

# Instructions



## Pro Xp™ Auto Air Spray Gun

333010K

EN

***Automatic Electrostatic Gun for use in Class I, Div. I Hazardous Locations using Group D spray materials.***

***Automatic Electrostatic Gun for use in Group II, Zone 1 Explosive Atmosphere Locations using Group IIA spray materials.***

***For professional use only.***

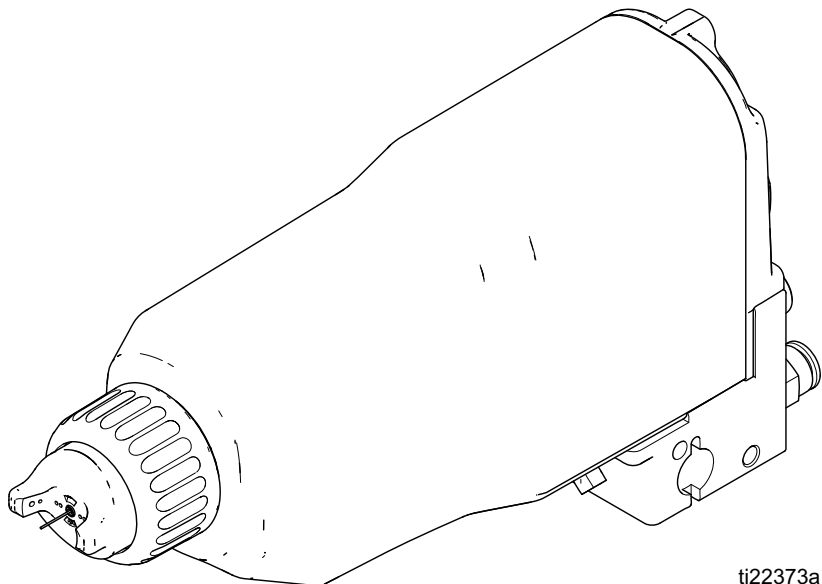
*100 psi (0.7 MPa, 7 bar) Maximum Air Inlet Press*

*100 psi (0.7 MPa, 7 bar) Maximum Working Fluid Pressure*



### **Important Safety Instructions**

Read all warnings and instructions in this manual before using the equipment. Save these instructions.



ti22373a

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# Models

All models have a 1.5 mm nozzle.

Part No.	kV	Display	Coatings	Manifold Mount
LA1M10	85	Smart	Standard	Rear
LA1M16	85	Smart	High Conductivity/High Wear	Rear
LA1T10	85	Standard	Standard	Rear
LA1T16	85	Standard	High Conductivity/High Wear	Rear
LA2M10	85	Smart	Standard	Bottom
LA2M16	85	Smart	High Conductivity/High Wear	Bottom
LA2T10	85	Standard	Standard	Bottom
LA2T16	85	Standard	High Conductivity/High Wear	Bottom

# Approvals



0.24 mJ  
 FM14ATEX0081  
 FM22UKEX0032  
 EN 50050-1  
 Ta 0°C-50°C











# Related Manuals







Manual No.	Description
332989	Instructions - Pro Xp Auto Control Module

# 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.

 <h1 style="margin: 0;">WARNING</h1>	
    	<p><b>FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD</b></p> <p>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, explosion, and electric shock:</p> <ul style="list-style-type: none"> <li>• Electrostatic equipment must be used only by trained, qualified personnel who understand the requirements of this manual.</li> <li>• Ground all equipment, personnel, object being sprayed, and conductive objects in or close to spray area. Resistance must not exceed 1 megohm. See <b>Grounding</b> instructions.</li> <li>• Only use grounded Graco conductive air supply hoses.</li> <li>• Do not use pail liners unless they are conductive and grounded.</li> <li>• <b>Stop operation immediately</b> if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem.</li> <li>• Check gun resistance, hose resistance, and electrical grounding daily.</li> <li>• Use and clean equipment only in well ventilated area.</li> <li>• Interlock the gun air and fluid supply to prevent operation unless ventilation air flow is above the minimum required value.</li> <li>• Use cleaning solvents with highest possible flash point when flushing or cleaning equipment.</li> <li>• Never spray or flush solvent at high pressure.</li> <li>• To clean the exterior of the equipment, cleaning solvents must have a flash point at least 5°C (9°F) above ambient temperature. Non-ignitable fluids are preferred.</li> <li>• Always turn the electrostatics off when flushing, cleaning or servicing equipment.</li> <li>• Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static sparking).</li> <li>• Do not plug or unplug power cords or turn lights on or off when flammable fumes are present.</li> <li>• Keep work area free of debris, including solvent, rags and gasoline.</li> <li>• Keep the spray area clean at all times. Use non-sparking tools to clean residue from the booth and hangers.</li> <li>• Keep a working fire extinguisher in the work area.</li> </ul>
 	<p><b>PRESSURIZED EQUIPMENT HAZARD</b></p> <p>Fluid from the equipment, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury.</p> <ul style="list-style-type: none"> <li>• Follow the <b>Pressure Relief Procedure</b> when you stop spraying/dispensing and before cleaning, checking, or servicing equipment.</li> <li>• Tighten all fluid connections before operating the equipment.</li> <li>• Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately.</li> </ul>

# ! WARNING

 	<p><b>EQUIPMENT MISUSE HAZARD</b></p> <p>Misuse can cause death or serious injury.</p> <ul style="list-style-type: none"> <li>• Do not operate the unit when fatigued or under the influence of drugs or alcohol.</li> <li>• Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See <b>Technical Specifications</b> in all equipment manuals.</li> <li>• Use fluids and solvents that are compatible with equipment wetted parts. See <b>Technical Specifications</b> in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request Safety Data Sheet (SDS) from distributor or retailer.</li> <li>• Do not leave the work area while equipment is energized or under pressure.</li> <li>• Turn off all equipment and follow the <b>Pressure Relief Procedure</b> when equipment is not in use.</li> <li>• Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.</li> <li>• Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.</li> <li>• Make sure all equipment is rated and approved for the environment in which you are using it.</li> <li>• Use equipment only for its intended purpose. Call your distributor for information.</li> <li>• Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.</li> <li>• Do not kink or over bend hoses or use hoses to pull equipment.</li> <li>• Keep children and animals away from work area.</li> <li>• Comply with all applicable safety regulations.</li> </ul>
 	<p><b>PLASTIC PARTS CLEANING SOLVENT HAZARD</b></p> <p>Many solvents can degrade plastic parts and cause them to fail, which could cause serious injury or property damage.</p> <ul style="list-style-type: none"> <li>• Use only compatible solvents to clean plastic structural or pressure-containing parts.</li> <li>• See <b>Technical Specifications</b> in all equipment manuals for materials of construction. Consult the solvent manufacturer for information and recommendations about compatibility.</li> </ul>
	<p><b>TOXIC FLUID OR FUMES HAZARD</b></p> <p>Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.</p> <ul style="list-style-type: none"> <li>• Read Safety Data Sheet (SDS) to know the specific hazards of the fluids you are using.</li> <li>• Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.</li> </ul>
	<p><b>PERSONAL PROTECTIVE EQUIPMENT</b></p> <p>Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. This protective equipment includes but is not limited to:</p> <ul style="list-style-type: none"> <li>• Protective eyewear, and hearing protection.</li> <li>• Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.</li> </ul>

# Introduction

## How the Electrostatic Air Spray Gun Works

The automatic electrostatic air spray gun operates very similar to a traditional air spray gun. The atomization and fan air are emitted from the air cap. The atomization air breaks up the fluid stream and controls the droplet size. The fan air controls the shape and width of the spray pattern. The fan and atomization air can be adjusted independently.

## Operating the Spray Function

Applying a minimum of 60 psi (0.42 MPa, 4.2 bar) air pressure to the gun manifold's cylinder air fitting (CYL) will retract the gun piston, which opens the air valves and a short time later opens the fluid needle. This provides the proper air lead and lag when triggering the gun. A spring returns the piston when the cylinder air is shut off.

## Operating the Electrostatics

To operate the electrostatics, apply air pressure to the gun manifold's turbine air fitting (TA) through a Graco Grounded Turbine Air Hose. The air enters the manifold and is directed to the inlet of the power supply turbine. The air spins the turbine, which then provides electrical power to the internal high voltage power supply. The fluid is charged by the spray gun electrode. The charged fluid is attracted to the nearest grounded object, wrapping around and evenly coating all surfaces.

## Gun Features and Options

- The gun's full voltage setting is 85kV.
- The gun is designed for use with a reciprocator, and can be mounted directly on a 1/2 in. (13 mm) rod. With additional brackets, the gun can be mounted for robotic applications.
- The gun's quick-disconnect design enables its removal without disconnecting the fluid and air lines to the gun.

## Smart Gun Features

Smart gun models with the Pro Xp Auto Control Module have the ability to:

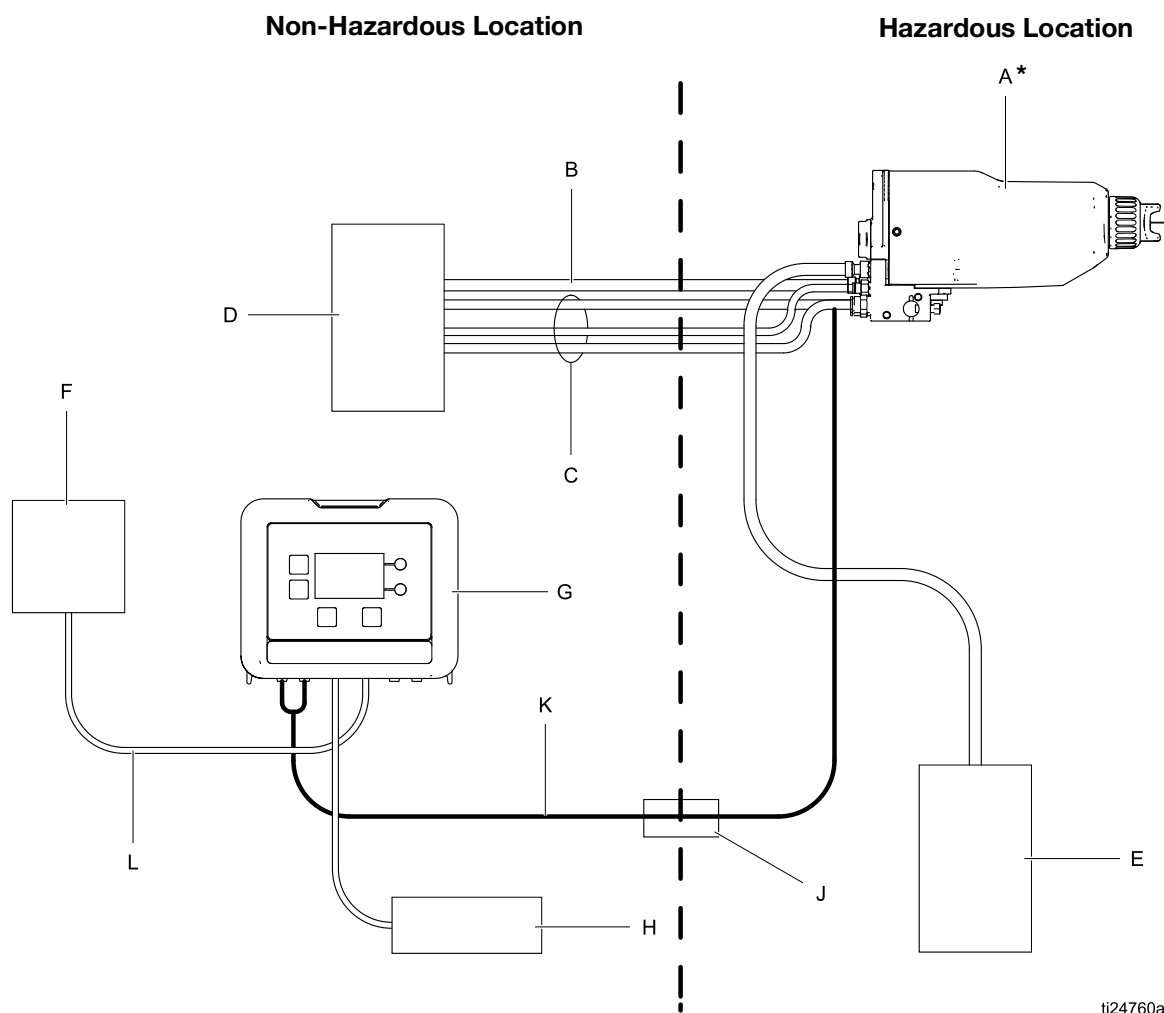
- Display the spraying voltage and current
- Change the gun voltage setting
- Display the gun turbine speed
- Store spray profiles
- Communicate equipment faults to a PLC
- Display and set maintenance totalizers
- Use a PLC to select a spray profile

See the ProXp Auto Control Module manual 332989 for more information.

## System Overview

### Typical System Installation

FIGURE 1 shows a typical electrostatic air spray system. It is not an actual system design. For assistance in designing a system to suit your particular needs, contact your Graco distributor.

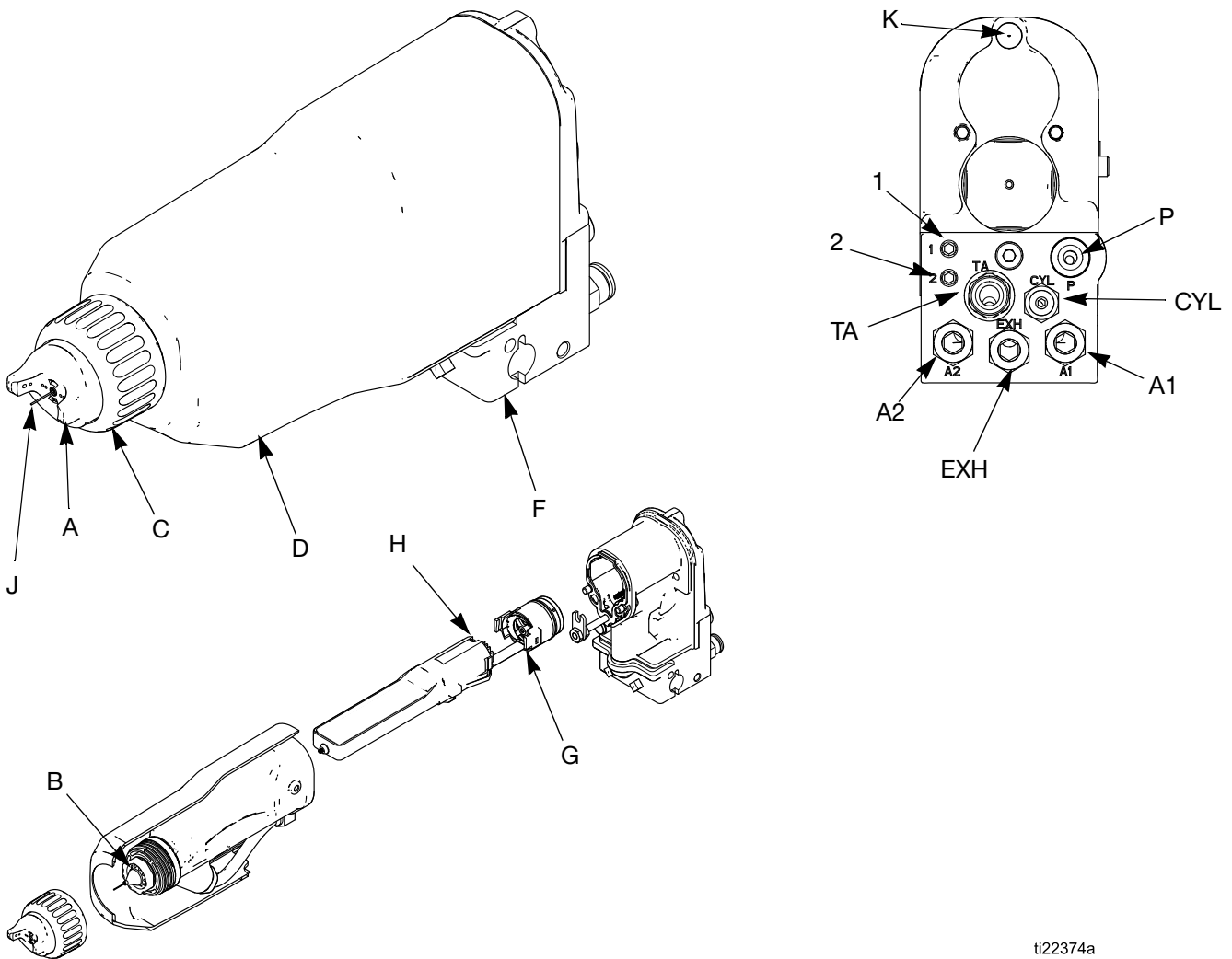


**FIG. 1. Typical System Installation**

A	Gun
B	Graco Grounded Turbine Air Hose
C	Atomizer, Fan, and Cylinder Air
D	Air Supply and controls
E	Fluid Supply and controls
* Approved for hazardous locations	

Smart System Components	
F	Programmable Logic Controller (PLC)
G	Pro Xp Auto Control Module
H	Power Supply (24 Volt)
J	Bulkhead (optional)
K	Fiber Optic F/O Cable
L	I/O Cable

## Gun Overview



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**FIG. 2. Gun Overview**

Key		Manifold Fittings and Indicators	
A	Air Cap	A1	Atomization Air Inlet Fitting
B	Fluid Nozzle	A2	Fan Air Inlet Fitting
C	Retaining Ring	CYL	Cylinder Air Inlet Fitting
D	Shroud	1	Fiber Optic Fitting Transmit (Operational on Smart models only)
F	Manifold/Mounting Bracket	2	Fiber Optic Fitting Receive (Operational on Smart models only)
G	Turbine	K	ES Indicator Light (Standard models only)
H	Power Supply	P	Fluid Supply Inlet Fitting
J	Electrode	TA	Turbine Air Inlet Fitting (to drive turbine)
		EXH	Exhaust Outlet Fitting



# Installation




## Install the System

				
<p>Installing and servicing this equipment requires access to parts which may cause electric shock or other serious injury if work is not performed properly.</p> <ul style="list-style-type: none"> <li>Do not install or service this equipment unless you are trained and qualified.</li> <li>Be sure your installation complies with local, state, and national codes for the installation of electrical apparatus in a Class I, Div. I, hazardous location or a Group II, Zone I explosive atmosphere location.</li> <li>Comply with all local codes and regulations.</li> </ul>				

## Warning Signs

Mount warning signs in the spray area where they can easily be seen and read by all operators. An English Warning Sign is provided with the gun.

## Ventilate the Spray Booth

				
<p>Do not operate the gun unless ventilating air flow is above the minimum required value. Provide fresh air ventilation to avoid the buildup of flammable or toxic vapors when spraying, flushing, or cleaning the gun. Interlock the gun air and fluid supply to prevent operation unless ventilating air flow is above the minimum required value.</p>				

The spray booth must have a ventilation system.




Electrically interlock the gun air and fluid supply with the ventilators to prevent gun operation any time that the ventilation air flow falls below minimum values. Check and follow all local codes and regulations regarding air exhaust velocity requirements. Verify the operation of the interlock at least once a year.

NOTE: The minimum allowable air exhaust velocity is 60 feet/minute (19 linear meters/minute). High velocity air exhaust will decrease the operating efficiency of the electrostatic system.

## Install the Air Line Accessories

See FIGURE 3.

1. Install a bleed-type master air valve (L) on the main air line (W) to shut off all air to the gun.
2. Install an air line filter/water separator on the gun air line to ensure a dry, clean air supply to the gun. Dirt and moisture can ruin the appearance of your finished workpiece and can cause the gun to malfunction.
3. Install a bleed-type air pressure regulator (M) on each of the air supply lines (B, C, D, E) to control air pressure to the gun.

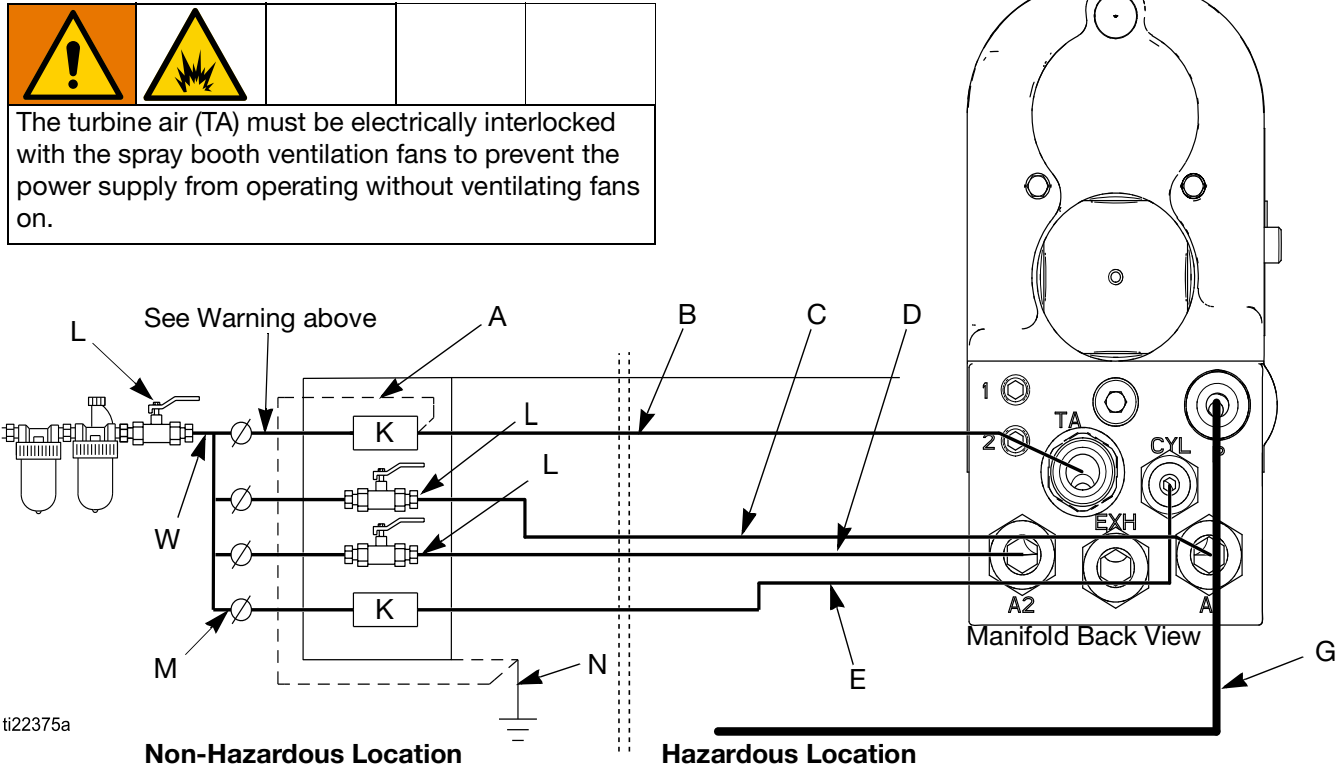
				
<p>Trapped air can cause the gun to spray unexpectedly, which can result in serious injury, including splashing fluid in the eyes or on the skin. The solenoid valves (K) must have a quick exhaust port so trapped air will be relieved between the valve and gun when the solenoids are shut off.</p>				

4. Install a solenoid valve (K) on the cylinder air line (E) to actuate the gun. The solenoid valve must have a quick exhaust port.
5. Install a solenoid valve (K) to actuate the turbine.

## Install the Fluid Line Accessories

1. Install a fluid filter and drain valve at the pump outlet.
2. Install a fluid regulator on the fluid line to control fluid pressure to the gun.

FIGURE 3 shows a typical electrostatic air spray system. It is not an actual system design. For assistance in designing a system to suit your particular needs, contact your Graco distributor.



**FIG. 3. Typical Installation**

Key to FIGURE 3

A	Air Hose Ground Wire
B	Graco Grounded Turbine Air Hose (TA)
C	Atomizing Air Hose, 5/16 in. (8 mm) OD (A1)
D	Fan Air Hose, 5/16 in. (8 mm) OD (A2)
E	Cylinder Air Hose, 5/32 in. (4 mm) OD (CYL)
G	Fluid Supply Hose to 1/4-18 npsm gun fluid inlet (P)

K	Solenoid Valve, requires quick exhaust port
L	Bleed-Type Master Air Valve
M	Air Pressure Regulator
N	True Earth Ground
W	Main Air Line

## Install the Gun

See FIGURE 4.

1. Loosen the manifold's two set screws (29) and slide the manifold (20) onto a 1/2 in. (13 mm) mounting rod.
2. Position the gun and tighten the two set screws.

For added positioning reliability, insert a 1/8 in. (3 mm) locating pin into the slot (NN) in the bracket and through a hole in the rod.

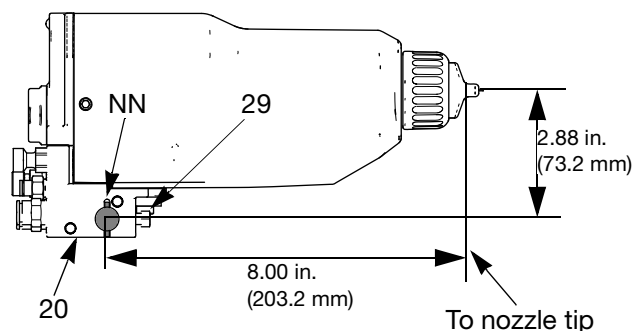


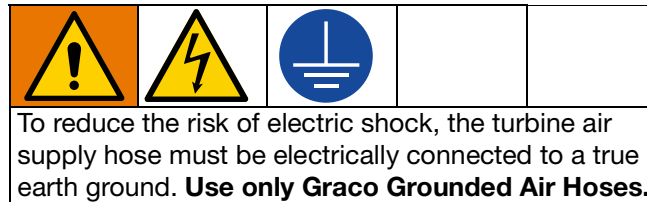
FIG. 4. Mounting

## Install the Pro Xp Auto Control Module

The Pro Xp Auto Control Module is required for use with smart models. To install a Pro Xp Auto Control Module, see the module instruction manual 332989.

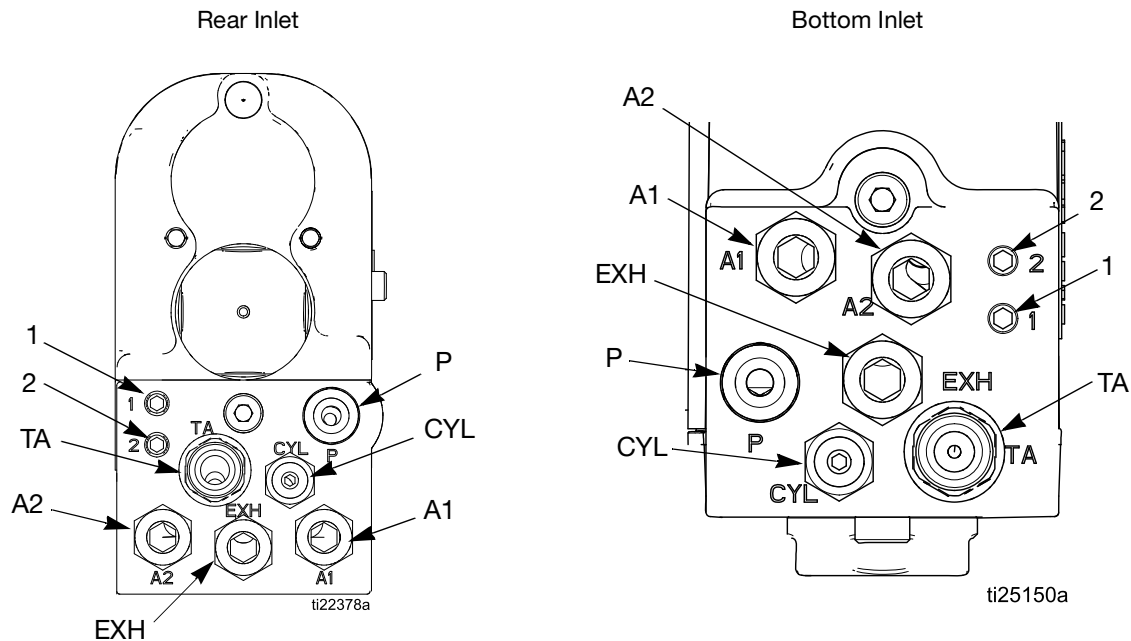
## Connect the Air and Fluid Lines

FIGURE 3 shows a schematic of air and fluid line connections, and FIGURE 5 shows the manifold connections. Connect the air and fluid lines as instructed below.



1. Connect the Graco Grounded Turbine Air Hose (B) to the gun's turbine air inlet (TA) and connect the air hose ground wire (A) to a true earth ground (N). The gun turbine air inlet fitting has left-hand threads to prevent connecting another type of air hose to the turbine air inlet.
2. Check the electrical grounding of the gun as instructed on page 14.
3. Before connecting the fluid line (P), blow it out with air and flush it with solvent. Use solvent which is compatible with the fluid to be sprayed.

## Manifold Connections



**FIG. 5. Manifold Connections**

A1	Atomization Air Inlet Fitting. Connect a 5/16 in. (8mm) OD tube between this fitting and the air supply.
A2	Fan Air Inlet Fitting. Connect a 5/16 in. (8 mm) OD tube between this fitting and the air supply.
CYL	Cylinder Air Inlet Fitting. Connect a 5/32 in. (4 mm) OD tube between this fitting and the solenoid. For quicker response, use the shortest hose length possible.
1	Fiber Optic Fitting Transmit (Operational on Smart models only). Connect the Graco Fiber Optic cable (see page 13).
2	Fiber Optic Fitting Receive (Operational on Smart models only). Connect the Graco Fiber Optic cable (see page 13).
P	Fluid Supply Inlet Fitting. Connect a 1/4 npsm swivel fitting between this fitting and the fluid supply.
TA	Turbine Air Inlet Fitting. Connect the Graco Electrically Conductive Air Hose between this fitting (left-hand thread) and the solenoid. Connect the air hose ground wire to a true earth ground.
EXH	Exhaust. Connect an exhaust tube to route the turbine exhaust air. 3 ft. max length. Fitting is for 5/16 in. OD tube.

## Fiber Optic Cable Connection

(Operational on Smart models only)

**NOTE:** Only use the supplied fiber optic cable.

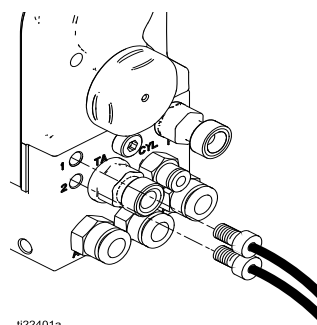
The fiber optic cable allows the gun to communicate with the Pro Xp Auto control module.

### For a 1 Gun System

1. Connect Port 1 of the gun 1 manifold to Port 1 of the Control Module.
2. Connect Port 2 of the gun 1 manifold to Port 2 of the Control Module.

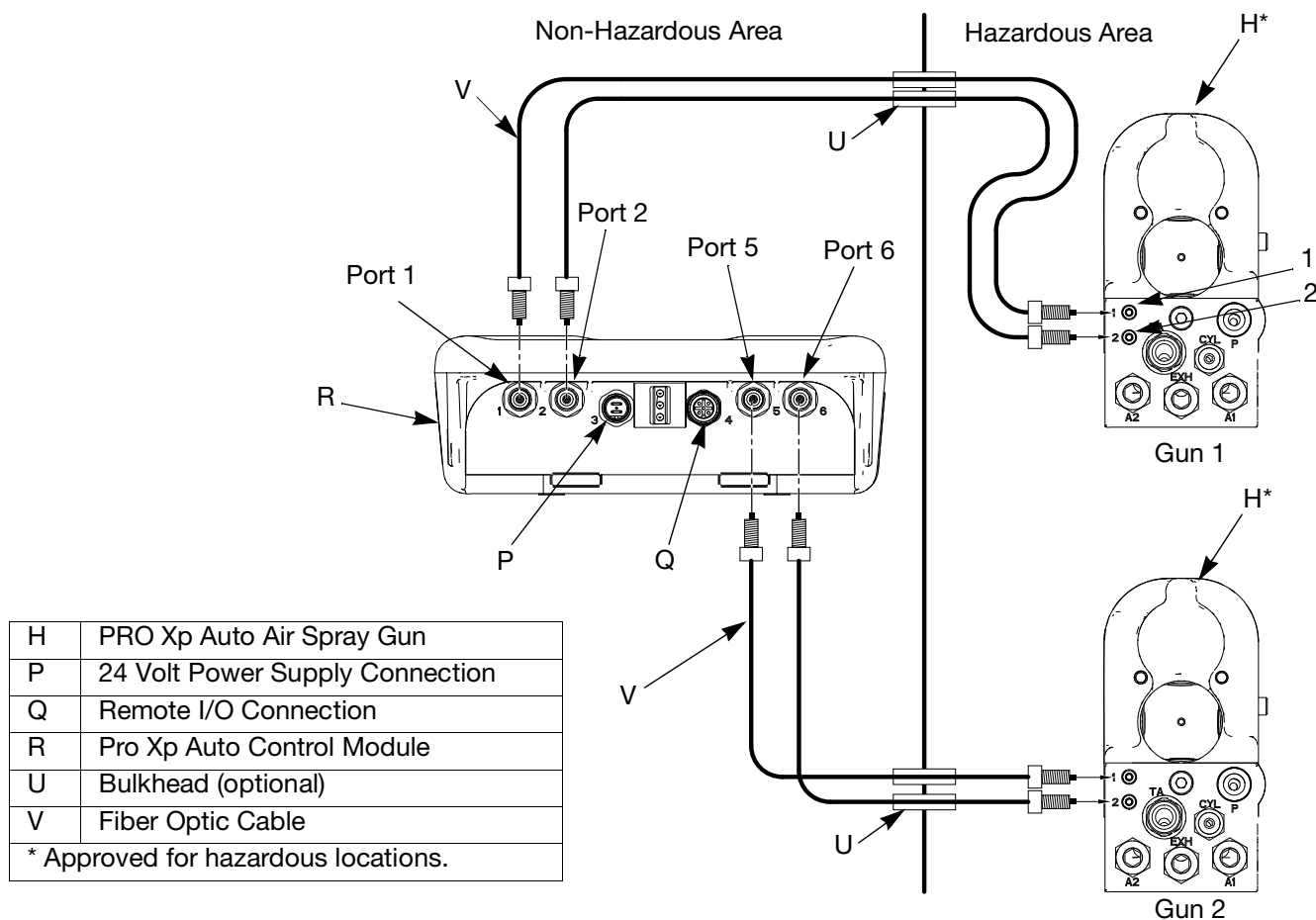
### For a 2 Gun System

1. Connect Port 1 of the gun 2 manifold to Port 5 of the Control Module.
2. Connect Port 2 of the gun 2 manifold to Port 6 of the Control Module.



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**FIG. 6. Making Fiber Optic Connections**



**FIG. 7. Fiber Optic Schematic**

## Grounding



The equipment must be grounded to reduce the risk of static sparking and electric shock. Electric or static sparking can cause fumes to ignite or explode. Improper grounding can cause electric shock. Ground all equipment, personnel, objects being sprayed, and conductive objects in or close to the spray area. The resistance must not exceed 1 megohm. Grounding provides an escape wire for the electric current.

When operating the electrostatic gun, any ungrounded objects (such as people, containers, and tools) in the spray location can become electrically charged.

The following are minimum grounding requirements for a basic electrostatic system. Your system may include other equipment or objects which must be grounded. Your system must be connected to a true earth ground. Check ground connections daily. Check your local electrical codes and regulations for detailed grounding instructions.

- **All persons entering the spray area:** Shoes must have conductive soles, such as leather, or personal grounding straps must be worn. Do not wear shoes with non-conductive soles such as rubber or plastic.
- **Object being sprayed:** Keep the workpiece hangers clean and grounded at all times. Resistance must not exceed 1 megohm.
- **Electrostatic Air Spray Gun:** Ground the gun by connecting the Graco Grounded Turbine Air Hose to the turbine air inlet and connecting the air hose ground wire to a true earth ground. See **Check Gun Electrical Grounding**, page 14.
- **Pump:** Ground the pump by connecting a ground wire and clamp as described in your separate pump instruction manual.
- **All electrically conductive objects or devices in the spray area:** including fluid containers and wash cans, must be properly grounded.

- **Fluid and waste containers:** Ground all fluid and waste containers in the spray area. Do not use pail liners unless they are conductive and grounded. When flushing the spray gun, the container used to catch the excess fluid must be electrically conductive and grounded.
- **Air compressors and hydraulic power supplies:** Ground the equipment according to the manufacturer's recommendations.
- **All air and fluid lines** must be properly grounded.
- **All electrical cables** must be properly grounded.
- **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.
- **Flammable liquids in the spray area:** must be kept in approved, grounded containers. Do not use plastic containers. Do not store more than the quantity needed for one shift.
- **All solvent pails:** Use only approved, grounded metal containers, which are conductive. Do not use plastic containers. Use only non-flammable solvents. Do not store more than the quantity needed for one shift.

## Check Gun Electrical Grounding



Megohmmeter Part No. 241079 (AA-see FIGURE 8) is not approved for use in a hazardous location. To reduce the risk of sparking, do not use the megohmmeter to check electrical grounding unless:




- The gun has been removed from the hazardous location;
- Or all spraying devices in the hazardous location are turned off, ventilation fans in the hazardous location are operating, and there are no flammable vapors in the area (such as open solvent containers or fumes from spraying).

Failure to follow this warning could cause fire, explosion, and electric shock and result in serious injury and property damage.

Graco Part No. 241079 Megohmmeter is available as an accessory to check that the gun is properly grounded.

1. Have a qualified electrician check the electrical grounding continuity of the spray gun and turbine air hose.
2. Make sure the turbine air hose (B) is connected and the hose ground wire is connected to a true earth ground.
3. Turn off the air and fluid supply to the gun. The fluid hose must not have any fluid in it.
4. Measure the resistance between the turbine air inlet fitting (TA) and a true earth ground (N).
  - a. *If using a black or gray turbine air hose, use a megohmmeter to measure the resistance. Use an applied voltage of 500 minimum to 1000 volts maximum. The resistance should not exceed 1 megohm.*
  - b. *If using a red turbine air hose, use an ohmmeter to measure the resistance. The resistance should not exceed 100 ohms.*
5. If the resistance is greater than the maximum reading specified above for your hose, check the tightness of the ground connections and be sure the turbine air hose ground wire is connected to a true earth ground. If the resistance is still too high, replace the turbine air hose.

## Check Fluid Resistivity

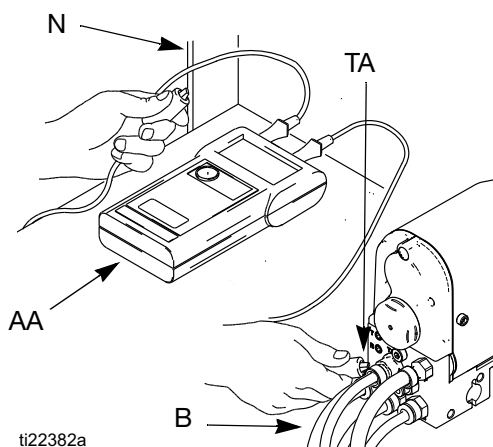
				
To reduce the risk of fire, explosion, or electric shock, check the fluid resistivity in a non-hazardous location only. Resistance Meter 722886 and Probe 722860 are not approved for use in a hazardous location.				

Check that the resistivity of the fluid being sprayed meets the requirements for an electrostatic air spray system. Graco Part No. 722886 Resistance Meter and 722860 Probe are available as accessories. Follow the instructions included with the meter and probe.

Fluid resistivity readings of at least 25 megohms-cm generally provide the best electrostatic results and are recommended.

A high conductivity kit or high conductivity hose may be required for readings less than 25 megohm-cm.

Megaohms-cm			
1-7	7-25	25-200	200-2000
High Conductivity Kit recommended	High Conductivity Kit may be needed	Best electrostatic results	Good electrostatic results



**FIG. 8. Check Gun Grounding**

## Check Fluid Viscosity

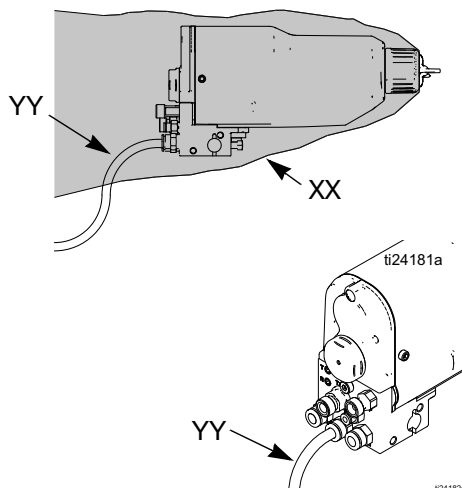
To check fluid viscosity you will need:

- a viscosity cup
  - a stopwatch
1. Completely submerge the viscosity cup in the fluid. Lift the cup out quickly, starting the stopwatch as soon as the cup is completely removed.
  2. Watch the stream of fluid coming from the bottom of the cup. As soon as there is a break in the stream, shut off the stopwatch.
  3. Record the fluid type, elapsed time, and size of the viscosity cup.
  4. Compare to the chart supplied by viscosity cup manufacturer to determine your fluid viscosity.
  5. If the viscosity is too high or too low, contact the material supplier. Adjust as necessary.

## Install the Fabric Cover

See FIGURE 9.

1. Install a fabric cover (XX) over the front of the gun and slide it back to cover the exposed tubing and hoses at the back of the manifold.
2. Route the exhaust tube (YY) outside the cover. This enables you to monitor the exhaust tube for the presence of any paint or solvent. See **Check for Fluid Leakage** on page 23. Strap down the exhaust tube to prevent it from moving around.



**FIG. 9. Fabric Cover**

## Flush Before Using Equipment

The equipment was tested in fluid at the factory. To avoid contaminating your fluid, flush the equipment with a compatible solvent before using the equipment. See **Flushing**, page 21.

## Guidelines for Abrasive Materials

When spraying abrasive materials, follow these guidelines:

- Order Part No. 24N704 Electrode (blue) for abrasive materials.
- Size the nozzle properly to reduce fluid pressure below 30 psi (0.21 MPa, 2.1 bar), producing an 8–12 in. (200–300 mm) fluid stream.
- Use the minimum atomizing and fan air pressures possible to achieve a good pattern.
- Follow all procedures under **Daily Care and Cleaning Checklist**, page 21.
- Inspect the electrode daily and replace if damaged. See **Electrode Replacement**, page 31.



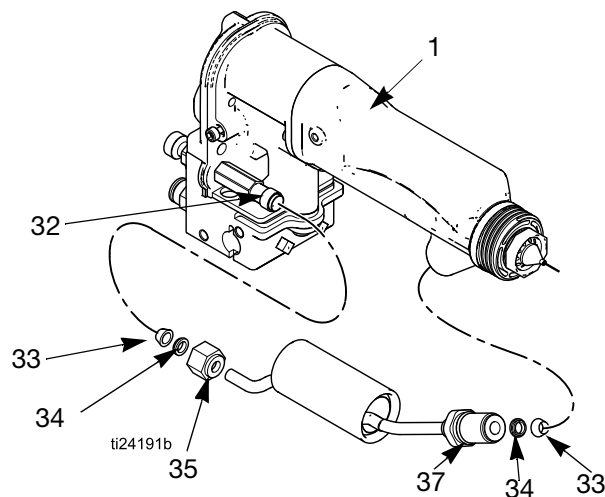
## High Conductivity (HC) Conversion Kit

Part No. 25N922 Conversion Kit is available to convert any Pro Xp Auto standard coating gun (Part No. LAxx10) to a high conductivity gun (LAxx16). For example, LA1T10 standard can be converted to LA1T16 High Conductivity. See **Models**, page 3.

The kit is for use with fluids with low resistivity values.

1. Turn the turbine air (TA) off.
2. Flush the gun. See **Flushing**, page 21.
3. Relieve the pressure. Follow the **Pressure Relief Procedure**, page 18.
4. Refer to the parts drawing for **LA1T10, Standard Coatings, Rear Manifold, Series B** on page 40.
5. Remove the retaining ring (24), air cap (25), and shroud (26).
6. Loosen the nut (35) and remove the fluid tube (39), and ferrules (33, 34) from the fluid fitting. Remove the other parts (33, 34, 36, 37, 39) at the gun barrel inlet and discard.
7. Make sure the barrel threads are clean and dry. Apply Graco Part No. 116553 dielectric grease to the fluid fitting threads (37), inner diameter, and o-rings. Thread the fitting into the barrel inlet.
8. Slide the ferrules (33, 34) onto the end of the tube. Push the fluid tube into the barrel and hold it in place while threading the fitting into the barrel. Torque to 25-35 in-lbs (3-4 N•m).

9. Slide the nut (35) and ferrule (33, 34) onto the tube. Insert the end of the tube into the fitting (32). Make sure the ferrules seat in the fitting. Tighten the nut (35).



**FIG. 10. HC Conversion Kit**

# Operation

## Pressure Relief Procedure



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

1. Turn off all the air to the spray gun except the cylinder air, which triggers the gun. If an air pilot fluid regulator is used in the system, the air pressure is needed at the regulator air inlet.
2. Turn off the fluid supply to the gun.
3. Trigger the gun into a grounded metal waste container to relieve the fluid pressure.
4. If an air pilot fluid regulator is used, turn off the air pressure at the regulator air inlet.
5. Relieve fluid pressure in the fluid supply equipment as instructed in its instruction manual.
6. Turn off the main air supply by closing the bleed-type master air valve on the main air supply line. Leave the valve closed until you are ready to spray again.

## Startup

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

- All operators are properly trained to safely operate an automatic electrostatic air spray system as instructed in this manual.
- All operators are trained in the **Pressure Relief Procedure** on page 18.
- The warning sign provided with the gun is mounted in the spray area where it can be easily seen and read by all operators.
- The system is thoroughly grounded and the operator and all persons entering the spray area are properly grounded. See **Grounding** on page 14.
- The condition of the gun's electrical components has been checked as instructed in **Electrical Tests** on page 24.
- Ventilation fans are operating properly.
- Workpiece hangers are clean and grounded.
- All debris, including flammable fluids and rags, is removed from the spray area.
- All flammable fluids in the spray booth are in approved, grounded containers.
- All conductive objects in the spray area are electrically grounded and the floor of the spray area is electrically conductive and grounded.
- The manifold exhaust tubes have been checked for the presence of any fluid as instructed in **Check for Fluid Leakage** on page 23.

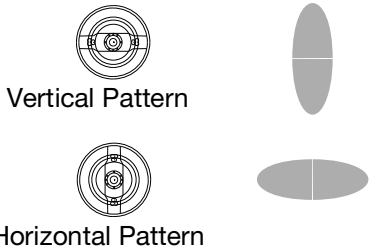
# Adjust the Spray Pattern

Follow the steps below to establish the correct fluid flow and air flow. **Do not** turn on the turbine air (TA) yet.



To reduce the risk of an injury, follow the **Pressure Relief Procedure** whenever you are instructed to relieve the pressure.

1. Relieve the pressure. Follow the **Pressure Relief Procedure**, page 18.
2. Select and install the appropriate air cap and nozzle for your application. See **Fluid Nozzle Selection Chart**, page 52 and **Air Cap Selection Chart**, page 55.
3. Loosen the air cap retaining ring, and rotate the air cap for a vertical or horizontal spray pattern. See FIGURE 11. Tighten the retaining ring until the air cap is held firmly in place; you should not be able to rotate the air cap horns by hand.



**Fig. 11. Air Cap Positions**

4. Adjust the fluid flow with the fluid pressure regulator. Refer to the Performance Charts on pages 53 to set the fluid pressure for various fluid flows, according to the size of the fluid nozzle being used.
5. Use the air pressure regulator on the atomization air supply line (A1) to adjust the degree of atomization. For example, for a fluid flow rate of 10 ounces per minute (0.3 liters per minute), a typical atomization pressure would be 20-30 psi (1.4-2.1 bar, 0.14-0.21 MPa) at the gun manifold.

For the most efficiency, always use the lowest air pressure possible.

6. Use the air pressure regulator on the fan air supply line (A2) to adjust the pattern size.

- When increasing to a long, flat pattern, it may be necessary to increase the supply of fluid to the gun to maintain the same amount of coverage over a large area.
- See **Spray Pattern Troubleshooting** on page 26 to correct spray pattern problems.

# Adjust the Electrostatics

1. Turn on the turbine air (TA) and adjust the air pressure per the settings in Table 1 . Set the proper pressure at the turbine air hose inlet *when air is flowing*.

**Table 1. Approximate Dynamic Turbine Air Pressures**

Turbine Air Hose Length ft (m)	Air pressure at turbine air hose inlet for full voltage psi (bar, MPa)
15 (4.6)	54 (3.8, 0.38)
25 (7.6)	55 (3.85, 0.38)
36 (11)	56 (3.9, 0.39)
50 (15.3)	57 (4.0, 0.40)
75 (22.9)	59 (4.1, 0.41)
100 (30.5)	61 (4.3, 0.43)

2. Check the turbine speed of the gun by checking the indicator light on the standard gun body or for the smart gun check the actual turbine speed on the Pro Xp Auto Control Module. See the following table. Adjust the air pressure as necessary to keep the indicator light green or the values within 400-750 Hz.

Smart models display values, standard models display color indicator lights.

**Table 2. Indicator Colors**



Indicator Color	Description
Green 400-750 Hz	When spraying, the indicator should remain green, indicating sufficient air pressure to the turbine.
Amber <400	If the indicator changes to amber after 1 second, the air pressure is too low. Increase air pressure until the indicator is green.
Red >750	If the indicator changes to red after 1 second, the air pressure is too high. Decrease air pressure until the indicator is green. Excessive turbine speed can shorten the bearing life and will not increase the voltage output.

Check the voltage output of the gun using a high voltage probe and meter or by reading the Pro Xp Auto Control Module.

The gun’s normal high voltage reading is 60-70 kV. If a ball end high voltage measurement probe is used, the gun voltage will rise to about 85 kV. This will happen with all resistive electrostatic guns.




See **Electrical Troubleshooting** on page 28 to correct voltage problems.

## Spraying

				
To reduce the risk of electric shock, do not touch the gun electrode or come within 4 in. (10 cm) of the nozzle during gun operation.				

1. Apply a minimum of 60 psi (4.2 bar, 0.42 MPa) air pressure to the cylinder air fitting (CYL) to activate the on/off sequence of atomization air (A1), fan air (A2), and fluid (P).
2. Turn the gun functions on and off by using the air solenoid valves on the cylinder (CYL) and turbine (TA) air supply lines.

3. To change a smart model to a lower voltage setting, see the Pro Xp Auto Control Module 332989.

				
If any fluid leakage from the gun is detected, stop spraying immediately. Fluid leakage into the gun shroud could cause fire or explosion and result in serious injury and property damage. See <b>Check for Fluid Leakage</b> on page 23.				

## Triggering the Fluid Alone

1. Shut off and relieve the air pressure to the atomization (A1) and fan (A2) air lines, using the bleed-type air shutoff valves.
2. Apply 60 psi (4.2 bar, 0.42 MPa) air pressure to the cylinder air fitting (CYL) to trigger the fluid.

## Shutdown

				
To reduce the risk of an injury, follow the <b>Pressure Relief Procedure</b> whenever you are instructed to relieve the pressure.				

1. Flush the gun, see **Flushing**, page 21.
2. Follow the **Pressure Relief Procedure**, page 18.
3. Clean the equipment. See **Maintenance** on page 21.

# Maintenance

				
To reduce the risk of an injury, follow the <b>Pressure Relief Procedure</b> whenever you are instructed to relieve the pressure.				



## Daily Care and Cleaning Checklist

Check the following list daily upon completion of equipment usage.

- Flush the gun. See **Flushing**, page 21.
- Clean the fluid and air line filters.
- Clean the outside of the gun. See **Clean Outside of Gun**, page 22.
- Clean the air cap and fluid nozzle daily, minimum. Some applications require more frequent cleaning. Replace the fluid nozzle and air cap if they are damaged. See **Clean the Air Cap and Fluid Nozzle**, page 22.
- Check the electrode and replace if broken or damaged. See **Electrode Replacement** on page 31.
- Check for fluid leakage from the gun and fluid hoses. See **Check for Fluid Leakage** on page 23. Tighten fittings or replace equipment as needed.
- Check Gun Electrical Grounding**, page 14.

## Flushing

- Flush before changing fluids, before fluid can dry in the equipment, at the end of the day, before storing, and before repairing equipment.
- Flush at the lowest pressure possible. Check connectors for leaks and tighten as necessary.
- Flush with a fluid that is compatible with the fluid being dispensed and the equipment wetted parts.

				
To reduce the risk of fire and explosion, turn off the turbine air before flushing the gun and always ground equipment and waste container. To avoid static sparking and injury from splashing, always flush at lowest possible pressure.				

### NOTICE

Do not use methylene chloride as a flushing or cleaning solvent with this gun as it will damage nylon components.

1. Turn off the turbine air.
2. Switch the fluid supply to a compatible solvent.
3. Trigger the gun to flush the fluid passages clean.

## Clean Outside of Gun

### NOTICE

- Clean all parts with a non-conductive, compatible solvent. Conductive solvents can cause the gun to malfunction.
- Fluid in the air passages could cause the gun to malfunction and could draw current and reduce the electrostatic effect. Fluid in the power supply cavity can reduce the turbine life. Whenever possible, point the gun down when cleaning it. Do not use any cleaning method which could allow fluid into the gun air passages.

1. Turn off turbine air (TA).
2. Flush the gun. See **Flushing**, page 21
3. Follow the **Pressure Relief Procedure**, page 18.
4. Clean the outside of the gun with a compatible solvent. Use a soft cloth. Wring out excess fluid from cloth. Point the gun down to prevent solvent from entering the gun passages. Do not immerse the gun.



## Clean the Air Cap and Fluid Nozzle

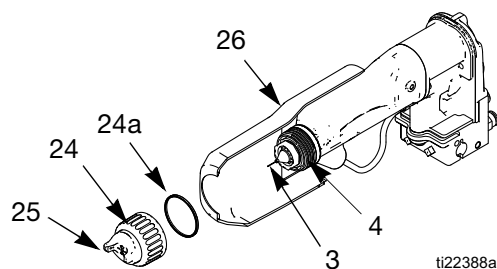
### NOTICE

- Clean all parts with a non-conductive, compatible solvent. Conductive solvents can cause the gun to malfunction.
- Fluid in the air passages could cause the gun to malfunction and could draw current and reduce the electrostatic effect. Fluid in the power supply cavity can reduce the turbine life. Whenever possible, point the gun down when cleaning it. Do not use any cleaning method which could allow fluid into the gun air passages.

### Equipment Needed




- soft bristle brush
- compatible solvent

1. Relieve the pressure. Follow the **Pressure Relief Procedure**, page 18.
2. Remove the air cap assembly (24, 25) and shroud (26). See FIGURE 12.
3. Wipe the fluid nozzle (4) of the gun clean with a cloth dampened in solvent. Avoid getting any solvent into the air passages. Whenever possible, point the gun down when cleaning it.
4. If it appears that there is paint inside the fluid nozzle (4) air passages, remove the gun from the line for servicing. See **Air Cap and Nozzle Replacement**, page 30 to remove the fluid nozzle for cleaning or replacement.
5. Clean the air cap (25) with the soft bristle brush and solvent or submerge the air cap in suitable solvent and wipe it clean. Do not use metal tools.
6. Slide the shroud (26) onto the gun.
7. Carefully install the air cap (25). Be sure to insert the electrode (3) through the center hole of the air cap. Rotate the air cap to the desired position.
8. Make sure the u-cup (24a) is in place on the retaining ring (24). The lips must face forward. Tighten the retaining ring until the air cap is held firmly in place; you should not be able to rotate the air cap horns by hand.
9. Test gun resistance, page 24.



**FIG. 12. Clean Air Cap and Fluid Nozzle**

## Check for Fluid Leakage

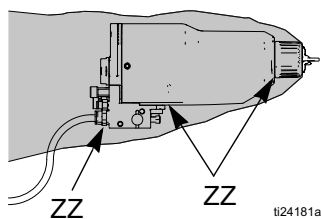
				
<p>If any fluid leakage from the gun is detected, stop spraying immediately. Fluid leakage into the gun shroud could cause fire or explosion and result in serious injury and property damage.</p>				

				
<p>To reduce the risk of an injury, follow the <b>Pressure Relief Procedure</b> whenever you are instructed to relieve the pressure.</p>				

During operation, periodically check all openings of the gun shroud (ZZ) for the presence of fluid. See FIGURE 13. Fluid in these areas indicates leakage into the shroud, which could be caused by leaks at the fluid tube connections or fluid packing leakage.

If fluid is seen in these areas:

1. Stop spraying immediately.
2. Relieve the pressure. Follow the **Pressure Relief Procedure**, page 18.
3. Remove the gun for repair.



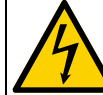


**FIG. 13. Check for Fluid Leakage**

# Electrical Tests

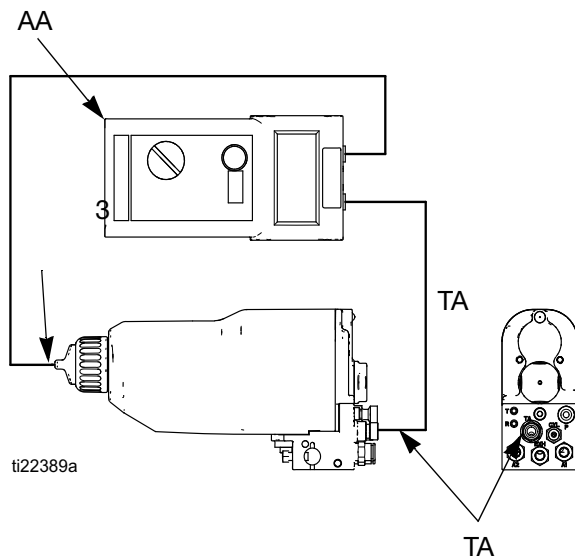
Electrical components inside the gun affect performance and safety. The following procedures test the condition of the power supply (7) and electrode (3), and electrical continuity between components.

Use megohmmeter Part No. 241079 (AA) and an applied voltage of 500 V. Connect the leads as shown.

				
<p>Megohmmeter Part No. 241079 (AA-see FIGURE 14) is not approved for use in a hazardous location. To reduce the risk of sparking, do not use the megohmmeter to check electrical grounding unless:</p> <ul style="list-style-type: none"> <li>• The gun has been removed from the hazardous location;</li> <li>• Or all spraying devices in the hazardous location are turned off, ventilation fans in the hazardous location are operating, and there are no flammable vapors in the area (such as open solvent containers or fumes from spraying).</li> </ul> <p>Failure to follow this warning could cause fire, explosion, and electric shock and result in serious injury and property damage.</p>				

## Test Gun Resistance

1. Flush and dry the fluid passage.
2. Measure resistance between the electrode needle tip (3) and the turbine air inlet fitting (TA); it should be 148-193 megohms.
3. If outside this range go to **Test Power Supply Resistance**, page 25. If in range, and there are performance concerns, see **Electrical Troubleshooting**, page 28 for other possible causes of poor performance.



**FIG. 14. Test Gun Resistance**

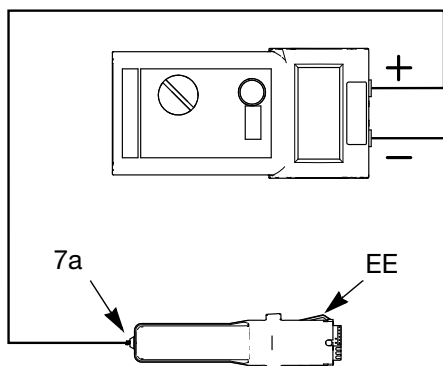


## Test Power Supply Resistance

1. Remove the power supply (7). See **Power Supply Removal and Replacement**, page 37.
2. Remove the turbine (8) from the power supply. See **Turbine Removal and Replacement**, page 38.
3. Measure resistance from the power supply's ground strips (EE) to the spring (7a). The resistance should be 130–160 megohms for 85kV guns. See FIGURE 15.

If outside this range, replace the power supply. If in range, and there are performance concerns, go to **Test Electrode Resistance**, page 25.

4. Refer to **Electrical Troubleshooting**, page 28 for other possible causes of poor performance.
5. Be sure the spring (7a) is in place before reinstalling the power supply.



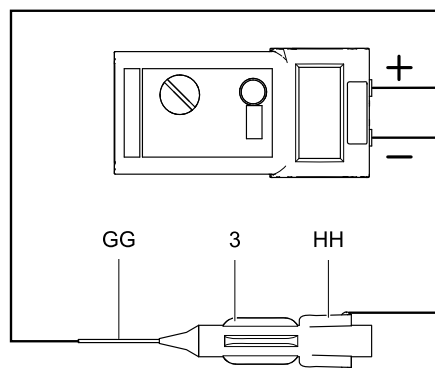
**FIG. 15. Test Power Supply Resistance**

## Test Electrode Resistance

Remove the electrode (3). See **Electrode Replacement**, page 31. Measure the resistance between the contact (HH) and the electrode wire (GG). The resistance should be 8–30 megohms. If out of range, replace the electrode.


If the gun resistance is still out of range after testing the power supply and electrode:

- Check that the conductive o-ring (4a) is making contact with the barrel pin.
- Check that the power supply spring (7a) is making contact with the barrel pin.



**FIG. 16. Test Electrode Resistance**

# Troubleshooting

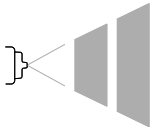



				
Installing and servicing this equipment requires access to parts which may cause an electric shock or other serious injury if the work is not performed properly. Do not install or repair this equipment unless you are trained and qualified.				

				
To reduce the risk of an injury, follow the <b>Pressure Relief Procedure</b> whenever you are instructed to relieve the pressure.				

Check all possible remedies in the Troubleshooting Chart before disassembling the gun.

## Spray Pattern Troubleshooting

Some spray pattern problems are caused by the improper balance between air and fluid.

Problem	Cause	Solution
Fluttering or spitting spray. 	No fluid.	Refill supply.
	Loose, dirty, damaged nozzle/seat.	Clean or replace nozzle, page 30.
	Air in fluid supply.	Check fluid source. Refill.
Improper spray pattern. 	Damaged nozzle or air cap.	Replace, page 30.
	Fluid buildup on air cap or nozzle.	Clean. See page 22.
	Fan air pressure too high.	Decrease.
	Fluid too thin.	Increase viscosity.
	Fluid pressure too low.	Increase.
	Fan air pressure too low.	Increase.
	Fluid too thick.	Reduce viscosity.
	Too much fluid.	Decrease flow.
Streaks.	Did not apply 50% overlap.	Overlap strokes 50%.
	Dirty or damaged air cap.	Clean, page 22 or replace, page 30.

## Gun Operation Troubleshooting



Problem	Cause	Solution
Excessive spray fog.	Atomizing air pressure too high.	Decrease air pressure as low as possible.
	Fluid too thin.	Increase viscosity.
"Orange Peel" finish.	Atomizing air pressure too low.	Increase air pressure; use lowest air pressure necessary.
	Poorly mixed or filtered fluid.	Remix or re-filter fluid.
	Fluid too thick.	Reduce viscosity.
Fluid leaks from the fluid packing area	Worn packings or rod.	Replace; see page 32
Air leaks from the air cap	Worn piston stem o-rings.	Replace; see page 34.
Fluid leakage from the front of the gun	Worn fluid seat.	Replace fluid nozzle (4) and/or electrode needle (7); see page 30.
	Loose fluid nozzle.	Tighten; see page 30.
	Damaged nozzle o-ring.	Replace; see page 30.
Gun does not spray	Low fluid supply.	Add fluid if necessary.
	Damaged air cap.	Replace; see page 30.
	Dirty or clogged fluid nozzle.	Clean; see page 30.
	Damaged fluid nozzle.	Replace; see page 30.
	Piston not actuating.	Check cylinder air. Check piston u-cup (34d); see page 34.
	Actuator arm is out of position.	Check actuator arm and nuts. See page 35.
Dirty air cap	Misaligned air cap and fluid nozzle.	Clean fluid buildup off air cap and fluid nozzle seat; see page 22.
	Damaged nozzle orifice.	Replace nozzle (4); see page 30.
	Fluid is coming on before the air.	Check actuator arm and nuts. See page 35.
Excessive paint wrap back to spray gun	Poor Grounding	See Grounding, page 14
	Incorrect distance from gun to part	Should be 8-12 in. (200-300 mm)
Air leaks from manifold	Gun not securely tightened to the manifold	Tighten manifold screws
	Worn or missing o-rings	Replace o-rings. See page 35
Fluid leaks at the quick-disconnect.	Gun not securely tightened to the manifold	Tighten manifold screws.
	Fluid seal o-rings are worn or missing.	Inspect or replace o-rings.

## Electrical Troubleshooting

Problem	Cause	Solution
Poor wrap.	Turbine air is not turned on.	Turn on.
	Booth exhaust velocity is too high.	Reduce velocity to within code limits.
	Atomizing air pressure too high.	Decrease.
	Fluid pressure too high.	Decrease.
	Incorrect distance from gun to part.	Should be 8-12 in. (200-300 mm).
	Poorly grounded parts.	Resistance must be 1 megohm or less. Clean workpiece hangers.
	Faulty gun resistance.	See <b>Test Gun Resistance</b> on page 24.
	Low fluid resistivity.	Check fluid resistivity, page 15.
	Fluid leaks from the packing (8d) and causes a short.	Clean the packing rod cavity. Replace the packing rod. See page 33.
	Faulty turbine.	Be sure the cap is in place on the back of the turbine housing. Remove and test the turbine. See page 38.
No power.	Replace power supply. See page 37.	
ES or Hz indicator is not lit (standard models only)	No power	Check power supply, turbine, turbine ribbon cable. See <b>Power Supply Removal and Replacement</b> , page 37 and <b>Turbine Removal and Replacement</b> , page 38.
ES indicator light is amber (standard models only)	Turbine speed is too low	Increase air pressure until indicator is green.
ES indicator light is red (standard models only)	Turbine speed is too high	Decrease air pressure until indicator is green
No voltage or low voltage reading on the Pro Xp Auto Control module	Damaged fiber optic cable or connection.	Check; replace damaged parts. See Pro Xp Auto Control Module manual 332989.
	Turbine air is not turned on.	Turn on.
Pro Xp Auto Control Module displays event code (smart models only)		See manual 332989 for Event Code Troubleshooting.

# Repair

## Prepare the Gun for Service

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

				
<p>To reduce the risk of injury, follow the <b>Pressure Relief Procedure</b> before checking or servicing any part of the system and whenever you are instructed to relieve the pressure.</p>				

- Check all possible remedies in **Troubleshooting** before disassembling the gun.
  - Use a vise with padded jaws to prevent damage to plastic parts.
  - Lightly lubricate o-rings and seals with non-silicone grease. Order Part No. 111265 Lubricant. Do not over-lubricate.
  - Only use genuine Graco parts. Do not mix or use parts from other PRO Gun models.
1. Flush and clean the gun, page 21.
  2. Relieve the pressure. Follow the **Pressure Relief Procedure**, page 18.
  3. Remove the gun from the manifold, page 29.
  4. Remove the gun from the work site. Repair area must be clean.

## Remove the Gun from the Manifold

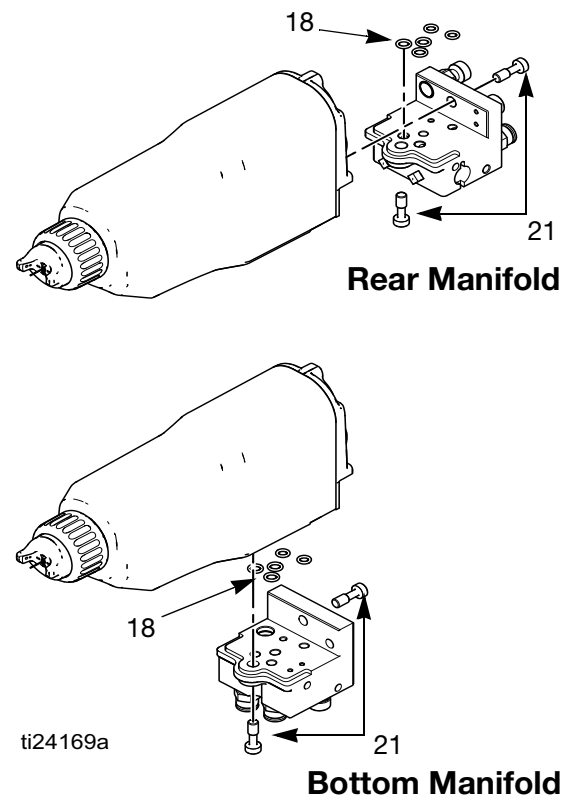
See FIGURE 17.

1. Holding the gun firmly in hand, loosen the two screws (21) from the back and bottom of the manifold.

The screws (21) should stay on the manifold.

2. Remove the gun from the manifold and take it to the service area.

The 5 o-rings (18) should stay on the gun.



**FIG. 17. Remove Gun from Manifold**

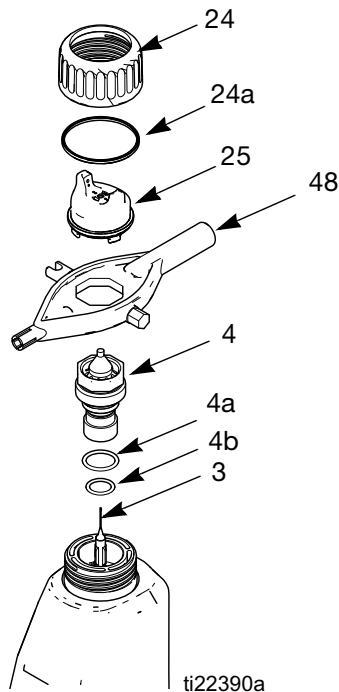
## Install the Gun on the Manifold

See FIGURE 17.

1. Make sure the five o-rings (17) are in place on the gun. Inspect the parts for damage and replace them as needed.
2. Secure the gun to the manifold by tightening the two screws (19).

## Air Cap and Nozzle Replacement

1. Follow the steps in **Prepare the Gun for Service**, page 29.
2. Remove the retaining ring (24) and air cap (25). See FIGURE 18.
3. Point gun up while removing the fluid nozzle (4) assembly with the multi-tool (48).





**Fig. 18. Air Cap and Nozzle Replacement**

<p>The nozzle contact ring (4a) is a conductive contact ring, not a sealing o-ring. To reduce the risk of fire and explosion or electric shock:</p> <ul style="list-style-type: none"> <li>• Do not remove the nozzle contact ring (4a) except to replace it.</li> <li>• Never operate the gun without the contact ring in place.</li> <li>• Do not replace the contact ring with anything but a genuine Graco part.</li> </ul>				

NOTICE
<p>Use non-silicone grease, Part No. 111265, on the small o-ring (4b). Do not over-lubricate. Do not lubricate the conductive contact ring (4a). Excessive grease can mix with paint and blemish the finish on the workpiece.</p>

4. Make sure the electrode needle (3) is finger-tight.
  5. Make sure the conductive contact ring (4a) and the small o-ring (4b) are in place on the nozzle (4). Lightly lubricate the small o-ring (4b).
- NOTE:** The conductive contact ring (4a) may show some wear at the point where it makes contact with the barrel pin. This is normal and does not require replacement.
6. Install the fluid nozzle (4) with the multi-tool (48). Tighten until the fluid nozzle seats in the gun barrel (1/8 to 1/4 turn past hand tight). Slide the shroud onto the gun. Secure with screw (optional).
  7. Carefully install the air cap (25). Be sure to insert the electrode (3) through the center hole of the air cap. Rotate the air cap to the desired position.
  8. Make sure the u-cup (24a) is in place on the retaining ring (24). The lips must face forward. Tighten the retaining ring until the air cap is held firmly in place; you should not be able to rotate the air cap horns by hand.
  9. Test gun resistance, page 24.
  10. Install the gun onto the manifold, see **Install the Gun on the Manifold**.

## Electrode Replacement

				
<p>Installing and servicing this equipment requires access to parts that may cause an electric shock or other serious injury if the work is not performed properly. Do not install or repair this equipment unless you are trained and qualified.</p>				

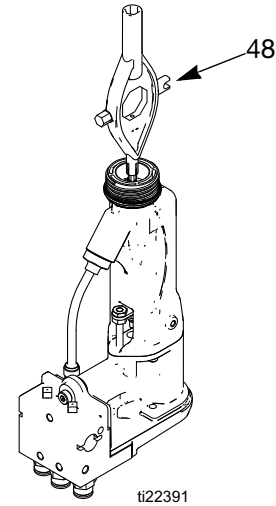
1. Prepare the gun for service, page 29.
2. Remove the air cap and nozzle, page 30.
3. Unscrew the electrode (3) with the multi-tool (48). FIGURE 19.

### NOTICE

To avoid damaging the plastic threads, be very careful when installing the electrode.

4. Apply low-strength (purple) thread sealant or equivalent to the replacement electrode and packing rod threads. Install the electrode finger-tight. Do not over tighten.

5. Install the fluid nozzle, page 30.
6. Test gun resistance, page 24.
7. Install the air cap, page 30.
8. Install the gun onto the manifold. See **Install the Gun on the Manifold**, page 30.



**FIG. 19. Electrode Replacement**

## Fluid Packing Rod Removal

You may replace the packing rod as an assembly, as described below, or as individual parts (see page 33). The assembly is pre-adjusted at the factory.

1. Follow the steps in **Prepare the Gun for Service**, page 29.
2. Remove the air cap, page 30. Remove the gun shroud (26).
3. Remove the jam nut (16), actuator arm (15), and adjustment nut (16). See FIGURE 23.

The fluid nozzle (4) must be in place when removing or installing the jam nut and actuator arm.

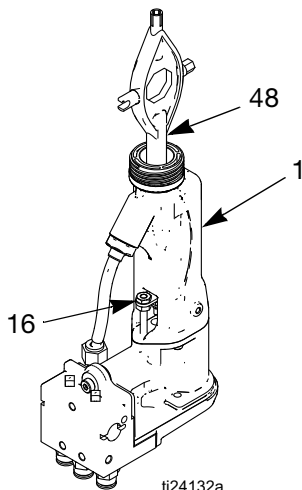
4. Remove the fluid nozzle (4) and electrode (3). See page 31.
5. Remove the packing rod (2), using the multi-tool (48).

### NOTICE

Clean all parts in non-conductive solvent compatible with the fluid being used. Use of conductive solvents can cause the gun to malfunction.

6. Check all parts for wear or damage and replace if necessary.

Before installing the packing rod, clean the internal surface of the barrel (1) with a soft cloth or brush. Check for marks from high voltage arcing. If marks are present, replace the barrel.



**FIG. 20. Fluid Packing Removal**

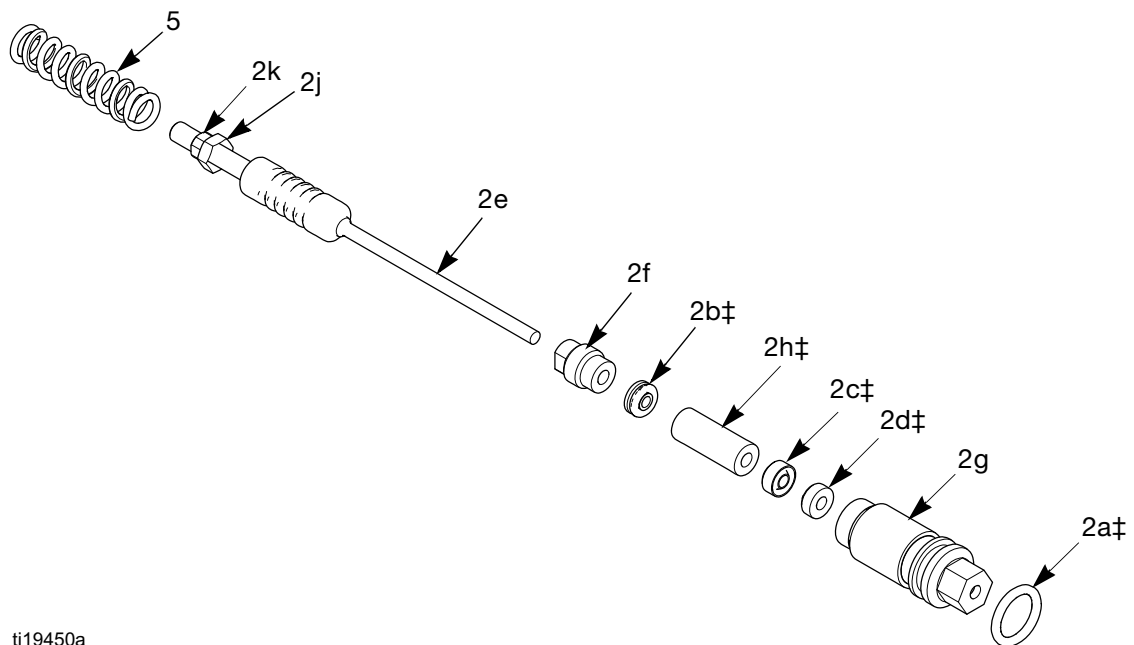


## Packing Rod Repair

You may replace the packing rod as individual parts, as described below, or as an assembly (see page 32). The assembly is pre-adjusted at the factory.

Before installing the fluid packing rod into the gun barrel, make sure the internal surfaces of the barrel are clean. Remove any residue with a soft brush or cloth. Check the inside of the barrel for marks from high voltage arcing. If marks are present, replace the barrel.

1. Place the packing nut (2f) and seal (2b†) on the fluid rod (2e). Flats on the packing nut must face the back of the fluid rod. The seal o-ring must face away from the packing nut.
2. Fill the inner cavity of the spacer (2h†) with dielectric grease (43). Place the spacer on the fluid rod (2e) in the direction shown. Generously apply dielectric grease to the outside of the spacer.
3. Place the fluid packing (2c†) on the packing rod (2e) with its lips facing the front of the rod. Install the needle packing (2d†) with the male end toward the fluid packing, then install the housing (2g).
4. Lightly tighten the packing nut (2f). The packing nut is properly tightened when there is 3 lb (13.3N) of drag force when sliding the packing housing (2g) assembly along the rod. Tighten or loosen the packing nut as needed.
5. Install the o-ring (2a†) on the outside of housing (2g). Lubricate the o-ring with non-silicone grease, Part No. 111265. Do not over-lubricate.
6. Install the spring (5) against the nut (2j) as shown.
7. Install the packing rod assembly (2) into the gun barrel. Using the multi-tool (48), tighten the assembly until just snug.
8. Install the electrode. See **Electrode Replacement**, page 31.
9. Install the nozzle and air cap. See **Air Cap and Nozzle Replacement**, page 30.
10. See **Test Gun Resistance**, page 24.



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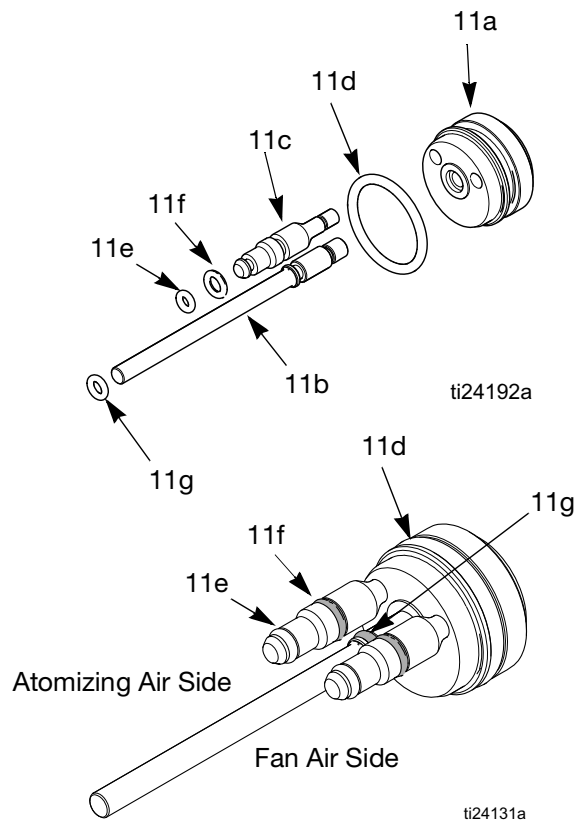
**FIG. 21. Packing Rod**

## Piston Repair

1. Follow the steps in **Prepare the Gun for Service**, page 29.
2. Remove the air cap, page 30. Remove the gun shroud (26).
3. Remove the jam nut (16), actuator arm (15), and adjustment nut (16). See FIGURE 23.

The fluid nozzle (4) must be in place when removing or installing the jam nut and actuator arm.

4. Remove piston cap (13) from the rear of the gun.
5. Push on the piston rod (11) to push the piston out the back of the gun.
6. Inspect the o-rings (11d, 11e, 11f, 11g) for damage. See Table 3 and FIGURE 22.
7. Lubricate the o-rings (11d, 11e, 11f, 11g) with non-silicone grease, Part No. 111265. Do not over-lubricate.
8. Align the two stems (11c) with the holes in the gun body and press the piston assembly into the back of the gun until it bottoms.
9. Install spring (12) and piston cap (13).
10. Install and adjust the actuator arm, page 35.



**FIG. 22. Piston O-Rings**

**Table 3. Piston O-Rings**

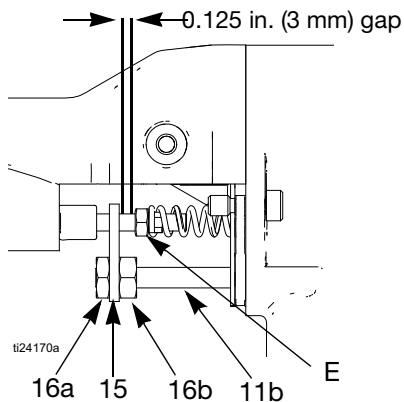
Description	Function
Shaft O-Ring (11g)	Seals cylinder air along the piston rod (34b). Replace if air leaks along rod.
Front O-Ring (11e)	Air shutoff seal. Replace if air leaks from air cap when gun is de-triggered.
Back O-Ring (11f)	Separates cylinder air from fan and atomizing air.
Piston O-Ring (11d)	Replace if air leaks from small vent hole at back of manifold when gun is triggered.
O-rings included in air seal repair kit 24W390	

## Adjust the Actuator Arm

The fluid nozzle (4) must be in place when removing or installing the jam nut and actuator arm.

See FIGURE 23.

1. Install the adjustment nut (16b), actuator arm (15), and jam nut (16a) onto the piston rod (11b).
2. Position the parts so there is a 0.125 in. (3 mm) gap between the actuator arm (15) and the fluid packing rod nut (E). This allows the atomizing air to actuate before the fluid.
3. Tighten the adjustment nut (16b) against the actuator arm (15). Check that the 0.125 in. (3 mm) gap has been maintained. In addition, there should be 3 mm of electrode needle travel when the gun is triggered. Adjust the jam nut position to obtain these dimensions. Tighten the jam nut (16a).
4. Test gun resistance, page 24.
5. Install the gun shroud (26) and air cap (25), page 30.
6. Install the gun onto the manifold. See page 29.



**FIG. 23. Actuator Arm Adjustment**

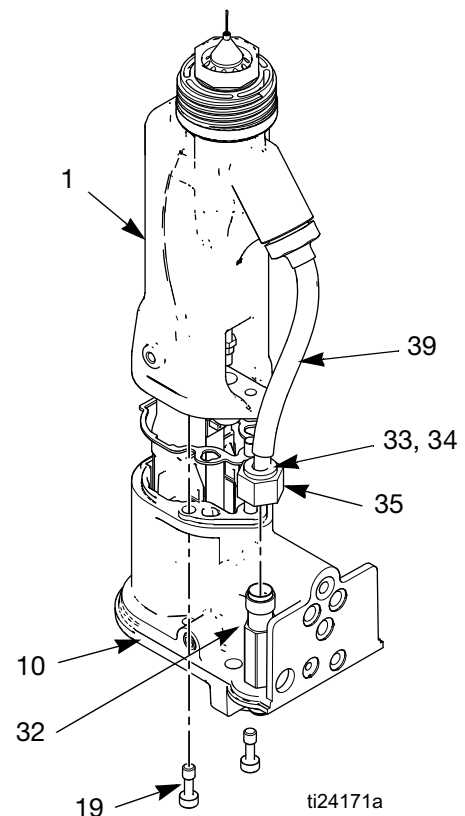
## Barrel Removal

1. Follow the steps in **Prepare the Gun for Service**, page 29.
2. Remove the air cap, page 30. Remove the gun shroud (26).
3. Carefully loosen the fluid fitting nut (35). Pull the tube (39) out of the fitting (32). Make sure both ferrules (33, 34) and the nut stay with the tube. See FIGURE 24.
4. Remove the adjustment nuts (16a) and actuator arm (15). See FIGURE 23.
5. Loosen the two screws (19). See FIGURE 24.

### NOTICE

To avoid damaging the power supply, pull the gun barrel (1) straight away from the gun body (10). If necessary, gently move the gun barrel from side to side to free it from the gun body.

6. Hold the gun body (10) with one hand and pull the barrel (1) straight off the body. See FIGURE 24.



**FIG. 24. Barrel Removal**

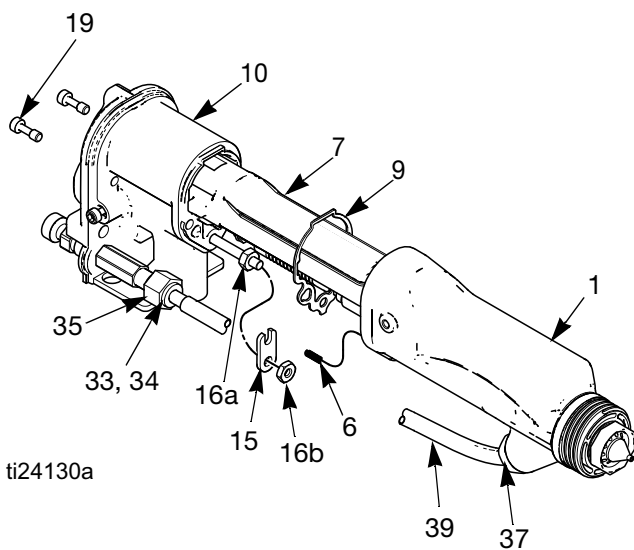
## Barrel Installation

See FIGURE 25

1. Verify the gasket (9) and grounding spring (6) are in place and the gasket air holes are aligned properly. Replace the gasket if damaged.
2. Make sure the spring is in place on the tip of the power supply (7). Liberally apply dielectric grease to the tip of the power supply. Place the barrel (1) over the power supply and onto the gun body (10).
3. Tighten the two barrel screws (19) oppositely and evenly (about 1/4 turn past snug or  $20 \pm 5$  in-lbs). Do not over-tighten.

To avoid damaging the gun barrel, do not over-tighten the screws (19).

4. Assemble the fluid tube (39) into the fluid fitting (32). Ensure that the ferrules (33, 34) are in place and tighten the nut (35).
5. Install and adjust the actuator arm (15), jam nut (16a), and adjustment nut (16b). See page 35.
6. Test gun resistance, page 24.
7. Install the gun shroud (26) and air cap, page 30.
8. Install the gun onto the manifold. See page 11.



**FIG. 25. Barrel Installation**

## Power Supply Removal and Replacement

- Inspect the gun body power supply cavity for dirt or moisture. Clean with a clean, dry rag.
  - Do not expose gasket (9) to solvents. Replace gasket if damaged.
- Follow the steps in **Prepare the Gun for Service**, page 29.
  - See **Barrel Removal**, page 35.

### NOTICE

Be careful when handling the power supply (7) to avoid damaging it.

- Grasp the power supply (7) with your hand. With a gentle side to side motion, free the power supply/turbine assembly from the gun body (10), then carefully pull it straight out.

**Smart models only:** disconnect the flexible circuit (30) from the socket at the top of the gun body.

- Inspect the power supply and turbine for damage.
- To separate the power supply (7) from the turbine (8), disconnect the 3-wire ribbon connector (PC) from the power supply.

**Smart models only:** disconnect the 6-pin flexible circuit (30) from the power supply.

Slide the turbine up and off the power supply.

- See **Test Power Supply Resistance**, page 25. Replace the power supply if necessary. To repair the turbine, see **Turbine Removal and Replacement**, page 38.

### NOTICE

To prevent damage to the cable and possible interruption of the ground continuity, bend the turbine's 3-wire ribbon cable (PC) upward and back, so the bend faces the power supply and the connector is at the top.

- Connect the 3-wire ribbon connector (PC) to the power supply.

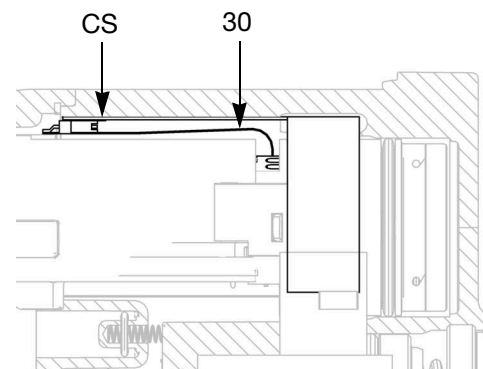
**Smart models only:** connect the 6-pin flexible circuit (30) to the power supply.

Tuck the ribbon forward, under the power supply. Slide the turbine (8) down onto the power supply (7).

- Insert the power supply/turbine assembly in the gun body (10). Make sure the ground strips (EE) make contact with the gun body.

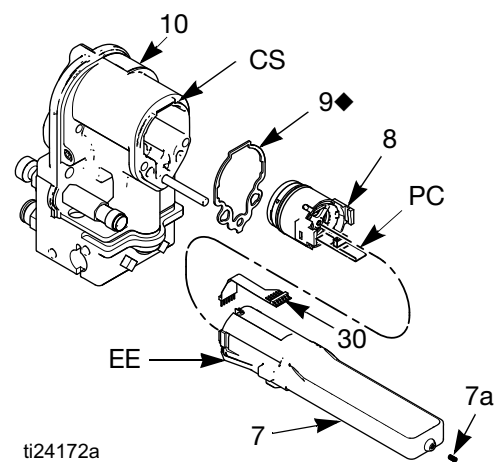
**Smart models only:** align the connector of the 6-pin flexible circuit (30) with the socket (CS) at the top of the gun body. See FIGURE 26.

Push the connector securely into the socket as you slide the power supply/turbine assembly into the gun body.



**FIG. 26. Connect Flexible Circuit**

- Make sure the gasket (8), ground spring (6), and power supply spring (7a) are in place. Assemble the barrel (1) to the body (10). See **Barrel Installation**, page 36.
- See **Test Gun Resistance**, page 24.

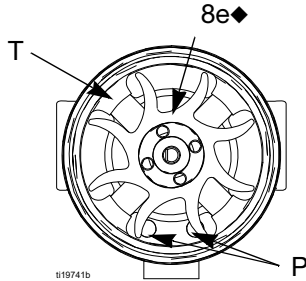


**FIG. 27. Power Supply**

## Turbine Removal and Replacement

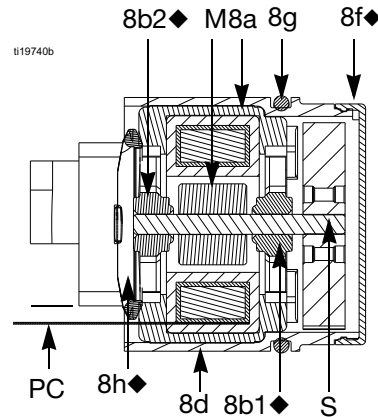
Replace turbine bearings after 2000 hours of operation. Order Part No. 24N706 Bearing Kit. Parts included in the kit are marked with a symbol (◆). See FIGURE 27 through FIGURE 29.

1. See **Prepare the Gun for Service**, page 29.
2. Remove the power supply/turbine assembly and disconnect the turbine. See **Power Supply Removal and Replacement**, page 37.
3. Measure resistance between the two outer terminals of the 3-wire connector (PC); it should be 2.0–6.0 ohms. If outside this range, replace the turbine coil (8a).
4. Using a flat blade screwdriver, pry the clip (8h) off the housing (8d). Remove the cap (8f), using a thin blade or screwdriver.
5. If necessary, rotate the fan (8e) so its blades clear the four bearing tabs (T) of the housing (8d).



**FIG. 28. Fan Orientation**

6. Push the fan and coil assembly (8a) out the front of the housing (8d).



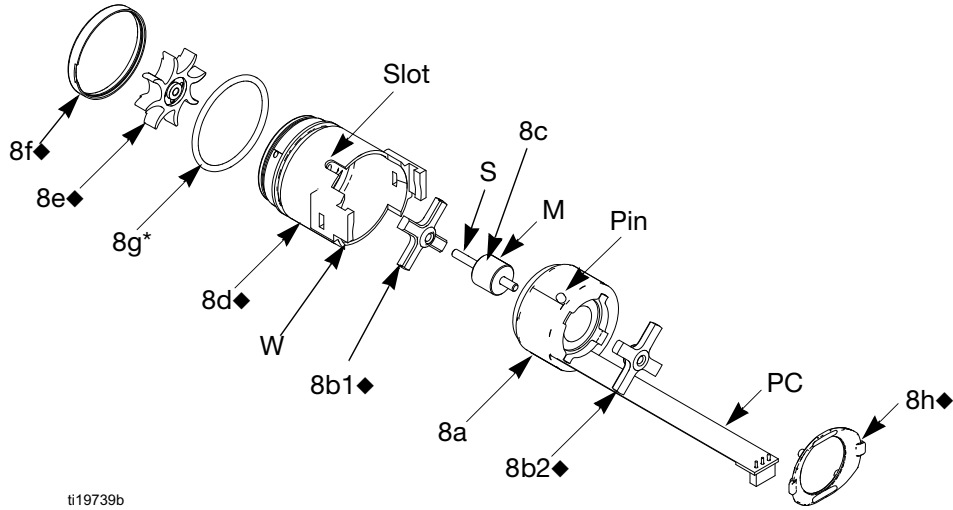
**FIG. 29. Turbine Cross-Section.**

### NOTICE

To prevent damage to the turbine do not scratch or damage the magnet (M) or shaft (S). Do not pinch or damage the 3-wire connector (PC) when disassembling and reassembling the bearings.

7. Hold the coil assembly (8a) on a workbench with the fan end facing up. Using a wide blade screwdriver, pry the fan (8e) off the shaft (S).
8. Remove the top bearing (8b2).
9. Remove the bottom bearing (8b1).
10. Install the new bottom bearing (8b1.) on the long end of the shaft (S). The flatter side of the bearing must face away from the magnet (M). Install in the coil (8a) so the bearing blades are flush with the surface of the coil.
11. Press the new top bearing (8b2.) onto the short end of the shaft so the bearing blades are flush with the surface of the coil (8a). The flatter side of the bearing must face away from the coil.
12. Hold the coil assembly (8a) on a workbench with the fan end facing up. Press the fan (8e.) onto the long end of the shaft (S).The fan blades must be oriented as shown in FIGURE 28.
13. Carefully press the coil assembly (8a) into the front of the housing (8d.) while aligning the pin on the coil with the slot in the housing. The 3-wire connector (PC) must be positioned below the wider notch (W) of the housing tabs.

14. Rotate the fan (8e) so its blades clear the four bearing tabs (T) at the back of the housing. Ensure that the blades of the bottom bearing (8b1) align with the tabs.
15. Seat the coil fully into the housing (8d.). Secure with the clip (8h.), ensuring that its tabs engage the slots in the housing.
16. Ensure that the o-ring (8g) is in place. Install the cap (8f).
17. Install the turbine on the power supply, and install both parts in the gun body. See **Power Supply Removal and Replacement**, page 37.



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**FIG. 30. Turbine**

# Parts

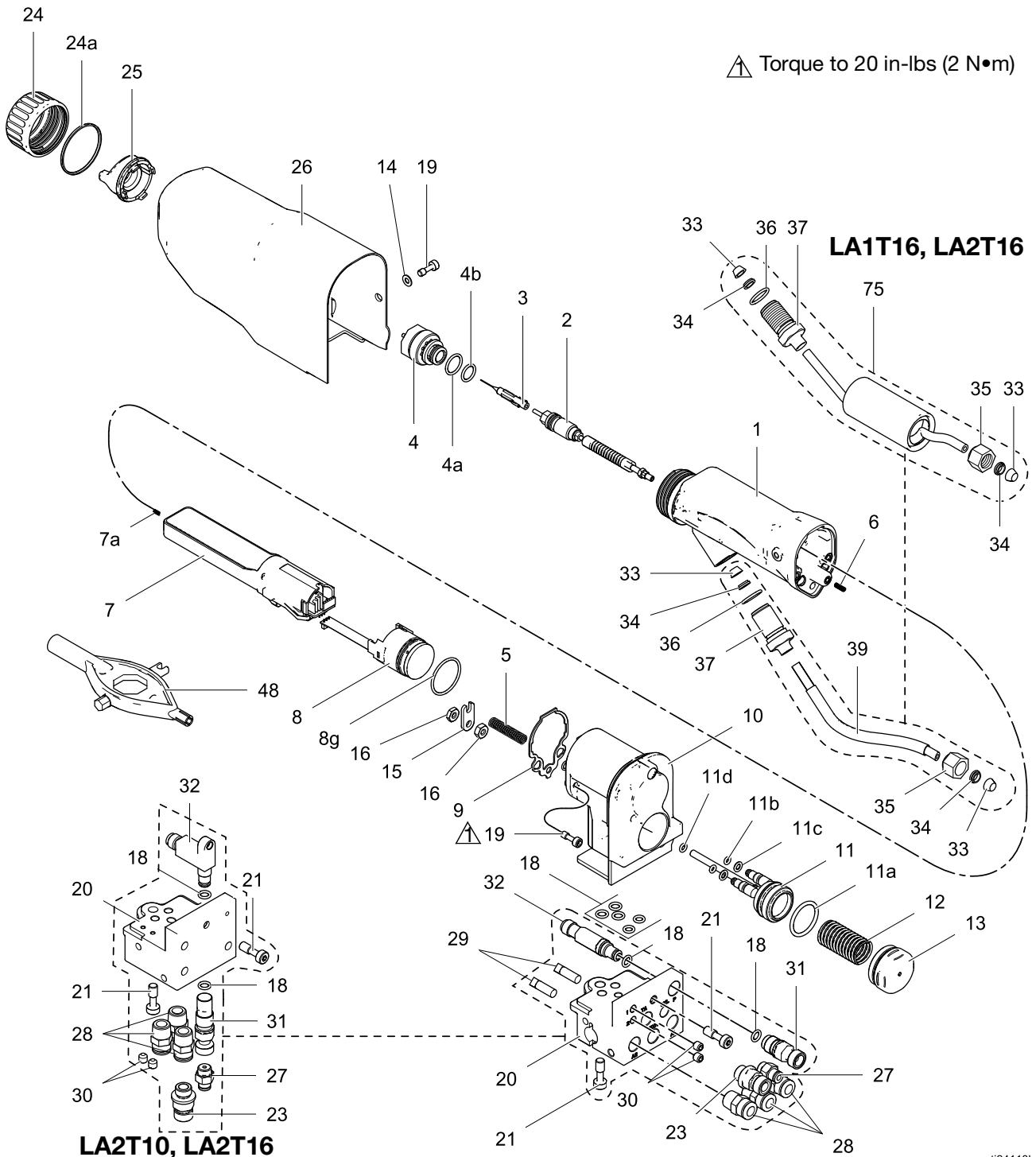
## Standard Pro Xp Auto Air Spray Gun Models

LA1T10, Standard Coatings, Rear Manifold, Series B

LA2T10, Standard Coatings, Bottom Manifold, Series B

LA1T16, High Conductivity Coatings, Rear Manifold, Series B

LA2T16, High Conductivity Coatings, Bottom Manifold, Series B



t24113b



**LA1T10, Standard Coatings, Rear Manifold, Series B**  
**LA2T10, Standard Coatings, Bottom Manifold, Series B**  
**LA1T16, High Conductivity Coatings, Rear Manifold, Series B**  
**LA2T16, High Conductivity Coatings, Bottom Manifold, Series B**

Ref. No.	Part No.	Description	Qty	Ref. No.	Part No.	Description	Qty
1	24W873	BODY, gun assembly (includes 9)	1	27	114263	FITTING, connector, male	1
2	See <b>Packing Rod Assembly</b> , page 44		1	28	115950	FITTING, connector, 1/4npt (M), 5/16T	3
3	24N651	NEEDLE, electrode (LA1T10, LA2T10)	1	29	110465	SCREW, set (LA1T10, LA1T16 only)	2
	24N704	NEEDLE, electrode, high wear (LA1T16, LA2T16)	1	30	102207	SCREW, set, SCH	2
4	24N616	NOZZLE, fluid; includes 4a and 4b (LA1T10, LA2T10)	1	31	24X299	FITTING, manifold, rear (LA1T10, LA1T16) Includes 18 qty 1	1
	25N833	NOZZLE, fluid, precision high wear; includes 4a and 4b (LA1T16, LA2T16)	1		24X300	FITTING, manifold, bottom (LA2T10, LA2T16) Includes 18 qty 1	1
4a	24N645	O-RING, conductive	1	32	24X297	FITTING, fluid, A/S, rear, (LA1T10, LA1T16) Includes 18 qty 1	1
4b	111507	O-RING; fluoroelastomer	1		24X298	FITTING, fluid, bottom (LA2T10, LA2T16) Includes 18 qty 1, 19 qty 1	1
5	185111	SPRING, compression	1				
6	197624	SPRING, compression	1	33*‡	111286	FERRULE, front	2
7	24N661	POWER SUPPLY, 85 kV	1	34*‡	111285	FERRULE, back	2
7a	24N979	SPRING	1	35‡	112644	NUT, swagelock	1
8	24N664	See <b>Turbine Assembly</b> , page 45	1	36‡	102982	PACKING, o-ring	1
8g■	110073	O-RING	1	37‡	24N658	FITTING, fluid barrel (LA1T10, LA2T10)	1
9■◆	25N921	GASKET, barrel	1		25N851	FITTING, fluid barrel (LA1T16, LA2T16)	1
10	24W379	BODY, assy, Auto XP Standard (includes 18, 19)	1	39	24W385	FLUID TUBE	1
11	24W396	PISTON, assy, actuation, auto	1	43	116553	GREASE, dielectric; 1 oz (30 ml) tube (not shown)	1
11a	17B704	O-RING	1	44▲	16P802	SIGN, warning	1
11b	111504	O-RING	2	46▲	179791	TAG, warning	1
11c	112319	O-RING	2	48	276741	MULTI-TOOL (shipped loose)	1
11d	111508	O-RING	1	75‡	25N922	See <b>High Conductivity Fluid Tube Assembly</b> , page 46.	1
12	112640	SPRING, compression	1				
13	24W397	CAP, piston, actuation	1				
14	513505	WASHER, plain #10 SST	1				
15	24W398	ARM, fluid actuator, XP (includes 16, qty 2)	1				
16	100166	NUT, full hex	2				
18■	111450	PACKING, O-RING	7				
19	24N740	SCREW, ES gun (pack of 2)	4				
20	24W392	MANIFOLD, rear inlet, LA1T10, LA1T16 (includes 18, 21, 23, 27, 28, 29, 30, 31)	1				
	24W393	MANIFOLD, bottom inlet, LA2T10, LA2T16. (includes 18, 21, 23, 27, 28, 30, 31)	1				
21	24W399	SCREW, modified, 1/4-20, XP Auto (pack of 2)	1				
23	24W411	FITTING, Adapter, M12 TO 1/4, LH, XP	1				
24	24N644	RING, retainer, assy; includes 24a	1				
24a■	198307	PACKING, u-cup; UHMWPE	1				
25	24N477	AIR CAP, machining, black	1				
26	24W388	COVER, shroud, Auto XP	1				

▲ Replacement Warning labels, signs, tags, and cards are available at no cost.

■ Included in Air Seal Repair Kit 24W390 (purchase separately)

\* Included in Fluid Seal Repair Kit 24W391 (purchase separately)

◆ Included in Turbine Assembly 24N664 (purchase separately). See **Turbine Assembly**, page 45.

‡ Included in High Conductivity Fluid Tube Assembly 25N922 (purchase separately). See **High Conductivity Fluid Tube Assembly**, page 46.


# Smart Pro Xp Auto Air Spray Gun Models

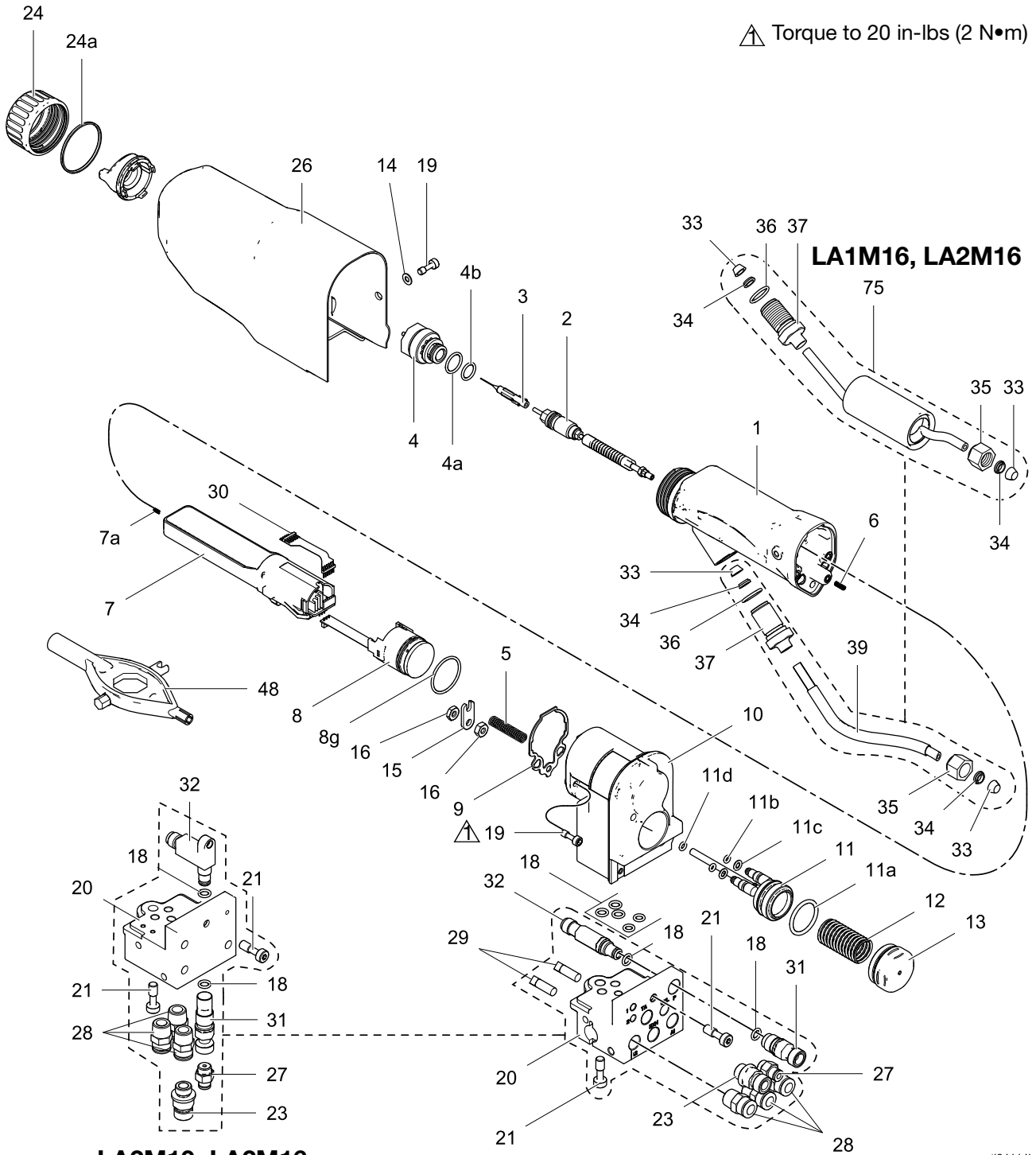
LA1M10, Standard Coatings, Rear Manifold, Series B

LA2M10, Standard Coatings, Bottom Manifold, Series B

LA1M16, High Conductivity Coatings, Rear Manifold, Series B

LA2M16, High Conductivity Coatings, Bottom Manifold, Series B

 Torque to 20 in-lbs (2 N•m)



**LA2M10, LA2M16**

ti24114b

**LA1M10, Standard Coatings, Rear Manifold, Series B**  
**LA2M10, Standard Coatings, Bottom Manifold, Series B**  
**LA1M16, High Conductivity Coatings, Rear Manifold, Series B**  
**LA2M16, High Conductivity Coatings, Bottom Manifold, Series B**

Ref. No.	Part No.	Description	Qty	Ref. No.	Part No.	Description	Qty
1	24W873	BODY, gun assy (includes 9)	1	28	115950	FITTING, connector, 1/4npt (M), 5/16T	3
2	See <b>Packing Rod Assembly</b> , page 44		1	29	110465	SCREW, set (LA1M10, LA1M16 only)	2
3	24N651	NEEDLE, electrode (LA1M10, LA2M10)	1	30	245265	CIRCUIT, flexible, assy	1
	24N704	NEEDLE, electrode, high wear (LA1M16, LA2M16)	1	31	24X299	FITTING, manifold, rear (LA1M10, LA1M16) Includes 18 qty 1	1
4	24N616	NOZZLE, fluid; includes 4a and 4b (LA1M10, LA2M10)	1		24X300	FITTING, manifold, bottom (LA2M10, LA2M16) Includes 18 qty 1	1
	25N833	NOZZLE, fluid, precision high wear; includes 4a and 4b (LA1M16, LA2M16)	1	32	24X297	FITTING, fluid, A/S, rear (LA1M10, LA1M16) Includes 18 qty 1	1
4a	24N645	O-RING, conductive	1		24X298	FITTING, fluid, bottom (LA2M10, LA2M16) Includes 18 qty 1, 19 qty 1	1
4b	111507	O-RING; fluoroelastomer	1				
5	185111	SPRING, compression	1	33*‡	111286	FERRULE, front	2
6	197624	SPRING, compression	1	34*‡	111285	FERRULE, back	2
7	24N661	POWER SUPPLY, 85 kV	1	35‡	112644	NUT, swagelock	1
7a	24N979	SPRING	1	36‡	102982	PACKING, o-ring	1
8	24N664	See <b>Turbine Assembly</b> , page 45	1	37‡	24N658	FITTING, fluid barrel (LA1M10, LA2M10)	1
8g■	110073	O-RING	1		25N851	FITTING, fluid barrel (LA1M16, LA2M16)	1
9■◆	25N921	GASKET, barrel	1				
10	24W383	BODY, assy, Auto XP Smart, rear (includes 18, 19)	1	39	24W385	FLUID TUBE	1
	24W868	BODY, assy, Auto XP Smart, bottom (includes 18, 19)	1	43	116553	GREASE, dielectric; 1 oz (30 ml) tube (not shown)	1
11	24W396	PISTON, assy, actuation, auto	1	44▲	16P802	SIGN, warning (not shown)	1
11a	17B704	O-RING	1	46▲	179791	TAG, warning (not shown)	1
11b	111504	O-RING	2	48	276741	MULTI-TOOL (shipped loose)	1
11c	112319	O-RING	2	75‡	25N922	See <b>High Conductivity Fluid Tube Assembly</b> , page 46.	1
11d	111508	O-RING	1				
12	112640	SPRING, compression	1	80	24W035	CONTROL MODULE, Pro Xp Auto (not shown. See 332989) Must be purchased separately.	
13	24W397	CAP, piston, actuation	1				
14	513505	WASHER, plain #10 SST	1				
15	24W398	ARM, fluid actuator, XP (includes 16, qty 2)	1				
16	100166	NUT, full hex	2				
18■*	111450	PACKING, O-ring	7				
19	24N740	SCREW, ES gun (pack of 2)	4				
20	24W392	MANIFOLD, rear inlet, Auto XP LA1M10, LA1M16 (includes 18, 21, 23, 27, 28, 29, 31)	1				
	24W393	MANIFOLD, bottom inlet, Auto XP LA2M10, LA2M16 (includes 18, 21, 23, 27, 28, 29, 31)	1				
21	24W399	SCREW, modified, 1/4-20, XP Auto (pack of 2)	1				
23	24W411	FITTING, Adapter, M12 TO 1/4, LH, XP	1				
24	24N644	RING, retainer, assy; includes 24a	1				
24a■	198307	PACKING, u-cup; UHMWPE	1				
25	24N477	AIR CAP, machining, black	1				
26	24W388	COVER, shroud, Auto XP	1				
27	114263	FITTING, connector, male	1				

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\* Included in Fluid Seal Repair Kit 24W391 (purchase separately)

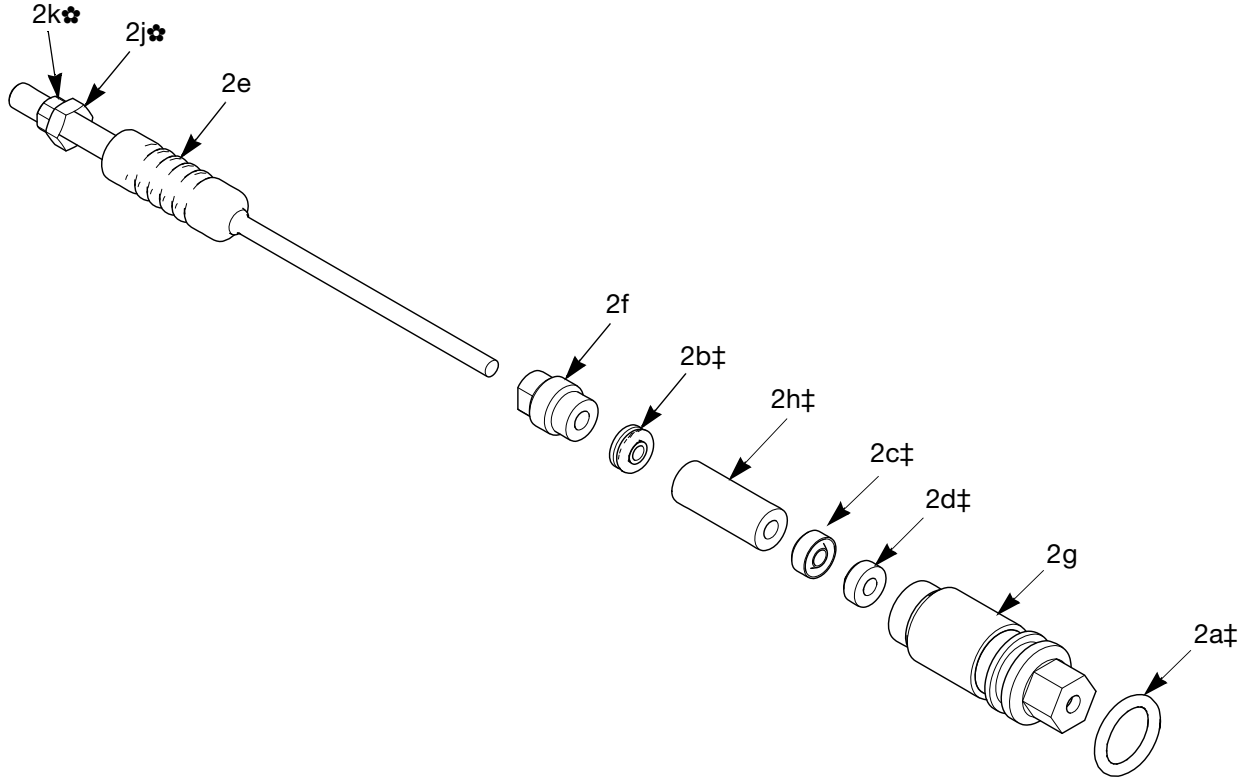
◆ Included in Turbine Assembly 24N664 (purchase separately). See **Turbine Assembly**, page 45.

‡ Included in High Conductivity Fluid Tube Assembly 25N922 (purchase separately). See **High Conductivity Fluid Tube Assembly**, page 46.

# Packing Rod Assembly

Part No. 24N655 85 kV Packing Rod Assembly

Includes items 2a-2k

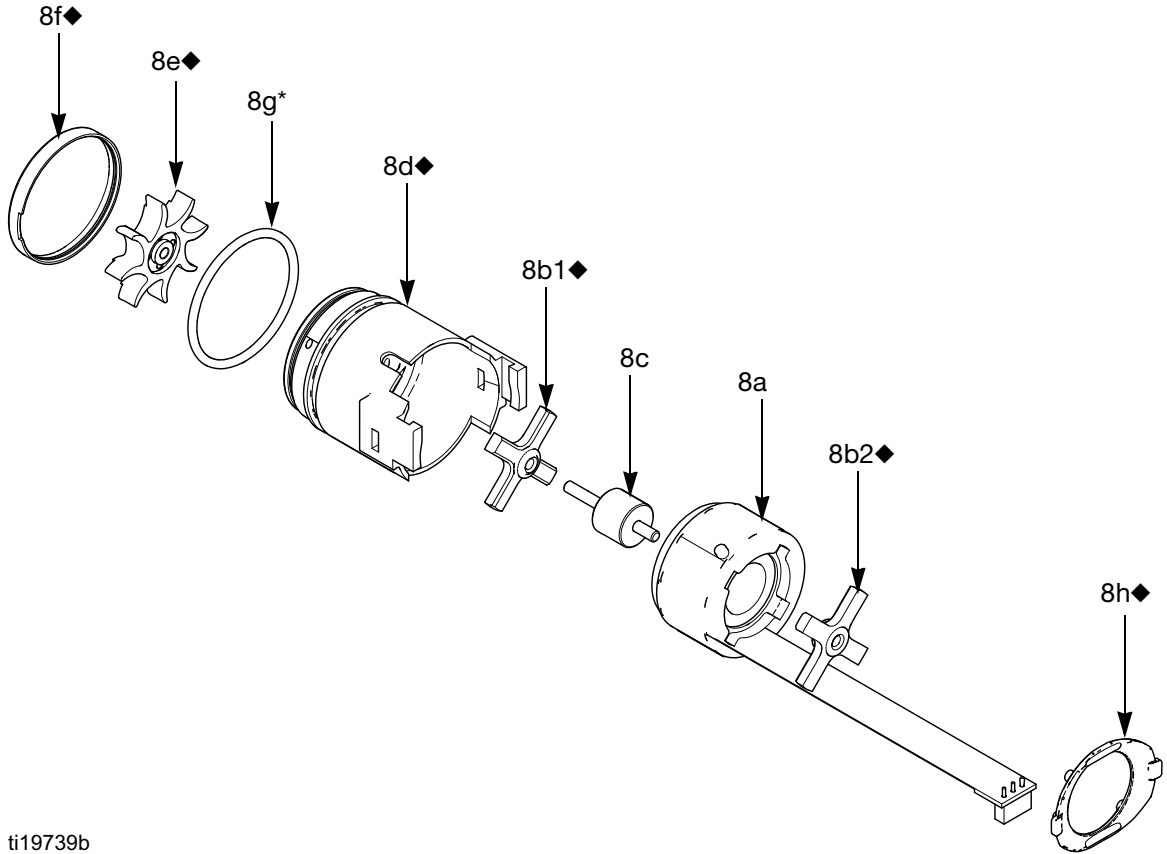


ti18641a

Ref. Part No. No.	Description	Qty	Ref. Part No. No.	Description	Qty
2a‡	111316 O-RING	1	2h‡	186069 SPACER, packing	1
2b‡	116905 SEAL	1	2j*	----- NUT, trigger adjustment (part of item 2e)	1
2c‡	178409 PACKING, fluid	1	2k*	----- NUT, trigger adjustment (part of item 2e)	1
2d‡	178763 PACKING, needle	1			
2e	24N703 ROD, packing, 85 kV guns (includes items 2j and 2k)	1			
2f	197641 NUT, packing	1	‡	These parts are included in Fluid Seal Repair Kit 24W391 (purchase separately).	
2g	185495 HOUSING, packing	1	*	These parts are included in Trigger Adjustment Nut Kit 24N700 (purchase separately).	

# Turbine Assembly

Part No. 24N664 Turbine Assembly

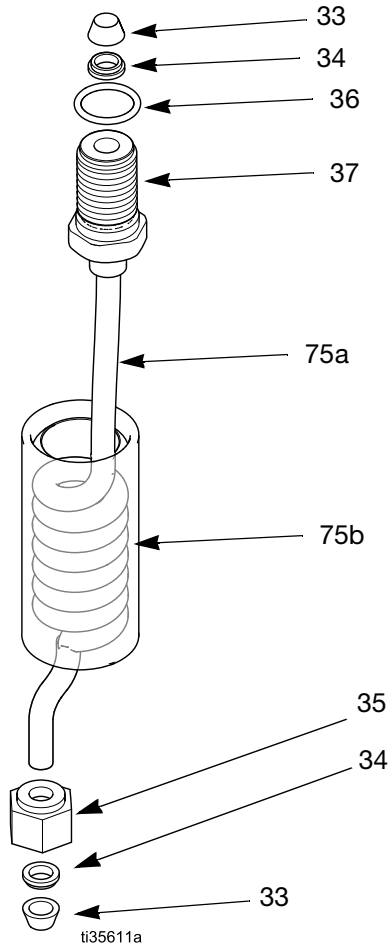


ti19739b

Ref. Part No.	Part No.	Description	Qty	Ref. Part No.	Part No.	Description	Qty
8a	24N705	COIL, turbine	1	8g*	110073	O-RING	1
8b◆	24N706	BEARING KIT (includes two bearings, item 8e fan, and one item 8h clip)	1	8h◆	24N709	CLIP; package of 5 (one clip included with item 15b)	1
8c	24Y264	SHAFT KIT (includes shaft and magnet)	1	9*◆	25N921	GASKET, barrel (not shown) See page 40.	1
8d◆	24N707	HOUSING; includes item 8f	1	* These parts are included in Air Seal Repair Kit 24W390 (purchase separately).			
8e◆	-----	FAN; part of item 8b	1	◆ These parts are included in Bearing Kit 24N706 (purchase separately).			
8f◆	-----	CAP, housing; part of item 8d	1	Parts labeled ----- are not available separately			

# High Conductivity Fluid Tube Assembly

Part No. 25N922 High Conductivity Fluid Tube Assembly  
 For models LA1T16, LA2T16, LA1M16, LA2M16

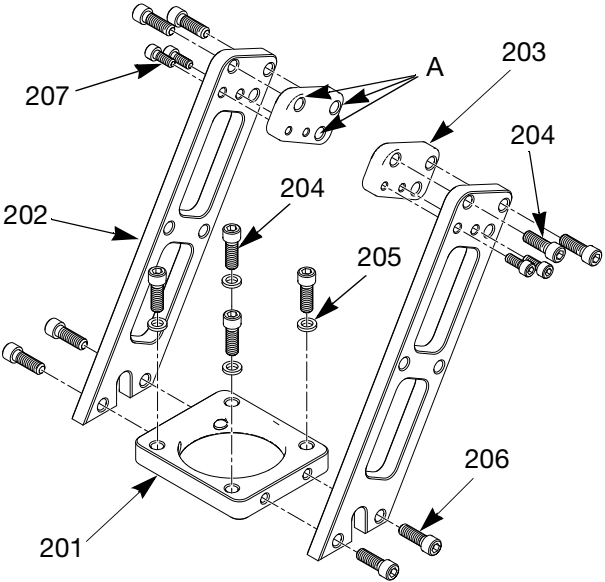


Ref. No.	Part No.	Description	Qty	Ref. No.	Part No.	Description	Qty
33	111286	FERRULE	2	37	25N851	FITTING, fluid barrel	1
34	111285	FERRULE	2	75a	-----	TUBE, fluid	1
35	112644	NUT, bracket	1	75b	-----	COVER	1
36	102982	PACKING, o-ring	1				

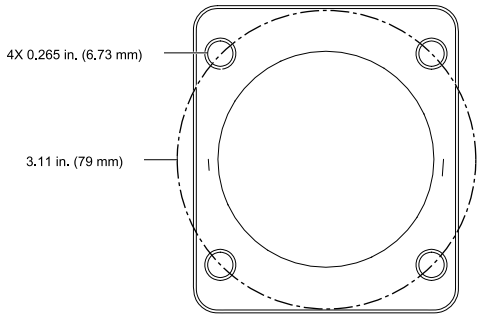
# Robot Mount Bracket Assembly

## Part No. 24X820 Mounting Bracket Assembly

Includes items



Ref. No.	Part No.	Description	Qty
201	- - -	PLATE, mounting	1
202	- - -	LEG	2
203	- - -	SPACER	2
204	112222	SCREW, cap, 1/4-20 x 1.0 in.	8
205	GC2042	WASHER, fender	2
206	111788	SCREW, cap, 1/4-20 x 0.75 in.	4
207	17A612	SCREW, cap, 10-24 x 0.5 in.	4
	- - -	Robot adapter plates (not shown; order separately); See Table 4 on page 48	



027894a

**NOTE:** Alignment holes (A) enable orienting gun spray angle at either 60° or 90° for either gun type.

**Table 4. Robot Adapter Plates**

<b>Adapter Plate</b>	<b>Robot</b>	<b>Bolt Circle</b>	<b>Mounting Screws</b>	<b>Locating Pin Circle</b>	<b>Locating Pins</b>
<b>24Y128</b>	MOTOMAN EPX1250	27.5 mm (1.083 in)	4X M5 x 0.8	27.5 mm (1.083 in)	5 mm
<b>24Y129</b>	MOTOMAN PX1450	32 mm (1.260 in)	8X M6 x 1.0	---	---
	MOTOMAN EPX2850, Three-roll type				
<b>24Y634</b>	MOTOMAN EPX2050	102 mm (4.02 in)	6X M6 x 1.0	102 mm (4.02 in)	2X 4 mm
	ABB IRB 580				
	ABB IRB 5400				
<b>24Y650</b>	MOTOMAN EPX2700	102 mm (4.02 in)	6X M6 x 1.0	102 mm (4.02 in)	2X 5 mm
	MOTOMAN EPX2800				
	MOTOMAN EPX2900				
	KAWASAKI KE610L				
	KAWASAKI KJ264				
	KAWASAKI KJ314				
<b>24Y172</b>	ABB IRB 540	36 mm (1.42 in)	3X M5	---	---
<b>24Y173</b>	ABB IRB 1400	40 mm (1.58 in)	4X M6	---	---
<b>24Y768</b>	FANUC PAINT MATE 200iA	31.5 mm (1.24 in)	4X M5	31.5 mm (1.24 in)	1X 5 mm
	FANUC PAINT MATE 200iA/5L				
<b>24Y769</b>	FANUC P-145	100 mm (3.94 in)	6X M5	100 mm (3.94 in)	1X 5 mm



# Accessories

## Smart Model Accessories and Fiber Optic Cables

Part No.	Description
24W035	Pro Xp Auto Control Module. See 332989 for details.

### Fiber Optic Cables for Gun

See item V in FIGURE 7 on page 13. Connect gun manifold to Pro Xp Auto Control Module. See 332989.

#### Models with Rear Manifolds (Model numbers LA1xxx or HA1xxx)

Part No.	Description
24X003	Fiber Optic Cable, 25 ft (7.6 m)
24X004	Fiber Optic Cable, 50 ft (15 m)
24X005	Fiber Optic Cable, 100 ft (30.5 m)

#### Models with Bottom Manifolds (Model numbers LA2xxx or HA2xxx)

Part No.	Description
24X006	Fiber Optic Cable, 25 ft (7.6 m)
24X007	Fiber Optic Cable, 50 ft (15 m)
24X008	Fiber Optic Cable, 100 ft (30.5 m)

### Fiber Optic Cable Kit

24W875	Parts necessary to replace damaged ends on one cable assembly.
--------	--

## Air Line Accessories

### AirFlex™ Flexible Grounded Air Hose (Grey)

100 psi (7 bar, 0.7 MPa) Maximum Working Pressure  
0.315 in. (8 mm) ID; 1/4 npsm(f) x 1/4 npsm(f) left-hand thread

Part No.	Description
244963	6 ft (1.8 m)
244964	15 ft (4.6 m)
244965	25 ft (7.6 m)
244966	36 ft (11 m)
244967	50 ft (15 m)
244968	75 ft (23 m)
244969	100 ft (30.5 m)

### Standard Grounded Air Hose (Grey)

100 psi (7 bar, 0.7 MPa) Maximum Working Pressure  
0.315 in. (8 mm) ID; 1/4 npsm(f) x 1/4 npsm(f) left-hand thread

Part No.	Description
223068	6 ft (1.8 m)
223069	15 ft (4.6 m)
223070	25 ft (7.6 m)
223071	36 ft (11 m)
223072	50 ft (15 m)
223073	75 ft (23 m)
223074	100 ft (30.5 m)

### Grounded Air Hose with stainless steel braid ground path (Red)

100 psi (7 bar, 0.7 MPa) Maximum Working Pressure  
0.315 in. (8 mm) ID; 1/4 npsm(f) x 1/4 npsm(f) left-hand thread

Part No.	Description
235068	6ft(1.8m)
235069	15 ft (4.6 m)
235070	25 ft (7.6 m)
235071	36 ft (11 m)
235072	50 ft (15 m)
235073	75 ft (23 m)
235074	100 ft (30.5 m)

### Bleed-Type Master Air Valve

300 psi (21 bar, 2.1 MPa) Maximum Working Pressure  
Relieves air trapped in the air line between this valve and the pump air motor when closed.

Part No.	Description
107141	3/4 npt

### Air Line Shutoff Valve

150 psi (10 bar, 1.0 MPa) Maximum Working Pressure  
For turning air to gun on or off.

Part No.	Description
224754	1/4 npsm(m) x 1/4 npsm(f) left-hand thread.

## Fluid Line Accessories

### Fluid Hose

225 psi (14 bar, 1.4 MPa) Maximum Working Pressure  
1/4 in. (6 mm) ID; 3/8 npsm (f); nylon.

Part No.	Description
215637	25 ft (7.6 m)
215638	50 ft (15.2 m)

### Fluid Shutoff/Drain Valve

500 psi (35 bar, 3.5 MPa) Maximum Working Pressure  
For turning fluid on or off to the gun and for relieving fluid line pressure at the pump.

Part No.	Description
208630	1/2 npt(m) x 3/8 npt(f); carbon steel and PTFE; for non-corrosive fluids

### Gun Mounted Fluid Regulator

100 psi (7 bar, 0.7 MPa) Maximum Working Pressure

Part No.	Description
236854	Air-piloted fluid regulator mounts directly to gun manifold for precise fluid control.

## System Accessories

Part No.	Description
222011	Ground wire for grounding pump and other components and equipment in the spray area. 12 gauge, 25 ft (7.6 m).

## Signs

Part No.	Description
16P802	English Warning Sign. Available at no charge from Graco.

## Round Spray Kits

To convert a standard air spray gun to a round spray air cap.

Part No.	Description
24X794	Large Pattern Kit
25N837	Medium Pattern Kit
25N836	Small Pattern Kit

## Fluid Recirculation Fitting

5000 psi (340 bar, 34 Mpa) Maximum Working Pressure

Part No.	Description
24X634	Stainless steel recirculation fitting that mounts directly to the gun fluid inlet fitting. 1/4-18 npsm inlet and outlet.

## Test Equipment

Part No.	Description
241079	Megohmmeter. 500 V output, 0.01–2000 megohms. Use for ground continuity and gun resistance tests. Not for use in hazardous areas.
722886	Paint Resistance Meter. Use for fluid resistivity test. See manual 307263. <b>Not for use in hazardous areas.</b>
722860	Paint Probe. Use for fluid resistivity test. See manual 307263. <b>Not for use in hazardous areas.</b>
245277	Test Fixture, High Voltage Probe, and kV Meter. Use to test the electrostatic voltage of the gun, and the condition of the turbine and power supply when being serviced. See manual 309455. Also requires 24R038 Conversion Kit.
24R038	Voltage Tester Conversion Kit. Converts the 245277 Test Fixture for use with the Pro Xp Gun turbine. See manual 406999.

## Gun Accessories

Part No.	Description
105749	Cleaning Brush
111265	Non-silicone Lubricant, 4 oz (113 g).
116553	Dielectric Grease. 1 oz (30 ml)
24V929	Gun Covers

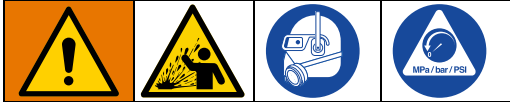
## Conversion and Repair Kits

Part No.	Description
25N922	Converts PRO Auto XP standard coating gun (Part No. LAXT10) to high conductivity gun (LAXT16). The kit is for use with fluids with low resistivity values. See page 17.
24W390	Air Seal Repair Kit
24W391	Fluid Seal Repair Kit
24N706	Turbine Bearing Repair Kit



# Air Caps and Fluid Nozzles

## Fluid Nozzle Selection Chart



To reduce the risk of an injury, follow the **Pressure Relief Procedure** before removing or installing a fluid nozzle and/or air cap.

Fluid Nozzle Part No.	Orifice Size, mm (in.)	Color	Description
24N619	0.55 (.022)	Black	<b>Standard nozzles (STD)</b> for standard coatings
24N613	0.75 (.029)	Black	
26D094	0.9 (.035)	Black	
25N895	1.0 (.042)	Green	
25N896	1.2 (.047)	Gray	
24N616	1.5 (.055)	Black	
25N897	1.8 (.070)	Brown	
24N618	2.0 (.079)	Black	
25N831	1.0 (.042)	Green	<b>Precision high wear nozzles (PHW)</b> with hardened SST seat and damage resistant SST tip; for standard coatings, abrasives, and metallics
25N832	1.2 (.047)	Gray	
25N833	1.5 (.055)	Black	
25N834	1.8 (.070)	Brown	
24N620	0.75 (.029)	Blue	<b>High wear nozzles (HW)</b> with hardened ceramic seat, for abrasives and metallics
24N621	1.0 (.042)		
24N622	1.2 (.047)		
24N623	1.5 (.055)		
24N624	1.8 (.070)		
24N625	2.0 (.079)		
24N729	-----	Black	<b>Round spray large pattern nozzle</b> for use with large pattern round spray air cap only
25N835	-----	Black	<b>Round spray medium or small pattern nozzle</b> for use with medium or small pattern round spray air caps only



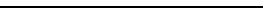

## Fluid Nozzle Performance Charts

Use the following procedure to select the proper fluid nozzle for your application.

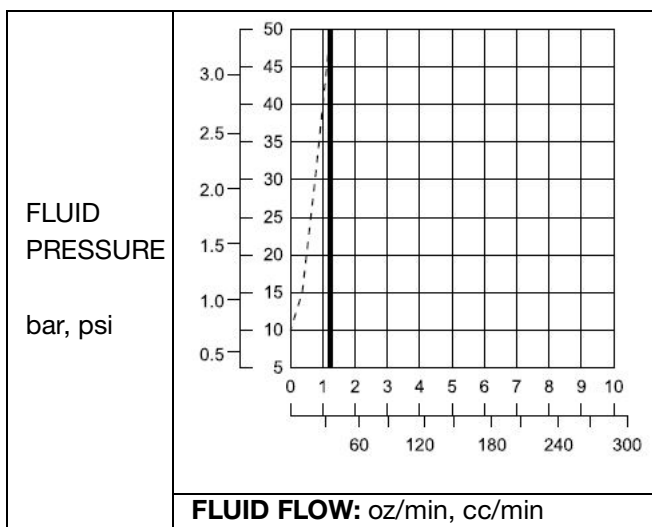
1. For each fluid nozzle performance chart, find the point on the graph corresponding to your desired flow rate and viscosity. Mark the point on each graph with a pencil.
2. The thick vertical line in each graph represents the target flow rate for that nozzle size. Find the graph that has the marked point closest to the thick vertical line. This is the recommended nozzle size for your application. Significantly exceeding the target flow rate may result in lower spray performance due to excessive fluid viscosity.
3. From the marked point, move across to the vertical scale to find the required fluid pressure. If the required pressure is too high, use the next largest nozzle size. If the fluid pressure is too low, (<0.35 bar, 3.5 kPa, 5 psi), use the next smallest nozzle size.

### Key to Fluid Nozzle Performance Charts

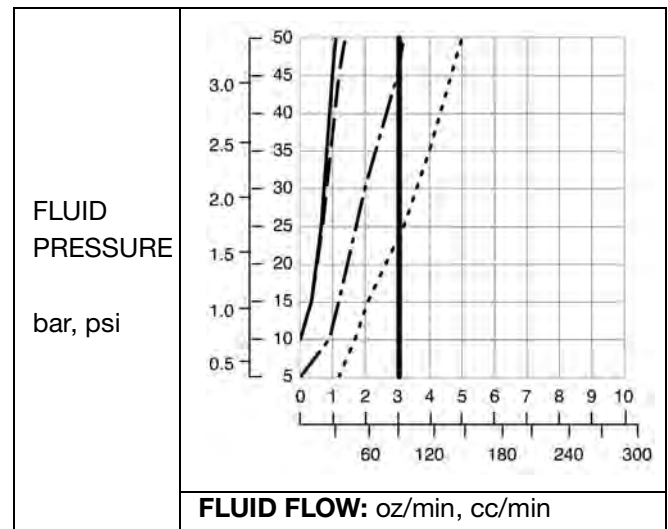
**NOTE:** Fluid pressures are measured at the spray gun inlet.

260 Centipoise Fluid	
160 Centipoise Fluid	
70 Centipoise Fluid	
20 Centipoise Fluid	

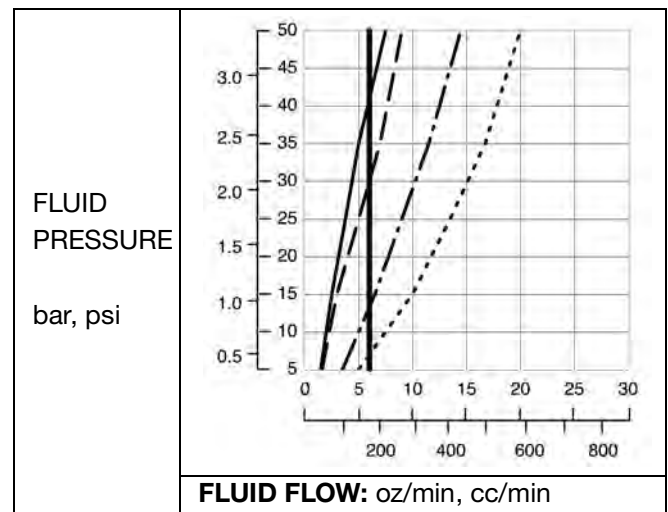
**Table 5: Orifice Size: 0.55 mm (0.022 in.)**



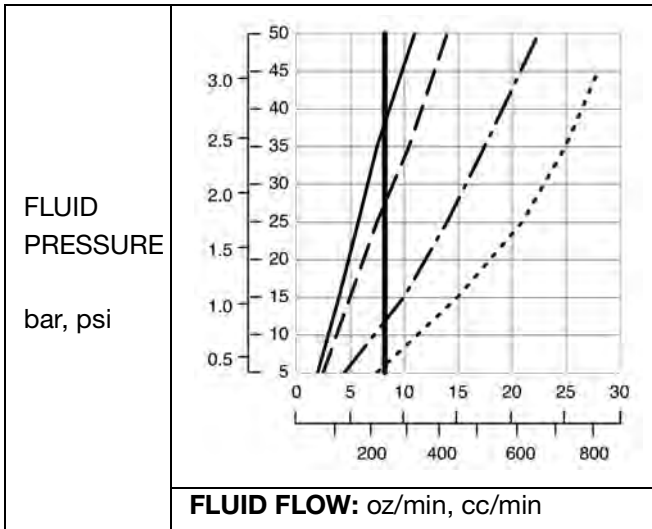
**Table 6: Orifice Size: 0.75 mm (0.030 in.)**



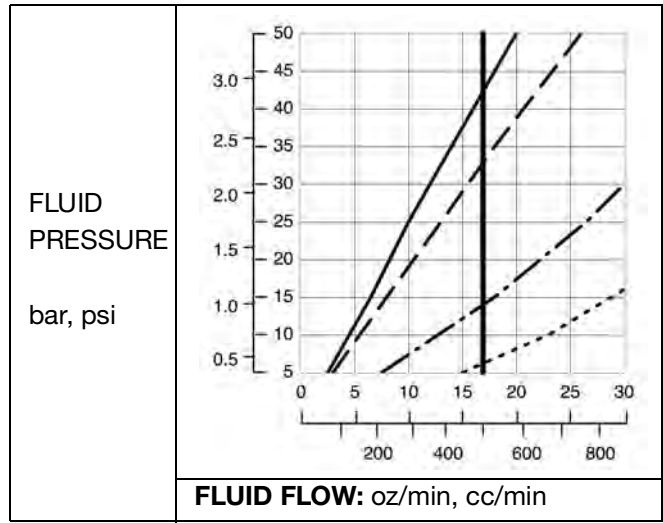
**Table 7: Orifice Size: 1.0 mm (0.040 in.)**



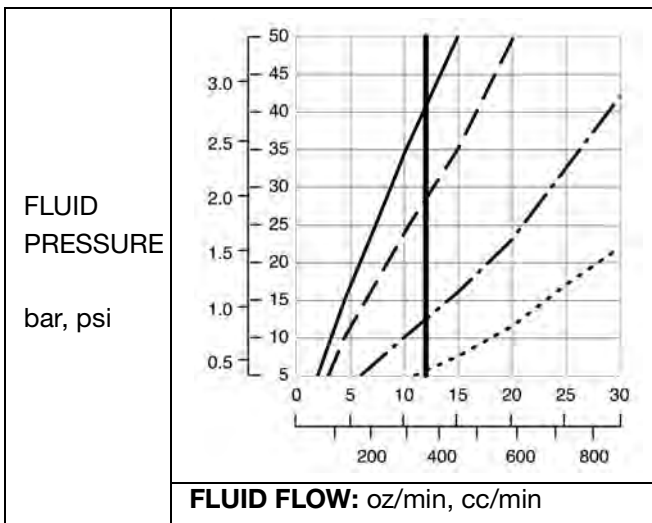
**Table 8: Orifice Size: 1.2 mm (0.047 in.)**



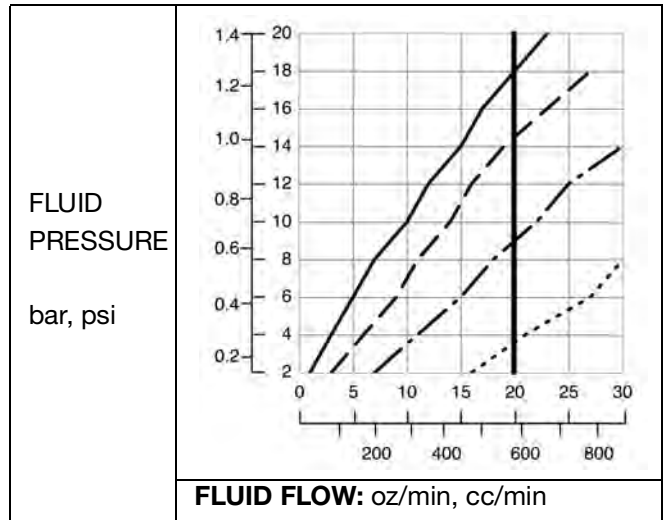
**Table 10: Orifice Size: 1.8 mm (0.070 in.)**







**Table 9: Orifice Size: 1.5 mm (0.059 in.)**



**Table 11: Orifice Size: 2.0 mm (0.079 in.)**



## Air Cap Selection Chart

			
<p>To reduce the risk of an injury, follow the <b>Pressure Relief Procedure</b> before removing or installing a fluid nozzle and/or air cap.</p>			

The charts in this section can assist you in selecting an air cap.

- Keep in mind that more than one air cap can meet your finish requirements.
- When selecting an air cap, consider coating properties, part geometry, pattern shape, pattern size, and operator preferences.

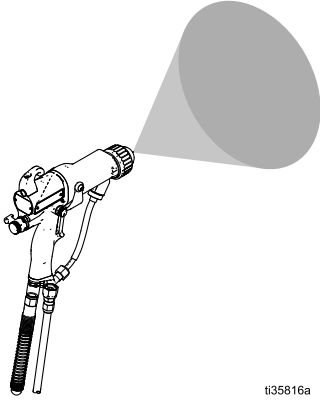
**NOTE:** All air cap pattern shapes and lengths in the following chart were measured under the following conditions. Pattern shape and length are material dependent. Air pressures are measured at the inlet of the gun.

- *Distance to target:* 10 in. (254 mm)
- *Atomizing air pressure:* 20 psi (138 kPa, 1.38 bar)
- *Fan air pressure:* 20 psi (138 kPa, 1.38 bar)
- *Fluid flow rate:* 10 oz/min (300 cc/min)

## Pattern Shape

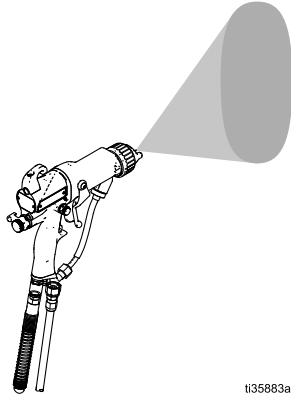
NOTE: Pattern shapes are influenced by the material viscosity, flow rate, and air pressure settings. The gun may not maintain the intended design shape under all conditions.

- **Round patterns** have a swirling, slow, round cone pattern for excellent finish and transfer efficiency.

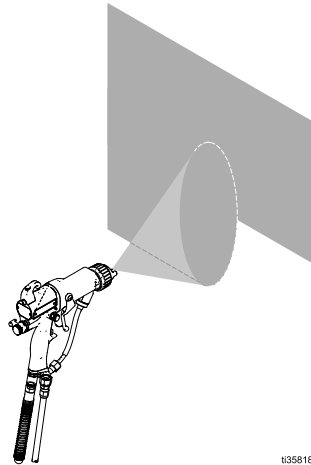
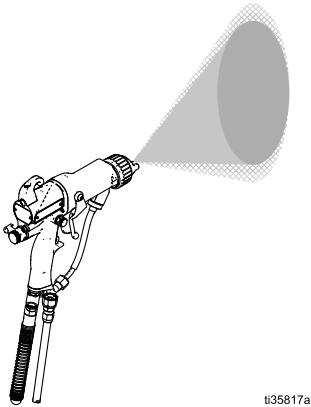


- **Fan patterns** have two styles: round ends and tapered ends.

- **Fan patterns with round ends** are versatile. They can be used in any application and are often the best option for smaller parts or cut-in painting.



- **Fan patterns with tapered ends** are best for achieving even coating thickness with overlapping paint passes.





## General Fan Pattern Air Caps: Descriptions

Part No.	Color	Description	Guidelines for Use
24N477	Black	Standard	Most versatile air cap. Recommended for most materials and applications. Class A finish.
24W279	Green		
24N438	Black	Alternate	Similar to the standard air cap with an alternate arrangement of atomizing air.
24N376	Black	Long Pattern	Longest spray pattern, optimized for painting large parts with overlapping paint passes.
24N276	Blue		
24N277	Red		
24N278	Green		
24N274	Black	Short Pattern	Shorter pattern, optimized for painting with overlapping passes.

## General Fan Pattern Air Caps: Specifications

Part No.	Color	Description	Pattern Shape	Nominal Pattern Length in. (mm)	Recommended Fluid Viscosity*	Recommended Production Rates**	Atomization	Cleanliness
24N477	Black	Standard	Round end	15-17 (381-432)	Light to medium	Standard	Best	Good
24W279	Green							
24N438	Black	Alternate	Round end	15-17 (381-432)	Light to medium	Standard	Best	Good
24N376	Black	Long Pattern	Tapered end	17-19 (432-483)	Light to medium	Standard	Better	Better
24N276	Blue							
24N277	Red							
24N278	Green							
24N274	Black	Short Pattern	Tapered end	12-14 (305-356)	Light to medium	Standard	Good	Best

\*Fluid Viscosity, in centipoise (cp) at 70°F (21°C).  
Centipoise = centistokes x fluid specific gravity.

Light to medium	20–70 cp
Medium to heavy	70–360 cp
High solids	360+ cp

\*\*Recommended Production Rates

Standard	300 cc/min to 500 cc/min (10 oz/min to 17 oz/min)
Low	100 cc/min to 300 cc/min (3 oz/min to 10 oz/min)
High	500 cc/min to 600 cc/min (17 oz/min to 20 oz/min)
Very High	600 cc/min to 750 cc/min (20 oz/min to 25 oz/min)

## Specialty Fan Pattern Air Caps: Descriptions

Part No.	Color	Description	Guidelines for Use
25E670	Black	Soft Spray	For painting small, lightweight parts with a slow-moving spray pattern. Optimized for low production rates.
24N275	Black	Aerospace	Optimized for aerospace coatings. <ul style="list-style-type: none"> <li>• Class A finish</li> <li>• Light, medium, and heavy viscosity, and high solid coatings</li> <li>• Very high production rates</li> </ul>
24N279	Black	Solids	Optimized for medium and heavy viscosity and high solid coatings at standard production rates.
24N439	Black	Solids High Flow	Required for use with 2.0 mm nozzles. Optimized for medium and heavy viscosity and high solid coatings at high production rates.
25E671	Black	HVLP	For applications where HVLP is required.

## Specialty Fan Pattern Air Caps: Specifications

Part No.	Color	Description	Pattern Shape	Nominal Pattern Length in. (mm)	Recommended Fluid Viscosity*	Recommended Production Rates**	Atomization	Cleanliness
25E670	Black	Soft Spray	Round end	10-12 (254-305)***	Light to medium	Low	Better	Good
24N275	Black	Aerospace	Tapered end	14-16 (356-406)	Light, medium, and heavy viscosity, and high solids	Very High	Good	Best
24N279	Black	Solids	Round end	14-16 (356-406)	Medium to heavy viscosity and high solids	Standard	Best	Good
24N439	Black	Solids High Flow	Tapered end	11-13 (279-330)	Medium to heavy viscosity and high solids	High	Best	Better
25E671	Black	HVLP	Round end	14-16 (356-406)	Light to medium	Standard	Good	Good

\*Fluid Viscosity, in centipoise (cp) at 70°F (21°C). Centipoise = centistokes x fluid specific gravity.

Light to medium	20–70 cp
Medium to heavy	70–360 cp
High solids	360+ cp

\*\*Recommended Production Rates

Standard	300 cc/min to 500 cc/min (10 oz/min to 17 oz/min)
Low	100 cc/min to 300 cc/min (3 oz/min to 10 oz/min)
High	500 cc/min to 600 cc/min (17 oz/min to 20 oz/min)
Very High	600 cc/min to 750 cc/min (20 oz/min to 25 oz/min)

\*\*\*The soft spray air cap was measured with the fluid flow rate adjusted to 3.5 oz/min (100 cc/min).

## Round Pattern Air Caps: Descriptions

Part No.	Color	Description	Guidelines for Use
24X794	Black	Large Pattern	Conventional round pattern design for larger patterns up to 8 in (20 cm). Swirling, slow, round cone pattern for excellent finish and transfer efficiency.
25N837	Black	Medium Pattern	Dual inner and outer atomizing air design for improved atomization at low air flows. For medium patterns up to 6 inches (15cm). Swirling, slow, round cone pattern for excellent finish and transfer efficiency.
25N836	Black	Small Pattern	Dual inner and outer atomizing air design for improved atomization at low air flows. For small patterns up to 4 inches (10cm). Swirling, slow, round cone pattern for excellent finish and transfer efficiency.

## Round Pattern Air Caps: Specifications

Part No.	Color	Description	Pattern Shape	Nominal Pattern Diameter in. (mm)	Recommended Fluid Viscosity*	Recommended Production Rates	Atomization	Cleanliness
24X794	Black	Large Pattern	Round end	8 (203)	Light to medium	Low	Good	Good
25N837	Black	Medium Pattern	Round end	6 (152)	Light to medium	Low	Better	Good
25N836	Black	Small Pattern	Round end	4 (102)	Light to medium	Low	Better	Good

\*Fluid Viscosity, in centipoise (cp) at 70°F (21°C).  
Centipoise = centistokes x fluid specific gravity.

Light to medium	20–70 cp
Medium to heavy	70–360 cp
High solids	360+ cp

\*\*Recommended Production Rates

Standard	300 cc/min to 500 cc/min (10 oz/min to 17 oz/min)
Low	100 cc/min to 300 cc/min (3 oz/min to 10 oz/min)
High	500 cc/min to 600 cc/min (17 oz/min to 20 oz/min)
Very High	600 cc/min to 750 cc/min (20 oz/min to 25 oz/min)

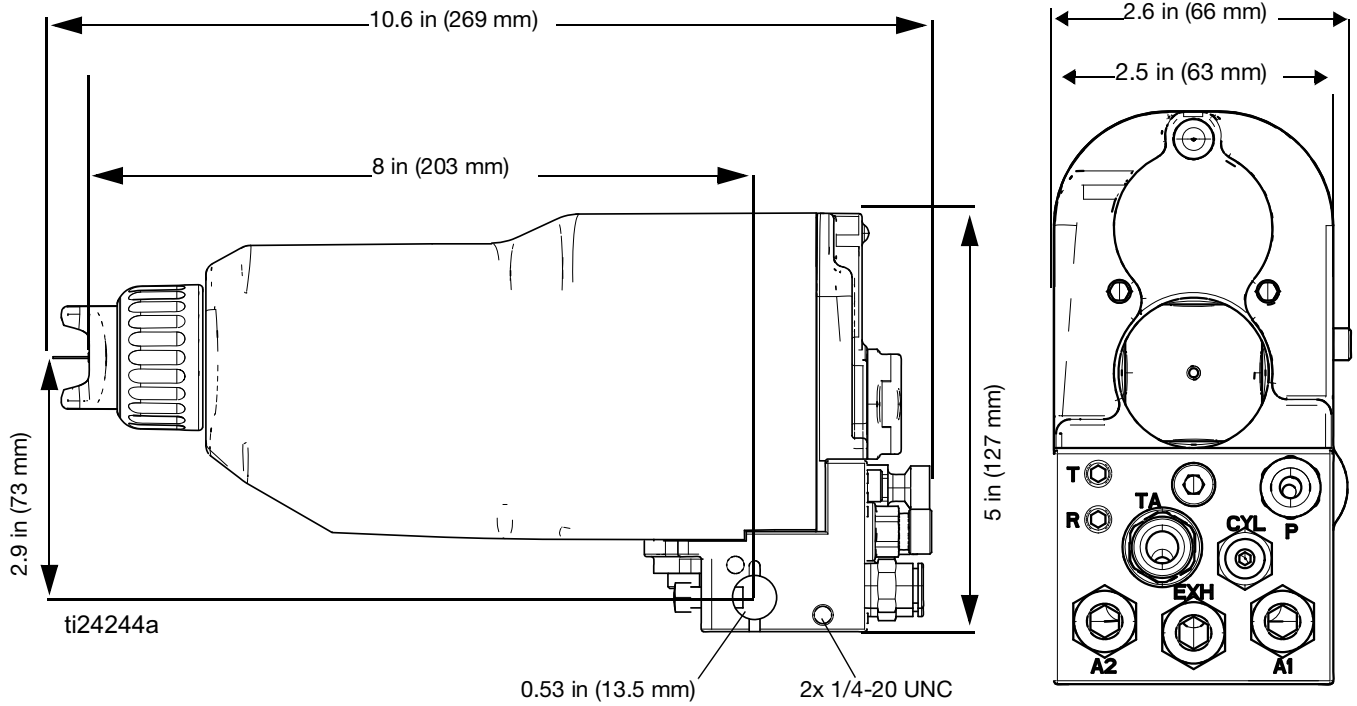
# Electrode Selection Chart

			
To reduce the risk of an injury, follow the <b>Pressure Relief Procedure</b> before removing or installing an electrode.			

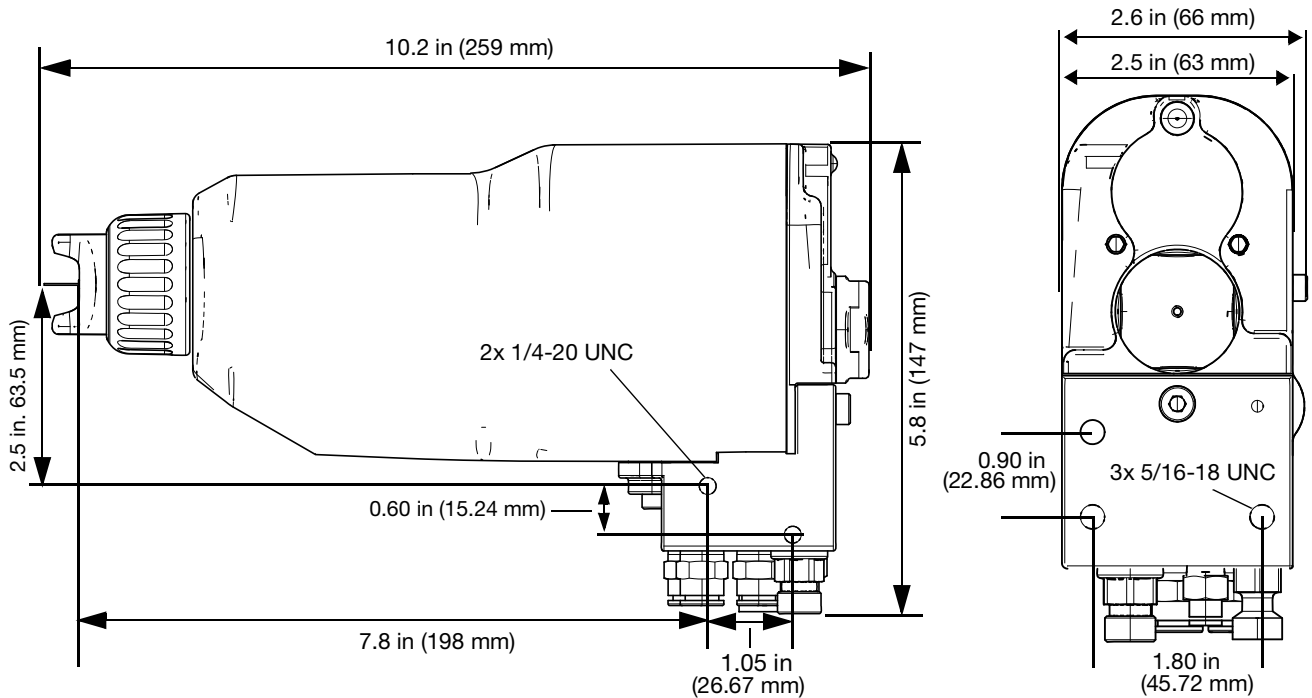
Electrode Part No.	Color	Description	Guidelines for Use
24N651	Gray	Standard (STD)	<p>Electrode assembly with a flexible snap-back wire.</p> <p>The standard wire is resistant to abrasive fluid wear and also resistant to handling damage.</p>
24N856	Gray	Short	<p>Electrode assembly with a short snap-back wire.</p> <p>The short wire has a low-profile design that positions the wire closer to the air cap for convenience.</p> <p>Use the short wire to extend wear life of the electrode wire in extremely abrasive materials.</p>
25N704	Blue	High wear (HW)	<p>Electrode assembly with a hard wire.</p> <p>The hard wire can bend and does not snap back if it is damaged by handling.</p> <p>Use the high wear electrode to extend wear life of the wire with abrasive materials.</p>
25N857	Brown	Hardened	<p>Electrode assembly with a hardened carbide wire.</p> <p>The hardened wire is easier to break with handling than the standard or high wear wires.</p> <p>Use the hardened electrode to extend wear life of the wire with extremely abrasive materials.</p>

# Dimensions

## Rear Inlet Manifold

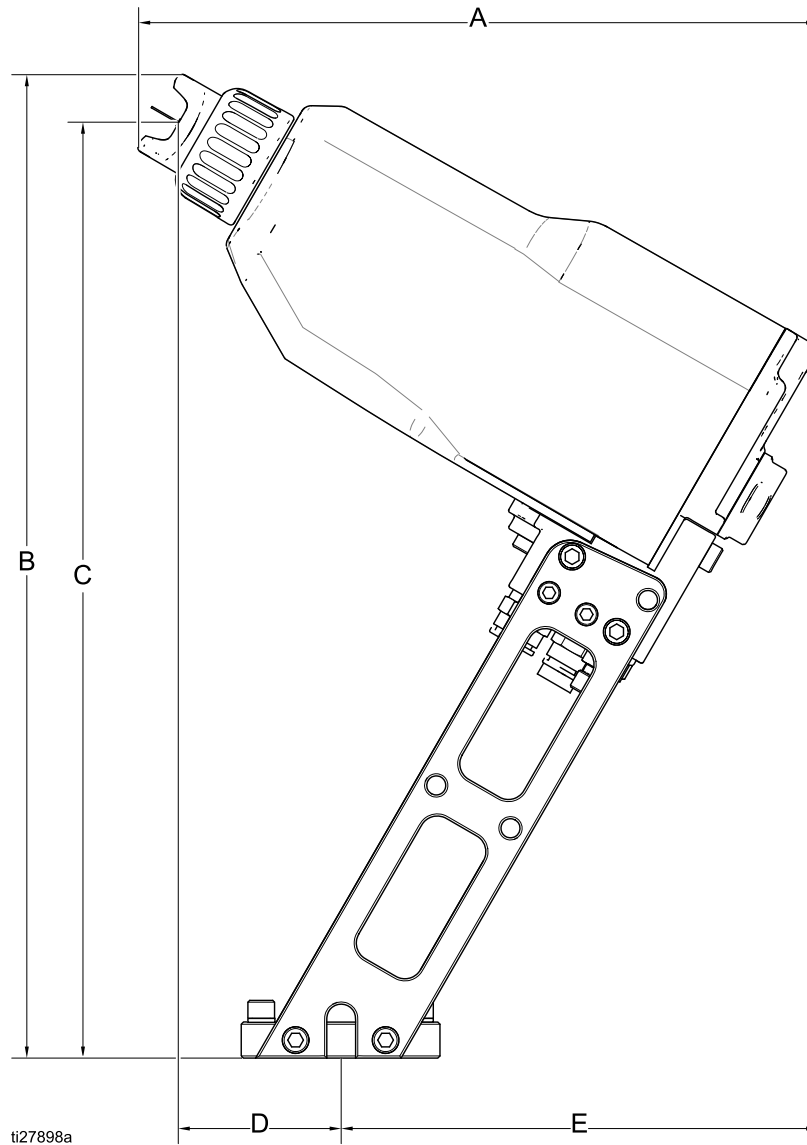


## Bottom Inlet Manifold



## Robot Mount Gun Dimensions

Typical configuration for a hollow-wrist robot with bottom-manifold gun.

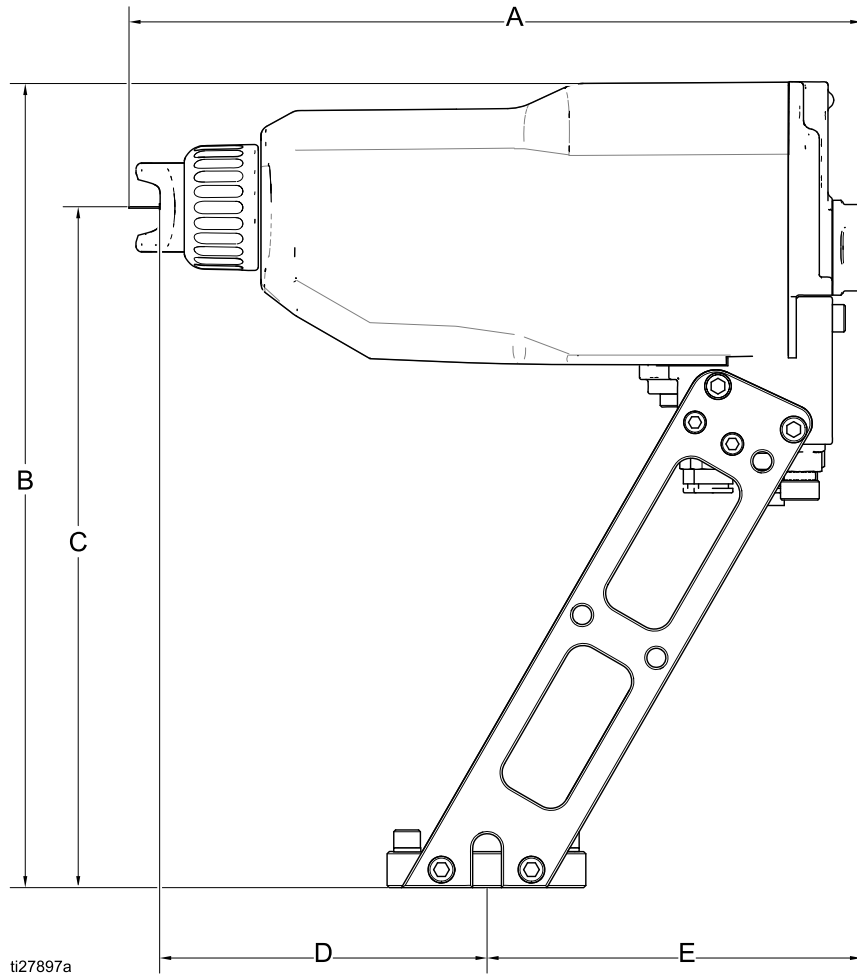


**NOTE:** Gun shown positioned for 60° spray setting in Robot Mount Bracket 24X820.

**FIG. 31. Dimensions, Gun with a Bottom Manifold, 60° position**

A	B	C	D	E
9.5 in. (24.1 cm)	13.7 in. (34.8 cm)	13.0 in. (33.0 cm)	2.3 in. (5.8 cm)	6.7 in. (17.0 cm)

Typical configuration for a hollow-wrist robot with bottom-manifold gun.



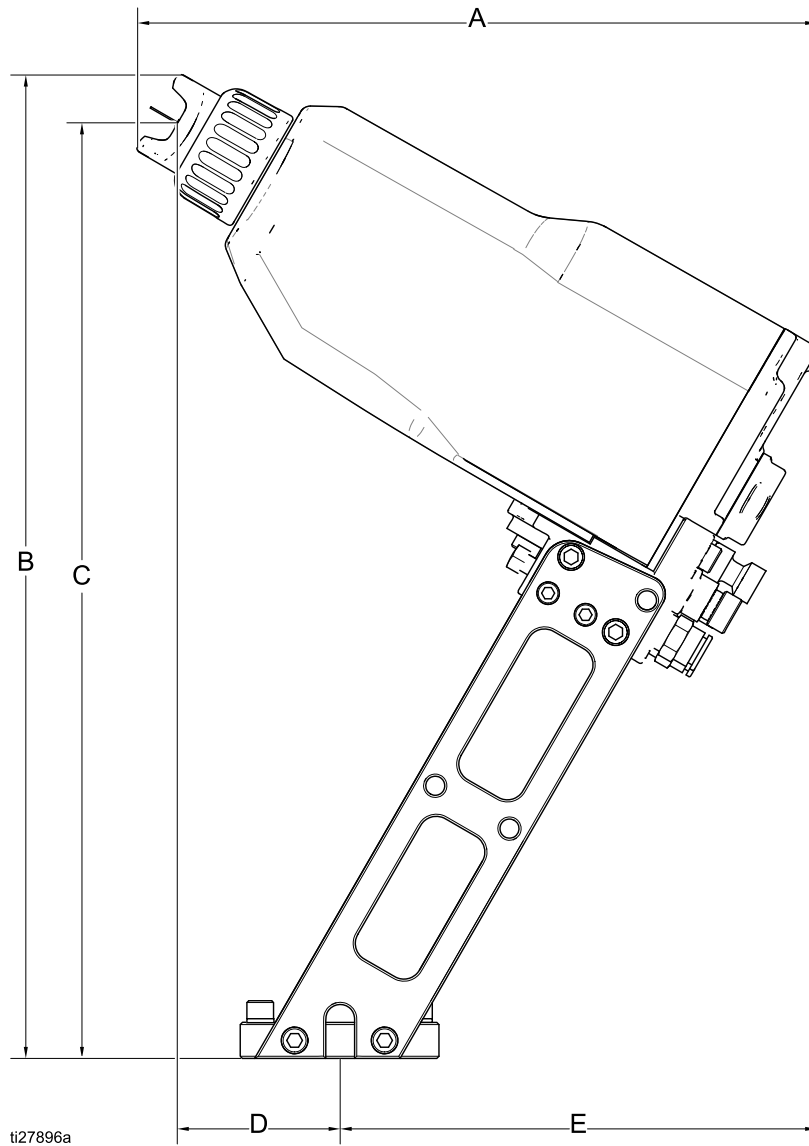
**NOTE:** Gun shown positioned for 90° spray setting in Robot Mount Bracket 24X820.

**FIG. 32. Dimensions, Gun with a Bottom Manifold, 90° Position**

A	B	C	D	E
10.1 in. (25.7 cm)	11.2 in. (28.4 cm)	9.5 in. (24.1 cm)	4.5 in. (11.4 cm)	5.7 in. (13.0 cm)

Dimensions

Alternate configuration for a robot with rear-manifold gun.



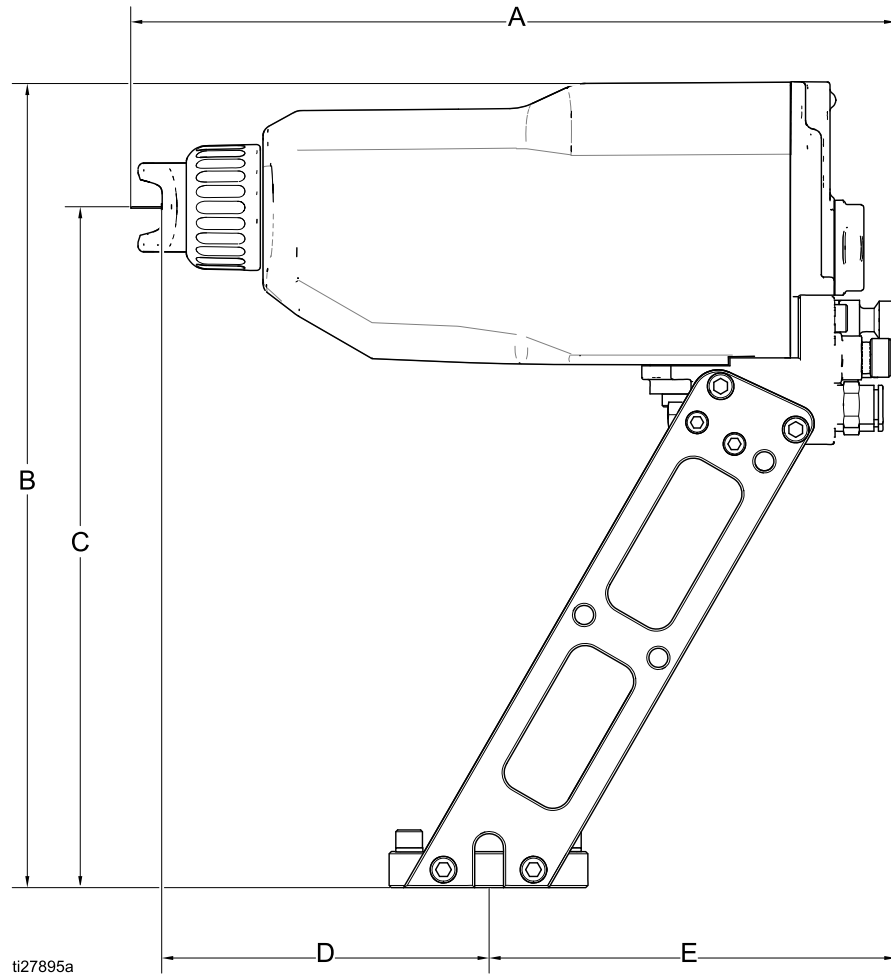
**NOTE:** Gun shown positioned for 60° spray setting in Robot Mount Bracket 24X820.

**FIG. 33. Dimensions, Gun with a Rear Manifold, 60° Position**

A	B	C	D	E
9.5 in. (24.1 cm)	13.7 in. (34.8 cm)	13.0 in. (33.0 cm)	2.3 in. (5.8 cm)	6.7 in. (17.0 cm)



Alternate configuration for a robot with rear-manifold gun.



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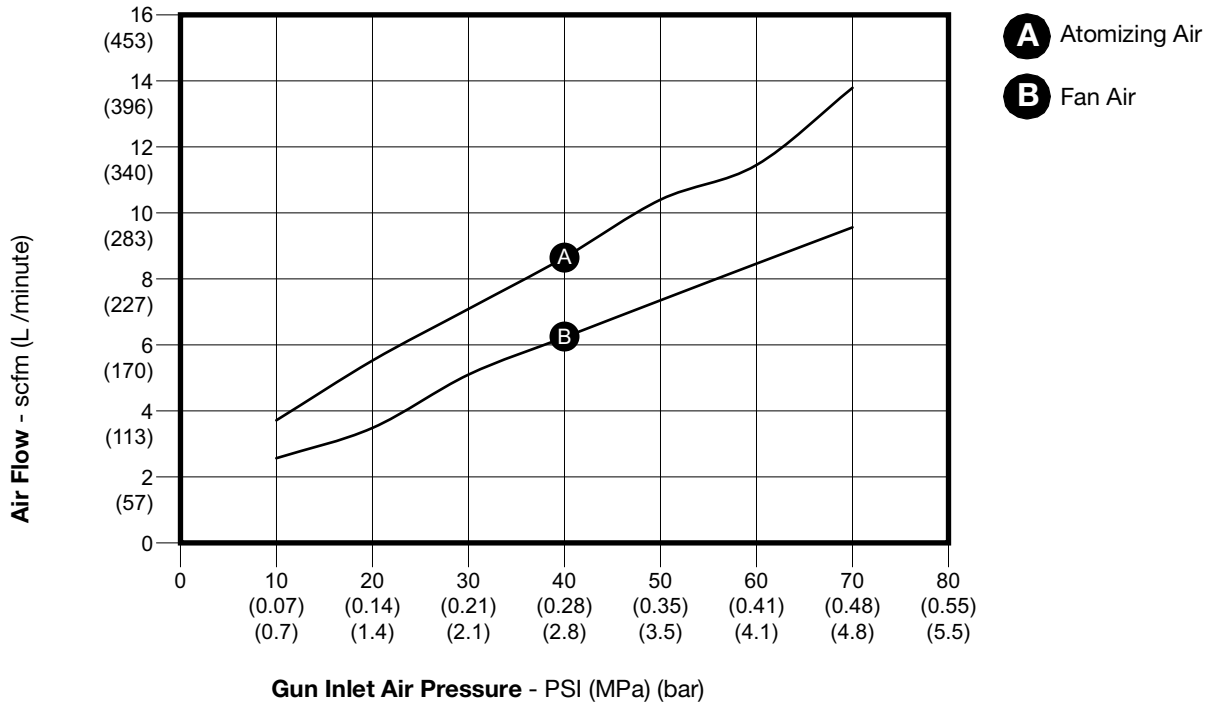
**NOTE:** Gun shown positioned for 90° spray setting in Robot Mount Bracket 24X820.

**FIG. 34. Dimensions, Gun with a Rear Manifold, 90° Position**

A	B	C	D	E
10.5 in. (26.7cm)	11.2 in. (28.4 cm)	9.5 in. (24.1 cm)	4.5 in. (11.4 cm)	5.7 in. (14.5 cm)

# Air Flow

The gun requires 6 scfm (170 l/min) of turbine air flow (see **Technical Specifications**). The following graph shows additional air consumption. For example, if both fan and atomizing air are set at 30 psi (2.1 bar) inlet pressure, the gun uses about 5 scfm (142 l/min) fan air and about 7 scfm (198 l/min) atomizing air. Add these amounts to the turbine air for a total of 18 scfm (510 l/min) air consumption. Air flow was tested using air cap 24N477.



# Technical Specifications

Pro Xp Auto Air Spray Gun		
	US	Metric
Maximum fluid working pressure	100 psi	0.7 MPa, 7 bar
Maximum working air pressure	100 psi	0.7 MPa, 7 bar
Maximum fluid operating temperature	120°F	48°C
Paint resistivity range	3 megohm/cm to infinity. For a table of electrostatic results at different resistance levels see, <b>Check Fluid Resistivity</b> , page 15.	
Short circuit current output	125 microamperes	
Gun Weight (Approximate)	2.6 lb	1.2 kg
Air Consumption		
Required turbine air flow	6 scfm	170 l/min
Typical total air flow with 24N477 air cap at 30 psi (2 bar) atomizing air and fan air inlet pressure	18 scfm	510 l/min
Voltage Output		
Standard Models	85 kV	
Smart Models	40-85 kV	
Noise (dBa)		
Sound Power (measured per ISO Standard 9216)	at 40 psi: 90.4 dB(A) at 100 psi: 105.4 dB(A)	at 0.28 MPa, 2.8 bar: 90.4 dB(A) at 0.7 MPa, 7 bar: 105.4 dB(A)
Sound Pressure (measured 1 m from gun)	at 40 psi: 87 dB(A) at 100 psi: 99 dB(A)	at 0.28 MPa, 2.8 bar: 87 dB(A) at 0.7 MPa, 7 bar: 99 dB(A)
Inlet/Outlet Sizes		
Turbine air inlet fitting, left-hand thread	1/4 npsm(m)	
Atomizing air inlet fitting	5/16 in. OD nylon tube (8 mm)	
Fan air inlet fitting	5/16 in. OD nylon tube (8 mm)	
Cylinder air inlet fitting	5/32 in. OD nylon tube (4 mm)	
Fluid inlet fitting	1/4-18 npsm(m)	
Materials of Construction		
Wetted Parts	Stainless Steel, Nylon, Acetal, Ultra-High Molecular Weight Polyethylene, Fluoroelastomer, PEEK, Tungsten Carbide, Polyethylene	

## California Proposition 65

### CALIFORNIA RESIDENTS

 **WARNING:** Cancer and reproductive harm. – [www.P65warnings.ca.gov](http://www.P65warnings.ca.gov).

# Graco Pro Xp 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. However, any deficiency in the barrel, gun body, trigger, hook, internal power supply, and alternator (excluding turbine bearings) will be repaired or replaced for thirty-six months from the date of sale. 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.

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For patent information, see [www.graco.com/patents](http://www.graco.com/patents).

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Original instructions. This manual contains English. MM 333010

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