Parts

INSTRUCTIONS-PARTS LIST

309280

Rev. A

This manual contains important warnings and information.
READ AND KEEP FOR REFERENCE.

INSTRUCTIONS

GRACO

First choice when quality counts.™

Ultra–Flo Shot Metering Dispenser

2500 psi (17.2 MPa, 172.4 bar) Maximum Fluid Working Pressure

The Ultra–Flo Shot Metering Dispensers listed below are described in this manual. These units are specifically designed to be used with robotic equipment. Use of the Graco Ultra–Flo Shot Metering Dispenser with non–robotic equipment can result in personnel injury or damage to equipment.

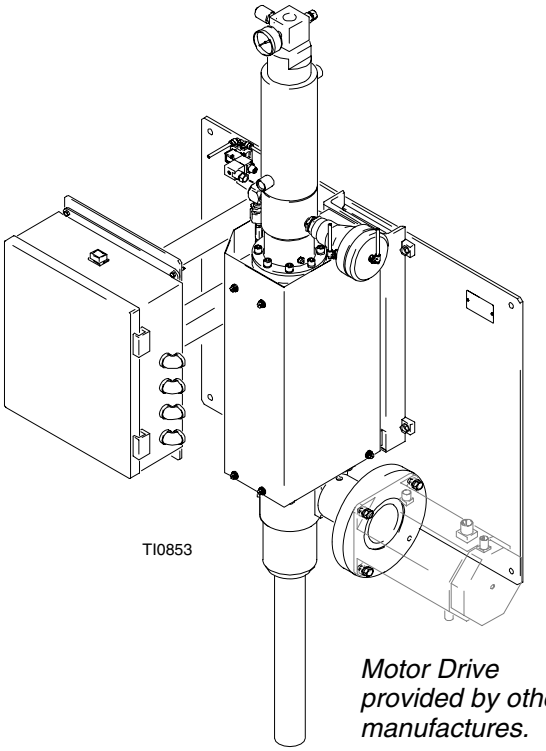
List of Models

Part No. 243348, Series A
Without board for Precision Swirl

Part No. 243349, Series A
With board for Precision Swirl

Part No. 244816, Series A
Without board for Precision Swirl and without temperature conditioning jacket

Part No. 244817, Series A
With board for Precision Swirl and without temperature conditioning jacket



Motor Drive provided by other manufactures.

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Graco Inc. is registered to I.S. EN ISO 9001

Table of Contents

Symbols

Warning Symbol

⚠ WARNING

This symbol alerts you to the possibility of serious injury or death if you do not follow the instructions.

Caution Symbol

⚠ CAUTION

This symbol alerts you to the possibility of damage to or destruction of equipment if you do not follow the instructions.

⚠ WARNING

INSTRUCTIONS

EQUIPMENT MISUSE HAZARD

Equipment misuse can cause the equipment to rupture or malfunction and result in serious injury.

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are uncertain about usage, call your Graco distributor.
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure stated on the equipment or in the **Technical Data** for your equipment. Do not exceed the maximum working pressure of the lowest rated component in your system.
- Use fluids and solvents which are compatible with the equipment wetted parts. Refer to the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.
- Do not use hoses to pull equipment.
- Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 180°F (82°C) or below –40°F (–40°C).
- Wear hearing protection when operating this equipment.
- Do not lift pressurized equipment.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.

MOVING PARTS HAZARD

Moving parts can pinch or amputate your fingers.

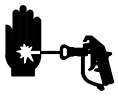
- Keep clear of all moving parts when starting or operating the pump.
- Before servicing the equipment, follow the **Pressure Relief Procedure** on page 8 to prevent the equipment from starting unexpectedly.

TOXIC FLUID HAZARD

Hazardous fluid or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, inhaled, or swallowed.

- Know the specific hazards of the fluid you are using.
- Store hazardous fluid in an approved container. Dispose of hazardous fluid according to all local, state and national guidelines.
- Always wear protective eyewear, gloves, clothing and respirator as recommended by the fluid and solvent manufacturer.

⚠ WARNING



INJECTION HAZARD

Spray from the gun, hose leaks, or ruptured components can inject fluid into your body and cause extremely serious injury, including the need for amputation. Fluid splashed in the eyes or on the skin can also cause serious injury.

- Fluid injected into the skin might look like just a cut, but it is a serious injury. **Get immediate medical attention.**
- Do not point the gun at anyone or at any part of the body.
- Do not put your hand or fingers over the spray tip.
- Do not stop or deflect leaks with your hand, body, glove or rag.
- Do not “blow back” fluid; this is not an air spray system.
- Always have the guards in place when spraying.
- Follow the **Pressure Relief Procedure** on page 8 whenever you are instructed to relieve pressure; stop spraying; clean, check, or service the equipment; and install or clean the spray tip.
- Tighten all fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn, damaged, or loose parts immediately. Permanently coupled hoses cannot be repaired; replace the entire hose.
- Use only Graco approved hoses. Do not remove any spring guard that is used to help protect the hose from rupture caused by kinks or bends near the couplings.

FIRE AND EXPLOSION HAZARD

Improper grounding, poor ventilation, open flames or sparks can cause a hazardous condition and result in a fire or explosion and serious injury.

- Ground the equipment and the container where the material is deposited. Refer to **Grounding the System** on page 7.
- If there is any static sparking or you feel an electric shock while using this equipment, **stop the pumps immediately.** Do not use the equipment until you identify and correct the problem.
- Provide fresh air ventilation to avoid the buildup of flammable fumes from solvents or the fluid being sprayed.
- Keep the spray area free of debris, including solvent, rags, and gasoline.
- Electrically disconnect all equipment in the spray area.
- Extinguish all open flames or pilot lights in the spray area.
- Do not smoke in the spray area.
- Do not turn on or off any light switch in the spray area while operating or if fumes are present.
- Do not operate a gasoline engine in the spray area.

Uncrating the System

The Ultra–Flo Shot Metering Dispenser was carefully packaged for shipment by Graco. When the system arrives, perform the following procedure to uncrate the system.

⚠ WARNING

EQUIPMENT MOVING HAZARD
Removing the unit off the pallet without following the uncrating procedure could cause personal injury and possible damage to the equipment.

To uncrate the system, do the following:

1. Inspect the crate carefully for shipping damage. Contact the carrier promptly if damage is discovered.
2. Remove the sides and top of the crate.
3. Inspect the contents carefully. There should not be any loose or damaged parts.
4. Compare the packing slip against all items included in the crate. Report any shortages or other inspection problems immediately.
5. Remove the band straps that hold the Ultra–Flo to the pallet.

NOTE: The Ultra–Flo is ready for installation. Before installing the system, read the "Overview" section on page 5 to become familiar with the system components.

Overview

Metering and application system

The complete Ultra–Flo Shot Metering Dispenser (SMD) is comprised of three components; shot meter and drive unit (with pressure and over travel sensing), inlet valve with air solenoid, and junction box, all assembled together as a single package. The SMD can be mounted on top of a stand or nearly anywhere else. It's connected by hoses to a pneumatically operated dispensing assembly (not included), which can be adapted to mount on almost any robot arm. The remaining two dispensing and control components and corresponding installation and operation instructions are provided by other manufactures.

A typical robotic metering assembly consists of an Ultra–Flo 50 cu. in. Shot Metering Dispenser, and automatic dispense valve. The materials are dispensed from the meter through an automatic dispense gun. The location of the Ultra–Flo should be as close to the dispensing area as possible or mounted directly to the robot frame.

Metering assembly operation

A user supplied servo motor transmits power to the ball screw. A push block is attached to one end of the ball screw. The push block presses against the piston moving it into the cylinder and forcing the sealant or mastic out.

Refill System operation

When the lead screw reaches its pre–determined extension and the material is expended from the cylinder, the motor reverses which retracts the ball screw and push block. A fill valve which is threaded into the cylinder wall is opened and the sealant or mastic is forced into the cylinder through an annular passage between the outside of the displacement rod and the inside of the cylinder. With the refill cycle complete, the fill valve is closed, and the system is ready to resume dispensing. Two proximity switches act as safety backups for both fill and dispensing to shut the system down in the event of displacement rod overtravel. End of travel, and end stroke marks are provided on the tie rods for reference.

Junction Box Panel

The junction box panel includes the necessary termination points for communication back to the controller.

Required Air Supply

The system requires a 1/8" NPT(m) air line to the Ultra–Flo meter. The air supply should be filtered, and capable of maintaining a minimum of 60 PSI under all operating conditions.

Required Electrical Supply

The electrical controls for the system are provided by the Robot Manufacturer's Control System.

Over Pressure Protection

A 5000 psi rupture disc is provided for over pressure protection.

Temperature Conditioning

This unit includes a water jacket that encloses the fluid cylinder. For temperature conditioning, 1/2 NPT(F) inlet and outlet ports are provided to connect to a conditioned water supply and return. Maximum water pressure of this jacket is 100 psi.

Installation

Preparing the Site

Ensure that you have an adequate compressed air supply. Keep the site clear of any obstacles or debris that could interfere with the installer's and operator's movement.

Preparing to Install the System

Before installing the system:

- See component manuals for specific data on component requirements. Data presented here pertains to the system only.
- Have all system and subassembly documentation available during installation.
- Be sure that all non-Graco supplied hoses are adequately sized and pressure-rated to meet the system requirements.
- Have all robot manufacturer's instructions and system documentation available for reference.

Initial Checkup and Startup

⚠ WARNING

PRESSURIZED EQUIPMENT HAZARD
To prevent the the risk of injury or equipment damage, do not pressurize the system until you have verified the system is ready and it is safe to operate.

⚠ WARNING

PRESSURIZED FLUID HAZARD
To reduce risk of injury or equipment damage:

- Make sure all material hose connections are secure.
- Check that all routing of air lines will not interfere with any moving components within the fixture.
- Do not pressurize the system until you have verified the system is ready and it is safe to do so.

1. Check all material hoses and fittings to ensure tightness to prevent any material leakage. Ensure that Input and Output hoses are correctly connected (See Fig.1).

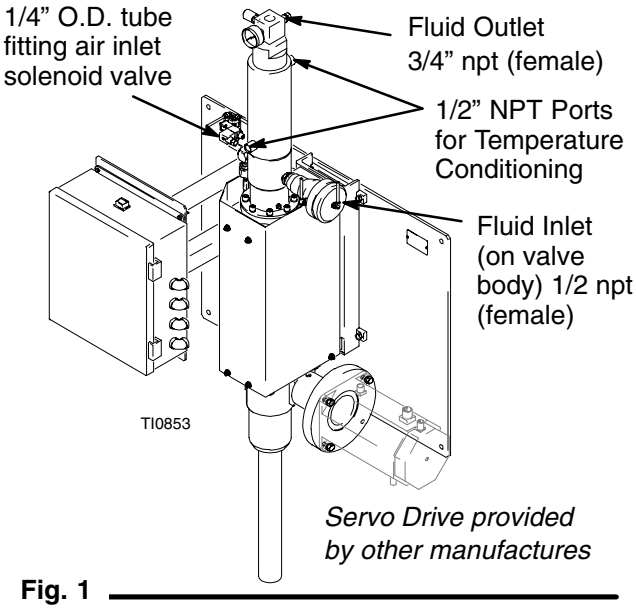


Fig. 1

2. Check all system air lines and automatic gun plumbing. Make sure that routing of all lines and cables will not interfere with any moving components with the fixture.

3. Connect temperature conditioning water supply line.

   a. Connect water supply line to either of the two 1/2" temperature conditioning ports.

   b. Connect water return line to second 1/2" port.

4. Follow system instructions of supply equipment.

5. Perform initial material loading and filling per system instructions.

Installation

Grounding the System

⚠ WARNING

FIRE AND EXPLOSION HAZARD
Before operating the pump, ground the system as explained below. Also read the section **FIRE AND EXPLOSION HAZARD** on page 4.

1. *Fluid Pump (not provided):* use a ground wire and clamp. See Fig. 2. Loosen the grounding lug locknut (W) and washer (X). Insert one end of a 12 ga (1.5 mm^2) minimum ground wire (Y) into the slot in lug (Z) and tighten the locknut securely. Connect the other end of the wire to a true earth ground. For a ground wire and clamp, order Part No. 237569.

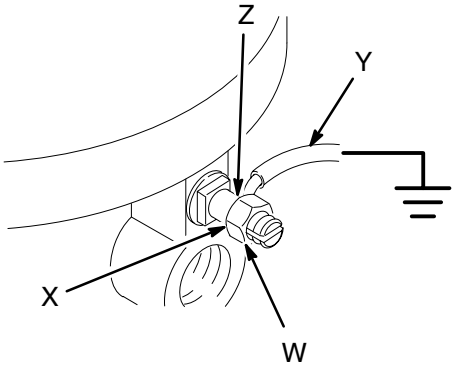


Fig. 2

2. *Air and fluid hoses:* Use only electrically conductive hoses.
3. *Air compressor:* follow manufacturer's recommendations.
4. *Spray gun or dispensing valve:* ground through connection to a properly grounded fluid hose and pump.
5. *Object being sprayed:* follow your local code.
6. *Fluid supply drum:* follow your local code.
7. *Solvent pails used when flushing:* follow your local code. Use only metal pails, which are conductive and placed on a grounded surface. **Do not** place the pail on a nonconductive surface, such as paper or cardboard which interrupts the grounding continuity.
8. *To maintain grounding continuity when flushing or relieving pressure*, hold a metal part of the spray / dispensing gun firmly to the side of a grounded *metal* pail, then trigger the gun.

Flushing the System Before Initial Use

Flushing the system before its initial use can prevent material contamination, which may cause the material to fail or perform poorly.

⚠ CAUTION

Flush the system before performing the initial material loading procedure. The system was factory tested using a light soluble oil, a soybean oil, or some other oil as tagged. Flush the system to avoid contaminating the material that has been designated for initial material loading.

To flush the system, perform the following procedure:

1. Select the material for the initial material load.
2. Verify whether the factory-test oil and the initial material load are compatible:
   a. If the two substances are compatible, omit the remaining steps in this procedure and perform the **Initial System Startup Procedure** on page 11.
   b. If the two substances are incompatible, perform the remaining steps in this procedure to flush the system.

⚠ WARNING

Use fluids and solvents that are chemically compatible with the equipment wetted parts. See the **Technical Data** sections of all the equipment manuals. Always read the material manufacturer's literature before using fluid or solvent in this equipment.

To avoid damaging the unit do not use fluids containing halogenated hydrocarbons (HHC) to flush or clean the system as HHC is not compatible with aluminum. See technical data on page 24 for a list of wetted parts.

3. Select a drum containing a compatible material that can dissolve, clean, and eliminate the factory-test oil from the system. If necessary, check with the material supplier for a recommended flush material.
4. Before flushing, be sure the entire system and flushing drums are properly grounded. Refer to **Ground the System**, on page 7.
5. Perform the **Initial System Startup Procedure** steps on page 11 to load the drum containing the solvent.
6. Run the flush material through the system for approximately 1 to 2 minutes.
7. Remove the drum containing the flush material.

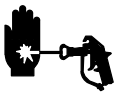
Installation

Initial Material Loading and Filling

⚠ WARNING

MOVING PARTS HAZARD
To reduce risk of injury or damage to equipment, make sure all material hose connections are secure.

⚠ WARNING



PRESSURIZED FLUID HAZARD
To reduce the risk of serious bodily injury, such as fluid injection or splashing fluid in the eyes or on the skin, always wear eye protection and protective clothing when installing, operating, or servicing this dispensing system**.**

1. Verify that supply lines to the meter are filled (see Loading and Filling on pg 11).

NOTE: Remove or open the dispense valve. Place the valve or hose end over an appropriate material waste container, and open the material inlet valve to the meter. This will allow the system to fill without restriction.

2. Turn on Ultra–Flo unit per Start–up control instructions supplied by Robot Manufacturer.

NOTE: During initial system fill, use a relatively low speed, 20–30% of full speed.

3. Turn on the air supply to the pumps and ram.
4. Dispense and reload the meter until air–free material is dispensed.

NOTE: While dispensing, verify that the dispense valve is open during a dispense cycle, and closed otherwise.

5. Set the desired flow rate per Robot Manufacturer's Control Instructions.

⚠ CAUTION

The inlet pressure to the meter should never exceed 2500 psi.

NOTE: Adjust the inlet valve stroke so that the cylinder rod retracts at approximately 1/2" per second.

NOTE: You will notice pressure faults (Robot Dispensing Controls) and bleed interruptions until the meter is full, and until the required flow rate is established.

Supply Pump Adjustment

Adjust the air pressure to each supply unit pump until the desired flow rate/bead characteristics are achieved, and the mastic regulator has been adjusted. For the Ultra–Flo meter do not exceed 2500 psi material pressure on the meter. Pressures between 500 and 2000 psi are ideal.

⚠ WARNING

PRESSURE RELIEF PROCEDURE
To reduce the risk of serious bodily injury, including fluid injection, splashing in the eyes or on the skin, or injury from moving parts, always follow this procedure whenever you shut off the pump, such as before checking and servicing system components.

1. Engage the dispensing valve safety latch (if applicable).
2. Shut off air supply to the pump and ram.
3. Open the drain valve and/or pump bleeder valve. Have a container ready to catch the material drainage.
4. Release the dispensing valve latch and trigger the dispensing valve to relieve any additional pressure.
5. Leave the drain valve open until you are ready to dispense again.

If you suspect the dispenser nozzle or hose has become completely clogged, or that pressure has not been fully relieved after following the steps above, VERY SLOWLY loosen the tip guard retaining nut or hose end coupling and relieve the pressure gradually, then loosen completely. Clear the tip or hose at this point.

Installation

Connecting to the Junction Box

Refer to Robot Manufacturer's supplied Control and System Instructions for connecting power to the junction box. All power to the junction box is provided by multi wired cables with matching pin connectors that connect to mating connector that is attached to the junction box (see connector information on page 24).

⚠ WARNING

ELECTRIC SHOCK HAZARD
Do not connect the junction box panel to a power source unless you are a trained electrician. Failure to follow standard procedures or to observe the necessary precautions could result in serious bodily injury or equipment damage.

⚠ CAUTION

If power and grounding connections are not done properly, the equipment may be damaged and the warranty will be voided.

⚠ WARNING

ELECTROCUTION HAZARD
Installing and servicing this equipment requires access to parts which could cause an electric shock or other serious injury. Have only qualified electricians access the control assembly.

Installation

Connecting to the Junction Box for Model 243348 W/O Swirl Board

Junction Box Panel

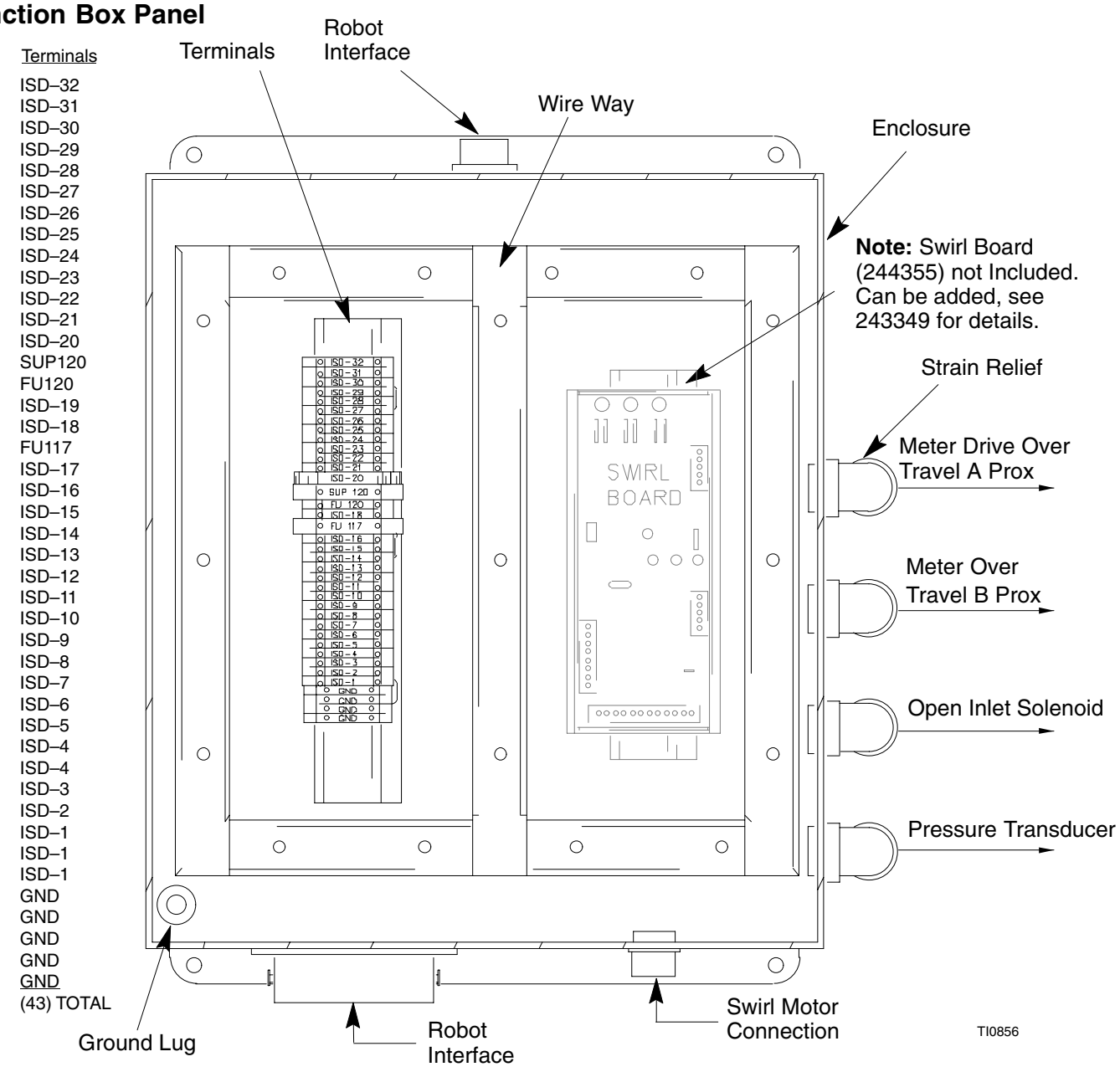


Fig. 3

Operation

Prepare the Operator

All persons who operate the equipment must be trained in the safe, efficient operation of all system components as well as the proper handling of all fluids. Every operator must thoroughly read all instruction manuals, tags, and labels before operating the equipment.

Initial System Startup Procedure

Follow the operating and system instructions provided by the Robot Manufacturer.

⚠ WARNING

PRESSURIZED FLUID HAZARD
To reduce the risk of serious bodily injury, such as fluid injection or splashing fluid in the eyes or on the skin, **always** wear eye protection and protective clothing when installing, operating, or servicing this dispensing system.

MOVING PARTS HAZARD
Moving equipment parts can cause personal injury, including severing of hands or fingers. Make sure all personnel are clear of moving parts before operating the equipment.

⚠ CAUTION

The use of a non-compatible lubricant can cause material contamination or inadequate performance. Use only a lubricant compatible with the material to be pumped. Check with the material supplier for a recommended lubricant.

⚠ WARNING

PRESSURIZED EQUIPMENT HAZARD
To reduce risk of injury or equipment damage:

- Make sure all material hose connections are secure.
- Do not pressurize the system until you have verified the system is ready and it is safe to do so.

Loading and Filling

⚠ WARNING

PRESSURIZED FLUID HAZARD
To reduce the risk of serious bodily injury, such as fluid injection or splashing fluid in the eyes or on the skin, **always** wear eye protection and protective clothing when installing, operating, or servicing this dispensing system.

1. Verify supply lines to the meter are filled.
2. Place the dispense valve over an appropriate waste container.
3. Open the dispense valve and open the material inlet valve to the meter. This will allow the system to fill without restriction.
4. For the remainder of this procedure refer to the instructions provided by the Robot Manufacturer.

System Shut Down

1. Shut off the main air supply to the system. This will disable all outputs of the dispense system.
2. Shut down supply units in accordance with the Pressure Relief Procedure on page 8.
3. Refer to system manual for other components.

Troubleshooting

Ultra–Flo Assembly

Problem	Cause(s)	Solution(s)
Ultra–Flo does not run.	Over travel limit has been exceeded.	Reset per Robot Control Instructions.
	Over/Under Pressure Limits have been exceeded.	Feed pressure too high / low. Readjust per Robot Control.
	Ball screw failure.	Replace / rebuild ball screw.
	Electric motor failure (no power to motor).	Check power to motor, refer to Robot Control Instructions.
	Guide bearing failure.	Check guide rails and bearings for wear. Repair or replace as necessary.
	Material inlet valve not functioning.	Refer to instruction manuals for information.
	Throat seals binding.	Replace throat seals.

Junction Box Panel

Problem	Cause(s)	Solution(s)
No power to solenoid valves, proximity sensors, pressure transducer.	Voltage limits to circuit in junction box exceeded.	Check surge suppressors SUP120 and replace if required.
	One or more fuse(s) blown.	Replace blown fuse(s). Check FU 117 and FU 120 on terminal block.
	No power to junction box.	Check voltage to junction box from Robot Controller. Refer to Robot Instruction Manual.
Precision swirl motor doesn't operate.	No power to motor.	Refer to Precision Swirl Instruction Manual Graco part number 310554.
	No power to junction box from Robot Controller.	Check voltage to Pin 16 24DC+, Pin 19 24DC–.

Maintenance

Preventive Maintenance Schedule

The operating conditions of your particular system determine how often maintenance is required. Establish a preventive maintenance schedule by recording when and what kind of maintenance is needed, and then determine a regular schedule for checking your system.

1. Purge and lubricate the packing area. There is a grease cavity between the two “U” cup shaft packings. This area should remain sealed with grease fittings or pipe plugs during operation. Periodically remove the plug from one side of the housing and push the old grease and sealant out from the other side with fresh grease. This should be done every 50,000 cycles, or as required for your sealant and process. A high quality synthetic grease is recommended.

2. Grease the ball screw at least every 30,000 to 40,000 cycles with a following recommended grease or equivalent.
   - Exxon – Nebulla EP#1
   - Mobil – Mobilux EP#1
   - Arco – Litholine EP#1
   - Gulf – Gulf Crown EP#1
   - Shell – Aeroshell #22
3. Keep rupture disc exhaust tube (51), see System Parts, page 20, clear at all times.

Flushing the System

⚠ WARNING

Use fluids and solvents that are chemically compatible with the equipment wetted parts. See the **Technical Data** sections of all the equipment manuals. Always read the material manufacturer’s literature before using fluid or solvent in this equipment.

To avoid damaging the unit do not use fluids containing halogenated hydrocarbons (HHC) to flush or clean the system as HHC is not compatible with aluminum. See technical data on page 24 for a list of wetted parts.

Flush the pump:

- Before the first use
- When changing material or fluid part number or brand
- Before fluid can dry or settle out in a dormant pump (check the shelf life or pot life of catalyzed fluids)
- Before storing the unit.

Flush with a fluid that is compatible with the fluid you are pumping and with the wetted parts in your system. Check with your fluid manufacturer or supplier for recommended flushing fluids and flushing frequency.

⚠ WARNING

FIRE AND EXPLOSION HAZARD Before flushing, read the section **FIRE AND EXPLOSION HAZARD** on page 4. Be sure the entire system and flushing pails are properly grounded. Refer to **Grounding** on page 7.

Service

Junction Box Panel

Fuse Removal

Remove the fuse as follows:

⚠ WARNING

ELECTROCUTION HAZARD
Installing and servicing this equipment requires access to parts which could cause an electric shock or other serious injury. Have only qualified electricians access the control assembly.

1. Shut off power to the junction box panel. by disconnecting the robot cable from the junction box.
2. Open the cover of the junction box panel.
3. Locate the failed fuse (A) on the terminal strip. Reference Fig. 4 for the fuse terminal identification.
4. Carefully remove the fuse from the fuse holder.

Fuse Replacement

Replace the fuse as follows:

NOTE: Check the new fuse to ensure that it matches the amp rating of the failed fuse. 1–Buss GDC–2.5A 5x20 mm, 1–Buss GDC–1.0A, 5x20 mm.

1. Press both ends of the new fuse evenly into place in the fuse holder (A). See Fig.4.
2. Close the cover on the junction box panel.
3. Reconnect the robot cable to the junction box.
4. Verify that the fuse operates correctly.
5. System is ready.

Surge Suppressor Removal

Remove the surge suppressor as follows:

⚠ WARNING

ELECTROCUTION HAZARD
Installing and servicing this equipment requires access to parts which could cause an electric shock or other serious injury. Have only qualified electricians access the control assembly.

1. Shut off power to the junction box panel by disconnecting the robot cable from junction box.
2. Open the cover of the junction box panel.
3. Locate the failed surge suppressor (B) on the terminal strip. Reference Fig. 4 for the surge suppressor terminal identification.
4. Remove the two screws and surge suppressor from the terminal strip.

Surge Suppressor Replacement

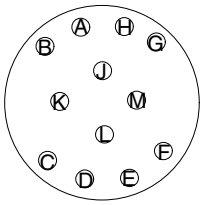
Replace the surge suppressor as follows:

1. Install the new surge suppressor (B) into place on the terminal strip using the two screws. See Fig.4.
2. Close the cover of the junction box panel.
3. Reconnect the robot cable to the junction box.
4. Verify that the new surge suppressor operates correctly.
5. System is ready.

Service

Connecting to the Junction Box for Model 243349 that includes Swirl Board

SWIRL AMPHENOL CONNECTOR



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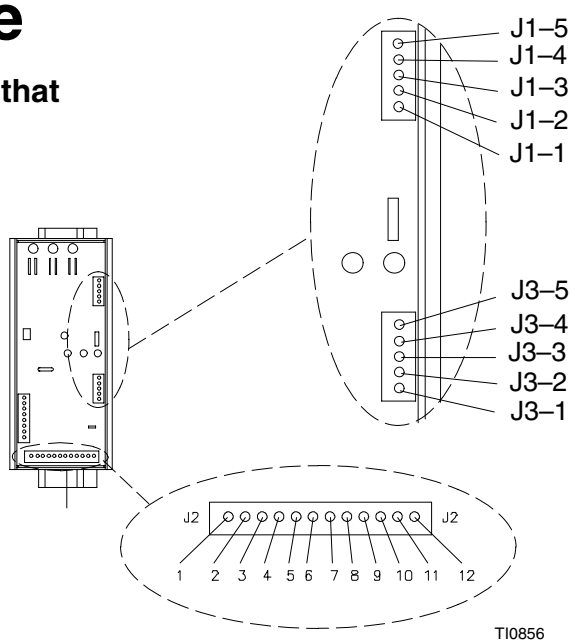
A J3–1
B J3–2
C J3–3
D J3–4
E J3–5
F F
G G
H H
J J1–3
K J1–5
M Panel Gnd



TI0856

Junction Box Panel

Terminals

ISD–32
ISD–31
ISD–30
ISD–29
ISD–28
ISD–27
ISD–26
ISD–25
ISD–24
ISD–23
ISD–22
ISD–21
ISD–20
SUP120
FU120
ISD–19
ISD–18
FU117
ISD–17
ISD–16
ISD–15
ISD–14
ISD–13
ISD–12
ISD–11
ISD–10
ISD–9
ISD–8
ISD–7
ISD–6
ISD–5
ISD–4
ISD–4
ISD–3
ISD–2
ISD–1
ISD–1
ISD–1
GND
GND
GND
GND
GND
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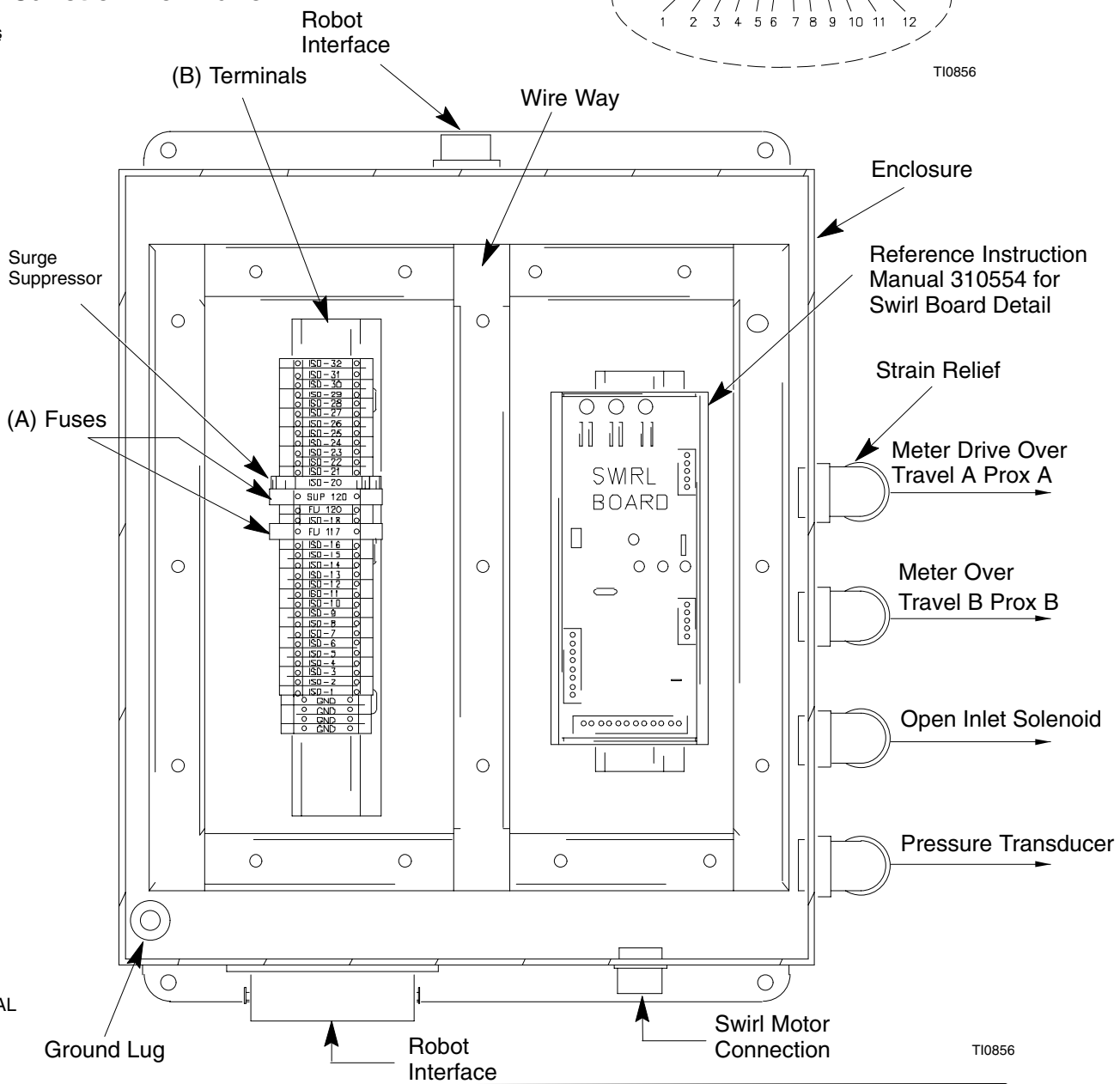

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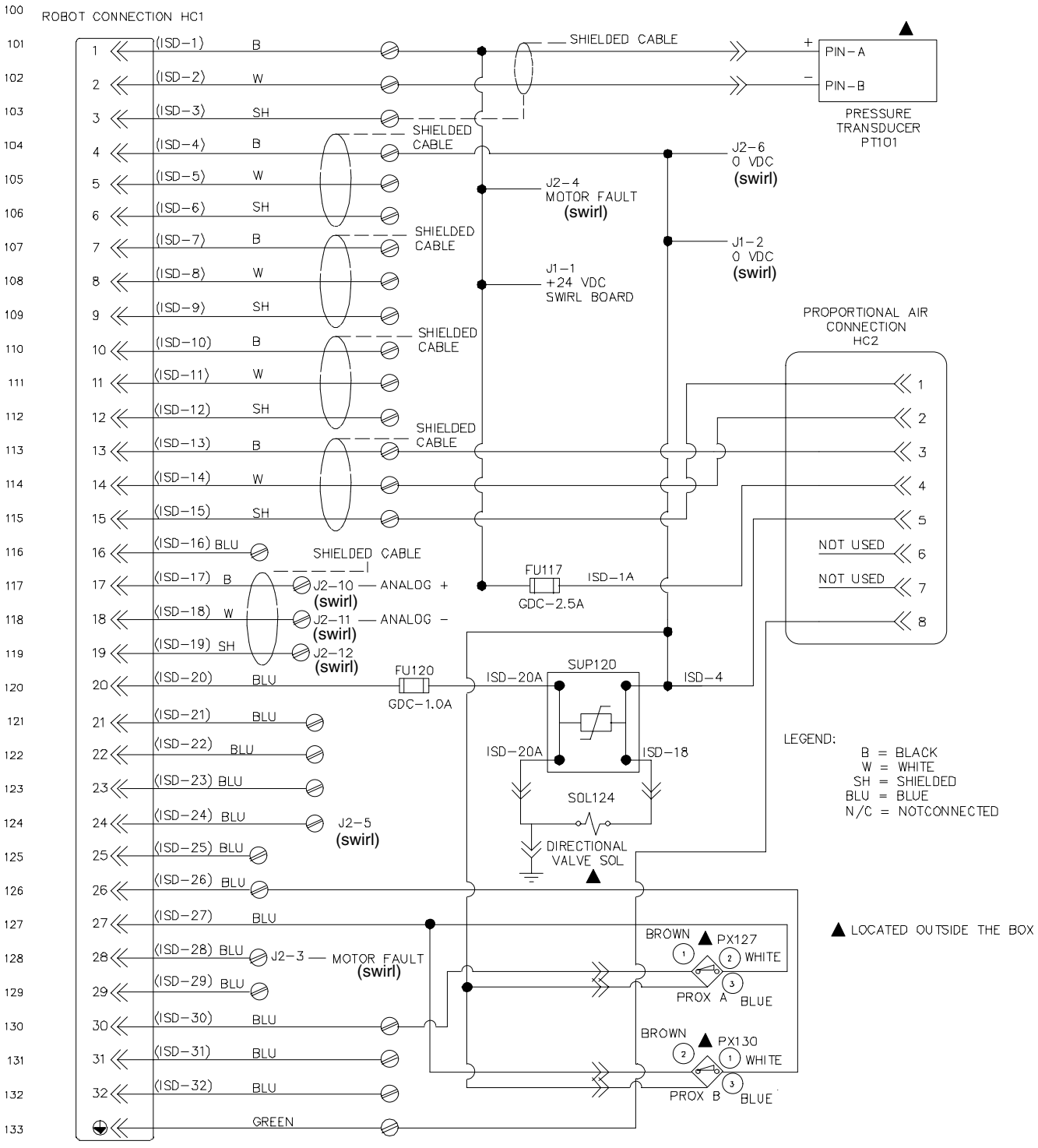
Fig. 4

Electrical Diagram



Service

Shot Meter Assembly / Piston Rod Seal

Piston Rod Seal Service is typically necessary when the grease for the seals becomes contaminated with the material that is being applied, or if the material being applied leaks down the displacement rod during operation.

Refer to the Parts information on page 20 and 22 when performing the following procedure to disassemble and assemble the shot meter.

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 8.

Disassembly

1. Relieve the fluid pressure and air pressure.
2. Purge the system as completely as possible, and disconnect the dispenser hoses, transducer, proximity switches, and other attachments.
3. Shut off electrical power to Ultra–Flo unit.
4. Disconnect motor electrical connections.
5. If unit will be moved to another location for repair, remove the unit from the dispenser support (22) by removing the four bolts, washers and nuts (43, 44, 45) (two on each side) holding the unit on the dispenser support.

NOTE: This step is not necessary if the unit will be repaired at installed location.

6. Remove the six hex screws, washers, and grommets, (58, 71, 70) holding the meter guard (66) in place. Remove the meter guard.
7. Remove (unscrew) the cylinder (6).

NOTE: Removing the cylinder at this point allows clear access to remove the eight cap screws from unit.

8. Remove the pin (82) from the linear bearing bracket (15) which holds the piston rod (7) to the bracket.
9. Remove the eight cap screws and washers (67, 83) from the flange of the meter housing (5) (four of the eight cap screws are attached to linear bearing shafts (17). When removing the four bolts from shafts (17) use wrench on flats located towards the bottom of the shaft to prevent shaft from turning.
10. Remove the split rings (72) when bolts are removed.
11. Remove the piston rod (7) and meter housing (5) from the pump mount plate (2).

NOTE: When split rings are reinstalled they **must** be positioned with curved edge down. Holes can be aligned as desired.

12. Remove piston rod (7) by turning the unit upside down and putting pressure on top. Piston rod can also be removed by tapping on top with plastic or rubber hammer.
13. Remove seal retainer (9) from piston rod (7). The seal retainer will probably come out when piston rod is removed. If not use a plastic rod inserted into grease cavity and pound out of meter housing (5).

NOTE: Check to make sure that both spacer seals (8) are removed (top spacer seal could remain in housing).

14. Clean material from meter housing (5).
15. Remove the following items from seal retainer (9):

- two spacer seals (8)
- upper and lower Polypak packing seals (10)
- Lower o–ring (13)
- Upper o–ring (12)
- wear bands (11)

NOTE: wear bands have diagonal cut to aid in removal and installation.

Reassembly

1. Inspect retainer seal (9), spacer seals (8), Polypak packing seals (10), wear bands (11) and o–rings (12, 13) for wear. Replace if necessary.
2. Install both the upper and lower wear bands (11).
3. Apply a light coating of grease on both seals (10) and insert seals so that packing lips face toward the top (narrow end) of retainer seal (9). Be sure to press seals completely into retainer seal.
4. Place o–rings onto seal retainer (9) making sure larger o–ring (13) goes on larger bottom of unit and smaller o–ring (12) on top.
5. Grease inside of seals and wear bands as well as both o–rings and outside of housing.
6. Replace top spacer seal (8) and insert narrow part of unit into meter housing (5).

7. Replace lower spacer seal (8).

NOTE: lower spacer should be even with lip on housing (5) if properly assembled.

8. Grease top of piston rod (7) and press to insert into meter housing (5).

NOTE: insert leading edge of rod from bottom towards top of housing to lessen chance of damaging packing seal lips (10).

9. Check condition of o–ring (25) in the linear bearing bracket (15) and replace if necessary. Grease o–ring (25). Insert piston rod (7) through the pump mounting plate (2) and down into the linear bearing bracket (15).

10. Insert pin (82) through the bearing bracket (15) and piston rod (7).

11. Rotate housing (5) for desired inlet and outlet port positioning. Press down flush against pump mounting plate (2).

12. Replace split rings (72).

NOTE: Split rings **must** be installed with curved edge down. Bolt holes can be aligned as desired.

13. Replace the eight cap head screws and washers (67, 83). Torque screws to 45–50 ft lbs. When replacing the four bolts for shafts (17) use wrench on flats located towards the bottom of the shaft to prevent shaft from turning.

14. Check o–ring (14) on meter cylinder (6) and replace if necessary.

15. Grease o–ring and meter cylinder threads.

16. Replace (screw) cylinder (6) on housing (5). Make sure cylinder is bottomed into housing. Snug up with wrench.

17. Replace the meter guard (66) and six hex screws, grommets, and washers (58, 70, 71) holding the meter guard in place.

18. If unit was moved to another location for repair, re attach unit to the dispenser support (22) by replacing the four cap screws, washers, and nuts (43, 44, 45) (two on each side) holding the unit to the dispenser support.

19. Reconnect hoses, transducer, proximity switches, and other attachments.

Ball Screw Repair and Bearing Replacement

Ball Screw Service is necessary when bearings (19) need replacement or the ball screw (4) needs repair or replacement.

Refer to the Parts information on page 20 and 22 when performing the following procedure to disassemble and assemble the shot meter.

NOTE: Ensure ball screw is at the upper third of the stroke before beginning this procedure. Bearing replacement requires removal of ball screw.

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 8.

Disassembly

1. Relieve the fluid pressure.

2. Purge the system as completely as possible, and disconnect hoses, transducer, and other attachments.

3. Shut off electrical power to Ultra–Flo unit.

4. Disconnect motor electrical connections.

5. If unit will be moved to another location for repair, remove the unit from the dispenser support (22) by removing the four bolts, washers and nuts (43, 44, 45) (two on each side) that hold the unit on to the dispenser support.

NOTE: This step is not necessary if the unit will be repaired at installed location.

6. Remove the shot meter assembly, see Service, Shot Meter Assembly / Piston Rod Seal .

7. Remove the motor from the ball screw assembly.

8. Remove the nut (16) holding the ball screw shaft on the linear bearing bracket (15).

9. Remove the two bolts and washers (26, 28) holding the pump mounting plate (2) on the dispenser mounting bracket (1), and slide plate off.

10. Remove the four socket head bolts and washers (27, 28) holding the ball screw (4) onto the mounting plate (3).

11. Carefully back away the ball screw (4) from the mounting plate.

> **⚠ CAUTION**
>
> Be sure to support ball unit and keep it level as ball unit is backed away from mounting plate. Failure to do so can result in damage to the screw and unit.

12. Remove the four screws and washers (21, 57) holding the shafts (17) on. Use wrench to hold flats of shafts to keep shafts from turning.

Bearing (19) replacement

NOTE: If you are replacing one or more bearings (19) you need only remove the bolt holding the shaft (17) needing the replacement bearing. To replace bearings:

a. Remove shaft (17) from ball screw mounting plate (3).

b. Slide off damaged bearing assembly from shaft (17) and linear bearing bracket (15).

c. Remove either top or bottom retaining clip (24) from the bearing assembly.

d. Press the bearing (19) out of the linear bearing sleeve (18) and press new bearing (19) into bearing sleeve.

NOTE: no lubrication is necessary for the bearing.

e. Replace retaining ring (34).

f. Slide new bearing assembly onto shaft (17) and linear bearing bracket (15).

g. Replace shaft (17) onto ball screw mounting plate (13). No further disassembly is necessary.

Disassembly (continued)

13. Remove the four shafts (17) and bearing assemblies.

14. Loosen the two recessed set screws (36) on the linear bearing bracket (15).

15. Turn linear bearing bracket (15) counter clockwise and remove it from the ball screw shaft.

NOTE: You may have to hold onto ball screw threads with a cloth and wrench when removing the linear bearing. Be careful not to damage ball screw threads.

16. Remove ball screw housing from unit.

Reassembly

> **⚠ CAUTION**
>
> Be sure to support ball unit and keep it level as ball unit is replaced. Failure to do so can result in damage to the screw and unit.

NOTE: Ensure ball screw is at the upper third of the stroke before beginning this procedure. Partially insert ball screw through mounting plate to allow access for replacing shafts and bolts.

1. Place the linear bearing bracket (15) onto shaft. Spin bearing bracket down on to ball screw shaft to secure in place. Position the bracket so that two holes of the linear bearing bracket (15) face towards the front.

2. Tighten two set screws (36).

3. Position bearing assemblies on shafts (17) and into linear bearing mounting bracket (15).

4. Replace shafts (17) with bearings onto ball screw mounting plate (3). Make sure flats on rods are located towards the ball screw.

5. Replace the four screws and washers (21, 57) holding the shafts (17) onto the mounting plate and torque bolts to 45 to 50 ft lbs.

6. Carefully slide ball screw assembly back onto mounting plate (3). Replace four bolts and washers (27, 28) and torque bolts to 60 ft lbs.

7. Place the pump mount plate (2) carefully over the four shafts (17). Make sure they fit into the spot face for each shaft.

8. Secure plate (2) to dispenser mount bracket (1) using two bolts and washers (26, 28). Torque to 45 – 50 ft lbs.

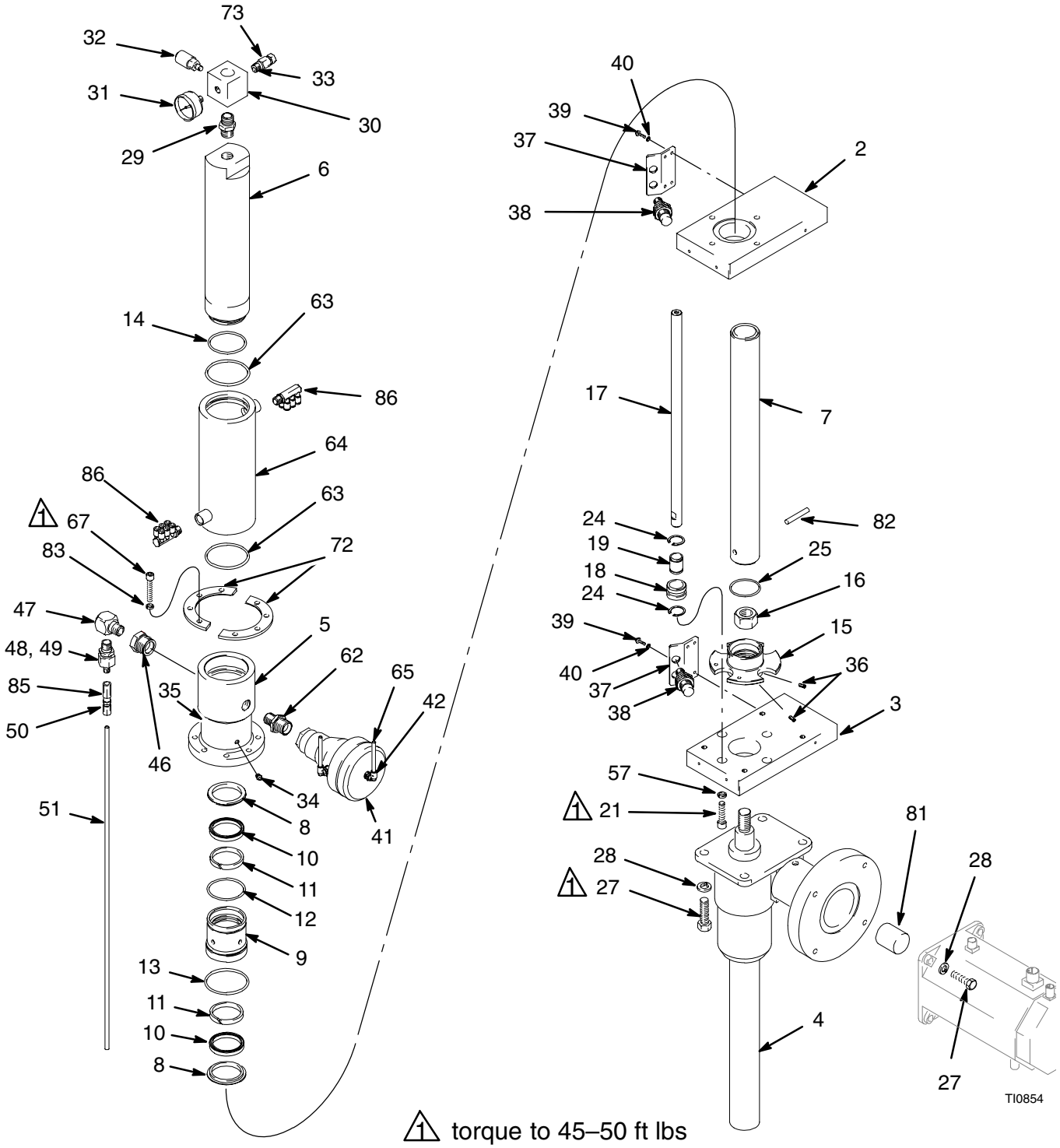
9. Replace nut (16) onto ball screw shaft and torque nut to 30 ft. lbs.

10. Replace the shot meter assembly, see Service, Shot Meter Assembly / Piston Rod Seal.

11. If unit was moved to another location for repair, reattach unit to the Ultra–Flo dispenser support (22) by replacing the four bolts (43, 44, 45) (two on each side) holding the unit to the mounting plate.

12. Reconnect hoses, transducer, proximity switches, and other attachments.

System Parts



System Parts

243348, Ultra–Flo Dispenser – without Precision Swirl Board

243349, Ultra–Flo Dispenser – with Precision Swirl Control Board

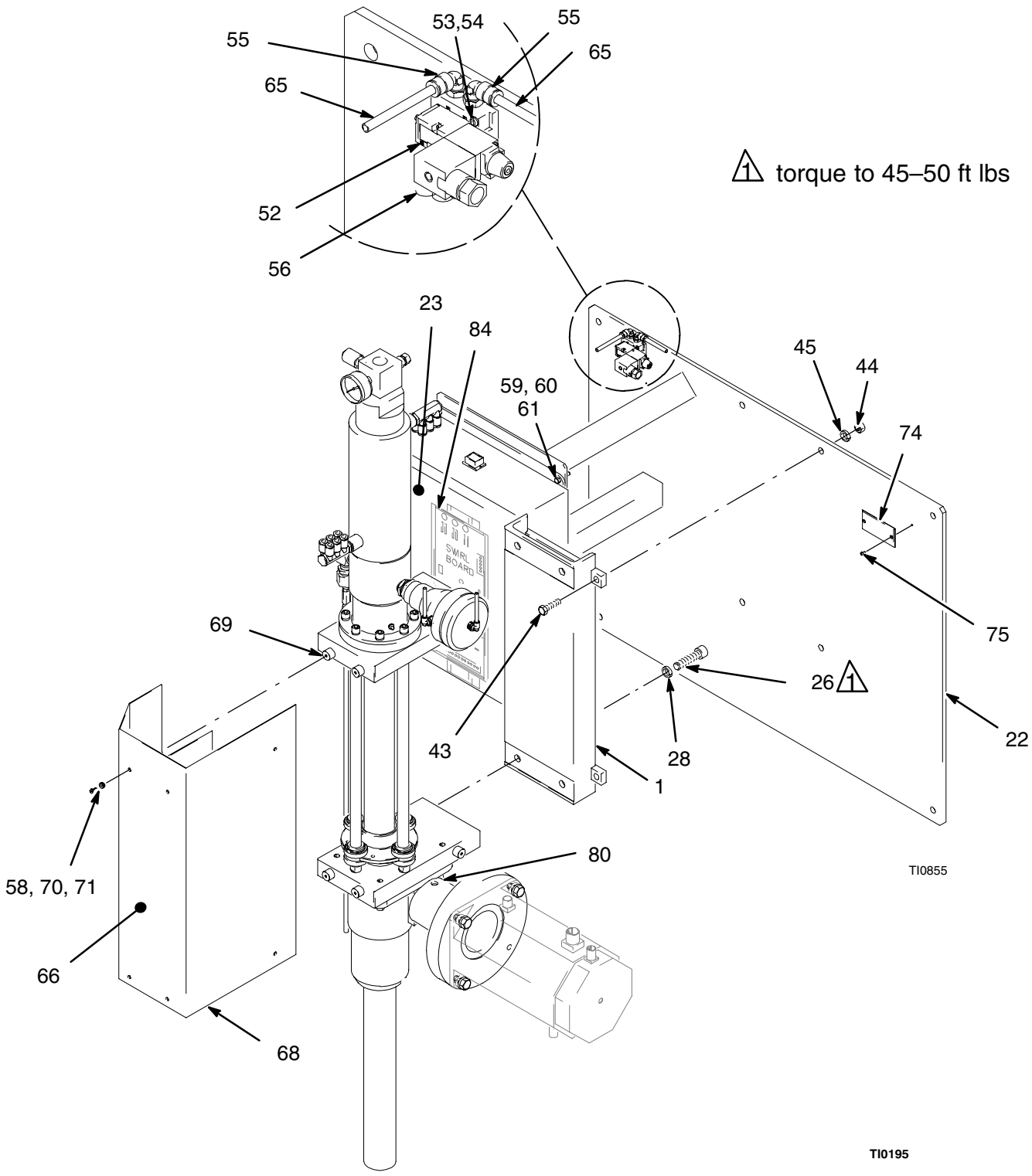
244816, Ultra–Flo Dispenser – Without board for Precision Swirl and without temperature conditioning jacket

244817, Ultra–Flo Dispenser – With board for Precision Swirl and without temperature conditioning jacket

Ref No.	Part No.	Description	Qty
2	195925	PLATE, Pump Mount	1
3	195950	PLATE, Ball Screw Mount	1
4*‡	116238	ACTUATOR, Ball Screw	1
5	195924	HOUSING, Meter 50 Cu. in. Ultra–Flo	1
6	195913	METER, Cylinder	1
7*	195914	PISTON, Rod	1
8	195929	SPACER, Seal 2–1/4 Dia. Rod	2
9*	195916	RETAINER, Seal	1
10*	115825	SEAL, Polypak, 2–1/4 ID.	2
11*	195949	BAND, Wear	2
12*	115812	PACKING, O–ring	1
13*	108301	PACKING, O–ring	1
14*	113054	PACKING, O–ring	1
15	195915	BRACKET, Linear Bearing	1
16	197030	NUT, Lock, 1–12 Un.	1
17*	196986	SHAFT, Linear Bearing	4
18	196988	SLEEVE, Linear Bearing	4
19*	518630	BEARING	4
21	104272	SCREW, Cap, Sch	4
24	518629	RING, Retaining	8
25*	160721	PACKING, O–ring	1
27	100060	SCREW, Cap, Hex HD	8
28	100018	WASHER, Lock, Spring	12
29	160032	NIPPLE	1
30	197024	MANIFOLD, 75 NPT X 4 Outlet	1
31*	102397	GAUGE, Press Fluid	1
32*‡	115672	GAUGE, Strain	1
33	165702	HOUSING, Valve	1
34	100054	FITTING, Lubtn, ST	1
35	104765	PLUG, Pipe, Headles	1
36	C19364	SCREW, Set, Sch, 1/4 X .75	2
37	C55383	BRACKET, Proximity Switch	2
38*‡	115728	SWITCH, Proximity	2
39*	110618	SCREW, Mach, Hex Washer HD	4
40	100020	WASHER, Lock	4
41*	918537	APPLICATOR, Ball Seat, 1/2 Port, 60:1	1
42	C19391	FITTING, Elbow	2
46	100896	FITTING, Bushing, Pipe	1
47	158683	ELBOW, 90 Deg.	1
48	512612	HOUSING, Rupture Disc	1
49*†	512613	DIAPHRAGM, Rupture Disc, 5000 psi	1
50	C18004	FITTING, Steel Tubing	1
51	C76503	TUBING, Steel	1
57	C19280	WASHER, Lock	4
59	100021	SCREW, Cap, Hex HD	4
60	100016	WASHER, Lock	4
61	100015	NUT, Hex, MSCR	4
62	157191	FITTING, Adapter	1
63*§	104023	PACKING, O–ring	2
64§	243813	JACKET, Temp, Conditioner	1
65*	C12509	TUBE, Nylon, Rnd	AR
67	106439	SCREW, Cap, SCH	8
72	197155	PLATE	1 pair
73	190128	PLUG, Valve	1
81*‡	115824	COUPLER, Servo, Class	1
82	115983	PIN, Quick Release	1
83	100133	WASHER, Lock	8
85	100175	COUPLING	1
86	116591	FITTING, Tee, Triple Branch	2

* Recommended spare parts, see page 23.
† Two spare discs are included with unit.
‡ Recommended purchased components, see page 24.
§ Used only with temperature conditioning units.
AR = as required.

System Parts



System Parts

243348, Ultra–Flo Dispenser – without Precision Swirl Board
243349, Ultra–Flo Dispenser – with Precision Swirl Control Board

Ref No.	Part No.	Description	Qty
1	244178	BRACKET, Dispenser Mount	1
22	244180	SUPPORT, Dispenser, Ultra–Flo	1
23*	195931	BOX, Junction	1
26	112384	SCREW, Cap, Socket HD	4
28	100018	WASHER, Lock, Spring	6
43	110861	SCREW, Cap, Hex HD	4
44	101213	NUT, Full, Hex	4
45	100052	WASHER, Lock	4
52*‡	551348	VALVE, Sol 4–Way, 24 VDC, 1/8 NPT	1
53	100410	SCREW, Machine, PNH	2
54	C19862	NUT, Lock, Hex	2
55	112698	ELBOW, Male, Swivel	3
56*	C06061	MUFFLER, Sintered, Dia 1/8	2
58	108296	SCREW, Mach, Hex, Washer HD	6
65	C12509	TUBE, Nylon, Rnd	AR
66	C57763	GUARD, Meter, UF50H	1
68	C51969	2601–601–33, Trim, PVC Edge 2601–601–33	AR
69	116276	STUD, Screen	6
70	116275	GROMMET, Screen	6
71	115814	WASHER, Flat, SST	6
74	290128	PLATE, Designation	1
75	100508	SCREW, Drive	2
80	116321	CAP, Plug, Safety	2
84*	244355	BOARD, Swirl Control (for 243349 only, see page 15 for details)	1

* Recommend spare parts, see page 23.
‡ Recommended purchased components, see page 24.
AR = as required.

Recommended Spare Parts

Spare Parts for Utra–Flo Dispenser Units

The customer should maintain an inventory of the spare parts (per unit) listed below.

Ref No.	Part No.	Description	Qty
4*	116238	ACTUATOR, Ball Screw	1
7*	195914	PISTON, Rod	1
9*	195916	RETAINER, Seal	1
10*	115825	SEAL, Polypak, 2–1/4 ID.	2
11*	195949	BAND, Wear	2
12*	115812	PACKING, O–ring	1
13*	108301	PACKING, O–ring	1
14*	113054	PACKING, O–ring	1
17*	196986	SHAFT, Linear Bearing	4
19*	518630	BEARING	4
23*	195931	BOX, Junction	1
25*	160721	PACKING, O–ring	1
31*	102397	GAUGE, Press Fluid	1
32*	115672	GAUGE, Strain	1
38*	115728	SWITCH, Proximity	2
39*	110618	SCREW, Mach, Hex Washer HD	4
41*	918537	APPLICATOR, Ball Seat, 1/2 Port, 60:1	1
49*	512613	DIAPHRAGM, Rupture Disc, 5000 psi, package of 3	1
52*	551348	VALVE, Sol 4–Way, 24 VDC, 1/8 NPT	1
56*	C06061	MUFFLER, Sintered, Dia 1/8	2
63*	104023	PACKING, O–ring	2
65*	C12509	TUBE, Nylon, Rnd	AR
81*	115824	COUPLING	1
84*	244355	BOARD, Swirl	1
		KIT, Applicator	
		FU117 – Fuse 2.5a	1
		FU120 – Fuse 1.0a	1
	918538	KIT, Repair Applicator (see Instruction Manual 310550 for Details)	1

Integration Data

‡ Recommended Purchased Components

The Ultra–flo requires that some components be purchased from other suppliers in order to match and connect to component parts that are shipped with this equipment. The following lists these parts along with the corresponding recommended manufacturer.

Ref No.	Part No.	Description	Manufacturer	Specifications
4	116238	ACTUATOR, Ball Screw	Action Jac 24:1 Ratio	5HLBSJ–1–15" W/B5–MB–X–20410 Motor Mount Adapter
32	115672	GAUGE, Strain (Pressure Transducer)	Sensotec 060–CH54–01	Excitation 9–32 VDC, Output 4–20MA, 4MA–OPSI, 20MA – 5000psi, Connection – 7/16–20 UNF Male
38	115728	SWITCH, Proximity	IMF Effector 1GSZ07	10–36 VDC Operating Voltage, Output 3 wire DC PNP
52	551348	VALVE, Sol 4–Way, 24 VDC, 1/8 NPT	Numatics 031SA4414	24 VDC 6.0 Watts, .25 Amps
81	115824	COUPLING, Servo	Zero Max SC060	Mating Input Shaft 35mm x 3.3 Keyway
—	—	For Use with Fanuc Servo Motor or equivalent	Ref. Fanuc A06B–0143–B175#0008 Reference mounting dimensions on page 27	28 KW, 12 Newton meters, 2000 RPM
Robot Interface Connector		HC1 Main	Harting 09320323001 Insert 09300160301 Housing 09330006104 Contacts	For 32 Pin Connectors
Robot Interface Connector		HC2 Prop. Air.	Harting 09360083101 Insert 09200030301 Housing 09150006201 Contacts	For 8 Pin Connectors

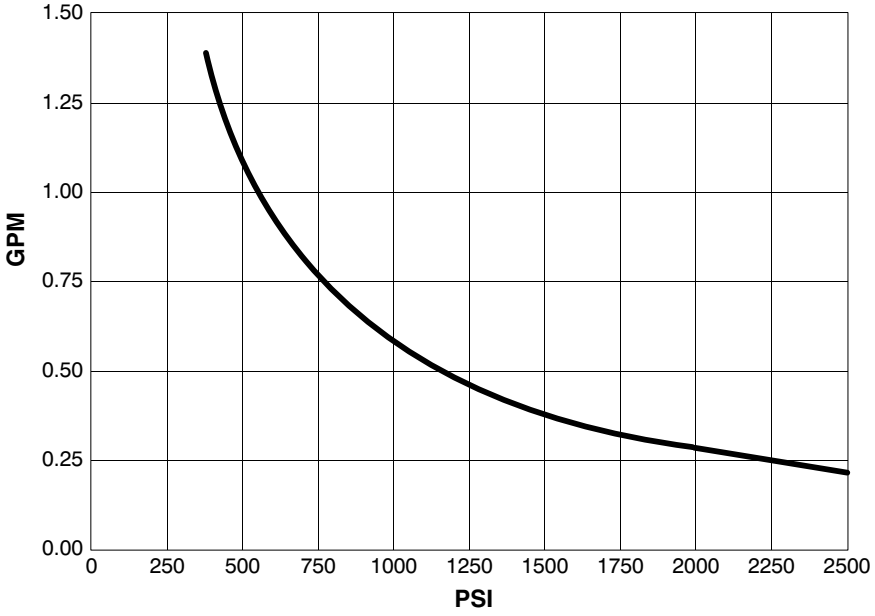
Technical Data

Unit	Description	Specification
Ultra–Flo Shot Metering Dispenser	Overall dimensions:	Width: 36 in. (914 mm) Depth: 23 in. (584 mm) Height: 75 in. (1905mm)
	Maximum Working Pressure	2500 psi
	Maximum Operating Temperature	150 deg F (65.5 deg C)
	Pump Cycles	4.6 per 1 gal (3.8 ltrs)
	Maximum Recommended Speed	1 cycle per minute
	Working Stride Length	13.25 in. (337 mm)
	Displacement Area	3.97 sq. in. (2561 sq. mm)
	Compressed air requirement	100 psi maximum (6.9 bar, 0.69 MPa)
	Main air inlet size	1/8 in. npt(f) x 1/4 in. tube fitting
	Water Conditioning Connections, ...In and Out	1/2in. npt(f)
	Water Conditioning Pressure	Max WPR – 40 psi
	Overall Weight	Approximately 500 lb (227 kg)
	Motor Torque Requirements	12 Newton Meters
	Motor Speed (Max.)	2000 RPM
	Shot Meter Voltage Requirements	24 VDC
	Wetted Parts	Aluminum, Chrome, Thermoplastic Polymers, Tungsten Carbide, Stainless Steel, Carbon Steel, Viton

Pressure Volume Curve

Maximum Flow vs. Pressure

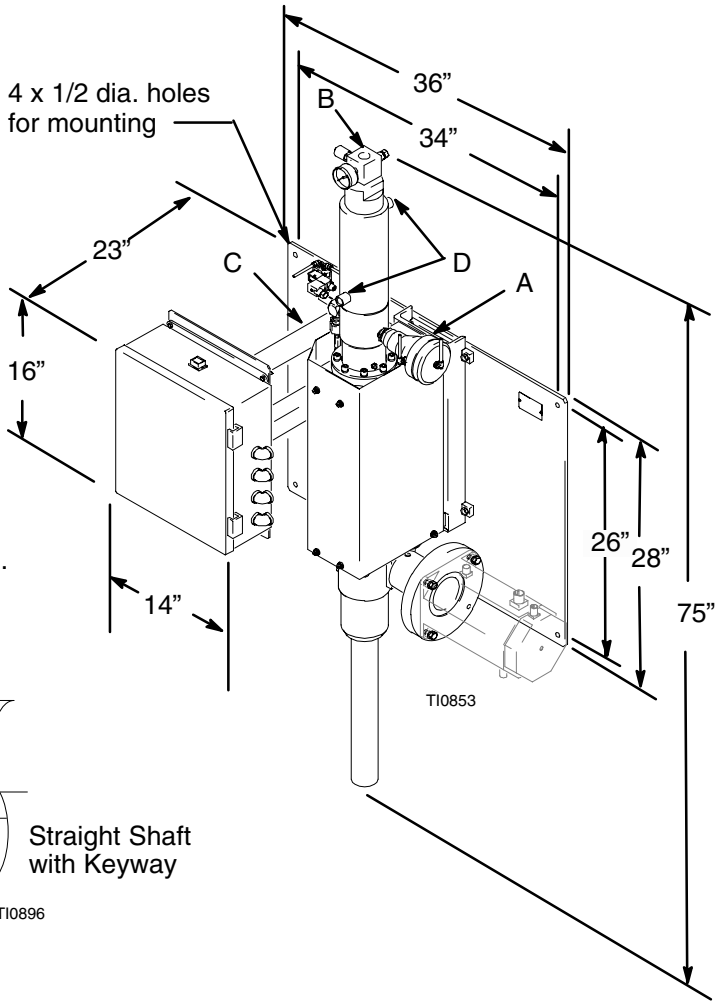
The ball screw of the Graco Ultra–Flo is designed to operate in the following range.



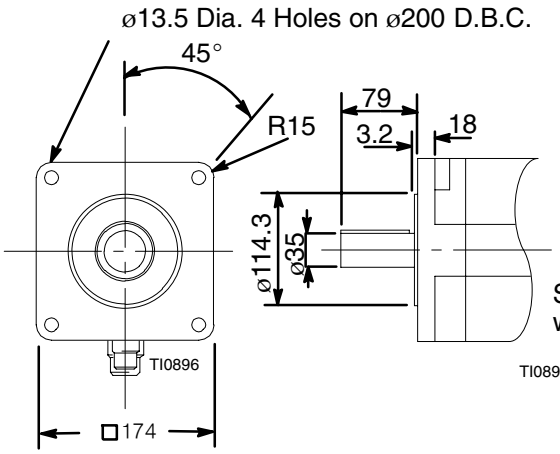
Notes

Dimensions

A Fluid Inlet – 1/2 npt (female)
B Fluid Outlet – 3/4 npt (female)
C Air Inlet – 1/4 O.D. Tube Fitting
D Water Conditioning Connec–
tions 1/2” npt (f)



MOTOR DIMENSIONS (Reference Only)



Graco Standard Warranty

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non–Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IN CONNECTION WITH ACCESSORIES, EQUIPMENT, MATERIALS OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO. These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

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Graco Phone Number

TO PLACE AN ORDER, contact your Graco distributor, or call this number to identify the distributor closest to you:

1–800–367–4023 Toll Free
612–623–6921 Local
612–378–3505 Fax

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