Tribomatic® Magnum Automatic Powder Spray Gun

Customer Product Manual
Part 343 547A

NORDSON CORPORATION • AMHERST, OHIO • USA

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Notice

Trademarks

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Tribomatic Magnum Automatic Powder Spray Gun

1. Safety

Read and follow these safety instructions. Task- and equipment-specific warnings, cautions, and instructions are included in equipment documentation where appropriate.

Make sure all equipment documentation, including these instructions, is accessible to all persons operating or servicing equipment.

Qualified Personnel

Equipment owners are responsible for making sure that Nordson equipment is installed, operated, and serviced by qualified personnel. Qualified personnel are those employees or contractors who are trained to safely perform their assigned tasks. They are familiar with all relevant safety rules and regulations and are physically capable of performing their assigned tasks.

Intended Use

Use of Nordson equipment in ways other than those described in the documentation supplied with the equipment may result in injury to persons or damage to property.

Some examples of unintended use of equipment include

- using incompatible materials
- making unauthorized modifications
- removing or bypassing safety guards or interlocks
- using incompatible or damaged parts
- using unapproved auxiliary equipment
- operating equipment in excess of maximum ratings

Regulations and Approvals

Make sure all equipment is rated and approved for the environment in which it is used. Any approvals obtained for Nordson equipment will be voided if instructions for installation, operation, and service are not followed.

All phases of equipment installation must comply with all Federal, State, and Local codes.

Personal Safety

To prevent injury follow these instructions.

- Do not operate or service equipment unless you are qualified.
- Do not operate equipment unless safety guards, doors, or covers are intact and automatic interlocks are operating properly. Do not bypass or disarm any safety devices.
- Keep clear of moving equipment. Before adjusting or servicing any moving equipment, shut off the power supply and wait until the equipment comes to a complete stop. Lock out power and secure the equipment to prevent unexpected movement.
- Relieve (bleed off) hydraulic and pneumatic pressure before adjusting or servicing pressurized systems or components. Disconnect, lock out, and tag switches before servicing electrical equipment.
- Obtain and read Material Safety Data Sheets (MSDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials, and use recommended personal protection devices.
- To prevent injury, be aware of less-obvious dangers in the workplace that often cannot be completely eliminated, such as hot surfaces, sharp edges, energized electrical circuits, and moving parts that cannot be enclosed or otherwise guarded for practical reasons.

Fire Safety

To avoid a fire or explosion, follow these instructions.

- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored.
- Provide adequate ventilation to prevent dangerous concentrations of volatile materials or vapors. Refer to local codes or your material MSDS for guidance.
- Do not disconnect live electrical circuits while working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.

- Know where emergency stop buttons, shutoff valves, and fire extinguishers are located. If a fire starts in a spray booth, immediately shut off the spray system and exhaust fans.

- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.

- Use only replacement parts that are designed for use with original equipment. Contact your Nordson representative for parts information and advice.

Grounding

All work conducted inside the spray booth or within 1 m (3 ft) of booth openings is considered within a Class 2, Division 1 or 2 Hazardous location and must comply with NFPA 33, NFPA 70 (NEC articles 500, 502, and 516), and NFPA 77, latest conditions.

- All electrically conductive objects in the spray areas shall be electrically connected to ground with a resistance of not more than 1 megohm as measured with an instrument that applies at least 500 volts to the circuit being evaluated.

- Equipment to be grounded includes, but is not limited to, the floor of the spray area, operator's platform, hoppers, photoeye supports, and metal blow-off nozzles. Personnel working in the spray area must be grounded.

- There is a possible ignition potential from the charged human body. Personnel standing on a painted surface, such as the operator platform, or wearing non-conductive shoes, are not grounded. Personnel must wear shoes with conductive soles or use a ground strap to maintain a connection to ground when working with or around electrostatic equipment.

- Operators must maintain skin-to-metal contact between their hand and the gun handle to prevent shocks while operating manual electrostatic spray guns. If gloves must be worn, cut away the palm or fingers, wear electrically conductive gloves, or wear a grounding strap connected to the gun handle or other true earth ground.

Grounding (contd)

- Shut off electrostatic power supplies and ground gun electrodes before making adjustments or cleaning powder spray guns.
- Connect all disconnected equipment, ground cables, and wires after servicing equipment.

WARNING: Operating faulty electrostatic equipment is hazardous and can cause electrocution, fire, or explosion. Make resistance checks part of your periodic maintenance program. If you receive even a slight electrical shock or notice static sparking or arcing, shut down all electrical or electrostatic equipment immediately. Do not restart the equipment until the problem has been identified and corrected.

Action in the Event of a Malfunction

If a system or any equipment in a system malfunctions, shut off the system immediately and perform the following steps:

- Disconnect and lock out electrical power. Close pneumatic shutoff valves and relieve pressures.
- Identify the reason for the malfunction and correct it before restarting the equipment.

Disposal

Dispose of equipment and materials used in operation and servicing according to local codes.

2. Description

The Tribomatic Automatic Powder Spray Gun uses friction (the tribo effect) to electrostatically charge powder coating particles as they are forced through the gun by compressed air. The gun is used with a Tribomatic Magnum control unit.

See Figure 1. The gun consists of a chargetube (4), diffuser (1), and a spacer (5). The gun mount (3) is used to mount the gun to a reciprocator, oscillator, or a fixed gun stand.

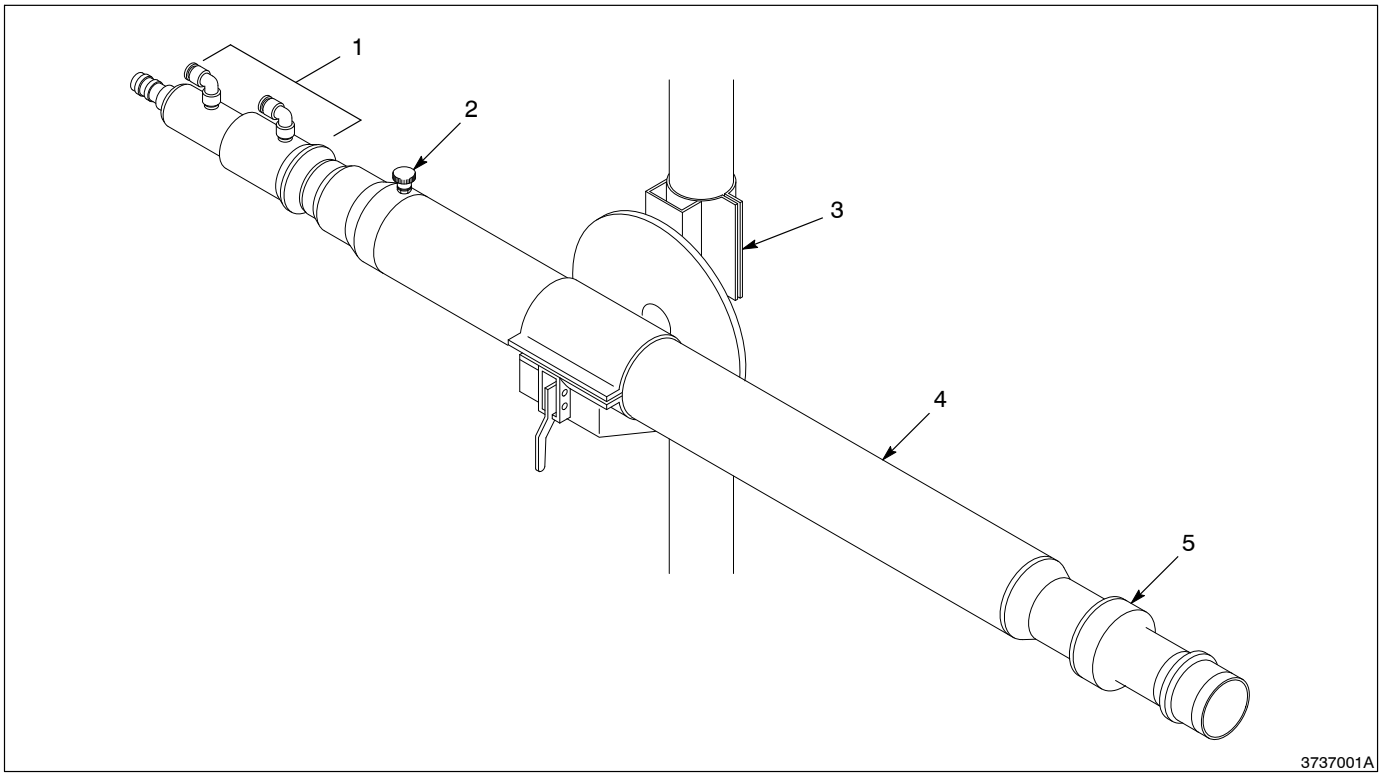

Fig. 1 Tribomatic Magnum Automatic Powder Spray Gun

1. Diffuser
2. Ground Stud
3. Gun mount
4. Chargetube
5. Spacer

Flow-rate air pumps powder out of the feed hopper and forces it through the feed hose into the diffuser. Diffuser air mixes with the powder and increases its speed. The powder and air mixture then passes through a group of spiral tubes inside the chargetube. The collision of the powder particles with the walls of the tubes electrostatically charges both the powder particles and the tubes' inner surface.

2. Description (contd)

The tubes are grounded through the gun body, ground wire, and the control unit. The charge picked up by the tubes is displayed in microampheres at the control unit. The display indicates how well the powder is charging (the higher the number, the stronger the charge the powder is receiving). The strength of the charge the powder receives will vary depending on many factors, including the powder type and its speed through the gun.

Specifications

Refer to Table 1.

Table 1 Specifications

Powder Flow	Maximum	300 g/min (11 oz/min)*
	Minimum	30 g/min (1 oz/min)*
	Recommended	150 g/min (5 oz/min)
	*These rates depend on the powder, pump venturi, powder hose, and the length and dimension of the hoses.	
Pneumatic Consumption	Maximum	700 l/min (24.7 cfm)
	Normal	300 l/min (10.5 cfm)
Dimensions	Length	95 cm (37 in.)
	Diameter	7.5 cm (3 in.)
	Weight	2930 g (6.5 lbs)
Air Supply Quality	Air must be clean and dry. Use a regenerative desiccant or a refrigerated air dryer capable of producing a 3.4 °C (38 °F) or lower dewpoint at 6.9 bar (100 psi). Use a filter system with prefilters and coalescent filters capable of removing oil, water, and dirt in the submicron range.	

3. Installation

WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

NOTE: The gun mount should be installed with the hinged portion of the clamp facing up to prevent the gun from falling when the clamp is opened.

1. See Figure 1. Install the gun mount (3) on a vertical bar mount.
2. Install the desired sprayhead on the spacer (5) with a clockwise twisting motion.
3. Place the gun in the gun mount and tighten the clamp.
4. See Figure 2. Attach the ground wire (7) to the ground stud (4). Tighten the knob.
5. Install the diffuser (6) on the gun.
6. Connect atomizing air 1 tubing (2) onto the diffuser and the labeled fitting on the rear panel of the control unit.
7. Connect atomizing air 2 tubing (5) onto the diffuser and the labeled fitting on the rear panel of the control unit.
8. Connect the powder feed hose (1) onto the diffuser and the powder pump.
9. Adjust the gun-to-workpiece distance and vertical position using the gun holder as an adjustment point.

3. Installation (contd)

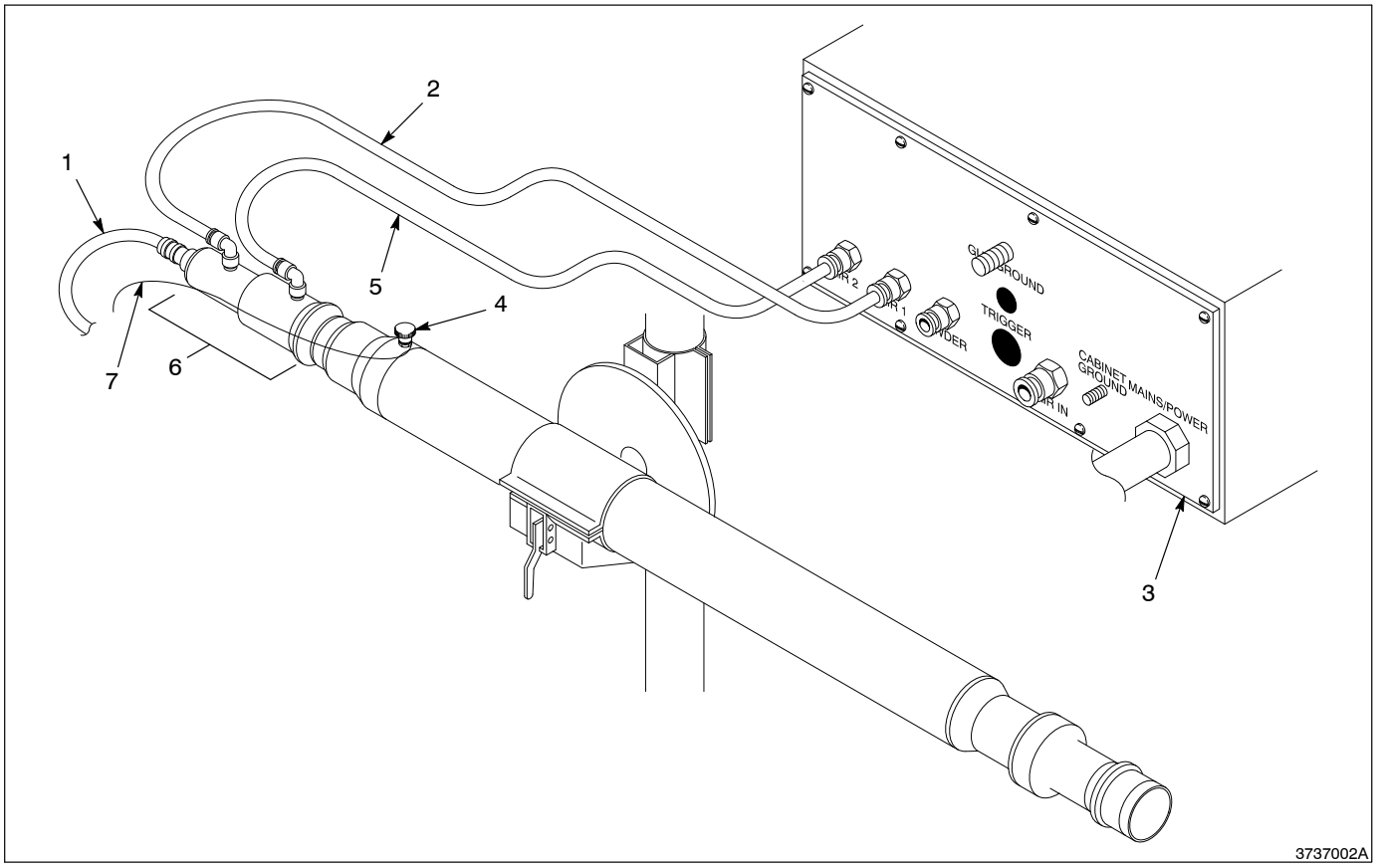

Fig. 2 Attaching the Tubing

1. Powder feed hose
2. Atomizing air 1 tubing
3. Control unit rear panel
4. Ground stud
5. Atomizing air 2 tubing
6. Diffuser
7. Ground wire

Gun Ground Connection

WARNING: All electrically conductive equipment in the spray area must be grounded. Ungrounded or poorly grounded equipment can store an electrostatic charge which can give personnel a severe shock or can arc and cause a fire or explosion.

Connect the gun ground wire to the red GUN GROUND connector at the rear panel of the control unit. Refer to the manual shipped with the Magnum control unit for the location of the ground.

Pneumatic Connections

The control unit is shipped with 8-mm and 10-mm tubing connnectors installed in the input and output ports.

If you want to use to use 0.3125-in. or 0.3750-in. tubing, remove the connectors, wrap the threads with PTFE tape and reinstall the connectors on the control unit's input and output ports.

For further instructions, refer to the manual shipped with the Magnum control unit.

4. Operation

WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

WARNING: Use appropriate respiratory protection. Breathing certain airborne dusts (including finishing powders) may be hazardous to your health. For specific guidance, ask the powder manufacturer for a Material Safety Data Sheet (MSDS).

WARNING: Make sure the gun is grounded before spraying powder or cleaning the gun with compressed air. Without a ground connection the gun will become electrostatically charged. Personnel touching the gun could receive a shock.

WARNING: All electrically conductive equipment in the spray area must be grounded. Ungrounded or poorly grounded equipment can store an electrostatic charge which can give personnel a severe shock or arc and cause a fire or explosion.

WARNING: This equipment can be dangerous unless it is used in accordance with the rules laid down in this manual.

Each automatic gun is controlled by one gun control unit which houses electrical controls, a digital display, and regulators and gauges for flow-rate and diffuser air. Refer to the manual shipped with the Magnum control unit for operation instructions.

Startup

Before activating the control unit, make sure that the

- Booth exhaust fans are activated
- Powder recovery system is operating
- Powder in the feed hopper is thoroughly fluidized

NOTE: Refer to the appropriate component manuals for startup procedures.

1. Turn the control unit power switch ON. The module LED will light.

2. If you switch S5 to Continuous, the powder LED will light. Atomizing and flow-rate air begins to flow through the powder pump and the gun.

3. Set the fluidizing (auxiliary) air pressure as recommended in the manual shipped with the Magnum control unit.

   NOTE: Typical fluidizing air pressure is 1 bar (14 psi). Wait 10–15 minutes for the powder in the feed hopper to adequately fluidize before spraying.

4. Make sure that the flow-rate and atomizing air pressures are correct.

Flow-rate air	1.5 bar (21 psi)
Atomizing air 1	2.0 bar (29 psi)
Atomizing air 2	2.5 bar (36 psi)

5. See Figure 2. Make sure that the tubing is connected correctly to the rear panel of the control unit.

Optimum Powder Flow Rate

NOTE: These settings may be different from one powder to another.

Set flow-rate and atomizing air to the lowest possible pressures that provide

- an acceptable spray pattern
- the desired powder coverage, film build, and finish coverage

Fluidizing Air Pressure

Set the fluidizing air pressure as specified in the manual shipped with the Magnum control unit.

When properly fluidized, small air bubbles rise gently and uniformly to the surface of the powder, making the powder look like it is boiling. If necessary, adjust the fluidizing air pressure. In this state, the powder is similar to a liquid, enabling the powder pump to easily transport the powder from the hopper to the spray gun.

Fluidizing Air Pressure	Results
Too low	Powder flows heavily and inconsistently
Too high	Powder boils violently and flows unevenly with possible air pockets in the powder stream

Flow-Rate Air Pressure

See Figure 2. Flow-rate air transports a powder and air mixture from the feed hopper through the powder feed hose (1) to the spray gun. Increasing the flow-rate air pressure increases the amount of powder that the gun sprays and may increase the thickness of the powder deposited on the part.

Flow-Rate Air Pressure	Results
Too low	Powder sprays unevenly or produces an inadequate film build
Too high	Powder velocity increases, causing excessive film build or overspray which reduces transfer efficiency and wastes powder Excessive flow-rate air pressure accelerates the build-up of impact-fused powder in the gun or pump, or causes premature wear of the gun and pump parts in contact with the powder

Keep the flow-rate air pressure to a minimum. This will reduce overspray, which lessens

- the amount of recovered and recycled powder
- wear on system components such as pumps, spray guns, and filters
- maintenance costs

Atomizing Air Pressure 1

See Figure 2. Atomizing air pressure 1 (2) is added to the powder and air stream to increase the powder velocity in the diffuser and to break up clumps of powder.

Atomizing Air Pressure 1	Results
Too low	Powder flows heavily and inconsistently
Too high	Powder velocity increases, causing excessive overspray, impact-fusion, and premature wear of the pump and gun parts

Increasing the atomizing air pressure decreases the powder flow rate of some pumps, requiring minor adjustments in the flow-rate air pressure setting to maintain the same powder flow rate.

Atomizing Air Pressure 2

See Figure 2. Atomizing air pressure 2 (5) is added to the powder to increase the powder velocity through the gun. The higher the flow rate, the higher the charge and wear on gun parts.

Atomizing air pressure 2	Results
Too low	Powder flows heavily and inconsistently
Too high	Powder velocity increases, causing excessive overspray, impact-fusion, and premature wear of the pump and gun parts

Increasing the atomizing air pressure decreases the powder flow rate of some pumps, requiring minor adjustments in the flow-rate air pressure setting to maintain the same powder flow rate.

Shutdown

1. Turn the control unit power switch OFF. The solenoid valve closes and shuts off air to the pump and gun. If you are using auxiliary air, turn the regulator counterclockwise until the gauge reads zero.

2. Perform the daily maintenance procedures described in *Maintenance.*

5. Maintenance

WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

Dust and powder accumulating on electrostatic equipment can cause malfunctions resulting in fire and shock hazards. The entire system should be cleaned periodically, along with the surrounding area.

Daily

1. Make sure all conductive equipment in the spray area, including the guns, are connected to a true earth ground. The resistance from part to ground, through the hangers and conveyor, must not exceed one megohm. For best results, the resistance should be less than 500 Ω.
2. Check the air supply filters and separators and the air dryer to make sure they are operating properly.

WARNING: Never blow out the chargetube with the ground wire disconnected. A potentially dangerous charge will build up in the chargetube which can cause severe electrical shock.

CAUTION: Always blow out the feed hose in the direction of powder flow (from pump to gun). Never blow out the feed hose from the gun back into the pump.

3. Disconnect the air fittings from the diffuser.
4. Disconnect the powder feed hose from the pump.
5. Blow out the powder feed hose, diffuser, and pump.
6. Disassemble and clean the pump and diffuser. Replace worn parts.
7. Reassemble the pump and diffuser.
8. Reattach the powder feed hose and air fittings.

6. Troubleshooting

WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

This section contains troubleshooting procedures. These procedures cover only the most common problems that you may encounter. If you cannot solve the problem with the information given here, contact your local Nordson representative for help.

Problem	Possible Cause	Corrective Action
1. Powder does not flow when gun is triggered	No air supply to control unit	Check the air supply to the system.
	Flow-rate air pressure too low	Increase the flow-rate air pressure.
	Blockage in system	1. Disconnect the powder feed hose at the pump. Blow out the hose with compressed air. 2. Disassemble the pump and diffuser. Clean them if necessary. 3. Check the powder supply in the hopper for dampness. Replace the powder supply if necessary. 4. Check the air dryer and filters.
	Control unit solenoid valve malfunction	Disconnect the air tubing from the control unit. Turn the switch to Continuous. If you do not feel air at the control unit output when the gun is triggered 1. Remove the cover of the control unit. **NOTE:** The orange test button is located on the right side of the solenoid, as seen from the front of the unit. 2. Press the orange test button on the solenoid. 3. Replace the valve if the valve does not open when you press the test button.

Continued on next page

Problem	Possible Cause	Corrective Action
2. Powder puffing from gun	Powder pump throat worn out	Change the powder pump throat.
	Diffuser filter clogged	Disassemble the diffuser and clean it.
	Powder feed hose too long	Shorten the hose.
	Incorrect ratio of diffuser-to-flow-rate air	Adjust the diffuser-to-flow-rate air pressure ratio. Refer to *Operation* for more information.
3. Poor powder charging (no electrostatic wrap or adhesion)	Flow-rate air pressure too high in relation to diffuser air; powder velocity prevents efficient charging	Reduce the flow-rate air pressure while maintaining diffuser-to-flow-rate air pressure ratio.
	Powder not suitable for tribo charging	Consult with the powder manufacturer.
	Workpiece not properly grounded	Check the conveyor rollers and hangers for coating build-up that could affect the ground. Resistance between the workpiece and the earth ground should not exceed 1 MΩ.
4. Inadequate powder flow	Wet powder causing blockage in system	1. Check the powder in the feed hopper for dampness. 2. Check the air dryer and filters for proper operation. 3. Clean the system components and feed tubing. Refer to *Operation* for more information.
	Poor fluidization of powder	Increase or decrease the fluidizing air pressure. Allow the powder enough time to fluidize properly before beginning spray operations. Refer to *Operation* for more information.
	Incorrect ratio of diffuser-to-flow-rate air	Adjust diffuser and flow-rate air pressure settings. Refer to *Operation* for more information.

7. Parts

To order parts, call the Nordson Customer Service Center or your local Nordson representative. Use the parts list, and the accompanying illustration, to describe and locate parts correctly.

Using the Illustrated Parts List

Numbers in the Item column correspond to numbers that identify parts in illustrations following each parts list. The code NS (not shown) indicates that a listed part is not illustrated. A dash (—) is used when the part number applies to all parts in the illustration.

The number in the Part column is the Nordson Corporation part number. A series of dashes in this column (- - - - - -) means the part cannot be ordered separately.

The Description column gives the part name, as well as its dimensions and other characteristics when appropriate. Indentions show the relationships between assemblies, subassemblies, and parts.

Item	Part	Description	Quantity	Note
—	000 0000	Assembly	1	
1	000 000	• Subassembly	2	A
2	000 000	• • Part	1	

- If you order the assembly, items 1 and 2 will be included.
- If you order item 1, item 2 will be included.
- If you order item 2, you will receive item 2 only.

The number in the Quantity column is the quantity required per unit, assembly, or subassembly. The code AR (As Required) is used if the part number is a bulk item ordered in quantities or if the quantity per assembly depends on the product version or model.

Letters in the Note column refer to notes at the end of each parts list. Notes contain important information about usage and ordering. Special attention should be given to notes.

Spray Gun

See Figure 3.

Item	Part	Description	Quantity	Note
—	635 599	Kit, Magnum, complete	1	
1	635 590	• Diffuser, Magnum, complete	1	
2	635 580	• Chargetube, Magnum	1	
3	635 560	• Gun holder	1	
4	635 579	• Spacer, front, Magnum, complete	1	
NS	635 236	• Nozzle, 780 mm	1	A
NS	635 598	• Pump, tribo, modular, complete	1	

NOTE A: Each nozzle contains 28 tubes.
NS: Not Shown

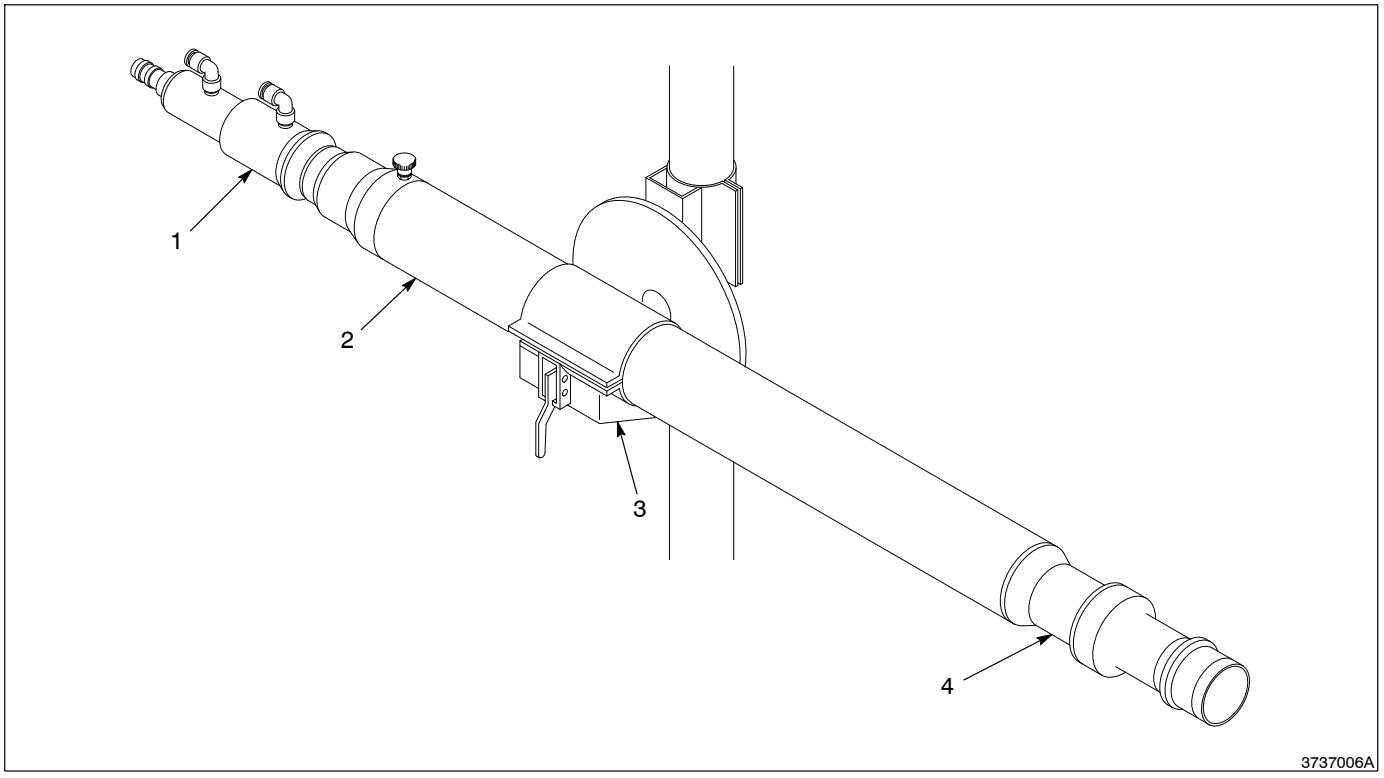

Fig. 3 Spray Gun

Spacer

See Figure 4.

Item	Part	Description	Quantity	Note
1	635 579	Spacer, front, Magnum, complete	1	
2	635 554	• O-ring, EPDM, 50 x 3 mm	2	

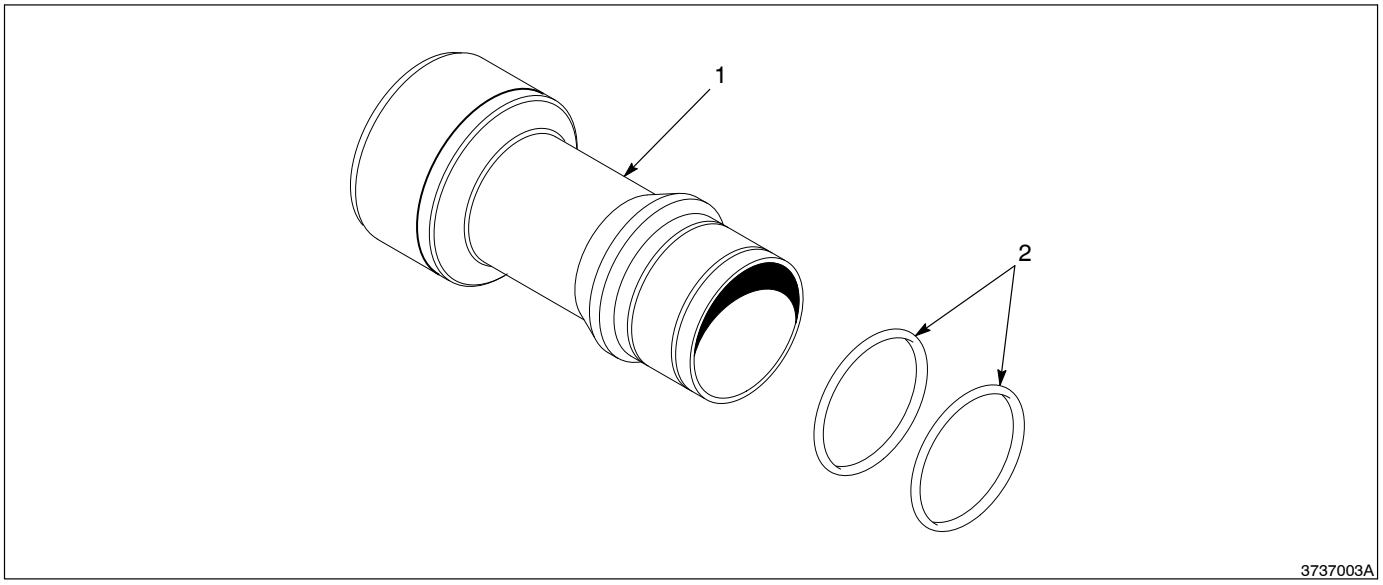

Fig. 4 Spacer

Chargetube

See Figure 5.

Item	Part	Description	Quantity	Note
—	635 580	Chargetube, Magnum	1	
1	635 585	• Distributor, inlet, Magnum	1	
2	630 073	• Knob, chargetube, ground stud	1	
3	630 088	• Stud, ground, with nut	1	
4	635 580	• Chargetube, Magnum	1	
NS	635 581	• Chargetube, Magnum, RBX	1	A
5	635 551	• O-ring, EPDM, 50.52 x 1.78 mm	1	
6	635 556	• Screw, M10 x 25, nylon	1	
7	635 595	• Distributor, outlet, Magnum	1	

NOTE A: Eligible for the Rebuild Exchange Program.
NS: Not Shown

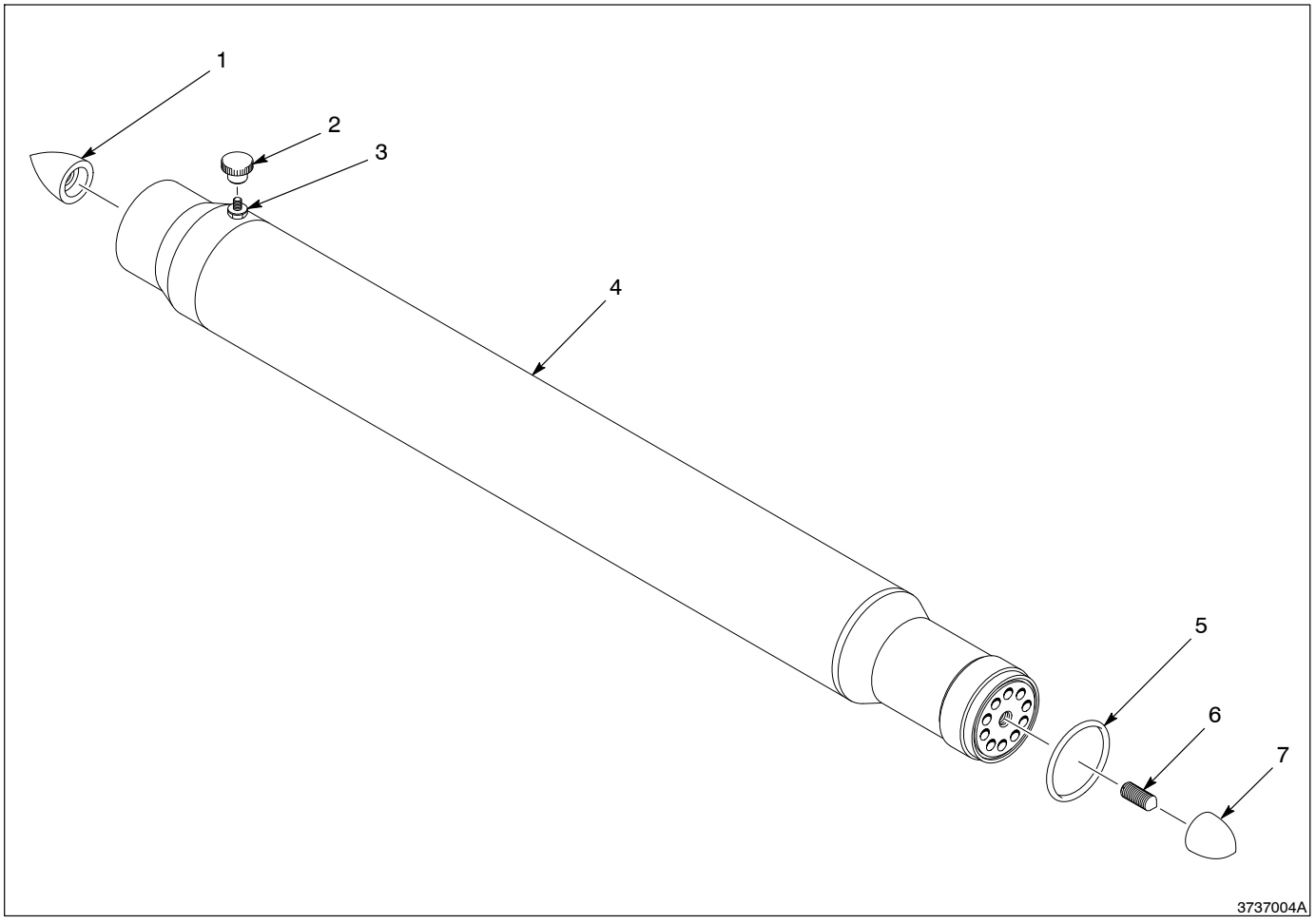

Fig. 5 Chargetube

Diffuser

See Figure 6.

Item	Part	Description	Quantity	Note
—	635 590	Diffuser, complete	1	
1	630 419	• Connector, tube	1	
2	630 409	• Filter, diffuser, Magnum	1	
3	630 033	• Fitting, air, diffuser	2	
4	635 591	• Housing, diffuser, Magnum, inlet	1	
5	630 025	• O-ring, EPDM, 25.12 x 1.78 mm	2	
6	635 593	• Housing, diffuser, Magnum, outlet	1	
7	634 042	• Filter, diffuser, Generation 4	1	
8	635 592	• Connector, diffuser, Magnum	1	
9	635 550	• O-ring, EPDM, 40 x 2 mm	2	

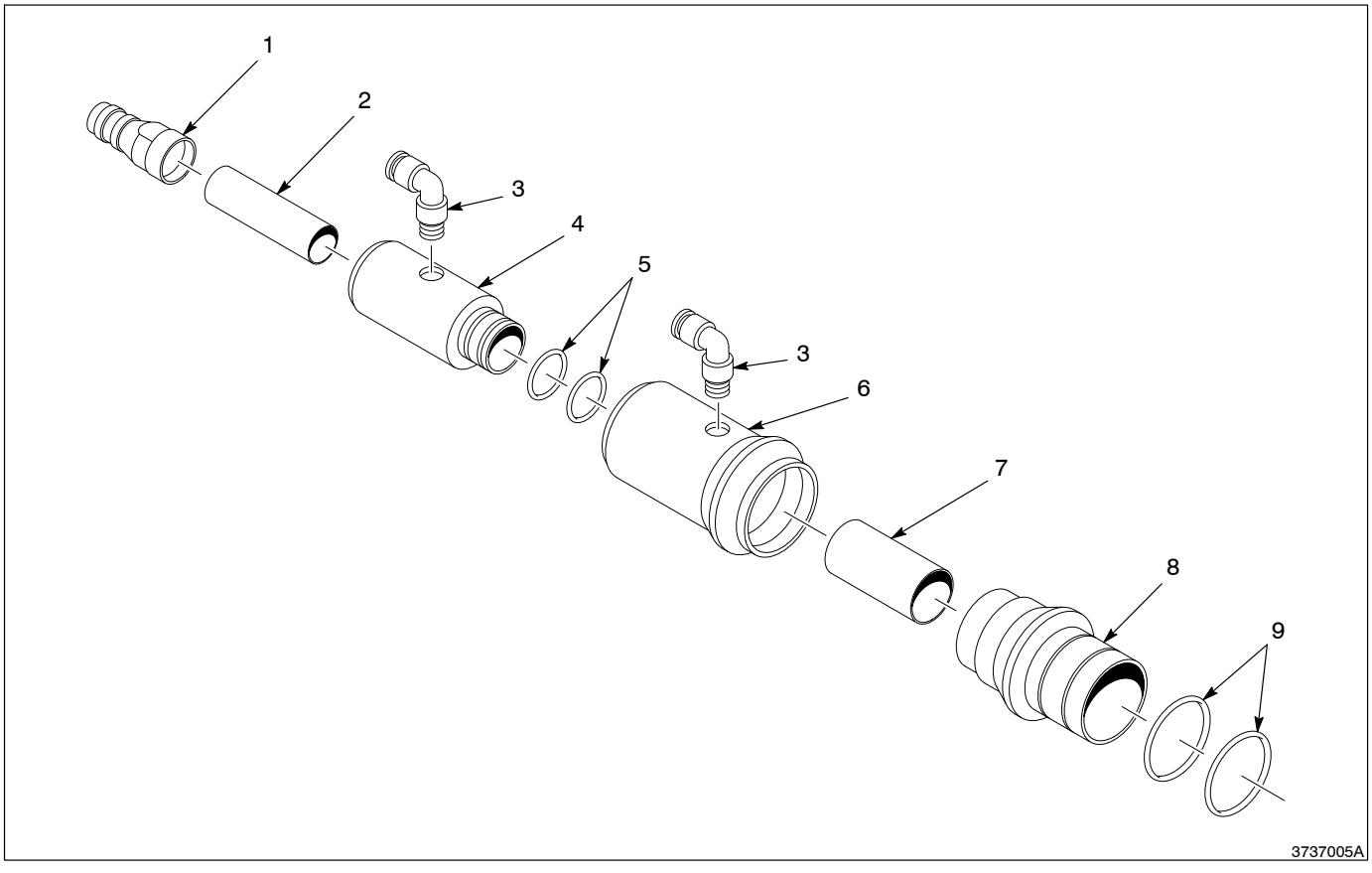

Fig. 6 Diffuser