

INSTRUCTIONS-PARTS LIST



307-939

Rev. C
Supersedes B

This manual contains IMPORTANT
WARNINGS AND INSTRUCTIONS
READ AND RETAIN FOR REFERENCE

CT-4000TM CENTRIFUGAL ATOMIZER

For use with 100 KV Non-Resistive, 100 KV Low Voltage,
or 135 KV Resistive Electrostatic Power Supplies

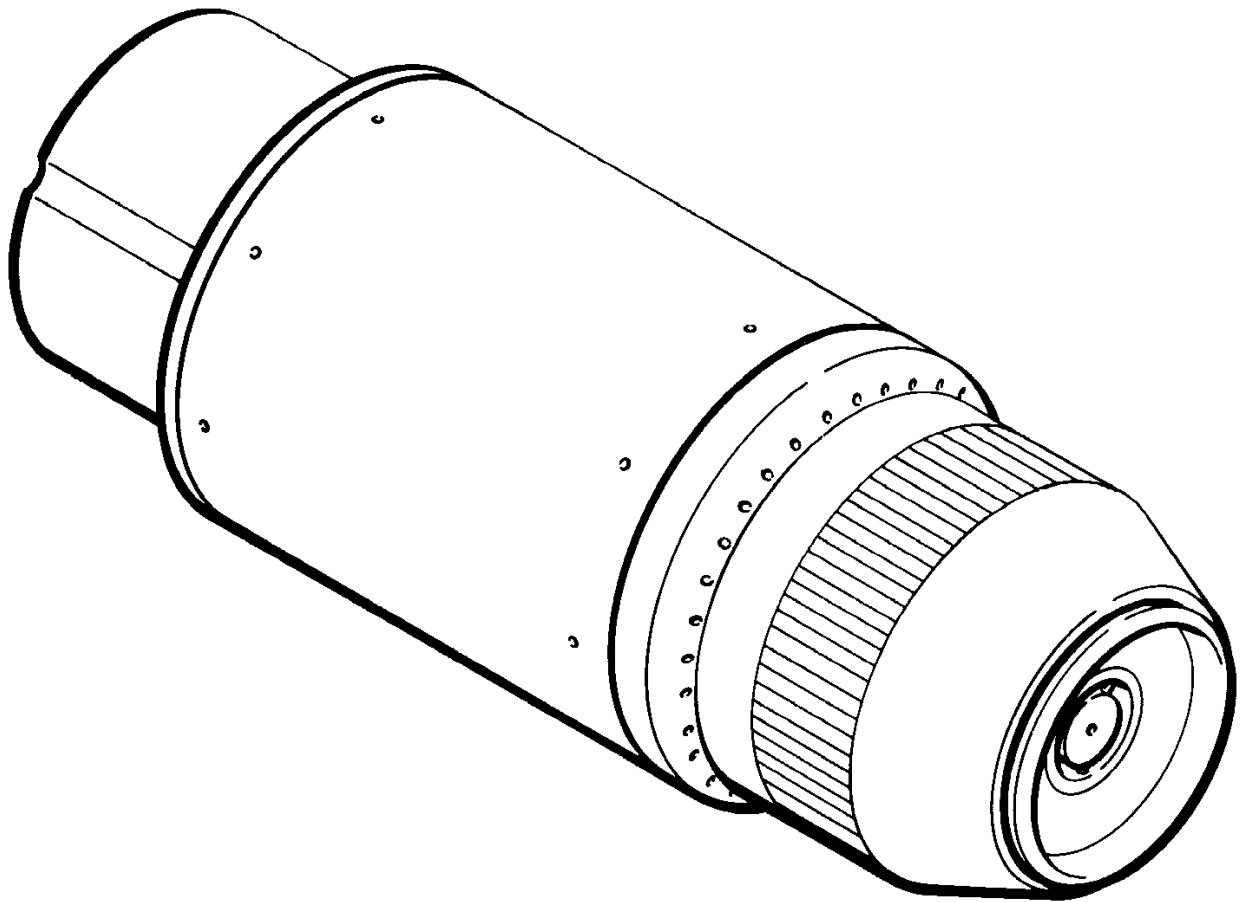
100 psi (7 bar) MAXIMUM WORKING AIR PRESSURE

100 psi (7 bar) MAXIMUM WORKING FLUID PRESSURE

Part No. 222-634

Includes centrifugal atomizer and manifold assembly

PATENT PENDING



Cup not included with atomizer.

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TERMS

- WARNING** Alerts user to avoid or correct conditions that could cause bodily harm.
- CAUTION** Alerts user to avoid or correct conditions that could cause damage to or destruction of equipment.
- NOTE** Identifies essential procedures or helpful information.

SAFETY WARNINGS

SERIOUS BODILY INJURY, EXPLOSION, FIRE, OR ELECTRIC SHOCK CAN OCCUR IF THE PRECAUTIONS BELOW ARE NOT FOLLOWED.

INSTALLATION OF THIS PRODUCT AND ANY ASSOCIATED EQUIPMENT MUST BE IN ACCORDANCE WITH REQUIREMENTS OF NFPA-33 STANDARD SPRAY, APPLICATION USING FLAMMABLE AND COMBUSTIBLE MATERIALS, 1985 (OR MORE CURRENT ISSUE). THIS STANDARD IS ALSO EXCERPTED AS ARTICLE 516 OF THE NATIONAL ELECTRICAL CODE, 1987 (OR MORE CURRENT ISSUE).

READ AND UNDERSTAND ALL INSTRUCTION MANUALS, TAGS, AND WARNING LABELS BEFORE OPERATING EQUIPMENT.

ELECTROSTATIC EQUIPMENT MUST ONLY BE USED BY TRAINED, QUALIFIED PERSONNEL WHO ARE FULLY CONVERSANT WITH THE REQUIREMENTS STATED WITHIN THIS INSTRUCTION MANUAL.

EQUIPMENT MISUSE HAZARD

General Safety

Any misuse of the spray equipment or accessories, such as overpressurizing, modifying parts, using incompatible chemicals and fluids, or using worn or damaged parts, can cause them to rupture and result in serious bodily injury, fire, explosion or property damage.

NEVER try to stop or deflect leaks with your hand or body.

NEVER alter or modify any part of this equipment; doing so could cause it to malfunction.

CHECK all spray equipment regularly and repair or replace worn or damaged parts immediately.

NEVER enter a high voltage or hazardous area until after all high voltage equipment has been discharged. A *safety fence air line interlock* **must** be installed to shut off the high voltage anytime the gate is opened.

All personnel involved in any way with paint spray processes must be specifically trained in accordance with the requirements of Chapter 15 of the standard NFPA-33, 1985 (or more current issue).

System Pressure

This atomizer has a **MAXIMUM WORKING AIR PRESSURE** of 100 psi (7 bar) and a **MAXIMUM WORKING FLUID PRESSURE** of 100 psi (7 bar). Never exceed the maximum air or fluid working pressure of the atomizer or any other component or accessory used in the system.

Fluid Compatibility

BE SURE all fluids and solvents used are chemically compatible with the "Wetted Parts" shown in the **TECHNICAL DATA** on page 32. Always read the fluid and solvent manufacturer's literature before using the fluid or solvent in this atomizer.

Hazard of Using Fluids Containing Halogenated Hydrocarbons

Never use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents in this equipment. Such use could result in a serious chemical reaction, with the possibility of explosion, which could cause death, serious bodily injury and/or substantial property damage.

Pressure Relief Procedure

To reduce the risk of serious bodily injury, including splashing in the eyes or on the skin, injury from moving parts or electric shock, always follow this procedure when shutting off the system, when checking or servicing any part of the spray system, when installing, cleaning or changing fluid nozzles or cups, and whenever you stop spraying.

1. **TURN OFF THE POWER SUPPLY and ground the high voltage system and all charged equipment.** Make sure all equipment in the high voltage/hazardous area has been grounded before entering the area.
2. Shut down the paint pump.
3. Actuate the atomizer to relieve fluid pressure.
4. Open the pump drain valve, having a waste container ready to catch the drainage.
5. Leave the pump drain valve open until you are ready to spray again.

HAZARDOUS FLUID HAZARD

Improper handling of hazardous fluids or inhaling vapors can cause extremely serious bodily injury, even death, due to splashing in the eyes, ingestion, inhalation, or bodily contamination. Know what fluid you are handling and spraying and its specific hazards. Store hazardous fluids in approved containers. Dispose of any waste fluid according to all Local, State and Federal regulations pertaining to the disposal of hazardous wastes. Observe all precautions when handling known or potentially hazardous fluids, including, but not limited to, the following.

1. Always wear appropriate, protective clothing and equipment, such as eye protection, respiratory protection, and gloves.
2. Provide for the safe piping and disposal of all exhaust air.
3. Provide proper ventilation in accordance with accepted industry standards and governmental regulations. Refer to **Ventilate the Spray Booth**, on page 8.

Warnings continued on page 4.

FIRE AND EXPLOSION HAZARD

To reduce the risk of fire, explosion, or electric shock, which may result from electrical discharge, it is essential that:

- All parts of the electrostatic system are properly grounded.
- All personnel in or close to the spray area are properly grounded.
- All electrically conductive objects or devices in the spray area, including paint containers, wash cans and tools, are properly grounded.

When operating the electrostatic device, any ungrounded objects in the spray area (such as people, containers, tools, etc.) can become electrically charged. Arcing may occur if these objects then come in contact or close to ground. Arcing of sufficient energy levels can ignite the fluid being sprayed, fumes from solvents, dust particles, and other flammable substances. This can cause a fire or explosion and result in serious bodily injury and property damage.

Static electricity can also be generated by the flow of fluid through the pump, hose, gun, and nozzle, but it is dissipated through proper grounding as described in **Grounding** below.

If you experience any arcing or feel even a slight shock, **STOP SPRAYING IMMEDIATELY**. Check for proper grounding of the entire system. Be sure you have corrected the problem before starting to spray again.

Minimum Spraying Distance

To reduce the risk of arcing, which could cause fire or explosion and result in serious bodily injury and property damage, **be sure** to maintain a **minimum** spraying distance of 10 in. (254 mm) between the atomizer cup and the workpiece or any other grounded object.

Grounding

The following are minimum requirements for grounding a basic electrostatic system. Your system may include other equipment or objects which must also be grounded. Always check your local electrical code for detailed grounding instructions. Be sure your system is connected to a true earth ground.

1. *Pump*: ground by using a ground wire and clamp as described in your separate pump instruction manual.
2. *Air compressors*: ground according to the manufacturer's recommendations.
3. *Power supplies*: must be properly grounded and located outside the spray area and Class I area, per NFPA-33. Ground according to the manufacturer's recommendations.
4. *Power supply cable*: obtain grounding through connection of an undamaged cable to a properly grounded power supply.
5. *All electric cables* going to the power supply must be properly grounded.
6. *Atomizer*: obtain grounding through connection to properly grounded power supply cable.
7. *Object being sprayed*: keep the workpiece hangers clean and grounded at all times. Contact points must be sharp points or knife edges.
8. *All electrically conductive objects or devices* in the spray area, including paint containers and wash cans, must be properly grounded.
9. *All persons entering the spray area*: shoes must have conductive soles, such as leather, or personal grounding straps must be worn. Rubber or plastic soles are not conductive.
10. *The floor of the spray area* must be electrically conductive and grounded. Do not cover the floor with cardboard or any non-conductive material which would interrupt grounding continuity.
11. *Flammable liquids* in the spray area must be kept in approved, grounded containers. Do not store more than the quantity needed for one shift.
12. *All solvent pails*: use only grounded metal pails, which are conductive. Do not place the pail on any non-conductive surface, such as cardboard or paper, which would interrupt grounding continuity.

Flushing and Cleaning Safety

Be sure the power supply is OFF and the equipment has been properly grounded before flushing or cleaning any part of the spray system.

To reduce the risk of static sparking or splashing, always use the lowest possible pressure to flush.

To flush or purge equipment, ALWAYS use solvents with a flash point equal to or greater than that of the fluid being sprayed.

To clean the exterior of the equipment, ALWAYS use non-polar solvents with a flash point of higher than 100° F (38° C).

To clean the exterior of the atomizer, hand wipe it **ONLY**. NEVER use a high pressure sprayer to clean it.

All paint lines, power supply cables, stand-off insulators, insulating arms, and atomizers must be clean for proper operation and safety of the system. Paint build up on any of these components can cause a fire or explosion and result in serious bodily injury and property damage.

ALWAYS remove all solvent from the system before reactivating the atomizer.

Use only non-sparking tools to clean residue from the booth and hangers.

Ventilate the Spray Booth

To prevent hazardous concentrations of toxic and/or flammable vapors, spray only in a properly ventilated spray booth.

Check and follow all National, State and Local codes regarding air exhaust velocity requirements. Check and follow all local safety and fire codes (NFPA-33 or NEC 516) and OSHA standard 1910-107(b)(5)(i).

The Power Supply must be electrically interlocked with the ventilators to prevent operation of the Power Supply unless ventilating fans are operating.

NEVER operate the atomizer unless the ventilating fans are operating.

Isolate High Voltage Equipment

100 KV High Voltage Cable Clearance

The 100 KV high voltage cables in the spray booth do not have ground shields. Care must be taken to properly insulate these cables from grounded objects. Clearance for non-shielded high voltage cables must be a minimum of 12 in. (305 mm) from any other grounded hose or grounded object.

High Voltage Equipment Isolation

High voltage equipment must be isolated from all personnel. Place fencing, booths, rails, or other barriers around equipment to ensure it is safely isolated. Before allowing personnel to enter the hazardous (spray) area, be sure all high voltage equipment has been grounded. A *safety fence air line interlock or electrical interlock* **must** be installed to shut off the high voltage anytime the gate is opened.

HOSE SAFETY

ALL HOSES MUST HAVE THE PROPER DIELECTRIC STRENGTH. NEVER replace hoses with hose that either reduces the dielectric strength or reduces the thickness of the hose wall (insulation). Paint lines MUST have insulating capability greater than 100,000 volts.

*When using conductive coating materials, **clearances from ground*** for non-shielded paint lines must be a *minimum* of 12 in. (305 mm) from any other hose or grounded object. Use stand-off insulators, insulated bushings, and insulated supports as required to maintain this clearance from ground.

When fluid hoses are installed, all clearances from ground MUST be checked carefully. Carelessness can result in a potential fire hazard. Check all paint hoses for a *minimum* of 12 in. (305 mm) of clearance from ground, other hoses, or any grounded object.

All paint (fluid) hoses MUST terminate at a grounded fitting. DO NOT use any intermediate, electrically-floating fittings in the installation or for temporary repair.

When metallic or semi-conductive paints are placed in the system, a fire hazard can be created by allowing the paint hose to be grounded at an intermediate point. The high voltage can puncture the hose, allowing a solid stream of paint to spray through the puncture. This stream of paint can be ignited by high voltage arcing through the paint stream to the nearest ground. Be sure to read and follow the ground clearance instructions stated previously.

Conductive fluids, such as porcelain enamel; Teflon®; and waterbase paints, require that the pressure tank be mounted on an insulated stand to avoid shorting out the high voltage. The pressure tank MUST clear all grounded items by 18 in. (457 mm).

TIGHTEN all fluid connections securely before each use.

NEVER use a damaged hose. Before each use, check the entire hose for cuts, leaks, abrasion, bulging cover, or damage or movement of the hose couplings. If any of these conditions exist, replace the hose immediately.

HANDLE AND ROUTE HOSES CAREFULLY. Do not pull on hoses to move equipment. Do not use fluids or solvents which are not compatible with the inner tube and cover of the hose.

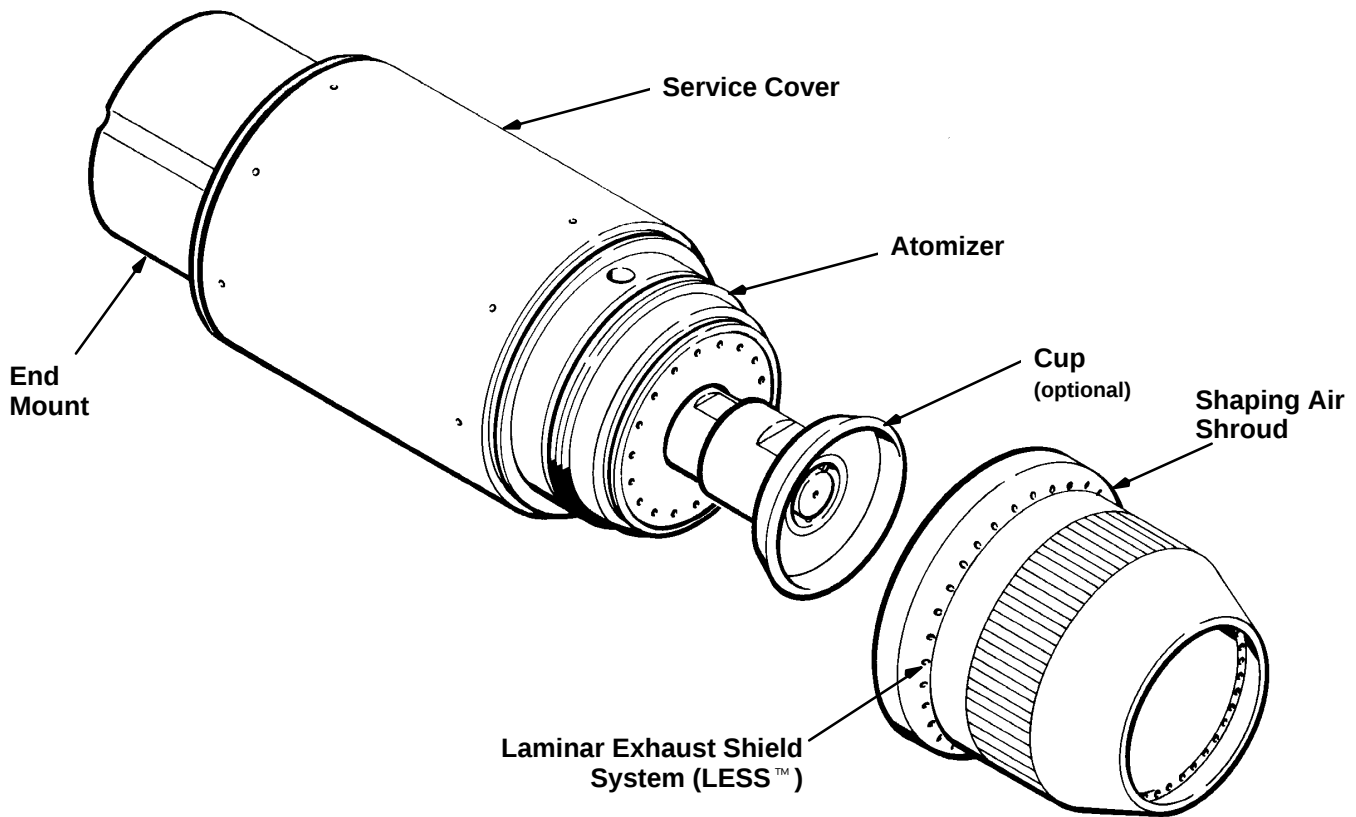
MOVING PARTS HAZARD

The atomizer's cup rotates at very high speeds. To reduce the risk of serious bodily injury, including cuts and loss of fingers, all personnel must stay clear of the cup whenever it is rotating.

Be sure to shut off turbine air to the atomizer (and brake air if used) and **MAKE SURE** the cup is not rotating before cleaning, removing or touching the cup. It takes a couple minutes after the turbine air is shut off for the cup to stop rotating. Check speed monitor to make sure the cup is not turning; **DO NOT** use a visual check alone to determine if the cup is turning.

IMPORTANT

United States Government safety standards have been adopted under the Occupational Safety and Health Act. These standards—particularly the General Standards, Part 1910.107 and any other appropriate regulations—should be consulted in connection with the installation, operation, and maintenance of electrostatic spray painting equipment.



CT-4000 Atomizer Features

The **CT-4000 Cartridge Ball Bearing Atomizer** applies most types of coating materials. Some of its special features include:

- **Center feed cup:** specially designed to provide uniform film across the entire cup, making fast, efficient flushing possible and minimizing paint waste and solvent usage.
- **Shaping air shroud:** specially designed to control the painting patterns.
- **Laminar exhaust shield system (LESS™):** helps keep paint from collecting on the atomizer and assists pattern control.
- **Service cover:** allows fast and easy access to fittings and valves and eases cleaning.

How the CT-4000 Atomizer Operates

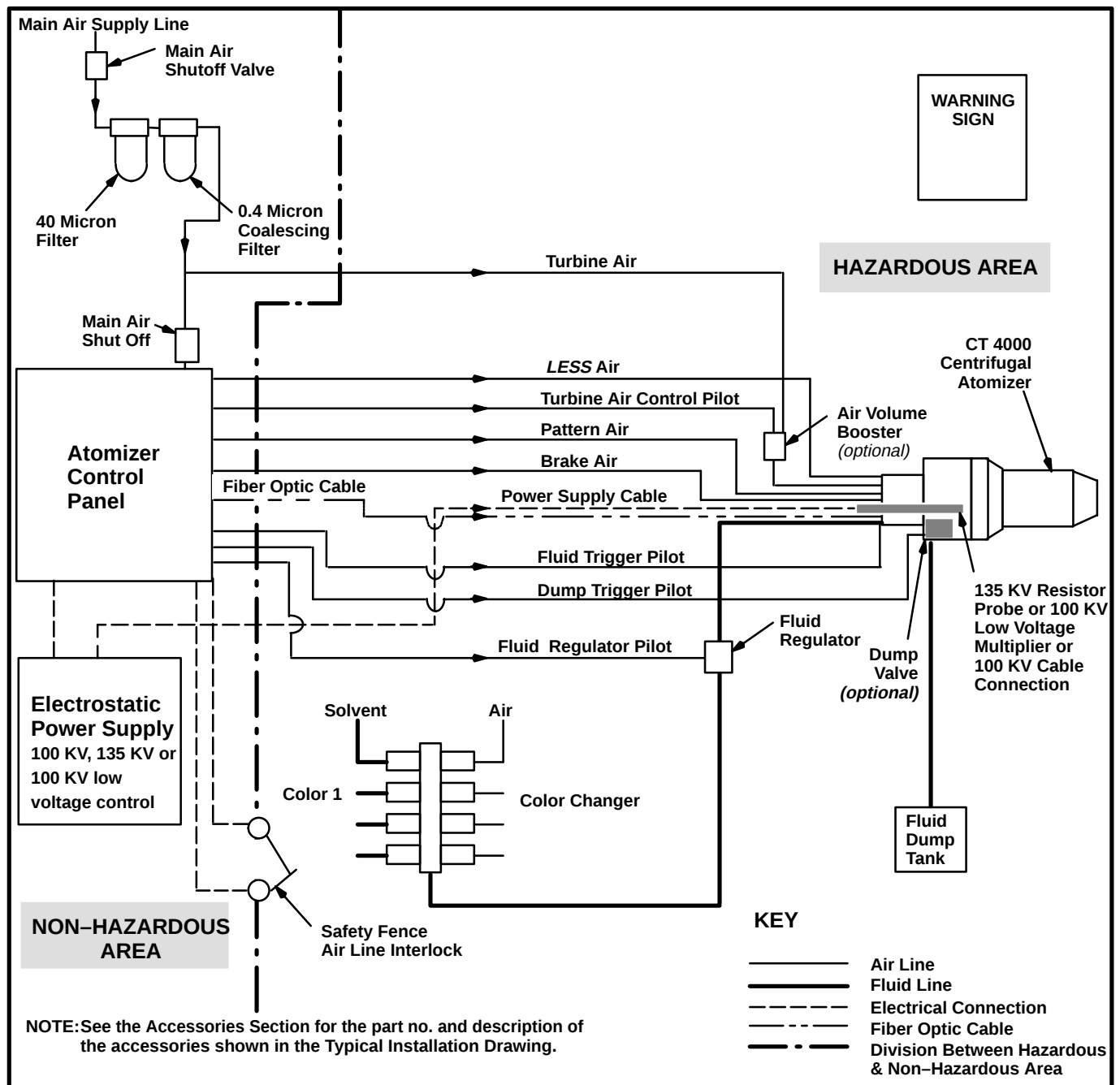
There are five air lines supplying air to the atomizer.

1. **Turbine air line** supplies air to operate the ball bearing turbine, which rotates the cup. The rotation of the cup atomizes the paint.
2. **Pattern air line** supplies air to the shaping air ring to control the size of the spray pattern.
3. **LESS air line** supplies air to maintain clean operation and to assist pattern control.
4. **Brake air line** supplies air to slow down or stop the turbine and cup from turning.
5. **Fluid trigger air line** supplies air to actuate the trigger valve.

Paint is supplied to the atomizer through a **fluid trigger valve**. With the trigger valve open, paint flows through the **nozzle** where it is atomized by the cup.

The **pattern air**, assisted by the **LESS air**, drive the coating toward the workpiece, where the charged coating is attracted by the grounded workpiece.

INSTALLATION



The Installation shown above is only intended as a guide for selecting and installing an electrostatic centrifugal atomizer system. It is not an actual system design. The particular type and size system for your operation must be custom designed for your needs. For assistance in designing a system, contact your Graco representative.

Warning Signs

Mount warning signs in the spray area where they can easily be seen and read by all operators.

WARNING

Installing and servicing this equipment requires access to parts which may cause electric shock or other serious bodily injury if work is not performed properly. **Do not install or service this equipment unless you are trained and qualified.**

Be sure your installation complies with National, State and Local codes for the installation of electrical apparatus in a Class 1, Group D Hazardous Location.

Install the Air Filter

(Refer to Installation Drawing, page 7.)

Install a 40 micron air filter and a 0.4 micron coalescing air filter on the main air supply line. See the Accessories Section.

CAUTION

The air must be properly filtered to ensure a clean, dry air supply to the atomizer. Dirt and moisture can ruin the appearance of your finished workpiece and cause turbine failure. Graco warranty will not cover turbine damage caused by dirty air usage.

Replace the filter elements as often as necessary to maintain a clean, dry air supply.

Ventilate the Spray Booth

WARNING

To prevent hazardous concentrations of toxic and/or flammable vapors, spray only in a properly ventilated spray booth. The power supply must be electrically interlocked with the ventilators to prevent operation of the power supply unless ventilating fans are operating. **NEVER operate the atomizer unless the ventilating fans are operating.**

Check and follow all National, State and Local codes regarding air exhaust velocity requirements. Check and follow all local safety and fire codes and OSHA standard 1910-107(b)(5)(i).

Install the Mounting Assembly

NOTE: The mountings and hardware must be ordered separately. See the Accessories Section.

Atomizers with Mounting Clamp 110-026

Secure the atomizer or extension to the stationary or reciprocating fixture with mounting clamp 110-026. See Fig 1.

Atomizers with an Extension

For a 135 KV or 100 KV Power Supply, use extension 222-145. For a 100 KV Low Voltage Power Supply, use extension 222-458. See Fig 1.

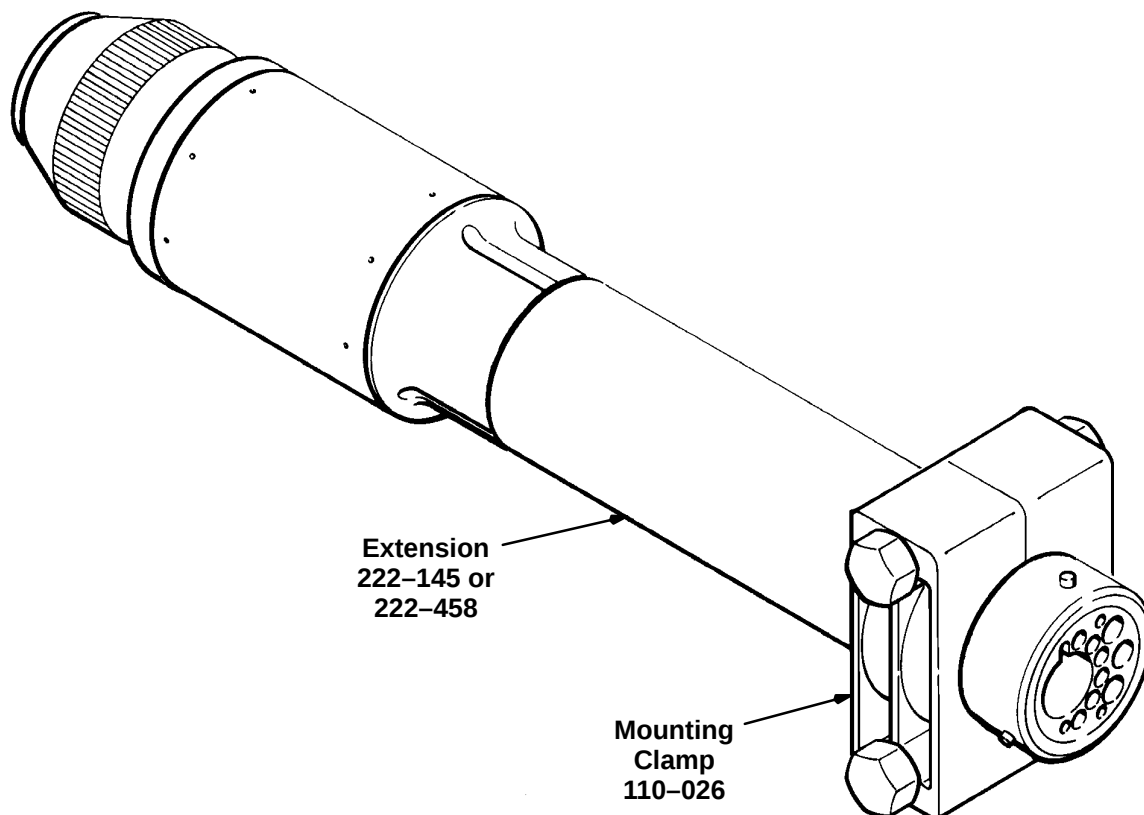


Fig 1

INSTALLATION

Connect the Air Lines

Remove the shaping air shroud (3) and the cover (7).

The ports in the manifold (6) are labeled. See Fig 2. Using polypropylene or nylon tubing, connect the air lines to the corresponding fitting.

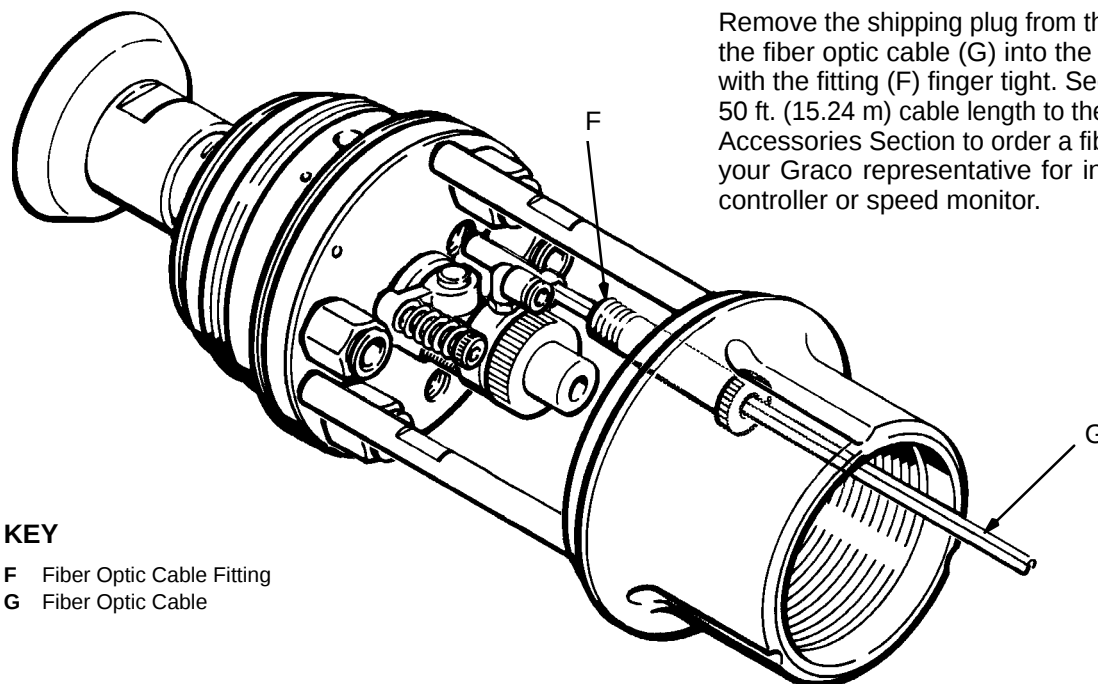
For the best performance, do not exceed 20 ft. (6 m) air line lengths. If longer lines are necessary, install an air line volume booster on the turbine air line, near the atomizer. See the Accessories Section.

Air Line Description	O.D.	Wall
Brake Air Line	3/8 in.	1/16 in.
LESS Air Line	3/8 in.	1/16 in.
Pattern Air Line	3/8 in.	1/16 in.
Turbine Air Line	3/8 in.	1/16 in.
Fluid Trigger Air Line	5/32 in.	1/16 in.
Dump Pilot Air Line	5/32 in.	1/16 in.

Connect the Fluid Lines

Using Teflon tubing, connect the fluid lines to the corresponding fitting. Do not exceed 12 ft. (3.66 m) lengths. See Fig 2.

Fluid Line Description	O.D.	Wall
Fluid Line	1/4 in.	1/16 in.
Fluid Dump Line (optional)	3/8 in.	1/16 in.



KEY

- F Fiber Optic Cable Fitting
- G Fiber Optic Cable

KEY

- D Fluid Trigger Fitting
- E Fluid Inlet Fitting
- 6 Manifold
- 9 Fluid Trigger Valve

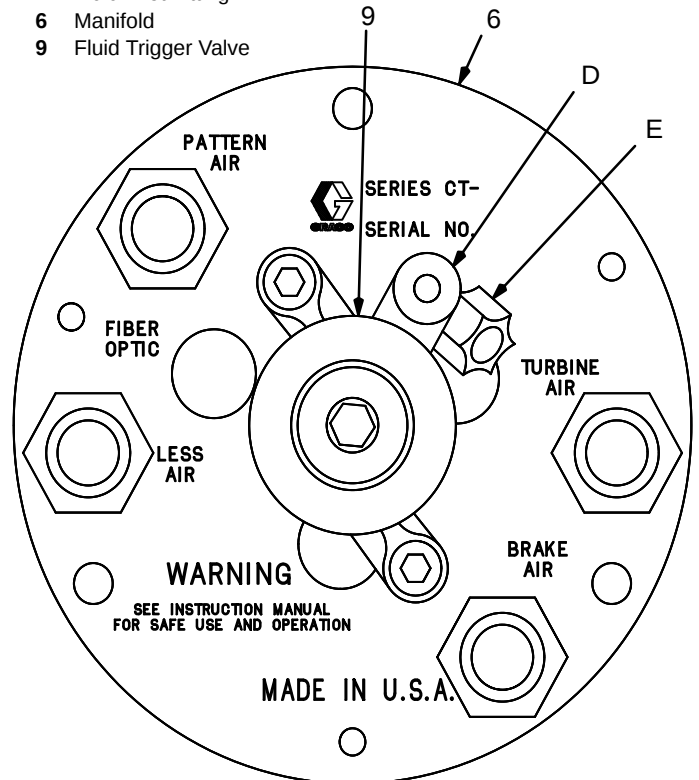


Fig 3

NOTE: Contact Graco for information on selecting and installing fluid lines for conductive and metallic coating materials.

Connect the Fiber Optic Cable

Remove the shipping plug from the fiber optic port. Push the fiber optic cable (G) into the manifold and secure it with the fitting (F) finger tight. See Fig 3. Do not exceed 50 ft. (15.24 m) cable length to the control panel. See the Accessories Section to order a fiber optic cable. Contact your Graco representative for information on a speed controller or speed monitor.

Fig 2

INSTALLATION

Connect the Power Supply Cable

WARNING

To reduce the risk of electric shock or other serious bodily injury, make sure the power supply is turned off before you connect the power supply cable to the atomizer.

The electrical connections to the power supply must be performed by a qualified electrician, in accordance with all applicable local, state, and national codes.

100 KV Power Supply

Be sure the high voltage power supply is OFF. Route the high voltage cable (Z) from the atomizer (S) to the power supply (R). Refer to Fig 4 and Form No. 681-904, 681-908, 681-911, 681-917, and 681-953.

TYPICAL INSTALLATION

NOTE: To order parts, see ACCESSORIES.

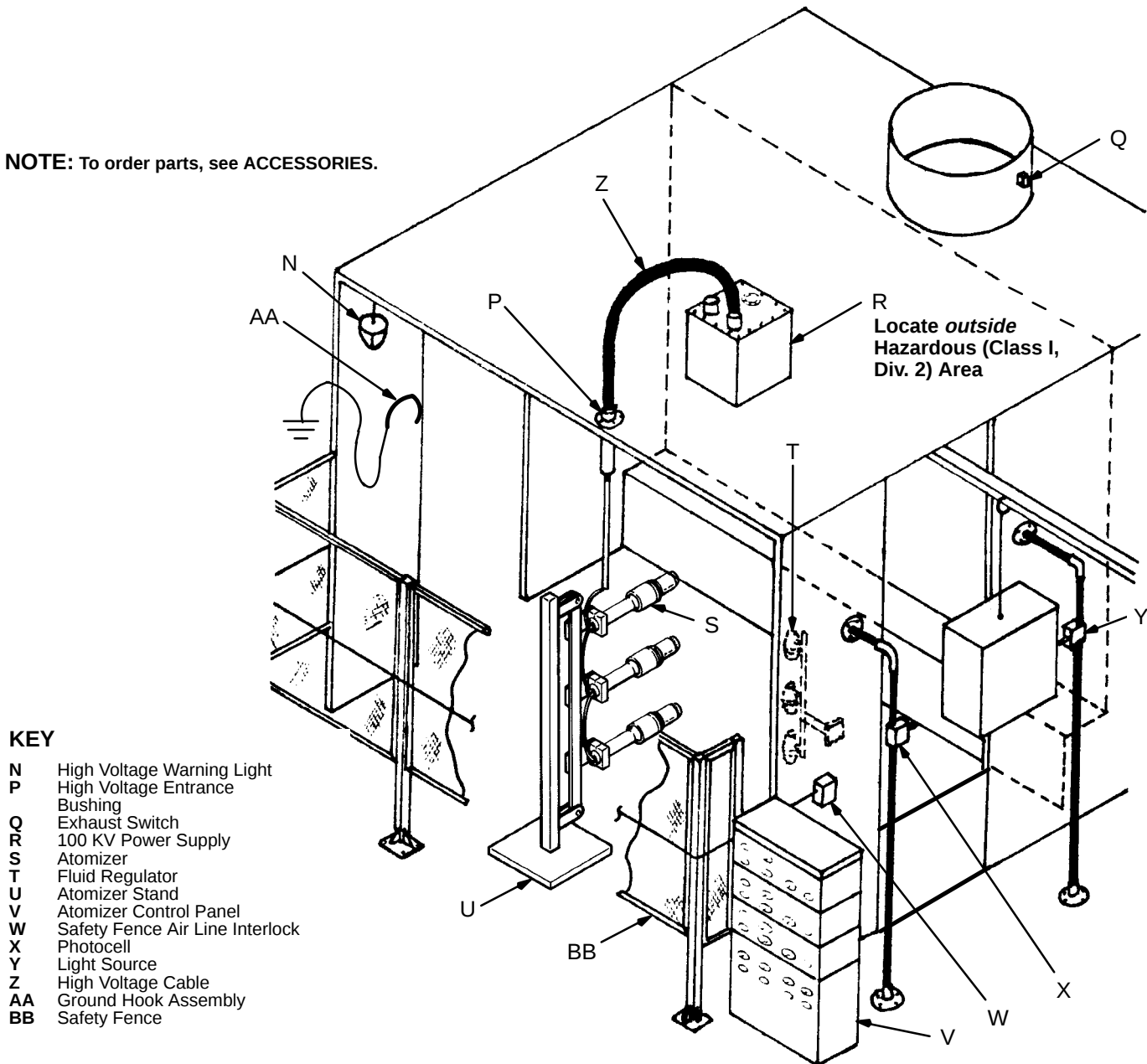


Fig 4 .

Connect the Power Supply Cable (continued)

135 KV Power Supply

Be sure the high voltage power supply is OFF. Connect the high voltage cable (K) to the atomizer's resistor tube. Route the cable from the atomizer to the power supply (M). Connect the cable to the power supply's cable connection (L). See Fig 5.

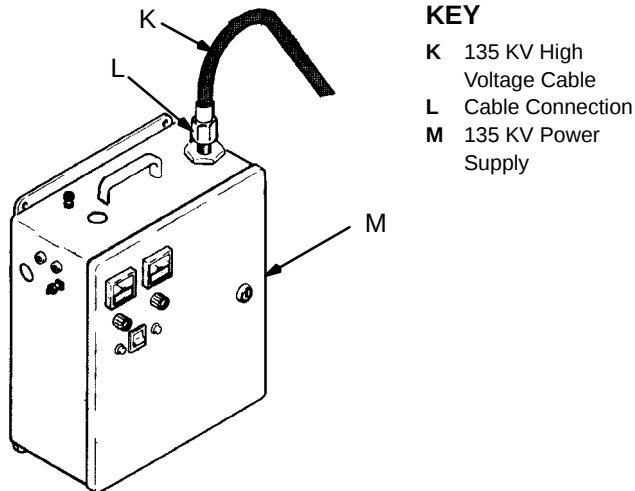


Fig 5

KEY

- K 135 KV High Voltage Cable
- L Cable Connection
- M 135 KV Power Supply

100 KV Low Voltage Power Supply

Be sure the low voltage power supply is OFF. Route the low voltage cable (CC) from the atomizer to the power supply (DD). Connect the plug. Refer to Fig 6.

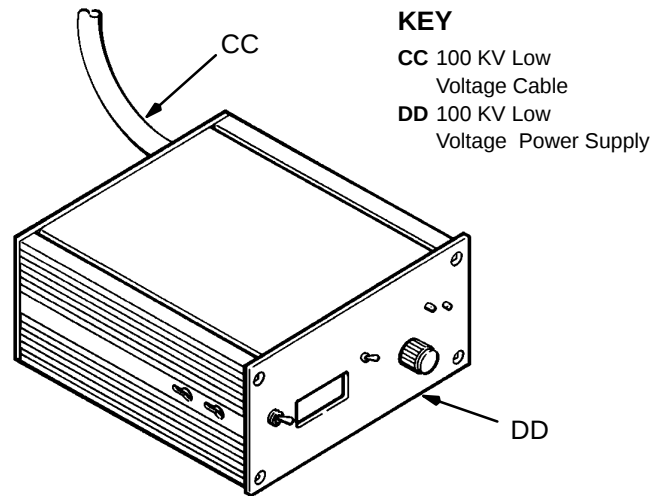


Fig 6

KEY

- CC 100 KV Low Voltage Cable
- DD 100 KV Low Voltage Power Supply

NOTE: After all the lines are connected to the manifold, reinstall the atomizer cover and shaping air shroud.

System Interlocks

To help prevent equipment damage, install the following system interlocks.

1. The fluid can not be turned on until the turbine is turning at the RPM required to obtain the desired atomization. Do not set the RPM below 15,000 RPM.

NOTE: With most coating materials, the common RPM range is 18,000 to 40,000 RPM.

2. The turbine's maximum speed rating of 40,000 RPM **MUST NOT** be exceeded.
3. A safety fence protects people from touching any charged equipment during operation. The safety fence air line interlock shuts off the power supply, the paint supply, and the turbine air anytime the gate is opened.
4. The power supply must be interlocked with the spray booth exhaust fan, pressure switch, and conveyor.

WARNING

For your safety, all operators must be properly trained to safely operate electrostatic equipment. Operators must read all instructions and warnings before using this equipment. Refer to NFPA-33, 1985, Ch 15 .

Operating Checklist

Check the following list daily, before starting to operate the system, to help ensure you of safe, efficient operation.

- | | |
|---|--|
| <p>___ 1. Make sure all operators are properly trained to safely operate an electrostatic centrifugal atomizer system.</p> <p>___ 2. Make sure the high voltage power supplied to the atomizer is turned off and grounded before cleaning, performing any maintenance, and before any persons enter the hazardous (spray) area.</p> <p>___ 3. Make sure all parts and equipment used in conjunction with the electrostatic spray system are properly grounded. See FIRE OR EXPLOSION HAZARD on page 4.</p> <p>___ 4. Make sure the operator and all persons entering the spray area are properly grounded.</p> <p>___ 5. Personnel must wear protective clothing and equipment, appropriate for the type of toxic material workers may be exposed to.</p> <p>___ 6. Personnel must stay clear of the cup whenever it is rotating. Be sure the cup has stopped rotating before touching it. It takes a couple minutes after the turbine air is shut off for the cup to stop rotating. Check the speed monitor to make sure the cup is not turning; DO NOT use a visual check alone to determine if the cup is turning.</p> | <p>___ 7. Read and follow HOSE SAFETY on page 5.</p> <p>___ 8. Make sure ventilation fans are operating properly.</p> <p>___ 9. Check system air line filters regularly to ensure proper operation. Replace filter element as needed.</p> <p>___ 10. Make sure the workpiece hangers are clean and grounded. Contact points must be sharp points or knife edges.</p> <p>___ 11. Make sure all refuse is removed from the spray booth.</p> <p>___ 12. Make sure all flammable liquids in spray booth are in approved, grounded containers.</p> <p>___ 13. Make sure all electrically conductive objects in the spray area are properly grounded and the floor of the spray area is electrically conductive and grounded.</p> <p>___ 14. Be sure to maintain a minimum spraying distance of 10 in. (254 mm) between the atomizer cup and workpiece or any other grounded object.</p> <p>___ 15. If the atomizer vibrates or makes a high-pitched noise, shut it down immediately and inspect or replace the cup.</p> |
|---|--|

Filter the Fluid

Filter the fluid to remove coarse particles and sediment which could clog the spray nozzle.

Adjust the Spraying Distance

WARNING

To reduce the risk of arcing, which could cause fire or explosion and result in serious bodily injury and property damage, maintain a **minimum spraying distance of 10 in. (254 mm)** between the atomizer cup and workpiece or any other grounded object.

The distance between the atomizer and the workpiece affects the spray application, as shown in the chart below.

Spraying Distance	Spray Pattern	Efficiency
decrease distance	smaller pattern	greater efficiency
increase distance	larger pattern	possibly reduce efficiency
too far from target		fluid wraps back on atomizer
too close to target		may cause arcing (see Warning above)

Adjust the Turbine Speed

CAUTION

DO NOT exceed the maximum speed rating of 40,000 RPM. Excessive speed may damage the turbine.

*Whenever fluid flow is reduced or stopped, the turbine air pressure **MUST** be reduced to prevent an over-speed condition and possible turbine damage.*

CAUTION

If the atomizer is vibrating or making excessive noise, check the cup for damage or for paint build-up. See **Cleaning and Maintenance** on page 14 and 15.

The turbine speed is controlled by the turbine air inlet pressure. See the **Turbine Air Consumption Graph**, page 31, for more information.

A turbine speed monitor or turbine speed controller is recommended for optimum atomizer performance. Contact your Graco representative for further information.

Adjust the Pattern Air

To reduce the size of the spray pattern, increase the pattern air pressure.

To increase the size of the spray pattern, decrease the pattern air pressure.

CAUTION

Be sure to turn on the shaping air before triggering the paint to avoid having the spray fall back on the atomizer.

Refer to the **Performance Graphs**, page 30 and 31, for additional information.

Adjust the LESS Air

The **LESS** air pressure should be set at approximately 5 psi (0.35 bar) at the atomizer.

The air pressure should only be increased if fluid accumulates on the shaping air shroud. If the coating material builds up between the ports of the **LESS** when the air pressure is increased, the air pressure needs to be reduced.

Adjust Fluid Delivery

Refer to the **Nozzle Selection Chart** on page 29 to select the proper nozzle orifice size for your application.

CAUTION

ALWAYS remove the cup and measure the fluid flow from the nozzle. **NEVER** check the fluid flow with the cup installed and rotating as this could flood the bearings.

Replacing Air Filter Elements

CAUTION

Dirt and moisture in the air supply to the atomizer can ruin the appearance of your finished workpiece and cause turbine failure. Replace filter elements as often as necessary to maintain a clean dry air supply. Graco warranty will not cover turbine damage caused by dirty air usage.

Refer to your air filter instruction manual. See the Accessories Section for an air filter and element available from Graco.

Flushing & Cleaning Safety & Precautions

WARNING

To reduce the risk of fire or explosion, the **high voltage MUST be shut off and the equipment MUST be grounded** before entering the hazardous (spray) area and before cleaning or performing any maintenance.

Ventilating fans **MUST** remain on while cleaning the equipment.

To flush or purge equipment, ALWAYS use solvents with a flash point equal to or greater than that of the fluid being sprayed. To clean the exterior of the equipment, ALWAYS use non-polar solvents with a flash point of higher than 100° F (38° C).

ALWAYS use the lowest possible pressure to flush.

ALWAYS remove all solvent from the system before reactivating the atomizer.

Use only non-sparking tools to clean residue from the booth and hangers.

WARNING

Pressure Relief Procedure

To reduce the risk of serious bodily injury, including splashing in the eyes or on the skin, injury from moving parts or electric shock, always follow this procedure when checking or servicing any part of spray system, when installing, cleaning or changing fluid nozzles or cups, and whenever you stop spraying.

1. **TURN OFF THE POWER SUPPLY and ground the high voltage system and all charged equipment.** Make sure all equipment in the high voltage/hazardous area has been grounded before entering the area.
2. Shut down the paint pump.
3. Actuate the atomizer to relieve fluid pressure.
4. Open the pump drain valve, having a waste container ready to catch the drainage.
5. Leave the pump drain valve open until you are ready to spray again.

CAUTION

To avoid getting solvent into the air passages, **DO NOT clean the atomizer with a solvent gun.**

To avoid damaging turbine parts, **DO NOT** immerse the turbine in solvent or other fluids.

Clean all parts with a non-conductive solvent, compatible with the fluid being sprayed.

Because of differences in automatic features built into your system and variations in color/solvent/dump valve combinations, your exact flushing and cleaning procedure may vary. However, **BE SURE** to follow **Flushing & Cleaning Safety & Precautions**, above and at left, and the following basic guidelines in your procedures.

Flushing

1. Read and follow **Flushing & Cleaning Safety & Precautions** before flushing.
2. With the turbine air on and the power supply off, flush the fluid lines with solvent, using the lowest possible fluid pressure.

CAUTION

Use the lowest possible fluid pressure when flushing. High solvent pressure or flow can cause back pressure or splashing, which can result in bearing damage.

3. Remove the remaining solvent from the fluid lines with air, and dry completely.
4. The cup will usually be fully cleaned while flushing. If any paint remains on the cup after flushing, remove the cup and clean it as instructed in **Cleaning the Cup**. Check the cup regularly to make sure that heavily pigmented fluids are not causing buildup inside the cup.

Cleaning the Atomizer Exterior

Read and follow **Flushing & Cleaning Safety & Precautions** before cleaning the atomizer exterior.

Hand wipe the atomizer. Dampen a clean rag in a compatible solvent and wipe clean the atomizer exterior..

CLEANING & MAINTENANCE

Cleaning the Cup

WARNING

To reduce the risk of serious bodily injury, including cuts and loss of fingers, **BE SURE** to shut off the turbine air to the atomizer (and brake air if used) and **MAKE SURE** the cup is not rotating before cleaning, removing or touching the cup.

It takes a couple of minutes after the turbine air is shut off for the cup to stop rotating. Check the speed monitor to make sure the cup is not turning; **DO NOT** use a visual check alone to determine if the cup is turning.

CAUTION

Paint buildup on the cup or between the shaft and stationary housing can alter the balance of the turbine and cause bearing damage.

To avoid scratching or nicking the cup surface, handle the cup with care and be careful not to drop it. Bearing damage caused by using a damaged cup will not be covered by Graco warranty.

1. Read and follow the **Flushing & Cleaning Safety & Precautions** on page 14 and the **Warning** and **Caution** at left before cleaning the cup.
2. Unscrew and remove the shaping air shroud and service cover.
3. Hold the bearing assembly shaft with the wrench (23c), supplied, while removing the cup (A) with the cup wrench (23d), supplied. See Fig 7. Turn the cup *counterclockwise*. Set the cup onto a soft surface to help avoid scratching or nicking its surface.

NOTE: If the turbine shaft is warm to the touch, let it cool a few minutes to ease removal.

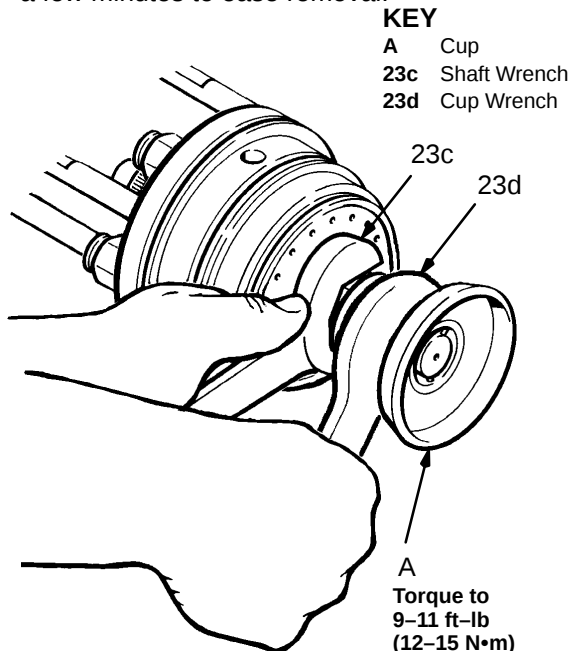


Fig 7

4. Soak the cup (A) in a compatible solvent. Clean it with a soft bristle brush dipped in solvent until all the paint is removed. Rinse the cup and dry it.
5. Remove the nut (2c) and baffle (2a). Remove the nozzle (2b) with the 1/2 in. hex driver (23b), supplied. Remove the o-ring (1b) with a dental pick. See Fig 8.

NOTE: If the nozzle seal (28) needs to be removed, remove it with a dental pick. Install the new seal.

6. Check for paint buildup on the turbine shaft and baffle cover. Carefully clean paint buildup from the area.

CAUTION

To prevent bearing damage, avoid soaking the turbine shaft and baffle cover area with solvent.

7. Install the nozzle (2b) into the bearing assembly (1) and tighten securely.
8. Place the cup baffle (2a) onto the nozzle (2b) and secure it with the nozzle nut (2c). Torque the nozzle nut to 45-55 in-lb (5-6.1 N·m).
9. Hold the bearing assembly shaft with the wrench (23c), while installing the cup (A) with the cup wrench (23d). Turn the cup *clockwise* and torque to 9-11 ft-lb (12-15 N·m).

CAUTION

DO NOT turn on the turbine without the cup installed as this may damage the atomizer.

10. Slide the service cover over the atomizer assembly and down against the end mount o-ring (15).
11. Screw the shaping air shroud onto the manifold (6). Tighten until it bottoms. Check the service cover for looseness. If loose, the shaping air shroud may not be tight enough or the end mount o-ring (15) might need replacement.

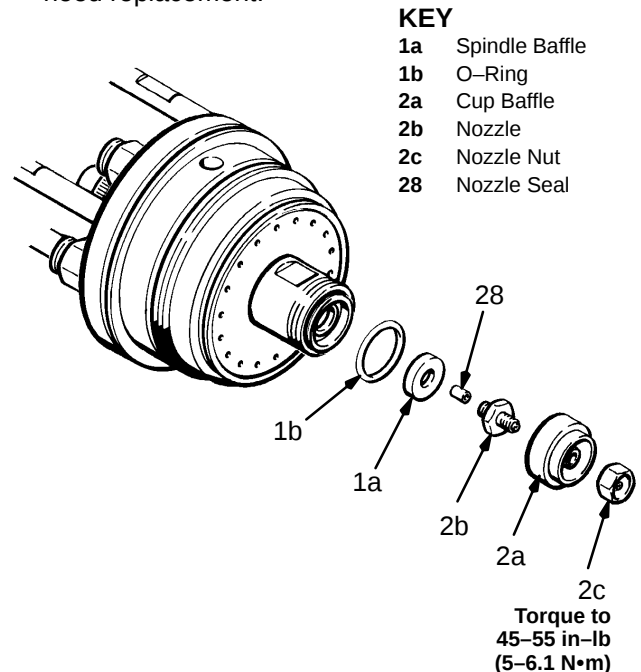


Fig 8

TROUBLESHOOTING CHART

WARNING

Pressure Relief Procedure

To reduce the risk of serious bodily injury, including splashing in the eyes or on the skin, injury from moving parts or electric shock, always follow this procedure when checking or servicing any part of the spray system, when installing, cleaning or changing fluid nozzles or cups, and whenever you stop spraying.

1. **TURN OFF THE POWER SUPPLY and ground the high voltage system and all charged equipment.** Make sure all equipment in the high voltage/hazardous area has been grounded before entering the area.

2. Shut down the paint pump.
3. Actuate the atomizer to relieve fluid pressure.
4. Open the pump drain valve, having a waste container ready to catch the drainage.
5. Leave the pump drain valve open until you are ready to spray again.

PROBLEM	CAUSE	SOLUTION
1. Bearing shaft does not turn	1a. Damaged bearing	1a. Return bearing assembly to Graco for repair or replacement
2. Excessive noise & vibration	2a. Turbine loose. b. Cup is damaged c. Rods (8) or screws (12) loose.	2a. Tighten the three screws in the manifold b. Replace the cup c. Tighten as necessary
3. Poor atomization	3a. Too high fluid flow or too low RPM	3a. Decrease fluid flow and/or increase RPM
4. Not enough turbine air power	4a. Restrictive air line b. Plugged air turbine line and/or turbine jets c. Air line longer than 20 ft (6 m)	4a. Remove air line restriction or use larger dia. and/or shorter air hose b. Clear air turbine line, remove atomizer and clean air jets c. Install an air volume booster
5. Center part of cup not totally clean	5a. Plugged cup center hole	5a. Clean center hole or replace cup
6. Paint residue on the back of the cup baffle	6a. Excessive fluid flow b. Excessive fluid velocity	6a. Lower fluid flow b. See Nozzle Selection Chart

Continued on next page.

TROUBLESHOOTING CHART

PROBLEM	CAUSE	SOLUTION
7. Pulsating spray pattern	7a. Air in paint line or fluid flow too low	7a. Remove air from air line by bleeding air, increase fluid flow, or use smaller size orifice; see Nozzle Selection Chart
8. Spray pattern too big or not controllable	8a. Pattern air pressure too low b. Fluid flow too high	8a. Increase pattern air pressure b. Decrease fluid flow to improve atomization
9. Split spray pattern	9a. RPM too low or fluid flow too high b. Pattern air pressure too high	9a. Increase RPM or decrease fluid flow to improve atomization b. Decrease pattern air pressure
10. No RPM or erratic RPM readout	10a. Dirt on fiber optic surface b. Dirt on reflective surface of turbine c. Broken fiber optic cable d. Bad speed monitor/controller	10a. Clean fiber optic b. Clean reflective surface c. Replace cable d. Refer to speed monitor/controller manual
11. No or low KV on the atomizer	11a. Damaged resistor cable and/or power supply b. Broken electrical connection c. Insufficient electrical continuity	11a. Replace resistor cable, multiplier, and/or power supply b. Reconnect or replace low voltage cable or 100 KV low voltage power supply c. Check continuity of atomizer assembly
12. Paint in bearing assembly	12a. Fluid flow or pressure too high b. Fluid velocity too high c. Fluid being supplied without cup rotating d. Leaking nozzle seal e. Nozzle nut or baffle not installed or installed improperly	12a. Reduce fluid flow or pressure b. Change nozzle size c. Interlock paint trigger to turbine air d. Change nozzle seal e. Install nozzle nut and baffle per assembly instructions

WARNING

Installing and servicing this equipment requires access to parts which may cause electric shock or other serious bodily injury if the work is not performed properly. Do not install or service this equipment unless you are trained and qualified.

To reduce the risk of serious bodily injury, including loss of fingers, follow the **Pressure Relief Procedure Warning**, page 16, before servicing the atomizer or any part of the system. Be sure the cup is not turning before removing it.

WARNING

ALWAYS check atomizer's electrical continuity whenever the atomizer is disassembled and reassembled. Improper assembly could alter electrical continuity and grounding of atomizer. An ungrounded atomizer could cause fire and explosion, which could result in serious injury and property damage.

NOTE: Check all possible remedies in the **Troubleshooting Charts** before disassembling the atomizer.

Flush the atomizer as described in the Cleaning & Maintenance Section. Follow the **Pressure Relief Procedure Warning** on page 16. Disconnect the air and fluid lines from the atomizer.

Disconnect the power supply cable from the atomizer and cover the cable to prevent contamination.

NOTE: The following instructions tell which part of the atomizer may be disassembled for cleaning or replacement. **DO NOT** disassemble any other parts. If further repair is needed, contact your Graco representative.

Returning the Bearing Assembly to Graco for Warranty Inspection or Repair

1. Remove the shaping air shroud (3) and service cover (7). See Fig 10.
2. Record the atomizer serial number from the plate located on the back of the manifold (6). See Fig 9.
3. Contact Graco with the following information.
 - a. The atomizer serial number.
 - b. The date the atomizer system was installed.
 - c. The atomizer's total usage hours.
4. Show all the information requested in step 3 on the packing slip.
5. Remove the bearing assembly (1) from the manifold (6) as instructed on page 20, steps 1 to 3.
6. Return the bearing assembly (1) to Graco or to your authorized Graco distributor.

IMPORTANT WARRANTY NOTE

DO NOT disassemble or repair a bearing assembly that is covered by Graco warranty. (An exception is the replacement of the bearing o-ring (1b) and baffle (1a), which are replaceable.) **The warranty will be voided on any bearing assembly disassembled or repaired by a non-authorized service facility.** Bearings which fail to operate properly within the warranty period **MUST** be returned to Graco for warranty inspection and repair.

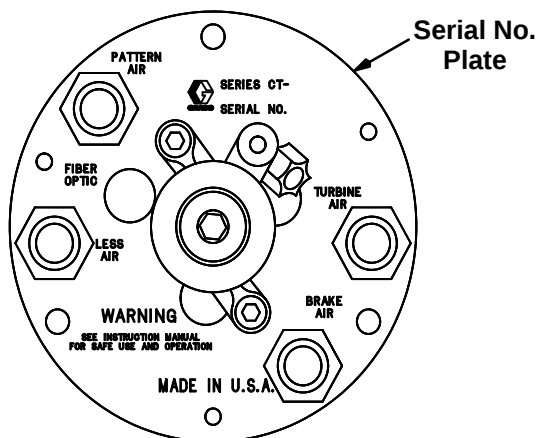


Fig 9

KEY

- 3 Shaping Air Shroud
- 7 Cover
- 6 Manifold

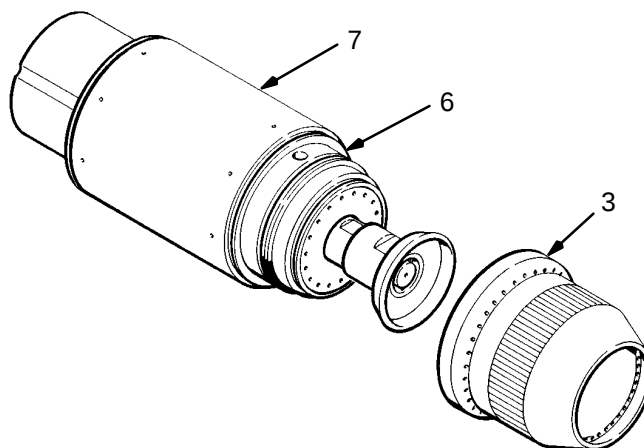


Fig 10

Replacing the Fluid Nozzle & Cup

1. Unscrew the shaping air shroud (3). See Fig 10.
2. Slide the service cover (7) off the atomizer.
3. Hold the bearing assembly shaft with the wrench (23c), while removing the cup (A) with the cup wrench (23d). See Fig 11. Turn the cup *counterclockwise*. Set the cup onto a soft surface to help avoid scratching or nicking its surface.

NOTE: If the turbine shaft is warm to the touch, allow it to cool a few minutes to ease removal.

4. Unscrew the nozzle nut (2c), using the 1/2 in. hex driver (23b). Refer to Fig 12.
5. Remove the cup baffle (2a). Then unscrew the fluid nozzle (2b), using the 1/2 in. hex driver (23b).

NOTE: If the nozzle seal (28) needs to be removed, remove it with a dental pick, then install the new seal. To prevent fluid leakage, **MAKE SURE** the nozzle seal is contacting the fluid nozzle.

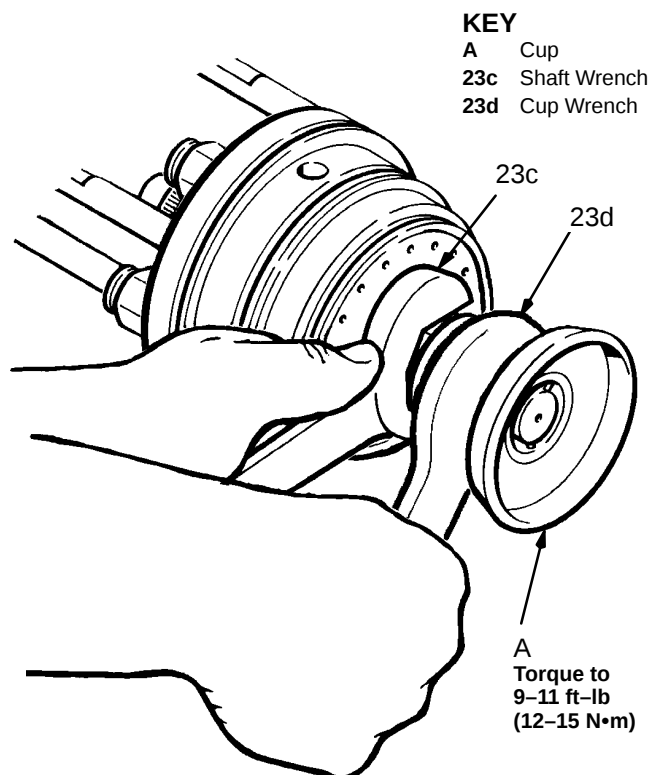


Fig 11

6. Install the nozzle (2b) into the bearing assembly (1) and tighten securely.
7. Place the cup baffle (2a) onto the nozzle (2b) and secure it with the nozzle nut (2c). Torque the nozzle nut to 45-55 in-lb (5-6.1 N·m).
8. Hold the bearing assembly shaft with the wrench (23c), while installing the cup (A) with the cup wrench (23d). Turn the cup *clockwise* and torque to 9-11 ft-lb (12-15 N·m).

CAUTION

DO NOT turn on the turbine without the cup installed as this may damage the atomizer.

9. Slide the service cover (7) over the atomizer assembly and down against the end mount o-ring (15). See Fig 10.
10. Screw the shaping air shroud (3) onto the manifold (6). Tighten until it bottoms. Check the service cover (7) for looseness. If loose, the shaping air shroud may not be tight enough or the end mount o-ring (15) might need replacement.

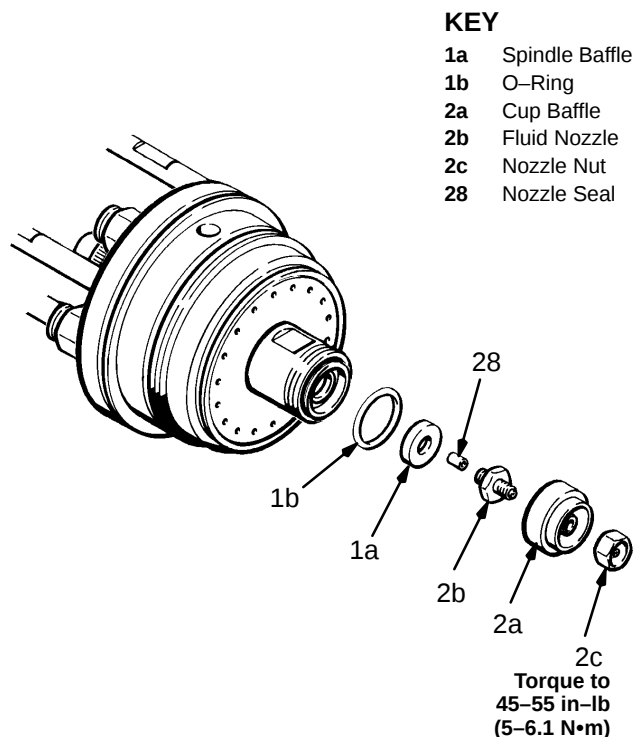


Fig 12

Removing the Bearing Assembly & Turbine Housing

CAUTION

Remove the atomizer from the worksite for service or repair. Service or repair area must be clean.

1. Follow steps 1 to 5 in **Replacing the Fluid Nozzle & Cup**, page 19.
2. Loosen **COMPLETELY** the three screws (6a) in the manifold (6), using the 4 mm ball driver (23a). Refer to Fig 13.

NOTE: The screws must be loosened completely to permit the removal of the bearings assembly (1) and to prevent the clamps (6b) from falling out if the turbine housing (5) is removed.

3. Grasp the bearing assembly (1) and firmly pull it in a straight line out of the turbine housing (5). The turbine cover (4) will come out with it.

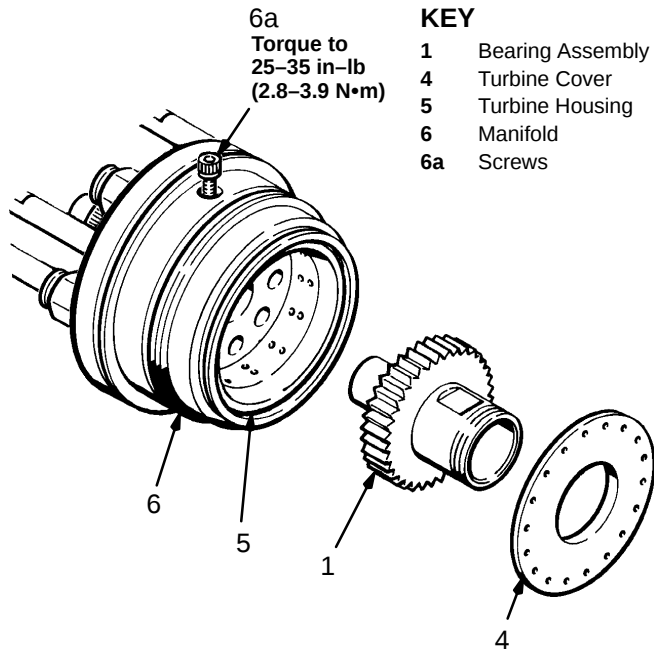


Fig 13

4. If the o-ring (1b) needs replacement, remove it from the front of the bearing assembly (1), using a dental pick. Refer to Fig 12.
5. If the nozzle seal (28) shows signs of leakage, remove it with a dental pick. Install the new nozzle seal .
6. *To replace the Viton® o-rings (21) on the turbine housing (5), remove the turbine housing from the manifold (6) by screwing in a M8 x 1.25 x 50 mm screw into the hole in the housing. The turbine housing will ease out as the screw is screwed in. Replace the o-rings as needed. See Fig 14.*
7. *Check the three Teflon® o-rings (19, 20, 22) on the manifold (6) for damage and replace as needed.*

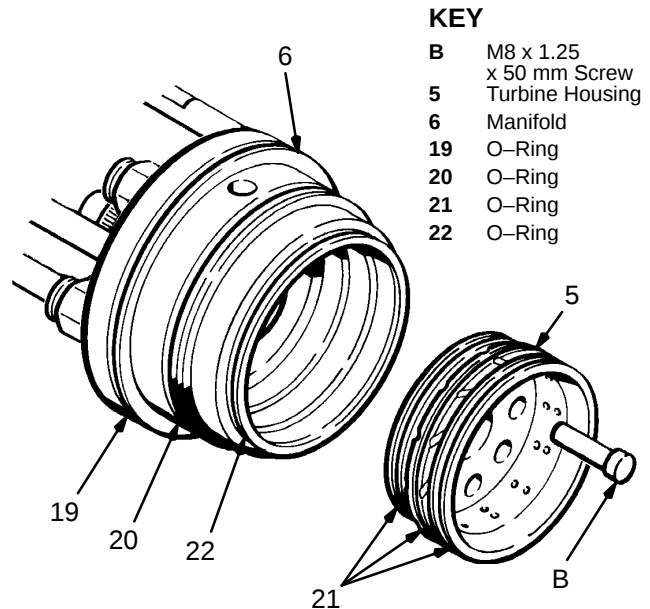


Fig 14

Assembling the Manifold

1. Be sure the three o-rings (21) are in place on the turbine housing (5). See Fig 14.
2. Be sure the three screws (6a) and clamps (6b) are in place in the manifold (6). See Fig 15.

NOTE: The clamps (6b) are electrically conductive.

3. Apply a very light coat of petroleum jelly to the o-rings to ease reassembly. Excessive petroleum jelly will block the turbine housing ports.

KEY

- 6 Manifold
- 6a Screw
- 6b Clamp

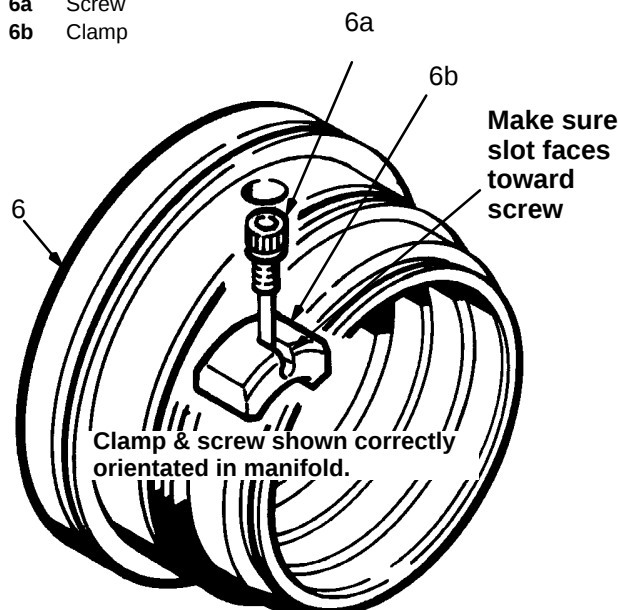


Fig 15

4. Align the turbine housing (5) and the manifold (5) fiber optic port, using an alignment pin (C). Then press the turbine housing into the manifold (6) as shown in Fig 16, using an arbor press.
5. Be sure the three o-rings (19, 20, 22) are in place on the manifold (6). See Fig 14.

KEY

- 5 Turbine Housing
- 6 Manifold
- C Alignment Pin

Push turbine housing down with arbor press until it bottoms in manifold.

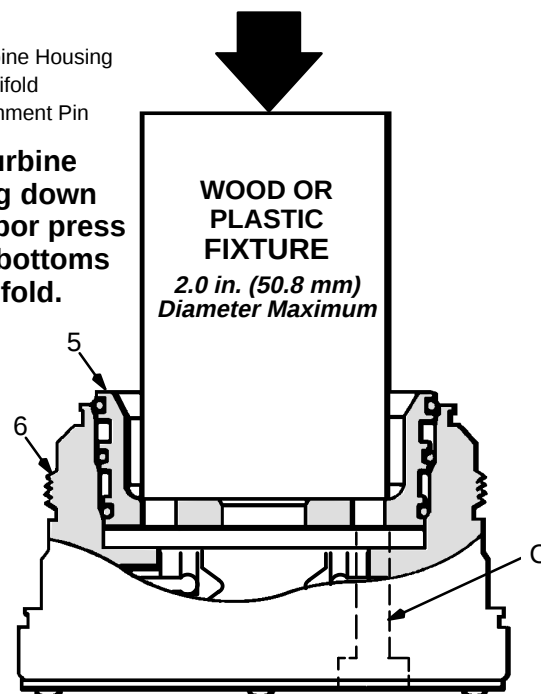


Fig 16

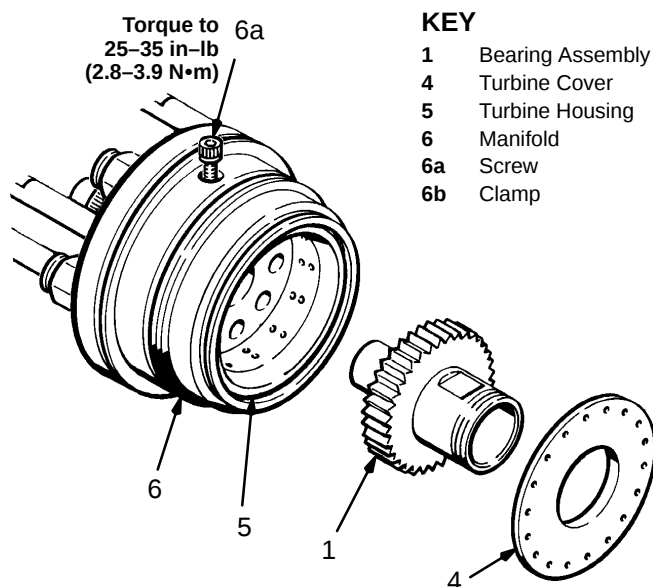
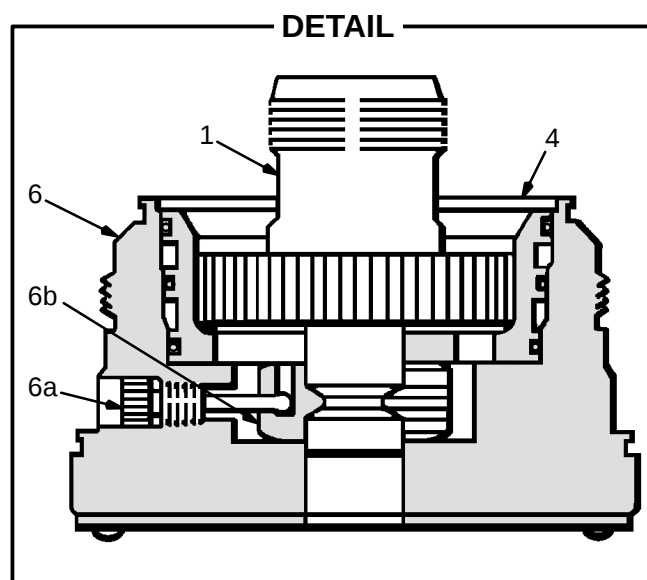


Fig 17

KEY

- 1 Bearing Assembly
- 4 Turbine Cover
- 5 Turbine Housing
- 6 Manifold
- 6a Screw
- 6b Clamp



Assembling the Atomizer

1. Press the spindle baffle (1a) into the bearing assembly shaft. **BE SURE** the o-ring (1b) is in place. See Fig 18.
2. *Before installing the turbine assembly*, loosen the two trigger valve screws (9b). If the trigger valve was removed, install it loosely with the screws (9b). **DO NOT** tighten the screws completely yet! See Fig 19.

NOTE: Be sure the trigger valve o-ring (9a) is in place on the trigger valve assembly (9).

3. Place the bearing assembly (1) into the turbine housing (5), then push down on the turbine until the assembly bottoms. See Fig 17.
4. Secure bearing assembly by tightening three screws (6a) in the manifold (6) to 25–35 in-lb (2.8–3.9 N•m).
5. Tighten the two trigger valve screws (9b). See Fig 19.
6. Install the nozzle (2b) into the bearing assembly (1) and tighten securely. See Fig 18.
7. Press the turbine cover (4) onto the manifold (6). See Fig 17, Detail.
8. Place the cup baffle (2a) onto the nozzle (2b) and secure it with the nozzle nut (2c). Torque the nozzle nut to 45–55 in-lb (5–6.1 N•m). See Fig 18.
9. Hold the bearing assembly shaft with the wrench (23c), while installing the cup (A) with the cup wrench (23d). Turn the cup *clockwise* and torque to 9–11 ft-lb (12–15 N•m). See Fig 11.
10. Slide service cover (7) over atomizer assembly and down against the end mount o-ring (15). See Fig 10.

NOTE: Make sure the shaping air baffle (3a) is pressed into place in the shaping air shroud (3b). Refer to the Parts Drawing, page 24.

11. Screw the shaping air shroud (3) onto the manifold (6). Tighten until it bottoms.

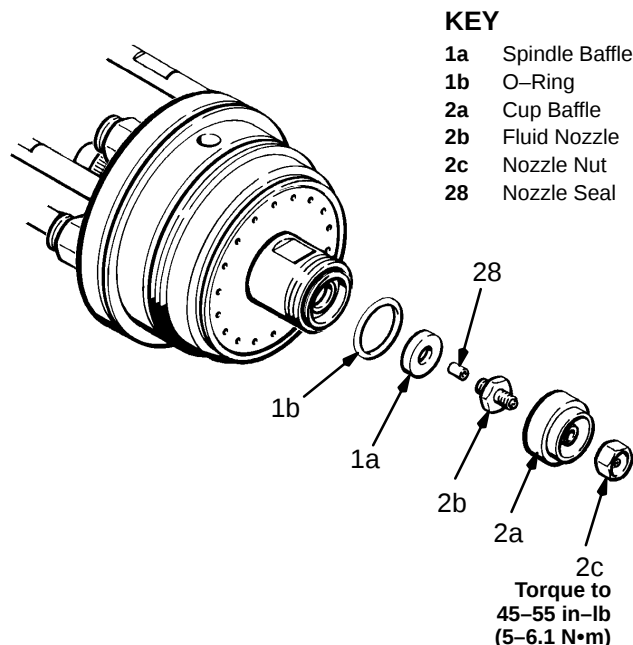
NOTE: Check the service cover (7) for looseness. If loose, the shaping air shroud may not be tight enough or the o-ring (15) may need replacement.

CAUTION

DO NOT turn on the turbine without the cup installed as this may damage the atomizer.

WARNING

ALWAYS check the atomizer's electrical continuity whenever it is disassembled and reassembled. See **Checking Atomizer Electrical Continuity**, page 23. Improper assembly could alter electrical continuity and grounding of the atomizer, which could cause fire and explosion and result in serious injury and property damage.



KEY

- 1a Spindle Baffle
- 1b O-Ring
- 2a Cup Baffle
- 2b Fluid Nozzle
- 2c Nozzle Nut
- 28 Nozzle Seal

Fig 18

Replacing the Manifold

1. Remove shaping air shroud (3) and service cover (7).
2. Disconnect the air tubing from the manifold (6). Disconnect the fiber optic cable and remove the trigger valve assembly (9).

NOTE: Mark the tubing with the appropriate function to ease reassembly.

3. While holding the atomizer, remove the three screws (12) from the end mount (11), using the 4 mm ball driver (23a). Be careful not to lose the washers (10) when removing the screws. See Fig 19.
4. Remove the atomizer from the end mount (11).
5. Check the o-ring (15) on the end mount (11) for damage. Replace the o-ring by sliding it over the end mount and into the o-ring groove.

CAUTION

Remove the atomizer from the worksite for service or repair. Service or repair area must be clean.

6. Remove the mounting rods (8) from the manifold (6).
7. Remove the tube fittings (18) from the manifold (6).
8. Remove and inspect the bearing assembly and turbine housing (5) as instructed on page 20.
9. Assemble the manifold and atomizer as instructed on page 21 and 22.
10. Install the tube fittings (18).
11. Apply Loctite® 242 or equivalent to the threads of the rods (8). Install the rods and torque them to 30–40 in-lb (3.4–4.5 N•m); **DO NOT** over tighten.
12. Place the washers (10) on the rod (8) ends.
13. Align atomizer rods (8) with end mount (11) screw holes. While holding atomizer, install three screws (12) in the end mount (11), using 4 mm ball driver (23a). Torque screws to 25–35 in-lb (2.8–3.9 N•m).
14. Connect the tubing to the manifold (6).

15. Install the trigger valve (9) into the manifold (6). **BE SURE** the o-ring (9a) is in place. Secure it with the two screws (9b).

16. Install service cover (7) and shaping air shroud (3).

Replacing the Trigger Valve

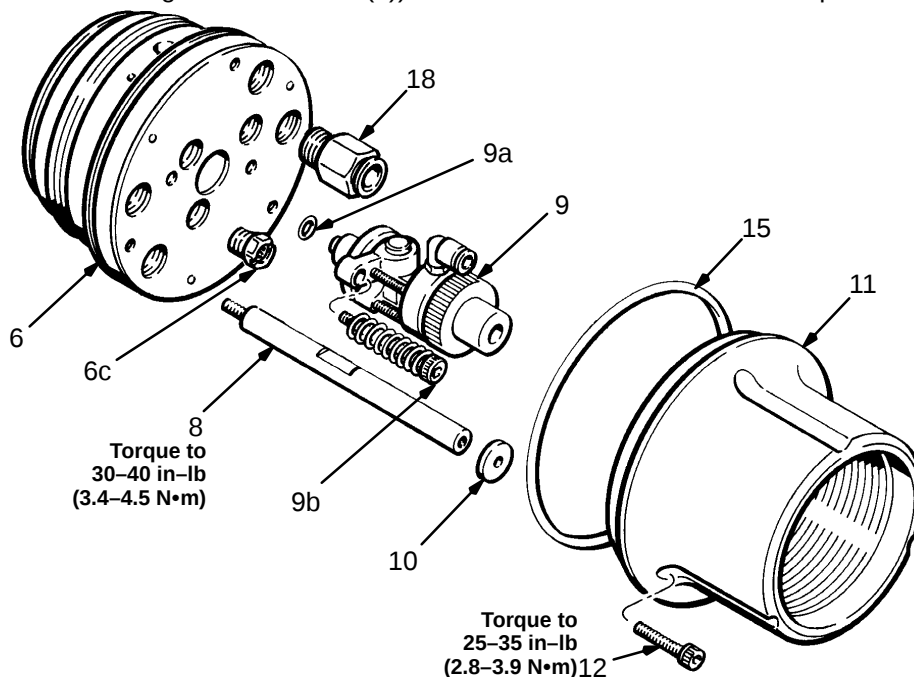
1. Remove shaping air shroud (3) and service cover (7).
2. Unscrew the two screws (9b) from the trigger valve (9), using a 4 mm ball driver.
3. Remove the trigger valve from the manifold (6) and disconnect the air and fluid line. To service trigger valve (9), see Manual 307–941.
4. Install the new trigger valve (9) into the manifold (6). **BE SURE** the o-ring (9a) is in place. Secure it with the two screws (9b).

Checking the Atomizer Electrical Continuity

WARNING

ALWAYS check the atomizer's electrical continuity whenever it is disassembled and reassembled. Improper assembly could alter electrical continuity and grounding of the atomizer, which could cause fire and explosion and result in serious injury and property damage.

1. Use an ohmmeter to measure the resistance between the capture nut (13) and the nozzle nut (2c). Refer to the **PARTS DRAWING**. The resistance should be less than 10 ohms.
2. Use a megohmmeter with an applied voltage of 500 minimum to 1000 volts maximum to measure the resistance between the capture nut (13) and the edge of the cup. The resistance should be less than 5000 ohms.
3. If the resistance is outside these ranges, the atomizer is not assembled properly. **DO NOT** use the atomizer until the problem is corrected.



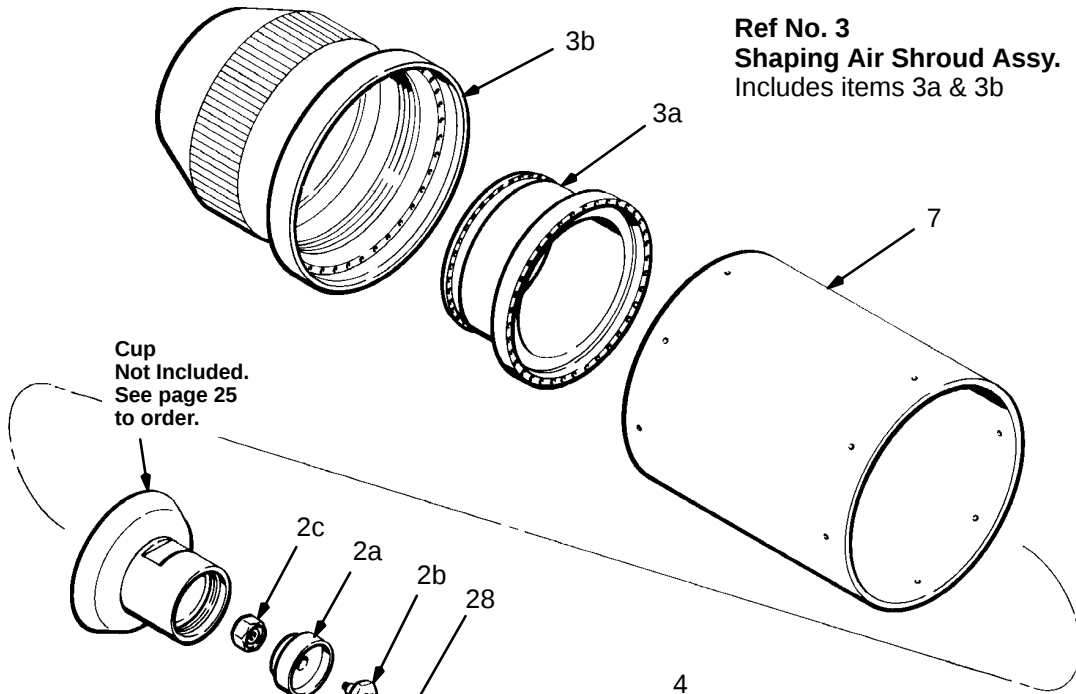
KEY

6	Manifold
6c	Exhaust Filter
8	Rod
9	Trigger Valve
9a	O-Ring
9b	Screw
10	Washer
11	End Mount
12	Screw
15	O-Ring
18	Fitting

Fig 19

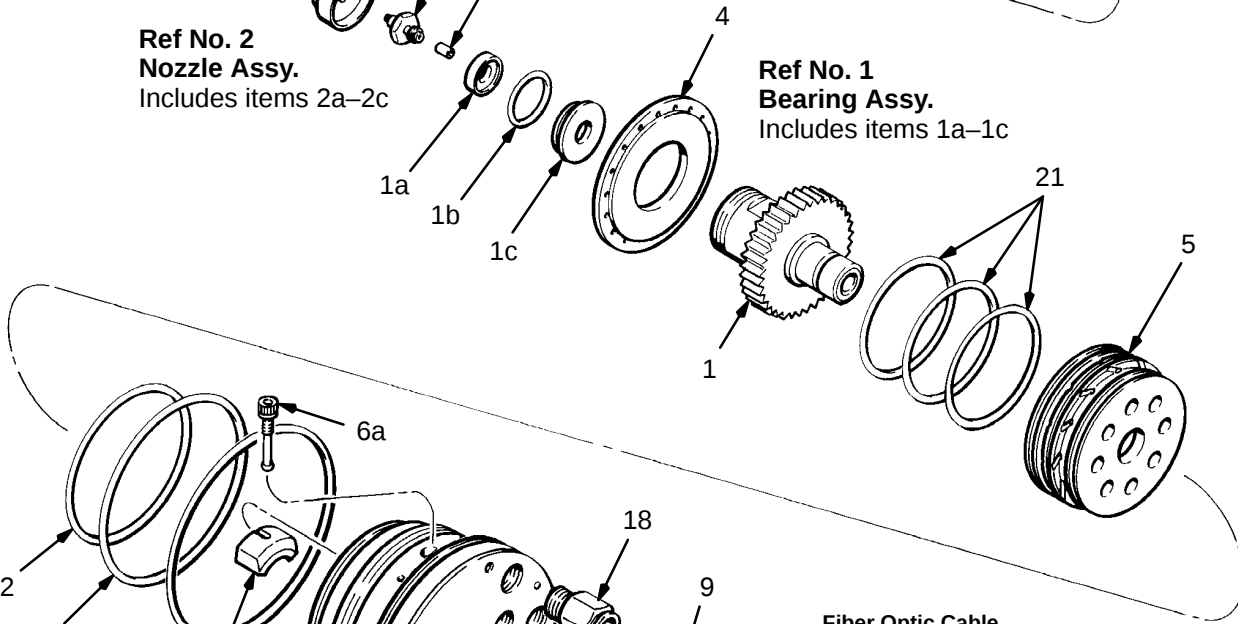
PARTS DRAWING

**Ref No. 3
Shaping Air Shroud Assy.**
Includes items 3a & 3b



**Ref No. 2
Nozzle Assy.**
Includes items 2a-2c

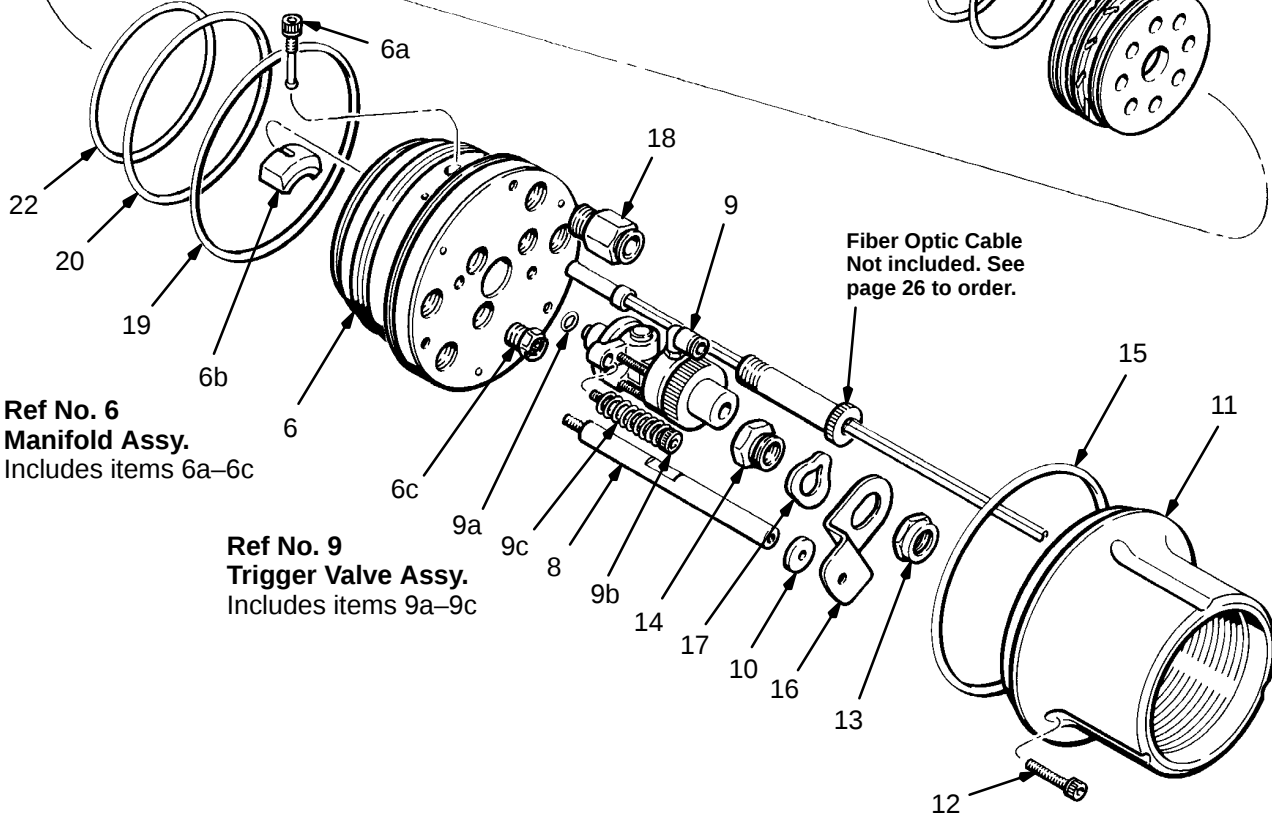
**Ref No. 1
Bearing Assy.**
Includes items 1a-1c



**Ref No. 6
Manifold Assy.**
Includes items 6a-6c

**Ref No. 9
Trigger Valve Assy.**
Includes items 9a-9c

Fiber Optic Cable
Not included. See
page 26 to order.



PARTS LIST

Model CT-4000

Centrifugal Atomizer & Manifold Assembly

Part No. 222-634, Series A

Includes items 1-28

REF

NO.	PART NO.	DESCRIPTION	QTY
1	222-597	BEARING ASSEMBLY Includes items 1a-1c	1
1a	185-332	•BAFFLE, spindle	1
1b*	110-172	•O-RING; Chemrez®	1
1c	185-328	•PLUG, spindle	1
2	222-476	NOZZLE ASSEMBLY Includes items 2a-2c	1
2a	185-249	•BAFFLE, cup	1
2b	183-891	•NOZZLE, 1 mm; Other sizes available. Order separately	1
2c**	185-203	•NUT, nozzle	1
3	222-466	SHAPING AIR SHROUD ASSY. Includes item 3a & 3b	1
3a	185-231	•BAFFLE, shaping air	1
3b	185-232	•SHROUD, shaping air	1
4	185-233	COVER, turbine	1
5	185-230	HOUSING, turbine	1
6	222-643	MANIFOLD ASSEMBLY Includes item 6a-6c	1
6a**	185-239	•BOLT, schs; M5 x 0.8	3
6b**	185-413	•CLAMP	3
6c	185-546	•FILTER, exhaust	2
7	185-242	COVER, service	1
8	185-240	ROD	3
9	222-202	VALVE, trigger; Includes items 9a-9c; <i>See Manual</i> <i>307-941 for parts numbers</i>	1
9a*	109-090	•O-RING, Chemrez	1
9b	183-979	•SCREW, shoulder, hex sch; M5 x 0.8 x 9.5	2
9c	110-019	•SPRING, compression	2
10	110-170	WASHER, plain	3
11	185-241	MOUNT, end	1
12	110-245	SCREW, cap, sch M5 x 0.8 x 25	6
13	183-992	NUT, capture	1
14	183-993	NUT, captive	1
15*	110-171	O-RING, Viton®	1
16	185-375	BRACKET	1
17	110-027	WASHER, spring	1
18	109-195	FITTING, tube	4
19*	110-168	O-RING; Teflon®	1
20*	109-084	O-RING; Teflon	1
21*	109-088	O-RING; Viton	3
22*	110-169	O-RING; Teflon	1
23	222-479	TOOL KIT (not shown) Includes items 23a-23d	1
23a	107-460	•BALL DRIVER, 4 mm (<i>to install/ remove screws 6a, 9b, & 12</i>)	1
23b	110-002	•HEX DRIVER, 1/2 in. (<i>to install/ remove fluid nozzle</i>)	1
23c	110-241	•WRENCH (<i>to hold bearing shaft when removing/ installing cup</i>)	1
23d	222-273	•WRENCH(<i>to install/ remove cup</i>)	1
28**	185-412	SEAL, nozzle	1

NOTE: Accessories must be purchased separately. Use *only* **GENUINE GRACO PARTS AND ACCESSORIES.**

O-Ring Repair Kit 222-459

Must be purchased separately.

Includes:

Ref No.	Qty
1b	1
9a	1
15	1
19	1
20	1
21	3
22	1

Fluid Nozzle

See **Fluid Nozzle Selection Chart** on page 29.

Part No.	Description
222-478	2.0 mm orifice
222-477	1.5 mm orifice (standard)
222-476	1.0 mm orifice

Atomizer Cup

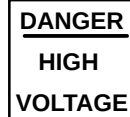
Contact Graco Technical Assistance for selection of cup edge configuration (phone number on back page).

Part No.	Size	Material	Edge
222-632	70 mm	aluminum	sharp
222-633	70 mm	aluminum	round

Warning Sign 727-161

Available at no charge from Graco.

Must be ordered separately.



HOW TO ORDER REPLACEMENT PARTS

1. To be sure you receive the correct replacement parts, kits or accessories, always give all of the information requested in the chart below.
2. Check the parts list to identify the correct part number; do not use the ref. no. when ordering.
3. Order all parts from your nearest Graco distributor.

6 digit Part Number	Qty	Part Description

*Included in Repair Kit 222-459.

**Recommended "tool box" repair parts.

ACCESSORIES

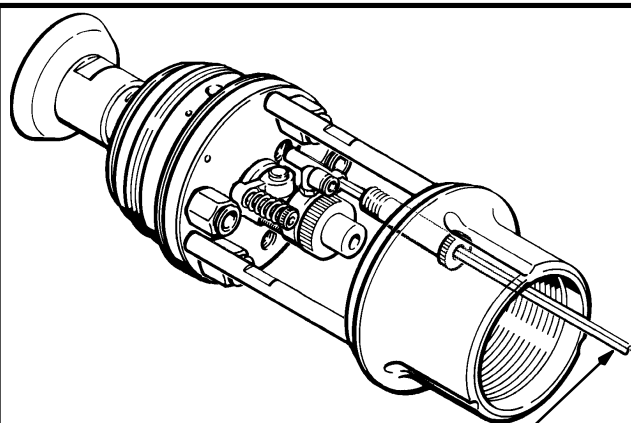
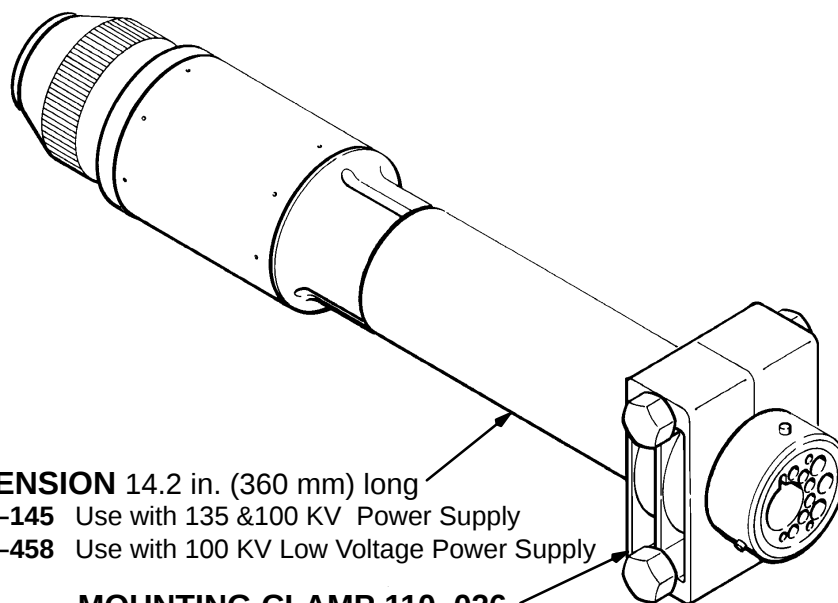
Accessories must be purchased separately.
Use only **GENUINE GRACO PARTS AND ACCESSORIES**.

EXTENSION 14.2 in. (360 mm) long

222-145 Use with 135 & 100 KV Power Supply

222-458 Use with 100 KV Low Voltage Power Supply

MOUNTING CLAMP 110-026



FIBER OPTIC CABLE 222-455

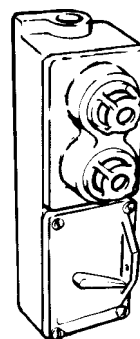
50 ft. (15 m) long

**FIBER OPTIC TRANSMITTER/
RECEIVER 598-949**

**TURBINE SPEED MONITOR OR
CONTROLLER**

To monitor and/or control the turbine speed of the CT-4000 Cartridge Ball Bearing Atomizer. Contact your Graco representative for further information.

**REMOTE SWITCH & SIGNAL LIGHT
728-386**



135 KV HIGH VOLTAGE CABLE

217-413 25 ft (8 m) long

217-414 50 ft (15 m) long

217-415 75 ft (23 m) long

217-416 100 ft (30 m) long

217-417 150 ft (45 m) long

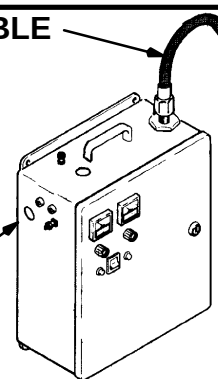
135 KV POWER SUPPLY

956-111 120 KV, analog

956-155 120 KV, standard

956-294 120 KV, 220 V input

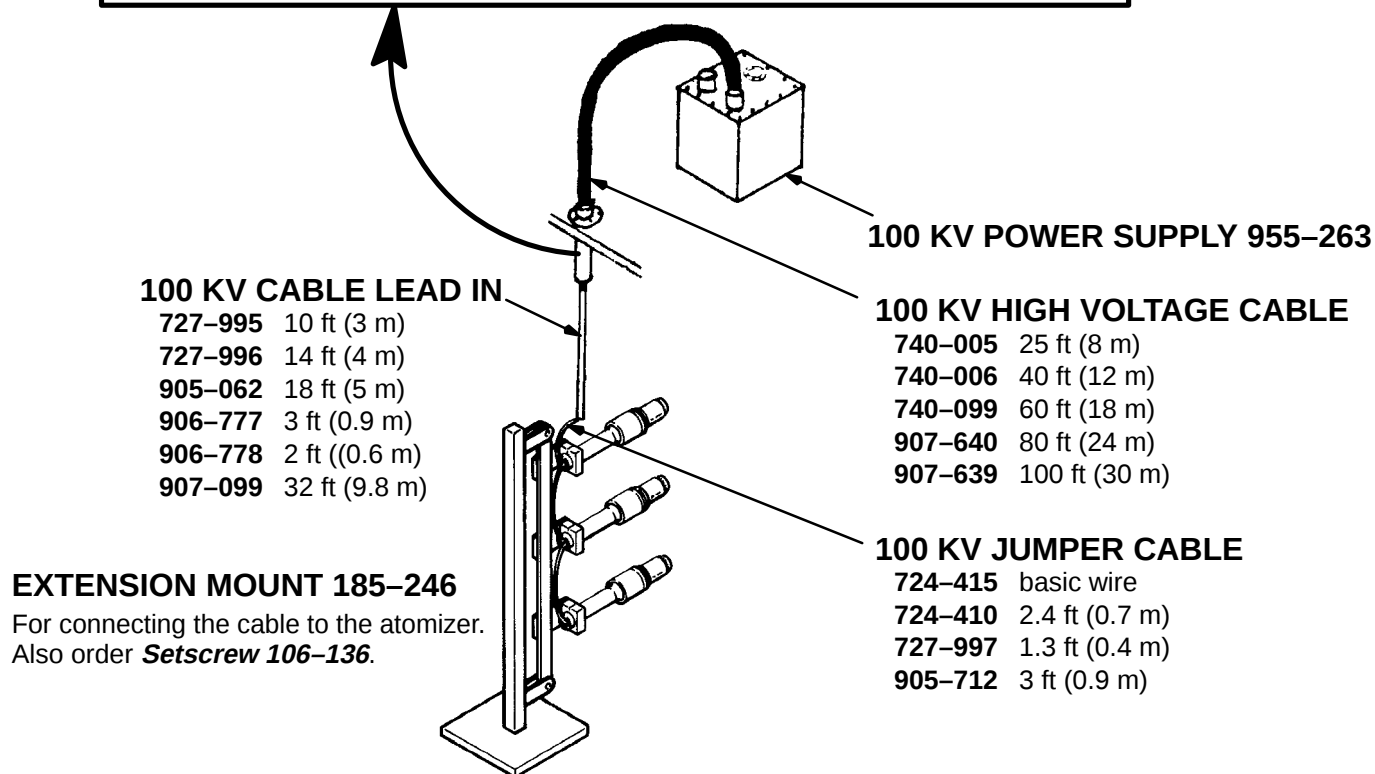
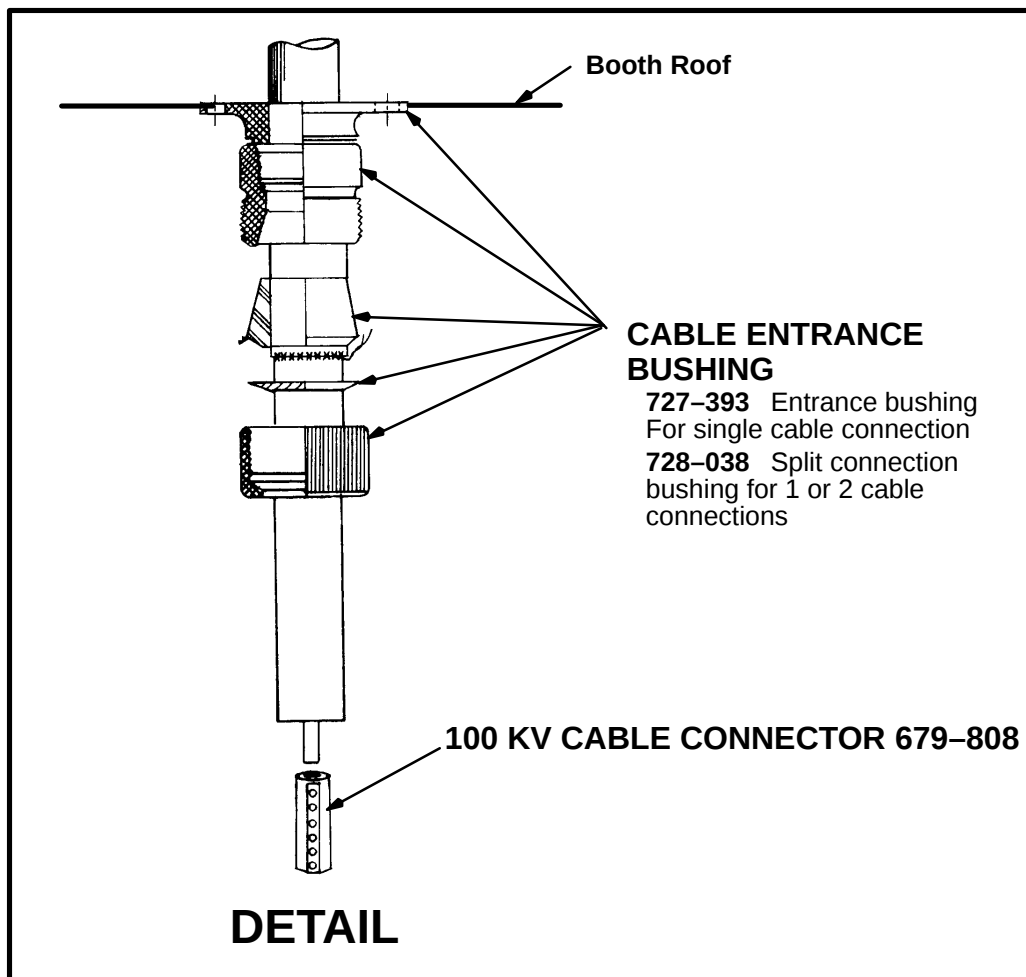
956-295 120 KV, 100 V input



ACCESSORIES

Accessories must be purchased separately.
Use only **GENUINE GRACO PARTS AND ACCESSORIES**.

NOTE: The Installation shown below is only intended as a guide. For assistance in system design, contact your Graco representative.



ACCESSORIES

Accessories must be purchased separately.
Use only **GENUINE GRACO PARTS AND ACCESSORIES**.

PAINT RESISTANCE METER 722-886

Used with 722-860 Paint Probe to measure paint resistance. **Not for use in Hazardous areas.**

PAINT PROBE 722-860

Used with 722-886 Paint Resistance Meter to measure paint resistance. **Not for use in Hazardous areas.**

AIR LINE VOLUME BOOSTER 110-252

Minimizes effects of air supply pressure variation and compensates for downstream air pressure changes.

AIR PURIFIER & FLOW EQUALIZER

110-054

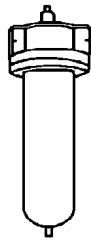
100 psi (7 bar) MAXIMUM WORKING PRESSURE

Coalescing filter with automatic drain valve & differential pressure indicator.

Largest aerosol particle passed: 1 micron

Largest solid particle passed: 0.4 micron

1 in. npt inlet & outlet



FILTER ELEMENT 110-055

Replaceable element for Filter 110-054, above.

AIR FILTER & MOISTURE SEPARATOR

250 psi (17.5 bar) MAXIMUM WORKING PRESSURE

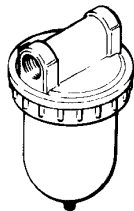
Pre-filter for cleaning and drying air in air spray system.

40 micron element

106-148 3/8 npt(f), 5 oz. bowl

106-149 1/2 npt(f), 8 oz. bowl

106-150 3/4 npt(f), 16 oz. bowl



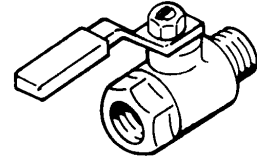
BLEED-TYPE MASTER AIR VALVE

300 psi (21 bar) MAXIMUM WORKING PRESSURE

Relieves air trapped in the air line between the pump air inlet and this valve when it is closed.

107-141 3/4 npt (m x f)

107-142 1/2 npt (m x f)

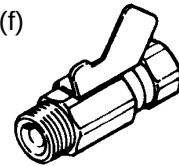


FLUID DRAIN VALVE 210-071

500 psi (35 bar) MAXIMUM WORKING PRESSURE

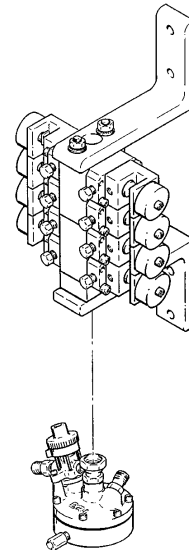
Use at fluid outlet to help relieve pressure.

3/8 npt(m) x 3/8 npt(f)



MODULAR COLOR CHANGER SYSTEM

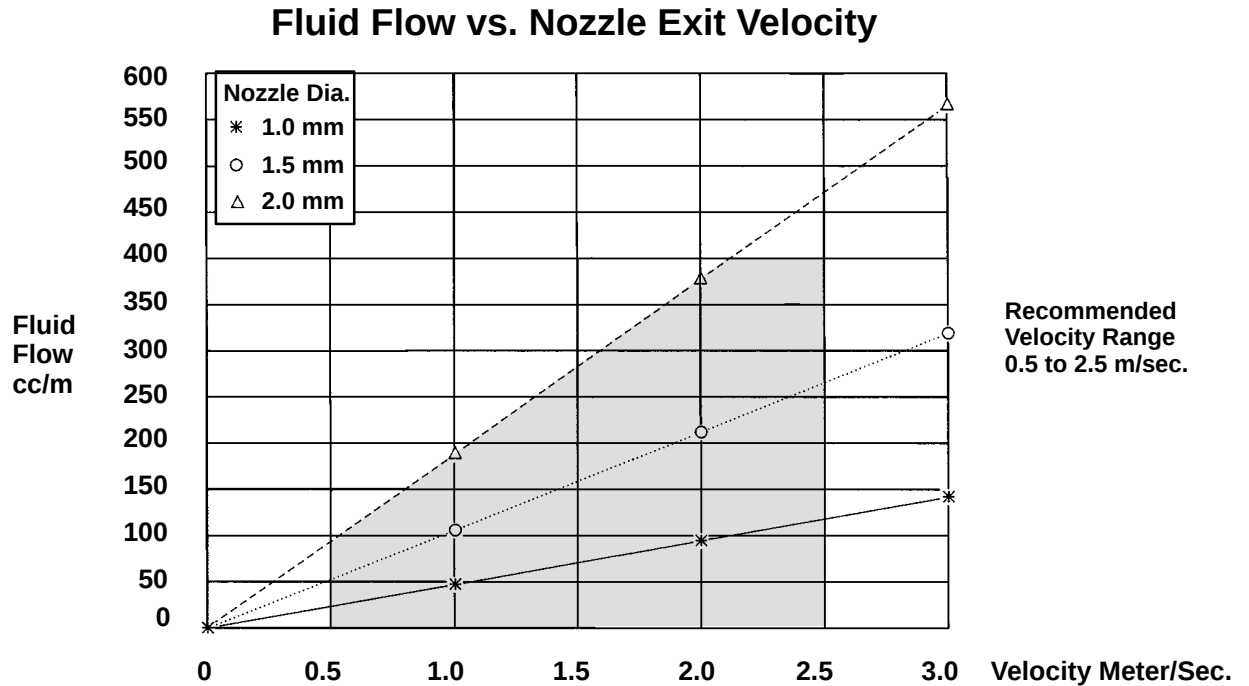
Comprised of modular color valves (one per color) mounted on connecting manifold blocks. Contact your Graco representative for further information.



FLUID REGULATOR 830-351

Remote air-piloted fluid regulator. Quick flush type with optional dump valve. Contact your Graco representative for further information.

FLUID NOZZLE SELECTION CHART



NOTE: To select a fluid nozzle for high deliveries (over 300 cc/min [10 fl oz/min]), or high viscosities (over 100 centipoise), or large particle loading in the pigment, consult your Graco representative. These conditions may require a special atomizing cup design.

Fluid Nozzles

Part No.	Description
222-478	2.0 mm orifice
222-477	1.5 mm orifice (standard)
222-476	1.0 mm orifice

TECHNICAL DATA

Fiber Optic Readout 1 pulse per revolution

Length 12 in. (305 mm)

Weight of Part No. 222-457 3.7 lb (1.67 kg)

Maximum Diameter 4.5 in. (115 mm)

Wetted Parts: Stainless Steel, Teflon®, Delrin®,

Aluminum (cup only)

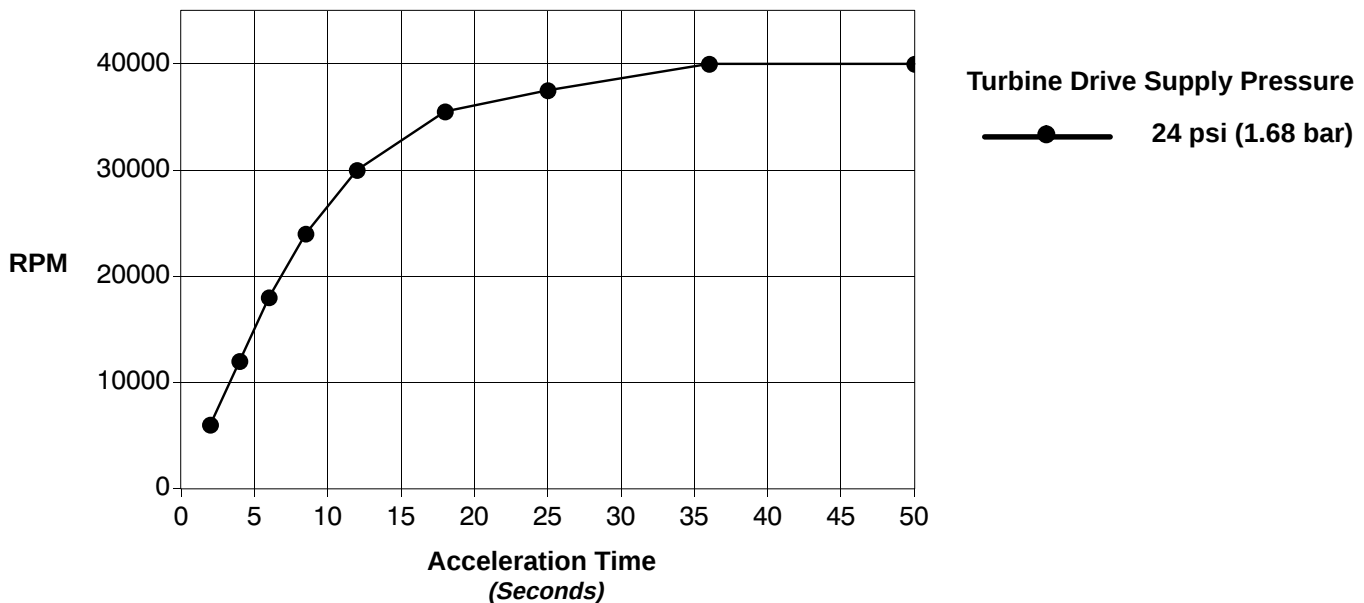
[®], Viton[®] and Teflon[®] are registered

Chemrez®, *Delrin®*, *Viton®* and *Teflon®* are registered trademarks of the DuPont Co.

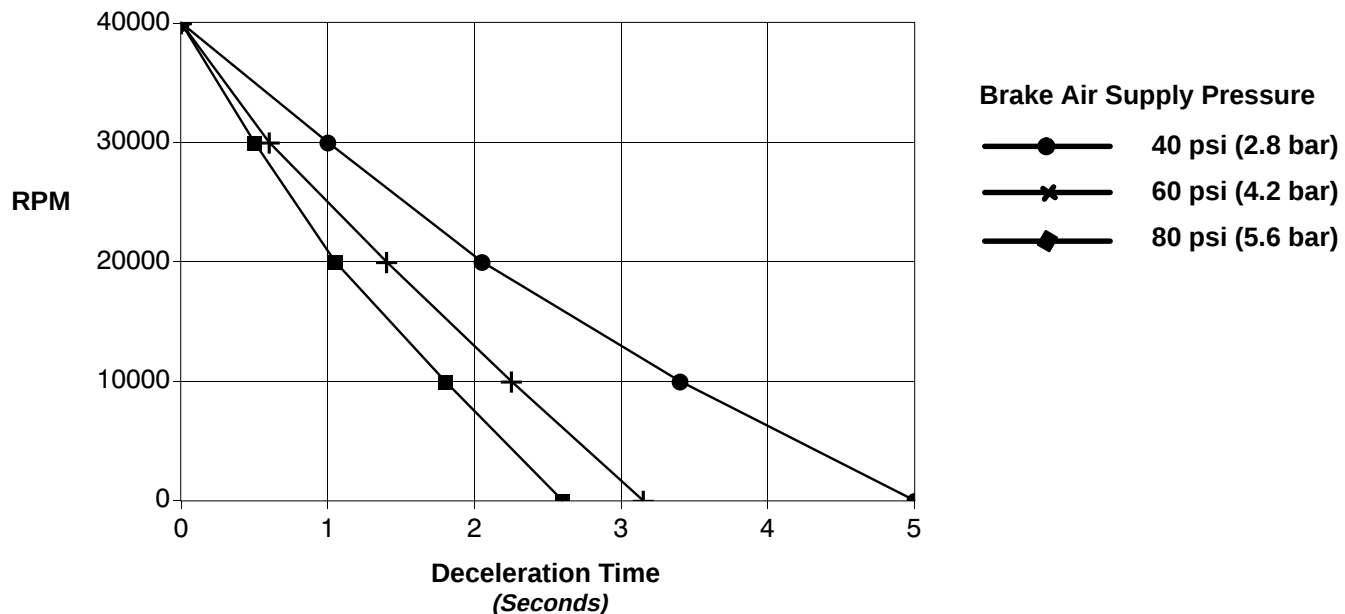
trademarks of the Bar Ont. Co.

PERFORMANCE CHARTS

Acceleration Performance

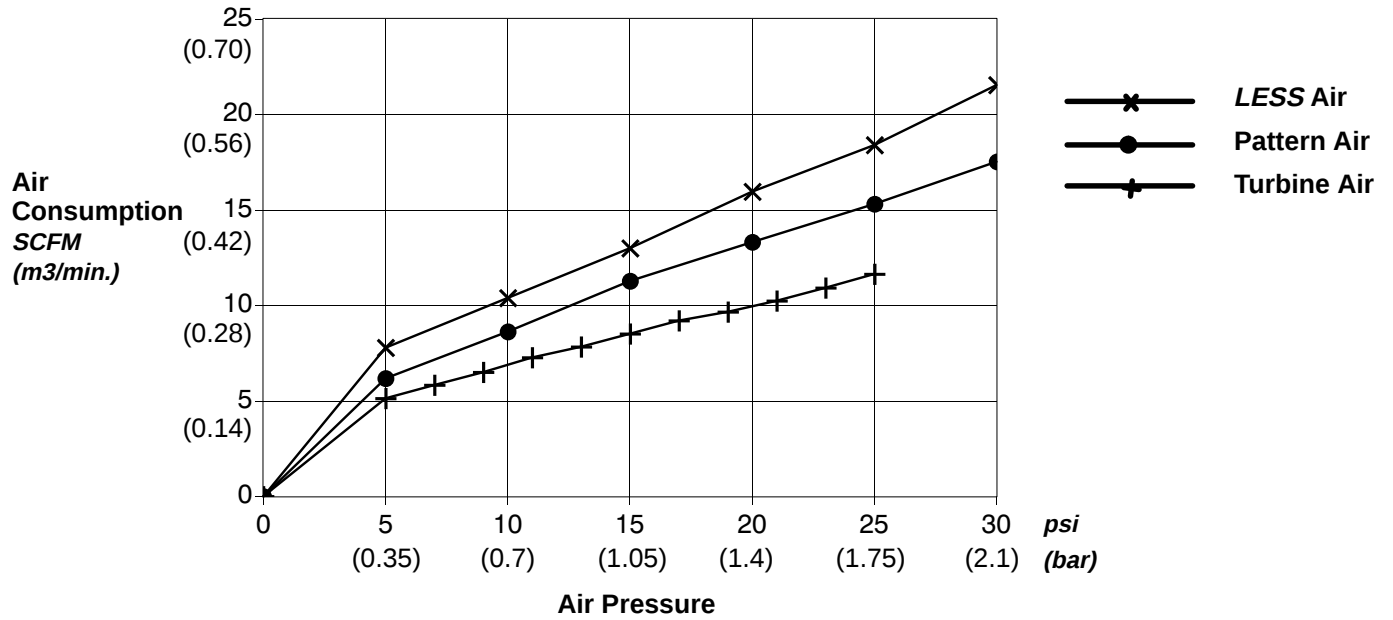


Deceleration Performance

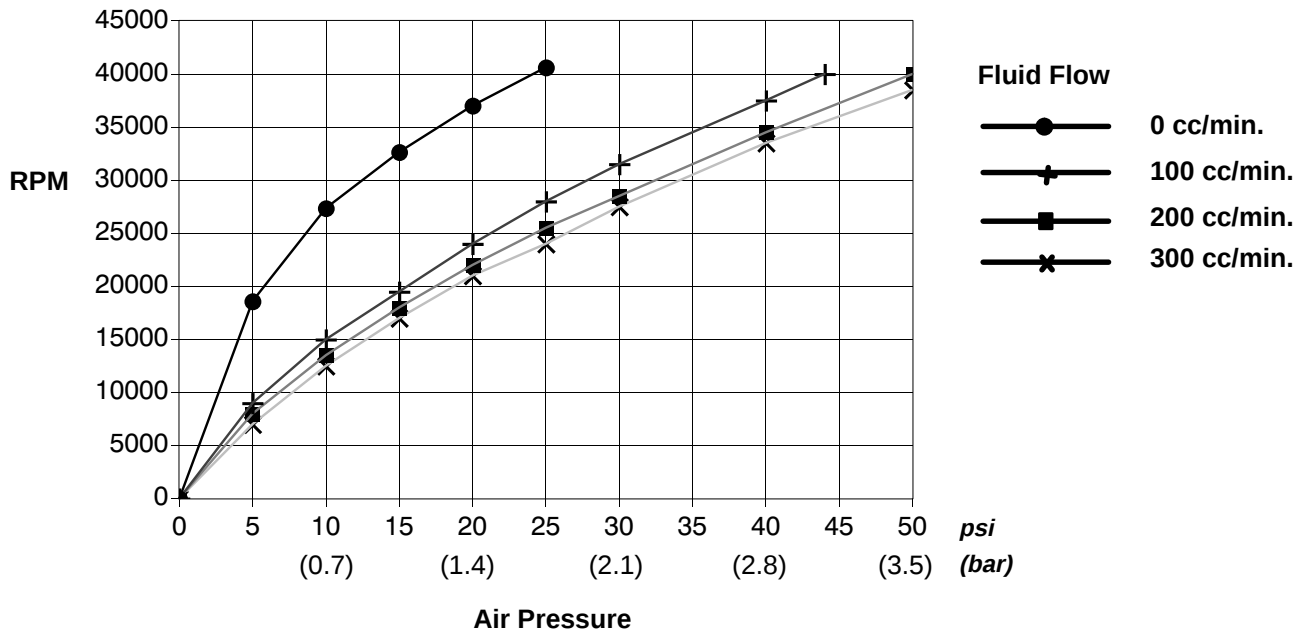


PERFORMANCE CHARTS

Air Consumption vs Pressure



RPM vs PSI with Fluid Flow



SERVICE INFORMATION

Changed design of wrench 222–273 (item 23d) and made general update of text.

IMPORTANT PHONE NUMBERS

TO PLACE AN ORDER, contact your Graco distributor, or call this number to identify the distributor closest to you: **1-800-328-0211 Toll Free**

FOR TECHNICAL ASSISTANCE, service repair information or assistance regarding the application of Graco equipment: **1-800-543-0339 Toll Free**

GRACO WARRANTY AND DISCLAIMERS

WARRANTY

Graco, Inc. warrants all new equipment manufactured by it 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. As purchaser's sole remedy for breach of this warranty, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment proven defective, with the exception of defects in the bearing, which will be repaired or replaced for 2,000 hours of operation from the date of first installation. Repair or replacement of the bearing under this warranty will not serve to extend the warranty period beyond 2,000 hours from the date of first installation. 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, 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 with Graco equipment of 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 for examination by Graco to verify 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.

DISCLAIMERS AND LIMITATIONS

THE TERMS OF THIS WARRANTY CONSTITUTE PURCHASER'S SOLE AND EXCLUSIVE REMEDY AND ARE IN LIEU OF ANY OTHER WARRANTIES (EXPRESS OR IMPLIED), INCLUDING WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, AND OF ANY NON-CONTRACTUAL LIABILITIES, INCLUDING PRODUCT LIABILITIES, BASED ON NEGLIGENCE OR STRICT LIABILITY. EVERY FORM OF LIABILITY FOR DIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OR LOSS IS EXPRESSLY EXCLUDED AND DENIED. IN NO CASE SHALL GRACO ROBOTIC'S LIABILITY EXCEED THE AMOUNT OF THE PURCHASE PRICE. ANY ACTION FOR BREACH OF WARRANTY MUST BE BROUGHT WITHIN TWO (2) YEARS OF THE DATE OF SALE.

EQUIPMENT NOT COVERED BY GRACO, INC. WARRANTY

GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO ACCESSORIES, EQUIPMENT, MATERIALS, OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO. These items sold, but not manufactured by Graco (such as electric motor, 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.

Factory Branches: Atlanta, Chicago, Dallas, Detroit, Los Angeles, West Caldwell (N.J.)

Subsidiary and Affiliate Companies: Canada; England; Switzerland; France; Germany; Hong Kong; Japan

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