

# Pro Xpc™ Auto Electrostatic Air Spray Gun

332992J

EN

## Solventborne Gun Models:

For use in Class I, Div. I Hazardous Locations using Group D spray materials.

For use in Group II, Zone 1 Explosive Atmosphere Locations using Group IIA spray materials.

## Waterborne Gun Models:

For use with conductive waterborne fluids that meet at least one of the following conditions for non-flammability:

- Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206.
- Materials which cannot be ignited, in any mixture with air, by energy source of less than 500 mJ.

**For professional use only.**

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

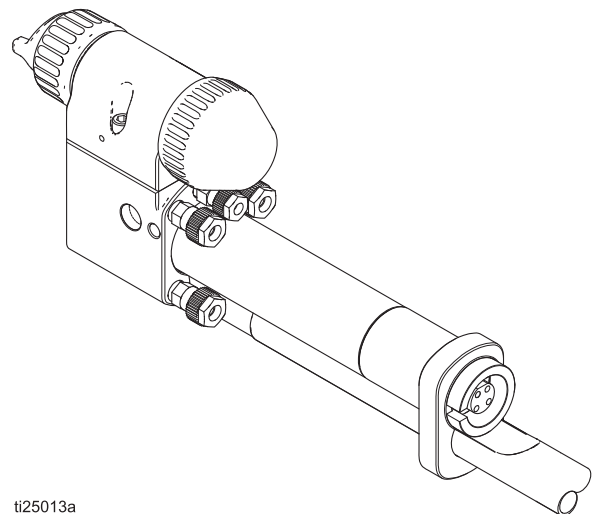
*100 psi (0.7 MPa, 7 bar) Maximum Working Fluid Pressure*



### Important Safety Instructions

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

See page 3 for **Models** and **Approvals**.



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## Models

Part No.	Description	Product Type	Output Voltage
LC1020	Rear Mount Air Spray Gun	Solventborne	100 kV
LC2020	Bottom Mount Air Spray Gun		
LC1028	Rear Mount Air Spray Gun	Waterborne	60 kV
LC2028	Bottom Mount Air Spray Gun		

## Approvals

Specific controllers, guns, and gun power cables must be used together. Refer to the table below for compatible models.

Gun Models	Gun Power Cables	Controller	Product Type	Gun Approvals
LC1020 LC2020	17J586 17J588 17J589	24Y307	Solventborne	 0359  II 2 G < 0.24 mJ PTB 15 ATEX 5009 EN 50050-1 EN 50176 
LC1028 LC2028	17J586 17J588 17J589	24Y308	Waterborne	

## Related Manuals

Manual No.	Description
333266	Pro Xpc Auto Controller

# 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 the procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

## **WARNING**



### **FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD**

Flammable fumes, such as solvent and paint fumes, in **work location** can ignite or explode. To help prevent fire, explosion, or electric shock for **all systems**:

- Electrostatic equipment must be used only by trained, qualified personnel who understand the requirements of this manual.
- Ground all equipment, personnel, object being sprayed, and conductive objects in or close to the spray location. Resistance must not exceed 1 megohm. See **Grounding** instructions.
- Keep spray location free of debris, including solvent, rags and gasoline.
- Keep a working fire extinguisher in the work location.
- Do not use pail liners unless they are conductive and grounded.
- **Stop operation immediately** if static sparking occurs. Do not use equipment until you identify and correct the problem.
- Check gun resistance and electrical grounding daily.
- Use and clean equipment only in well ventilated location.
- Always turn the electrostatics off when flushing, cleaning, or servicing equipment.
- Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static arc).
- Do not plug or unplug power cords or turn lights on or off when flammable fumes are present.



### **For solventborne systems only:**

- Use cleaning solvents with highest possible flash point when flushing or cleaning equipment.
- To clean the exterior of the equipment, cleaning solvents must have a flash point at least 5°C (9°F) above ambient temperature.

### **For waterborne systems only:**

- Do not spray or clean with flammable materials. Use water-based materials only.

# ! WARNING



## ELECTRIC SHOCK HAZARD

This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock for **all systems**:

- Turn off and disconnect power at main switch before disconnecting any cables and before servicing or installing equipment.
- Connect only to a grounded power source.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.

### For waterborne systems:

- Connect the electrostatic gun to a voltage isolation system that will discharge the system voltage when not in use.
- All components of the voltage isolation system that are charged to high voltage must be contained within an isolation enclosure that prevents personnel from making contact with the high voltage components before the system voltage is discharged.
- Follow the **Fluid Voltage Discharge and Grounding Procedure** when instructed to discharge the voltage; before cleaning, flushing, or servicing the system; before approaching the front of the gun; and before opening the isolation enclosure for the isolated fluid supply.
- Do not enter a high voltage or hazardous location until all high voltage equipment has been discharged.
- Do not touch the gun nozzle or electrode, or come within 8 inches (20.4 cm) of the electrode during gun operation. Follow the **Fluid Voltage Discharge and Grounding Procedure**.
- Interlock the gun controller with the voltage isolation system to shut off the electrostatics anytime the isolation system enclosure is opened.
- Do not splice fluid hoses together. Install only one continuous Graco Waterborne Fluid Hose between the isolated fluid supply and the spray gun.



## PRESSURIZED EQUIPMENT HAZARD

Fluid from the equipment, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury.

- Follow the **Pressure Relief Procedure** when you stop spraying/dispensing and before cleaning, checking, or servicing equipment.
- Tighten all fluid connections before operating the equipment.
- Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately.



## PLASTIC PARTS CLEANING SOLVENT HAZARD

Many solvents can degrade plastic parts and cause them to fail, which could cause serious injury or property damage.

- Use only compatible water-based solvents to clean plastic structural or pressure-containing parts.
- See **Technical Data** in this and all other equipment instruction manuals. Read fluid and solvent manufacturer's Safety Data Sheet (SDS) and recommendations.

# ⚠️ WARNING



## TOXIC FLUID OR FUMES HAZARD

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

- Read Safety Data Sheet (SDS) to know the specific hazards of the fluids you are using.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.



## PERSONAL PROTECTIVE EQUIPMENT

Wear appropriate protective equipment when in the work location 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:

- Protective eyewear, and hearing protection.
- Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.



## EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.

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



# 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 (A). See FIG. 1, page 8.

- 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. See **Adjust the Spray Pattern** on page 28.

## Operating the Spray Function

Applying a minimum of 50 psi (0.34 MPa, 3.4 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-time when triggering the gun. A spring returns the piston when the cylinder air is shut off.

## Operating the Electrostatics

The controller sends power to the power supply (E), which increases the voltage to the level set at the controller. The electrostatics enter the manifold (C) and is directed to the gun electrode (D). 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. See FIG. 1, page 8.

## Gun Features and Options

- The full voltage setting is:
  - 60 kV (waterborne models)
  - 100 kV (solventborne models).
- The gun is designed to work with both reciprocators and robots, so select the appropriate model. Mounting brackets can be purchased for all models.
- The gun's quick-disconnect design enables its removal without disconnecting the fluid and air lines to the gun.
- The small metal points on each side of the gun are charged electrodes known as "charge points". The charge points improve the transfer efficiency of the gun.
- This gun is equipped with ability to circulate paint through the gun head.
- The Pro Xpc Auto Controller provides the ability to:
  - Display and set the voltage and current
  - Create and store spray presets
  - Operate the spray gun remotely via discrete I/O.

# Pro Xpc Auto Air Spray Gun Components

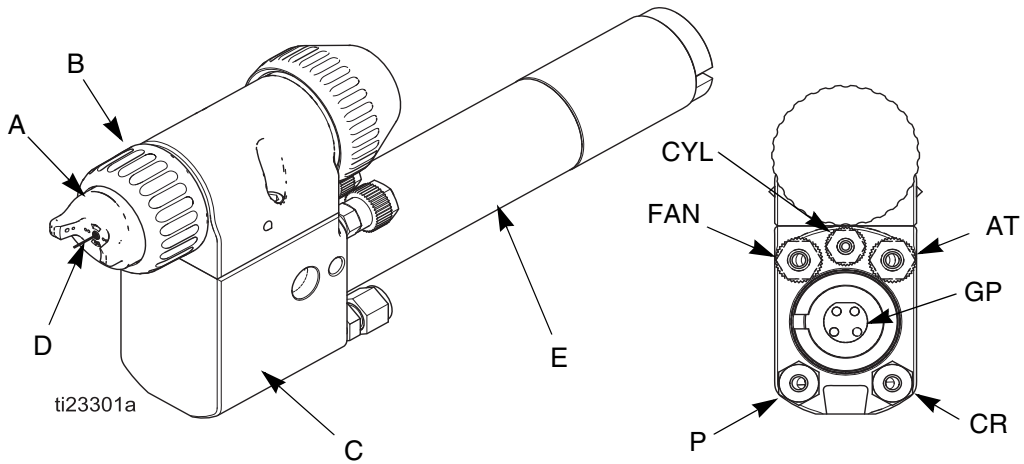


FIG. 1 Gun Overview with Rear Mount

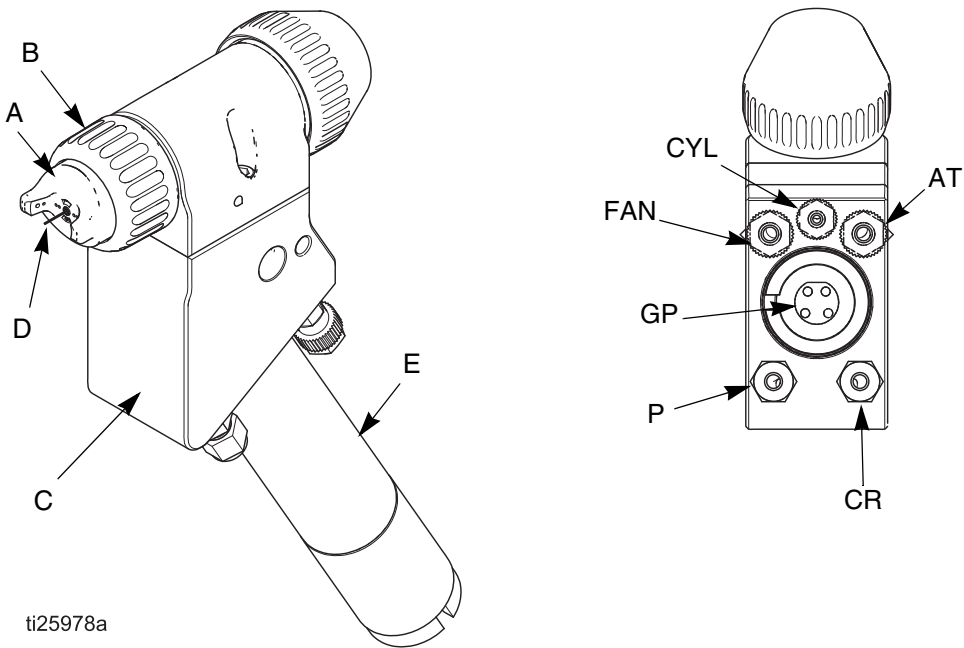


FIG. 2 Gun Overview with Bottom Mount

**Key**

A	Air Cap
B	Retaining Ring
C	Manifold
D	Electrode
E	Gun Power Supply

**Manifold Fittings**

AT	Atomization Air Inlet Fitting; 8 mm (5/16 in.) tube
FAN	Fan Air Inlet Fitting; 8 mm (5/16 in.) tube
CYL	Trigger Air Inlet Fitting; 6 mm (1/4 in.) tube
P	Fluid Supply Inlet Fitting; 6 mm (1/4 in.) tube
CR	Fluid Circulation Fitting; 6 mm (1/4 in.) tube
GP	Gun Power Supply



# Installation



Installing and servicing this equipment requires access to parts which may cause fire, explosion, electric shock, or other serious injury if work is not performed properly.

- Do not install or service this equipment unless you are trained and qualified.
- Comply with all applicable local, state, and national fire, electrical, and other safety regulations.
- If using a solventborne system, ensure your installation complies with national, state, and local codes for the installation of electrical apparatus in a Class I, Division 1, or a Group II, Zone 1 Hazardous Location.
- If using a waterborne system, ensure that the electrostatic gun is connected to a voltage isolation system that will discharge the system voltage when not in use.

- The gun must be connected to a voltage isolation system that will discharge the system voltage when the gun is not in use.
- There should be a bleed resistor to drain off the system voltage when the spray gun is not in use.
- All components of the voltage isolation system that are charged to high voltage must be contained within an isolation enclosure that prevents personnel from making contact with the high voltage components before the system voltage is discharged.
- The controller must be interlocked with the voltage isolation system to shut off the electrostatics anytime the isolation enclosure is opened or entered.
- The voltage isolation system must be interlocked with the spray location entrance to automatically discharge the voltage and ground the fluid whenever someone opens the isolation enclosure or enters the spray location.

## Basic Guidelines

### Solventborne System Installation Requirements

- A solvent interlock must be provided to prevent spraying solvent while electrostatics are applied.
- Ventilation must be provided to prevent buildup of flammable or toxic vapors while spraying, flushing, or cleaning the gun.
- Earth grounds must be provided for all specified system components.

### Waterborne System Installation Requirements

- The gun must be connected to a voltage isolation system, which isolates the fluid supply from ground and allows voltage to be maintained at the tip of the gun.

#### NOTICE

The system should not have severe arcing occurring when the isolation mechanism opens and closes. Severe arcing will shorten the life of the system components.

### Graco Waterborne Fluid Hose

Use a Graco Waterborne Fluid Hose between the voltage isolation system fluid outlet and the gun fluid inlet. See **Accessories**, page 68 for available hoses. The hose consists of an inner PTFE tube, a conductive layer covering the PTFE tube, and an outer cover.

See **Waterborne Systems**, page 21 for details on connecting fluid hoses to ensure that the shield layer is properly attached to earth ground.

If a hose failure occurs where high voltage arcs through the inner tube, voltage will be discharged to ground through the conductive hose layer. When properly installed, the conductive hose layer is grounded through its connection to the grounded enclosure.

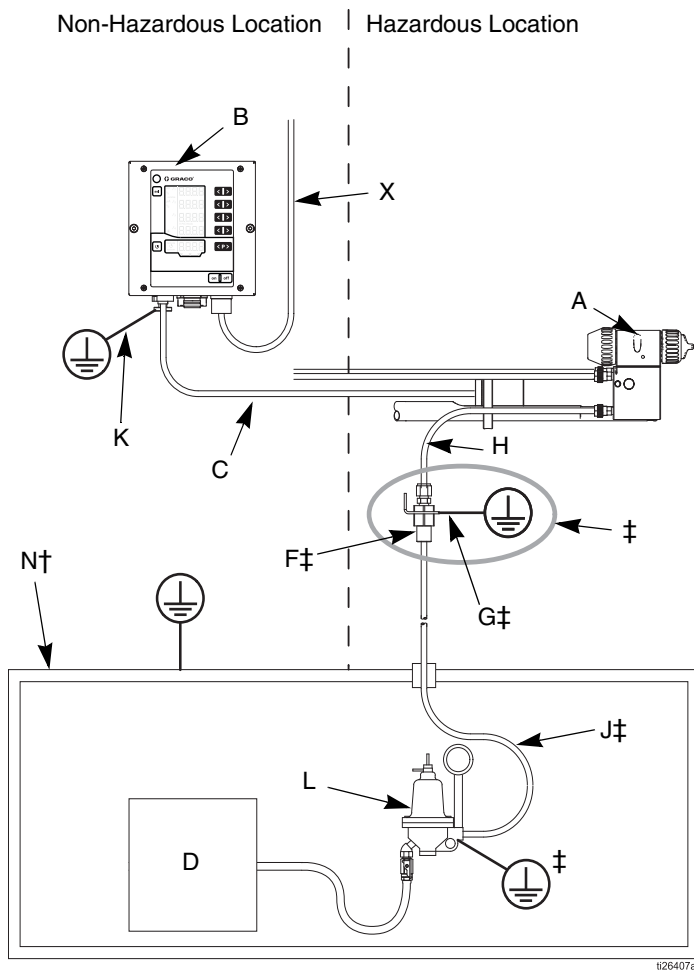
# Installation Options

The following figures show typical installations for different electrostatic air spray system integrations. They are not actual system designs. For assistance in designing a system to suit your particular needs, contact your Graco distributor.

## No Integration

The defining characteristics of a typical installation with no integration include:

- No integration of the Pro Xpc Auto Air Spray Gun or Controller.
- Local operation using the Pro Xpc Auto Controller interface.
- Interlocks managed independently of the spray gun installation.



<p>To reduce the risk of fire and explosion, the controller (B) must be electrically interlocked with the spray booth ventilation fans to prevent the gun from operating without ventilation fans operating.</p>				

**KEY:**

A	Pro Xpc Auto Air Spray Gun
B	Pro Xpc Auto Controller operating in Local Mode (interlocks disabled through switches)
C	Gun Power Cable
D	Fluid Supply
F‡	Fluid Hose Ground Bracket
G‡	Fluid Bracket Ground Wire
H	‡Fluid Supply Tube (Graco-supplied) to gun fluid inlet, maximum 8 ft length †Graco Waterborne Fluid Supply Hose, from fluid regulator (L) to gun inlet (hose must be a single, uninterrupted length).
J‡	Fluid Supply Hose
K	Pro Xpc Auto Controller Ground Wire
L	Fluid Regulator
N†	Isolation Enclosure
X	Pro Xpc Auto Controller Power Cord

† Waterborne systems only  
‡ Solventborne systems only

**FIG. 3. Typical Installation With No Integration**

## Basic Integration

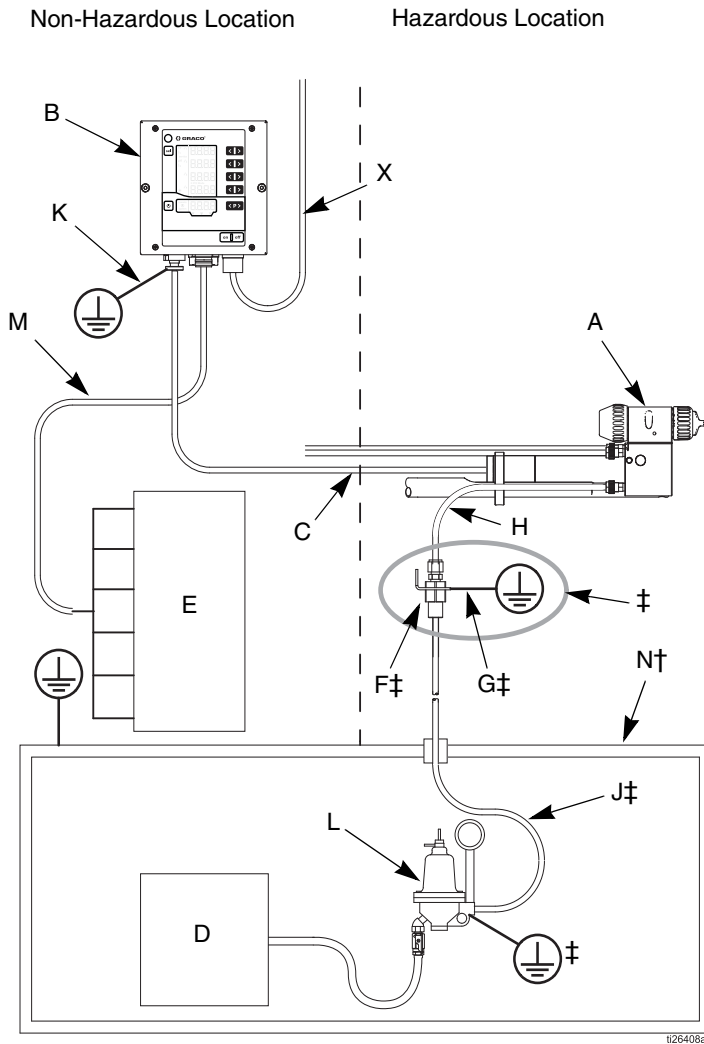
The Discrete I/O cable provides for 19 possible discrete I/O signals. This example shows a basic integration. The defining characteristics of a Basic Integration installation include:

- Integration of basic gun and controller functions.
- Integration of controller interlocks.
- Local operation of setup and error functions.

The Discrete I/O signals used include:

- **Preset Select 1 (Pin #1) and Preset Select 2 (Pin #2):** Used to select Presets P000-P003. For example: Select Preset P002 by applying 24V to Pin #2, and Ground or no connection to Pin #1.

- **Remote Enable/Disable (Pin #4):** Enable remote control by applying 24V to Pin #4.
- **Electrostatic Enable (Pin #5):** Use a switched voltage source for Pin #5 to activate/trigger the electrostatics.
- **GND:** Used as ground reference for I/O signals.
- **Interlocks:** See the Pro Xpc Auto Controller manual (333266) for information on how to set up the required interlocks.



To reduce the risk of fire and explosion, the controller (B) must be electrically interlocked with the spray booth ventilation fans to prevent the gun from operating without ventilation fans operating.				

**KEY:**

A	Pro Xpc Auto Air Spray Gun
B	Pro Xpc Auto Controller
C	Gun Power Cable
D	Fluid Supply
E	Discrete I/O Signals
F‡	Fluid Hose Ground Bracket
G‡	Fluid Bracket Ground Wire
H	‡Fluid Supply Tube (Graco-supplied) to gun fluid inlet, maximum 8 ft length. †Graco Waterborne Fluid Supply Hose, from fluid regulator (L) to gun inlet (hose must be a single, uninterrupted length).
J‡	Fluid Supply Hose
K	Pro Xpc Auto Controller Ground Wire
L	Fluid Regulator
M	I/O Cable
N†	Isolation Enclosure
X	Pro Xpc Auto Controller Power Cord

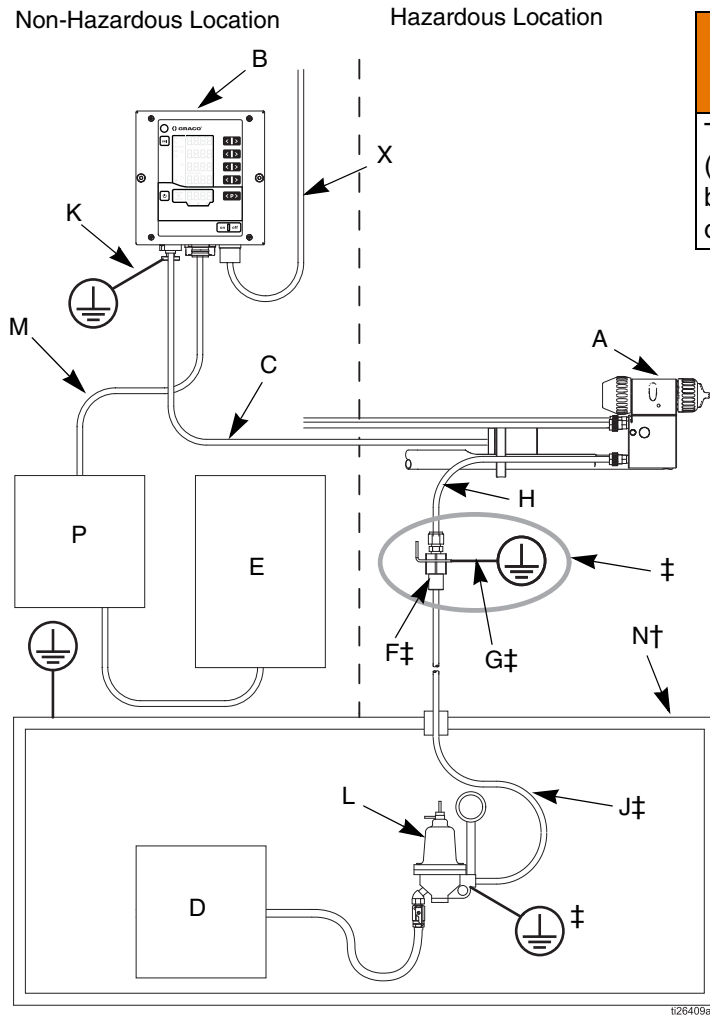
† Waterborne systems only  
‡ Solventborne systems only

**FIG. 4. Typical Installation with Basic Integration**

## PLC Integration

The defining characteristics of a PLC (Programmable Logic Controller) Integration installation include:

- PLC integration of all gun and controller functions. See the Pro Xpc Auto Controller manual (333266) for a complete description of the signals.
- Local setup of controller.



<p>To reduce the risk of fire and explosion, the controller (B) must be electrically interlocked with the spray booth ventilation fans to prevent the gun from operating without ventilation fans operating.</p>				

**KEY:**

A	Pro Xpc Auto Air Spray Gun
B	Pro Xpc Auto Controller
C	Gun Power Cable
D	Fluid Supply
E	Robot or Reciprocator
F‡	Fluid Hose Ground Bracket
G‡	Fluid Bracket Ground Wire
H	‡Fluid Supply Tube (Graco-supplied) to gun fluid inlet, maximum 8 ft length
J‡	†Graco Waterborne Fluid Supply Hose, from fluid regulator (L) to gun inlet (hose must be a single, uninterrupted length).
J‡	Fluid Supply Hose
K	Pro Xpc Auto Controller Ground Wire
L	Fluid Regulator
M	I/O Cable
N†	Isolation Enclosure
P	PLC
X	Pro Xpc Auto Controller Power Cord

† Waterborne systems only  
‡ Solventborne systems only

**FIG. 5. Typical Installation with PLC Integration**

## Warning Signs

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

## Ventilate the Spray Booth



Provide fresh air ventilation to avoid the buildup of flammable or toxic vapors when spraying, flushing, or cleaning the gun. Do not operate the gun unless ventilation fans are operating.

Electrically interlock the controller (B) with the ventilators to prevent gun operation without ventilating fans operating. Check and follow all National, State, and Local codes regarding air exhaust velocity requirements.

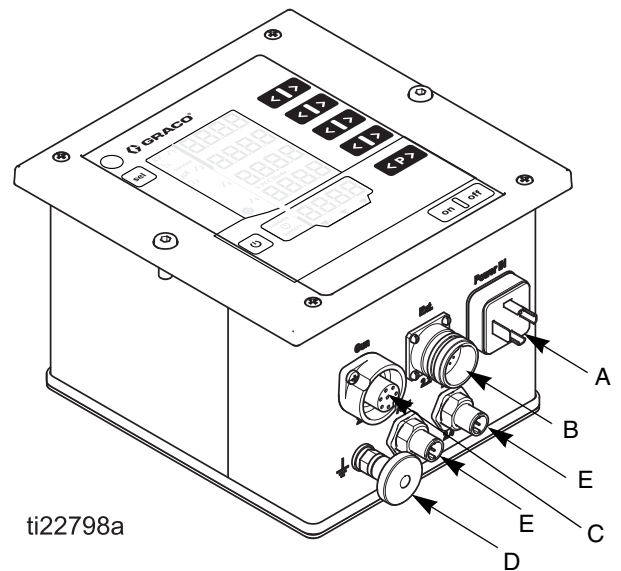
**NOTE:** High velocity air exhaust will decrease the operating efficiency of the electrostatic system. The minimum allowable air exhaust velocity is 60 ft/minute (19 linear meters/minute).

## Install the Controller



To reduce the risk of fire and explosion, do not install equipment approved only for a non-hazardous location in a hazardous location.



See the Pro Xpc Auto Controller Manual (333266) for installation instructions.



**FIG. 6. Pro Xpc Auto Controller**

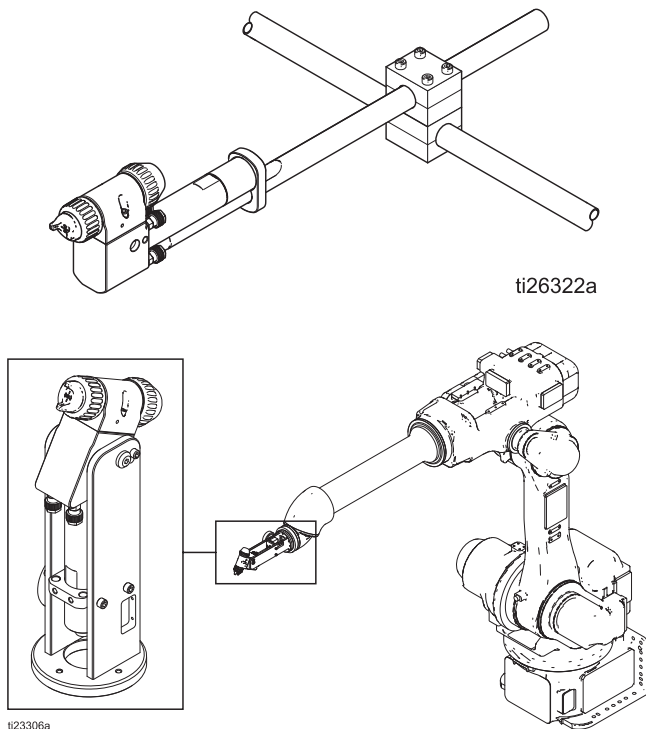
A	Input Power Connection
B	Discrete I/O Cable Connection
C	Gun Power Cable Connection
D	Ground Connection
E	CAN Connections (not enabled)

## Install the Gun and Mounting Bracket

				
<p>To reduce the risk of fire and explosion, keep all grounded objects at least 8 inches (20.3 cm) away from the gun, including all grounded or conductive hoses. Use only plastic, non-conductive mounting brackets and fasteners.</p>				

**NOTE:** If the gun will use the circulation feature, remove the circulation plug prior to mounting. See **Circulation**, page 17.

Install the gun and manifold on a reciprocator or robot using either the 1-inch bar or the robot bracket.

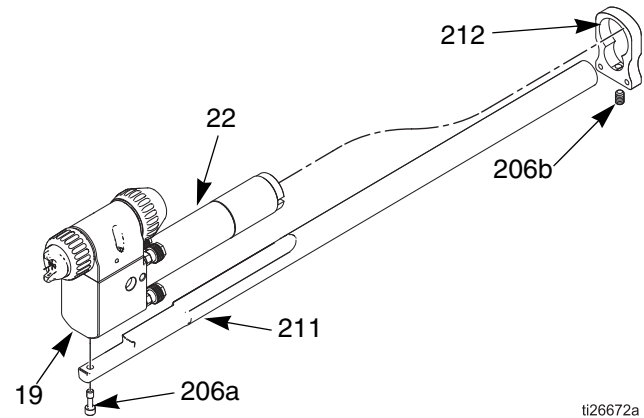


**FIG. 7. Reciprocator & Robot Mounting**

## Rear Mount (Reciprocator) Installation

The Rear Mount Bracket Assembly (24L044) can be purchased separately. See FIG. 8.

1. Insert the mounting rod (211) into the dovetail slot in the bottom of the manifold (19).



**FIG. 8 Rear Mount Installation**

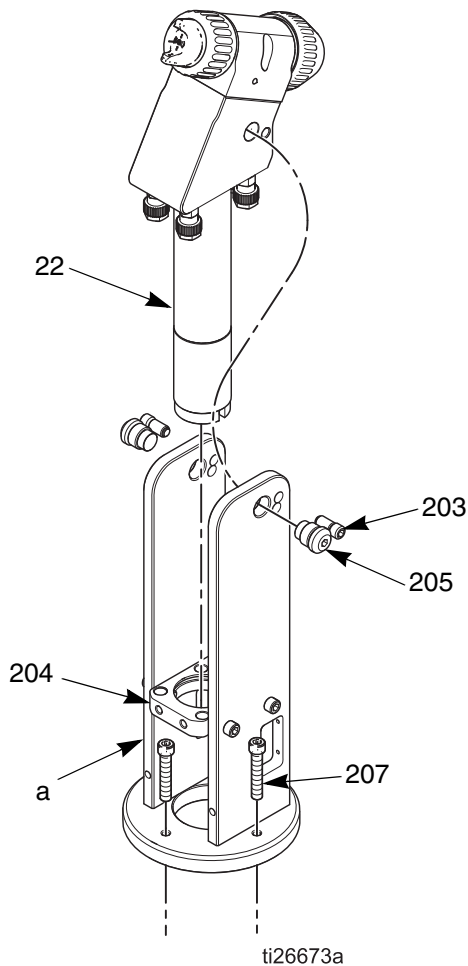
2. Attach the mounting rod (211) to the manifold (19) using the provided plastic retainer fastener (206a). Torque to 10 in-lbs (1.1 N · m).
3. Slide the mounting plate (212) over the mounting rod (211) and power supply (22) until the threaded hole in the mounting plate is aligned with the divot in the mounting rod. Torque the set screw (206b) to 10 in-lbs (1.1 N · m).

See **Rear Mount Gun Dimensions**, page 53.

## Bottom Mount (Robot) Installation

The Bottom Mount Bracket Assembly (24L050) can be purchased separately (includes items 201-207). See FIG. 9.

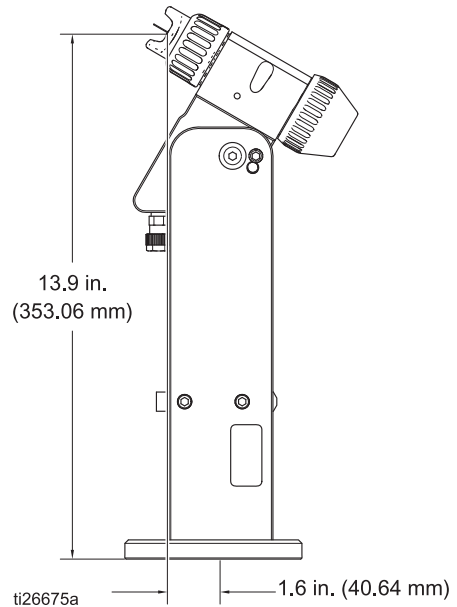
1. Select the appropriate mounting adapter plate for the model of robot. See **Robot Adapter Plates**, page 67.
2. Secure the adapter plate to the robot.



**FIG. 9 Bottom Mount Installation**

3. Attach the robot mounting bracket (a) to the adapter plate using the supplied screws (207).

4. Attach the fluid and air hoses to the manifold connections.
5. Mount the gun using the two locking pins (203) and retainers (205).



**FIG. 10 Bottom Mount Bracket Dimensions**

For alternate mounting configurations and required clearance dimensions using this mounting bracket, see **Robot Mount Gun Dimensions**, page 54.


## Install the Air Line Accessories

1. Install a bleed-type air valve (L) on the main (W), fan (FAN), and atomization (AT) air lines to shut off all air to the gun. See FIG. 11.
2. Install an air line filter/water separator on the gun air line to ensure a dry, clean air supply to the gun.

### NOTICE

Dirt and moisture can ruin the appearance of your finished workpiece and can damage the equipment, causing the gun to malfunction.

3. Install a bleed-type air regulator (M) on each of the air supply lines (AT, FAN, CYL) to control air pressure to the gun.
4. Install a solenoid valve (K) on the cylinder air line (CYL) to actuate the gun. The solenoid valve must have a quick exhaust port.



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 valve (K) must have a quick exhaust port so trapped air will be relieved between the valve and gun when the solenoid is shut off.

## Install the Fluid Line Accessories

1. Install a fluid filter and drain valve at the pump outlet.
2. Install a fluid regulator to control fluid pressure to the gun.
  - For solventborne systems: Install a fluid bracket between the gun and the fluid regulator.
  - For waterborne systems: Install all fluid line accessories inside the isolation enclosure.

AT	Atomization Air Inlet
CYL	Trigger Air Inlet
FAN	Fan Air Inlet
K	Solenoid Valve
L	Bleed-type Air Valve
M	Bleed-type Air Regulator
W	Main Air Line

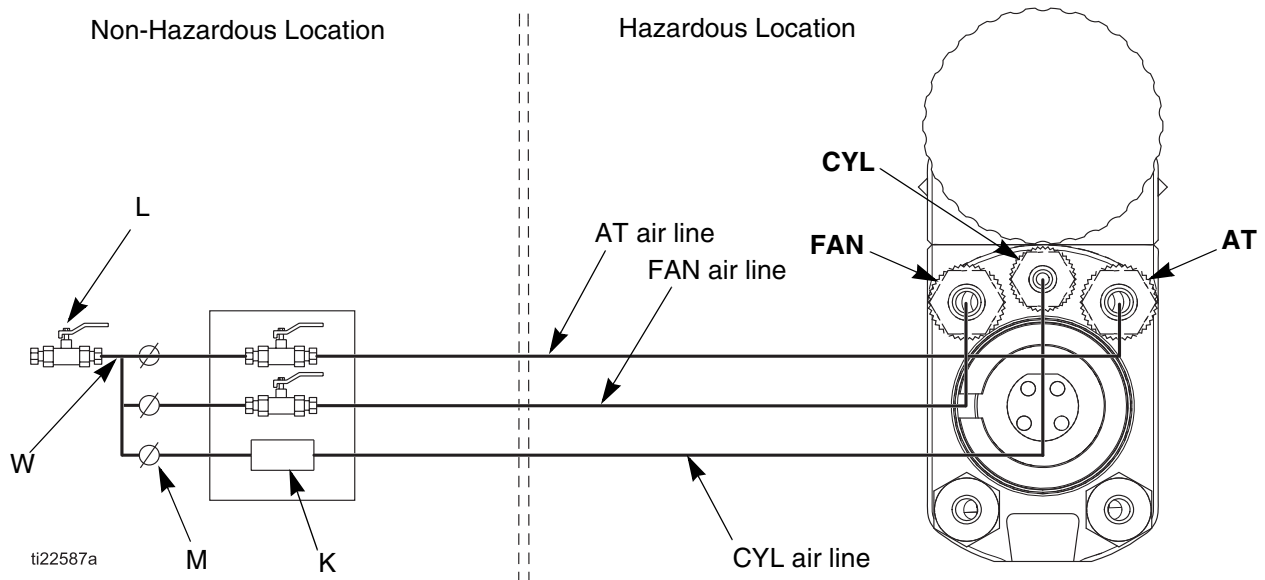


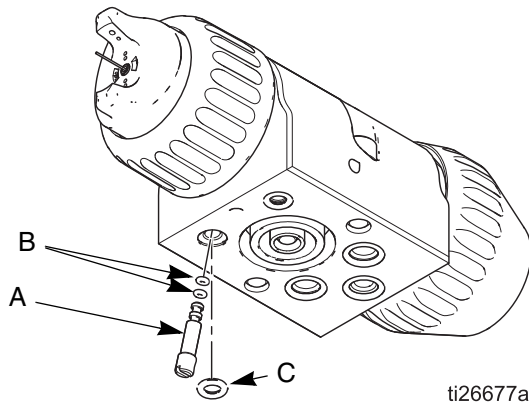
FIG. 11 Air Line Schematic



## Circulation

The gun is equipped with the ability to circulate paint through the gun head. This is possible by removing the factory-installed circulation plug from the circulation port.

### Remove Circulation Plug



**FIG. 12 Circulation Plug and Port**

1. **Prepare the Gun for Service**, see page 42.
2. **Remove the Gun from the Manifold**, see page 43.
3. Remove the outer o-ring (C).
4. Use a flathead screwdriver to loosen and remove the circulation plug (A).
5. Verify that both packing o-rings (B) were removed with the plug.
6. Replace the outer o-ring (C) on the gun body, and **Reinstall the Gun on the Manifold**, see page 43.

### Reinstall Circulation Plug

1. **Prepare the Gun for Service**, see page 42.
2. **Remove the Gun from the Manifold**, see page 43.
3. Remove the outer o-ring (C).
4. Verify that both packing o-rings (B) are in place on the circulation plug (A).
5. Insert the plug into the circulation port, using a flat-head screwdriver to turn the plug while pushing it in place.
6. Replace the outer o-ring (C) on the gun body, and **Reinstall the Gun on the Manifold**, see page 43.

## Manifold Connections

<p><b>Solventborne systems:</b> The fluid between the gun and fluid bracket can be charged by the gun. To reduce the risk of fire, explosion, and electric shock, use only a Graco-supplied fluid tube, with a maximum length of 8 ft (2.4 m). Use only the fluid fittings supplied with the gun. See <b>Grounding</b>, page 23.</p>				

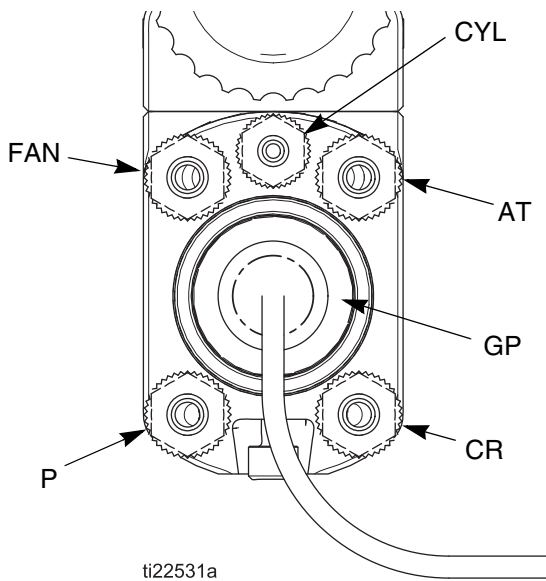
<p><b>Waterborne systems:</b> The fluid between the gun and fluid supply will be charged by the gun. To reduce the risk of electric shock, use only a Graco-supplied waterborne fluid hose. Use only the fluid fittings supplied with the gun. See <b>Grounding</b>, page 23.</p>				

<b>AT</b>	<b>Atomization Air Inlet Fitting*</b> Connect to a regulated air supply.
<b>FAN</b>	<b>Fan Air Inlet Fitting*</b> Connect to a regulated air supply.
<b>CYL</b>	<b>Trigger Air Inlet Fitting**</b> Connect to a regulated air supply.
<b>P</b>	<b>Fluid Supply Inlet Fitting***</b> Connect a Graco-supplied fluid tube or fluid hose, depending on type of system.
<b>CR</b>	<b>Fluid Circulation Fitting*** - Optional</b> Connect a Graco-supplied fluid tube or fluid hose, depending on type of system. The circulation plug must be removed for this function. See <b>Circulation</b> , page 17.
<b>GP</b>	<b>Gun Power Cable Connection</b> Connect the gun power cable from this fitting to the gun power supply.

\* 8 mm (5/16 in.) O.D. tube; with 1 mm (0.04 in.) wall and 6 mm (0.23 in.) I.D.

\*\* 6 mm (1/4 in.) O.D tube; with 1 mm (0.04 in.) wall and 4 mm (0.17 in.) I.D.

\*\*\* *Solventborne systems:* Thick-walled PFE tube - 6 mm (1/4 in.) O.D. tube; with 1.6 mm (0.625 in.) wall and 3.2 mm (1/8 in.) I.D.  
*Waterborne systems:* Thick-walled FEP tube - 9.4 mm (0.369 in.) O.D., 1.5 mm (0.060 in.) wall, and 6 mm (1/4 in.) ID







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**FIG. 13 Manifold Connections**

## Connect the Air and Fluid Lines

### Solventborne Systems

				
<p>The fluid between the gun and fluid bracket will be charged by the spray gun. To reduce the risk of fire, explosion, or electric shock, use only a Graco-supplied solventborne fluid tube, with a maximum length of 8 ft (2.4 m). Use only the fluid fittings supplied with the gun. See <b>Grounding</b>, page 23.</p>				

#### For Any Gun Configuration Using Straight Fluid Tubes Into the Gun

**NOTE:** This is applicable to both hollow-wrist and solid-wrist robot configurations that are using the Graco-supplied straight fluid tube and the fluid tube grounding bracket shown in FIG. 14.

1. Connect the air lines as shown in FIG. 11, page 16.

**NOTE:** Blow out the fluid supply line and circulation line (if used) with air and flush with solvent before connecting. Use solvent which is compatible with the fluid to be sprayed.

**NOTE:** The minimum tube length between the fluid bracket and the gun is 1 ft (0.8 m). This distance is to prevent a ground from being too close to the gun.

2. See FIG. 3, page 10.
  - a. See **Grounding**, page 23. Install a fluid bracket (F) behind the gun, in a location that can be reached by a Graco-supplied fluid tube with a maximum length of 8 ft (2.4 m). Connect a ground wire securely to the bracket and connect the other end to a true earth ground.
  - b. Connect the fluid supply line from the pump to one 1/8 npt(f) fitting on the fluid bracket. Connect a circulation line (if used) to the second fitting in the same way.
  - c. Connect a Graco-supplied fluid tube from the fluid bracket to the gun's fluid supply inlet port (P). See FIG. 13, page 18. If a circulation line is used, connect a Graco-supplied fluid tube from the fluid bracket to the gun's circulation port (CR).

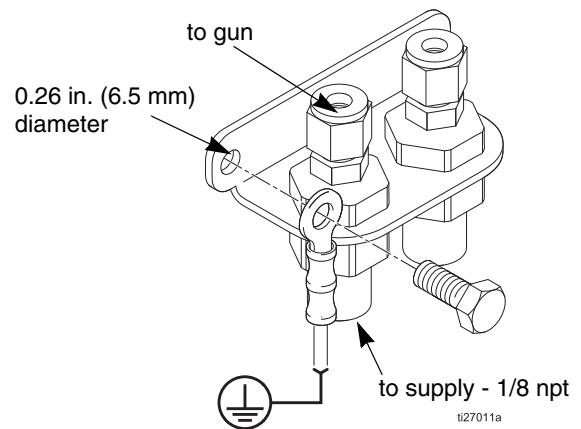


FIG. 14 Fluid Grounding Bracket

#### For A Gun Configuration Using Coiled Fluid Hose(s) Into the Gun (Example 1)

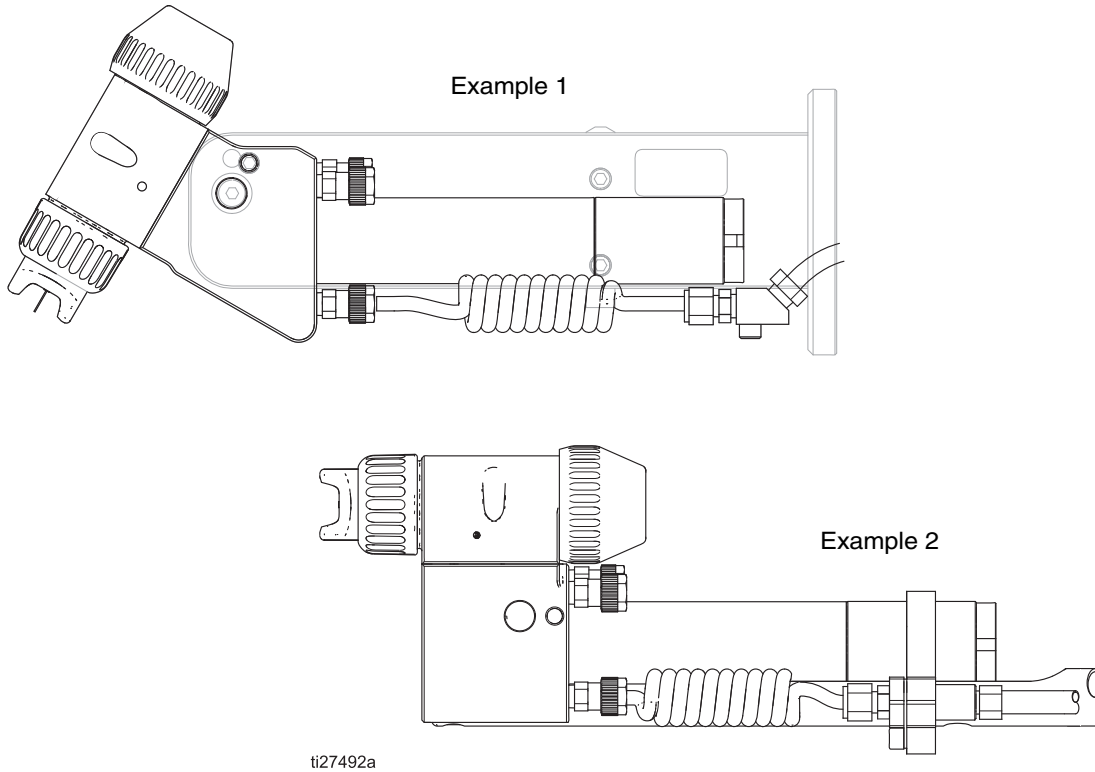
**NOTE:** This is not applicable to solid-wrist robots or hollow-wrist robots using a rear mount gun, such as the LC1020.

**NOTE:** A coil hose kit is an accessory that must be ordered separately. The kit (24Y328) contains the items necessary to install a single coil fluid hose to the gun and an extra fitting that can be used with a circulation hose. If a coil circulation hose is intended, an additional coil hose (25A346) must also be ordered.

1. Connect the air lines as shown in FIG. 11, page 16.

**NOTE:** Blow out the fluid supply hose and circulation hose (if used) with air and flush with solvent before connecting. Use solvent which is compatible with the fluid to be sprayed.

2. See **Grounding**, page 23. Attach the fluid supply coil hose and circulation coil hose (if used) to the gun/s fluid supply inlet port (P) and circulation port (CR). Use the fitting(s) supplied with the coil hose kit to attach the other end to the coil hoses to the fluid manifold.
3. Connect the fluid supply line from the pump to one 1/8 npt(m) fitting on the fluid manifold. Connect a circulation line (if used) to the second manifold fitting in the same way.
4. Mount the fluid manifold on the arms of the robot mounting bracket.



**FIG. 15 Coil Fluid Hose Installation**

**For A Gun Configuration Using Coiled Fluid Hose(s) Into the Gun (Example 2)**

**NOTE:** This is applicable to robots using a reciprocator mounting rod and a rear mount gun, such as the LC1020. It may necessary to use the bracket provided with the coil hose kit in place of the bracket provided with the reciprocator purchased. The bracket on the reciprocator arm must have coil hose fitting holes.

**NOTE:** A coil hose kit is an accessory that must be ordered separately. The kit (24Y325) contains the items necessary to install a single coil fluid hose to the gun and an extra fitting that can be used with a circulation hose. If a coil circulation hose is intended, an additional coil hose (25A346) must also be ordered.

1. Connect the air lines as shown in FIG. 11, page 16.

**NOTE:** Blow out the fluid supply hose and circulation hose (if used) with air and flush with solvent before connecting. Use solvent which is compatible with the fluid to be sprayed.

2. Use the hardware provided to mount the two brackets and the fluid connection items on the reciprocator arm.
3. See **Grounding**, page 23. Attach the fluid supply coil hose and circulation coil hose (if used) to the gun/s fluid supply inlet port (P) and circulation port (CR). Use the fitting(s) supplied with the coil hose kit to attach the other end to the coil hoses to the mounting bracket.
4. Connect the fluid supply line from the pump to one 1/8 npt(m) fitting on the bracket. Connect a circulation line (if used) to the second bracket fitting in the same way.

## Waterborne Systems

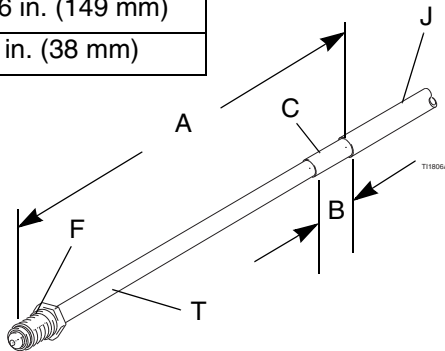
<p>The fluid between the gun and fluid supply will be charged by the spray gun. To reduce the risk of electric shock, use only a Graco-supplied waterborne fluid hose. See <b>Grounding</b>, page 23.</p>				

Connect the air lines as shown in FIG. 11, page 16.

Always use a Graco Waterborne Fluid Hose between the voltage isolation system fluid outlet and the gun fluid inlet. The waterborne fluid hose consists of an inner PTFE tube (T), a conductive layer (C), and an abrasion-resistant outer jacket (J). The conductive layer must be connected to ground at the isolation enclosure.

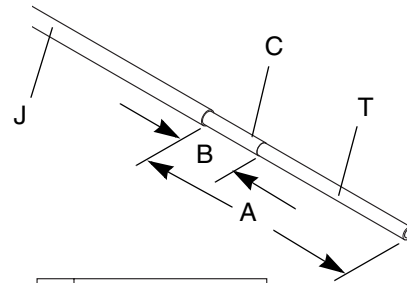
The waterborne hose comes fully assembled to these dimensions. A fitting (F) which is attached to the gun is provided on one end.

A	5.86 in. (149 mm)
B	1.5 in. (38 mm)



The other end of the hose has been stripped as shown below at the factory. If desired, the hose can be shortened on this end.

**NOTE:** The conductive layer (C) must be no closer than 12 in. (30.48 cm) to the end of the hose.



A	14.50 in. (368 mm)
B	0.75 in. (19 mm)

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### NOTICE

Be careful not to cut into the inner tube (T) of the hose when stripping the hose. Nicks or cuts in the PTFE tube will cause premature hose failure.

**NOTE:** Blow out the fluid supply hose and circulation hose (if used) with air and flush with water before connecting.

Connect the fluid hose(s) as follows:

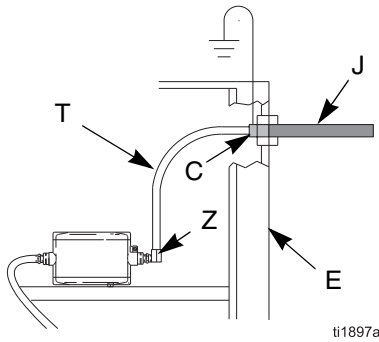
1. Apply dielectric grease to the waterborne fluid hose fitting and attach to the gun fluid fitting (P). If the circulation is being used, attach a second waterborne fluid hose fitting to the gun circulation fitting (CR).

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The conductive hose layer (C) must be grounded through its connection to the isolation enclosure (E). To maintain grounding continuity, the conductive hose layer (C) of the waterborne fluid hose must be engaged when the strain relief fitting is tightened. Failure to properly install the hose in the strain relief could result in an electric shock.

2. Attach the inner tube (T) of the waterborne fluid hose(s) to the fluid outlet of the isolated fluid supply (Z), and if used, the circulation connection. The conductive layer (C) of all installed waterborne fluid

hoses must be attached to the isolation enclosure ground.



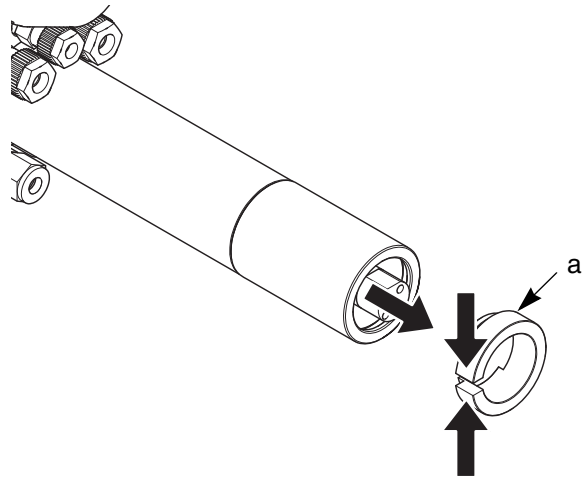
- Using an ohmmeter, verify continuity between the conductive layer closest to the gun and the isolation enclosure ground.

<p>To reduce the risk of electric shock, the areas of the Graco Waterborne Fluid Hose that are accessible to personnel during normal operation must be covered by the outer hose jacket (J). The portion of the inner PTFE tube (T) not covered by the outer jacket (J) must be inside the isolation enclosure (E).</p> <p>The conductive layer (C) must be grounded through its connection to the isolation enclosure (E) ground.</p>				

## Connect the Power Supply

<p>To reduce risk of fire, explosion, or electric shock, use only approved cables. Do not modify cables.</p>				





- Using a pliers, squeeze the power supply connector guard (a) and pull it away from the power supply to remove it.



**FIG. 16 Power Supply Connection**

- Slide the connector guard over the power supply cable and attach the power supply cable to the gun power supply using the threaded cable connector.
- Reinstall the power supply connector guard by squeezing it with a pliers and pushing it into the power supply.

## Grounding

				
<p>When operating the electrostatic gun, any ungrounded objects in the spray location (people, containers, tools, etc.) can become electrically charged. Improper grounding can result in static sparking, which can cause a fire, explosion, or electric shock. Ground all equipment, personnel, object being sprayed, and conductive objects in or close to the spray location. Follow the grounding instructions below.</p>				

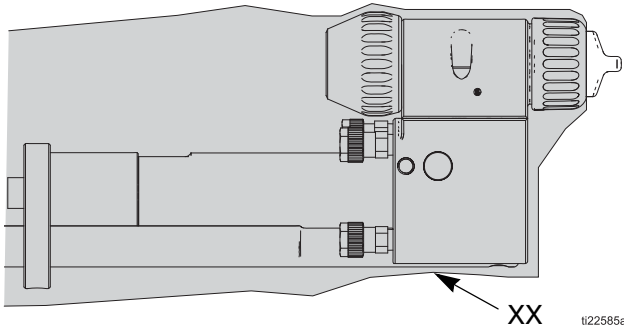
The following are minimum grounding requirements for a basic electrostatic system. Your system may include other equipment or objects which must be grounded. Check your local electrical code for detailed grounding instructions. Your system must be connected to a true earth ground.

- *Pump*: ground the pump by connecting a ground wire and clamp as described in your separate pump instruction manual.
- *Voltage Isolation System (for waterborne systems only)*: electrically connect the voltage isolation system to a true earth ground.
- *Fluid Bracket (for solventborne systems only)*: ground the fluid bracket by connecting the bracket ground wire to a true earth ground. Mount the fluid bracket behind the gun in a location that can be reached by a hose with a maximum length of 8 ft (2.4 m).
- *Fluid Manifold (for solventborne systems with coil fluid hoses only)*: ground the manifold by connecting the ground wire to a true earth ground. The fluid manifold is attached to the robot mounting bracket.
- *Fluid Tube (for solventborne systems only)*: ground the fluid tube by connecting it to the grounded fluid bracket.
- *Fluid Hose (for waterborne systems only)*: the hose is grounded through the conductive layer. Install the hose as instructed, page 21.
- *Electrostatic Air Spray Gun*: ground the gun by connecting the gun power cable to a properly grounded controller.
- *Pro Xpc Auto Controller*: the unit is grounded through the input power cord and the ground wire connection, as described in the Pro Xpc Auto Controller manual (333266).
- *Air compressors and hydraulic power supplies*: ground the equipment according to the manufacturer's recommendations.
- *All electrical cables* must be properly grounded.
- *All persons entering the spray location*: 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.
- *The floor of the spray location*: must be electrically conductive and grounded. Do not cover the floor with cardboard or any non-conductive material which would interrupt ground continuity.
- *Flammable liquids in the spray location*: must be kept in approved, grounded containers. Do not use plastic containers. Do not store more than the quantity needed for one shift.
- *All electrically conductive objects or devices in the spray location*: including fluid containers and wash cans, must be properly grounded.

## Install the Gun Cover

Install a gun 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. See FIG. 17.




**NOTE:** Replacement gun covers are available from Graco for both rear- (24Y403) and bottom-mounted (24Y404) guns.



**FIG. 17 Gun Cover**

## Check Fluid Resistivity

For solventborne systems only.

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

Graco Part No. 722886 Resistance Meter and 722860 Probe are available as accessories to check that the resistivity of the fluid being sprayed meets the requirements of an electrostatic air spray system.

Follow the instructions included with the meter and probe. Readings of 25 megohms-cm and above provide the best electrostatic results.



## Check Fluid Viscosity

### Equipment Needed

- a viscosity cup
- a stopwatch

### Procedure

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

## 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 31.

## Guidelines for Abrasive Materials

When spraying abrasive materials, follow these guidelines:

- *For solventborne systems:* 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 inch (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**, page 30.
- Inspect the electrode daily and replace if damaged. See **Electrode Replacement**, page 46.

# Operation

## Pressure Relief Procedure



Follow the Pressure Relief Procedure whenever you see this symbol.

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

1. Turn off power at the controller. See manual 333266.
2. *On waterborne systems:* follow the **Fluid Voltage Discharge and Grounding Procedure**, page 26.
3. 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.
4. Turn off the fluid supply to the gun.
5. Trigger the gun into a grounded metal waste container to relieve the fluid pressure.
6. If an air pilot fluid regulator is used, turn off the air pressure at the regulator air inlet.
7. Relieve fluid pressure in the fluid supply equipment as instructed in its instruction manual.
8. 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.

## Fluid Voltage Discharge and Grounding Procedure

*For waterborne systems only.*

<p>The fluid supply is charged with high voltage until the voltage is discharged. Contact with the charged components of the voltage isolation system or spray gun electrode will cause an electric shock. To avoid an electric shock, follow the <b>Fluid Voltage Discharge and Grounding Procedure</b>:</p> <ul style="list-style-type: none"> <li>• whenever you are instructed to discharge the voltage</li> <li>• before cleaning, flushing, or servicing the system equipment</li> <li>• before approaching the front of the gun</li> <li>• or before opening the isolation enclosure for the isolated fluid supply.</li> </ul>				

**NOTE:** An accessory grounding rod, part No. 210084, is available to discharge any voltage remaining on a system component.

1. Turn off power at the controller and wait 30 seconds. **NOTE:** A “Discharge time” countdown timer is available on the controller. The time value must be defined for your system configuration. See manual 333266.
2. Discharge the voltage at the voltage isolation system by following the procedure specified in the voltage isolation system instruction manual.
3. Touch the pump, supply pail, and electrode of the gun with a grounded rod to make sure the voltage has been discharged. If you see an arc, verify that the electrostatics are turned off or see **Electrical Troubleshooting**, page 39 or the voltage isolation system manual for other possible problems. Resolve the problem before proceeding.

# Operating Checklist

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

*All system types*

- 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**, page 26.
- The warning sign provided with the gun is mounted in the spray location 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 location are properly grounded. See **Grounding**, page 23.
- The condition of the gun's electrical components has been checked as instructed in **Electrical Tests**, page 33.
- Ventilation fans are operating properly.
- Workpiece hangers are clean and grounded.
- All debris, including flammable fluids and rags, is removed from the spray location.
- All flammable fluids in the spray booth are in approved, grounded containers.
- All conductive objects in the spray location are electrically grounded and the floor of the spray location is electrically conductive and grounded.
- The gun has been checked for the presence of any fluid as instructed in **Check for Fluid Leakage**, page 32.



*Waterborne systems only*

- All operators are trained in the **Fluid Voltage Discharge and Grounding Procedure**, page 26
- Electrostatics off and voltage discharged according to **Fluid Voltage Discharge and Grounding Procedure**, page 26 before any person enters the isolation enclosure, before cleaning, and before performing any maintenance or repair.

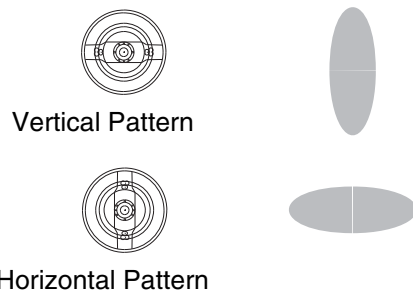
- The Graco Waterborne Fluid Hose is in good condition with no cuts or abrasions of the PTFE tube. Replace fluid hose if damaged.
- Fluids used must meet one of the following flammability requirements:  
  
Material does not sustain burning in accordance with the Standard Test Method for Sustained Burning of Liquid Mixtures, ASTM D4206.  
  
Materials which cannot be ignited, in any mixture with air, by an energy source of less than 500mJ.

## Adjust the Spray Pattern

Follow the steps below to establish the correct fluid flow and air flow. **Do not** turn on the high voltage.

				
<p>To reduce the risk of an injury, follow the <b>Pressure Relief Procedure</b>, page 26 whenever you are instructed to relieve the pressure.</p>				

1. Follow the **Pressure Relief Procedure**, page 26.
2. Select and install the appropriate air cap and nozzle for your application. See **Air Caps and Fluid Nozzles**, page 50.
3. Loosen the air cap retaining ring, and rotate the air cap for a vertical or horizontal spray pattern. See FIG. 18.
4. 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.



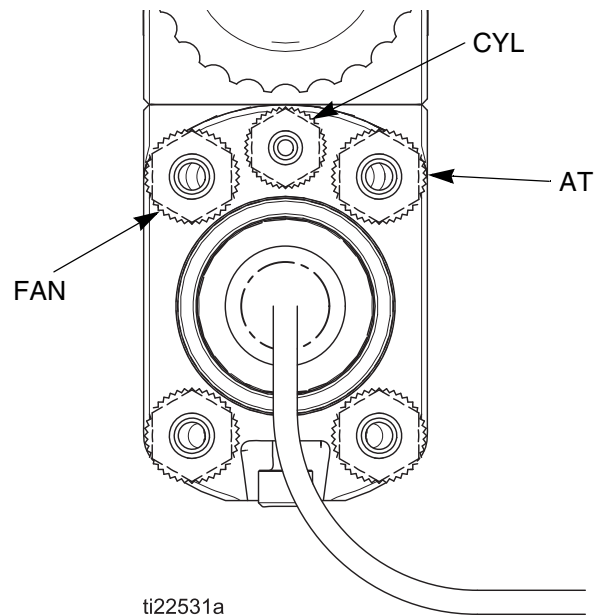
**FIG. 18. Air Cap Positions**

5. Adjust the fluid flow with the fluid pressure regulator. Refer to the **Fluid Nozzle Performance Charts**, starting, page 50, to set the fluid pressure for various fluid flows, according to the size of the fluid nozzle being used.
6. Use the air pressure regulator on the atomization air supply line (AT) to adjust the degree of atomization. (See FIG. 19.) 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.

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

**NOTES:**

- For the most efficiency, always use the lowest air pressure possible.
- When increasing to a wide, 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**, page 37 to correct spray pattern problems.



**FIG. 19 Manifold Air Connections**



## Adjust the Electrostatics

The electrostatics are adjusted using the Pro Xpc Auto Controller. See the Pro Xpc Auto Controller manual (333266).

1. Verify that all interlocks are satisfied.
2. Turn on the electrostatics at the controller.
3. Check the gun voltage by checking the controller. Actual spraying voltage is dependent on paint resistivity.
  - *Solventborne systems:* Normal kV output ranges between 65 and 100 kV when set to 100 kV.
  - *Waterborne systems:* Normal kV output ranges between 40 and 55 kV when set to 60 kV.
4. Adjust the sensitivity of the arc detection settings at the controller, if needed. The arc detection settings will cause the electrostatics to shut off if the gun gets too close to a ground, or in the case of a rapid voltage change. The default settings will shut off electrostatics if the output voltage goes below approximately 20 kV.
5. Periodically verify the proper operation of the arc detection function.

See **Electrical Troubleshooting**, page 39 to correct voltage problems.

## Spraying

				
<p>Contact with the charged components of the spray gun will cause an electric shock. Do not touch the gun nozzle or electrode or come within 8 in. (204 mm) of the front of the gun during operation.</p>				

1. Turn on the electrostatics just before the next part is to be painted.
2. Turn the gun spray functions on and off by using the air solenoid valve on the cylinder (CYL) air supply line. Applying a minimum of 50 psi (3.4 bar, 0.34 MPa) air pressure to the cylinder air fitting (CYL) will activate the on/off sequence of atomization air (AT), fan air (FAN), and fluid (P). See FIG. 19, page 28.

3. When the paint job is complete, turn off the electrostatics until the next part arrives.
4. To change the voltage setting, see the Pro Xpc Auto Controller manual (333266).

## Triggering the Fluid Alone

1. Turn off the electrostatics.
2. Shut off and relieve the air pressure to the atomization (AT) and fan (FAN) air lines, using the bleed-type air shutoff valves.
3. Apply 50 psi (3.4 bar, 0.34 MPa) air pressure to the cylinder air fitting (CYL) to trigger the fluid.

## Shutdown



1. *Waterborne systems:* Follow **Fluid Voltage Discharge and Grounding Procedure**, page 26
2. Flush the gun. Follow **Flushing**, page 31.
3. Follow the **Pressure Relief Procedure**, page 26.
4. Clean the equipment. See **Maintenance**, page 30.

# Maintenance



## Daily Care and Cleaning

**NOTICE**

- Clean all parts with a non-conductive, compatible solvent. Conductive solvents can cause the gun to malfunction.
- Do not use methylene chloride as a flushing or cleaning solvent with this gun as it will damage nylon components.
- Fluid in the air passages could cause the gun to malfunction, and could draw current and reduce the electrostatic effect. Whenever possible, point the gun down when cleaning it. Do not use any cleaning method which could allow fluid into the gun air passages.

*Do not immerse the gun in fluid.*



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*Do not point the gun up while cleaning it.*



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*Do not wipe the gun with a cloth that is heavily saturated; wring out the excess fluid.*



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## Daily Care and Cleaning (continued)

Check the following list daily upon completion of equipment usage.

- Flush the gun. See **Flushing**, page 31.
- Clean the fluid and air line filters daily.
- Clean the outside of the gun daily with a soft cloth dampened in a compatible solvent.
- 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 31.
- Check the electrode and replace if broken or damaged. See **Electrode Replacement**, page 46.
- Check for fluid leakage from the gun and fluid hoses. See **Check for Fluid Leakage**, page 32. Tighten fittings or replace equipment as needed.
- Flush the gun before changing colors and whenever you are done operating the gun.

### Flushing



To avoid fire, explosion, and electric shock, always ground equipment and waste container. To avoid static sparking and injury from splashing, always flush at the lowest possible pressure. Always turn the electrostatics off when flushing, cleaning, or servicing equipment.

- 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's wetted parts.

#### NOTICE

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

1. Shut off power at the controller and remove all power from the system.
2. *Waterborne systems:* Follow **Fluid Voltage Discharge and Grounding Procedure**, page 26
3. Switch the fluid supply to a compatible solvent.
4. Trigger the gun to flush the fluid passages clean.

### Clean the Air Cap and Fluid Nozzle



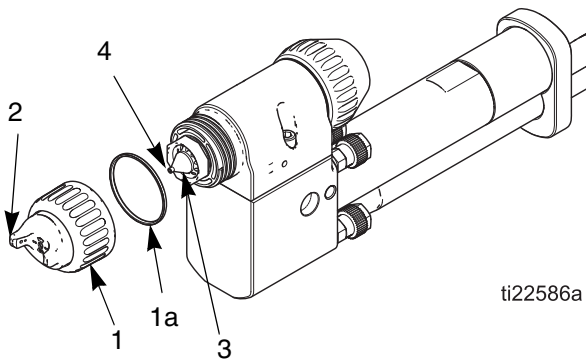
#### Equipment Needed

- soft bristle brush
- compatible solvent

#### Procedure

1. *Waterborne systems:* Follow **Fluid Voltage Discharge and Grounding Procedure**, page 26
2. Follow the **Pressure Relief Procedure**, page 26.
3. Remove the retaining ring (1) and air cap (2). See FIG. 20, page 32.
4. Wipe the fluid nozzle (3) and the exterior 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.
5. If it appears that there is paint inside the fluid nozzle (3) air passages, remove the gun from the line for servicing.

6. Clean the air cap (2) with the soft bristle brush and solvent, or submerge the air cap in a suitable solvent and wipe it clean. Do not use metal tools.
7. Carefully install the air cap (2). Be sure to insert the electrode (4) through the center hole of the air cap.
8. Rotate the air cap (2) to the desired position.
9. Make sure the u-cup (1a) is in place on the retaining ring (1). The lips must face forward.
10. Tighten the retaining ring (1) until the air cap (2) is held firmly in place; you should not be able to rotate the air cap horns by hand.
11. Test the gun's resistance. See **Test Full Gun with Power Supply**, page 33.



**FIG. 20. Clean Air Cap and Fluid Nozzle**

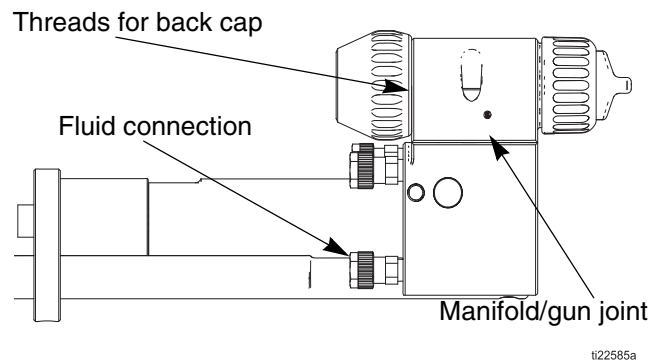
## Check for Fluid Leakage

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

**NOTE:** Replacement gun covers are available from Graco for both rear- (24Y403) and bottom-mounted (24Y404) guns.



During operation, periodically remove the gun cover to check for the presence of fluid. Any fluid leaking from the packings is directed to the threads for the back cap. See FIG. 21 for location of potential leaks.



**FIG. 21 Check for Fluid Leakage**

Fluid in these locations indicate leakage, which could be caused by the fluid tube connectors, manifold o-rings, or fluid packing leakage.

If fluid is seen in any of these locations:

1. Stop spraying immediately.
2. *Waterborne systems:* Follow **Fluid Voltage Discharge and Grounding Procedure**, page 26
3. Follow the **Pressure Relief Procedure**, page 26.
4. Remove the gun for repair.



# Electrical Tests

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Megohmmeter Part No. 241079 (AA-see FIG. 22) 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, or electric shock, and result in serious injury and property damage.

Electrical components inside the gun affect performance and safety. The following procedures test the condition of the power supply and electrode (4), and electrical continuity between components.

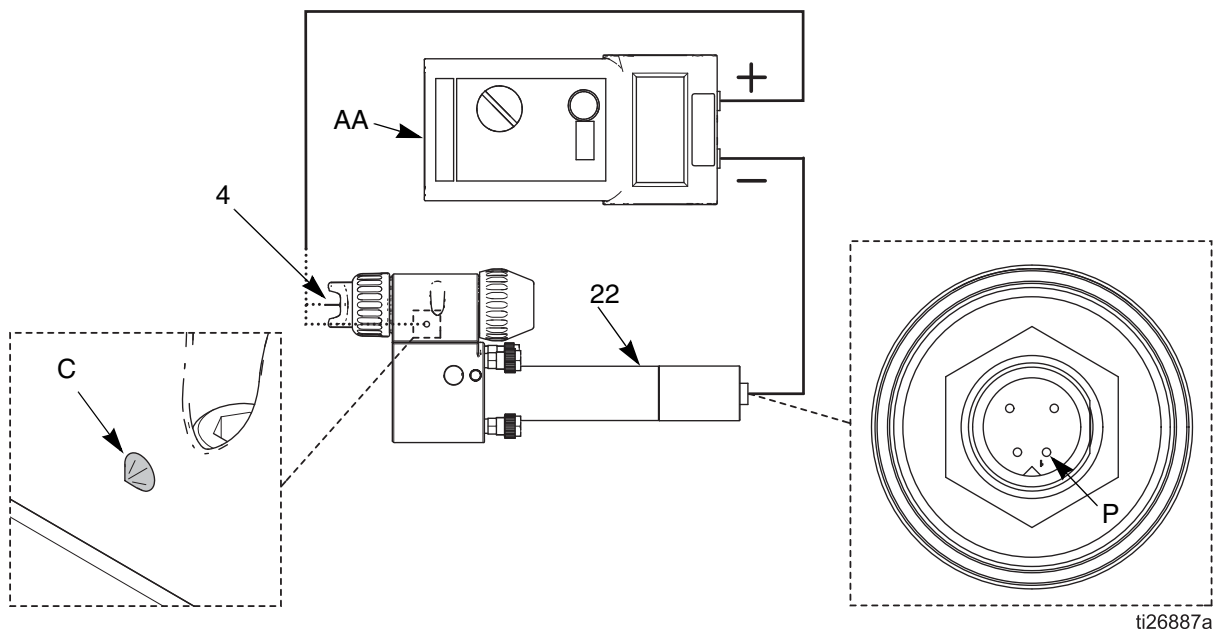
Use megohmmeter (AA) and an applied voltage of 500 V. Connect the leads as shown.

**NOTE:** Flush the gun, using **Flushing**, page 31, and dry the fluid passages prior to performing electrical tests.

## Test Full Gun with Power Supply

See FIG. 22.

1. Measure resistance between the electrode needle tip (4) and power supply connector pin P. The resistance should be 140-170 megohms.
  - If resistance is within this range, proceed to step 2.
  - If resistance is outside this range, test the gun and manifold assembly, and the power supply separately. See **Test Power Supply Resistance**, page 34, and **Test Gun and Manifold Resistance**, page 34.
2. Measure resistance between one conical charge point (C) and the power supply connector pin P. The resistance should be 140-170 megohms. Repeat the measurement using the alternate charge point on the other side of the gun body.
  - If resistance is within this range, testing is complete.
  - If resistance is outside this range, test the gun and manifold assembly, and the power supply separately. See **Test Power Supply Resistance**, page 34, and **Test Gun and Manifold Resistance**, page 34.



**FIG. 22 Full Gun and Power Supply**

## Test Power Supply Resistance

See FIG. 23.

1. Remove the power supply (22). See **Power Supply Repair**, page 49.
2. Measure resistance from the power supply (at P) to the spring (22a). The resistance should be 120-150 megohms.
  - If resistance is outside this range, obtain a replacement power supply.
  - If resistance is within this range, go to **Test Gun and Manifold Resistance**.

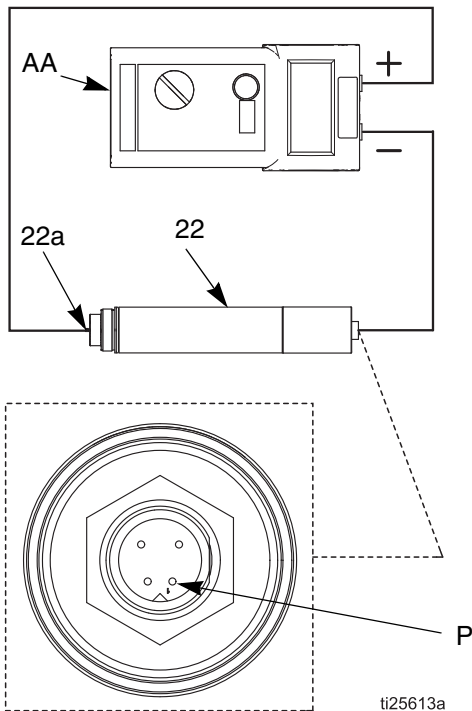


FIG. 23 Power Supply Resistance

## Test Gun and Manifold Resistance

See FIG. 24.

1. Remove the power supply (22). See **Power Supply Repair**, page 49.
2. Measure resistance between the electrode needle tip (4) and the high voltage contact in the gun manifold.

**NOTE:** To access the high voltage contact, use a long screwdriver or other metallic shaft (S).

- If the resistance is outside of the 8-30 megohms range, test the gun resistance separately. See **Test Gun Resistance**, page 34 and **Test Charge Point Resistance**, page 35.
- If the gun and manifold resistance is within the 8-30 megohm range and the power supply resistance is within the 120-150 megohm range, there is a bad connection between the power supply and the manifold. See **Power Supply Repair**, page 49. If the power supply repair procedure does not solve the problem, replace the manifold.

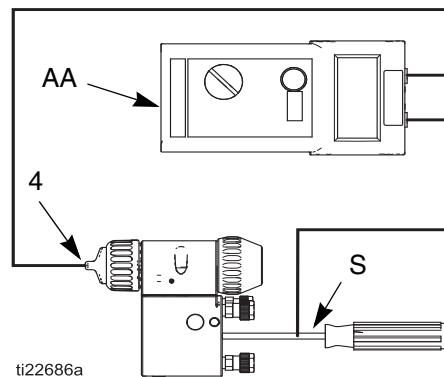


FIG. 24 Gun and Manifold Resistance

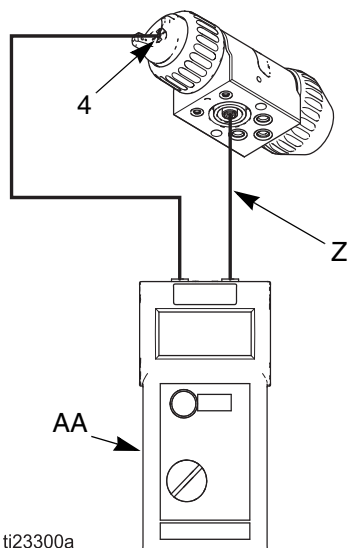
## Test Gun Resistance

See FIG. 25.

1. Check the resistance between the electrode needle tip (4) and the high voltage contact on the gun (Z).
2. The resistance should be between 8-30 megohms. If outside this range, **Test Electrode Resistance**, page 36 and **Test Gun Body Resistance (No Electrode)**, page 36.

**NOTE:** If the gun resistance is still out of range after testing the electrode and gun body, check that the conductive o-ring (3a) is making contact with the body pin and that the electrode contacts the nozzle. See FIG. 29, page 45.

**NOTE:** If the **Test Gun and Manifold Resistance** test on page 34 fails, but the **Test Gun Resistance** test passes, there is a bad connection between the gun and the manifold. See **Manifold HV Contact Repair**, page 46

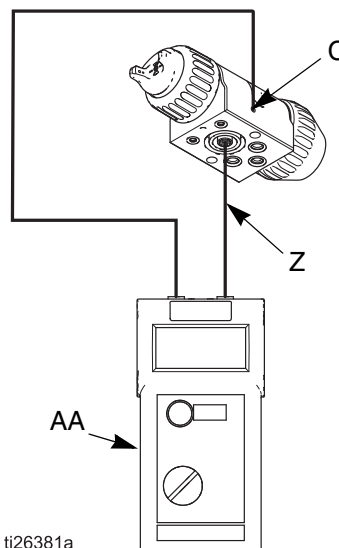


**FIG. 25 Gun Resistance**

## Test Charge Point Resistance

See FIG. 26.

1. Check the resistance between a charge point (C) and the high voltage contact on the gun (Z).
2. The resistance should be between 8-30 megohms. If outside this range, replace the gun body.
3. Repeat steps 1 and 2 for the charge point on the other side of the gun.

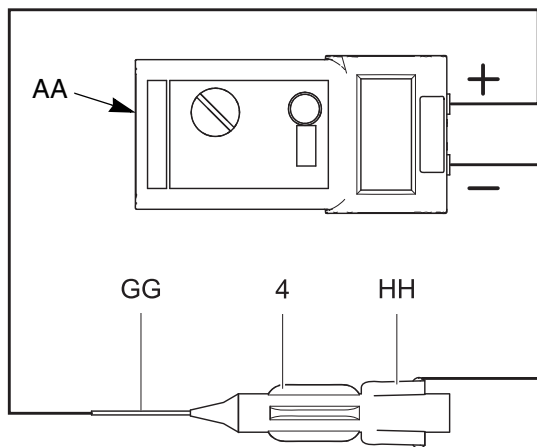


**FIG. 26 Charge Point Resistance**

**NOTE:** If the **Test Gun and Manifold Resistance** test on page 34 fails, but the **Test Charge Point Resistance** test passes, there is a bad connection between the gun and the manifold.

## Test Electrode Resistance

1. Remove the electrode (4). See **Electrode Replacement**, page 46.
2. Measure the resistance between the contact (HH) and the electrode wire (GG). The resistance should be 8-30 megohms.
3. If the resistance is out of range, replace the electrode.



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**FIG. 27 Electrode Resistance**

**NOTE:** If the gun resistance is still out of range after testing the electrode, check that the conductive o-ring (3a) is making contact with the body pin.

## Test Gun Body Resistance (No Electrode)

1. With the nozzle removed, measure the resistance between the electrode contact pin located in the gun body nozzle opening and the high voltage contact on the gun (Z). The resistance should be less than 10 ohms.
2. If the resistance is not less than 10 ohms, examine the conductive o-ring is present on the nozzle and that it shows evidence of contact with the pin in the gun body nozzle opening.
  - If the gun body resistance was within the specified range and the conductive o-ring shows evidence of contact with the contact pin in the gun body nozzle opening, **Test Electrode Resistance**.
  - If the gun body resistance was within the range specified and the conductive o-ring does not show evidence of contact with the contact pin, replace the nozzle, see **Air Cap/Nozzle Replacement**, page 45.

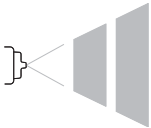



# Troubleshooting



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

## Spray Pattern Troubleshooting

**NOTE:** 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 31 and 45
	Air in fluid supply	Check fluid source. Refill.
Improper spray pattern 	Damaged nozzle or air cap	Replace, page 45
	Fluid buildup on air cap or nozzle	Clean. See page 31
	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 or replace, page 31 or 45

## 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 or the threads at the back cap	Worn packings or rod	Replace; see <b>Packing Rod Repair</b> , page 48
Air leaks from the air cap	Worn piston stem o-rings	Replace piston air seals; see <b>Piston Repair</b> , page 49
Fluid leakage from the front of the gun	Worn fluid seat	Replace fluid nozzle (3) and/or electrode needle (4); see <b>Air Cap/Nozzle Replacement</b> , page 45
	Loose fluid nozzle	Tighten; see <b>Air Cap/Nozzle Replacement</b> , page 45
	Damaged nozzle o-ring	Replace; see <b>Air Cap/Nozzle Replacement</b> , page 45
Gun does not spray	Low fluid supply	Add fluid if necessary
	Dirty or clogged fluid nozzle	Clean; see <b>Clean the Air Cap and Fluid Nozzle</b> , page 31
	Damaged fluid nozzle	Replace; see <b>Air Cap/Nozzle Replacement</b> , page 45
	Piston not actuating	Check cylinder air. Check piston o-ring (8a); see <b>Piston Repair</b> , page 49
Dirty air cap	Misaligned air cap and fluid nozzle	Clean fluid buildup off air cap and fluid nozzle seat; see <b>Clean the Air Cap and Fluid Nozzle</b> , page 31
	Damaged nozzle orifice	Replace nozzle (3); see <b>Air Cap/Nozzle Replacement</b> , page 45
Air leaks from manifold	Manifold is not tight	Tighten manifold screws, see <b>Reinstall the Gun on the Manifold</b> , page 43
	Missing or damaged o-ring	Replace o-ring, see <b>Reinstall the Gun on the Manifold</b> , page 43
Fluid leaks at the quick-disconnect manifold/gun joint	Manifold is not tight	Tighten manifold screws
	Missing or damaged o-ring	Replace o-ring

## Electrical Troubleshooting

				
<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 your are trained and qualified.</p>				

Problem	Cause	Solution
<i>Waterborne systems:</i> Voltage still present after following the <b>Fluid Voltage Discharge and Grounding Procedure</b> , page 26	Air pocket in fluid line leaves fluid near gun isolated.	Determine cause and correct. Purge air from fluid line.
	Voltage isolation system failed.	Service voltage isolation system.
Poor wrap	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 Full Gun with Power Supply</b> , page 33.
No Electrostatics	Electrostatics are on, but there is no electrostatic effect from the gun	If there is an error code (an H followed by two numbers) on the display, refer to the Pro Xpc Auto Controller manual (333266) to determine its cause. <i>For waterborne systems:</i> Follow <b>Waterborne System Voltage Loss Troubleshooting</b> , page 40
		If there are no error codes displayed, see the <b>Electrical Tests</b> starting, page 33, replace any out-of-spec parts, and retest.
		If there are no error codes and the electrical tests show no problems, test the gun power cable for continuity. See the Pro Xpc Auto Controller manual (333266).

## Waterborne System Voltage Loss Troubleshooting

Normal spraying voltage for a system using the waterborne gun is 40-55 kV. The system voltage is lower due to spraying current demands and voltage isolation system losses.

A loss of spraying voltage can be caused by a problem with the spray gun, fluid hose, or voltage isolation system, since all of the system components are electrically connected through the conductive, waterborne fluid.

Before troubleshooting or servicing the voltage isolation system itself, you need to determine which component in the system is most likely causing a problem. Possible causes include the following:

### Spray Gun

- Fluid leakage
- Dielectric breakdown at the fluid hose connection or fluid packings
- Faulty power supply
- Excessive over spray on gun surfaces
- Fluid in the air passages

### Waterborne Fluid Hose

- Dielectric failure of the hose (pin-hole leak in the PTFE layer)

### Voltage Isolation System

- Fluid leakage
- Dielectric breakdown of hoses, seals, or connections
- Isolators not functioning properly

### Visual Checks

First, check the system for any visible faults or errors to help isolate whether the spray gun, fluid hose or voltage isolation system has failed.

1. Check that all of the air and fluid tubes and hoses are properly connected.

2. Check that the voltage isolation system valves and controls are properly set for operation.
3. Check that the interior of the isolated enclosure is clean.
4. Check that the voltage isolation system has sufficient air pressure.
5. Check that the gun electrostatics are turned on.
6. Check that the voltage isolation system's enclosure door is closed and that any safety interlocks are engaged and working properly.
7. Make sure the voltage isolation system is isolating the fluid voltage from ground.
8. To eliminate air gaps in the fluid column, spray enough fluid to purge the air out between the voltage isolation system and the spray gun. An air gap in the fluid hose can break the electrical continuity between the spray gun and the isolated fluid supply and cause a low voltage reading on the controller.
9. Check the spray gun cover for accumulated overspray. Excessive overspray can create a conductive path back to a ground. Install a new gun cover and clean the exterior of the gun.
10. Inspect the entire system for any visible fluid leakage and repair any fluid leaks that are found. Pay special attention to the following areas:
  - Packing area of the spray gun.
  - Fluid hose: check for leakage or any bulges in the outer cover, which may indicate an internal leak.
  - Internal voltage isolation system components



## Tests



If you still have no voltage, separate the spray gun and hose from the voltage isolation system and check whether the gun and hose alone will hold voltage with the following test.

1. Flush the system with water and leave the lines filled with water.
2. Discharge the system voltage (see **Fluid Voltage Discharge and Grounding Procedure**, page 26).
3. Follow the **Pressure Relief Procedure**, page 26.
4. Disconnect the fluid hose and circulation hose (if used) from the voltage isolation system.

Avoid allowing any water to leak out of the fluid hose(s) as that could cause a significant air gap in the fluid column up to the gun electrode, which can break the conductivity path and conceal a potential failure area.

5. Position the end of the hose(s) as far as possible away from any grounded surface. The end of the hose must be at least 1 ft. (0.3 m) from any ground. Make sure that no one is within 3 ft. (0.9 m) of the end of the hose.  
**NOTE:** The conductive layer of the hose must remain grounded.
6. Using the controller, turn on the electrostatics to the gun. Observe the gun voltage and current level on the controller.
7. Discharge the system voltage (see **Fluid Voltage Discharge and Grounding Procedure**, page 26).
8. Using the controller, check the spraying voltage:
  - If the voltage is 40 to 55 kV, the gun and fluid hose are okay, and the problem is in the voltage isolation system.
  - If the spraying voltage is below 40 kV, the problem is in the gun or fluid hose.
9. Flush the fluid hose and gun with enough air to dry out the fluid passages.

10. Using the controller, turn on the electrostatics to the gun. Observe the gun voltage and current level on the controller.
11. If the voltage is 40-55 kV, the gun power supply is okay, and there is probably a dielectric breakdown somewhere in the fluid hose or gun. Continue with step 12.

If the voltage is below 40 kV, do the **Electrical Tests**, page 33 to check the gun and power supply resistance. If those tests show the gun and power supply are okay, continue with step 12.

12. A dielectric breakdown is most likely in one of the following three areas. Repair or replace the component that is failing.
  - a. Fluid hose:
    - Check for leakage or any bulges in the outer cover, which may indicate a pin-hole leak through the PTFE layer. Disconnect the fluid hose from the gun, and look for signs of fluid contamination on the outside of the PTFE portion of the fluid tube.
    - Inspect the end of the hose connected to the voltage isolation system. Look for cuts or nicks.
    - Make sure the hose is properly stripped (see **Waterborne Systems**, page 21). Re-strip or replace the hose.
  - b. Fluid hose connection to the spray gun:
    - A breakdown at the fluid hose connection joint would be caused by fluid leaking past the seal on the end of the hose. Remove the hose at the gun connection and look for signs of fluid leakage along the PTFE tube.
13. Before reassembling the gun, clean and dry the gun fluid inlet tube. Reassemble the gun.
14. Reconnect the fluid hose.
15. Check the gun voltage before filling the gun with fluid.

# Repair

## Prepare the Gun for Service



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.

Contact with the charged components of the spray gun will cause an electric shock. Do not touch the gun nozzle or electrode or come within 8 in. (204 mm) of the front of the gun during operation.

For waterborne systems, perform the **Fluid Voltage Discharge and Grounding Procedure**, page 26

To reduce the risk of an injury, follow the **Pressure Relief Procedure**, page 26 before checking or servicing any part of the system, and whenever you are instructed to relieve the pressure.

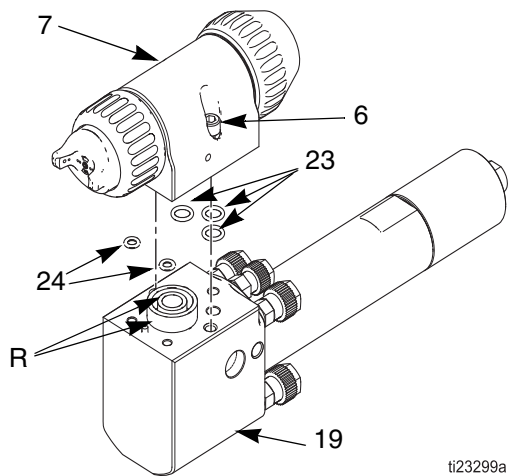
### NOTES:

- 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.
1. *Waterborne systems:* Follow **Fluid Voltage Discharge and Grounding Procedure**, page 26
  2. Follow the **Pressure Relief Procedure**, page 26.
  3. Flush the gun, using **Flushing**, page 31.
  4. Turn off the power at the controller and disconnect the gun power cable.
  5. **Remove the Gun from the Manifold**, page 43.
  6. Clean the gun. See **Daily Care and Cleaning**, page 30.
  7. Remove the gun to the repair location from the work area. Repair location must be clean.

## Remove the Gun from the Manifold

1. Loosen the two screws (6) from the top of the of the gun body (7).
2. Separate the gun body (7) from the manifold (19) by lifting the gun straight up and away from the manifold, see FIG. 28.

**NOTE:** It is possible for some of the o-rings (23 and 24) to come loose from the gun body (7) when separated from the manifold (19); however, the o-rings (23 and 24) and the screws (6) should stay with the gun body (7) in their appropriate holes.

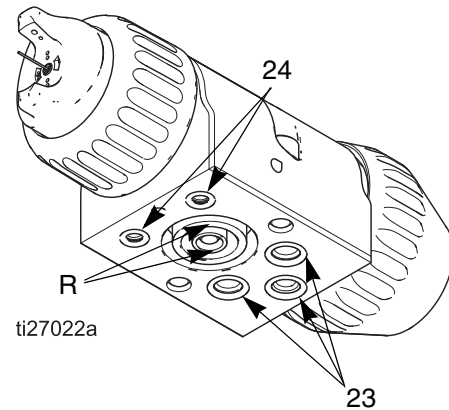


**FIG. 28. Remove Gun from Manifold**

## Reinstall the Gun on the Manifold

See FIG. 28 and below.

1. Make sure the o-rings (23 and 24) are in place on the bottom of the gun body (7).
2. Apply dielectric grease around the concentric rings (R) on the bottom of the gun and on the manifold.



3. Secure the gun body (7) to the manifold (19) by tightening the two screws (6). Torque to 10 in-lbs (1.1 N·m).

## Prepare for Power Supply Service



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 **Pressure Relief Procedure**, page 26 before checking or servicing any part of the system, and whenever you are instructed to relieve the pressure.

### NOTES:

- 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 (111265). Do not over-lubricate.
- Only use genuine Graco parts.

1. Turn off the power at the controller and disconnect the gun power cable.
2. *On waterborne systems:* follow the **Fluid Voltage Discharge and Grounding Procedure**, page 26.
3. Follow the **Pressure Relief Procedure**, page 26.
4. Flush the gun by spraying a compatible solvent through it. See **Flushing**, page 31.
5. Remove the gun, manifold, and power supply from the mount. (See **Rear Mount (Reciprocator) Installation**, page 14, or **Bottom Mount (Robot) Installation**, page 15.)
6. Remove the power supply from the manifold. (See **Power Supply Repair**, page 49.)

## Air Cap/Nozzle Replacement

1. Prepare the Gun for Service, page 42.
2. Remove the retaining ring (1) and air cap (2). See FIG. 29.
3. Remove piston cap (14) and springs (12 and 13) from the rear of the gun. See FIG. 34, page 49.
4. Remove the fluid nozzle (3) assembly with the multi-tool (40).

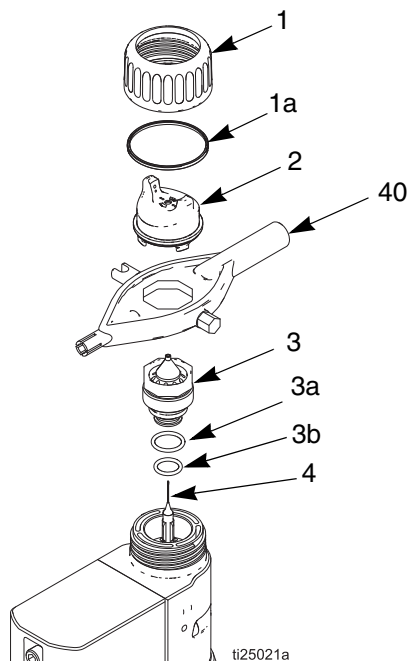
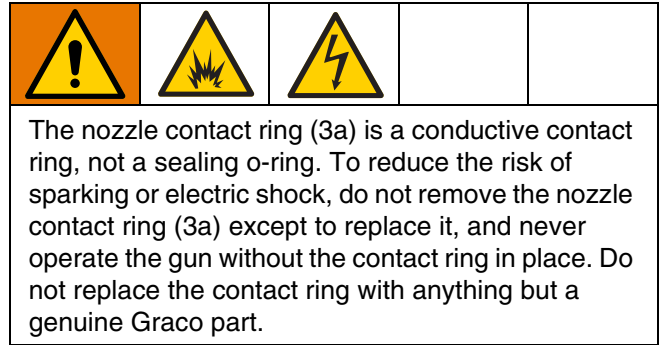


FIG. 29. Air Cap/Nozzle Replacement



**NOTE:** Use non-silicone grease (111265) on the small o-ring (3b). Do not over-lubricate. Do not lubricate the contact ring (3a).

5. Lightly lubricate the o-ring (3b). Install it and the contact ring (3a) on the nozzle (3).
- NOTE:** Make sure the electrode needle (4) is finger-tight (see **Electrode Replacement**, page 46).
6. Install the fluid nozzle (3) with the multi-tool (40), and tighten until the fluid nozzle seats in the gun body (1/8 to 1/4 turn past hand-tight).
  7. Carefully install the air cap (2). Be sure to insert the electrode (4) through the center hole of the air cap.
  8. Rotate the air cap (2) to the desired position.
  9. Make sure the u-cup (1a) is properly in place on the retaining ring (1). The lips must face forward.
  10. 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.
  11. **Test Gun Resistance**, page 34.
  12. Install the gun onto the manifold and bracket.

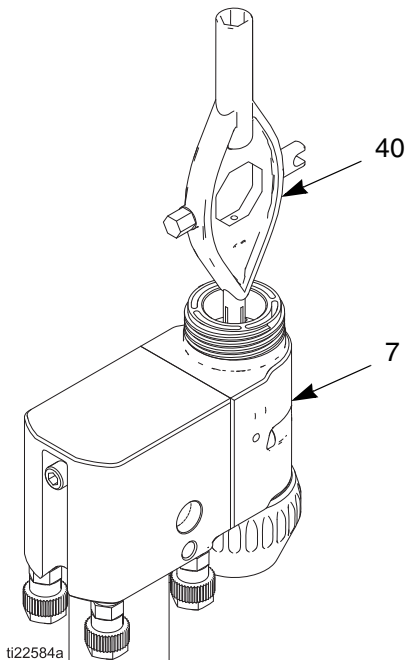
## Electrode Replacement

1. **Prepare the Gun for Service**, page 42.
2. Remove the air cap and nozzle. See **Air Cap/Nozzle Replacement**, page 45.
3. Unscrew the electrode (4) with the multi-tool (40) from the front of the gun body (7). FIG. 30.

### NOTICE

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

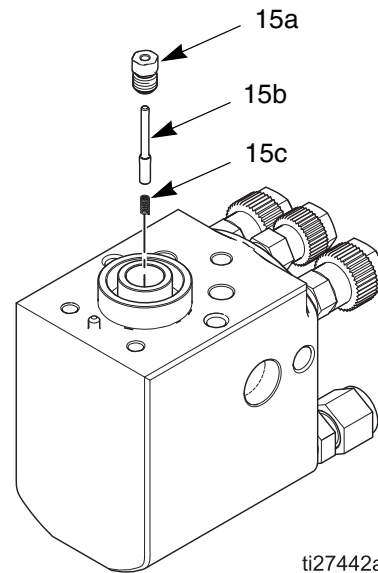
4. Apply low-strength (purple) Loctite® or equivalent thread sealant to the electrode and packing rod threads. Install the electrode finger-tight. Do not over tighten.
5. Install the fluid nozzle. See **Air Cap/Nozzle Replacement**, page 45.
6. **Test Gun Resistance**, page 34.
7. Install the air cap. See **Air Cap/Nozzle Replacement**, page 45.
8. Install the gun onto the manifold and bracket.



**FIG. 30. Electrode Replacement**

## Manifold HV Contact Repair

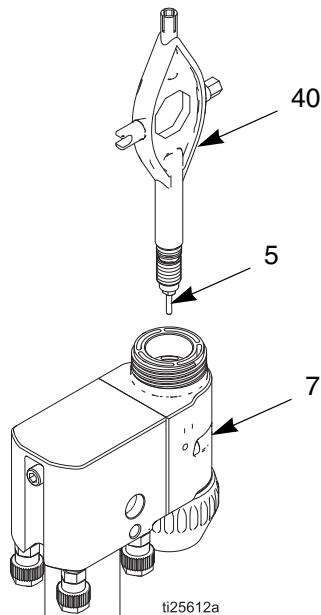
1. **Prepare the Gun for Service**, page 42.
2. Remove the plunger retainer nut (15a).
3. Remove the plunger (15b) and spring (15c).
4. Inspect for damage, replace if needed.
5. Carefully align and place the spring (15c) in the manifold.
6. Place the large end of the plunger (15b) into the hole in the manifold.
7. Install the plunger retainer nut (15a). Torque to 10 in-lbs (1.1 N·m).



**FIG. 31. Manifold HV Contact Repair**

## Packing Rod Removal

1. **Prepare the Gun for Service**, page 42.
2. Remove the air cap and fluid nozzle. See **Air Cap/Nozzle Replacement**, page 45.
3. Remove the electrode. See **Electrode Replacement**, page 46.
4. Remove piston cap (14) and springs (12 and 13) from the rear of the gun. See FIG. 34.
5. Unscrew the set screw (10) and remove from the needle stop (11).
6. Remove the packing rod assembly (5), using the multi-tool (40).
7. Check all parts for wear or damage and replace if necessary. See **Packing Rod Repair**, page 48.



**FIG. 32. Fluid Packing Rod Removal**

## Packing Rod Installation

1. Install the packing rod assembly (5) into the gun body. Using the multi-tool (40), tighten the assembly until just snug.
2. Install the electrode. See **Electrode Replacement** on page 46.
3. Install the nozzle and air cap. See **Air Cap/Nozzle Replacement** on page 45.
4. **Test Gun Resistance**, page 34.

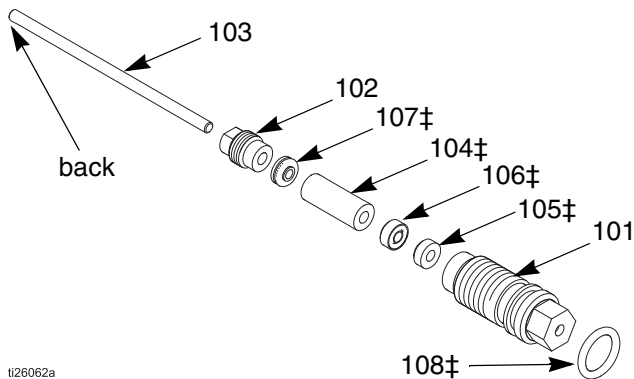
## Packing Rod Repair

**NOTE:** You may replace the packing rod (5) components as individual parts, as described below, or you may replace the packing rod assembly. The fluid rod drag force is pre-adjusted at the factory but must be checked each time work is done on the packing rod assembly.

### Disassembly

After the packing rod assembly has been removed from the gun, perform the following to disassemble the packing rod assembly.

1. Remove the packing rod (103).
2. Use the multi-tool to loosen the packing nut (102). Remove the packing nut.
3. Use the packing rod (103) inserted in the small hole of the packing housing (101) to help push the components out of the packing housing.
4. Separate remaining items and inspect for damage. Replace any damaged parts.



**FIG. 33 Packing Rod Repair**

### Assembly

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

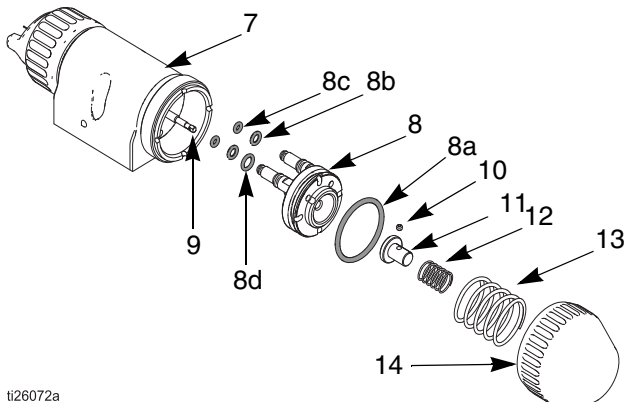
**NOTE:** To provide an orientation reference during assembly, the end of the fluid rod that is exposed beyond the packing flats is referred to as the back end of the fluid rod.

1. Place the packing nut (102) and seal (107) on the fluid rod (103). Flats on the packing nut must face away from all other components installed on the packing rod. The seal lips must face away from the packing nut.
2. Fill the inner cavity of the spacer (104) with dielectric grease (43). Place the spacer on the fluid rod (103) in the direction shown. Generously apply dielectric grease to the outside of the spacer.
3. Place the fluid packing (106) on the packing rod (103) with its lips facing the front of the rod. Install the needle packing (105) with the male end toward the fluid packing, then insert the combined components into the housing (101).
4. Lightly tighten the packing nut (102). The packing nut is properly tightened when there is 3 lb (13.3N) of drag force when sliding the packing housing (101) assembly along the rod.
5. Install the o-ring (108) on the outside of the housing (101). Lubricate the o-ring with non-silicone grease (111265). Do not over-lubricate.
6. Install the packing rod assembly (5) into the gun. See **Packing Rod Installation**, page 47.



## Piston Repair

1. **Prepare the Gun for Service**, page 42.
2. Remove piston cap (14) and springs (12 and 13) from the rear of the gun. See FIG. 34.
3. Unscrew the set screw (10) and remove from the needle stop (11).
4. Remove piston (8) from gun by threading an 8-32 bolt into the hole provided in the back of the piston and pulling the piston out.
5. Inspect the o-rings (8a, 8b, 8c, and 8d) for damage. Replace if damaged.
6. Lubricate the o-rings with non-silicone grease (111265). Do not over-lubricate.
7. Align the two stems with the holes in the gun body (7) and press assembly back into the back of the gun until it bottoms out.
8. Install the needle stop (11). Press until it bottoms on the shaft.
9. Apply medium strength (blue) thread sealant to the set screw (10) and tighten.
10. Install the two springs (12 and 13) and piston cap (14).



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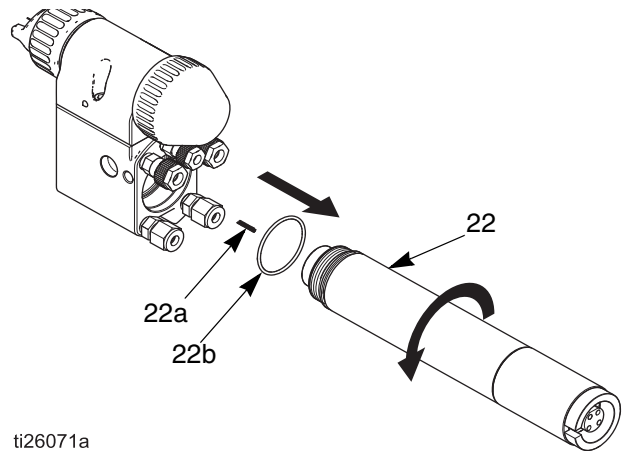
**FIG. 34 Piston Removal**

## Power Supply Repair



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.

1. **Prepare for Power Supply Service**, page 44.
2. Unscrew the power supply (22) from the gun manifold. See FIG. 35.
3. Inspect the o-ring (22b) and spring (22a) on front of the power supply (22) for damage, and replace if damaged.
4. **Test Power Supply Resistance**, page 34.
5. Apply dielectric grease to the concentric rings on the front of the power supply (22).
6. Screw the power supply (22) into the manifold until hand tight.
7. **Test Full Gun with Power Supply**, page 33.







ti26071a

**FIG. 35 Power Supply Removal**

# Air Caps and Fluid Nozzles

## Fluid Nozzle Selection Chart

				
<p>To reduce the risk of an injury, follow the <b>Pressure Relief Procedure</b>, page 26 before removing or installing a fluid nozzle and/or air cap.</p>				

Fluid Nozzle Part No.	Color	Description	Orifice Size, mm (in.)
24N613	Black	For standard coatings	0.75 (.029)
24N614			1.0 (.042)
24N615			1.2 (.047)
24N616			1.5 (.055)
24N617			1.8 (.070)
24N618			2.0 (.079)
24N619			0.55 (.022)
24N620	Blue	With hardened seat, for abrasives and metallics	0.75 (.029)
24N621			1.0 (.042)
24N622			1.2 (.047)
24N623			1.5 (.055)
24N624			1.8 (.070)
24N625			2.0 (.079)





## Fluid Nozzle Performance Charts

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

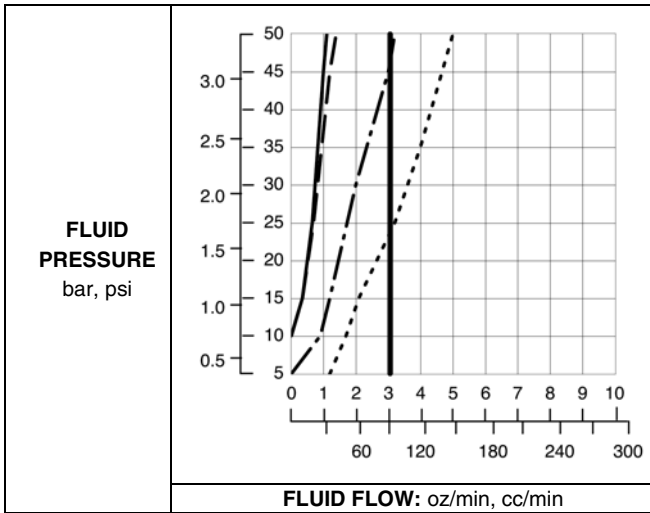
1. For each fluid nozzle performance chart, find the point on the graph corresponding to your desired flow rate and viscosity. Mark the point on each graph with a pencil.
2. The thick vertical line in each graph represents the target flow rate for that nozzle size. Find the graph that has the marked 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

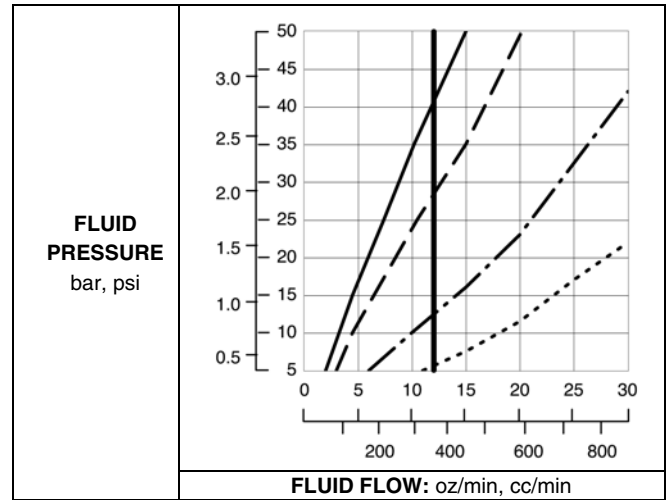
**NOTE:** Fluid pressures are measured at the spray gun inlet.

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

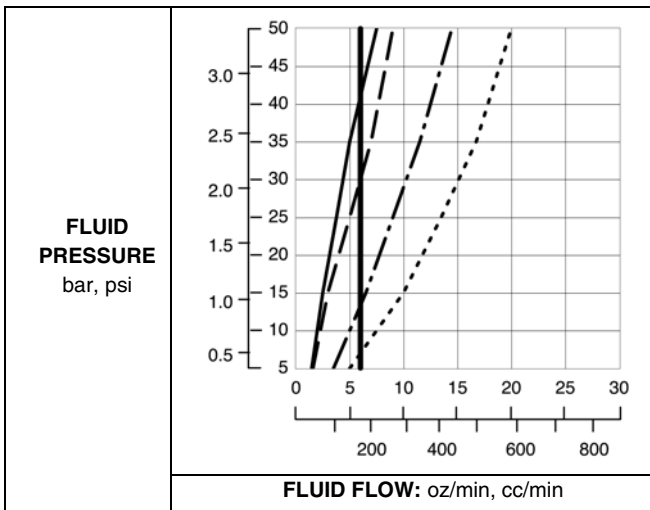
**Table 1: Orifice Size: 0.75 mm (0.030 in.)**



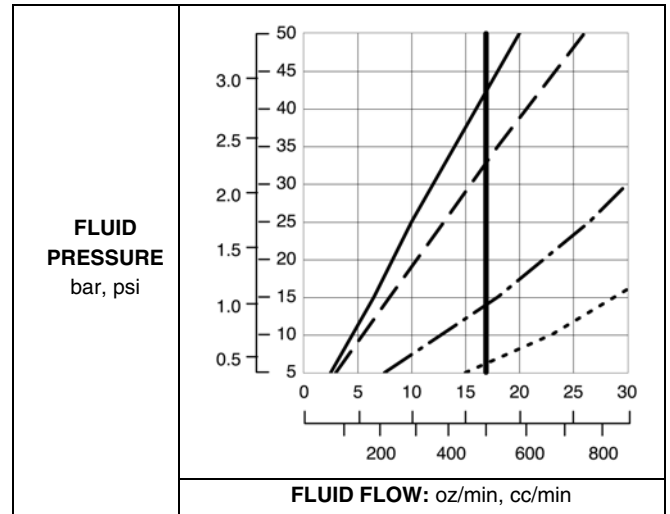
**Table 4: Orifice Size: 1.5 mm (0.059 in.)**



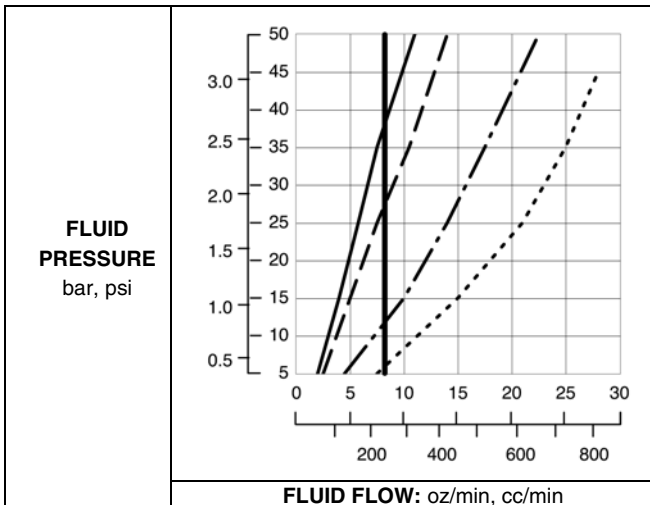
**Table 2: Orifice Size: 1.0 mm (0.040 in.)**



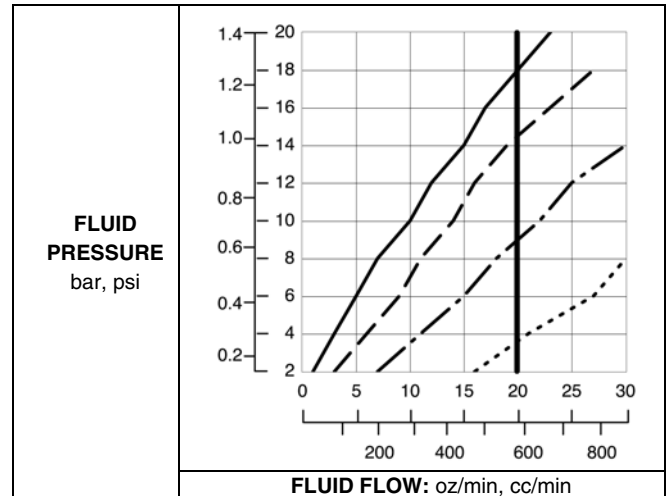
**Table 5: Orifice Size: 1.8 mm (0.070 in.)**







**Table 3: Orifice Size: 1.2 mm (0.047 in.)**



**Table 6: 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>, page 26 before removing or installing a fluid nozzle and/or air cap.</p>			

**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.

- *Distance to target:* 10 in. (254 mm)
- *Inlet air pressure:* 50 psi (34 kPa, 3.4 bar). [Tested on a manual spray gun.]
- *Fan air:* adjusted for maximum width
- *Fluid flow rate:* 10 oz/min (300 cc/min)

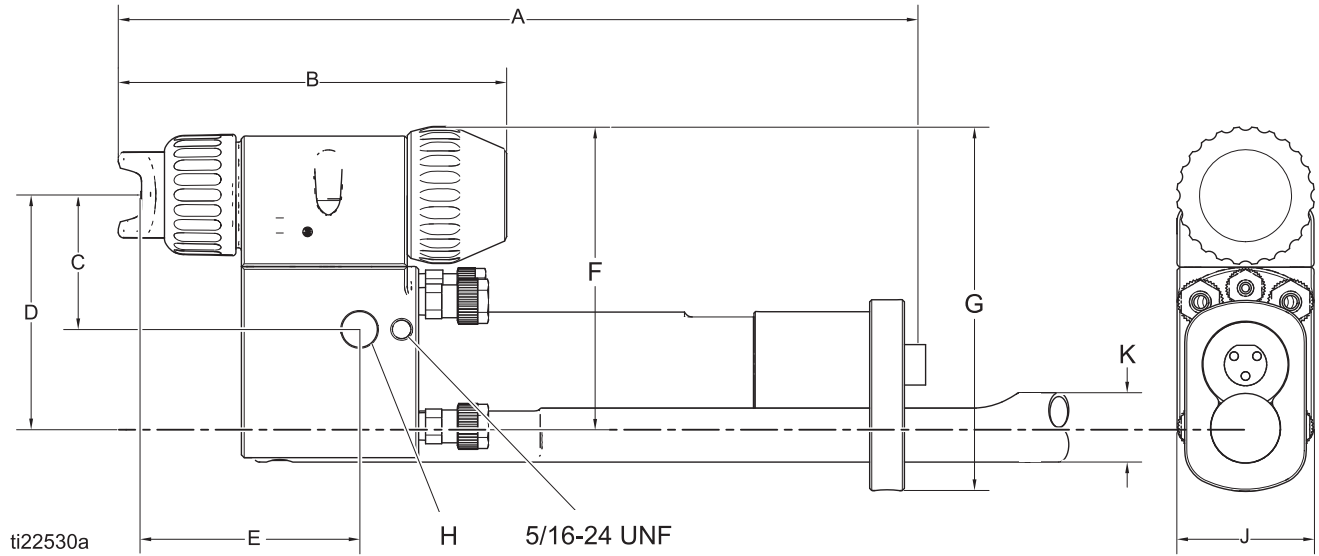
Part No. (color)	Pattern Shape	Length in. (mm)	Recommended Fluid Viscosity, in centipoise (cp) at 70°F (21°C)◆	Recommended Production Rates	Transfer Efficiency	Atomization	Cleanliness
24N438 (black)	Round end	15-17 (381-432)	Light to medium (20-70 cp)	Up to 15 oz/min (450 cc/min)	Better	Best	Good
24N279 (black)	Round end	14-16 (356-406)	Medium to heavy (70-260 cp), and high solids (360+ cp)	Up to 15 oz/min (450 cc/min)	Better	Better	Good
24N376 (black) 24N276 (blue) 24N277 (red) 24N278 (green)	Tapered end	17-19 (432-483)	Light to medium (20-70 cp)	Up to 15 oz/min (450 cc/min)	Best	Better	Better
24N274 (black)	Tapered end	12-14 (305-356)	Light to medium (20-70 cp)	Up to 15 oz/min (450 cc/min)	Good	Good	Best
24N275 (black)	Tapered end	14-16 (356-406)	Light to medium (20-70 cp), and high solids (360+ cp), aerospace coatings	Up to 25 oz/min (750 cc/min)	Best	Good	Best
24N439 (black)	Tapered end	11-13 (279-330)	For use with 2.0 mm nozzles. Medium to heavy (70-260 cp), and high solids (360+ cp)	Up to 20 oz/min (600 cc/min)	Good	Best	Better
24N477 (black)	Round end	15-17 (381-432)	Light to medium (20-70 cp)	Up to 15 oz/min (450 cc/min)	Better	Best	Good
24N453 (black)	Round end	14-16 (356-406)	Light to medium (20-70 cp)	Up to 15 oz/min (450 cc/min)	Better	Better	Good

◆ Centipoise = centistokes x fluid specific gravity.

# Dimensions

## Rear Mount Gun Dimensions

(Shown with rear mount bracket assembly.)

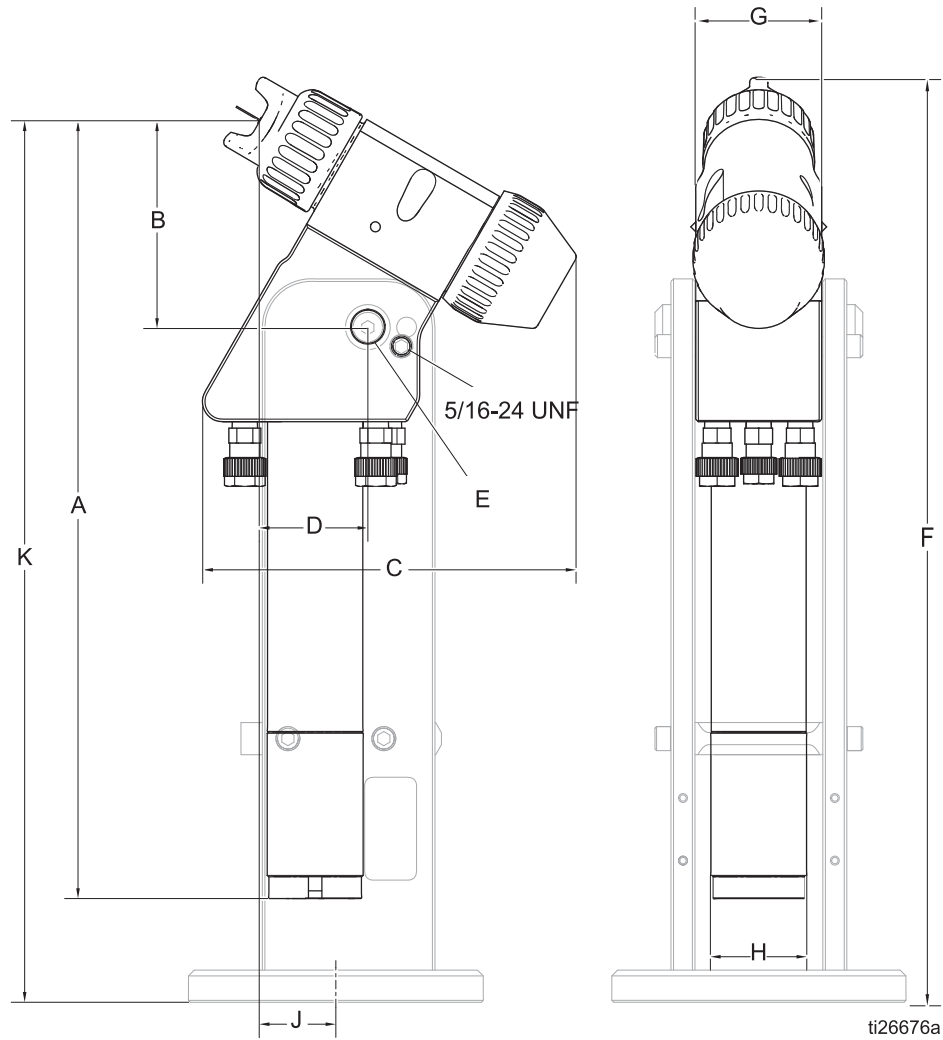


**FIG. 36. Rear Mount Gun Dimensions**

A	B	C	D	E	F	G	H	J	K
11.4 in. (29.0 cm)	5.7 in. (14.5 cm)	1.9 in. (4.8 cm)	3.3 in. (8.4 cm)	3.2 in. (8.1 cm)	4.4 in. (11.2 cm)	5.3 in. (13.5 cm)	0.52 in. (1.3 cm)	2.1 in. (5.3 cm)	1.0 in. (2.5 cm)

## Robot Mount Gun Dimensions

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

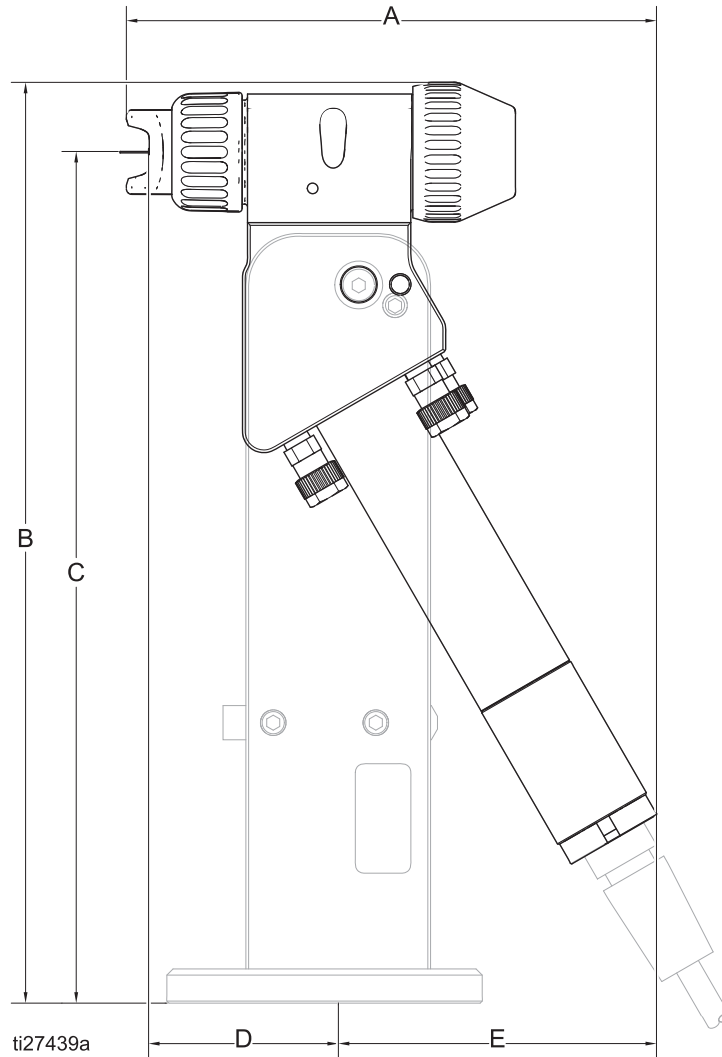


**NOTE:** Gun shown positioned for 60° spray setting in Robot Mount Bracket 24L050.

**FIG. 37. Bottom Mount Gun Dimensions**

A	B	C	D	E	F	G	H	J	K
12.2 in. (31.0 cm)	3.5 in. (8.9 cm)	5.8 in. (14.7 cm)	2.0 in. (5.1 cm)	0.52 in. (1.3 cm)	13 in. (33.0 cm)	2.1 in. (5.3 cm)	1.5 in. (3.8 cm)	1.6 in. (4.06 cm)	13.9 in. (3.53 cm)

Typical configuration for a solid-wrist robot with bottom mount gun.

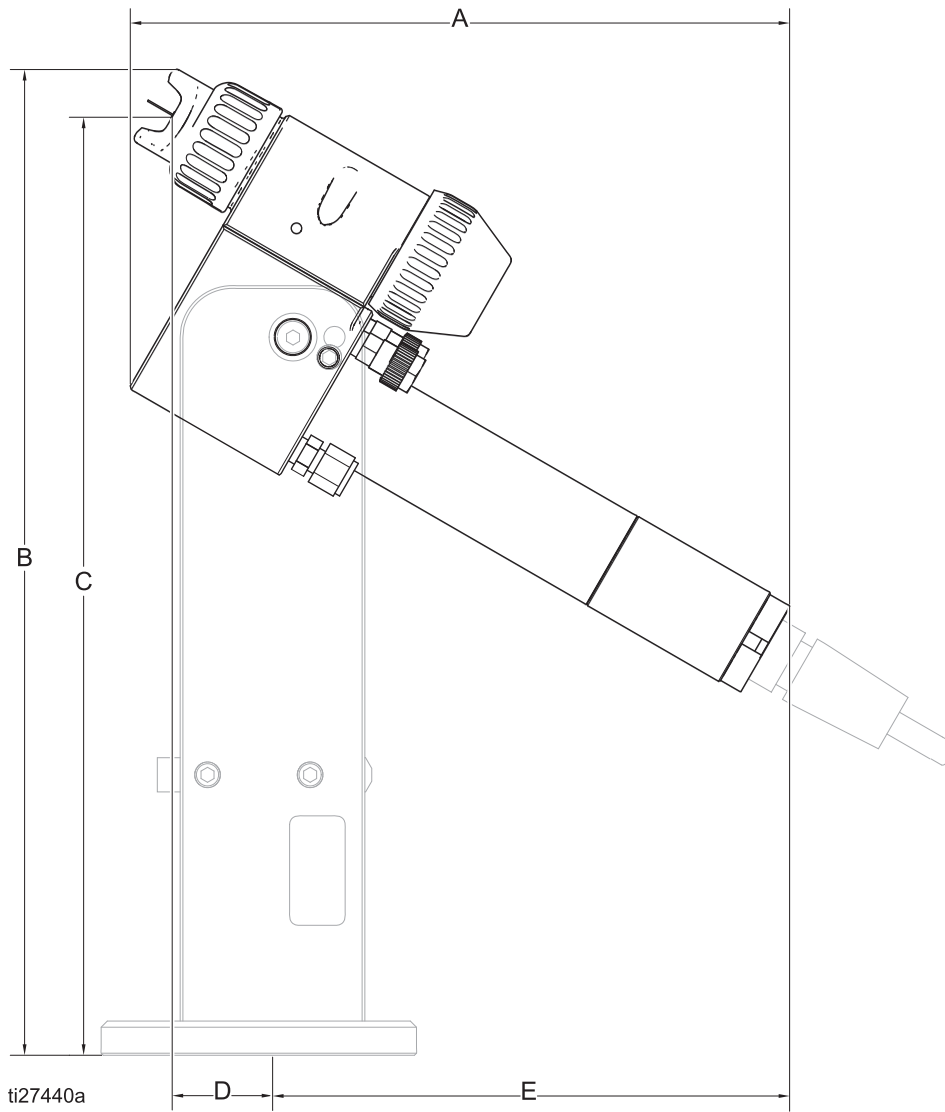


**NOTE:** Gun shown positioned for 90° spray setting in Robot Mount Bracket 24L050.

**FIG. 38. Bottom Mount Gun Dimensions**

A	B	C	D	E
7.6 in. (19.3 cm)	13.5 in. (34.3 cm)	12.4 in. (31.5 cm)	2.6 in. (6.6 cm)	4.7 in. (11.9 cm)

Alternate configuration for a solid-wrist robot with rear mount gun.



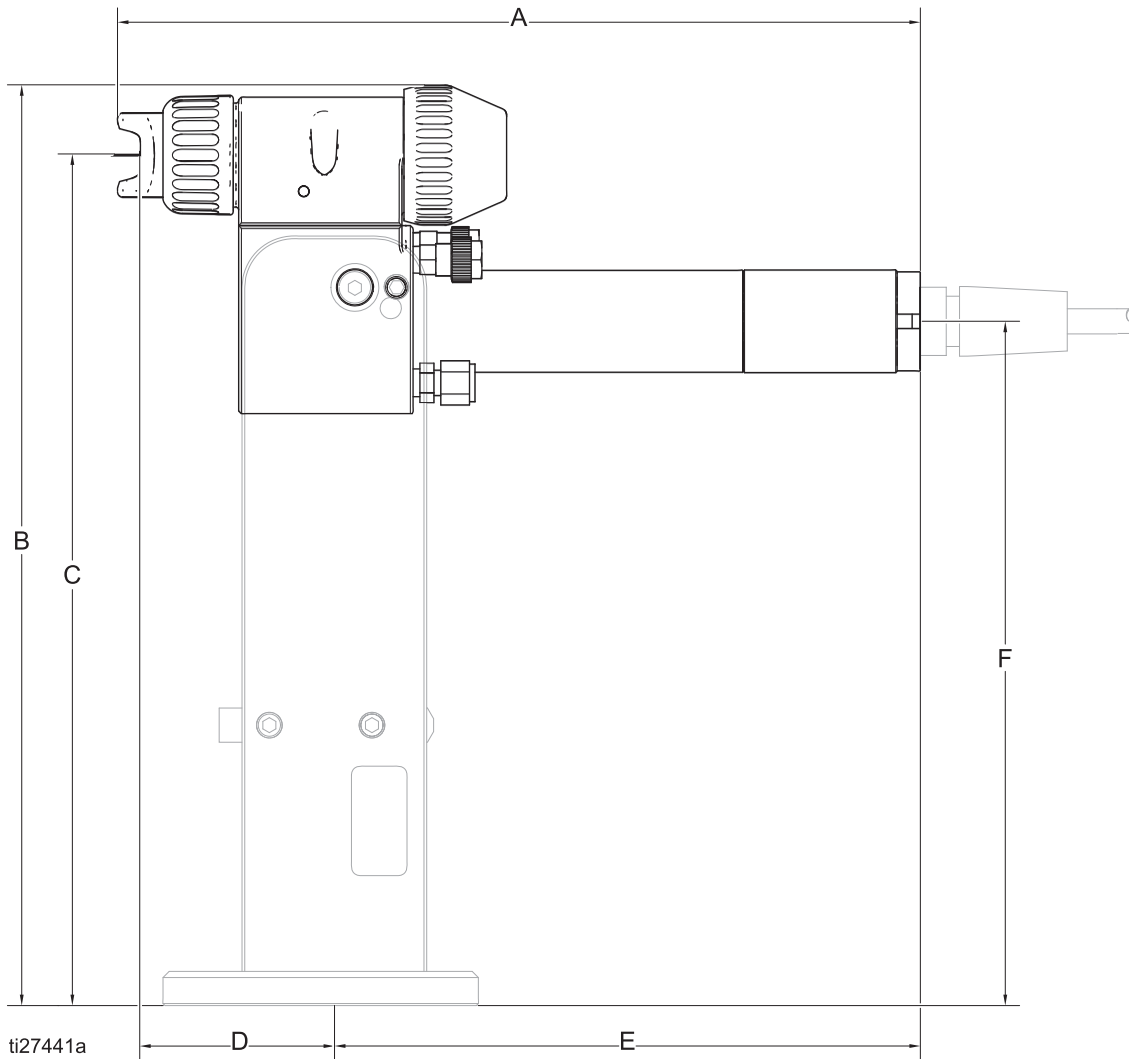
**NOTE:** Gun shown positioned for 60° spray setting in Robot Mount Bracket 24L050.

**Fig. 39. Bottom Mount Gun Dimensions**

A	B	C	D	E
9.3 in. (23.6 cm)	14.4 in. (36.6 cm)	13.7 in. (34.8 cm)	1.3 in. (3.3 cm)	7.4 in. (18.8 cm)



Alternate configuration for a solid-wrist robot with rear mount gun.



**NOTE:** Gun shown positioned for 90° spray setting in Robot Mount Bracket 24L050.

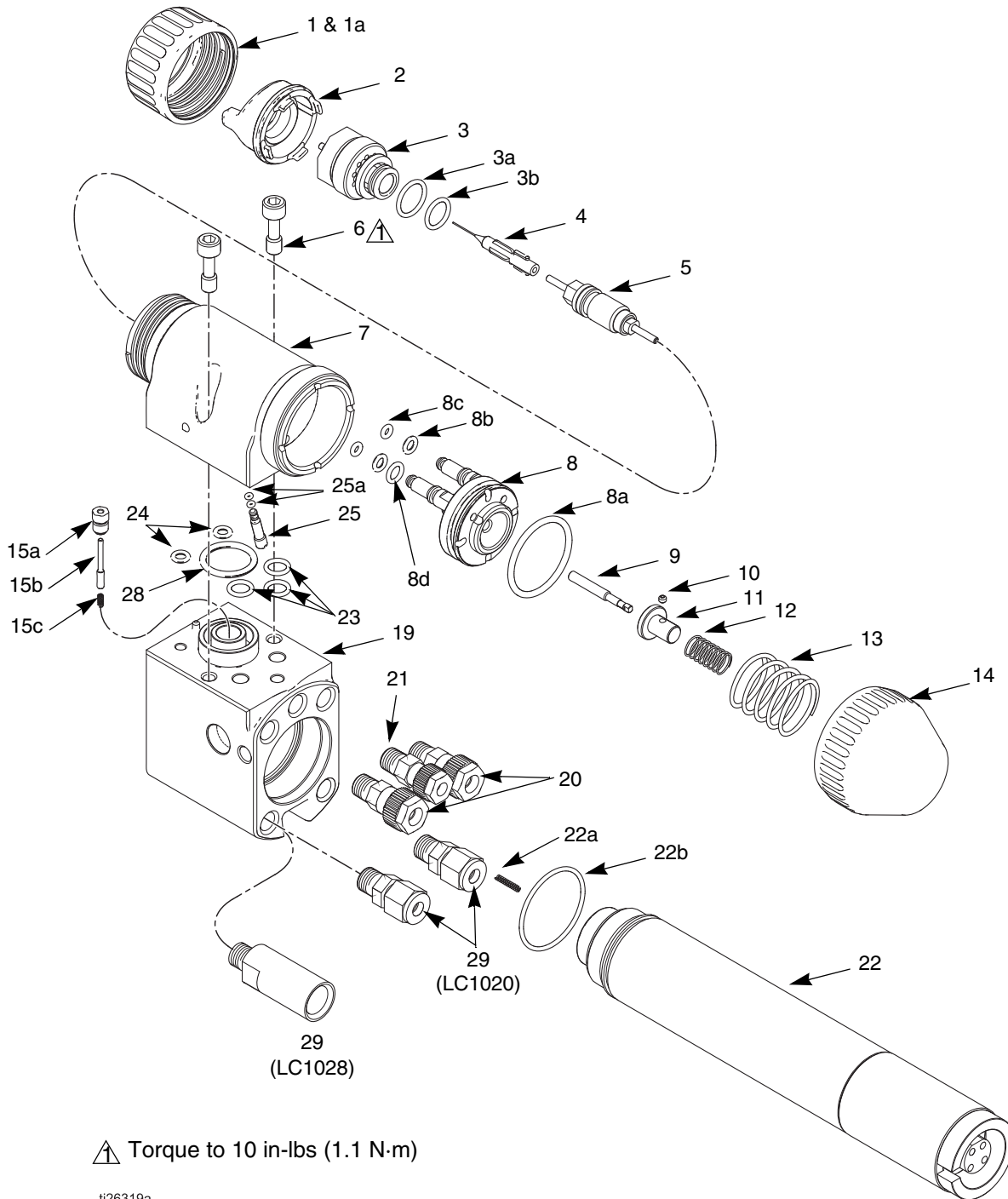
**FIG. 40. Robot Mount Dimensions with Rear Mount Gun**


A	B	C	D	E	F
11.4 in. (29.0 cm)	13.5 in. (34.3 cm)	12.4 in. (31.5 cm)	2.65 in. (6.7 cm)	8.65 in. (22.0 cm)	10.0 in. (25.4 cm)

# Parts

## Pro Xpc Auto Rear Mount Air Spray Gun

LC1020, LC1028



 Torque to 10 in-lbs (1.1 N·m)

ti26319a

## LC1020, LC1028

Ref. No.	Part No.	Description	Qty
1	24N644	Retaining ring kit (includes 1a)	1
1a	198307	U-cup Packing	1
2	24N477	Air cap kit	1
3	24N616	1.5 mm Nozzle Kit (includes 3a & b)	1
3a	24N645	Conductive O-ring Kit	1
3b	111507	O-ring Packing	1
4		Electrode Needle Kit	1
	24N651	LC1020	
	24N652	LC1028	
5	24X828	Packing Rod Assembly Kit (see page 62)	1
6	24X790	Screw Kit (pack of 2)	2
7		Pro Xpc Auto Spray Head Kit (includes 1-14, 23-25)	1
	24X827	LC1020	
	24Y856	LC1028	
8	24X829	Piston Assembly (includes 8a-8d)	1
8a	125249	FX75 O-ring	1
8b	112319	FX75 O-ring	2
8c	111504	FX75 O-ring	2
8d	111450	FX75 O-ring	1
9	24X830	Piston Shaft	1
10	114137	Set Screw	1
11	192452	Needle Stop	1
12	114138	Compression Spring	1
13	114139	Compression Spring	1
14	24X831	Piston Cap	1
15	24X849	Contact Plunger Kit (includes 15a, 15b, & 15c)	1
15a	- - -	Plunger Retainer	1
15b	- - -	Contact Pin	1
15c	- - -	Spring	1
19		Rear Mount Manifold (includes 15, 20, 21, 28, & 29)	1
	24X826	LC1020	
	24Y892	LC1028	
20	16W734	Air fitting, 8mm	2
21	16W733	Air fitting, 6mm	1
22	24X832	Power Supply (includes 22a & 22b)	1
22a	24Y773	Spring	1
22b	102895	O-ring	1
23	113137	O-ring	3
24	112319	O-ring	2

Ref. No.	Part No.	Description	Qty
25	25A193	Recirculation Plug (includes 25a)	1
25a	■ - - -	O-ring	2
28	■ 122530	O-ring	1
29		Fluid Fitting	2
	111157	LC1020	
	17J394	LC1028	
40	276741	Multi tool (not shown)	1
41	101821	Hex Wrench - 3/16 in. (not shown)	1
42	114141	Hex Wrench - 1/16 in. (not shown)	1
43‡	24X793	Fluid Bracket Kit (see page 62)	1
44‡	24Y323	Fluid Tube Kit (not shown)	2
45	116553	Dielectric Grease, 1 oz. (30 ml) tube (not shown)	1
46▲		Sign, Warning (not shown)	1
	17H128	Solventborne systems only	
	17J075	Waterborne systems only	
47▲	179791	Tag, Warning (not shown)	1
48	24Y403	Cover, gun; package of 10 (not shown)	1

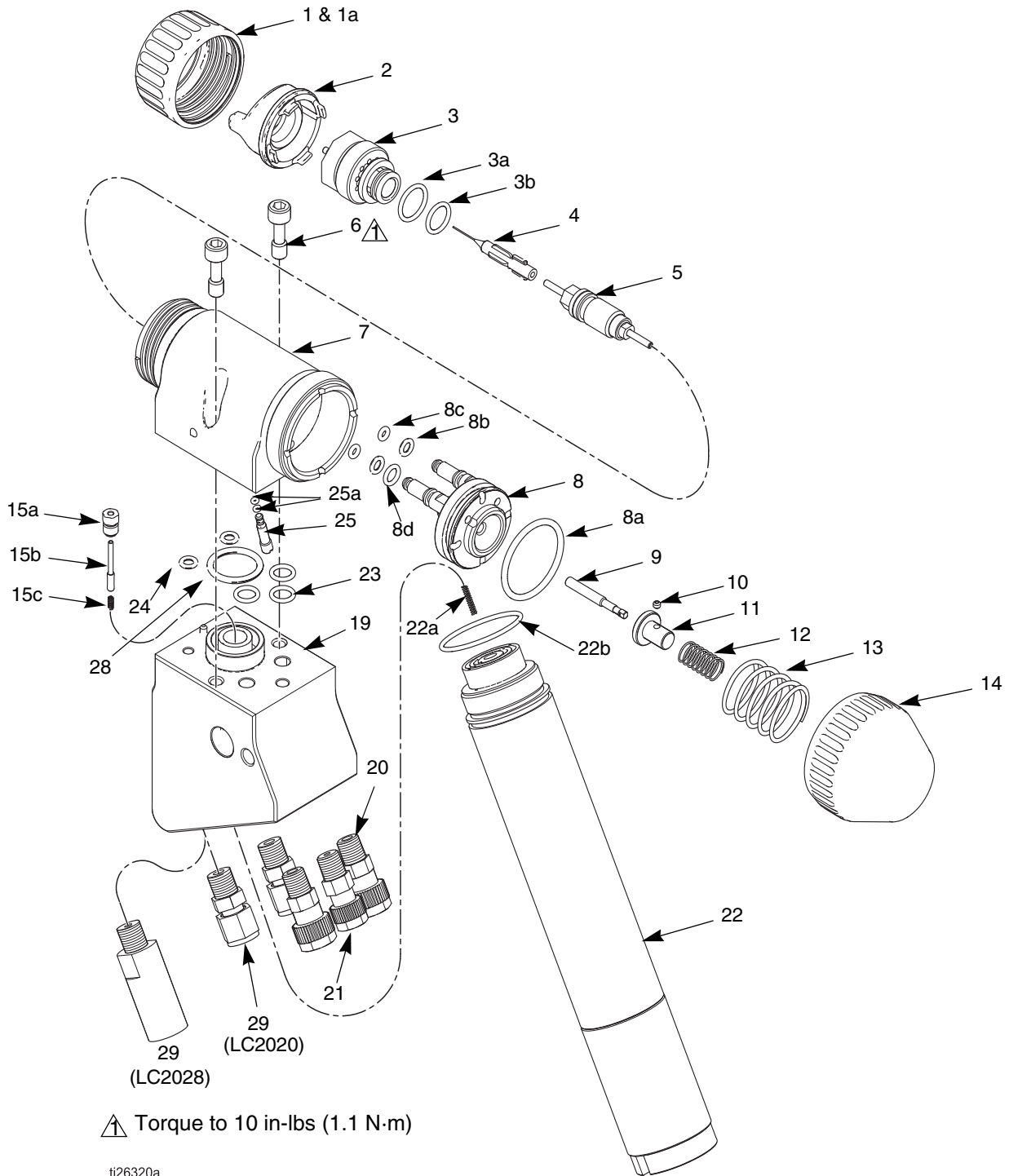
▲ Replacement warning labels, signs, tags, and cards are available at no cost.

■ Included in o-ring repair kit 24X789

‡ Included in solventborne systems only

# Pro Xpc Auto Bottom Mount Air Spray Gun

LC2020, LC2028



## LC2020, LC2028

Ref. No.	Part No.	Description	Qty
1	24N644	Retaining ring kit (includes 1a)	1
1a	198307	U-cup Packing	1
2	24N477	Air cap kit	1
3	24N616	1.5 mm Nozzle Kit (includes 3a & b)	1
3a	24N645	Conductive O-ring Kit	1
3b	111507	O-ring Packing	1
4		Electrode Needle Kit	1
	24N651	LC2020	
	24N652	LC2028	
5	24X828	Packing Rod Assembly Kit (see page 62)	1
6	24X790	Screw Kit (pack of 2)	2
7		Pro Xpc Auto Spray Head Kit (includes 1-14, 23-25)	1
	24X827	LC2020	
	24Y856	LC2028	
8	24X829	Piston Assembly (includes 8a-8d)	1
8a	125249	124 FX75 O-ring	1
8b	112319	008 FX75 O-ring	2
8c	111504	006 FX75 O-ring	2
8d	111450	010 FX75 O-ring	1
9	24X830	Piston Shaft	1
10	114137	Set Screw	1
11	192452	Needle Stop	1
12	114138	Compression Spring	1
13	114139	Compression Spring	1
14	24X831	Piston Cap	1
15	24X849	Contact Plunger Kit (includes 15a, 15b, & 15c)	1
15a	- - -	Plunger Retainer	1
15b	- - -	Contact Pin	1
15c	- - -	Spring	1
19		Bottom Mount Manifold (includes 15, 20, 21, 28, & 29)	1
	24Y262	LC2020	
	24Y893	LC2028	
20	16W734	Air fitting, 8mm	2
21	16W733	Air fitting, 6mm	1
22	24X832	Power Supply (includes 22a & 22b)	1
22a	24Y773	Spring	1
22b	102895	O-ring	1
23	113137	O-ring	3
24	112319	O-ring	2

Ref. No.	Part No.	Description	Qty
25	25A193	Recirculation Plug (includes 25a)	1
25a	■ - - -	O-ring	2
28	■ 122530	O-ring	1
29		Fluid Fitting	2
	111157	LC2020	
	17J394	LC2028	
40	276741	Multi tool (not shown)	1
41	101821	Hex Wrench - 3/16 in. (not shown)	1
42	114141	Hex Wrench - 1/16 in. (not shown)	1
43‡	24X793	Fluid Bracket Kit (see page 62)	1
44‡	24Y323	Fluid Tube Kit (not shown)	2
45	116553	Dielectric Grease, 1 oz. (30 ml) tube (not shown)	1
46	▲	Sign, Warning (not shown)	1
	17H128	LC2020	
	17J075	LC2028	
47	▲ 179791	Tag, Warning (not shown)	1
48	24Y404	Cover, gun; package of 10 (not shown)	1

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

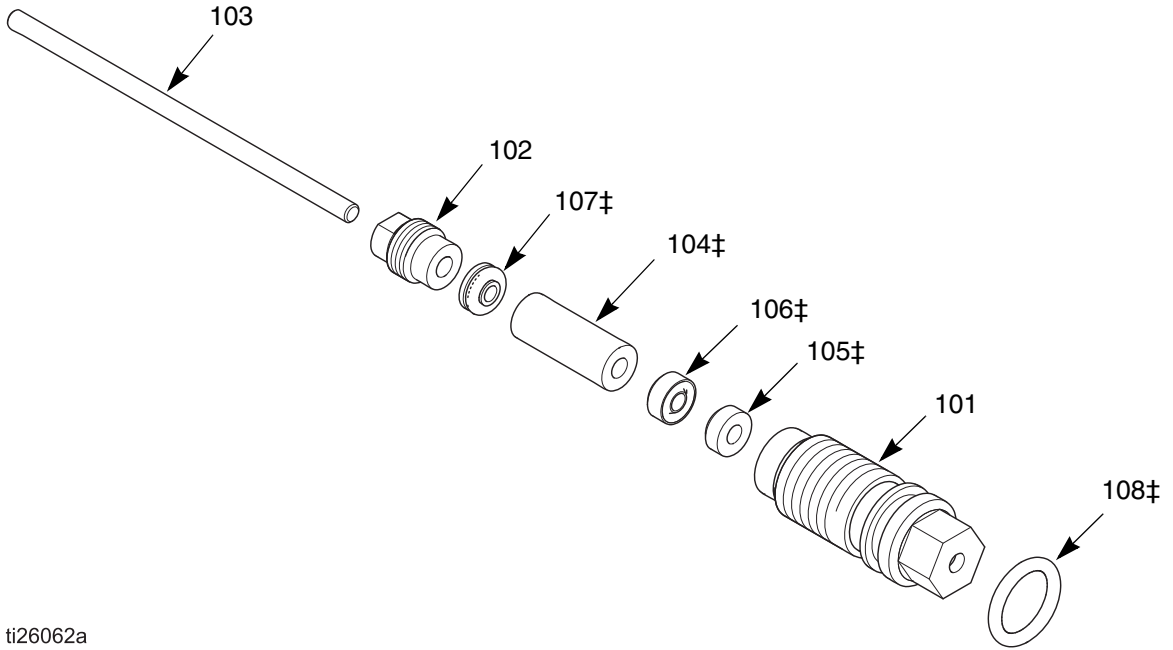
■ Included in o-ring repair kit 24X789

‡ Included in solventborne systems only

# Packing Rod Assembly

**Part No. 24X828 Packing Assembly**

Includes items



ti26062a

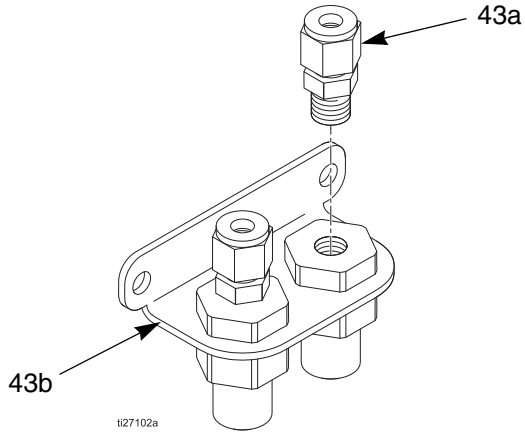
Ref. No.	Part No.	Description	Qty
101	185495	Packing housing	1
102	197641	Packing nut	1
103	25A194	Packing rod	1
104‡	186069	Packing spacer	1
105‡	178763	Needle packing	1
106‡	178409	Fluid packing	1
107‡	116905	Seal	1
108‡	111316	O-ring	1
109	070321	Grease lubricant (not shown)	1
‡	These parts are included in the Fluid Seal Repair Kit 17H258 (purchase separately).		

## Fluid Bracket Kit

*For solventborne systems only.*

### Part No. 24X793 Fluid Bracket Kit

Includes items

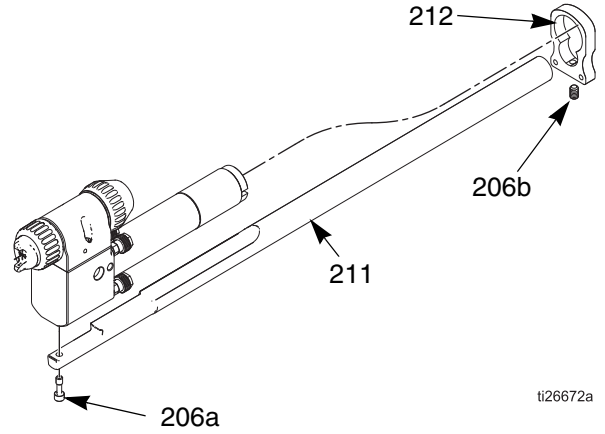


Ref. No.	Part No.	Description	Qty
43	24X793	Fluid Bracket (includes 43a-43c)	1
43a	111157	Fluid Fitting	2
43b	- - -	Bracket Assembly	1
43c	223547	Ground Wire (not shown)	1

## Rear Mount Bracket Assembly

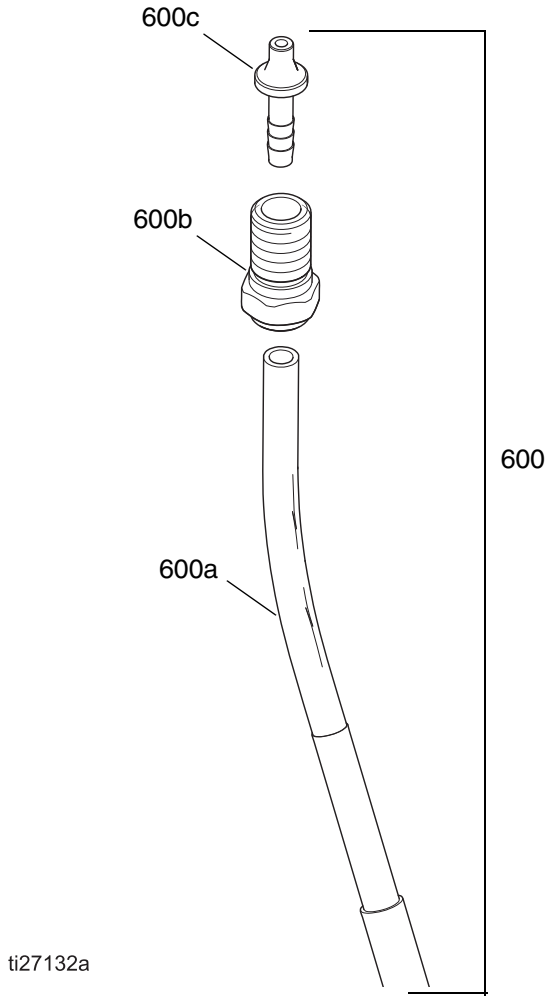
### Part No. 24L044 Rear Mount Reciprocator Kit

Includes items

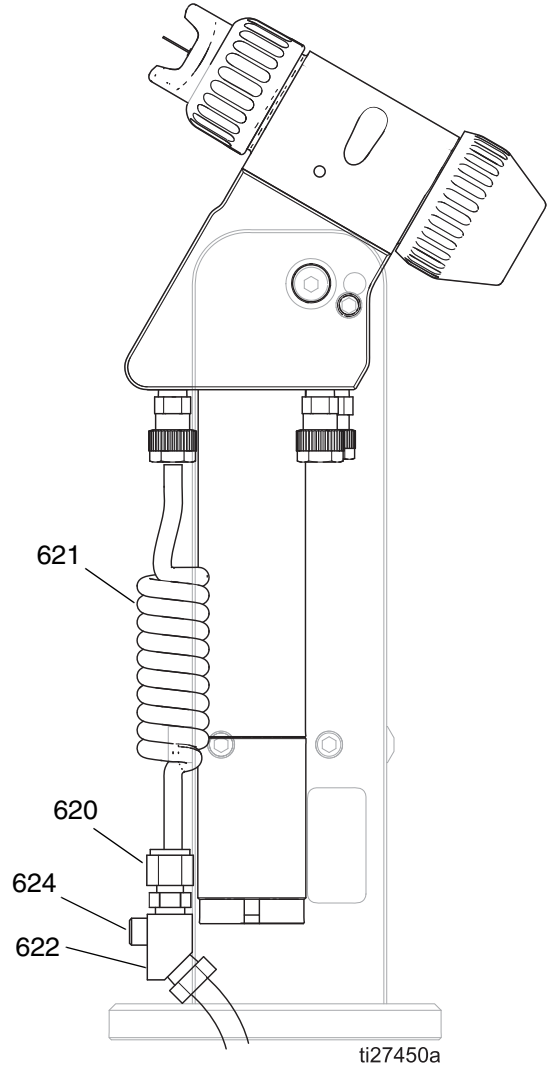


Ref. No.	Part No.	Description	Qty
206a	24X790	Screw (pack of 2)	1
206b	17K153	Setscrew	1
211	- - -	Mounting rod	1
212	- - -	Mounting plate	1

## Shielded Waterborne Fluid Hose 24S112, 24S113



## Coil Fluid Hose Kit 24Y328

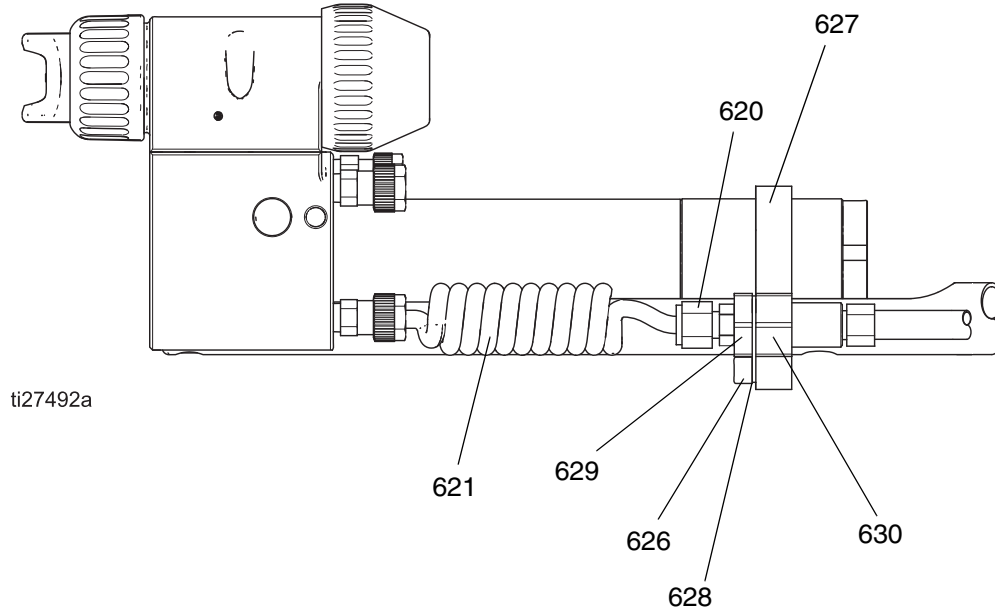


Ref. No.	Part No.	Description	Qty
600	24S112	HOSE, 25 ft (7.6m)	1
	24S113	HOSE, 50 ft (15.2 m)	
600a	537107	HOSE, PTFE 1/4 ID	1
600b	17J395	FITTING, connector, barrel	1
600c	17J392	FITTING, seal, fluid	1

Ref. No.	Part No.	Description	Qty
620	111157	Fluid Fitting	2
621	25A346	Tube, coiled	1
622	---	Manifold	1
623	223547	Wire, ground (not shown)	1
624	124588	Screw, cap, hex head	2
625	---	Screw, ground (not shown)	1



# Coil Fluid Hose Kit 24Y325

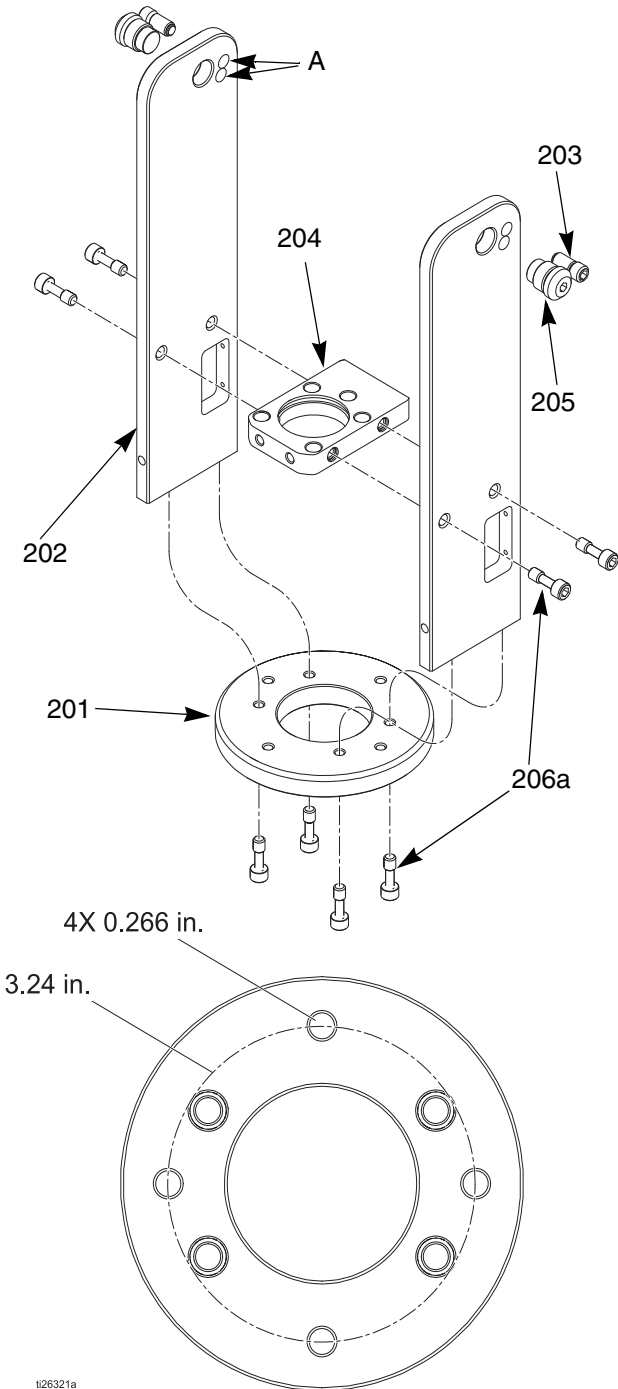


Ref. No.	Part No.	Description	Qty
620	111157	Fluid Fitting	2
621	25A346	Tube, coiled	1
623	223547	Wire, ground (not shown)	1
626	GC2248	Screw, cap, socket head	2
627	---	Plate, mounting, acetal	1
628	---	Bracket, mounting, SST	1
629	---	Fitting	2
630	---	Nut	2

# Robot Mount Bracket Assembly

Part No. 24L050 Mounting Bracket Assembly

Includes items



Ref. No.	Part No.	Description	Qty
201	16U245	Mounting plate	1
202	16N406	Gun plate	2
203	24Y771	Locking pin (pack of 2)	2
204	16P858	Center plate	1
205	24Y772	Mounting pin (pack of 2)	2
206a	24X482	Retainer fastener, plastic (pack of 4)	8
207	GC2248	Screw	4
	- - -	Robot adapter plates (not shown; order separately); See Table 7 on page 67	

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

**Table 7. Robot Adapter Plates**

Adapter Plate	Robot	Bolt Circle	Mounting Screws	Locating Pin Circle	Locating Pins
<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-250	100 mm (3.94 in)	6X M5	100 mm (3.94 in)	1X 5 mm

# Accessories

## Controller

Part No.	Description
24Y307	Pro Xpc Auto Controller, Solventborne
24Y308	Pro Xpc Auto Controller, Waterborne
24Y335	Controller Power Cord (included in 24Y307 and 24Y308)
17H039	I/O Cable (included in 24Y307 and 24Y308)

## Gun Power Cables

Part No.	Description
17J586	Gun Power Cable; 11 m (36 ft)
17J588	Gun Power Cable; 20 m (65.6 ft)
17J589	Gun Power Cable; 30 m (98.4 ft)

## Fluid Line Accessories

### Fluid Tube, Solventborne Systems

Part No.	Description
24Y323	Thick Walled PFE, 8 ft (2.4 m) section
24Y325	Coil Hose; Reciprocator; includes mounting hardware
24Y328	Coil Hose; Robot; includes mounting hardware
25A346	Coil Hose; Robot; hose only

### Shielded Waterborne Fluid Hose

24S112	25 ft (7.6 m)
24S113	50 ft (15.2 m)

## System Accessories

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

## Mounting Brackets

Part No.	Description
24L044	Rear Mount (Reciprocator)
24L050	Bottom Mount (Robot)
- - -	Robot Adapter Plates; see Table 7 on page 67

## Test Equipment

Part No.	Description
241079	Megohmmeter. 500 V output, 0.01–2000 megohms. Use for ground continuity and gun resistance tests. <b>Not for use in hazardous locations.</b>
722886	Paint Resistance Meter. Use for fluid resistivity test. See manual 307263. <b>Not for use in hazardous locations.</b>
722860	Paint Probe. Use for fluid resistivity test. See manual 307263. <b>Not for use in hazardous locations.</b>
245277	Test Fixture, High Voltage Probe, and kV Meter. Use to test the electrostatic voltage of the gun, and the condition of the power supply when being serviced. See manual 309455.

## Miscellaneous Equipment

### Gun Accessories

Part No.	Description
111265	Non-silicone Lubricant, 4 oz (113 g).
116553	Dielectric Grease. 1 oz (30 ml)
24Y403	Gun Cover. Rear Mounted (Reciprocator) gun. Box of 10.
24Y404	Gun Cover. Bottom Mounted (Robot) gun. Box of 10.
210084	Hand-held Grounding Rod

## Conversion and Repair Kits

Part No.	Description
24X794	Round Spray Kit. To convert a standard air spray gun to a round spray air cap. See manual 3A2498.
24N704	Electrode Replacement Needle for Abrasive Materials. Blue.
24X789	O-Ring Repair Kit
17H258	Fluid Seal Repair Kit

# Technical Data

Category	Data
Maximum Working Fluid Pressure	100 psi (0.7 MPa, 7 bar)
Maximum Working Air Pressure	100 psi (0.7 MPa, 7 bar)
Typical total air flow with 24N477 air cap at 30 psi (2 bar) atomizing air and fan air inlet pressure	12 scfm (340 l/min)
Minimum Cylinder Actuating Pressure	50 psi (0.34 MPa, 3.4 bar)
Ambient Temperature Range	41°F - 104°F (5°C - 40°C)
Maximum Fluid Operating Temperature	120°F (48°C)
Paint Resistivity Range	<i>Solventborne systems:</i> 1 megohm-cm to infinity <i>Waterborne systems:</i> conductive waterborne fluids
Short Circuit Current Output	150 micro-amperes
Voltage Output	<i>Solventborne guns:</i> 0-100 kV <i>Waterborne guns:</i> 0-60 kV
Sound Power (measured per ISO Standard 9216)	at 40 psi (0.28 MPa, 2.8 bar): 90.4 dB(A) at 100 psi (0.7 MPa, 7 bar): 105.4 dB(A)
Sound Pressure (measured 1 m from gun)	at 40 psi (0.28 MPa, 2.8 bar): 87 dB(A) at 100 psi (0.7 MPa, 7 bar): 99 dB(A)
Atomizing air inlet fitting	8 mm (5/16 in.) O.D., 1 mm (.04 in.) wall, and 6 mm (0.23 in.) ID, nylon tube
Fan air inlet fitting	8 mm (5/16 in.) O.D., 1 mm (0.04 in.) wall, and 6 mm (0.23 in.) ID, nylon tube
Cylinder air inlet fitting	6 mm (1/4 in.) O.D., 1 mm (0.04 in.) wall, and 4 mm (0.17 in.) ID, nylon tube
Fluid inlet fitting	<i>Solventborne:</i> 6 mm (1/4 in.) O.D., 1.6 mm (0.0625 in.) wall, and 3.2 mm (0.125 in.) ID, thick-walled PFE tube <i>Waterborne:</i> 9.4 mm (0.369 in.) O.D., 1.5 mm (0.060 in.) wall, and 6 mm (1/4 in.) ID, thick-walled FEP tube
Gun Weight	1.2 lb (545 g)
Wetted Parts	Nylon, Acetal, Ultra-High Molecular Weight Polyethylene, Fluoroelastomer, Polyethylene

# Graco Standard Warranty

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

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Original instructions. This manual contains English. MM 332992

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Revision J, October 2018