Operation - Maintenance

Dispensit 1093

313566J

EN

Patented meter and dispense system for precise one-component micro-dispensing.

2000 psi (14 MPa, 138 bar) Maximum Outlet Fluid Working Pressure
Metal Sleeves: 1200 psi (8 MPa, 83 bar) Maximum Material Inlet Pressure
Plastic Sleeves: 400 psi (2.8 MPa, 28 bar) Maximum Material Inlet Pressure
100 psi (0.7 MPa, 7 bar) Maximum Air Working Pressure
110°F (43°C) Maximum Ambient Temperature
150°F (65°C) Maximum Operating Temperature

Important Safety Instructions

Read all warnings and instructions in this manual.
Save these instructions.

PROVEN QUALITY. LEADING TECHNOLOGY.

Contents

Related Manuals

Part	Description
3A0261	1053/1093 Control Box

1093 Valve Models

1093 Valves		
Part No.	**Configuration**	**Description**
A2A05401	1093-10A-4RS1-500-V	2 inch stroke, .500 diameter rod, nitrided tool steel wetted components, NEMA 23 motor ready
A2A05402	1093-10A-4RS1-625-V	2 inch stroke, .625 diameter rod, nitrided tool steel wetted components, NEMA 23 motor ready
A2A05403	1093-10A-4RS1-750-V	2 inch stroke, .750 diameter rod, nitrided tool steel wetted components, NEMA 23 motor ready
A2A05404	1093-10A-4TT1-500-V	2 inch stroke, .500 diameter rod, stainless steel wetted components, NEMA 23 motor ready
A2A05405	1093-10A-4TT1-625-V	2 inch stroke, .625 diameter rod, stainless steel wetted components, NEMA 23 motor ready
A2A05406	1093-10A-4TT1-750-V	2 inch stroke, .750 diameter rod, stainless steel wetted components, NEMA 23 motor ready

Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

⚠ WARNING





SKIN INJECTION HAZARD

High-pressure fluid from dispensing device, hose leaks, or ruptured components will pierce skin. This may look like just a cut, but it is a serious injury that can result in amputation. **Get immediate surgical** treatment.

- Do not point dispensing device at anyone or at any part of the body.
- Do not put your hand over the fluid outlet.
- Do not stop or deflect leaks with your hand, body, glove, or rag.
- Follow the **Pressure Relief Procedure** when you stop dispensing and before cleaning, checking, or servicing equipment.
- Tighten all fluid connections before operating the equipment.
- Check hoses and couplings daily. Replace worn or damaged parts immediately.

TOXIC FLUID OR FUMES HAZARD

Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.

- Read Safety Data Sheets (SDSs) for handling instructions and to know the specific hazards of the fluids you are using, including the effects of long-term exposure.
- When spraying, servicing equipment, or when in the work area, always keep work area well-ventilated and always wear appropriate personal protective equipment. See **Personal Protective Equipment** warnings in this manual.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.

PERSONAL PROTECTIVE EQUIPMENT

Always wear appropriate personal protective equipment and cover all skin when spraying, servicing equipment, or when in the work area. Protective equipment helps prevent serious injury, including long-term exposure; inhalation of toxic fumes, mists or vapors; allergic reaction; burns; eye injury and hearing loss. This protective equipment includes but is not limited to:

- A properly fitting respirator, which may include a supplied-air respirator, chemically impermeable gloves, protective clothing and foot coverings as recommended by the fluid manufacturer and local regulatory authority.
- Protective eyewear and hearing protection.

⚠ WARNING




FIRE AND EXPLOSION HAZARD

Flammable fumes, such as solvent and paint fumes, in **work area** can ignite or explode. Paint or solvent flowing through the equipment can cause static sparking. To help prevent fire and explosion:

- Use equipment only in well-ventilated area.
- Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static sparking).
- Ground all equipment in the work area. See **Grounding** instructions.
- Never spray or flush solvent at high pressure.
- Keep work area free of debris, including solvent, rags and gasoline.
- Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present.
- Use only grounded hoses.
- Hold gun firmly to side of grounded pail when triggering into pail. Do not use pail liners unless they are anti-static or conductive.
- **Stop operation immediately** if static sparking occurs or you feel a shock**.** Do not use equipment until you identify and correct the problem.
- Keep a working fire extinguisher in the work area.


EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.

- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See **Technical Specifications** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Specifications** in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request Safety Data Sheets (SDSs) from distributor or retailer.
- Do not leave the work area while equipment is energized or under pressure.
- Turn off all equipment and follow the **Pressure Relief Procedure** when equipment is not in use.
- Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink or over bend hoses or use hoses to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.


MOVING PARTS HAZARD

Moving parts can pinch, cut or amputate fingers and other body parts.

- Keep clear of moving parts.
- Do not operate equipment with protective guards or covers removed.
- Pressurized equipment can start without warning. Before checking, moving, or servicing equipment, follow the **Pressure Relief Procedure** and disconnect all power sources.

BURN HAZARD

Equipment surfaces and fluid that is heated can become very hot during operation. To avoid severe burns:

- Do not touch hot fluid or equipment.

Important Isocyanate (ISO) Information

Isocyanate Conditions

Spraying or dispensing fluids that contain isocyanates creates potentially harmful mists, vapors, and atomized particulates.

- Read and understand the fluid manufacturer's warnings and Safety Data Sheet (SDS) to know specific hazards and precautions related to isocyanates.
- Use of isocyanates involves potentially hazardous procedures. Do not spray with this equipment unless you are trained, qualified, and have read and understood the information in this manual and in the fluid manufacturer's application instructions and SDS.
- Use of incorrectly maintained or mis-adjusted equipment may result in improperly cured material. Equipment must be carefully maintained and adjusted according to instructions in the manual.
- To prevent inhalation of isocyanate mists, vapors, and atomized particulates, everyone in the work area must wear appropriate respiratory protection. Always wear a properly fitting respirator, which may include a supplied-air respirator. Ventilate the work area according to instructions in the fluid manufacturer's SDS.
- Avoid all skin contact with isocyanates. Everyone in the work area must wear chemically impermeable gloves, protective clothing and foot coverings as recommended by the fluid manufacturer and local regulatory authority. Follow all fluid manufacturer recommendations, including those regarding handling of contaminated clothing. After spraying, wash hands and face before eating or drinking.

Material Self-ignition

Some materials may become self-igniting if applied too thick. Read material manufacturer's warnings and material Safety Data Sheet (SDS).

Keep Components A and B Separate

Cross-contamination can result in cured material in fluid lines which could cause serious injury or damage equipment. To prevent cross-contamination:

- Never interchange component A and component B wetted parts.
- Never use solvent on one side if it has been contaminated from the other side.

Moisture Sensitivity of Isocyanates

Exposure to moisture (such as humidity) will cause ISO to partially cure, forming small, hard, abrasive crystal that become suspended in the fluid. Eventually a film will form on the surface and the ISO will begin to gel, increasing in viscosity.

NOTICE

Partially cured ISO will reduce performance and the life of all wetted parts.

- Always use a sealed container with a desiccant dryer in the vent, or a nitrogen atmosphere. **Never** store ISO in an open container.
- Keep the ISO pump wet cup or reservoir (if installed) filled with appropriate lubricant. The lubricant creates a barrier between the ISO and the atmosphere.
- Use only moisture-proof hoses compatible with ISO.
- Never use reclaimed solvents, which may contain moisture. Always keep solvent containers closed when not in use.
- Always lubricate threaded parts with an appropriate lubricant when reassembling.

NOTE: The amount of film formation and rate of crystallization varies depending on the blend of ISO, the humidity, and the temperature.

Foam Resins with 245 fa Blowing Agents

Some foam blowing agents will froth at temperatures above 90°F (33°C) when not under pressure, especially if agitated. To reduce frothing, minimize preheating in a circulation system.

Changing Materials

NOTICE

Changing the material types used in your equipment requires special attention to avoid equipment damage and downtime.

- When changing materials, flush the equipment multiple times to ensure it is thoroughly clean.
- Always clean the fluid inlet strainers after flushing.
- Check with your material manufacturer for chemical compatibility.
- When changing between epoxies and urethanes or polyureas, disassemble and clean all fluid components and change hoses. Epoxies often have amines on the B (hardener) side. Polyureas often have amines on the B (resin) side.

Installation

Grounding

The equipment must be grounded to reduce the risk of static sparking. Static sparking can cause fumes to ignite or explode. Grounding provides an escape wire for the electric current.

Metering valve: Attach the ground wire from the grounding lug to true earth ground. See **Component Identification** starting on page 8.

Fluid hoses: Use only electrically conductive hoses.

Feed system components: Attach the ground wire from the grounding lug to true earth ground. See your feed system manual for grounding points.

Fluid supply container: Follow local code.

Solvent pails used when flushing: Follow local code. Use only conductive metal pails placed on a grounded surface. Do not place the pail on a non-conductive surface, such as paper or cardboard, which interrupts grounding continuity.

Overview

This single-component meter and dispense device accurately meters liquid and semi-paste materials.

The machine is designed for applications that require very small and precisely dispensed beads and/or dots of material at a wide range of material inlet pressures.

The ratio of the flow rate/stroke length to pump shaft area provides the adjustable pressure intensification needed to move the separate liquids through the needle with a flow rate suitable for production requirements.

The complete system is enclosed. See **Sequence of Operation** on page 14.

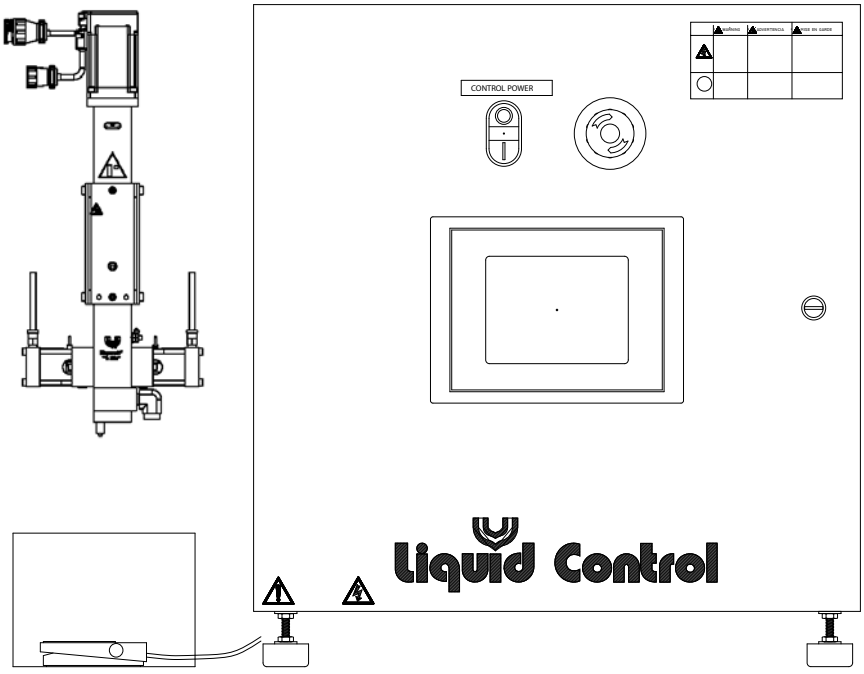
Cycle Detection Spool Sensors

The spool sensors are magnetic reed switches and must be connected to an electrical control. An LED on the switch illuminates to indicate the shifting of the spool.

Component Identification

Typical System Configurations

Valve *Controls*



System shown with optional controls

FIG. 1

Typical Feed System Components

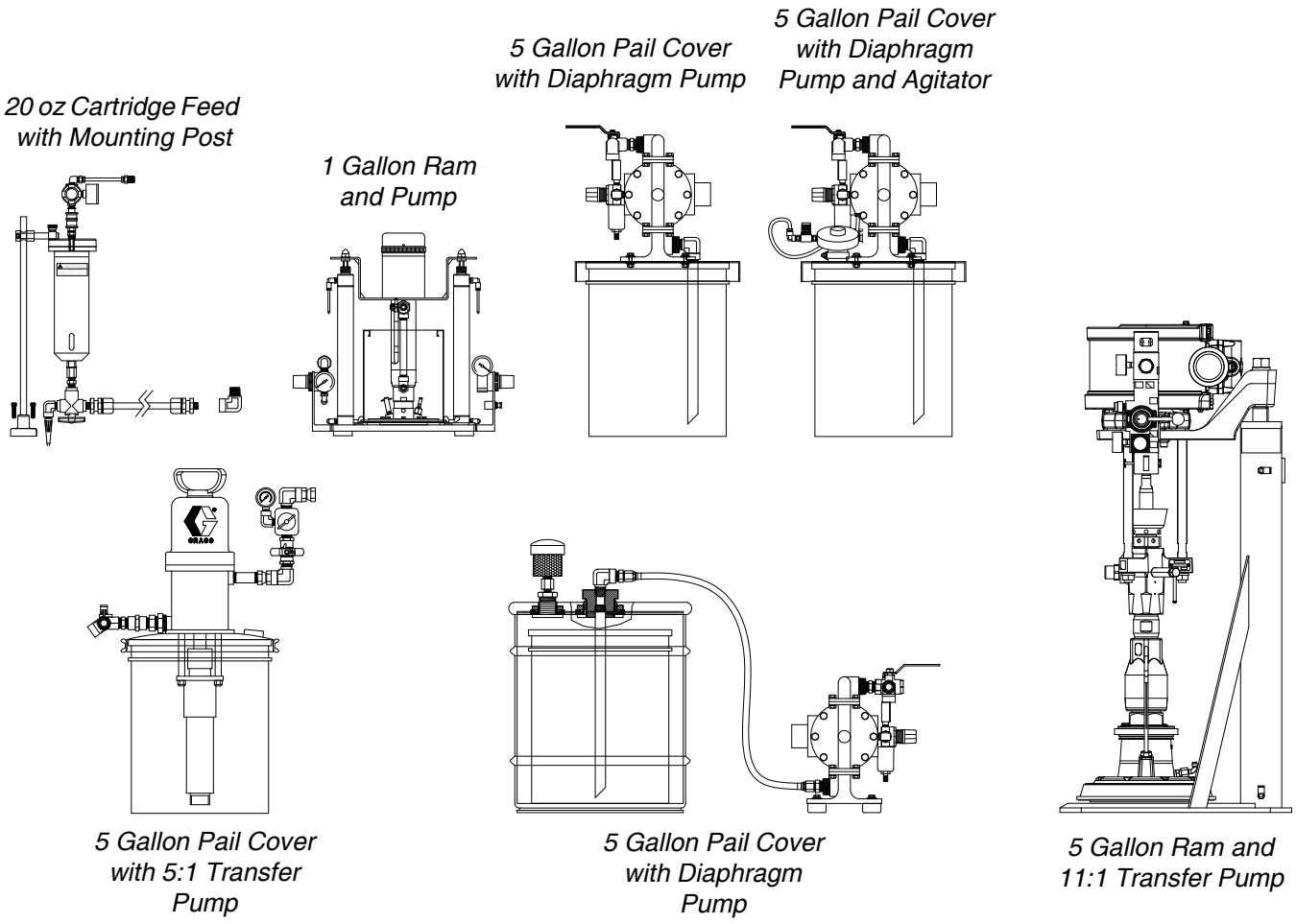
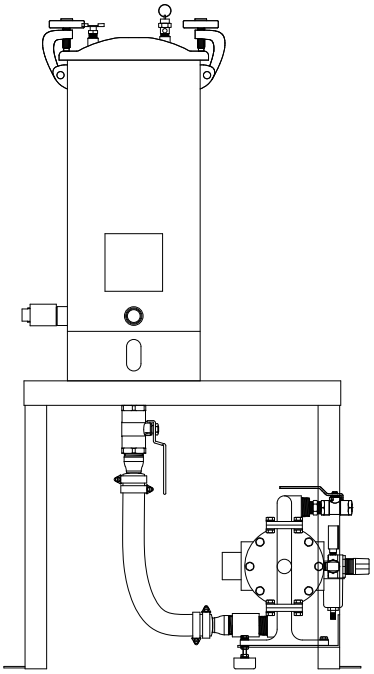
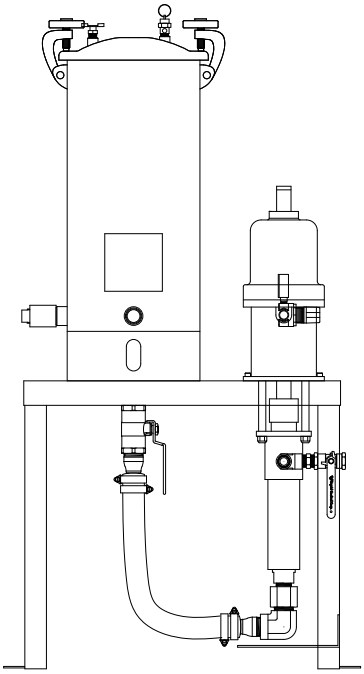


FIG. 2

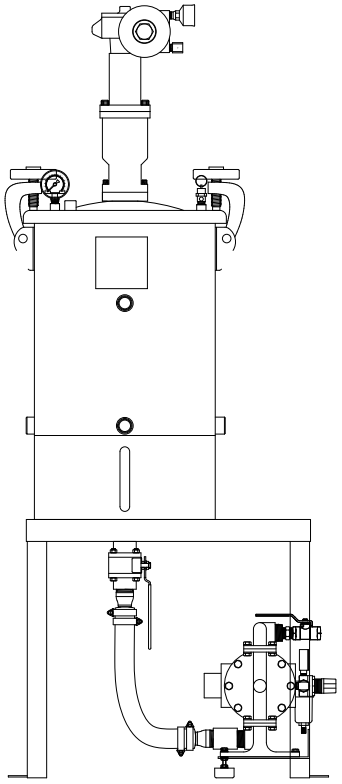
Typical Feed System Components (continued)



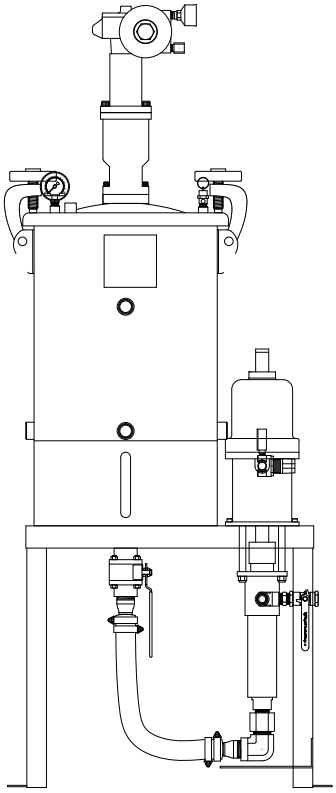
5 Gallon Tank with Diaphragm Pump and Stand



5 Gallon Tank with 5:1 Pump and Stand



10 Gallon Tank with Diaphragm Pump, Agitator, Vacuum, and Stand



10 Gallon Tank with 5:1 Pump, Agitator, Vacuum, and Stand

FIG. 3

Model 1093 Main Component Illustration

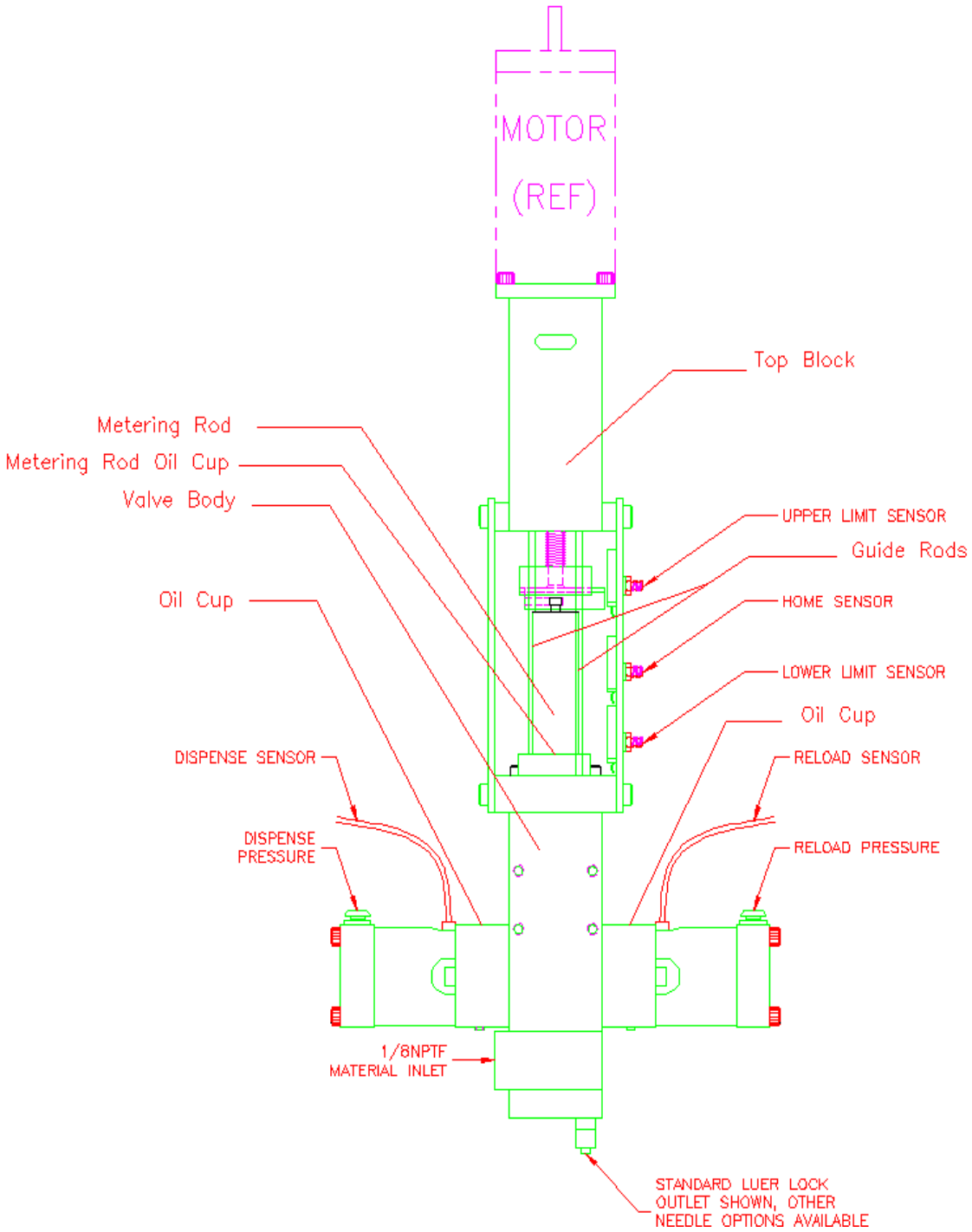


FIG. 4

Setup

NOTE: See the **Typical Installation** diagram.

1. Perform the setup procedure for feed system components. See your feed system manual(s).
2. Place an in-line air pressure regulator, air-water separator/filter, and shut-off/bleed valve between the air supply and the control solenoids.
3. Connect each of the supplied 1/4 in. outside diameter air line to the corresponding control solenoid. See **Component Identification** starting on page 8.
4. Connect the chemical lines from the feed system to the metering valve material inlets. See **Component Identification** starting on page 8.

Typical Installation

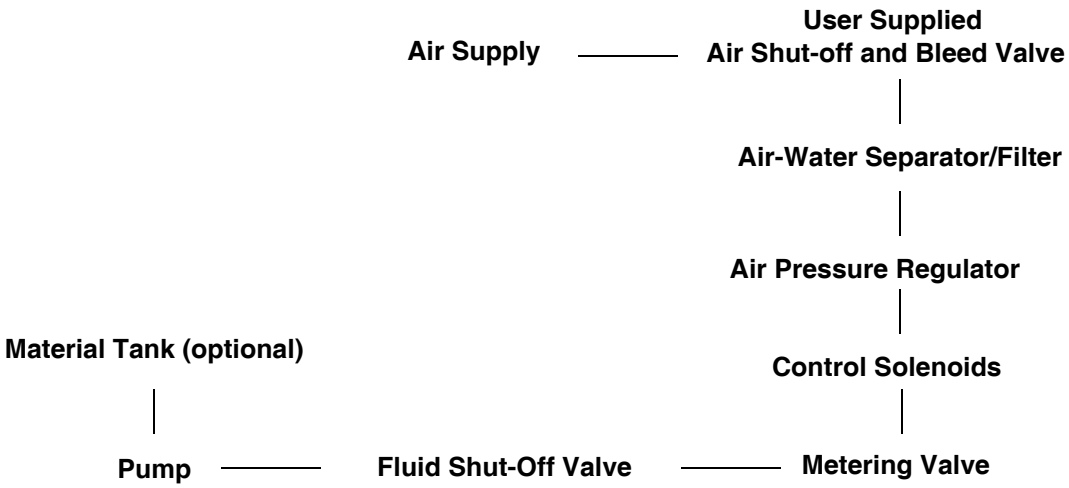


FIG. 5

Air Controller: The Model 1093 requires a programmable servo or stepper motor controller. Both options are offered by Graco, but can also be supplied by the customer. The inside diameter of the standard motor coupler is .25”.

Air Lines: Install the pneumatic supply lines for spool shifting between the fill and dispense cycles.

- Minimum air pressure required is 70 psi (4.8 bar).
- Maximum air pressure is 100 psi (6.9 bar).
- Pneumatic supply lines of .16 inch ID X .25 inch OD.

Spool Position Sensors: The spool sensors are magnetic reed switches that must be connected to an electrical control. An LED on the switch illuminates to indicate the shifting of the spool.

Home Position Sensor: The home sensor indicates the position of the Metering Rod Connection Block (the typical “home” position).

Coupling and Lead Screw: The coupling and lead screw must rotate counter-clockwise to dispense and clock-wise to fill. Verify proper rotation of the servo or stepper motor.

Valve Mounting Diagram

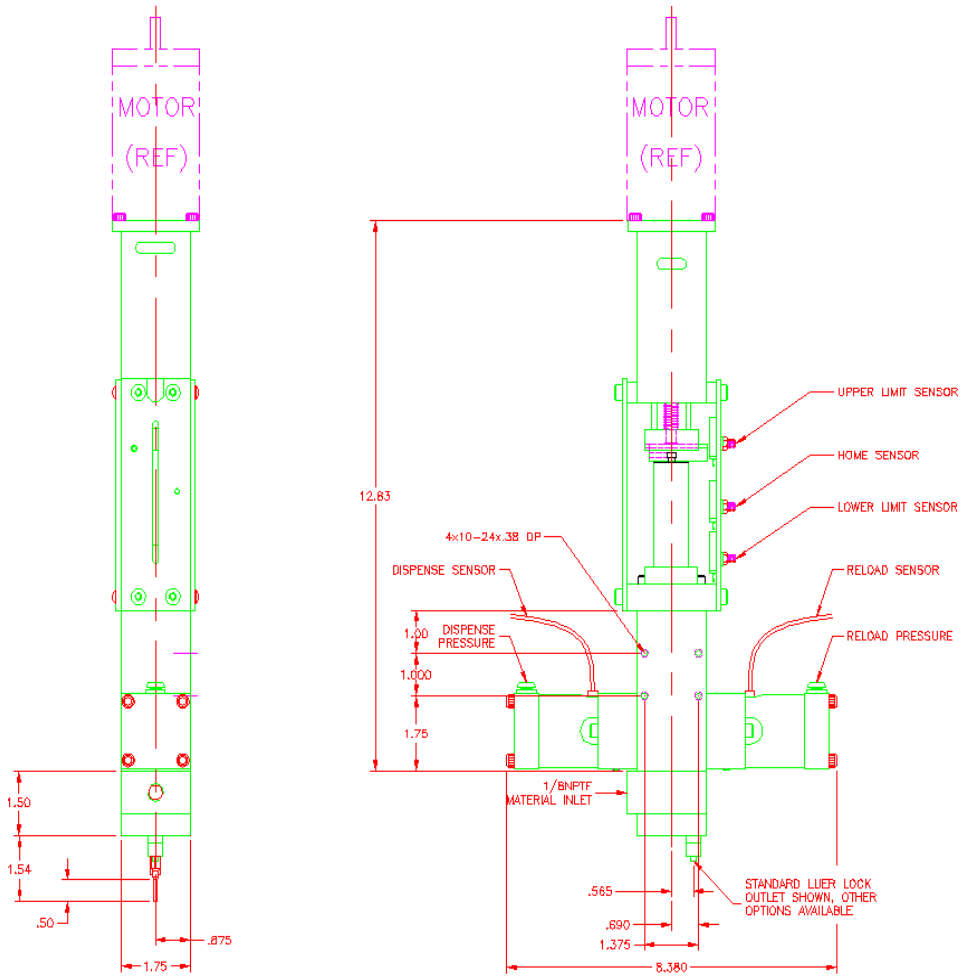
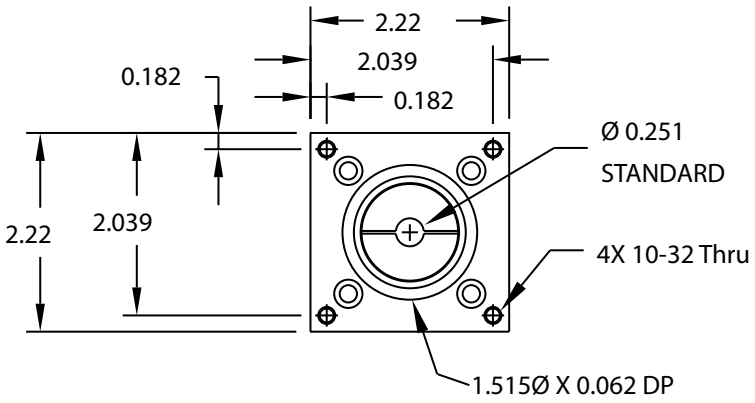


FIG. 6

Motor Mounting Diagram

If using a non-Graco motor with the dispense valve, use the following diagram to install the non-Graco motor onto the valve. See **Motor Specifications** on page 29.

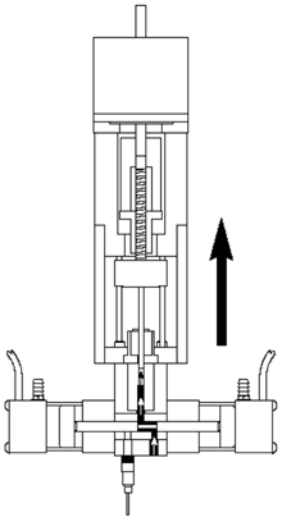


Operation

The operation of the 1093 metering valve is controlled by an external source. If a control box was purchased, see the your control box manual for operation instructions. See **Related Manuals** on page 2.

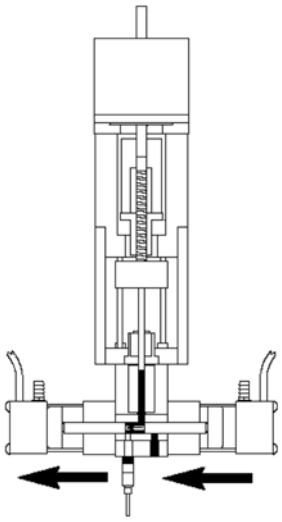
Sequence of Operation

Step 1: Reload



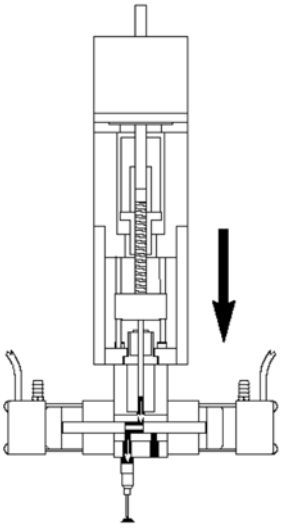
- The spool shifts to the right
- Material feed inlet is opened
- Material is transferred into the metering chambers by a pressurized feed system
- The outlet port is blocked
- The metering rod is retracted to a precise position determining the volume of each material

Step 2: Shift



- The balanced spool shifts to the dispense position
- The material path to the needle is opened
- The material feed inlet port is blocked
- The metering rod remains in the retracted position

Step 3: Dispense



- The metering rod extends
- Material is dispensed from the metering chamber into the needle

Upon completion of the dispense stroke, the metering rod and spool shifts back to the reload position.

Operating Procedures

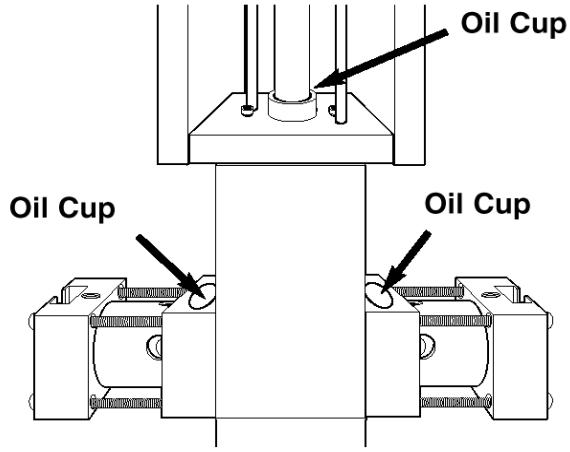
A dry run demonstrates the valve's controls and dispensing steps. It also verifies that the valve is working correctly before you load materials.

Dry Run

1. Cycle the valve to verify the sequence of operation. See **Sequence of Operation** on page 14.
2. To verify the spool is shifting, check the illumination of the LED's on the spool reed sensors.
3. The system is installed correctly if valve performs properly.

Loading & Priming

1. Fill the oil cups with a compatible lubricant (suitable for use with material being used).



2. If not previously removed, remove the material line from the inlet port of the valve.
3. Prime the material line.
4. Extend the valve to the dispense cycle. See **Sequence of Operation** on page 14.
5. Install the material line to the inlet port of the valve.
6. Increase the material inlet pressure for loading.

Recommended Material Supply Pressure
Minimum - 20 psi (1.4 bar)
Maximum for Plastic Spools - 400 psi (27.6 bar)
Maximum for Steel Spools - 1200 psi (82.7 bar)
The above settings depend on the cycle rate and viscosity of the material.

7. Perform the loading sequence of the valve until air free material is visible.

Output Verification

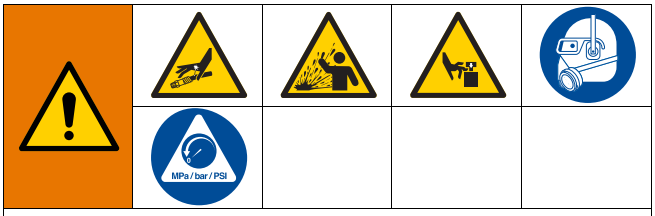
Output verification is a simple procedure where individual samples of material are collected, weighed, and compared for desired output. We recommend that you perform output verification at least once a day, and if the machine is used in production for more than one shift, then once a shift.

1. Position a clean container under the valve outlet.
2. Set the stroke of the metering rod to the desired shot size.
3. Weigh three small empty cups and label them.
4. Dispense a purge shot into a waste container.
5. Dispense ten shots into the first labeled cup.
6. Proceed in the same manner with the other labeled cups.
7. Reweigh all three cups and record the results, which should be ten times desired shot size.

NOTE: If the shot weights are inconsistent, an adjustment of the material pressure and/or the frequency of the pulses to the motor may be necessary.

Pressure Relief Procedure

Follow the Pressure Relief Procedure whenever you see this symbol.



This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as skin injection, splashing fluid and moving parts, follow the Pressure Relief Procedure when you stop spraying and before cleaning, checking, or servicing the equipment.

1. Retract the metering rods. See your control box manual. See **Related Manuals** on page 2.
2. Close the fluid shut-off valve.
3. Remove the needle.
4. Dispense five shots. Shots should be at least 75% of the full stroke.
5. Extend the metering rod into the tubes. If Graco controls are provided with the system, see your controls manual. See **Related Manuals** on page 2.
6. Close the incoming air shut-off/bleed valve that supplies air to the metering valve.
7. Close the incoming air shut-off/bleed valve that supplies the feed system. See your feed system manual for the proper pressure relief procedure.

Shutdown

1. Perform the **Pressure Relief Procedure**.
2. Inspect the metering rod for material buildup. Clean as necessary.
3. Lubricate the metering rod with compatible lubricant such as mesamoll or silicone oil.
4. Remove the needle adapter and replace it with a 5/16-28 set screw.

Maintenance

Perform the following procedures once a shift.

NOTE: If material is leaking, see **Troubleshooting** on page 18.

Material Reservoirs

Check material levels and refill as necessary. Ensure the material reservoirs are properly vented.

Air Dryer

Check the condition of the desiccant air dryer. Replace as necessary.

Metering Rod Port (oil cup)

Lubricate with compatible lubricant such as mesamoll or silicone oil.

Exterior

Check and clean the exterior of the valve.

Spool Valve Port (wet cups)

Fill with compatible lubricant such as mesamoll or silicone oil.

Troubleshooting

Perform the **Pressure Relief Procedure** before performing any troubleshooting procedure.

Problem	Cause	Solution
Metering valve stalling and no material being dispensed despite adequate input pressure	Blocked needle	Check needle for cured material, replace as required
Metering valve not discharging normal or full volume	Low material level in reservoirs	Fill material reservoirs and prime the machine
	Air in material tank	Fill reservoir and prime machine
Material leaks past spool valve	Spool valve worn or damaged	Replace the spool valve
The 1093 valve will not cycle	Cycle detection sensors not working	Check connections or replace as needed
The 1093 valve cycles slowly	Oil cup/wet cups are not supplied with lubrication	Add lubrication. Note: Lubrication must be compatible with all seals.
The 1093 valve drools or leaks	Air is trapped in the valve	Prime the valve until air/free material is visible
	Seals are worn	Replace seals
Spool will not actuate	Low air pressure	Increase air pressure to approximately 20-30 psi
	Cured material on spool	Check spool for cured material, replace as required
	Seals are worn	Replace seals

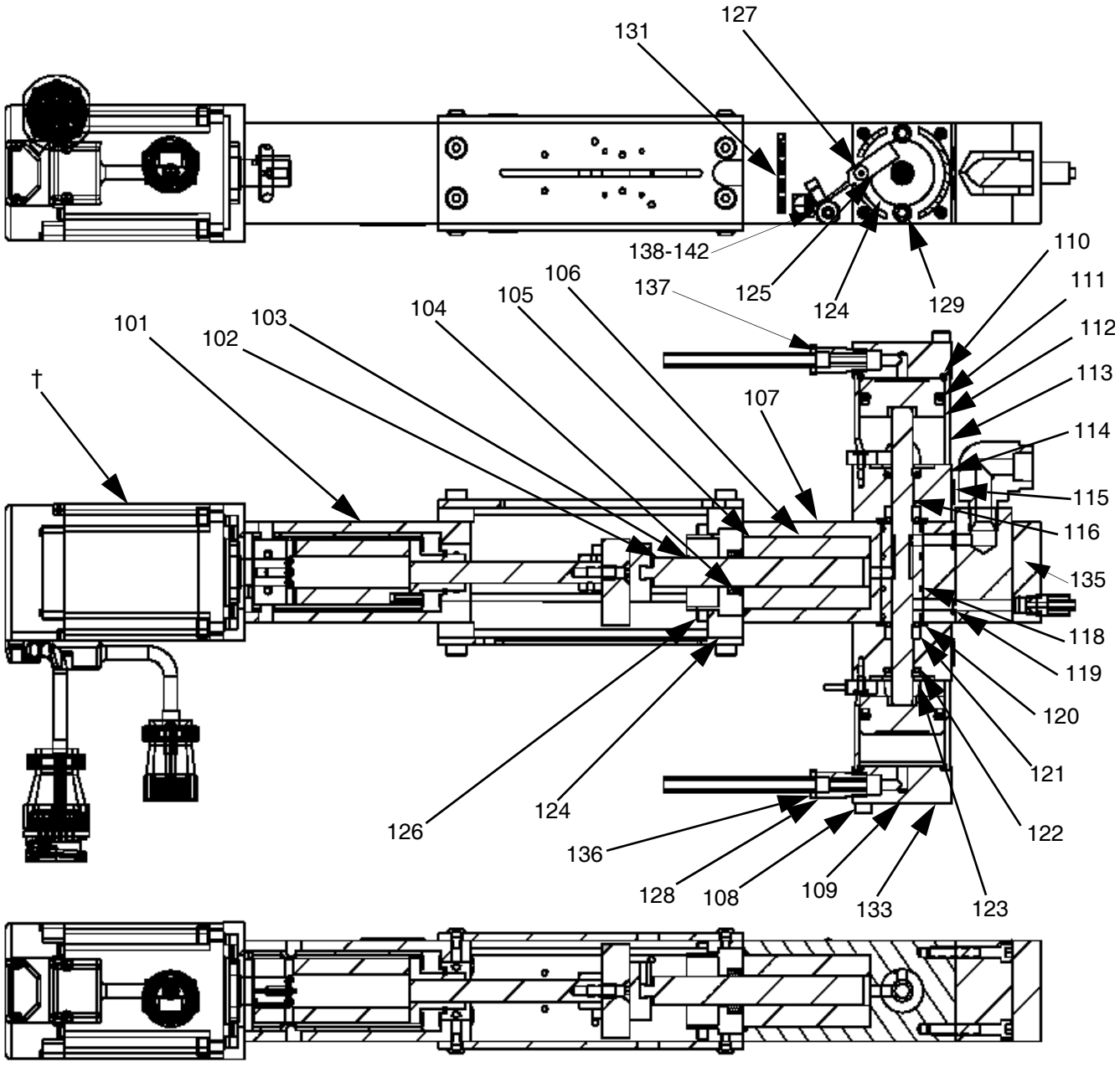
Schematics

For standard machines, the schematics will be included in the Controls Parts manual. See **Related Manuals** on page 2.

For custom machines, the schematics will be included in the assembly drawings manual.

Parts

1093 Valve



† *The motor is not included with the valve.*

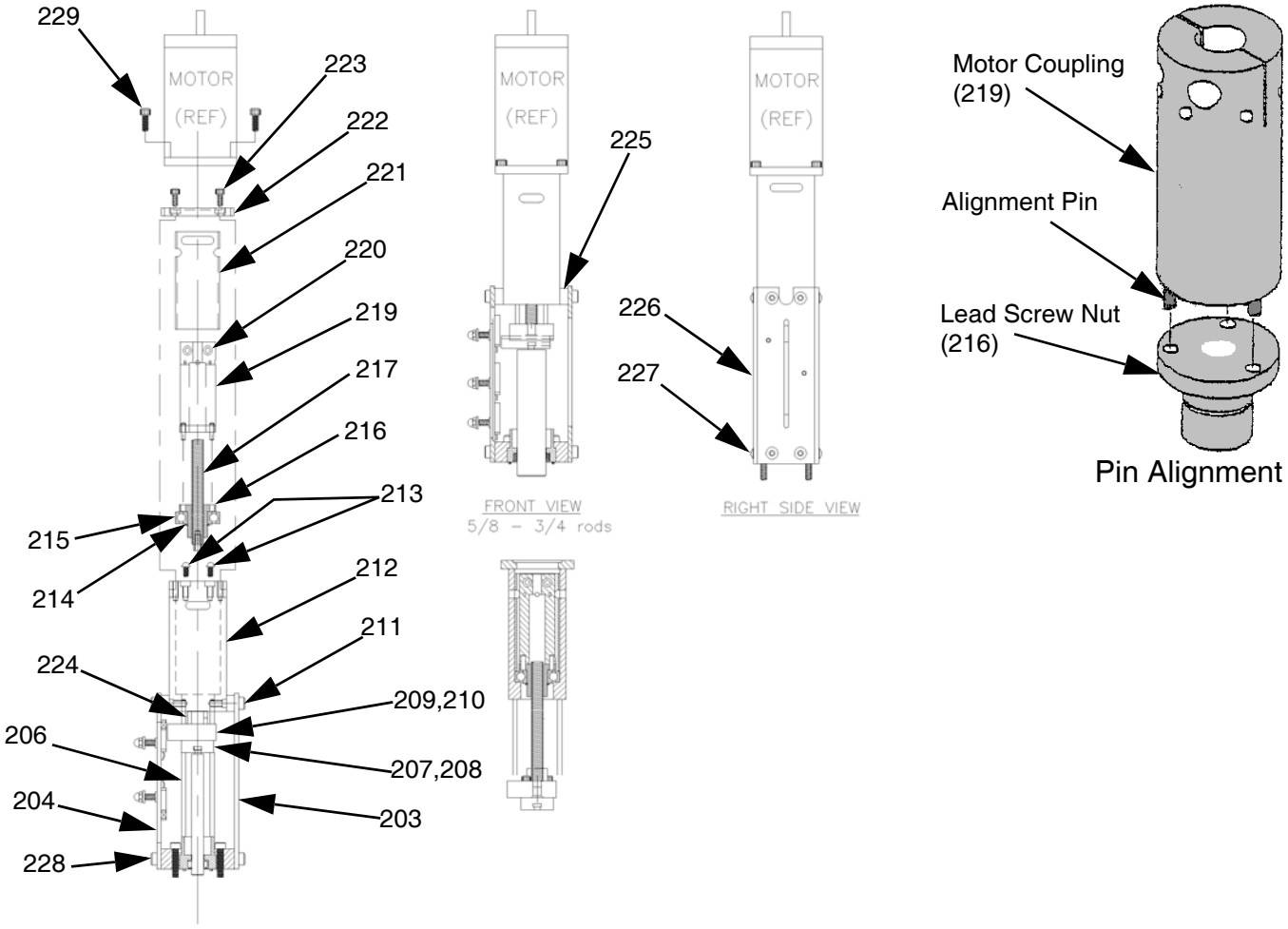
1093 Valve Shared Components

Ref	Part	Description	Qty
101	A2A05400	KIT, 1093, drive assy, stepper	1
105	95/0866/00	O-RING, vit	1
107	A2010209	VALVE, 1093, main blk, ss, 2 in, etc	1
108	96/0509/98	SCREW, shc	4
109	16D002	CAP, end, air cyl, spl	2
110	95/0504/01	O-RING, buna	2
111	95/0601/01	SEAL, u-cp	2
112	A2000009-1	PISTON, 1093, spool	2
113	01/2801-1/97	TUBE, air cyl, spool, 1093	2
114	A2000006-1	RETAINER, 1093, seal, wet, spool valve	2
115	J6300019	PLUG	4
117	J1000002	PIN, roll	1
118	95/0909/00	O-RING, vit	4
119	95/0503/00	O-RING, vit	2
120	95/0903/00	O-RING, vit	2
121	D2000040	SEAL, posipak	2
122	95/0849/11	SEAL, posipak	2
123	A2000007-1	RETAINER, 1092, seal	2
124	A2010202	RETAINER, 1093, oil cup, large	1
125	P7626-WH	HARNESS, assy, 1093	1
126	96/0307/98	SCREW, shc	4
127	96/0575/98	SCREW, fhsc	2
128	123453	FITTING	2
129	B4000023	SCREW, shc	4
133	617559	SCREW, cap	4
135	A2010029	NEEDLE, 1092, adptr asy	1
136	123537	BUTTON, snap-on, green	1
137	123538	BUTTON, snap-on, yellow	1
138	84/0130-22/11	CRUSH LABEL	2
139	84/0130-25/11	GROUND LABEL	1
140	96/0005-2/99	WASHER	2
141	96/0124/99	NUT	2
142	81/9997-M/11	TERMINAL	1
149	070311	ADHESIVE	1

1093 Valve Variable Components

Ref. No.	Description	RS 500	RS 625	RS 750	TT 500	TT 625	TT 750	Qty
		A2A05401	A2A05402	A2A05403	A2A05404	A2A05405	A2A05406	
102	ROD, 1093, metering	A2010207-08N	A2010207-10N	A2010207-12N	A2010207-08S	A2010207-10S	A2010207-12S	1
103	1093, seal cup	16T143	A2010203-10	A2010203-12	16T143	A2010203-10	A2010203-12	1
104	SEAL, pospk	95/0873/11	D2000113	D2000053	95/0873/11	D2000113	D2000053	1
106	SLEEVE, 1093, metering	A2010206-08N	A2010206-10N	A2010206-12N	A2010206-08D	A2010206-10T	A2010206-12T	1
116	SPOOL, 1092, assy, t type	A2010014	A2010014	A2010014	A2010013	A2010013	A2010013	1
130	KIT, seal	D5000187	D5000188	D5000189	D5000187	D5000188	D5000189	1
131	LABEL, decal	84/1050-1200/11	84/1050-1200/11	84/1050-1200/11	84/1050-400/11	84/1050-400/11	84/1050-400/11	1

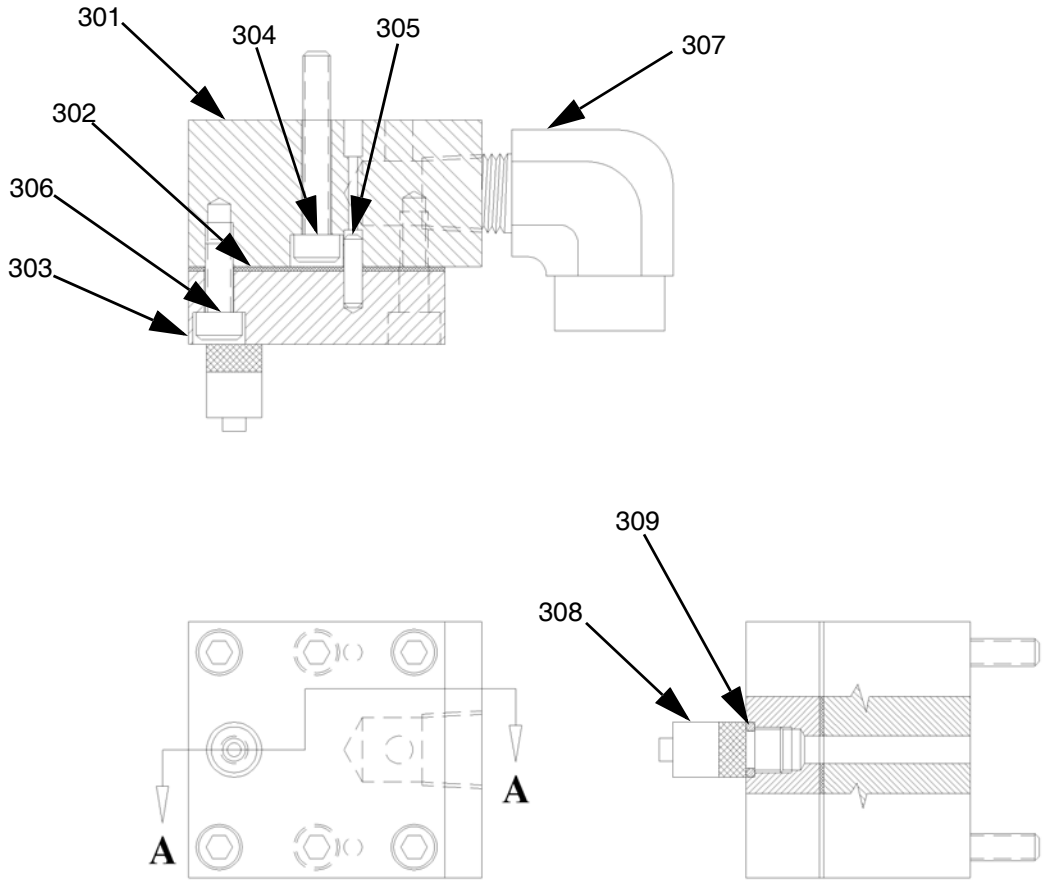
Motor and Motor Coupling (A2A05400)



Ref.	Part	Description	Qty.
203	01/2983/97	PLATE, tie, front	1
204	01/2982/97	PLATE, tie, back, pd44, 3 slot	1
206	01/2706-A/99	ROD, guide, 1093	2
207	A2010204	BLOCK, 1093, connector, metering	1
208	96/0260/98	SCREW, shc	2
209	A2010205	BLOCK, 1093, connector, lead screw	1
210	514210	SCREW, fhsc	1
211	96/0328-2/98	SCREW, shc	4
212	01/2990/97	HOUSING, lead screw	1
213	130858	SCREW, bhsc	2
214	96/0209/99	RING, ret, ext	1
215	84/0129/11	BALL	1
216	01/2993/25	NUT, lead screw, drive	1

Ref.	Part	Description	Qty.
217	01/2994-1/25	SCREW, lead screw, drive, 1093	1
219	01/2991-1/97	COUPLER, lead screw, pd44	1
220	128410	SCREW, shc	2
221	01/2992/97	RETAINER, bearing, lead screw, pd3	1
222	01/2890/97	PLATE, mtg, stpr, pd44	1
223	96/0187/98	SCREW, shc	4
224	01/2993-S/89	SPACER, drive nut	1
225	A2010208	SPACER, 1093, drive	4
226	01/2995-1/11	GUARD, side, 1093	2
227	GC0612	SCREW, 8-32 x 1/4 bhcs	4
228	96/0328-3/98	SCREW, shc, sdr	4
229	GC2188	SCREW, shc	4
230	017480	ADHESIVE	1

Needle Adapter Assembly (A2010029)



Ref.	Part	Description	Qty.
301	A2000166	BLOCK, 1092, inlet, ss	1
302	A2000290	GASKET, 1092	1
303	A2000205	BLOCK, 1092	1
304	B4000016	SCREW, shc, ss	2
305	J1000002	PIN, roll, ss	2
306	B4000010	SCREW, sch, ss, 316	4
307	94/0300-1/98A	FITTING, elbow	1
308	E4000016	ADAPTER	1
309	95/0904/00	O-RING, fkm	1

Rebuild

Before proceeding, remove material feed line and pump material out of the valve. Shut power off from control panel and disconnect main power. Disconnect the motor wire harness from the system. Loosen the home and spool sensor set screws. Note the position of the sensors and slide them out of the valve. Disconnect the air lines.

Disassembly

To reduce the risk of electric shock, turn off and disconnect power at main switch before disconnecting any cables and before servicing or installing equipment.

Disconnect electrical power before servicing the motor and motor coupling assembly. See the illustrations shown on page 21.

See the illustration on page 19 and the assembly drawing in the back of this manual for your exact model.

Disassembly of 1093 Valve Section

1. Remove the mounting screws to remove the valve from the support.
2. Remove the motor from the mounting plate (222), then loosen and remove the socket head cap screws (229).
3. On the right side of the valve, remove the valve end cap (109). The valve piston spool (112) will be inside the end cap.

NOTE: If necessary, apply low air pressure through the valve air inlet to push the valve piston spool (112) out of the valve end cap (109).

4. Remove the seal plate (123).
5. Repeat steps 3 and 4 with the left side of the valve.
6. Push the spool/sleeve (116) out with a finger. If it does not slide out, tap it gently using a wood or plastic dowel.

NOTE: A worn spool and sleeve assembly must be replaced with a new (matched) assembly. If you are rebuilding multiple valves, be sure to keep the spools and sleeves matched.

7. Remove the needle block (303) from the inlet block (301).
8. Remove the inlet block (301) from the valve body (107).
9. Remove the o-rings (119) from the valve body (107).
10. Remove the spool wet seal retainers (114) on the left and right of the valve body (107).
11. Remove the valve body (107) from the oil cup retainer (124) by removing the screws (126).
12. Remove the rod sleeve (106) from the valve body (107).
13. Remove the seal cup (103) from the oil cup retainer (124). Remove the Posipak rod seal (104) from the seal cup (103).
14. Slide the guide rods out of the connection block (207).
15. Remove the metering rod (102) from the connection block (207).

NOTE: Only perform the steps below if the motor coupling section needs rebuilt.

Disassembly of Motor Coupling Section

NOTE: Disconnect electrical power before servicing the motor and motor coupling assembly.

See the illustration on page 13 for your exact model.

16. Remove the screws (208) to disconnect the connection block (207) from the lead screw connector block (209).
17. Remove the lead screw connector block (209) from the lead screw by removing the FHSC screw (210).
18. Remove the mounting plate (222) from the drive assembly by removing the SHC screws (223).
19. Remove the retaining sleeve (221) from the drive assembly by removing the screws (213).
20. Remove the lead screw (217) and lead screw nut (216) with the ball bearing assembly (215) and e-ring (214) attached.

Assembly

Before proceeding, remove any old o-rings or seals from the valve and discard. Clean the valve parts with an appropriate solvent and replace the o-rings and seals with new parts from the seal kit (130). Use Krytox 203GPL (part number 84/0200-K3/11) for lubricating the valve parts, including the seals and o-rings.

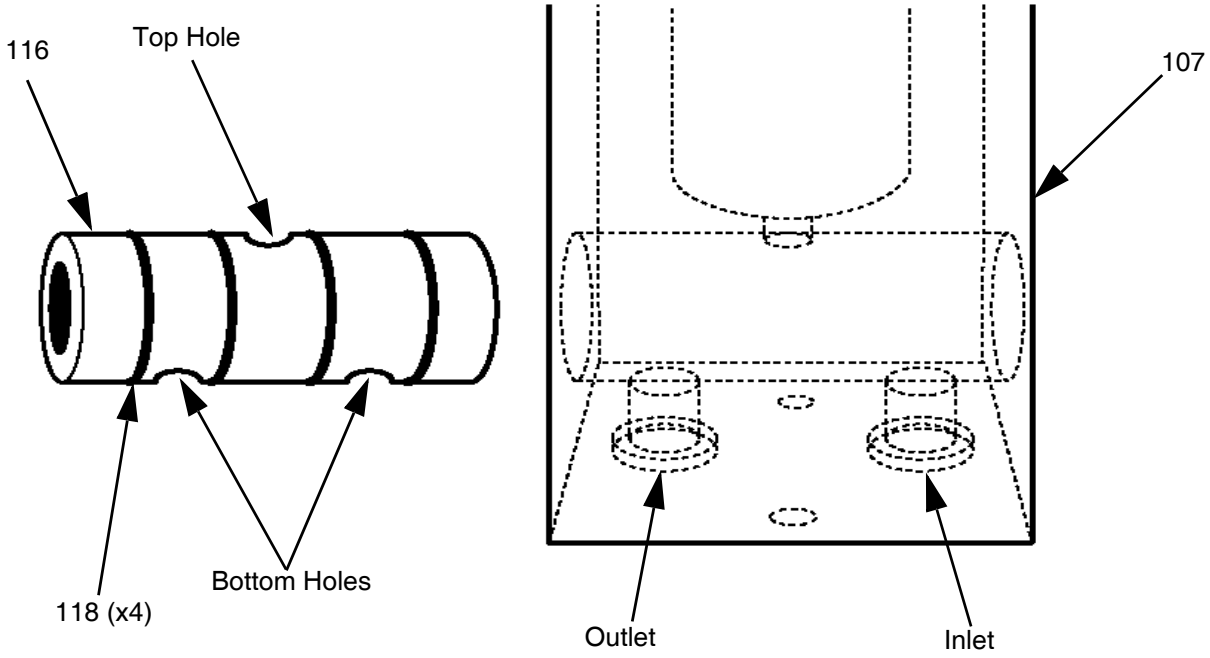
Assembly of 1093 Valve Section

NOTE: Check the metering rod (102), rod sleeve (106), spool/sleeve assembly (116) and main body (107) for wear. If any of these parts are worn, secure replacements before proceeding.

NOTE: Use caution when installing a new u-cup and Posipak seals so they are not pinched or torn. To do this, make sure the seals are lubricated and the lips of the seal are tucked inward before uniformly pushing them into position.

1. Install four lubricated o-rings (118) onto the spool/sleeve assembly (116). Lubricate the spool rod and the outside of the spool rod sleeve along with the inside of the main body (107).

2. Carefully insert the spool/sleeve assembly (116) into the valve body (107), rocking it to ease it into place. Be sure to align the bottom holes of the sleeve piece of the spool/sleeve (116) with the outlet and inlet holes of the valve body (107).



Install the Spool Wet Seal Retainer on the Main Body

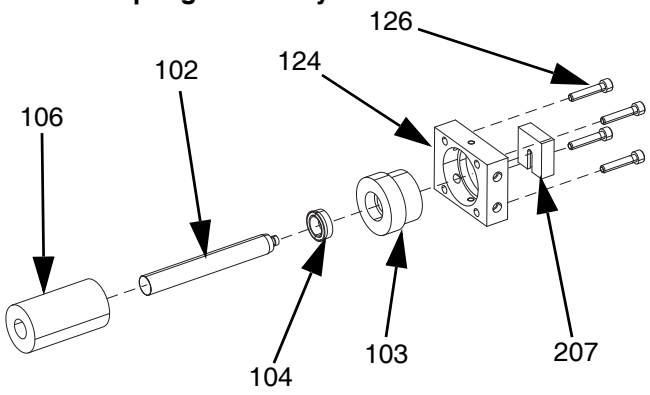
3. Install a lubricated o-ring (120) on the side of the retainer (114).

4. Install two lubricated Posipak seals (121,122) wet seal retainer (114) so the o-ring side of both Posipaks are facing the valve body (107). Be sure to tuck the lip of the Posipak into its cavity to avoid tearing it.

5. Position the wet seal retainer upwards with the oil cup and slide it over the spool part of the spool/sleeve assembly (116), with the counterbore for the wet seal retainer (114) facing out. Slide the wet seal retainer (114) over the spool and install two screws (129) using adhesive (149) and torque to 27 in-lbs. Install the rod sleeve and connect the motor and motor coupling assembly.

6. Repeat steps 3, 4 and 5 for the right side seal plates.

Install the Rod Sleeve and Connect the Motor & Motor Coupling Assembly



7. Lubricate the dispense sleeve bore in the valve body (107). Insert the rod sleeve (106) into the main body (107).

8. Place the lubricated o-ring (105) over the rod sleeve (106) and against the main body (107).

9. With the o-ring slide facing down, carefully slide a lubricated Posipak seal (104) into the lubricated seal cup (103).

10. From the head end, insert the assembled Posipak seal (104) and seal cup (103) onto the lubricated metering rod (102) and about an inch over the guide angle.

11. Insert the oil cup retainer (124) over the assembled seal cup (103), Posipak seal (104) and metering rod (102).

12. Place the drive assembly (101), lead screw (217) and assembled unit in the retract position.

13. Insert the guide rods (206) through the lead screw connection block (209) and into the oil cup retainer (124).

14. Pull the metering rod (102) away from the assembled unit and slide it into the key slot in the metering rod connection block (207).

15. Guide the metering rod (102) and assembled unit into the rod sleeve (106).

16. Carefully place the seal cup (103), Posipak seal (104) and oil cup retainer (124) down against the main body and secure with screws (126).

NOTE: If the motor and motor coupling assembly (219) was disassembled, follow the reassembly instructions below before proceeding.

17. Position the motor and motor coupling assembly (219) above the main body assembly (107) and bring them together so the guide rods (206) enter their holes in the drive assembly (101) and the end of the lead screw (217) seats in the connection block (209).

18. Install the screws (210) into the connection block (209) using adhesive (230) and torque to 27 in-lbs.

19. Install screws (208) through the lead screw connector block (209) into the connection block (207) using adhesive (230) and torque to 16 in-lbs.

20. Install the 3-slot back tie plate (204) and secure it with screws (228). Install the clear plastic guards (226, not shown) so the access hole in the guard is facing the valve outlet end. Install the front tie plate (203) and secure it with screws (228).

Mount the Valve End Caps to the Seal Plate Cups

21. Install a lubricated u-cup seal (111) into the groove on the spool shift piston (112). The piston is thicker on one side of the groove. The lip of the seal must be facing the thicker section.

22. Lubricate the bore in the end cap (109). Slide the spool shift piston (112) into the left end cap (109) and carefully tuck the lip of the u-cup seal (111) into the end cap (109). The lip should be facing the end cap (109) using adhesive (149) and torque to 27 in-lbs.

23. Install the piston/end cap onto the left spool wet retainer (114) using four screws (108). Tighten the

screws in a cross pattern gradually to prevent binding due to misalignment.

24. Push the spool rod (116) into the valve body (107) until it contacts the piston.

25. Install the lubricated o-rings (119) to the main body (107) and attach the inlet block (301) with screws (304).

26. Lubricate the gasket (302) and attach it to the inlet block (301).

27. Install the needle block (303) with screws (306). Remount the valve.

28. Install the upper/home/lower sensors (125).

29. Install the shift spool position dispense/reload sensors (125) with the screw (127) using adhesive (149).

30. Install the air supply lines and connect the power.

31. Perform the Dry Run, Loading & Priming and Output Verification procedures seen on page 15.

Motor & Motor Coupling Assembly

NOTE: Disconnect electrical power before servicing the motor and motor coupling assembly.

1. Assemble the motor coupler by inserting the roll pins and screws (220). See the **Motor and Motor Coupling** illustration on page 21 for more information.

2. Assemble the lead screw nut (216) with the bearing (215) and e-ring (214).

3. Thread the lead screw (217) into the lead screw nut assembly (216) until the lead screw is flush with the top of the nut.

4. Slide the lead screw and nut assembly into the housing (212).

5. Slide the bearing retaining sleeve (221) on to the lead screw assembly. Take care to line up the slots in the two pieces (212, 221). Secure the pieces in place with the socket head cap screws (213).

6. Secure the motor mounting plate (222) to the housing (212) using the socket head cap screws (223).

7. Place the motor coupler (219) on the motor shaft and lightly snug the screws (220), leaving about ½" of motor shaft visible between the motor coupler and motor. Insert the motor coupler (219) through the motor mounting plate (222). Align the three roll pins (see the illustration on page 21) and insert them into the lead screw nut (216). Gently seat the motor.

8. Remove the motor and motor coupler. Tighten the screws (220) to 10 in-lbs and reassemble. Secure the motor to the motor mounting plate using the socket head cap screws (229).

Model 1093 Recommended Spare Parts

NOTE: These parts are routine supply items or wear parts not covered by warranty for normal wear.

Quantity	Description	Part Number
1	SEAL KIT, 1093	*see assembly drawing for part number*
1	DISPENSE SLEEVE	*see assembly drawing for part number*
1	METERING ROD	*see assembly drawing for part number*
1	SPOOL/SLEEVE ASSEMBLY	*see assembly drawing for part number*
1	LEAD SCREW	*see assembly drawing for part number*
1	BEARING (LEAD SCREW)	*see assembly drawing for part number*
1	E-RING (LEAD SCREW)	*see assembly drawing for part number*
**	KRYTOX 203GPL ASSEMBLY LUBRICANT	84/0200-K3/11
#10-32 Hub Replacement Needles for Single Needle Block Models **Needle Length is .75" from mounting face to needle tip. Custom lengths available.**		
Quantity	**Description**	**Needle Part Number**
**	NEEDLE, 12 GUAGE x .75", Pack of 4	A9010017-4
**	NEEDLE, 14 GUAGE x .75", Pack of 4	A9010019-4
**	NEEDLE, 16 GUAGE x .75", Pack of 4	A9010010-4
**	NEEDLE, 17 GUAGE x .75", Pack of 4	A9010011-4
**	NEEDLE, 18 GUAGE x .75", Pack of 4	A9010012-4
**	NEEDLE, 19 GUAGE x .75", Pack of 4	A9010013-4
**	NEEDLE, 20 GUAGE x .75", Pack of 4	A9010014-4
**	NEEDLE, 22 GUAGE x .75", Pack of 4	A9010020-4
Luer Lock Hub Replacement Needles for Single Needle Block Models **Needle length shown is length projecting from LL hub. Other lengths available.**		
	Description	**Needle Part Number**
**	Needle Sampler Package, 10 each of 14, 16, 18, 20 and 22 gauge ½" long needles	E4000025-50
**	Needle,LL,14 ga.x ½", Dark Green, Pack of 50 *	E4000001-50
**	Needle,LL,14 ga.x 1", Dark Green, Pack of 50	E4000014-50
**	Needle,LL,15 ga.x ½", Orange, Pack of 50	E4000004-50
**	Needle,LL,16 ga.x ½", Purple, Pack of 50 *	E4000088-50
**	Needle,LL,16 ga.x 1", Purple, Pack of 50 *	E4000005-50
**	Needle,LL,18 ga.x ½", Pin, Pack of 50 *	E4000006-50
**	Needle,LL,19 ga.x ½", Brown, Pack of 50	E4000008-50
**	Needle,LL,20 ga.x ½", Yellow, Pack of 50 *	E4000009-50
**	Needle,LL,22 ga.x ½", Black, Pack of 50 *	E4000011-50
**	Needle,LL,23 ga.x ½", Light Blue, Pack of 50	E4000024-50

** Needled are included in Needle Sampler Package.*

*** The quantity or needle size may vary for your application.*

General Guidelines for O-Rings and U-Cup Seals

Sizes and materials of construction for o-rings and u-cup seals are selected by Graco based on compatibility with the chemicals to which they will be exposed. Solvents that may remove residual chemicals often have negative effects on the mechanical properties of o-rings and seals.

O-Ring Guidelines

- Always replace o-rings with new o-rings identical in size, durometer hardness, type and material of construction. Always be alert to the location and size of each o-ring and be careful not to mix them. Similar sizes may be used in various locations on the equipment, and if replaced incorrectly, the equipment may not function properly. See your Machine Operation and Service Manual for the correct part number of all o-rings used throughout the equipment. Replace o-rings with factory approved parts only.

- Re-use of o-rings is not recommended. Only re-use o-rings as a last resort. If you must re-use them, be sure that they are clean, have no cuts or flat spots and contain NO foreign material. Also, be sure not to soak them in solvent for extended periods as this can cause deterioration of the o-ring. Always replace o-rings that are cut, nicked, or distorted in shape or cross-section.

- Always apply a very thin film of Krytox 203GPL lubricant (84/0200-K3/11) to the entire surface of the o-ring before installation. Avoid excessive lubrication. If installing o-rings over threads on a shaft or across sharp edges, roll or push the o-ring carefully into place, being careful to avoid cutting or nicking it.

- Avoid stretching the o-ring too much as it may not return to the proper size.

- Do not use any sharp tools or objects to install o-rings.

U-Cup Seal Guidelines

- Always replace u-cup seals with new u-cup seals identical in size, durometer hardness, type and material of construction. Always be alert to the location and size of each u-cup seal and be careful not to mix them. Similar sizes may be used in various locations on the equipment, and if replaced incorrectly, the equipment may not function properly. See your Machine Operation and Service Manual for the correct part number of all u-cups used throughout the equipment. Replace u-cups with factory approved parts only.

- Always apply a very thin film of Krytox 203GPL lubricant (84/0200-K3/11) to the inner and outer lips of the seal before installation.

- Re-use of u-cup seals is not recommended. Only re-use u-cups as a last resort. If you must re-use them, be sure that they are clean, have no cuts or flat spots and contain NO foreign material. Also, be sure not to soak them in solvent for extended periods as this can cause deterioration of the seal. Always replace u-cups that are cut, have flat spots, are distorted in shape or are damaged in any manner.

- Always be alert to the proper orientation of the sealing lips and re-install them in the same direction as shown on the specific equipment assembly drawing. The u-cup seals are intended to seal in only one direction, and if installed incorrectly, chemical leakage through the u-cup can occur.

- Whenever possible, push the back side of the seal over the shaft to protect the inner and outer lips. If this is not possible, carefully tuck the lip in to avoid rolling it back or cutting it.

- If installing over sharp edges, slide the seal carefully into place to avoid cutting it.

- Do not use any sharp tools or objects to install u-cups.

Technical Data

NOTE: See your feed system manuals for dimensions, weights, and wetted parts lists for components. Dimensions, weights, and wetted parts for combined assemblies and components not covered in your component feed system manuals assemblies are listed below.

Maximum Ambient Temperature	110°F (43°C)
Maximum Operating Temp	150°F (65°C)
Maximum Outlet Fluid Working Pressure	2000 psi (14 MPa, 138 bar)
Maximum Air Working Pressure	100 psi (0.7 MPa, 7 bar)
Minimum Air Working Pressure	70 psi (480 kPa, 4.8 bar)
Maximum Material Inlet Pressure	Metal Sleeves: 1200 psi (8 MPa, 83 bar) Plastic Sleeves: 400 psi (2.8 MPa, 28 bar)
Supplied Air Requirements	1 to 3 cfm at 80 psi to 100 psi
Shot Size Range (depending on metering rods selected)	0.193 cc to 14.479 cc
Maximum Cycle Rate (application dependent, heat required)	Up to 15 cycles per minute (with standard Graco motor)
Dimensions (H x L x W), height to end of material inlet block (less needles)	*2 in.:* 14.35 x 8.375 x 1.75 in. (364 x 212 x 44 mm) *Graco-supplied Feed System Assemblies (depends on selected options):* *Smallest:* 22.5 x 10 x 4 in. (572 x 254 x 102 mm) *Largest:* 60 x 28 x 19 in. (1524 x 711 x 483 mm)
Weight	*Metering Valve:* 7 - 9 lb (3.17 - 4.08 kg) *with Standard Graco motor:* 10-12 lb (4.55 - 5.44 kg)
Wetted Parts	*Metering Valve:* Hardened steel, 303/304, 404, UHMWPE, Tungsten, carbide, fluoroelastomer, EPDM, PTFE *Graco-supplied Feed System Hoses and Fittings:* Mild steel, 303/304, PTFE, buna, polyethylene, polypropylene *Graco-supplied Tanks:* Polyethylene, 303/304, mild steel

Motor Specifications

Any motor used with the motor driven model must meet the following specifications.

Frame: NEMA 23

Torque at Typical Dispense Speed: 180 oz-in. (11.25 in-lb) at 10 revolutions per second (1/2 in. rod travel per second) or less. Above 10 revolutions per second, the power declines.

Torque at Maximum Speed: 117 oz-in (7.3 in-lb) at 20 revolutions per second (1 in. of rod travel per second).

Motor Face Pilot Boss: 1.5 in. diameter by 0.0625 in. projection from motor face flange.

Shaft Size: 0.25 diameter by 0.75 in. projection from motor face pilot boss to end of shaft.

California Proposition 65

CALIFORNIA RESIDENTS

⚠ **WARNING:** Cancer and reproductive harm – www.P65warnings.ca.gov.

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 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 Information

Sealant and Adhesive Dispensing Equipment

For the latest information about Graco products, visit www.graco.com.
For patent information, see www.graco.com/patents.
TO PLACE AN ORDER, contact your Graco distributor, go to www.graco.com, or call to identify the nearest distributor.

If calling from the USA: 1-800-746-1334

If calling from outside the USA: 0-1-330-966-3000

All written and visual data contained in this document reflects the latest product information available at the time of publication.
Graco reserves the right to make changes at any time without notice.

Original instructions. This manual contains English. MM 313566
Graco Headquarters: Minneapolis
International Offices: Belgium, China, Japan, Korea

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