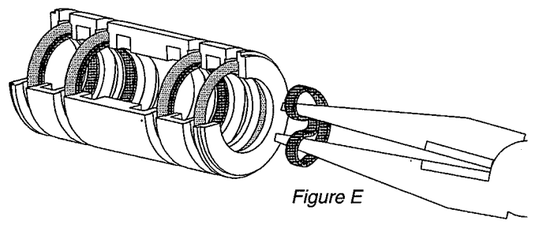


Figure E

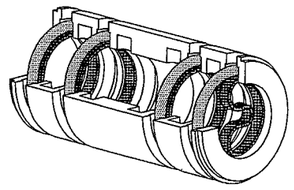


Figure F

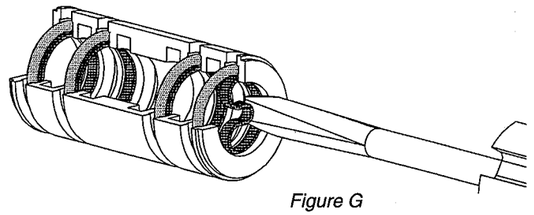


Figure G

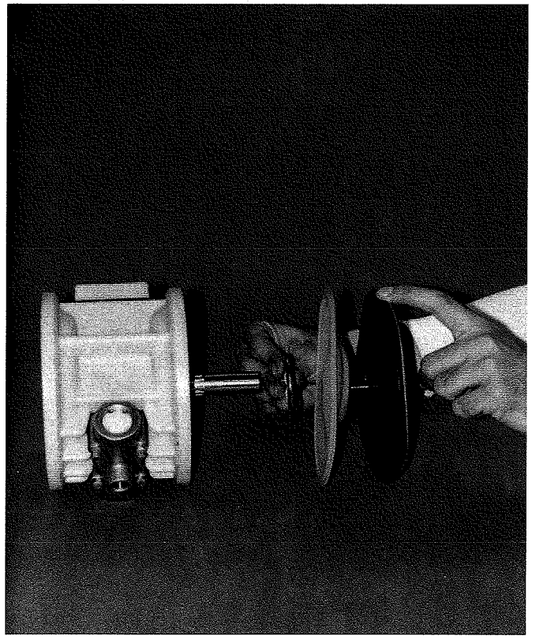


Figure 15

Reassembly of diaphragms: Inner piston is installed so that the concave side is positioned toward the shaft. Back-up diaphragm is then installed with Primary diaphragm holding the assembly together. (The primary diaphragm is black on one side and does not have a hole in the center.)

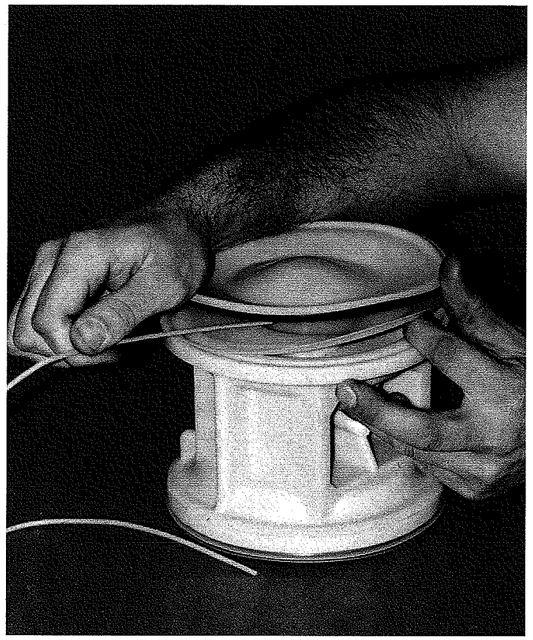


Figure 16

Upon reassembly, the sensor wire must be installed between the primary and back-up diaphragms on both sides of the pump at the 6 o'clock position. They should be positioned approximately half the distance to the shaft from the edge of the diaphragm.

SECTION 3
INSTALLATION
MODEL M2 SANIFLO^{3A}

Months of careful planning, study, and selection efforts can result in unsatisfactory pump performance if installation details are left to chance. Long term satisfaction can be assured if reasonable care is exercised throughout the installation process.

Operator safety, liquid supply vessels, discharge sites, noise levels, and other logistical factors usually dictate where the pump will be installed on the production floor. 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 for maximum advantage.

1. **ACCESS:** Sanitary pumps must be cleaned, inspected, and maintained on a regular basis in accordance with company or Federal protocol. To this end, the installation site should be easily accessible allowing personnel room to carry out their tasks. Ease of access will reduce downtime and maintenance costs.

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. (Refer to the pump performance chart on page 2.) 1/4" air line is the minimum size required. Most applications require far less than the maximum air inlet pressure of 125 psig. (Refer to pump performance chart.)

For best results, the air supply should be free of pipe scale and moisture. The use of an air filter installed just prior to the pump will eliminate the majority of any pipeline contaminates. It is important that this filter does not restrict the air volume below the value required to achieve the desired pumping rate. The filter should be cleaned periodically to ensure its operation integrity. The use of an oil with arctic characteristics (ISO 15-5 wt) will reduce friction resulting in longer part life. The pump can operate lube-free on intermittent duties only. An air regulator and needle valve installed on the air supply line enables the operator to adjust pump speed and therefore, flow rate. The pump's supply air line should be connected to the top of the main air header so that water does not run down from the main air header and into the pump. Excessive moisture can crystallize in the pump forming ice which blocks air ports causing reliability concerns.

The M2 SANIFLO^{3A} is delivered with a muffler in the shipping box. This muffler installed on the discharge port will reduce sound levels below OSHA specifications. Sound levels will vary depending on air inlet and liquid discharge pressure; therefore, an aftermarket muffler may be needed to satisfy your ecosystem needs.

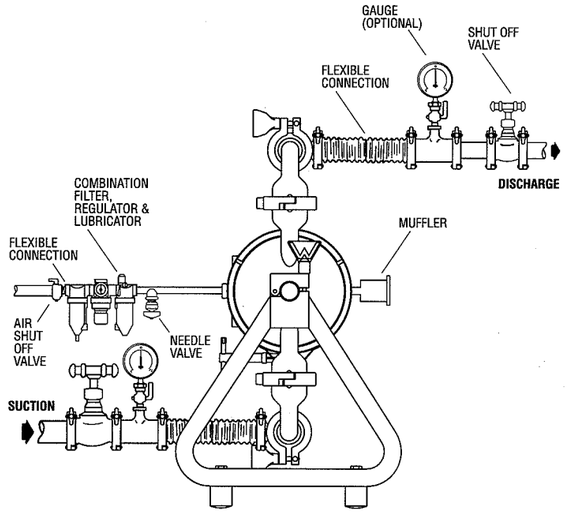
3. **ELEVATION:** The pump can be installed in such a way that it has positive liquid inlet pressure or that a suction lift condition exists. The maximum positive liquid inlet pressure is 10 psig when pump is in operation. Excessive positive liquid inlet pressure will reduce diaphragm life. The maximum suction lift is listed in Section 2 of page 2. To avoid loss of prime and erratic operation in suction lift conditions, a foot valve can be installed at the end of the suction pipe.

4. **PIPING:** Final determination of the pump site should not be made until all piping concerns are addressed. The most advantageous pump site will involve the shortest and straightest suction and discharge piping possible. Unnecessary elbows, bends, fittings, and components will increase head pressure and therefore decreasing efficiencies. Pipe sizes should be selected so as to keep friction losses to a minimum. All piping should be supported independently of the pump. Approximately 18" of non-collapsible hose or expansion joints should be installed immediately prior to and after the pump to isolate it from the piping. This practice protects the pump and the pipe from undue stress. Suction and discharge pipe size should be at least 1" diameter. If viscous product is being pumped, larger pipe size will reduce friction loss, lower air requirements and/or increase flow rate. It is critical that all fittings and connections are airtight or a reduction in suction lift capability and/or flow rate will result. The pump system should be thoroughly flushed with chemically compatible sanitizer prior to initiating line in production.

WIL-GARD™

The Wil-Gard™ I diaphragm monitoring system is shipped as a standard accessory for all SANIFLO^{3A} pumps. A 304 stainless steel mounting bracket is enclosed so that the Wil-Gard™ can be mounted to the pump stand. The large wing nut on pump stand must be removed, the stud inserted through the large mounting bracket hole, and then tightened. If direct high pressure wash-down procedures are utilized, the Wil-Gard™ can be removed from the area and then returned to service per the above instructions. Please read pages 4 and 5 for detailed information regarding Wil-Gard™ installation and operation.

SUGGESTED INSTALLATION



SECTION 3 (Cont'd.)

INSTALLATION OF THE WIL-GARD™ DIAPHRAGM MONITORING SYSTEM

The Wil-Gard™ I diaphragm monitoring system is standard with the M2 SANIFLO[3A] pump. The NEMA 4X enclosure is constructed of Polycarbonate with stainless steel screws, nylon cable grip, and polycarbonate label.

The Wil-Gard™ I can be powered by a variety of electrical sources to meet your application requirements: 110V AC, 220V AC (European), and 9 Volt battery operation are available.

If the control module is powered by a 9-VOLT, ALKALINE BATTERY, life expectancy of the battery is approximately 5 months. A low battery alarm is incorporated into this system which alerts the user of a low battery condition. For further information please refer to page 3 (Low Battery Jumper).

The control module is splash resistant, but should be mounted in a dry, safe, accessible location. The circuit board has a conformal coating (mill spec I46058C Type UR) to protect it from inadvertent contact with moisture. Upon completion of installation, verify the integrity of all connections. Cable grip, lid, and all wiring connections should be secure to assure proper operation.

The Wil-Gard™ I has been designed to meet UL standard 913 for intrinsically safe electrical devices for Class I, Division I Categories C and D. The control module **must** be mounted in a "safe area." The sensors, however, may safely be located in the Class I, Division I, Categories C and D areas.

The Wil-Gard™ I system alone is designed to detect diaphragm failure. However, with the addition of a few electric components, it is simple to use the detection features of the module to actively intervene when diaphragm failure occurs. In most applications, the internal relay (1 amp, 250 volts max.) is used to direct power to a solenoid valve installed on the pump air inlet, which suspends pump operation when failure occurs. In some situations, it is appropriate to isolate the inlet and discharge piping from the pump to prevent product contamination. In all cases, an external latching relay (see page 4, figure 8) is recommended to ensure that component reactivation will not occur upon battery depletion.

Care should be used during the installation process to protect the sensor from being exposed to fluid, or from fluid being trapped between the diaphragms. When the pump is assembled, the sensor must be installed so that the sensor is located at the 6 o'clock position (bottom of pump). Place end of sensor cable mid-way between the center and outer edge of diaphragm between the primary and back-up diaphragms. The wires should be routed straight down and along the outside of the liquid chamber under the clamp band.

CAUTION: Do not expose sensor to fluids before sensor is installed in pump.

Sensors cannot be reused. Back-up diaphragms and sensor cables must be replaced when primary diaphragm failure occurs.

It is suggested that an external latching relay be utilized to ensure that component reactivation does not occur upon battery depletion or electrical power fluctuation.

CAUTION: When powered by a 9 Volt Alkaline battery in cold weather (below 40° F), battery life is considerably shortened.

Figure 1 is an illustration of the control module circuit board highlighting important features which need to be taken into consideration prior to installation. Please refer to *Figures 3–7* on the opposite page for discussion on sensor cable installation, installation of external components to internal relay, supplying power to module, and low battery jumper positions. Please read the operating manual in its entirety prior to the installation of the Wil-Gard™ I.

Figure 1

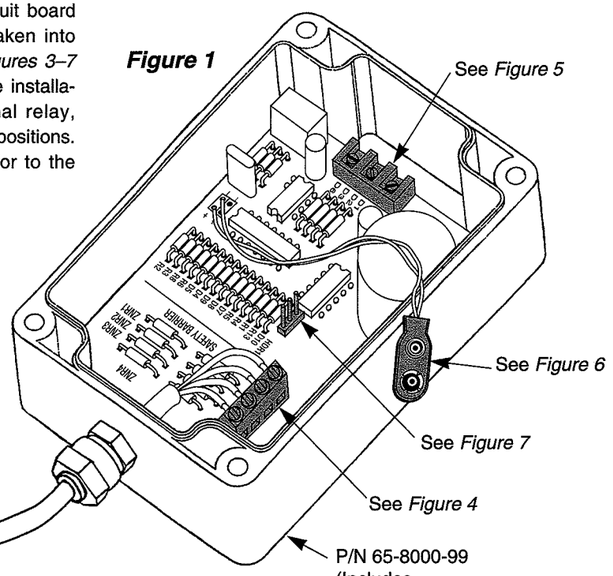
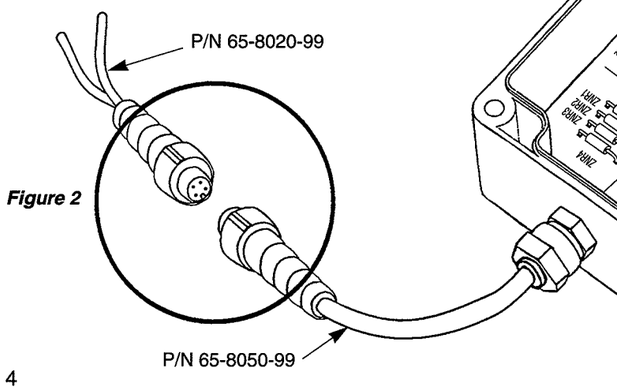


Figure 2



STEP 6

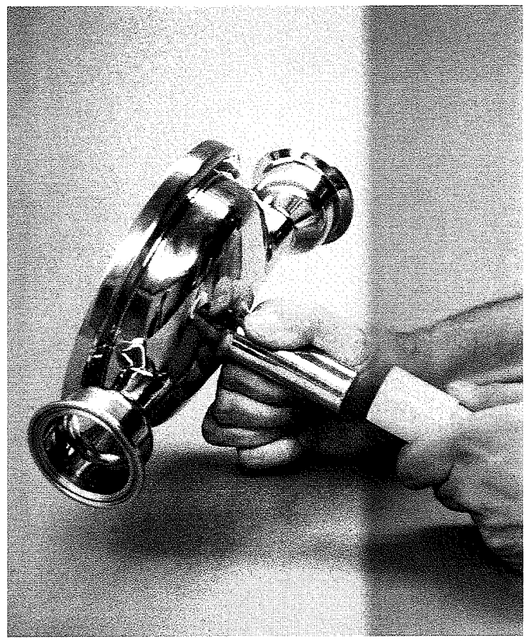


Figure 10

The liquid chamber sleeves can easily be removed for cleaning. These sleeves are a press fit. Simply pull sleeve off of liquid chamber site. No tools required.

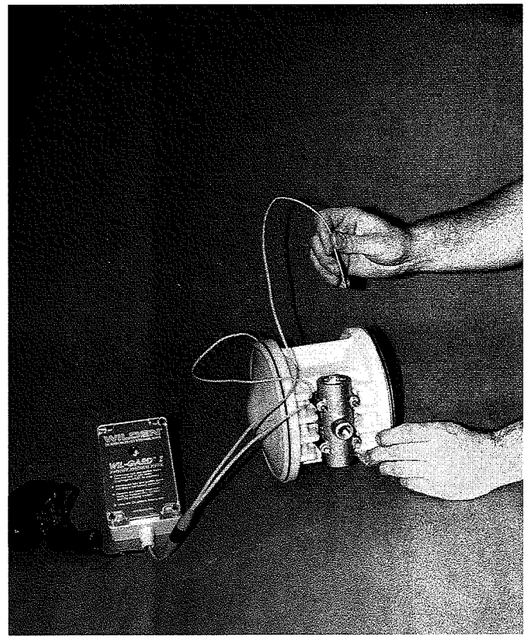


Figure 11

Remove Wil-Gard™ sensor cables by simply pulling the wire out of the diaphragm stack. Do not attempt to force the wires out of their position. The diaphragms may need to be separated allowing the wire to move freely. (Refer to *Figure 11.)*

STEP 7

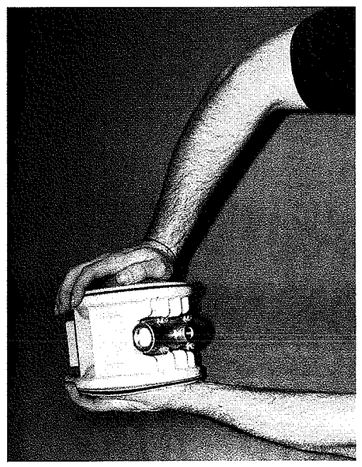


Figure 12

Remove diaphragms by holding the assembly in hands and turning counterclockwise. (Refer to *Figure 12.)* One side will spin off the shaft, place inner piston, the primary diaphragm, and back-up diaphragm aside. Pull the remaining diaphragms with shaft through the center section bushing. (Refer to

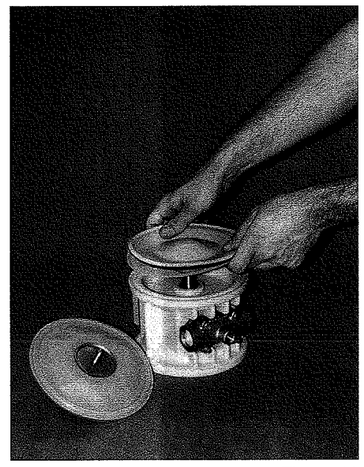


Figure 13

Figure 13.) Hold shaft in hand (or soft jaws) and spin remaining diaphragms counterclockwise. Inspect diaphragms for chemical attack, abrasion, and fatigue. Replace parts as needed.

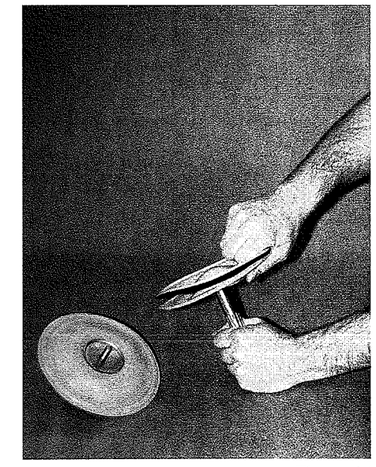


Figure 14

STEP 2

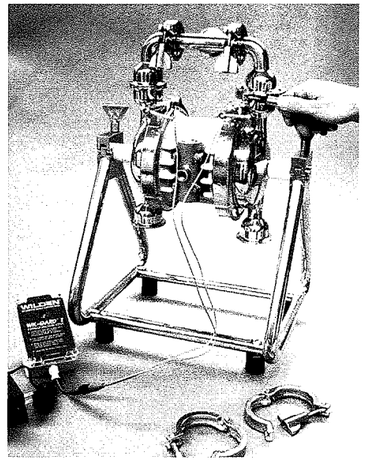


Figure 5

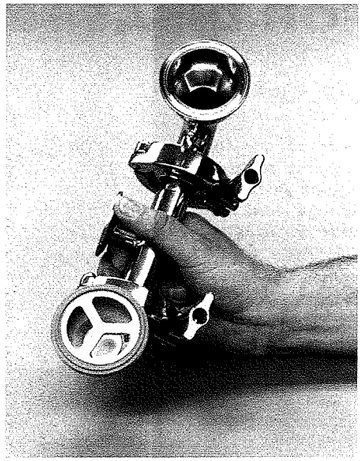


Figure 6

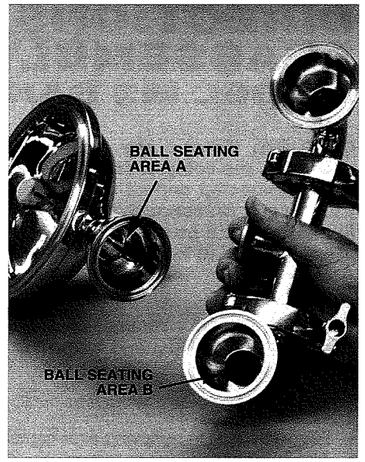


Figure 7

Loosen large wing nuts on stand and swing pump upside-down. (Refer to *Figure 5.)* Loosen wing nuts on small clamp bands. Remove inlet manifold. CAUTION: When manifold is removed, ball cage, valve ball, and gasket may fall. Remove seal, ball cage, and valve ball from each manifold and inspect for abrasion, nicks, or chemical attack. Valve ball must be round and smooth to assure maximum pump efficiency and proper operation. Replace parts as needed. NOTE: The ball cage is positioned in the inlet manifold so that the valve ball is trapped in the seating area of the manifold when reassembled. (Refer to *Figure 6* and *Figure 7, Area B.)*

STEP 3

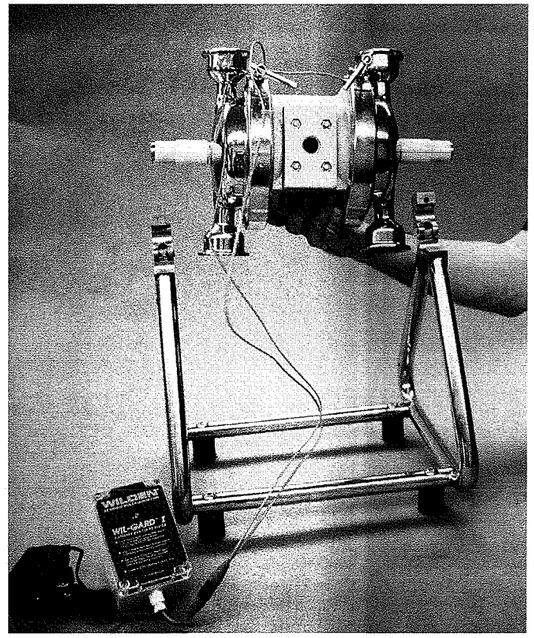


Figure 8

Remove large wing nuts on pump stand and swing the top portion of clamp upward. Lift center section with liquid chambers off stand. (Refer to *Figure 8.)*

STEP 4

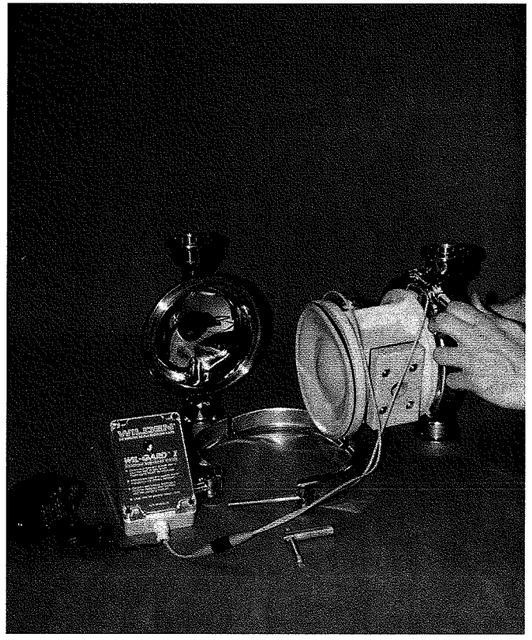


Figure 9

Remove large clamp bands. Remove liquid chambers, inspect, and set aside. Inspect clamp bands for damage and set aside.

INSTALLATION OF SENSOR RECEPTACLE AND EXTENSION CORDS

Once the sensor cables have been installed within the pump as discussed on page 1, they must be connected to the control module via the sensor receptacle which is factory installed. (See *Fig. 2.)* The sensor cables are connected to the sensor receptacle by simply inserting the in-line plug into the receptacle, aligning the key notch, and turning the connector clockwise one-half turn until a click is heard. If the sensor cables extending from the pump are not long enough to reach the control module, the user can lengthen the wiring with 35' (10,67m) and 100' (30,48m) extension cords available from Wilden. These extension cords utilize the same connectors as the sensor cable and receptacle for compatibility and ease of use. (See *Fig. 3.)* In lieu of the Wilden extension cords, the user may supply his own wire (AWG 24) up to 2500 feet (762m). It is critical that the wires are kept separate and Wilden sensor cable is installed in the pump. It is important that all wiring connections are waterproof and secure. It may be necessary to run all wiring through conduit. The cable grip located on the bottom of the control module should be tightened so that the penetration is resistant to liquid intrusion. It is possible that the 6" sensor receptacle (P/N 65-8050-99) may need to be replaced. It is vital that the sensor wire pairs are kept separate and installed as per *Figure 4.*

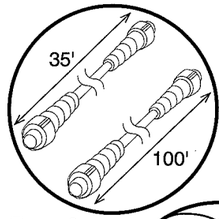


Figure 3

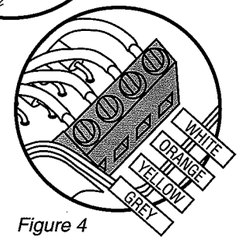


Figure 4

INSTALLATION OF EXTERNAL COMPONENTS TO INTERNAL RELAY

There is a single-pole, double-throw (SPDT) relay on the control module circuit board. External wiring is connected to this relay through the screw terminals on the edge of the circuit board. (See *Fig. 5.)* This relay connects the common (COM) pole to the normally open (N.O.) pole when an alarm is triggered. The relay is provided so that external components can be controlled by the module, handling a maximum of 1 Amp at 250 Volts. Therefore, to attach more than one component or a large inductive load, it may be necessary to use the internal relay to drive an external multi-pole relay which can handle more components and/or higher amperage. There is also a normally closed contact (N.C.) which can be used to operate a component (such as an air inlet shut-off solenoid valve) which should be powered during normal operation and deenergized when an alarm occurs. **It is suggested that an external latching relay be utilized to ensure that component reactivation does not occur upon battery depletion.**

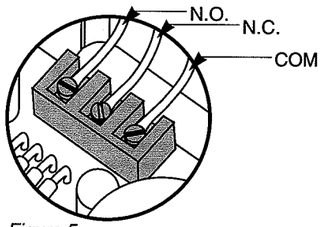


Figure 5

SUPPLYING POWER TO CONTROL MODULE

The Wil-Gard™ I can be powered by a variety of electrical sources to meet your application requirements. The control module utilizes a 9 Volt battery terminal connector as a power supply interface. Either a 110V AC to 9V DC transformer or a 220V AC to 9V DC (European) transformer is supplied with the Wil-Gard™ I. These transformers have a 9 Volt battery terminal connector which plugs into the control module terminal connector allowing for alternating currents to be used to power the unit. If your application requires battery operation, disconnect transformer via the battery terminal connector (see *Fig. 6),* cut transformer wire, feed through cable grip of enclosure and remove. Install a 9 Volt Alkaline Battery. When the 9 Volt battery is utilized to power the unit, the low battery alarm alerts the operator that the battery is nearing a low voltage and should be replaced. The LED and audible alarm activate intermittently whenever a low battery condition is detected. The relay discussed above can also respond when this low battery condition occurs. There is a small jumper switch on the circuit board whose setting determines the relay response. If the jumper is set to position 1 (see *Fig. 7),* the relay activates intermittently (RELAY FLASH). If the jumper is set to position 2 (see *Fig. 7),* the relay turns on and stays on (RELAY STEADY). If the jumper is disconnected as shown in position 3 (see *Fig. 7),* the relay will not respond to low battery conditions (RELAY OFF).

NOTE: USE ONLY A 9 VOLT ALKALINE BATTERY. One can verify that the battery is dead by connecting top two terminals on the terminal block (see *Fig. 3)* via a screwdriver. If the alarm does not sound, the LED does not function, and the relay does not close, the battery is dead.

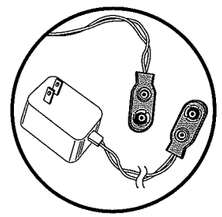


Figure 6

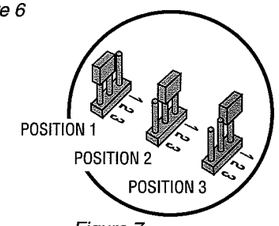


Figure 7

SECTION 4

SUGGESTED OPERATION
MODEL M2 SANIFLO^{3A}

Do not attempt to operate the pump until you have read the installation section (Section 3) of this manual. Verify that the pump is chemically compatible to the pumping fluid and assure that the discharge line is positioned in such a way that the pumped fluid will be contained. It is important that all pump hardware (wing nuts, bolts, etc.) are tightened and that the Wil-Gard™ I diaphragm monitoring system is powered.

There are three ways of controlling flow rate which allow flexibility in design. 1) Adjusting the air inlet volume and/or pressure of the air supply line. As air volume is increased, the faster the pump should reciprocate. As air pressure is increased, the more head pressure the pump can overcome. 2) Adjusting the discharge head with a valve. As pressure is increased, the flow rate should decrease. 3) Adjusting the air discharge orifice by restricting with a valve (least preferred method). Increasing restriction results in a decreased stroke rate and therefore flow rate.

If the pump is to be installed as a batching or metering pump, the Wilden FCSI computerized batching computer can automatically operate the pump resulting in repeatable batch quantities.

SECTION 5

INSPECTION, CLEANING & MAINTENANCE

The SANIFLO^{3A} pump needs to be cleaned periodically in accordance with the IAMFES, USPHS, and the DIC. Please review these guidelines and internal protocol prior to cleaning this pump. The SANIFLO^{3A} meets the requirements applicable to 3-A Sanitary Standard (air or hydraulically drive diaphragm pumps for milk and milk products). There are several methods of sanitizing the SANIFLO pump.

Chemical: Certain chemical compounds are effective for the sanitization. The bactericidal activity of such compounds is influenced by temperature, hydrogen-ion concentration (pH), exposure time, and interfering substances. Popular chemical solutions include:

Hypochlorites — Either calcium or sodium hypochlorite (stock powder or solution). An exposure period of at least 1 minute to at least 50 ppm available chlorine be maintained when the temperature is at least 75°F (24°C). Lower solution temperatures result in slower action.

Organic Chlorine Compounds — The bactericidal action of Chloramine T, the chlorinated hydantoins, the chlorinated isocyanurates and other organic forms of chlorine are significantly affected by pH.

Quaternary Ammonium Compounds — The bactericide's effectiveness of specific quaternary ammonium compounds varies and is influenced by the chemical nature and concentration of active agent, temperature, pH, exposure time, and by interfering substances.

Iodine Compounds — A combination of iodine with certain non-ionic substances has proven effective as a halogen sanitizer.

Steam: When steam is used, each group of assembled piping shall be treated separately by inserting the steam hose into the inlet and maintaining steam flow from the outlet for at least 5 minutes after the temperature of the drainage at the outlet has reached 200°F (94°C). Hot water may be used by pumping it through the inlet if the temperature at outlet is maintained to at least 170°F (77°C) for at least 5 minutes.

IMPORTANT NOTE: MAXIMUM POSITIVE INLET PRESSURE AT PUMP IS 50 PSIG. REDUCED DIAPHRAGM LIFE WILL OCCUR IF PRESSURE IS EXCEEDED. REMOVE AIR SUPPLY SO THAT PUMP DOES NOT RECIPROCATE. MAXIMUM CLEANING TEMPERATURE IS 225°F (107°C).

SECTION 6

TROUBLESHOOTING

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 with cleaning fluid.
3. Check for worn out air valve. Replace if necessary.
4. Check center block seals. If worn excessively, they will not seal and air will simply flow through pump and out air exhaust. Use only Wilden seals as they are of special construction.
5. Check for rotating piston in air valve.

Pump runs but little or no product flows.

1. Check for pump cavitation; slow pump speed down to allow material to enter pumping chambers. Increase speed accordingly.
2. Check for sticking ball checks. If material being pumped is not compatible with pump elastomers, swelling may occur. Replace ball 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 large clamp bands.

SECTION 7A

DIRECTIONS FOR DISASSEMBLY / REASSEMBLY
MODEL M2 SANIFLO^{3A}

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: Prior to cleaning pump parts, refer to chemical resistance guide (RBG E-4) to confirm compatibility.

TOOLS NEEDED:
- Pliers to assist in removing over-tightened wing nuts.
- 1/4" socket or wrench to remove air valve screws.
- O-ring pick to remove center section seals.

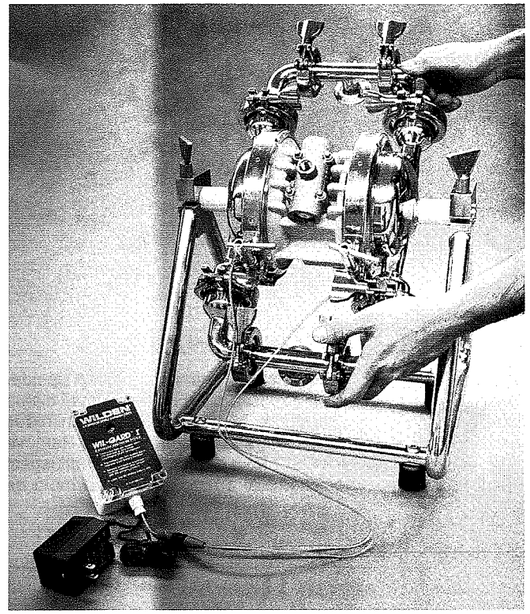


Figure 1

STEP 1

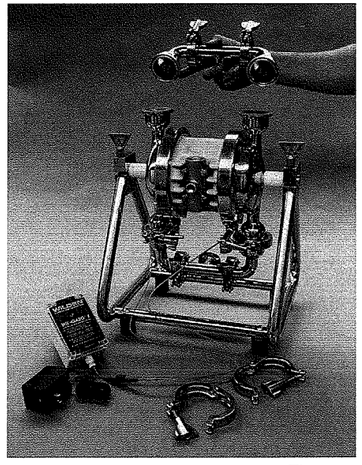


Figure 2

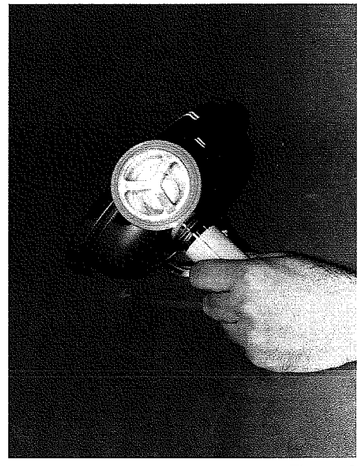


Figure 3

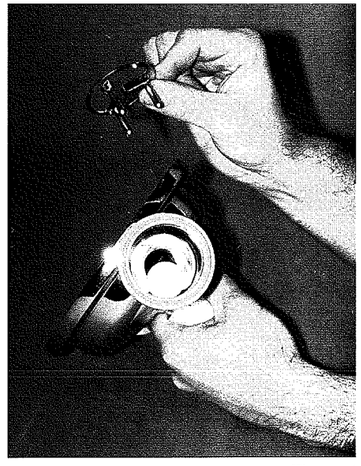


Figure 4

Remove small clamp bands at discharge elbows. Inspect discharge manifold (Tee-section with 2 elbows) for abrasion, nicks, or chemical attack. (Refer to *Figure 2.)* Place discharge manifold aside. Remove gasket, ball cage, and valve ball from each liquid chamber and inspect for abrasion, nicks, or chemical attack. Valve ball must be round and smooth to assure maximum pump efficiency and proper operation. Replace parts as needed. NOTE: The discharge ball cage is positioned in the liquid chamber so that the ball is trapped in the liquid chamber seating area when reassembled. (Refer to *Figure 7, Area A.)*

NOTE: Liquid chamber is shown removed from center section in *Figures 2* and *3.*