Pro-Flo® Hi-Flo Dispensing Gun

Part 108 112B

NORDSON CORPORATION • AMHERST, OHIO • USA

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Notice

Trademarks

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Pro-Flo Hi-Flo Dispensing Gun

1. Safety

Introduction

This section contains general safety instructions for using your Nordson equipment. Task- and equipment-specific warnings are included in other sections of this manual where appropriate. Note all warnings and follow all instructions carefully. Failure to do so may result in personal injury, death, or property damage.

To use this equipment safely,

- read and become familiar with the general safety instructions provided in this section of the manual before installing, operating, maintaining, or repairing this equipment.
- read and carefully follow the instructions given throughout this manual for performing specific tasks and working with specific equipment.
- store this manual within easy reach of personnel installing, operating, maintaining, or repairing this equipment.
- follow all applicable safety procedures required by your company, industry standards, and government or other regulatory agencies.
- obtain and read Material Safety Data Sheets (MSDS) for all materials used. Contact your material supplier for this information.

Safety Symbols

Become familiar with the safety symbols presented in this section. These symbols will alert you to safety hazards and conditions that may result in personal injury, death, or property and equipment damage.

WARNING: Failure to observe this warning may result in personal injury, death, or equipment damage.

WARNING: Risk of electrical shock. Failure to observe this warning may result in personal injury, death, or equipment damage.

Safety Symbols *(contd)*

WARNING: Disconnect equipment from line voltage. Failure to observe this warning may result in personal injury, death, or equipment damage.

WARNING: Risk of explosion or fire. Fire, open flames, and smoking prohibited.

WARNING: Wear protective clothing, safety goggles, and approved respiratory protection. Failure to observe may result in serious injury.

WARNING: Hot! Risk of burns. Wear heat-protective clothing, safety goggles with side shields and/or heat-protective gloves depending on the symbol shown.

WARNING: System or material pressurized. Relieve pressure. Failure to observe this warning may result in serious injury or death.

WARNING: Injection hazard. Do not point this device at yourself or other personnel. Failure to observe this warning may result in serious injury or death.

CAUTION: Failure to observe may result in equipment damage.

CAUTION: Hot surface. Failure to observe may result in burns.

Qualified Personnel

"Qualified personnel" is defined here as individuals who thoroughly understand the equipment and its safe operation, maintenance, and repair. Qualified personnel are physically capable of performing the required tasks, familiar with all relevant safety rules and regulations, and have been trained to safely install, operate, maintain, and repair the equipment. It is the responsibility of the company operating the equipment to see that its personnel meet these requirements.

Intended Use

WARNING: Use of this equipment in ways other than described in this manual may result in personal injury, death, or property and equipment damage. Use this equipment only as described in this manual.

Nordson Corporation cannot be responsible for injuries or damages resulting from nonstandard, unintended applications of its equipment. This equipment is designed and intended only for the purpose described in this manual. Uses not described in this manual are considered unintended uses and may result in serious personal injury, death, or property damage. Unintended uses may result from taking the following actions:

- making changes to equipment that have not been recommended or described in this manual or using parts that are not genuine Nordson replacement parts
- failing to make sure that auxiliary equipment complies with approval agency requirements, local codes, and all applicable safety standards
- using materials or auxiliary equipment that are inappropriate or incompatible with your Nordson equipment
- allowing unqualified personnel to perform any task

Installation

Read the installation section of all system component manuals before installing your equipment. A thorough understanding of system components and their requirements will help you to install the system safely and efficiently.

- Allow only qualified personnel to install Nordson and auxiliary equipment.
- Use only approved equipment. Using unapproved equipment in an approved system may void agency approvals.
- Make sure all equipment is rated and approved for the environment in which you are using it.

Installation (contd)

- Follow all instructions for installing components and accessories.
- Install locking, manual shutoff valves in the air supply lines to the system. This allows you to relieve air pressure and lock out the pneumatic system before undertaking maintenance and repairs.
- Ground (and fuse, if necessary) all electrically conductive equipment within 10 feet (3 meters) of the spray area or according to its rated current consumption. (See the ID plate on your equipment.) Ungrounded conductive equipment can store a static charge which could ignite a fire or cause an explosion if a hot spark is discharged.
- Route electrical wiring, cables, hoses, and air supply tubing along a protected path. Make sure they will not be damaged. Do not bend cables or hoses around a radius of less than 6 in. (152 mm).
- Do not use unapproved fluid hoses. Solvents may cause them to deteriorate rapidly and allow flammable liquids or pressurized material to escape.
- Protect components from damage, wear, and harsh environmental conditions.
- Allow ample room for maintenance, material supply container drop-off and loading, panel accessibility, and cover removal.
- Protect equipment with safety devices as specified by applicable safety regulations.

Operation

- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning.

Only qualified personnel, physically capable of operating the equipment and with no impairments to their judgement or reaction times, are permitted to operate this equipment.

Read all component manuals before operating your Nordson equipment. A thorough understanding of components and their operation will help you operate the system safely and efficiently.

- Do not deactivate or bypass automatic safety interlocks, locked-out electrical disconnects, or pneumatic valves.
- Never operate equipment with a known malfunction or leak.
- Do not attempt to operate electrical equipment if standing water is present.

***Operation** (contd)*

- Know where EMERGENCY STOP buttons, safety shutoff components, and fire extinguisher are located. Make sure they work. If a component malfunctions, shut down and lock out the equipment immediately.

- Know the pinch points, temperatures, pressures, and dispense material composition for all equipment that you are working with. Recognize potential hazards associated with these and exercise appropriate caution.

- Use this equipment only in the environments for which it is rated. Do not operate this equipment in humid, flammable, or explosive environments unless it has been rated for safe operation in these environments.

- Before operating, make sure all equipment, objects being sprayed, and fluid containers are connected to a true earth ground.

- Never touch exposed electrical connections or equipment while the power is ON.

- If you notice electrical arcing in a spray area, shut down the system immediately. An arc can cause a fire or explosion.

- Do not operate the equipment at pressures higher than the rated maximum working pressure of any component in the system.

- Keep parts of the body or loose clothing away from moving equipment or parts. Remove jewelry and cover or tie back long hair.

- Shut off moving equipment before taking measurements or inspecting workpieces.

- Wear National Institute of Occupational Safety and Health (NIOSH) approved respirators while operating spray equipment and when performing maintenance and cleaning tasks.

- Wear gloves, eye protection, and protective clothing to protect your skin when operating equipment.

- If your skin has been exposed to dispense materials or solvents wash frequently with soap and water, especially before eating or drinking. Do not use solvents to remove coating materials from your skin.

- Do not use high-pressure compressed air to blow dust or powder off your skin or clothes. High-pressure compressed air can be injected under the skin and cause serious injury or death. Treat all high-pressure fittings and hoses as if they could leak and cause injury.

Operation (contd)

- Never point handguns or applicator nozzles at yourself or other persons.
- Do not smoke in the spray area. A lit cigarette could ignite a fire or cause an explosion.
- Keep paint pumps, pressure pots, and containers of flammable materials far enough away from spray booths to prevent their inclusion in a booth fire.
- Do not use fluids that will corrode the equipment.

Less-obvious Dangers

Operators should also be aware of less-obvious dangers in the workplace that often cannot be completely eliminated:

- exposed surfaces on the equipment which may be hot or have sharp edges and cannot be practically safeguarded
- ungrounded conductive equipment which may continue to store an electrostatic charge after the equipment has been shut off
- vapors and materials which may cause allergic reactions or other health problems
- automatic hydraulic, pneumatic, or mechanical equipment or parts that may move without warning
- unguarded, moving mechanical assemblies

Action in the Event of a System or Component Malfunction

Do not operate a system that contains malfunctioning components. If a component malfunctions, turn the system OFF immediately.

- Disconnect and lock out electrical power. Close and lock out hydraulic and pneumatic shutoff valves and relieve pressures.
- Allow only qualified personnel to make repairs.

Maintenance and Repair

Allow only qualified personnel to perform maintenance, troubleshooting, and repair tasks.

- Always wear appropriate protective clothing and use safety devices when working on this equipment.

Maintenance and Repair *(contd)*

- Follow the recommended maintenance procedures in your equipment manuals.
- Do not service or adjust any equipment unless another person trained in first aid and CPR is present.
- Use only genuine Nordson replacement parts. Using unapproved parts or making unapproved modifications to equipment may void agency approvals and create safety hazards.
- Refer to MSDS before using solvents to clean this equipment. The MSDS will provide use, storage, and disposal information about the solvent. Read this information carefully and follow all instructions.

WARNING: Note the flash point of the cleaning solvent used. Only use controlled methods and equipment, such as temperature-controlled or explosion-protected heaters, to heat cleaning solvent. Observe explosion-prevention regulations and follow applicable safety instructions.

- Never use an open flame to clean the unit or components of the unit.
- Do not store flammable materials in the spray area or room. Keep paint pumps, pressure pots, and containers of flammable materials far enough away from spray booths to prevent their inclusion in a booth fire. If a fire or explosion occurs, flammable materials in the area will increase the chances and the extent of personal injuries and property damage.
- Make sure that the room where you are working is sufficiently ventilated. Avoid breathing vapors over prolonged periods of time.
- Make sure the spray area floor is conductive to ground and that the operator's platform is grounded.
- Connect all disconnected equipment ground cables and wires after servicing the equipment. Ground conductive equipment.
- Disconnect, lock out, and tag electrical power at a disconnect or breaker in the service line ahead of electrical equipment before servicing.

WARNING: Service lines connected to panel disconnect switches may still be energized unless they are disconnected. Make sure the power is off before servicing. Wait five minutes for the capacitors to discharge after shutting off the electrical power.

Maintenance and Repair (contd)

- Do not attempt to service electrical equipment if there is standing water present. Do not service electrical equipment in a high-humidity environment.
- Use tools with insulated handles when working with electrical equipment.
- Relieve air and fluid pressures before servicing equipment. Follow the specific instructions in this manual.
- If you must disassemble a spring-loaded component, carefully preload the spring first if it is possible to do so.

Material and Solvent Precautions

Heated materials may cause severe burns on contact. Remember that some materials, even solid materials, may retain heat for some time. If you are burned by a heated material, immediately cool the affected skin with lots of cool, clean water. Do not try to remove hot, melted material from the skin. Seek immediate medical attention.

WARNING: Hot! Risk of burns. Wear heat-protective clothing, safety goggles with side shields and/or heat-protective gloves.

High-pressure fluids, unless they are safely contained, are extremely hazardous. A jet of high-pressure fluid can act like a knife or needle, penetrate skin and muscle, and inject itself into your body. Injected fluids can cause toxic poisoning.

Do not treat an injection injury as minor. Seek medical care immediately. Inform the medical staff at the hospital that you have an injection injury and identify the fluid that was injected. If possible, give the doctor copies of the MSDS for the injected fluid and for any additives, such as solvents, that are in the injected fluid.

Material and Solvent Precautions *(contd)*

Nordson recommends that you carry a National Safety Equipment Manufacturers Association (NSEMA) wallet card to give to emergency medical staff in the event of an injection injury. These cards are supplied with the equipment. Additional cards are available free from Nordson Corporation.

WARNING: Injection hazard. Do not go near a known leak in a hose or fitting, and stay clear of all dispensing device nozzles or orifices. Do not point a dispensing device at yourself or other personnel. The high-pressure fluid stream can penetrate skin and inject fluid into the body causing serious injury or death.

- Always handle fluid dispensing devices carefully. Do not point the nozzle of a pressurized device at yourself or other personnel.
- Never place hands, fingers, or other parts of your body directly over a nozzle or near a leak in a high-pressure system.
- Never “back-flush” the nozzles. Blocking a nozzle causes the high-pressure fluid to change direction. An injection injury may result.
- Always relieve system pressure before servicing equipment. Trigger all dispensing devices and bleed off system pressure.

See Table 1. Halogenated hydrocarbon solvents can cause an explosion when used with aluminum components in a pressurized fluid pumping system (pumps, heaters, filters, valves, spray guns, and tanks). The explosion could cause serious bodily injury, death, or substantial property damage. No available stabilizers will prevent this violent reaction from happening.

WARNING: Never use halogenated hydrocarbon solvents to clean aluminum parts or to flush any system. Cleaning agents, coatings and paints, or adhesives may contain halogenated hydrocarbon solvents. Obtain and read MSDS for each material and solvent being used.

- Contact your solvent supplier to determine whether your existing materials and solvents contain halogenated hydrocarbons or to obtain a suitable, nonhalogenated hydrocarbon solvent for cleaning and flushing your system.

Material and Solvent Precautions (contd)

- If you must use halogenated hydrocarbon solvents, consult your Nordson representative about compatible Nordson components.

Table 1 Solvents Containing Halogenated Fluids

Chlorinated Solvents	Iodinated Solvents	Brominated Solvents	Fluorocarbon Solvents
Carbon Tetrachloride	Ethyl Iodide	Ethylene Dibromide	Dichlorofluoromethane
Chloroform	Methyl Iodide	Methyl Bromide	Trichlorofluoromethane
Ethylene Dichloride	N-butyl Iodide	Methylene Chlorobromide	Freon
Methylene Chloride	Propyl Iodide		
1-1-1 Trichloroethane			
Monochlorobenzene			
Orthodichlorobenzene			
Perchloroethylene			
Trichloroethylene			

Disposal

Dispose of equipment and materials used in operation and cleaning according to your local regulations.

2. Description

Introduction

The Nordson Pro-Flo system Hi-Flo dispensing guns are typically used in robotic applications for precise, proportional dispensing of heated and ambient-temperature adhesives and sealants. They are designed for bonding and sealing applications using urethane, epoxy, and silicone materials.

Description

See Figure 1.

Hi-Flo dispensing guns are available as extrude (4), co-extrude (13), or heated extrude guns.

The material supply connector of the co-extrude gun (13) is mounted on top, rather than on the side, of the trimset valve. Material travels in a straight path through the gun to provide greater flow for the application of highly viscous material. Heaters can not be attached to co-extrude guns.

Heated extrude guns feature 120 or 240 V heaters, and a resistance temperature detector (RTD) to monitor temperature.

Theory of Operation

The actuator (1) receives the signal from the Pro-Flo controller and controls air flow from the air inlet to raise or lower the piston (10). When a signal is received to dispense material, air is directed under the piston, pushing it upward and lifting the valve stem (7) from the seat (6). Material enters the trimset valve through the material inlet (3) or (12) and is dispensed through the outlet. When signaled to stop dispensing, air is directed on top of the piston, forcing it downward and closing the valve stem in the seat.

The Pro-Flo controller monitors robot speed and material pressure to control the flow of material from the gun.

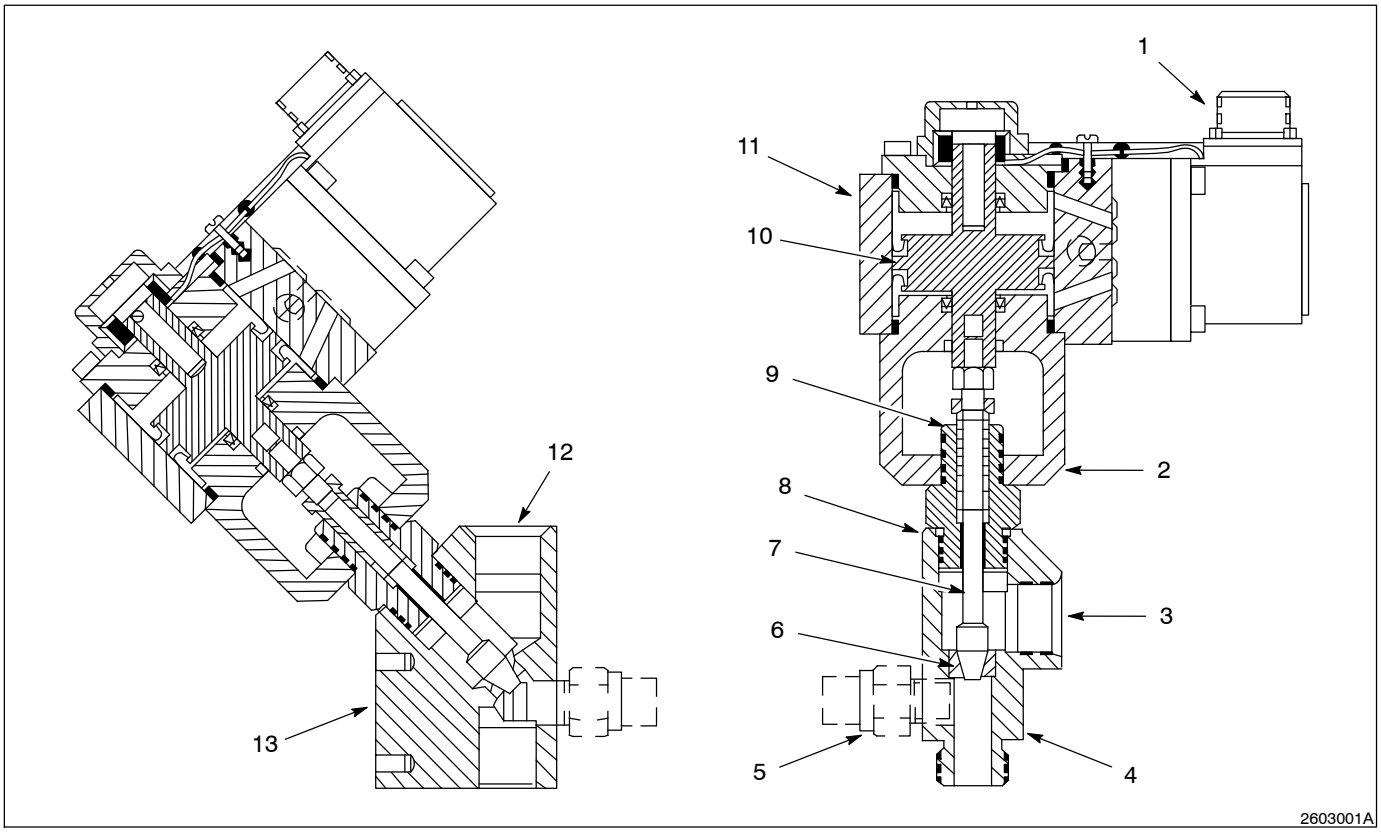


Fig. 1 Extrude and co-extrude Hi-Flo dispensing guns

1. *Actuator*
2. *Yoke*
3. *Material inlet fitting*
4. *Extrude gun*
5. *Pressure transducer*
6. *Seat*
7. *Valve stem*
8. *Trimset valve*
9. *Packing gland*
10. *Piston*
11. *Cylinder body*
12. *Material inlet fitting*
13. *Co-extrude gun*

3. Installation

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

Inspection

Inspect the gun for dents, scratches, corrosion, and other physical damage. If any damage is visible, contact a Nordson representative immediately.

Installation

WARNING: Disconnect the robot controller from line voltage. Failure to observe this warning may result in personal injury, death, or equipment damage.

WARNING: System or material pressurized. Relieve pressure. Failure to observe this warning may result in serious injury or death.

Gun Mounting

See Figure 2.

Mount the gun to a robot arm by using a customer-supplied adapter specifically designed for the application. The adapter must accept two $^1/_4$-in. (M6) threaded bolts and two $^1/_4$-in. dowel pins spaced in a square pattern, 1.250 in. (31.75 mm) apart (center-to-center). The adaptor template is shown in Figure 2.

Most applications require precise mounting of the gun on the robot. See Figure 2 for clearance and mounting dimensions of the gun. Consider the clearances necessary for cables, air lines, and material supply hoses and their fittings when calculating the robot and gun path.

NOTE: Route cables, air lines, and the material supply hose to avoid contact with workpieces and damage from robot movement.

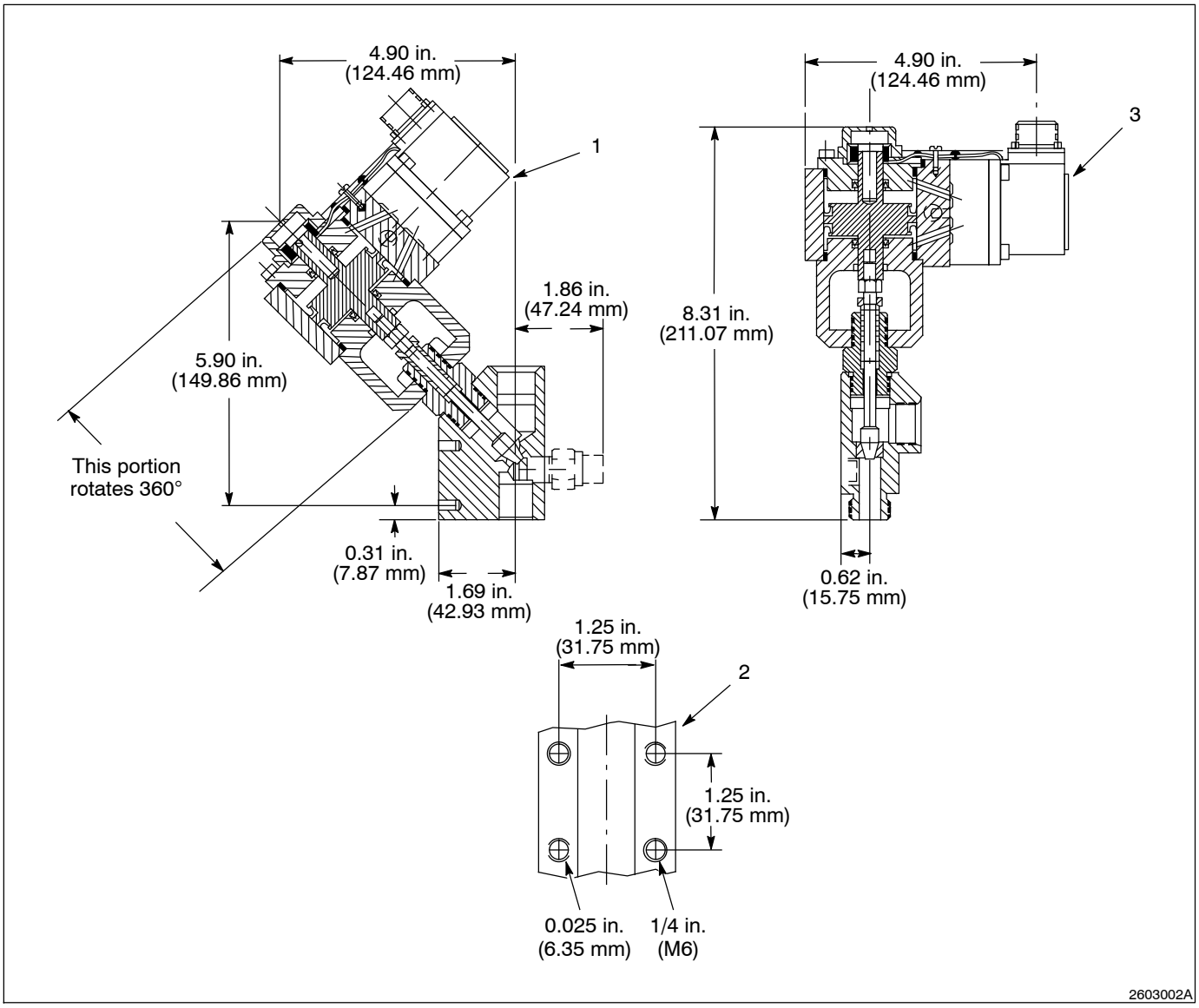


Fig. 2 Extrude and co-extrude Hi-Flo gun dimensions

1. *Co-extrude gun*
2. *Adaptor template*
3. *Extrude gun*

Cable Connections

The type of cables used to hook the gun to the controller vary slightly, depending on the controller being used and the optional equipment supplied with the gun.

See Figure 3.

1. Connect the gun control cable to the pneumatic actuator, (1) or (7).

2. Connect the pressure transducer cable to the pressure transducer, (3) or (10).

3. Route the cables through the carrier on the robot and connect them to the controller. Use a gun control extension cable, if needed to allow free robot movement.

4. If your gun is heated, connect the heater cordset to the heated hose connector.

Make sure the cables will not bind as the robot moves.

NOTE: Cables may be purchased in different lengths. Contact your Nordson representative for more information.

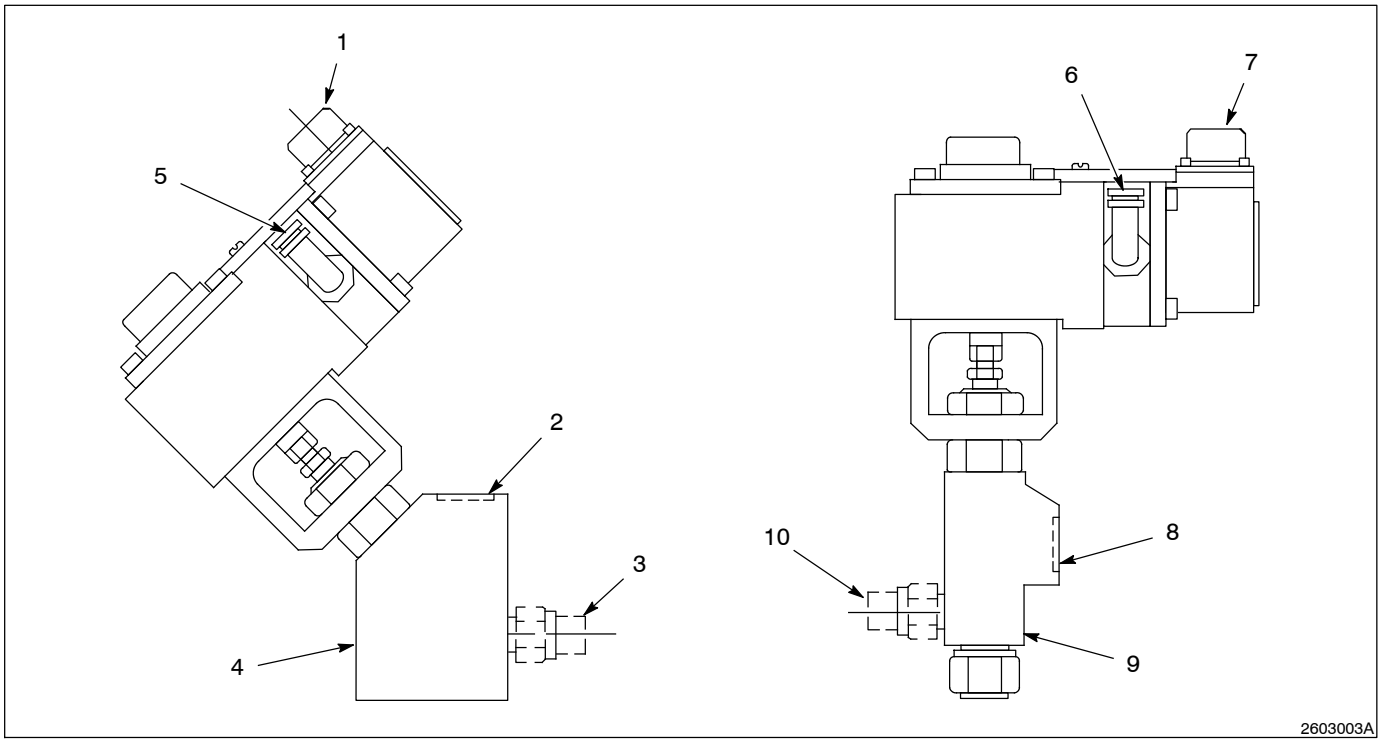


Fig. 3 Connections and fittings

1. Actuator
2. Material inlet fitting
3. Pressure transducer
4. Co-extrude gun
5. Actuator air fitting
6. Actuator air fitting
7. Actuator
8. Material inlet fitting
9. Extrude gun
10. Pressure transducer

Supply Air Connection

Supply air must be taken from an oil-free shop air outlet that will maintain a pressure of at least 70 psi (4.83 bar). The gun will not operate properly without the required amount of air pressure (70 to 120 psi (4.83 to 8.28 bar)). Gun performance will increase at higher pneumatic pressures.

1. Install a filter and a regulator in a convenient location near the robot.

2. Connect tubing from a shop air supply to the input of the filter.

3. Connect $^1/_4$-in. tubing from the regulator output to the actuator air fitting, (5) or (6).

Material Supply Line

Connect a Nordson swivel (purchased separately) to the material inlet (2, 8) on the trimset valve. Refer to the manual, *Nordson High Pressure Fluid Swivel Connections* for appropriate part numbers, connector sizes, and possible configurations. If additional assistance is needed, contact your Nordson representative.

If a standard material inlet fitting is required, a 90° elbow can be used. This fitting features a JIC-6 hose connection ($^9/_{16}$-18 thread).

Nozzles

Your Nordson representative can help select the correct nozzles for your applications. Nozzle selection depends on the type of material to be dispensed, the desired bead size, and your production rate requirements.

To install an extrude nozzle, place the nozzle nut over the nozzle and tighten securely to the trimset valve.

Purging

Purge the gun before operating to avoid trapping air in the valve. Trapped air may create erroneous transducer readings and irregular bursts of material and air from the nozzle. Purging procedures are given in *Operation* of this document and in your *Pro-Flo Controller* manual.

4. Operation

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

Introduction

The Pro-Flo system Hi-Flo dispensing guns have no operating controls of their own. Gun operation is controlled by a Pro-Flo system controller and the robot controller.

Before operating a Pro-Flo system, read all related component manuals and be familiar with the operating characteristics of each component in the system. A thorough understanding of system operation will help you adjust the proper system settings to obtain desired results.

Gun Purging

After the gun has been installed, purge the gun to remove air from the material hose, trimset valve, and nozzle. Place a material waste container under the gun.

Purging may be initiated from either the robot controller or the Nordson controller. Purge the gun until material flows freely from the nozzle. Refer to your Pro-Flo controller manual for purging procedures.

Pressure Transducer Calibration

NOTE: If your system is equipped with a Nordson digital controller, do not calibrate the pressure transducer. It is automatically calibrated by the digital controller.

If your system is equipped with an analog controller, the pressure transducer must be calibrated after any of the following procedures:

- a new gun is installed
- the transducer is replaced
- the pressure transducer cable is replaced by a longer or shorter one

Refer to the *Pro-Flo Analog Controller* manual for pressure transducer calibration procedures.

5. Maintenance

General

Follow a preventive maintenance schedule to keep your Pro-Flo system compact guns operating efficiently.

WARNING: System or material pressurized. Relieve pressure. Failure to observe this warning may result in serious injury or death.

WARNING: Wear protective clothing, safety goggles, and approved respiratory protection. Failure to observe may result in serious injury.

Daily

- Check the nozzle for wear. Replace it when necessary.
- Make sure the cable connections are tight.

Weekly

- Check the gun for leaks at the packing gland. Tighten the packing gland screw if necessary.
- Calibrate the pressure transducer (analog controller only).

Periodically

- Make sure the gun is mounted securely.
- Clean the filter in the air supply line.
- Remove and clean the pressure transducer.

6. Troubleshooting

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

Introduction

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.

Troubleshooting Charts

NOTE: Some problems presented in this section may originate with the Pro-Flo analog or digital controller, the robot controller, or the drum unloader. If the problem cannot be corrected at the gun, see the appropriate manuals for corrective actions.

Problem	Possible Cause	Corrective Action	Refer to
1. Gun does not dispense material.	Nozzle blocked.	Remove and clean the nozzle.	Repair section
2. Gun does not dispense material, and does not open.	Stem binding in packing gland	Remove the trimset valve and loosen the packing gland screw. If binding is not relieved, check and replace yoke if it is bent. Otherwise replace the trimset valve.	Repair section
	Actuator malfunctioning	Replace the actuator.	Repair section

Troubleshooting Charts *(contd)*

Problem	Possible Cause	Corrective Action	Refer to
3. Gun does not dispense material, but opens fully.	Trimset valve blocked	Remove and clean the trimset valve.	Repair section
4. Gun does not change dispensing rate to control bead size.	Pressure transducer cordset damaged	Check the continuity of cordset. Replace cordset if necessary.	Repair section
5. Gun continues to dispense after cycle. Controller indicates that gun is closed.	Needle is not seating.	Purge the gun.	Repair section
	Stem and trimset valve seat worn.	Replace trimset valve.	Repair section
6. Dispensing starts late.	Stem binding	Loosen packing gland screw.	Repair section
7. Bead deposition "wiggles".	Material velocity through nozzle too high	Install larger nozzle.	Contact Nordson for part numbers
8. Bead size changes unexpectedly.	Nozzle partially blocked	Clean nozzle.	Repair section
	Material temperature fluctuating	Replace heater.	Repair section
	Material has exceeded shelf life.	Use new material.	—
9. Material leaks from packing around stem.	Packing gland screw loose	Tighten packing gland screw	Repair section
	Packings worn	Replace trimset valve	Repair section

7. Repair

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

7. Repair (contd.)

WARNING: Disconnect equipment from line voltage. Failure to observe this warning may result in personal injury, death, or equipment damage.

Disconnect, lock out, and tag electrical power at a disconnect or breaker in the service line ahead of electrical equipment before servicing.

WARNING: System or material pressurized. Relieve pressure. Failure to observe this warning may result in serious injury or death.

Tools and Supplies Required

The following supplies are recommended for use during repair procedures:

- PTFE grease
- threadlock adhesive

Clearing a Blocked Nozzle

1. Shut off air pressure to the drum unloader.
2. Bleed off residual pressure through the in-line pressure relief valve in the material supply line. This valve should be located near the drum unloader.
3. Shut off and lock out all power to the system.
4. Remove the nozzle nut and nozzle. Clean the nozzle thoroughly with an appropriate solvent.
5. Reinstall the nozzle.

NOTE: Follow procedures given in your *Pro-Flo Controller* manual for clearing a blocked material supply hose.

Removing the Gun from the Robot

1. Shut off the drum unloader.
2. Purge the gun to relieve the pressure in the hose and gun.
3. Shut off and lock out all power to the system.
4. Disconnect the material supply hose from the material inlet fitting on the trimset valve.

Removing the Gun from the Robot (contd)

5. Disconnect the air line from the actuator fitting.
6. Disconnect the gun control and pressure transducer cables from the gun.
7. If your gun is equipped with a heater, disconnect the heater cable from the connector on the heated hose.
8. Remove the two bolts securing the gun to the robot arm adapter.

Removing the Actuator

See Figure 4.

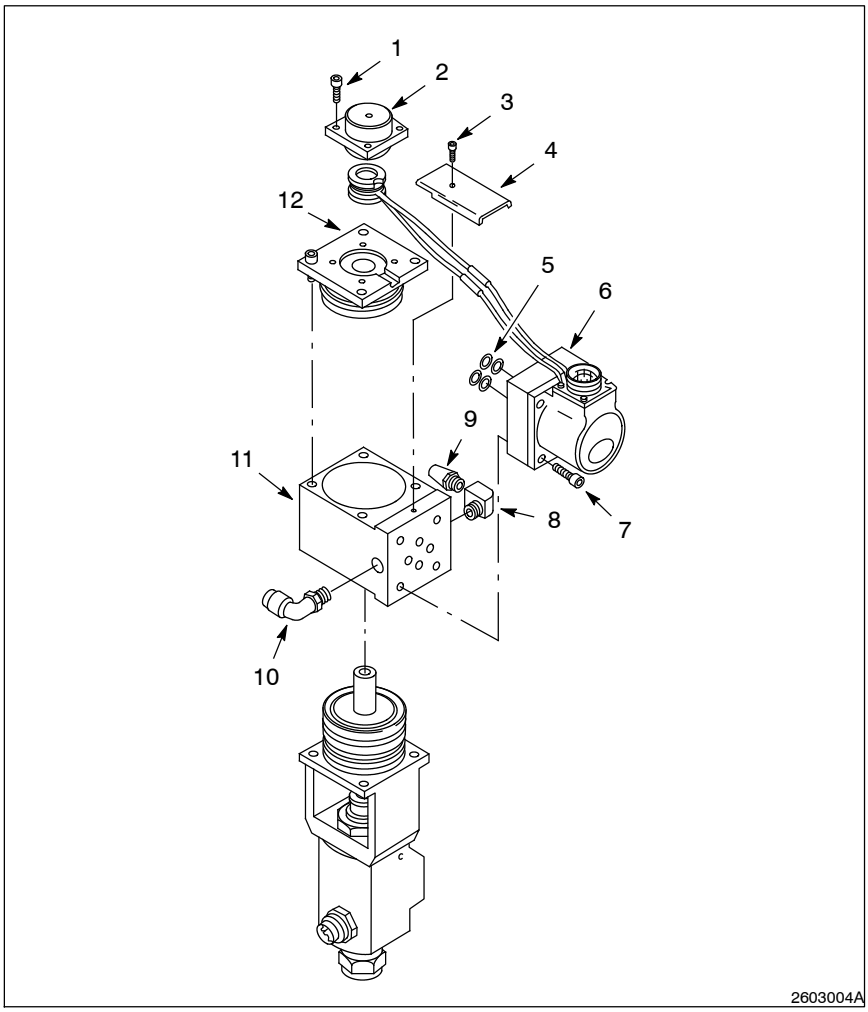


Fig. 4 Replacing the actuator

1. *Screw*
2. *Bobbin cover*
3. *Pan head screw*
4. *Actuator leads cover*
5. *O-rings*
6. *Actuator*
7. *Socket head screw*
8. *Elbow*
9. *Muffler*
10. *Air inlet fitting*
11. *Cylinder body*
12. *Cylinder head*

1. Remove the pan head screw (3) and the actuator leads cover (4) from the top of the gun.
2. Remove the four screws (1) and the bobbin cover (2) from the cylinder head (12).
3. Lift the cylinder body (11) from the shaft of the piston.
4. Remove four socket head screws (7), the actuator (6), and the four O-rings (5) from the cylinder body.
5. If necessary, remove and replace the elbow (8), muffler (9), and air inlet fitting (10). Place threadlock adhesive on the threads of each component before installing.

Removing the Air Cylinder

See Figure 5.

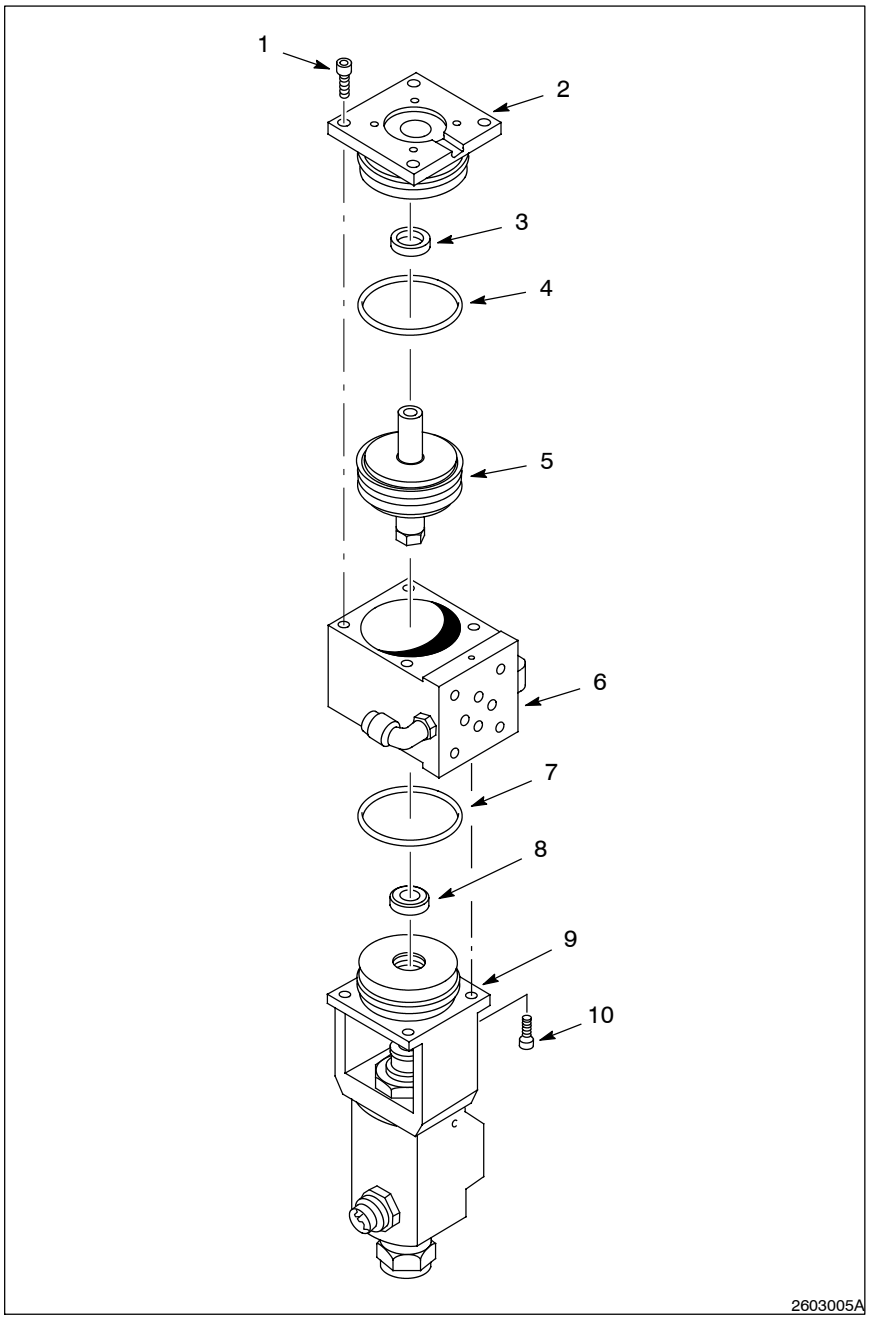


Fig. 5 Replacing the air cylinder

1. *Cylinder head screws*
2. *Cylinder head*
3. *U-cup seal*
4. *O-ring*
5. *Piston and rod assembly*
6. *Cylinder body*
7. *O-ring*
8. *U-cup seal*
9. *Yoke*
10. *Yoke screws*

1. Remove the four screws (1) that secure the cylinder head (2) to the cylinder body (6).

2. Replace the cylinder head U-cup seal (3) and O-ring (4) with new ones. Lubricate each with PTFE grease before installing.

3. Remove the four screws (10) that secure the yoke (9) to the cylinder body (6).

4. Grasp the cylinder body (6), and carefully pull it straight away from the yoke (9). The piston and rod assembly (5) will stay with the yoke.

   See Figure 6.

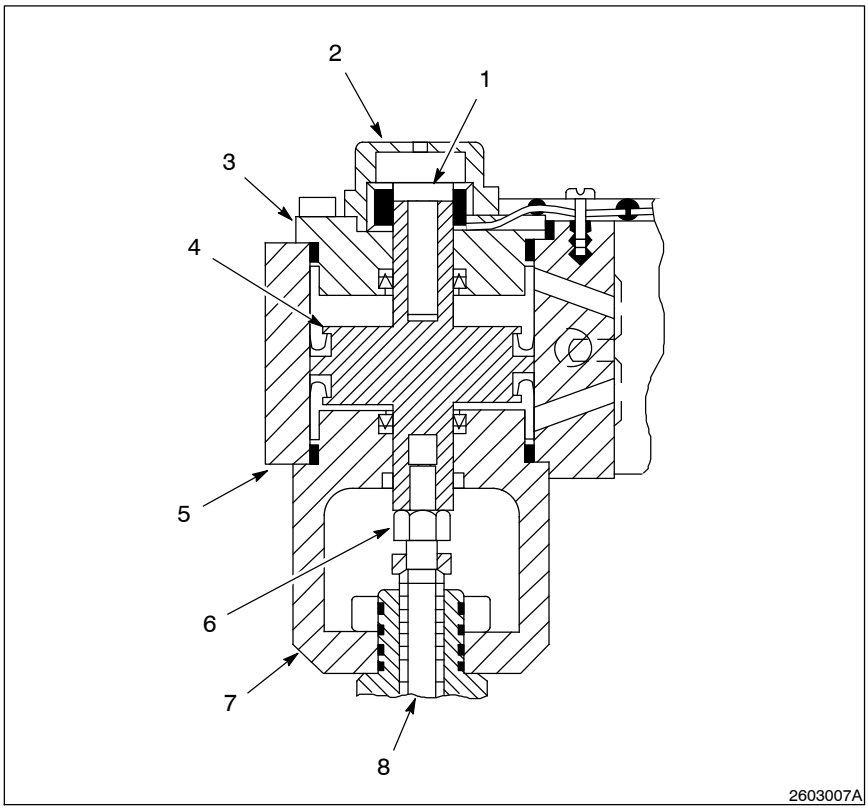
5. Remove the piston and rod assembly (4) from the valve stem (8). Place a wrench on the flats on the bottom of the piston rod and use another wrench to hold the flat of the valve stem and unscrew piston and rod assembly (4) from the valve stem. Remove the yoke (7).

   See Figure 5.

6. Remove the U-cup seal (8) and O-ring (7) from the yoke (9). Replace them with new ones, lubricating with PTFE grease before installing.

Removing the Air Cylinder

(contd)



1. Bobbin
2. Bobbin cover
3. Cylinder head
4. Piston and rod assembly
5. Cylinder body
6. Jam nut
7. Yoke
8. Valve stem

Fig. 6 Cutaway view of the air cylinder

Removing the Trimset Valve

See Figure 7.

1. Loosen and remove the retaining nut (1) from the packing gland assembly (5).

2. If the packing gland (5) is being replaced, unscrew the entire assembly from the trimset valve, (7) or (8). Remove the valve stem (6) from the packing gland.

   NOTE: If either the valve stem or seat is worn, replace the entire trimset valve.

3. If the trimset valve is being replaced, remove the pressure transducer (10) and nozzle nut (9)

Replacing the Trimset Valve

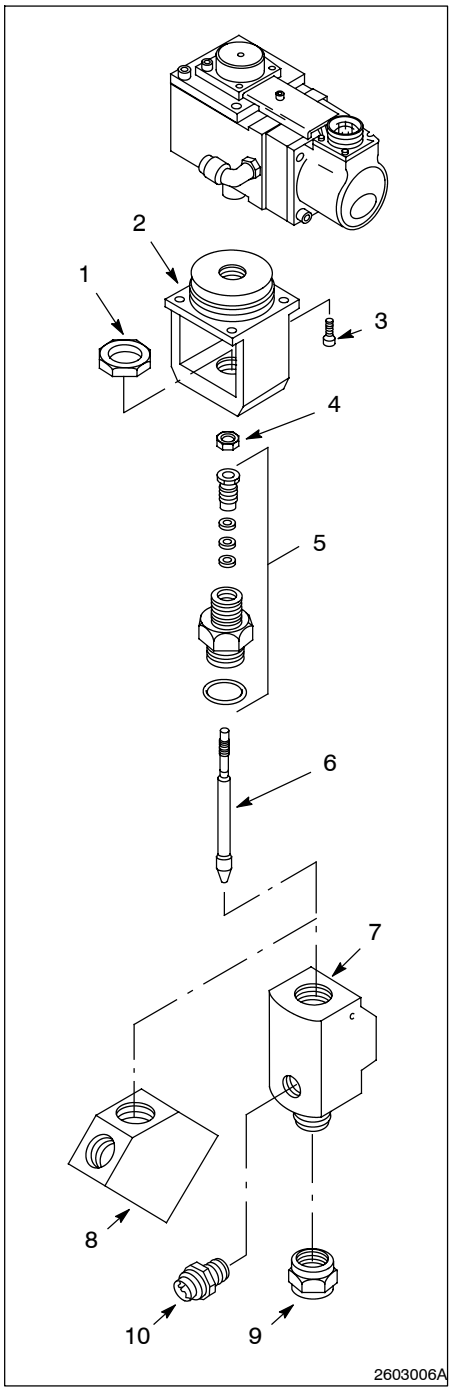


Fig. 7 Replacing the trimset valve

1. *Retaining nut*
2. *Yoke*
3. *Yoke screw*
4. *Jam nut*
5. *Packing gland assembly*
6. *Valve stem*
7. *Trimset valve, extrude gun*
8. *Trimset valve, co-extrude gun*
9. *Nozzle nut*
10. *Pressure transducer*

See Figure 7.

1. Apply threadlock adhesive to the threads of the pressure transducer (10) and nozzle nut (9). Install them into the new trimset valve.

2. Lubricate the packing gland O-ring with PTFE grease and install it on the packing gland.

3. Loosen the gland screw and carefully insert the valve stem (6) into the packings from the O-ring end of the gland, approximately halfway. Tighten the gland screw $^1/_8$-turn past finger tight.

4. Install the packing gland (5) in the top of the trimset valve without touching the sides with the valve stem (6). Tighten the gland with a torque wrench to 100 lb-ft (136 N•m). Slowly push the stem down until light contact is made with the seat.

5. Thread the jam nut (4) onto the stem, so there are only a few threads left to go before the stem is fully seated.

6. Orient and install the trimset valve assembly (7) on the yoke (2) and tighten the retaining nut (1).

Replacing the Air Cylinder

See Figure 6.

1. Lubricate the piston seal and place the piston in the seal tool so the seals are not folded and are near the ramped end of the tool.

2. Hold the ramped end of the tool against the bore on top of the cylinder body. Push the piston assembly until it leaves the tool and enters the bore. If the seals pinch during this step, add more PTFE grease and insert again. Save the tool for future use.

3. Lubricate the lower portion of the piston rod and slide it into the top of the yoke. Thread the piston and rod assembly (4) onto the top of the valve stem (8). Hold the valve stem from turning with a wrench on the stem flats. Be careful not to press or jam the valve stem against the seat.

4. Thread the valve stem in or out of the piston rod until the valve stem is lightly seated against the yoke (7). Tighten the jam nut (6) against the piston and rod assembly (4).

See Figure 5.

5. Attach the yoke (9) to the body (6) with four screws (10).

6. Lubricate the inside of the cylinder head (2), the O-ring (4), and the U-cup seal (3) with PTFE grease. Orient the cylinder head as shown in Figure 5 and carefully slide it over the upper piston rod.

7. Attach the cylinder head to the cylinder body with four screws (1).

Replacing the Actuator

See Figure 4.

1. Replace the four O-rings (5). Lubricate new O-rings with PTFE grease and install them in the actuator (6).

2. Attach the actuator (6) to the cylinder body (11) with four socket head screws (7).

3. Replace the cylinder body (11) on the shaft of the piston.

4. Replace the actuator leads and the bobbin cover (2). Attach the bobbin cover with four screws (1).

5. Replace the actuator leads cover (4) and secure with a pan head screw (3).

Replacing the Heater Module

See Figure 8.

1. Remove a screw (4) from each side of the heater cover (10). Remove the screw (5) and lock washer (6) from the grounding lug. Carefully remove the cable cordset (1), with the heater (8) and RTD (7), from the trimset valve.

2. See Figure 9. Note the proper cable connections. Mark the leads of the RTD (2) and heater (1), and remove the wire nuts. Remove the heater and RTD from the cordset cable.

   NOTE: If replacing the heater cable cordset, perform steps 3, 4, and 5, otherwise, go to step 6.

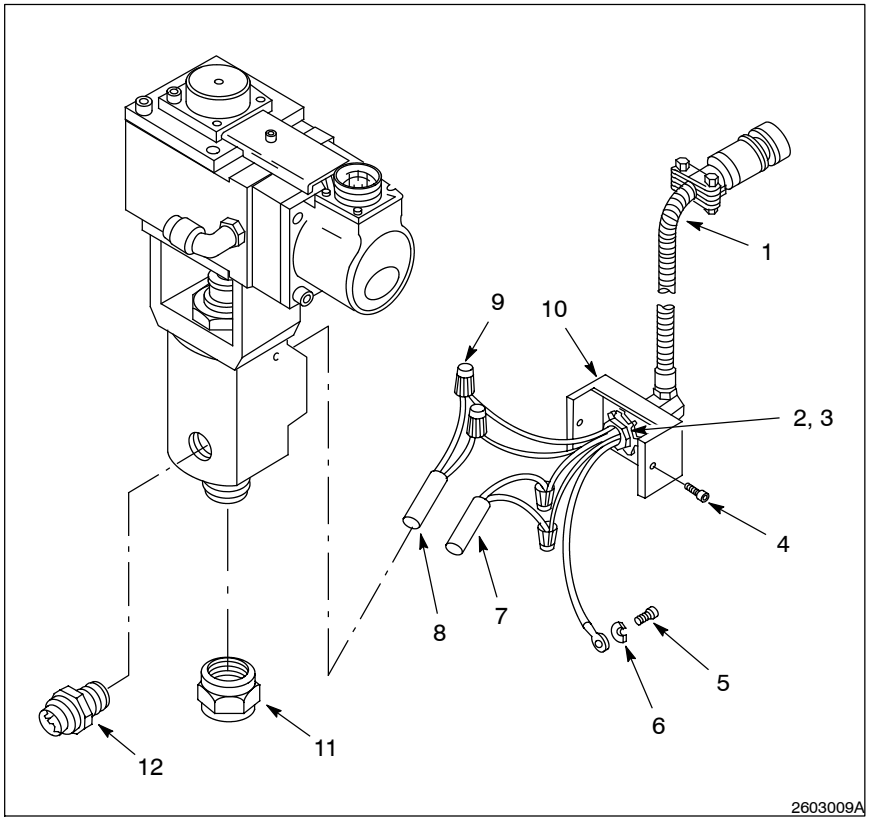


Fig. 8 Replacing the heater module

1. Heater cordset cable
2. Lock washer
3. Nut
4. Screw
5. Screw
6. Lock washer
7. RTD
8. Heater
9. Wire nut
10. Heater cover
11. Nozzle nut
12. Pressure transducer

3. See Figure 8. Loosen the cordset nut (3) and lock washer (2) from the heater cover (10) and slide both from the cable leads. Remove the heater cover from cordset cable.

4. Feed the new cable leads for the RTD, heater, and ground through the hole in the heater cover (10).

5. Thread the lock washer (2), and nut (3) over the cable leads onto the cable. Tighten the nut to secure the cordset cable on the heater cover.

Replacing the Heater Module
(contd)

6. See Figure 9. Install the heater (1) and RTD (2) on the proper leads of the cable. Polarity is not important for either the RTD or heater, but do not confuse the heater and RTD connections. Secure each connection with a wire nut.

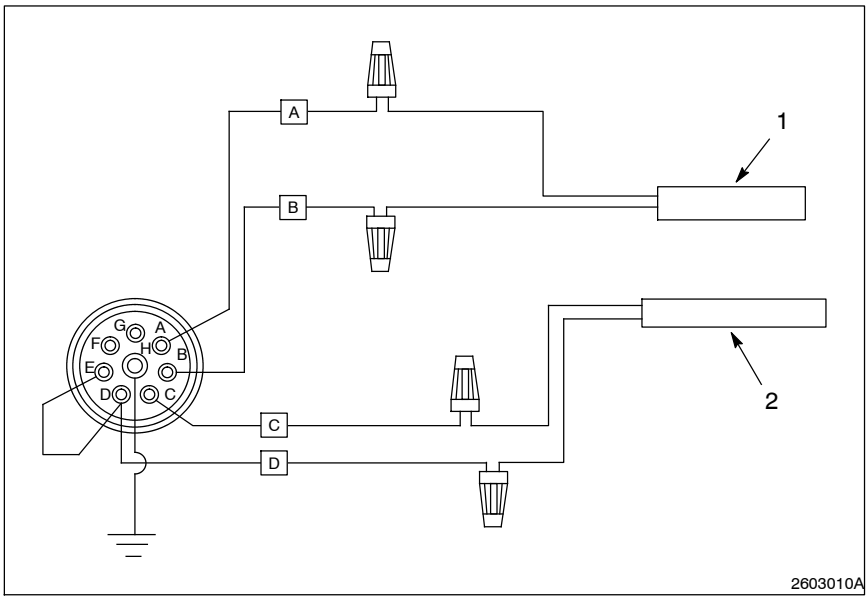


Fig. 9 RTD and heater connections

1. Heater
2. RTD

7. See Figure 8. Install the cable ground lug on the trimset valve with the screw (5) and lock washer (6).

8. Coat the heater and RTD with heat conductive paste and install them in their respective cavities in the trimset valve.

9. Replace the cable if it is defective.

10. Tuck the wire nuts and their leads under the cover.

11. Attach the cover to the trimset valve with two screws (4).

Checking the Continuity of the Pressure Transducer Cable

1. Remove the pressure transducer cable from the pressure transducer and controller.

2. Check the continuity of each wire with an ohmmeter. The wires are connected as shown in Table 2.

Table 2 Wire Connections on Cordset

Controller end pin	Transducer end pin	Wire color
A	A	Red
B	E	Green
C	F	White
D	D	Black

Installing Gun on Robot

1. Install the gun on the robot arm adapter. Secure with two $^1/_4$-in. (M6) bolts.

See Figure 3.

2. Connect the material supply hose to the material inlet fitting, (2) or (8). If you are using high pressure fluid swivels, remove the swivel lock, tighten the fluid swivel, and tighten the swivel lock.

3. Connect the gun control cable to the gun actuator, (1) or (7).

4. Connect the pressure transducer cable to the pressure transducer, (3) or (10).

5. Connect the air supply line to the actuator fitting (1).

6. Turn on the drum unloader and check for leaks in the hose and fittings.

7. Purge the gun to remove trapped air from the hoses and gun. Refer to your controller manual for purging procedures.

8. Parts

Introduction

To order parts, call your distributor or local Nordson representative. Use this five-column parts list, and the accompanying illustration, to describe and locate parts.

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 six-digit 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.

Using the Illustrated Parts List *(contd.)*

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
—	000 000	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.

Hi-Flo Dispensing Gun Parts List

See Figure 10. The following service parts are available for the repair of the Hi-Flo dispensing gun:

Item	Part	Description	Quantity	Note
—	131 717	Gun, co-extrude, 20 VOhms	AR	
—	131 718	Gun, co-extrude, 63 VOhms	AR	
—	133 223	Gun, 20 VOhms, 120 VAC	AR	
—	133 224	Gun, 63 VOhms, 120 VAC	AR	
—	133 225	Gun, 20 VOhms, 230 VAC	AR	
—	133 226	Gun, 63 VOhms, 230 VAC	AR	
—	133 221	Gun, cold, 20 VOhms	AR	
—	133 222	Gun, cold, 63 VOhms	1	
1	117 287	• Locknut, bulkhead, $^3/_4$-16	1	
2	132 987	• Cylinder, with servo, Hi-Flo	1	
3	- - - - - -	• • Piston and rod assembly	1	
4	- - - - - -	• • Yoke, Hi-Flo	1	
NS	132 990	• • Seals service kit	1	

NS: Not Shown

AR: As Required

Continued on next page

Hi-Flo Dispensing Gun
Parts List (contd)

Item	Part	Description	Quantity	Note
5	- - - - - -	• • • Packing, U-cup, $^1/_2$-in. ID	2	
6	- - - - - -	• • • O-ring, Viton, 1.812 x 2.00	2	
7	- - - - - -	• • • O-ring, Viton, 0.375 x 0.500	4	
8	- - - - - -	• • Body, actuator	1	
9	- - - - - -	• • Head, cylinder	1	
10	- - - - - -	• • Coil and pneumatic actuator assembly	1	
11	- - - - - -	• • Cover, actuator leads	1	
12	981 837	• • Screw, pan hd., #6-32 x $^3/_8$ in.	1	
13	- - - - - -	• • Cover, bobbin	1	
14	981 171	• • Screw, skt. hd, #10-32 x 1-$^1/_4$ in.	4	
15	981 132	• • Screw, #10-32 x $^5/_8$ in.	8	
16	981 505	• • Screw, #6-32 x $^3/_8$ in.	4	
17	241 040	• • Muffler	1	
18	973 125	• • Elbow, pipe, $^1/_8$P x $^1/_8$P	1	
19	972 119	• • Elbow, air, $^1/_4$T x $^1/_8$P	1	
20	132 791	• Valve assembly, trimset	AR	A
21	- - - - - -	• • Packing gland assembly	1	
22	- - - - - -	• • Stem, valve	1	
23	- - - - - -	• • Nut, hex, M6	1	
24	- - - - - -	• • Body, trimset valve, co-extrude	1	
NS	132 815	• Valve assembly, trimset	AR	B
NS	- - - - - -	• • Packing gland assembly	1	
NS	- - - - - -	• • Stem, valve	1	
NS	- - - - - -	• • Nut, hex, M6	1	
NS	- - - - - -	• • Body, trimset valve, co-extrude	1	
NS	133 227	• Valve assembly, trimset	AR	C
NS	- - - - - -	• • Packing gland assembly	1	
NS	- - - - - -	• • Stem, valve	1	
NS	- - - - - -	• • Nut, hex, M6	1	
25	- - - - - -	• • Body, trimset valve	1	

NOTE A: For use with 20 VOhm co-extrude gun, part 131 717, only
B: For use with 63 VOhm co-extrude gun, part 131 718, only
C: For use with 20 VOhm dispense guns, parts 133 223, 133 225, 133 221

AR: As Required

NS: Not Shown

Continued on next page

Hi-Flo Dispensing Gun
Parts List (contd)

Item	Part	Description	Quantity	Note
NS	133 228	• Valve assembly, trimset	AR	D
NS	- - - - - -	• • Packing gland assembly	1	
NS	- - - - - -	• • Stem, valve	1	
NS	- - - - - -	• • Nut, hex, M6	1	
NS	- - - - - -	• • Body, trimset valve	1	
26	133 229	• Module, 120 VAC, heated gun	AR	E
27	938 161	• • Heater, 120 VAC, 150 W	1	
28	939 523	• • Sensor, temperature, gun (RTD)	1	
29	933 056	• • Connector, wire nut	4	
30	130 784	• • Cover, heater connection	1	
31	983 161	• • Washer, lock, ext., 0.375 in.	1	
32	984 155	• • Nut, panel mating	1	
33	133 231	• • Cable, cordset, 120 V	1	
34	981 024	• • Screw, #6-32 x $^3/_{16}$ in.	3	
35	983 100	• • Washer, lock, int., #6	1	
NS	133 230	• Module, 230 VAC, heated gun	AR	F
NS	938 123	• • Heater, 230 VAC, 150 W	1	
NS	939 523	• • Sensor, temperature, gun (RTD)	1	
NS	933 056	• • Connector, wire nut	4	
NS	130 784	• • Cover, heater connection	1	
NS	983 161	• • Washer, lock, ext., 0.375 in.	1	
NS	984 155	• • Nut, panel mating	1	
36	133 232	• • Cable, cordset, 230 V	1	
NS	981 024	• • Screw, #6-32 x $^3/_{16}$ in.	3	
NS	983 100	• • Washer, lock, int., #6	1	
37	325 104	• Nut, nozzle, $^1/_2$ NPSM	1	
38	- - - - - -	Transducer, pressure	1	G

D: For use with 63 VOhm dispense guns, parts 133 224, 133 226, 133 222

E: For use with 120 VAC dispense guns, part 133 223, 133 224

F: For use with 230 VAC dispense guns, part 133 225, 133 226

G: Pressure transducer part numbers are given in the Pressure Transducer Parts List.

AR: As Required

NS: Not Shown

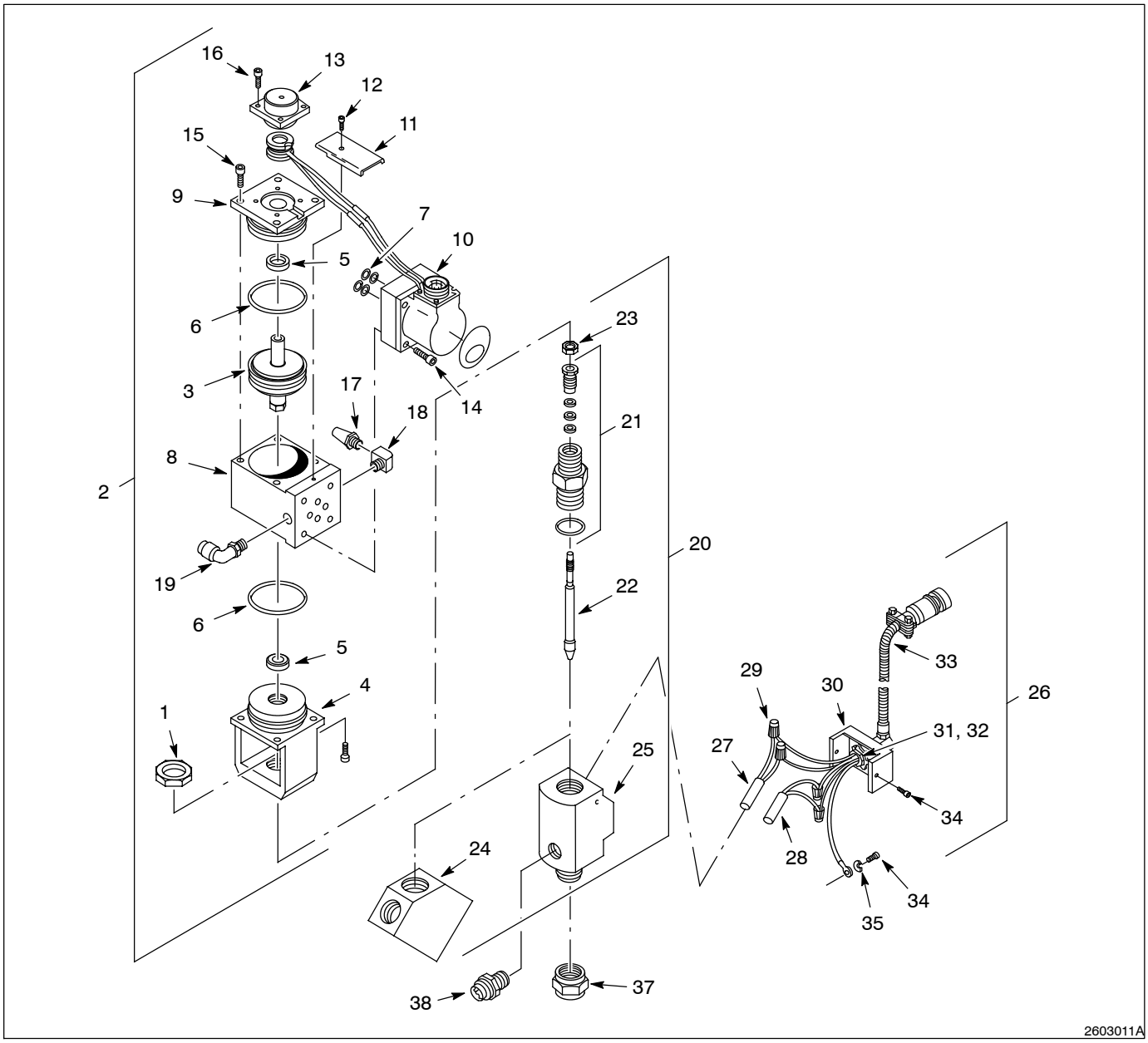


Fig. 10 Pro-Flo system Hi-Flo dispensing gun

Pressure Transducer Parts List

Item	Part	Description
NS	324 224	Transducer, pressure, 500 psi
NS	100 305	Transducer, pressure, 1000 psi
NS	324 216	Transducer, pressure, 2000 psi
NS: Not Shown		

9. Specifications

Dimensions

See Figure 2.

Weight

Extrude: 5.10 lbs (2.31 kg)

Co-extrude: 5.30 lbs (2.40 kg)

Heated extrude: 5.50 lbs (2.49 kg)

Air Pressure

Operating: 70–120 psi (4.83–8.38 bar)

Maximum airflow: 0.8 scfm (0.023 m^3/min)

Ambient air temperature: 40–160 °F (4–71 °C)

Fluid Pressure Rating, Static

Maximum of 3000 psi (206.90 bar)

Maximum Operating Temperature of Material

Extrude, co-extrude: 120 °F (48 °C)

Heated extrude: 300 °F (149 °C)

Material Viscosity Range

10,000-3,000,000 cps

Flow Range

0-350 lbs/hr (0-158 kg/hr)