

Pressure Gravity & Gravity Filler Manual

Revision A



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1.0 SAFETY

1.1 GENERAL SAFETY

E-PAK Machinery designs and manufactures all of its products so they can be operated safely. However the real responsibility for safety rests with those who use and maintain these products. The following safety precautions are offered as a guide that if conscientiously followed, will minimize the possibility of accidents throughout the useful life of this equipment.

Only those who have been trained and delegated to do so and have read and understood this operator's manual should operate the equipment. Failure to follow the instructions, procedures and safety precautions in this manual can result in accidents and injuries.

DO NOT modify the equipment except with written factory approval. Unauthorized equipment modifications will void the warranty.

Each day walk around the equipment and inspect for leaks, loose parts, missing or damaged components, and parts out of adjustment. Perform all recommended maintenance noted in this manual.

EQUIPMENT SHOULD <u>ALWAYS</u> BE DE-ENERGIZED BEFORE MAKING MECHANICAL ADJUSTMENTS.

1.2 ELECTRICAL SHOCK

- > To avoid electrical shock hazard, make sure this equipment is properly grounded.
- Dangerous voltages are present within the electrical enclosures. DO NOT operate this equipment with electrical covers open or removed.
- Keep all parts of the body, hand held tools, or other conductive objects away from exposed live-parts of the electrical system. Maintain dry footing and stand on insulating surfaces. DO NOT contact any portion of the equipment when adjusting or making repair to exposed live parts of electrical system.
- > Attempt repairs only in a clean, dry, well-lighted, and ventilated area.

1.3 CONTACT MATERIALS COMPATIBILITY

E-PAK endeavors to make all contact parts compatible with buyer's products, if known. Because of the wide variety of possible products, E-PAK Machinery cannot be responsible or liable for ensuring compatibility of contact material with the products. Evaluate material compatibility prior to machine use. Failure to follow this procedure can result in machine damage, fire, operator injury or death.

1.4 SAFETY COMPLIANCE LIABILITY

E-PAK endeavors to make machinery as safe to operate as possible. National, state and local laws related to safety in the workplace apply primarily to the responsibilities of the employer, and not the equipment manufacturer. The seller agrees to cooperate with the buyer in finding feasible answers to compliance problems. However, because E-PAK has little control of the many factors which may significantly affect the environment that this equipment is installed, the seller does not warrant this equipment to be in compliance with OSHA or any like state or local laws or regulations. It is the buyer's responsibility to provide the modifications necessary to assure compliance with the laws and regulations at the point of installation. <u>A complete inspection of product is necessary until the machinery is proven to produce acceptable results. This should also be performed after every changeover.</u>

2.0 MACHINE FEATURES & SPECIFICATIONS

2.1 INTRODUCTION

The E-PAK Gravity Filling machines provide an accurate and versatile method for filling water-thin to low, constant viscosity liquids into a wide range of containers. They are especially suited to highly foaming products. The Pressure Gravity Filler gives you all the features of the Gravity Filling Machine, and is capable of filling up to medium, constant viscosity liquids.

The fill heads are adjustable to accommodate a wide range of container sizes. Accurate and consistent filling is achieved using PLC controlled bottle movement and fill control.

2.2 FEATURES & BENEFITS

□ Simplicity

No moving parts and no recirculation of product maximizes the working life of your machine, minimizes maintenance costs and downtime, and enhances the quality of the product being packaged

□ Easy Changeover

Quick to changeover, simple to use and easy to clean, which minimizes downtime between production runs each day

□ Flexible

Versatility and Simplicity are intrinsic to the design. Many container sizes and shapes, and many products can be run on one machine

□ Customized

Construction materials, contact parts, number of fill heads and other options are all fitted to match each customer's products

□ Accurate

The right volume of product is dispensed repeatedly. Volumetric filling by time is the most accurate method available for many products and applications

Drip Protection with Foam Control

Specially designed nozzles prevent drips and control foam, increasing production output and minimizing waste, keeping containers clean

2.3 PERFORMANCE SPECIFICATIONS

Dispensing Time Accuracy: .01 Seconds **Nominal Dispensing Accuracy:** ±1% Dependant on product consistency and other factors **Operating Temperature:** 32 to 122 Degrees F (0 to 50 Degrees C)

2.4 MECHANICAL DIMENSIONS

Length: 34" (.9m) Width: 64" (1.3m) Height: 108" (2.8m) Approximate Net Shipping Weight: 1400 lbs. (522 kg.) (Varies considerably with options)

2.5 ELECTRICAL REQUIREMENTS

FE & FG-1000 to FE & FG-4000 Series: 95-130VAC, 1 PHASE, 50/60Hz @ 3 AMPS **FE & FG-1200 to FE & FG-4200 Series:** 190-260VAC, 1 PHASE, 50/60Hz @ 1.5 AMPS

2.6 AIR REQUIREMENTS

FE Series: <5 CFM @ 80 PSI (<70 l/min at 5.6 bar) (Varies considerably for different applications) **FG Series:** <1 CFM @ 80 PSI (<14 l/min at 5.6 bar) (Less than 1CFM nominally required)

3.0 INSTALLATION & START-UP

3.1 INSTALLATION PROCEDURES

NOTE: If the Filler appears to have any damage, or missing parts, you must report it to E-PAK Machinery's Service Dept. at (800) 328-0466 prior to operation.

Your E-PAK Filler can be delivered and installed by an E-PAK Service Technician. Please contact your regional sales manager or E-PAK's service department for pricing and availability. In order to facilitate installation, your company should have installed a main disconnect switch with branch circuit protection. An air line of 100 PSI @ 10 CFM should also be available.

3.2 STARTUP & COMMISSIONING

This manual should be read completely before powering up the Machine. Commissioning of the Machine should be preformed by a trained technician only after complete understanding of the Machine, and with products that match samples indicated to E-PAK Machinery, Inc. if supplied.

NOTE: See Touch Screen Filler Controls Manual for startup instructions.

3.3 TANK PRESSURE SET-UP PROCEDURE

Two ¹/4" airlines are connected to the top of the reservoir. One line proceeds to the air solenoid valve and one proceeds to inside of the main electrical box, where the pressure diaphragm valve is located.

The pressure diaphragm valve directly senses the amount of pressure in the reservoir through the diaphragm, which is wired directly into the air solenoid valve.

NOTE: The rhythm the air solenoid valve should be sending should be just over one pulse per second.

There is a manual ball valve (vent) on the reservoir lid and one on the side of the tank. Close the larger valve completely, then adjust the other manually to bleed air out of the reservoir, so that the air solenoid valve surges air (opens and closes) into the reservoir. The faster the air solenoid valve opens and closes, the more consistent the air pressure will remain.

NOTE: For gravity fill, open the large valve completely, and leave the smaller valve set for easy changeover. To increase the amount of pressure in the reservoir for a more viscous product, turn the screw on the face of the diaphragm valve clockwise, if product flows too fast into the container, turn the screw counter clockwise. If the air solenoid valve remains open or continuously bleeds air into the reservoir, slightly close the manual ball valve (ball valve may be bleeding out too much air). If air valve still remains open turn the diaphragm screw counter clockwise until the air solenoid valve starts clicking again (diaphragm may be calling for a non-achievable amount of pressure).

WARNING: Never use pressure greater than 15 PSI (102 KPA), this can cause injury to personnel and/or damage to equipment.

4.0 **OPERATION**

4.1 THEORY OF OPERATION

The FE Series Pressure Gravity Filler & the FG Series Gravity Filler were designed to fill a wide range of products, from beverages and liquid food products, to acids and industrial chemicals. The concept of the gravity filler is that gravity allows a constant volume of product to flow based on consistent head pressure controlled by the float control system, in a set length of time controlled by Nematron Controller. Pressure gravity uses a constant tank pressure to flow product for a set length of time controlled by Nematron Controller.

4.2 NEMATRON CONTROLLER

See Nematron Controller Manual.



Figure 4-1 Nematron Controller

4.3 CUSTOMER SUPPLIED BULK TANK

The bulk tank must be sufficiently sized to hold an ample amount of product to be supplied to the filler. This tank will require at the bottom a 3/4" hose barb connection for non-sanitary machines, or a 3/4" Tri-Clamp connection for sanitary machines to be attached to the inlet of the Filler.

The bulk tank should be located at a height greater than that of the inlet port. The purpose for this is to provide an easy transition of the product from the customer supplied bulk tank to the inlet. With the customer supplied bulk tank located in this position there will be virtually no requirement for priming the pump for filling operations. For ease of cleaning, the most effective tank will provide a low point of drain also.

4.4 **RESERVOIR**

The product reservoir is a 316 stainless steel enclosure that can be pressurized up to 18 PSI (124 KPA), the system is supplied with a blow-off valve.

4.5 RESERVOIR LEVEL SENSING

Type 316 stainless steel float system with backup float and warning light. The stainless steel ball floats on top of the product. As the product is depleted the stainless steel ball activates a reed switch, which sends a signal to the float controller, opening the check valve and energizing the supply pump replenishing the product supply in the reservoir. If the main float should fail, the backup float will prevent the reservoir from being overfilled. This system allows the reservoir to maintain consistent product level and head pressure ensuring accurate filling (**Figure 4-2**).



Figure 4-2

4.6 **PRODUCT DISPENSING VALVE**

The product dispensing valve (**Figure 4-3**) is either an air to open / air to close actuated, ball valve or an electrical operated solenoid valve. The product dispensing valve serves a dual role in operation:

- The first is to provide an accurate means of starting and stopping the flow of product to the product container.
- The second is to accommodate the mounting of different filling nozzles, which may vary for each application, aiding the transition of product to the holding container.

4.7 **PRODUCT SUPPLY VALVE**

The product supply valve (**Figure 4-4**) works in conjunction with the float control system (**Figure 4-2**). When the level sensor calls for more product to be supplied and the supply pump is activated, it simultaneously opens allowing the reservoir to be replenished.



4.8 **PRODUCT TUBING**

The product tubing is made of Convoluted Teflon with tri-clover fittings. Call E-PAK customer service for further application information.

4.9 AIR CONTROL SYSTEM

The Air Pressure system provides a means of supplying pressurized air for operating the two pneumatically operated valves in the system. The system consists of the following parts:

The <u>Air Pressure Gauge</u> provides a visual means of monitoring the pressure applied to the two pneumatically operated valves in the system (Figure 4-5).

An <u>Air Pressure Regulator</u> is used to mechanically maintain a set air pressure to the system (Figure 4-5). This component regulates the amount of air pressure to 90PSI without changing the flow of air available to the valves.

An <u>Air Filter Water Trap</u> provides a means of connecting to an air source, filtering some of the impurities and water associated with compressed air (Figure 4-6).

5.0 MACHINE CHANGEOVER

5.1 CLEANING PROCEDURE

- ➢ Filler clean-up
 - Close bulk tank valve.
 - Drain filler reservoir, tubes, and pump, if any, of remaining product.
 - Connect inlet side of supply pump to a compatible cleaning solution and fill reservoir. For water-soluble products, hot water (140° F) is recommended. If there is no supply pump, connect directly to two C.I.P. intakes.
 - Open the fill head valves and circulate cleaning solution through the tubing and fill nozzles to flush product from the contact parts. If product and cleaning solution is environmentally safe, containment is not necessary. Certain products and cleaning solutions must be contained and disposed of per state, federal, or local EPA requirements. It is the responsibility of the customer to be aware of any applicable EPA regulations pertaining to disposal of product or cleaning solution.
- Clean nozzle screens (if present)
 - Remove nozzles from fill heads.
 - Disassemble one nozzle at a time.
 - Remove screen.
 - Visually inspect screen and remove any particles (utilizing pressurized air works good).

CAUTION: After cleaning or changing screens, fill times should be reset due to change in flow rate.

- Re-assemble nozzle and repeat process for each nozzle.
- Re-attach nozzles to fill heads (use Teflon tape on heads).
- Cleaning filter/regulator
 - Open drain valve at the bottom of the bowl (turn clockwise) to drain any water accumulation.
 - Inspect to detect crazing, cracking, damage, or other deterioration (replace if necessary).
 - Clean filter element if dirty.
 - Depressurize unit before removing bowl.
 - Unscrew bowl and remove.
 - Unscrew filter element retainer and let down vane plate disc assembly (replace if bad).
 - Check o-ring on disc assembly (replace if bad).
 - Unscrew spring cage and remove diaphragm and adjusting spring (replace if diaphragm is stiff or swollen).

NOTE: Clean metal parts with alcohol. Clean filter with air. Clean bowl with household soap.



Figure 5-1 Filter/Regulator

5.2 CLEAN IN PLACE

See Section 5.3 in the Nematron Controller Manual.

5.3 FILL TANK CLAMP DISASSEMBLY & ASSEMBLY PROCEDURE (PRESSURE GRAVITY ONLY)

- > Disassembly
 - Ensure that filling machine is **de-energized**, **tagged out**, and all **pressure has been released** from the system. Verify that pressure gauge on upper tank shell indicates 0 P.S.I.

WARNING: Releasing tank banding clamp with the system under pressure will cause the tank lid to blow off causing severe personal injury and/or equipment damage. Never adjust, tighten of loosen tank banding clamp when the tank is under pressure.

- Loosen clamp nuts on each side of tank alternately until one is removed. Remove spring and washers noting part orientation. Lift clamp assembly off of the tank (Figure 5-3).
- Being careful not to damage the tank seal, gently lift the upper tank shell off of the lower tank shell.
- Inspect tank seal for cuts, nicks, or tears. If seal is damaged contact E-PAK Machinery for replacement part number 1115-001.
- Clean tank seal area of tank shell (Both halves) and tank seal.
- Remove and clean the metal band, which supports the tank seal on the inside of the tank. Note that this band has a formed bead in its center to locate it in the assembled tank (**Figure 5-4**). Check band for bends and ensure that it is not out of round. If damaged contact E-PAK Machinery for replacement part number 1052-054.
- Lubricate the tank seal with petroleum jelly, silicone grease, or similar products.



- > Assembly
 - Carefully install tank seal and upper tank shell. Inspect internal tank band for damage.

CAUTION: Be sure upper tank shell contacts tank seal surface evenly and seal area is clean and free from dirt. Upper tank shell should sit on lower shell evenly.

• Install clamp springs, washer, and nuts. Tighten nuts evenly and alternately until spring coils touch each other, as shown in **Figure 5-3**. Gently tap clamp around tank with rubber hammer to assist in the seating of the clamp.

WARNING: Use of non-original equipment parts on tank banding clamps may cause these tensioning devices to malfunction. Improper clamp installation can cause the tank lid to blow off causing severe personal injury and/or equipment damage.

CAUTION: Do not over tighten the tank banding clamp. Tightening the banding clamp beyond recommended procedures may damage the banding clamp and cause unexpected failure, sudden release of pressure and injury or damage. Over tightening may also cause the tank seal to deform resulting in leakage at the banding clamp.

5.4 MACHINE ADJUSTMENTS & PROCEDURES

- For Manual Vertical Nozzle Adjustment, turn the adjusting handle clockwise to raise and counter clockwise to lower the nozzle bar assembly. Nozzles should be adjusted to 1/4" above the product containers (Figure 5-5).
- > For **Power Height Adjustment**, see Section 5.4 of the Nematron Controller Manual.
- For Horizontal Nozzle Adjustment, loosen the adjusting handle and slide the product dispensing valve along the adjusting rail until the nozzle lines up with the center of the product container, then tighten the adjusting handle. Repeat the process for every product dispensing valve (Figure 5-6).
- For the Float Level Adjustment, you must loosen the locking collar at the top of the filler cabinet where the float assembly sticks out, and move the entire float assembly either up or down depending on the reservoir level wanted. Tighten the locking collar when finished (Figure 5-7).



6.0 SERVICING

6.1 RECOMMENDED MAINTENANCE & SCHEDULES

Your FE or FG Series Filler was designed with ease of maintenance in mind. However, by following these simple recommendations you will greatly extend the service life of this machine and avoid untimely breakdowns.

COMPONENTS	DAILY	WEEKLY
Inspect air filter regulator and drain any water accumulation.	Х	
Inspect product tubing, fill head valves and supply pump for leaks.	Х	
Perform cleaning procedures (Section 5.1)	Х	
Perform maintenance procedures (Section 6.2)	Х	
Check air cylinder mounts for looseness (tighten if necessary).		Х
Check product lines for cracks and loose connections.		Х
Supply pump lubrication: The centrifugal supply pump motor sleeve bearings should be lubricated with two or three drops of S.A.E. 20 weight non-detergent oil. The holes are located on the top at each end of the motor. NOTE: Not supplied with every filler		Х

6.2 MAINTENANCE PROCEDURES

- Inspect float system
 - Remove tank lid, or float system cover.
 - Disconnect pump power from float control box.
 - Holding the tank lid level (or float system cover), manually lift each of the floats and observe the inlet valves open and close appropriately and that the warning light is illuminated when the upper ball is lifted.
 - If a problem occurs, replace the offending part.
 - Replace tank lid and attach firmly.
- Visually inspect the operation of the photo-eyes
 - With the machine power on, turn fill head off and remove containers.
 - Pass hand in front of each eye, checking to see if the light on top illuminates.
 - If there is a problem, check the eye sensitivity and connections. If this fails, replace offending part.

WARNING: DO NOT plug or unplug with power on.

- Fill head leaks
 - With either product or water in reservoir, remove the nozzles. With the heads closed, observe for leaks.
 - If after wiping the heads off, a leak continues, drain the reservoir.
 - Inspect valve for looseness.
 - If valve is tight, check seals for pits, wear, or corrosion. If problem is found, replace valves, or seals depending on the valves.

6.3 MAINTENANCE LOG

COMPONENT	REPAIR DETAILS	REPLACEMENT DETAILS	DATE

6.4 SPARE PARTS LIST(S)

DESCRIPTION	PART NUMBER
Nozzles (12)	1045-021
Actuator Seal Kit (2)	1061-007
¹ / ₄ " Air Line (25')	1051-101
Air Cylinder	1113-005
Photo Eye	
KBIC with Resistor	1211-001

6.5 CUSTOMER SERVICE & SUPPORT

E-PAK Machinery, Inc.

1535 S STATE ROAD 39 LA PORTE, INDIANA 46350-6301 USA (800) 328-0466 www.epakmachinery.com

customerservice@epakmachinery.com

Parts & Service at (800) 328-0466, Ext. 1112 Technical Support at (800) 328-0466, Ext. 1111

7.0 CONTROLS

7.1 ELECTRICAL PANEL CONTROLS

- See the **Nematron Controller** manual for information on operation.
- > The **Conveyor Speed Dial** controls the conveyor speed.
- > The **Power Buttons** control the power going to the electrical box.
- > The **Power Indicator** shows that power is currently turned on.
- > The **CIP** switch controls the Clean-In-Place option.
- > The **Emergency Stop** shuts down all power to the electrical box.
- > The **OFF/ON Switch** is a lockout power switch, which controls all power to the electrical box.
- > The Back Up Float Alarm lets operator know main float in not working
- > The **Float switch** turns power on and off to main float.



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8.0 TROUBLESHOOTING

8.1 GENERAL TROUBLESHOOTING GUIDE

The information contained in the troubleshooting guide has been compiled from field report data and factory experience. It contains symptoms and usual causes for the described problems. However, DO NOT assume that these are the only problems that may occur. All available data concerning the trouble should be systematically analyzed before undertaking any repairs or component replacement procedures.

A detailed visual inspection is worth performing for all problems thus avoiding unnecessary additional damage to the machine.

Should your problem persist after making the recommended check, consult your E-PAK service technician (Section 6.5).

SYMPTOM	POSSIBLE CAUSES	CORRECTIVE ACTION
Inconsistent fill	Tank level inconsistent for each fill	Be sure supply lines are functioning and
		sufficient product is available
	Screens in nozzles are sideways or possibly	Align the screens so they are horizontal and
	moving	can not move.
	Air pressure constant to valves	Check rating on air compressor, and check for
		leaks
	Not enough air pressure to operate valves	Check in-coming air line size, and/or
	properly	compressor rating 80-100 PSI (552-689 KPA)
	If stainless steel tank, is there as much in-	Open valves all the way. Prop head of tank
	flow as out-flow of product	away from bottom
	Sugar, wax, or particles depositing on	Filter product, or run without screens
	screens reducing flow rate	
	Tank tees horizontal	Tees should be horizontal to fill head ports.
		In-flow of product should not touch each other
		or cross the outlet parts
	Moisture in incoming air lines	Remove actuator from filling valve and
		remove water
	Time is constant, level and pressure is	Mix product more thoroughly by re-
	constant, and orifice size is constant, then	circulating from the bottom to the top of the
	problem is inconsistent product	bulk tank
	Nozzles too big	Re-size nozzles
Fill head does not	Faulty valve actuator	Replace valve actuator
operate	Faulty air actuator	Replace air actuator
	Faulty controller	Replace controller

8.2 POWER HEIGHT TROUBLESHOOTING GUIDE (OPTIONAL)

SYMPTOM	POSSIBLE CAUSES	CORRECTIVE ACTION
Actuator fails to operate	1. Automatic thermal protector tripped	1. Disconnect power, fan cool motor and
		reduce duty cycle
	2. Blown fuse or open circuit breaker	2. Replace fuse or reset circuit breaker
	3. Improper electrical connections	3. Reconnect properly
	4. Defective limit switch or reversing switch	4. Replace limit switch
	5. Defective capacitor	5. Replace capacitor
	6. Actuator drive tube jammed against	6. Readjust drive tube position or
	stop	readjust limit switch cam setting
	7. Defective actuator	7. Repair or replace
Actuator runs continuously	1. Defective limit switches	1. Replace limit switches
to stall condition	2. Improper limit switch cam	2. Readjust cam settings
	adjustment	
Actuator operates but with	1. Low voltage	1. Disconnect and check voltage
reduced thrust capacity	2. Lack of lubrication on screw	2. Add lubricant
	3. Defective capacitor	3. Replace capacitor
	4. Defective actuator	4. Repair or replace
	5. Side load on screw due to	5. Remove side load and align actuator
	misalignment	mounting
Actuator spinning	1. Mounting loose	1. Tighten mounting bolts
Motor shaft rotates screw	1. Defective gear assembly (possible	1. Replace gear assembly and avoid
	caused by shock or excessive load)	shock load or reduce thrust load
Screw rotates but no linear	1. Screw nut separated from drive tube	1. Replace drive tube
motion of drive tube		
Excessive noise	1. Loose bolts or screws on actuator	1. Retighten screws and bolts
	and clevis connection	
	2. Thrust load exceeds rating	2. Reduce load
	3. Lack of lubrication on acme screw	3. Check lubrication and add if required
	4. Defective or worn gearing	4. Replace
	5. Side load on screw due to	5. Remove side load and align actuator
	misalignment	

8.3 TROUBLESHOOTING RECORD

To better assist you in troubleshooting, please record the following information with the model number from the frame, the problem that is occurring, speed of application, product characteristics (i.e. Wrap, Panel, or Special Variation).

Model:
Company Name:
Your Name:
Phone Number:
FAX Number:
Date:

CONTAINER	COLOR	SIZE	PROBLEM
EXAMPLE: Glass	CLEAR	16 <i>oz</i> .	Product does not maintain a consistent level.

NOTES